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EDITORIAL INDEX—PAGE 161 BUYERS' DIRECTORY—PAGE 143 ADVERTISING INDEX—PAGE 162

9157

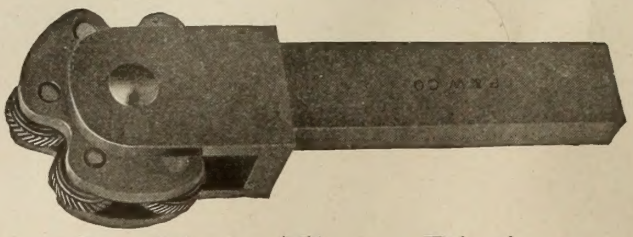
CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 1. Publication Office: Toronto, January 2, 1919 Subscription Price $3.00 per Year

SMALL TOOLS

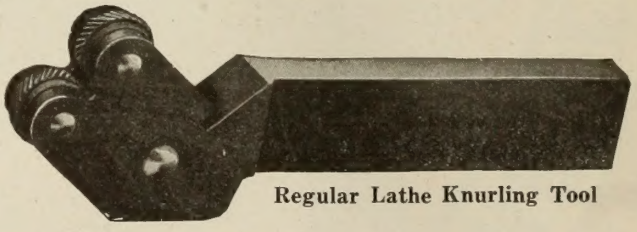
P. & W. Combination Lathe Knurling Tool



Combines Three Distinct Knurling Tools in One

You will save time by using this three-in-one Lathe Knurling Tool. It carries three pitches of knurls, fine, medium and coarse, as shown in sample. This does away with necessity of having three holders or of changing knurls where but one holder is available. Same knurls can be used in this holder as are used in our regular Lathe Knurling Tool.

Fine Medium Coarse



Regular Lathe Knurling Tool

PROMPT SERVICE

is assured at our nearest store where P. W. Small Tools are carried in stock. Place your order there to-day.

Precision Machine Tool—Standards & Gauges

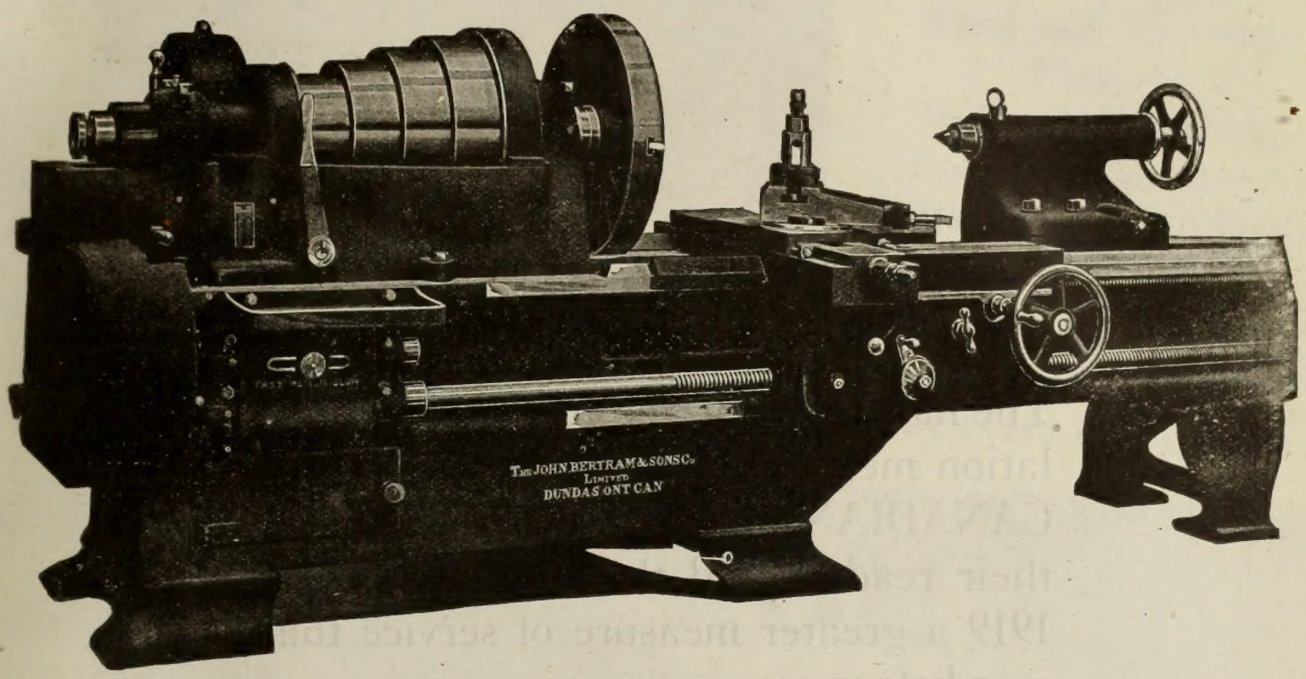
PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe

26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons Co., Limited

MISCELLANEOUS DEPARTMENT

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

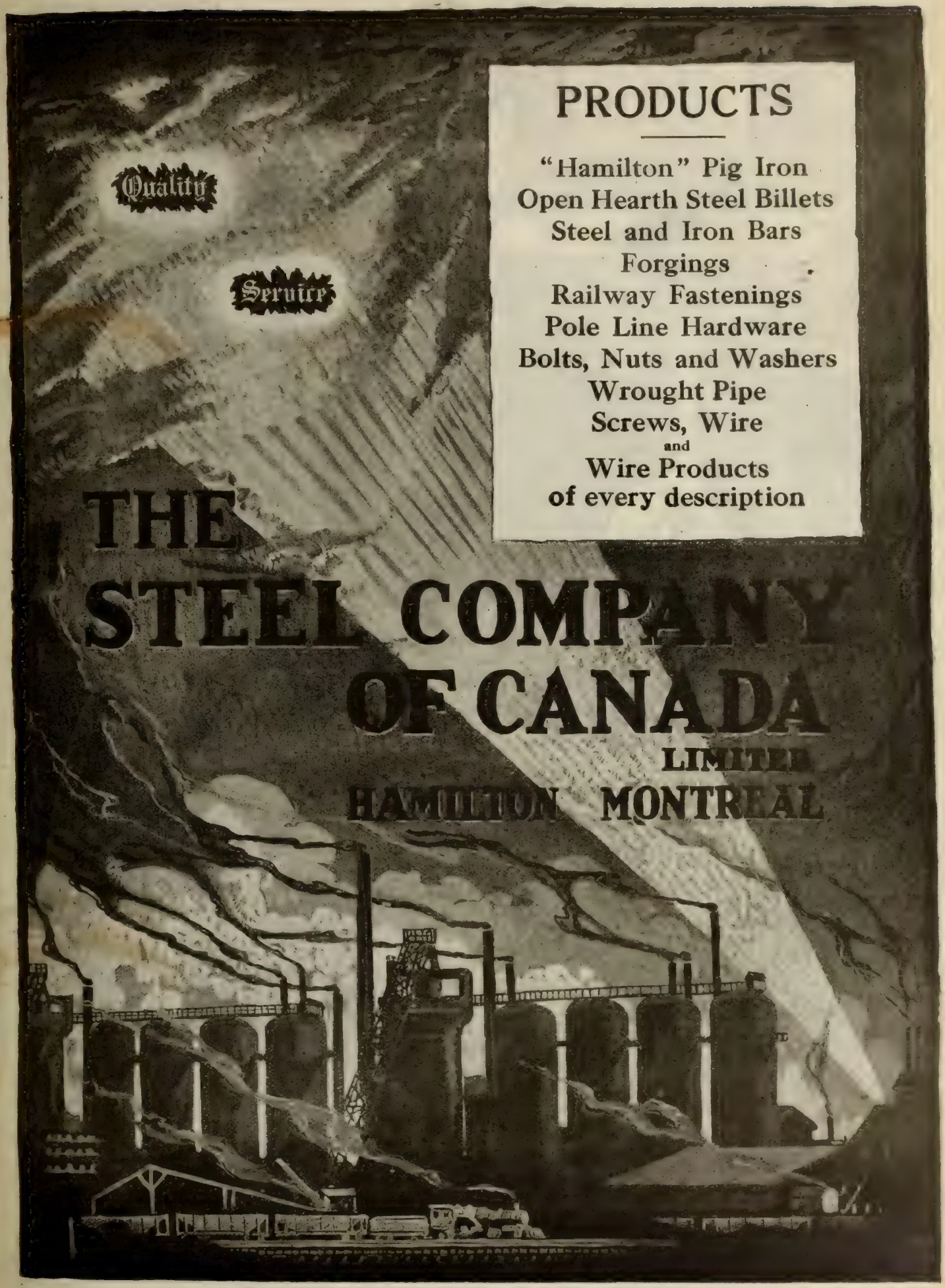
TORONTO JANUARY 2, 1919

Happy New Year!

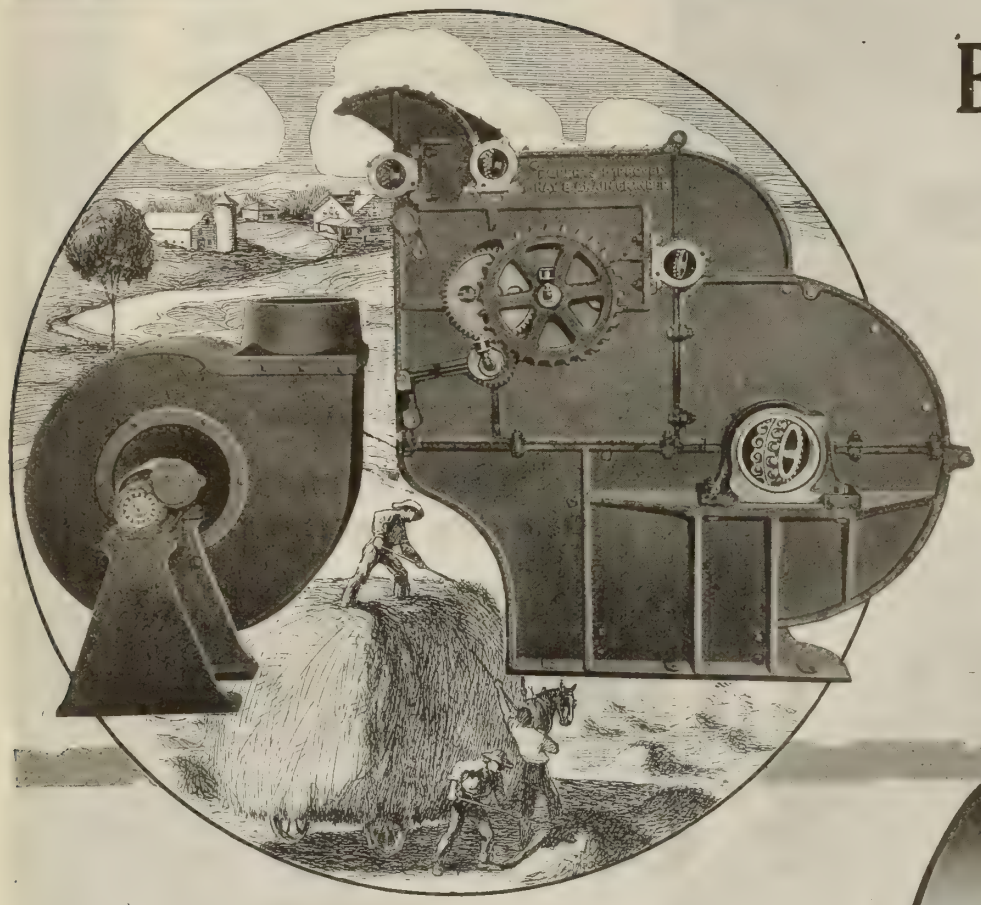
The management, the editors, the circulation men and the advertising staff of CANADIAN MACHINERY promise their readers and their advertisers for 1919 a greater measure of service than ever before.

Your co-operation and good-will in the past have been appreciated. Your help in the days to come will be most welcome.

A happy and prosperous New Year to you all!

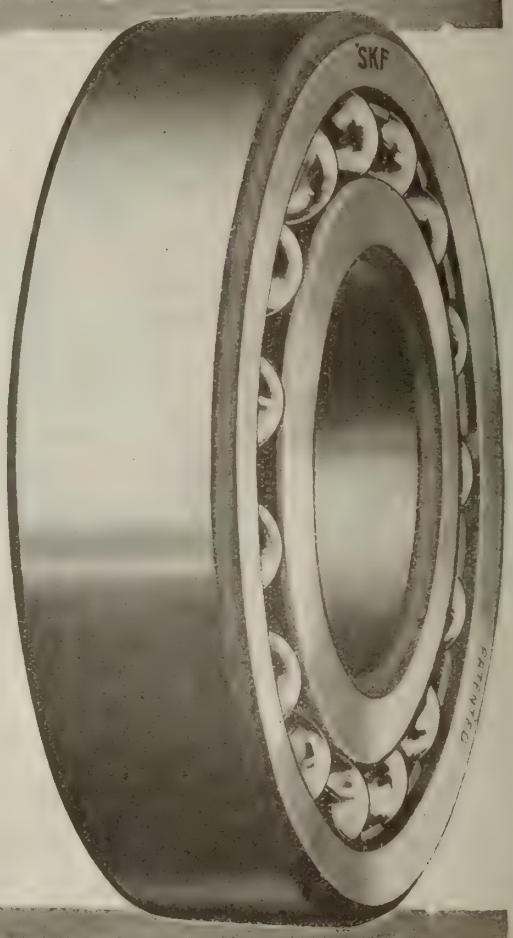

Quality
Service
PRODUCTS
"Hamilton" Pig Iron
Open Hearth Steel Billets
Steel and Iron Bars
Forgings
Railway Fastenings
Pole Line Hardware
Bolts, Nuts and Washers
Wrought Pipe
Screws, Wire
and
Wire Products
of every description
THE
STEEL COMPANY
OF CANADA
LIMITED
HAMILTON MONTREAL

S K F



Ball Bearing Equipped Farm Machinery

Roberts Forage Hay and Grain Grinder equipped with S K F Ball Bearings



S K F Ball Bearing equipped farm machinery is free from adjustment and continual oiling or other attention. The farmer need never worry about bearings heating or grit or dirt entering the bearings. Because of the exclusive advantages of S K F Ball Bearings they are becoming the standard for all types of farm machinery, regardless of their initial cost.

Canadian SKF Co., Limited

Toronto, Ontario

412 St. James St. W., Montreal, Que.

WILT

Every Wilt Drill is Thoroughly and Scientifically Inspected Before it is Delivered to You

Every WILT HIGH-SPEED AND CARBON TWIST DRILL is made from the very best materials by highly skilled workmen—THEN they are thoroughly and scientifically inspected after each operation.

This is the best GUARANTEE you can have that the drill delivered to you is as near perfect as it is possible to make a drill. In handling WILT DRILLS you are therefore fully protected and can guarantee to your customer that in selling him a WILT DRILL you are giving him

THE BEST THAT MONEY CAN BUY

WILT HIGH-SPEED AND CARBON TWIST DRILLS are being used in the majority of the largest plants in Canada —and to a large extent **EXCLUSIVELY.**

IT WILL PAY YOU TO BUY AND SELL THEM.

"WHERE THERE'S A WILT —THERE'S THE WAY."

WILT TWIST DRILL CO.
OF CANADA, LIMITED

Walkerville - - - Ontario

London Office Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E. C. 2, England

HIGH SPEED AND CARBON TWIST DRILLS

Drills for Heavier Feeds and Greater Speeds

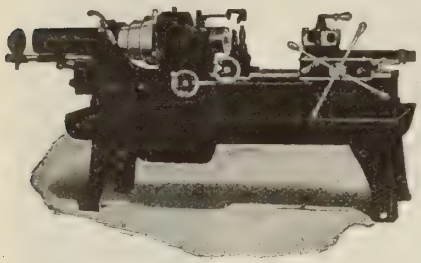
Rich Drills stand heavier feeds and greater speeds than ordinary drills. They are FORGED, not milled, and the solid bar of the best grade of steel is used—therein lies the secret of their superiority. The same quality are seen in RICH Reamers, Track Bits, Flat Drills, Drill and Reamer Chucks and Rivet Sets.

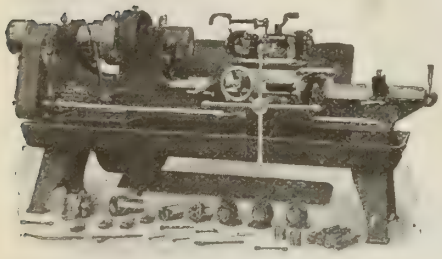
Use RICH products for better and more economical results.

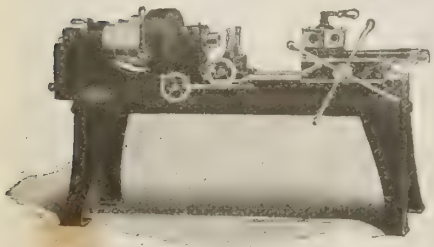
MACHINERY AND SUPPLIES — We have the facilities for adequately equipping all kinds of factories and mills. Modern ideas — quick service.

Standard Machinery & Supplies, Limited
261 Notre Dame St., Montreal
Western Representative: Wm. W. Hicks, 567 Banning Street, Winnipeg

Machinery Machine Tools and Mill Supplies


2¼" x 11" Screw Machine.


2¼" x 26" Flat Turret Lathe with Bar Equipment.


18" Turret Lathe.

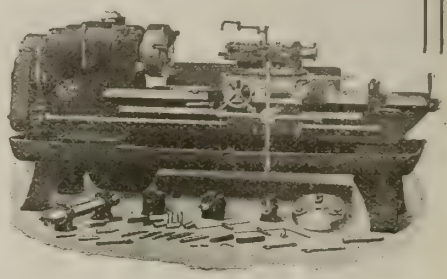
CINCINNATI Acme

Wherever Cincinnati Acme Machine Tools are in operation you'll always find the user ready to put in a good word for them—because their highly efficient service stamps them as machines of unusual merit.

Brass Working Machines Universal Turret Lathes

Flat Turret Lathes Screw Machines Turret Lathes and All Tool Accessories

When you purchase a Cincinnati Acme you are getting a tool with a well established reputation for quality, accuracy and production.


Universal Flat Turret Lathe with Chucking Equipment.

The Acme Machine Tool Co.
Cincinnati, Ohio

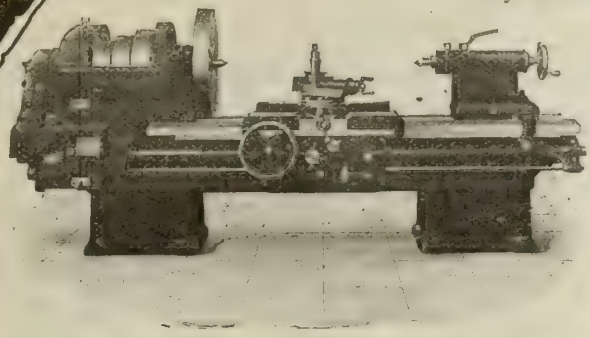
SIDNEY

For SERVICE

Heavy Duty Lathes

The 25-inch Heavy Duty Quick Change Sidney shown below is the last word in lathe construction. Every possible improvement will be found in this late model. Bed lengths available are 10, 12, 14, 16, 18 and 20 feet. Also built with a 27-inch swing.

Easy Masters of Big Jobs



Regardless of the severity of work, dependence put on Sidney Lathes has never been misplaced. The Sidney line has made good—with a vengeance. New Bulletins just issued on 25-inch machine. Write to-day!

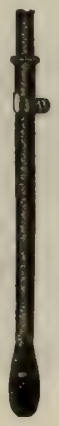
The Sidney Tool Company

SIDNEY, OHIO

CANADIAN AGENTS:

The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

Every Emery Wheel With Its Own Dresser



Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"**—the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

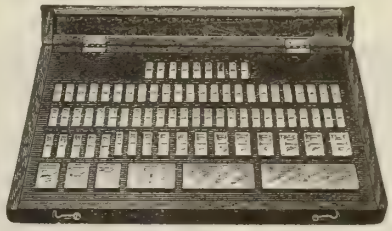
The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company

HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

Guaranteed Accuracy .00001"



JOHANSSON GAGE BLOCKS

These Gages are the standard with such organizations as Imperial Munitions Board, Canada Cement Company, Willys-Overland Company, Dominion Arsenal, Dominion Cartridge Company, The Turnbull Elevator Mfg. Co., Holden-Morgan Co., and Brown Engineering Corp.

Any one of thousands and thousands of measurements to .0001" can be made up by any shop man in a few moments.

They take the place of less accurate tools both for producing work and checking its accuracy. One use nowadays is to set and check Johansson Adjustable Snap Gages in those shops that have taken advantage of the Limit System.

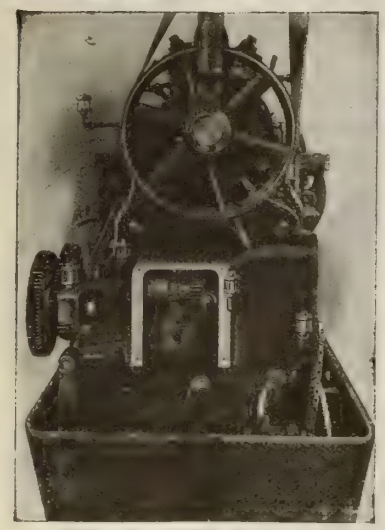
Write us for further information. Better still, let us demonstrate in your own shop.

H. E. STREETER

523 New Birks Bldg. - Montreal

Johansson Gage Blocks, Special Taps, Hobs, Reamers and Cutters; Bench Lathes, Surface Grinders, Magnetic Chucks, Prestowich Gages, Micrometers, etc.

THE JOHNSON FRICTION CLUTCH



Courtesy National Acme Co., Cleveland, Ohio.

WATCH

is subject to exceptional hard usage, but it gives unfailing service.

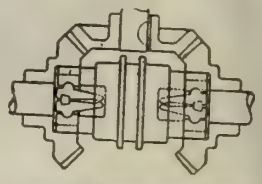
YOUR MACHINE

should be equipped with clutches that will give just such satisfaction.

What are your requirements? Let us know. We maintain an engineering force to work out all clutch installations. They will co-operate with you.

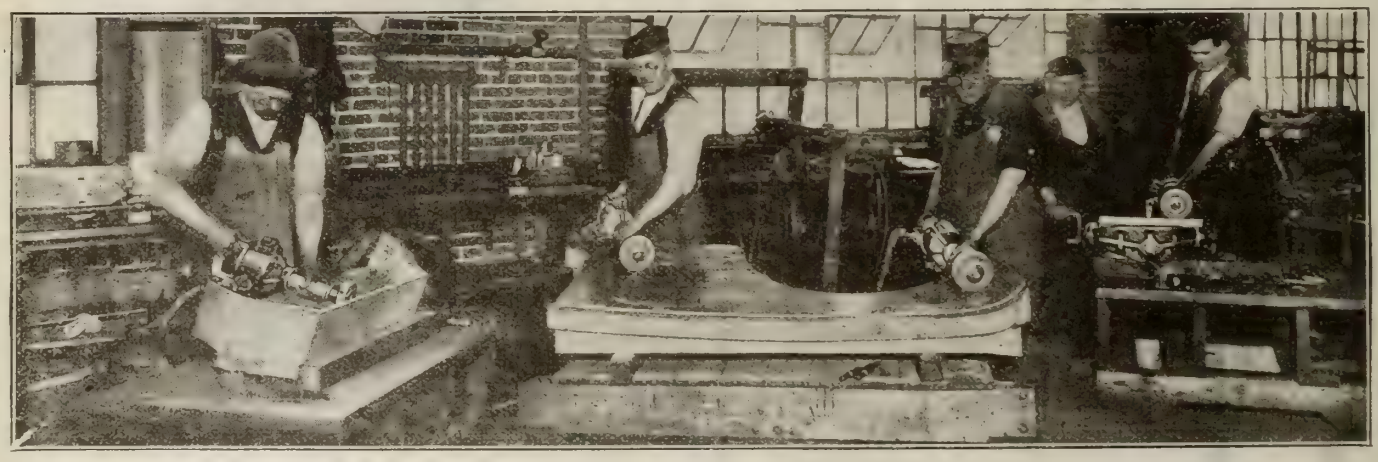
Write for our Yellow Data Sheets and Booklet, "Clutches as Applied in Machine Building"

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal; The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. I, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 10 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.



Double Clutch in Nest of Gears

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



How One Plant Uses The "LITTLE DAVID" GRINDER

CANADIAN INGERSOLL-RAND CO., LTD.

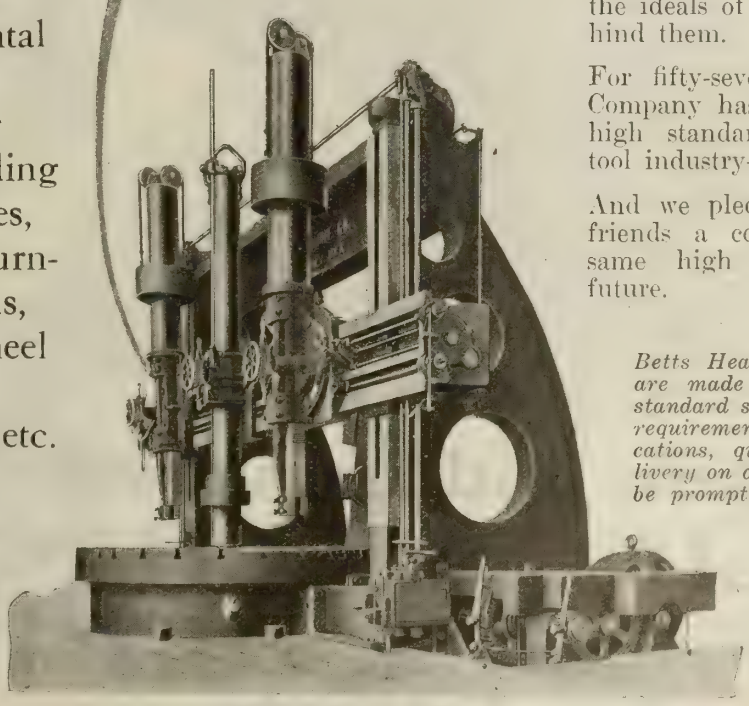
With Offices at

SYDNEY, SHERBROOKE, MONTREAL, TORONTO, COBALT, WINNIPEG, NELSON, VANCOUVER

BETTS

HEAVY BETTS DUTY

Planers, Boring and Turning Mills, Horizontal Boring, Drilling and Milling Machines, Tire Turning Mills, Car Wheel Borers, Slotters, etc.



A Symbol

In itself means nothing. What it stands for means everything.

This symbol stands for the service built into all "Betts" Tools and the ideals of the organization behind them.

For fifty-seven years, the Betts Company has maintained a very high standard in the machine tool industry—

And we pledge to our hosts of friends a continuance of these same high standards for the future.

Betts Heavy Machine Tools are made in a number of standard sizes to meet every requirement. Detailed specifications, quotations and delivery on any Betts tool, will be promptly furnished.

BETTS MACHINE CO.

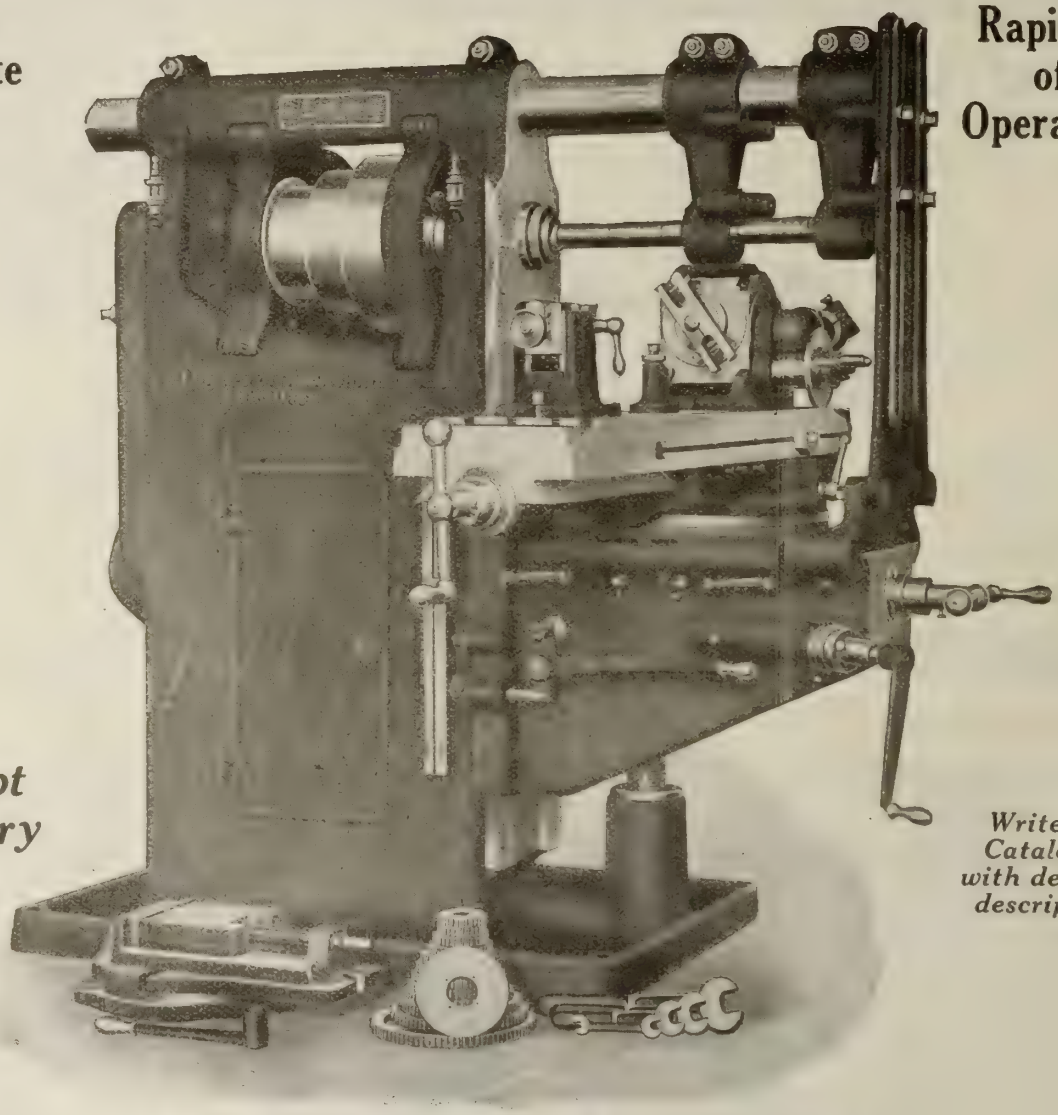
408 Blossom Rd. Rochester, N.Y.

Formerly of WILMINGTON, DEL.

FORD-SMITH

Rigid
Accurate

Rapidity
of
Operation



Prompt
Delivery

Write for
Catalogue
with detailed
description

Plain and Universal
MILLING MACHINES

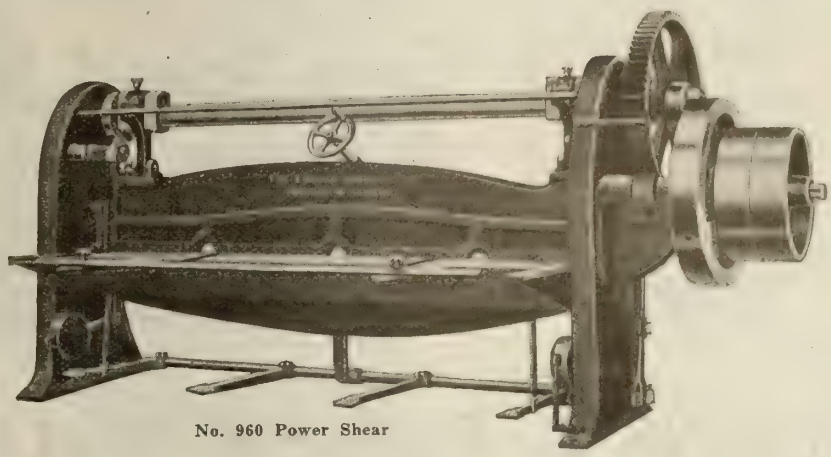
Floor Grinders (Belt and Motor Driven) **Disc Grinders, Polishers**
Water Tool Grinders

MANUFACTURED BY

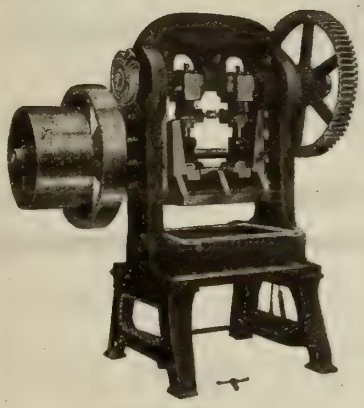
The Ford-Smith Machine Co., Limited
Hamilton, Ontario, Canada

Agent for Great Britain; W. E. Storey, 3 Arundel St., London, Eng.
Agent for United States and Foreign Countries: Alf. Herbert, Limited 54 Dey St., New York

Stood The Test



No. 960 Power Shear



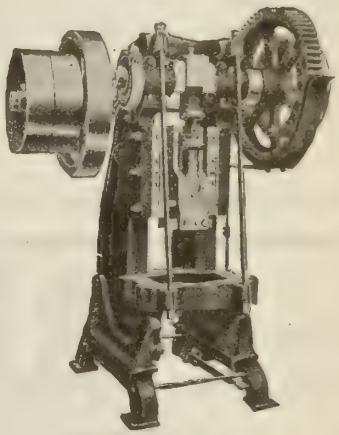
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

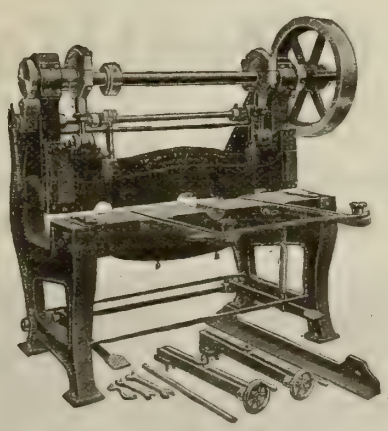
Inexperienced help and 24 hours daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

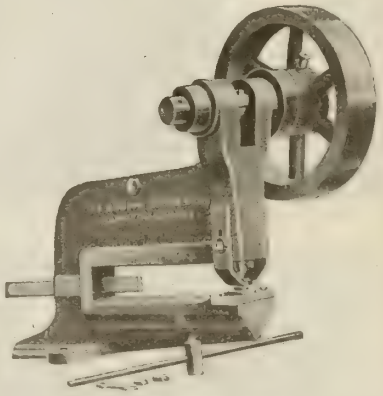
Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press



No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

If any advertisement interests you, tear it out now and place with letters to be answered.

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

GEO. A. MARSHALL & CO.

1118 Queen Street West, Toronto, Ontario

Phone Park. 250

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:
703 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

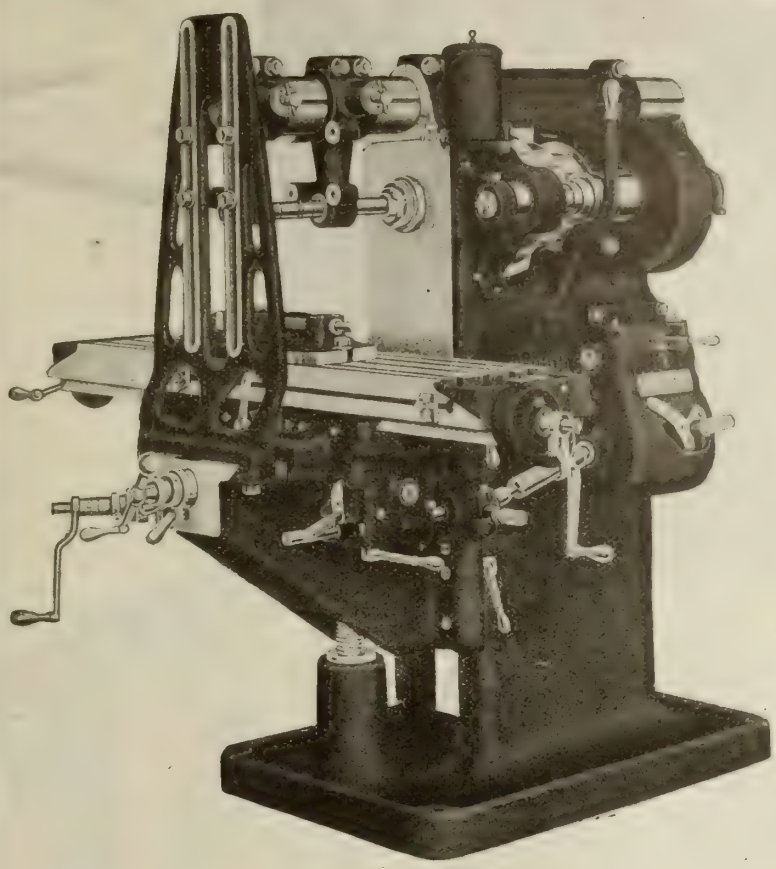
The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager



LeBLOND
Heavy Duty Milling Machines

Plain or Universal Types—Cone or Gear Drive. All commercial sizes No. 0 to No. 5.

Adapted for the Heaviest Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

Patent Self-Aligning Arbor Supports—

Hardened Steel Spindle Bearings—

Double-Friction Back Gears—and the simplest type of right-hand control, contribute to an increased production and longer life as a precision machine.

The R. K. LeBlond Machine Tool Company

CINCINNATI, OHIO, U.S.A.

Canadian Agents:

THE A. R. WILLIAMS MACHINERY CO., LIMITED
St. John, N.B. Montreal, P.Q. Toronto, Ont.
Winnipeg, Man. Vancouver, B.C.

THE ST. LAWRENCE WELDING COMPANY, LIMITED
MONTREAL, P.Q.

A. M. BARRY, Mgr.

Office and Works:
138-140 Inspector Street
Telephone: Office
Main 5779

Maritime Branch:
HALIFAX, N.S.

CONSULTING ENGINEERS on all kinds of welding. Breakdown repairs handled at once, just 'phone us and we will be on the job by next train.

OXY-ACETYLENE WELDING of heavy cast iron frames, cylinders, gears, water wheels, etc.

STEEL, any kind of welding on parts of large or small machines, tanks, digesters, boilers, shafts, brackets, etc.

Can be welded in place when necessary.

ELECTRIC WELDING on boilers, digesters, leaking tanks, etc.

MARINE REPAIRS undertaken by our Marine Welding Tug which is equipped with Electric and Oxy-Acetylene Welding Apparatus with Compressed Air Plant complete.

OXY-ACETYLENE CUTTING of any kind of steel construction.

PORTABLE WELDING APPARATUS of all kinds with trained operators always available to repair your breakdown at once.

THERMIT WELDING on all classes of work is a special feature of present activities.

Manufacturers of Steel Tanks, Air Receivers, Welded Tanks, etc.; Electric Welders, Oxy-Acetylene Welders, Boiler Repairs, Lead Burning and Thermit Welding.

If You Need a POWER HAMMER

of uncommon strength throughout — a hammer constructed to deliver work of surpassing quality in great quantity, and to keep everlastingly at it—

You Need Jardine's

Note a few particulars:

Hammer slide is a steel casting; so is the ram, and connecting bolts for the ram are machined from solid steel bar.

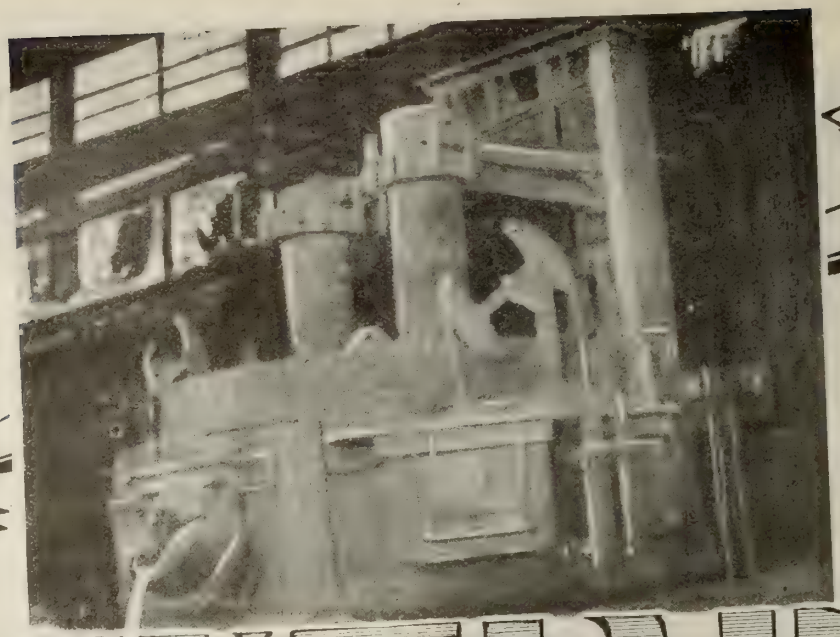
Hammer and anvil dies of properly tempered, highest grade tool steel are held in machine seats by tapered keys in the ram and anvil block, so there's no need to put taper on the dies.

Jardine's Canadian Giant Power Hammer has never failed.

Write for Catalog

A. B. JARDINE & CO.
Limited
Hespeler, Ont., Canada

If interested tear out this page and place with letters to be answered.



ELECTRITE

High Speed Steel

SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art: Electric Furnaces—entirely infallible, automatically regulated, delivering the same result time after time.

Uranium—this rare element, cousin to Radium, effects a profound change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.
LATROBE, PENN.

URANIUM

STELLITE

"Not Steel, but its Master"

It has been claimed that Stellite is not suitable for finish turning shafting.

An excellent finish can be obtained and your production greatly increased if our instructions are followed. Stellite ground in the same way as tool steel will not produce results.

CONSULT OUR SERVICE DEPARTMENT

A Record of Performance

Work—Open-hearth Steel Shafting.

Machine—Shaft-turning Lathe.

Tool—2 x 5/8 x 4 inch Stellite No. 2.

Surface Speed—97 feet, per min.

Depth of cut—1/32 inch.

Feed—3 feet per minute.

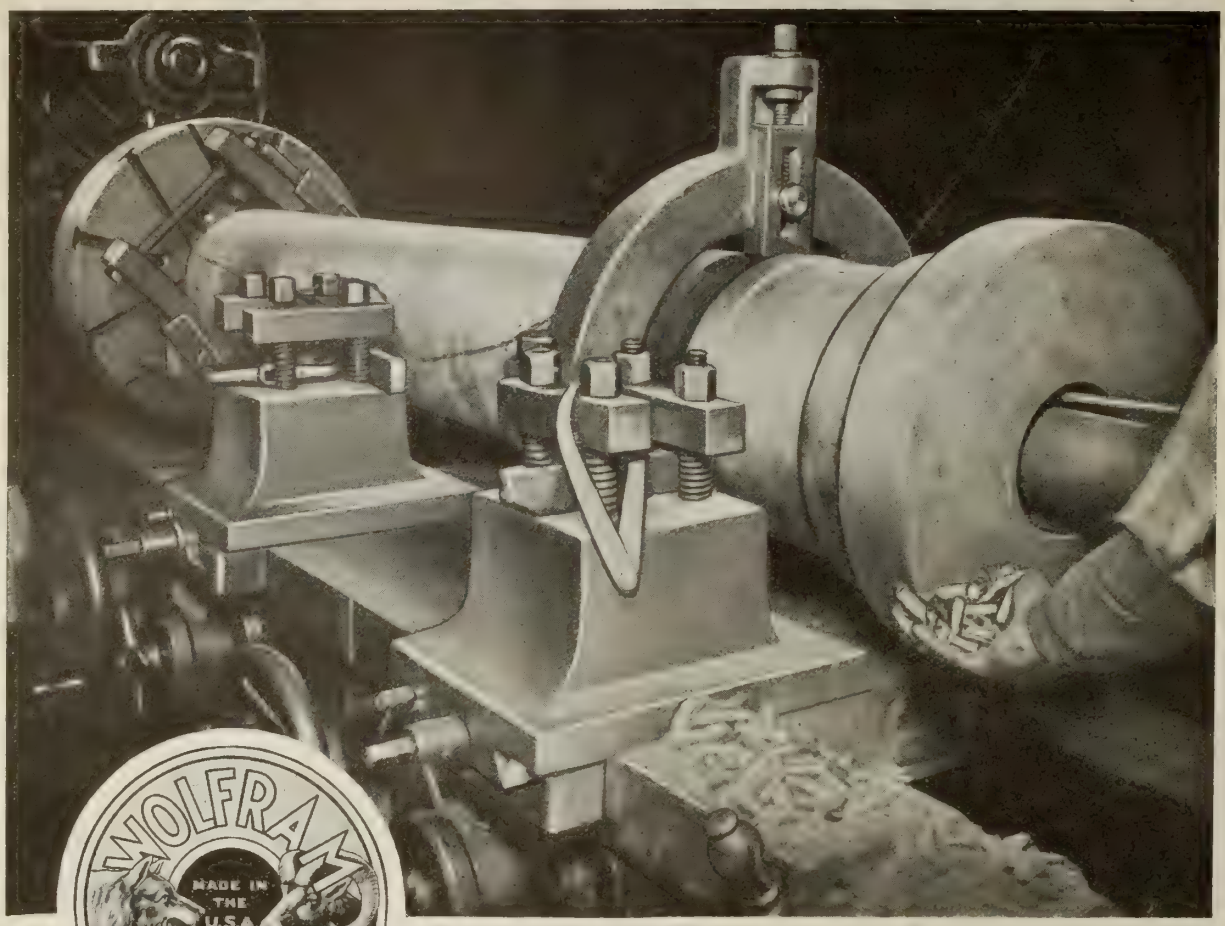
Production—Six 30-foot shafts turned to 0.001 inch limit with one grind.

Deloro Smelting and Refining Co.
Limited

DELORO, ONTARIO

Toronto
200 King St. W.

Montreal
315 Craig St. W.



WOLFRAM

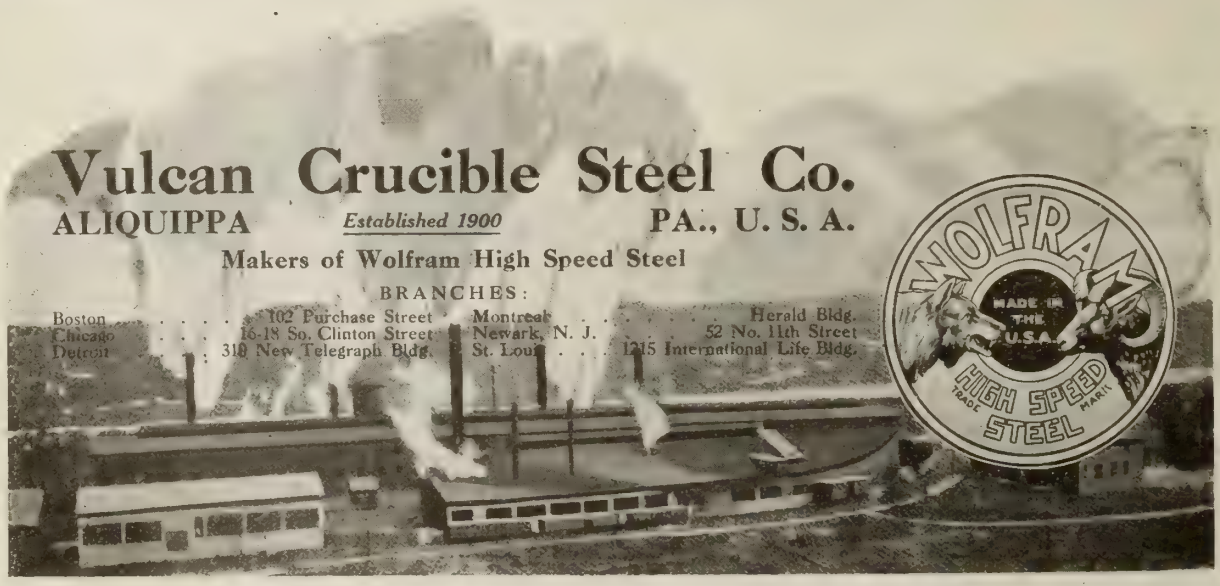
HIGH SPEED STEEL TOOLS FOR THIS JOB

"Wolfram" is the answer to your tool steel problems — and it is ready for immediate delivery.

Boring 9⅝" diam., hole 7 ft. deep in 50 Point Carbon Steel.

Tool fed in 7/32" per minute. Speed, 10 R.P.M.

Finished in 3 cuts with only 2 grindings!



CANADA
FOUNDRIES & FORGINGS
LIMITED

Producers and Distributors

TOOL HANDLES

Made from Canadian Hardwoods

Quantity Business Preferred

Special service given export inquiries

JAS. SMART PLANT

Brockville, Ont.

Swedish Steel & Importing Co., Limited

Montreal
New York

Toronto
Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK
SS
DOUBLE ESS

PROMPT SHIPMENTS
from large stock

Forging Billets and Bars
Electric Furnace
Alloy Steels
Die Blocks
Annealed
Piston Rods Rough Turned
Annealed
Blue Ribbon
High Speed Steel

General Steel Company
Milwaukee, Wisconsin
DETROIT - 823 Dime Bank Building

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"RedCut Superior"

The Nationally Known FIRST QUALITY

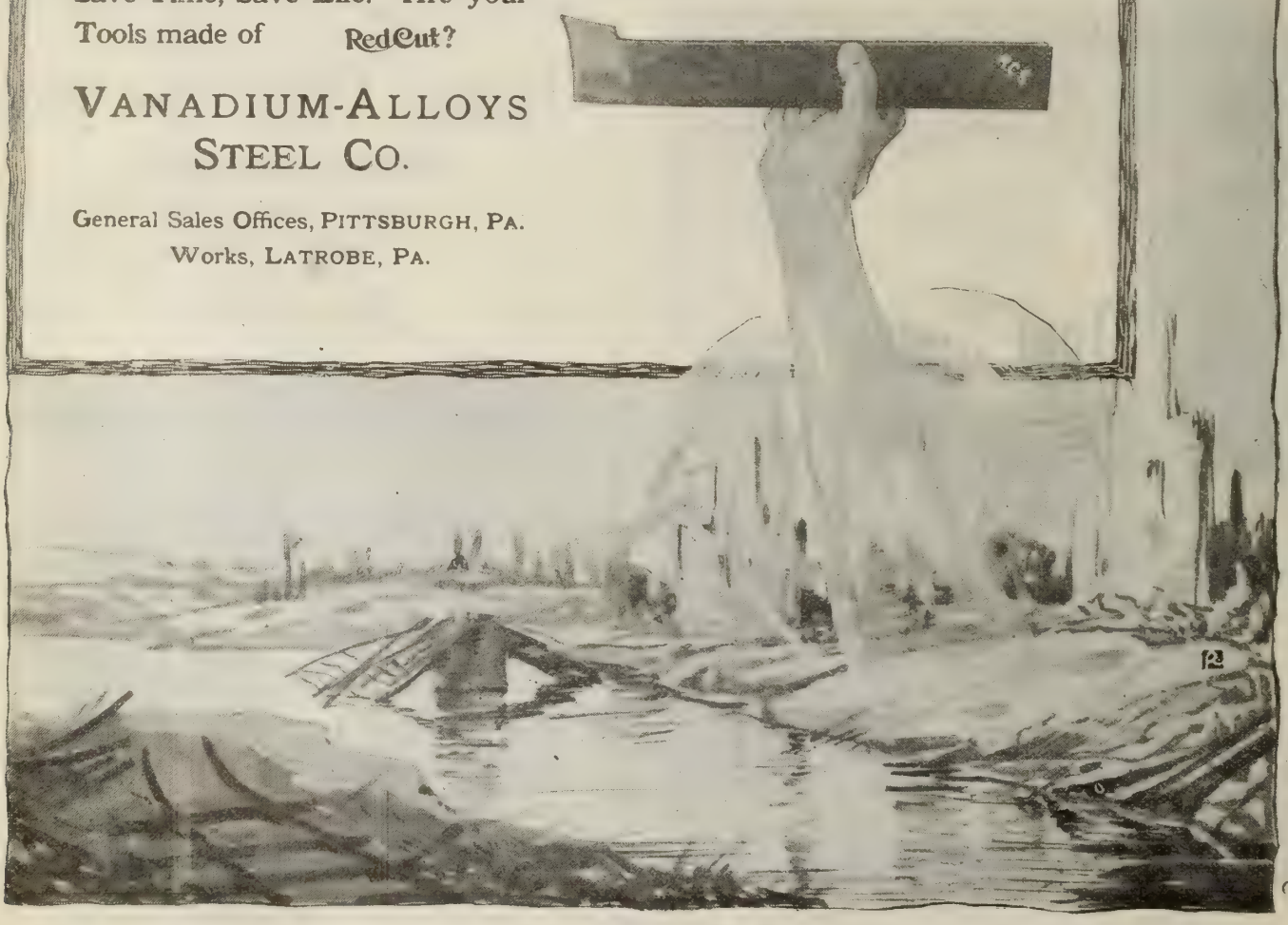
HIGH SPEED STEEL

Is the Avowed Enemy of Waste and Inefficiency, and is Allied with Life

Save Time, Save Life. Are your Tools made of RedCut?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.



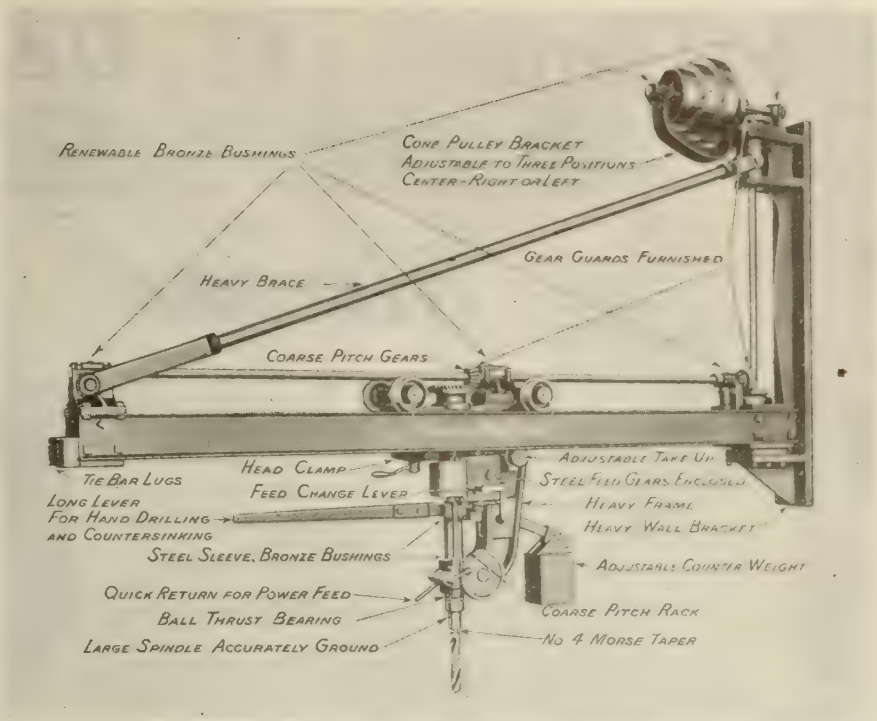
Here's a Drill You will Like

The Lynd-Farquhar Wall Radial Drilling Machine is a real machine tool, carefully designed and made from the best material. The entire control of the drill is within easy reach of the operator. The arm is constructed of extra heavy channels and is supported from the outer end of the top of the wall bracket by heavy steel brace bars. The head is exceedingly rigid. It is mounted on four flanged wheels, fitted with roller bearings, and moves with extreme ease from end to end of the arm.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.

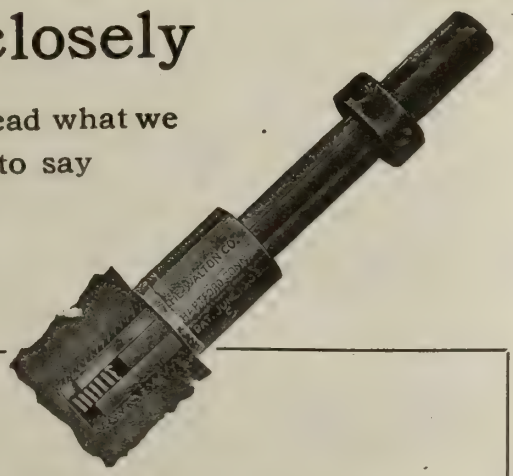


LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**

Look at this again —closely

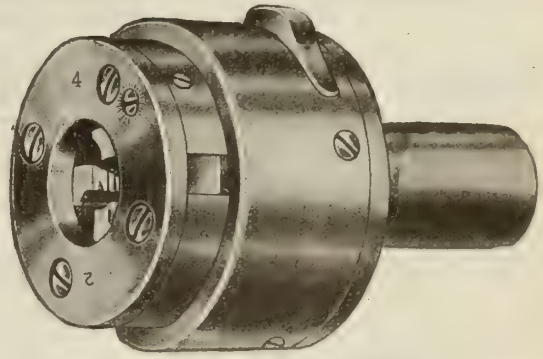
and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company

Hartford, Conn.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

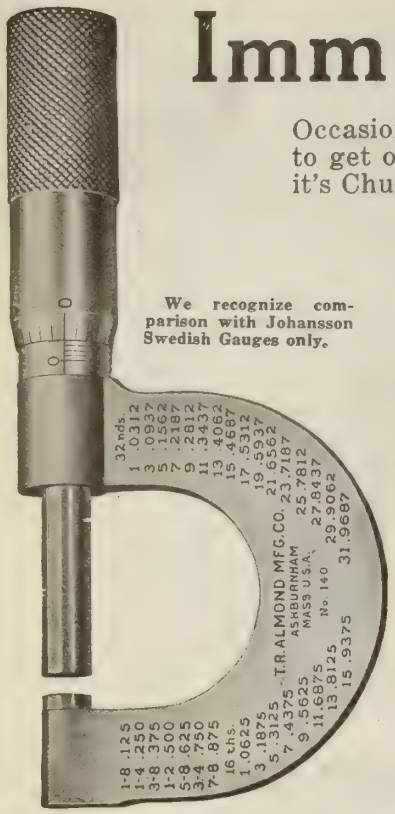
Ask for Catalog

Eastern Machine Screw Corp.

New Haven, Conn., U.S.A.

Immediate Deliveries!

Occasions frequently arise now which make it necessary for you to get order for tools delivered to you with exceptional speed. If it's Chucks or Micrometers you require, specify—



We recognize comparison with Johansson Swedish Gauges only.

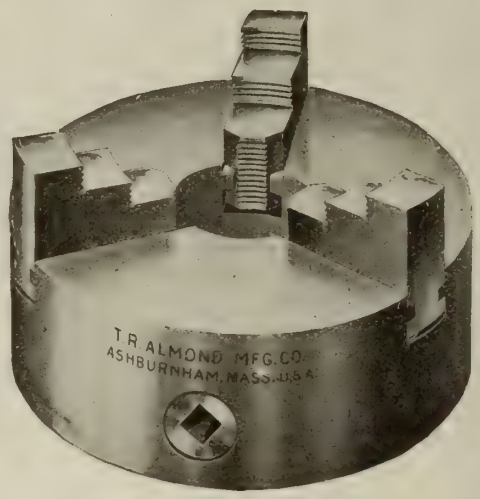
Almond

We are in a position to fill your wants for Micrometers, Drill Chucks (all sizes) and Lathe Chucks of the smaller sizes, 5", 6", 7½" and 9".

ALMOND CHUCKS are powerful, accurate and durable and cost less to operate.

ALMOND MICROMETERS — **Recognize Comparison with Johansson Swedish Gauges Only.**

Made in English measurements, 1", 2" and 3", by thousandths and ten thousandths; metric measurements 25 mm., 50-mm. and 75-mm. by 1/100-mm.



Pleased to send you full information about these quality Tools.

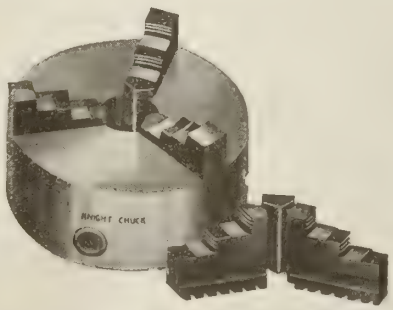
T. R. Almond Manufacturing Co. 5 MAPLE AVENUE **Ashburnham, Mass.**

"Knight" Scroll Chucks

The "Knight" Geared Scroll Chuck is substantially constructed by expert workmen, using high-grade materials, and is guaranteed to be commercially, mechanically perfect.

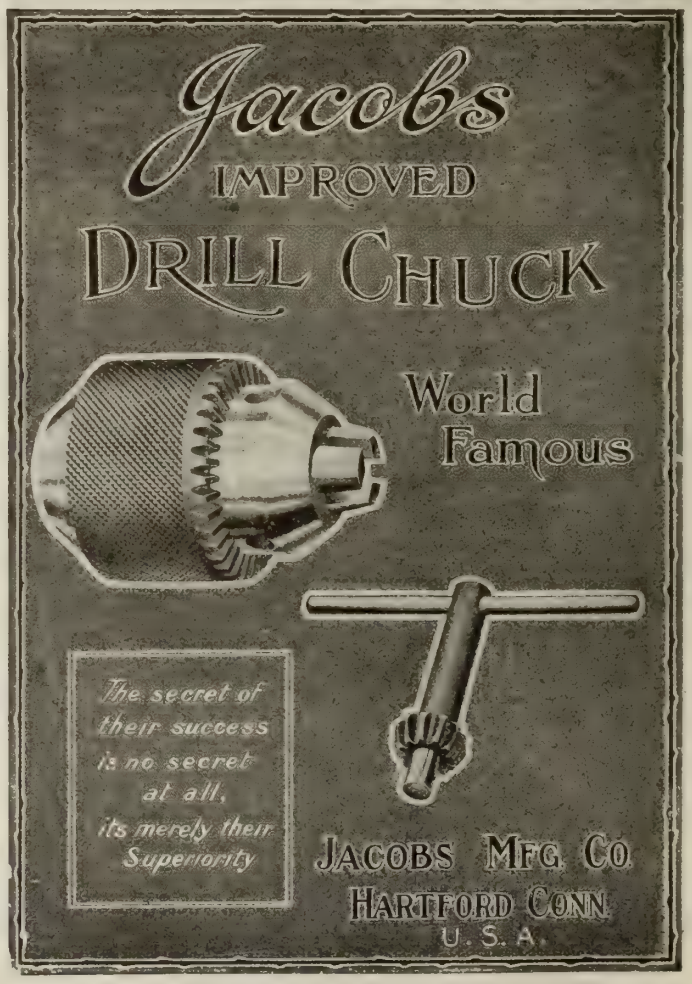
Sizes from 4 inch to 10½ inch.

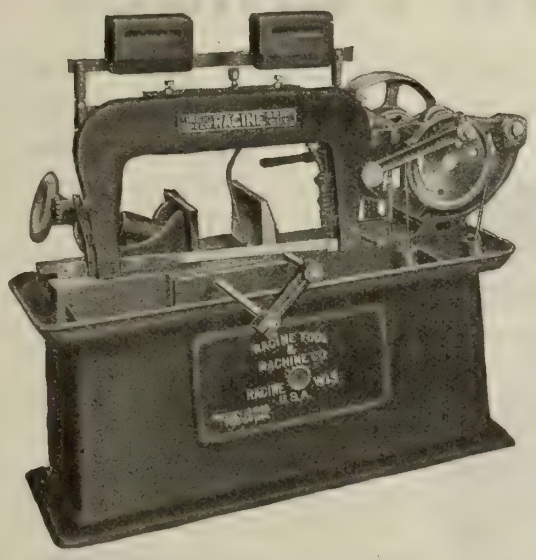
Domestic and Export Trade Supplied.



Knight Metal Products, Limited

119 Adelaide St. W. - TORONTO, ONT.





Use "RACINE" H. S. Tungsten Power Blades

Standard
the World Over

Only on the draw stroke does the blade of this

"RACINE"

High Speed Metal Cutting Machine

come in contact with the metal—then

How It Cuts---
Deep and Quick

Machine is of substantial construction, designed for accuracy, for speed, for long service of both machine and blade.

The "Racine" is the only machine that duplicates every cut exactly. It has no equal for quantity of accurate work done in a day, in a year, in a lifetime.

Proof for the asking.

Racine Tool & Machine Company

Melbourne Ave., Racine, Wis., U.S.A.

One of 120

A Fuel Saver!

Bellevue Furnaces heat up rapidly and hold heat long after burners are shut off. This results in great fuel economy. In view of high cost of fuel your shop urgently needs

BELLEVUE

Heat Treating Furnaces

For heating, case-hardening and annealing. Perfected combustion precludes the formation of oxidizing elements. The flame, not visible in the muffle, does not come in contact with the material.

Scalding is practically eliminated where **Bellevue Furnaces** are in use.

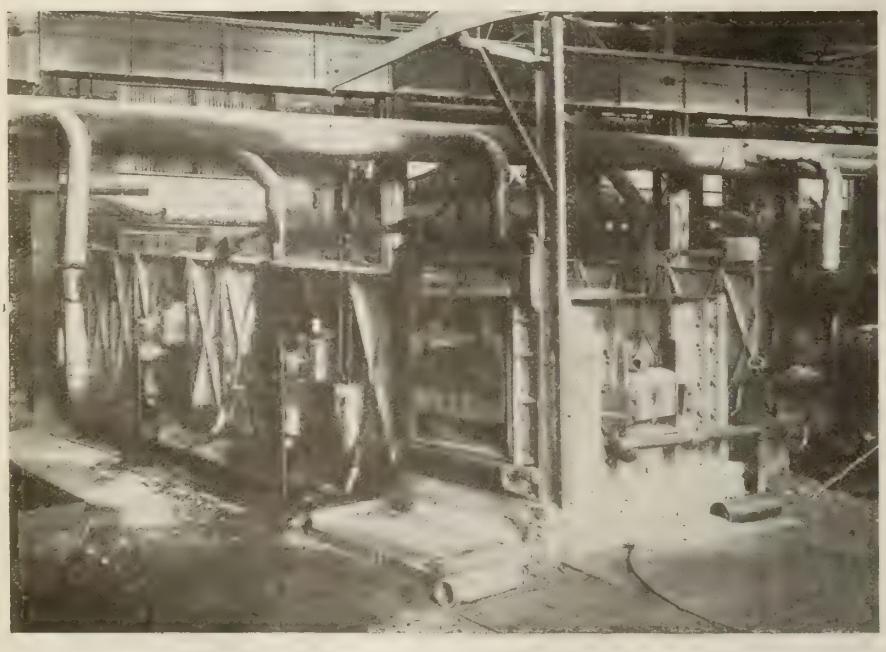
Write for catalog of full line. Enquiries promptly attended to.

Representatives in Canada:
H. W. Petrie, Limited, Toronto, Canada

Bellevue Industrial Furnace Co.
703 Bellevue Ave. - Detroit, Mich.
JULIUS C. HINZ, Pres.

Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



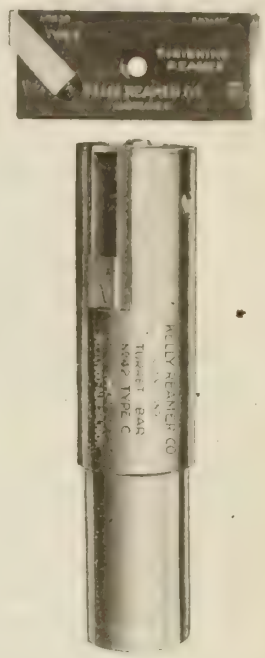
Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering
Company, Limited
Three Rivers, Quebec, Canada

Kelly Multiple Rigid with front or rear pilots. Multiple operation tools increase output and produce perfect work.

Kelly cylinder tools are made to machine any type and size cylinder. Adjustable to keep accurate size and finish.



Kelly Floating Reamers and Bars with or without pilots for all makes of turret lathes. Sizes from 1" to 12". Each reamer has ¼" adjustment.

KELLY HIGH SPEED TOOLS FOR NEW PRODUCTION

The greatest factories in the world use Kelly Production Tools and Kelly Adjustable Floating Reamer and have increased their output—some as much 500%. Every plant has some operation that Kelly Tools can improve. Send us your blue print and let us design a tool for the job and save you time and money. All tools have adjustable high-speed steel blades.

Kelly Production Tools perform several operations at one contact with the work. Over ten years of service has shown their advantage on every variety of work such as

Engine Cylinders **Transmission Cases** **Accurate Bushings**
Gear Blanks **Auto Parts, Hubs** **Machine Parts**
Crank Cases-- Cam and Crank Bearings **Connecting Rods** **Tools, Etc.**

Catalog J4, having over 100 illustrations, sent on request

THE KELLY REAMER CO.

CLEVELAND, OHIO, U.S.A.

Burton, Griffiths & Co., Ltd., London, English Agents **Burton Fils, Paris, French Agents** **40 Domestic Agencies**

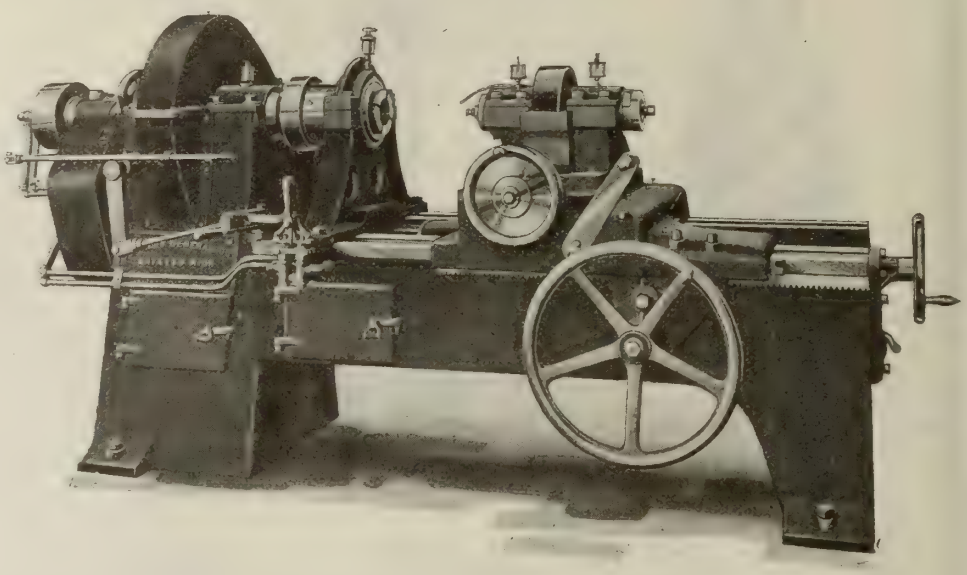
Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.



Write for Bulletin.

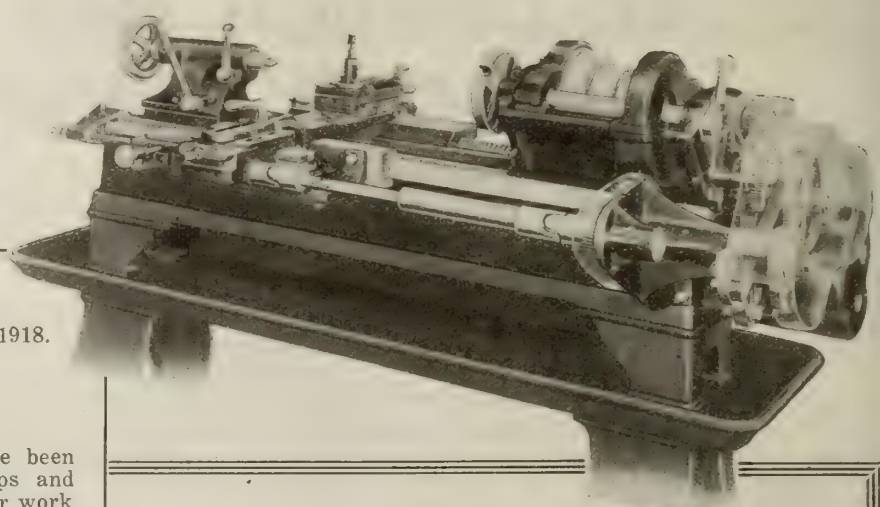
Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

No Lifting or Movement of the Work

The illustration below shows the Heald 10-in. x 32-in. Flat Magnetic Chuck on planer work. It is taking a chip 5-16 in. deep with 5-32-in. feed at 60 feet per minute table speed, with no tendency to lift or move on the chuck.

HEALD MAGNETIC CHUCKS

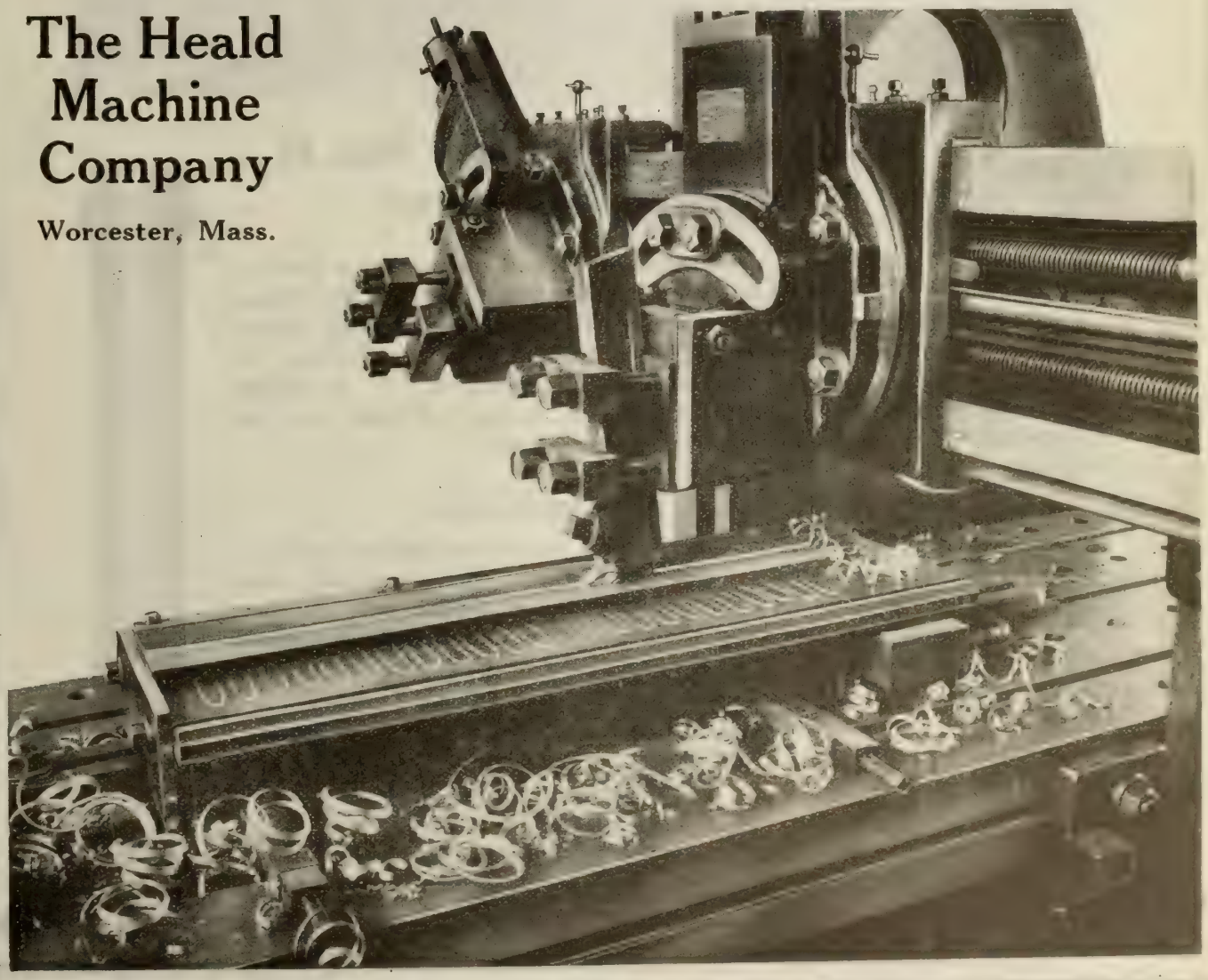
have great holding power, and consequently permit heavy cuts, coarse feeds and rapid work speeds.

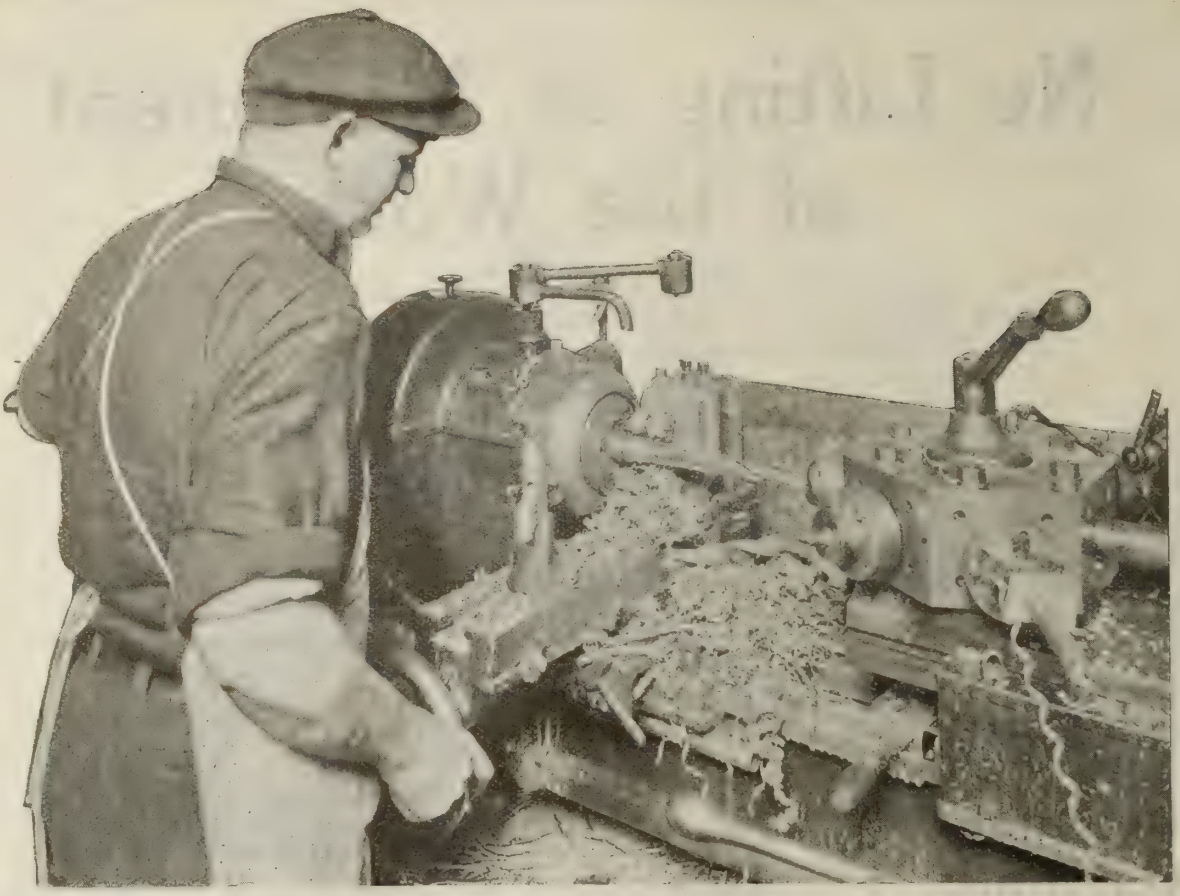
All Heald standard rectangular chucks have both ends accurately machined so they can be placed end to end for holding long work. When grouped together they can be wired so as to be controlled either separately or together.

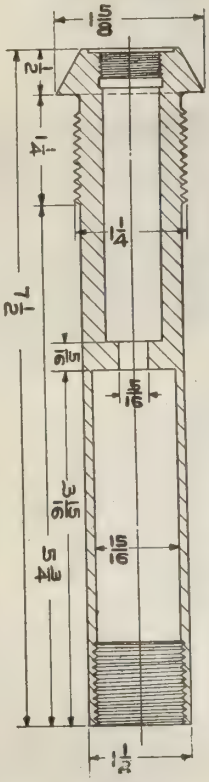
Ask your local machine dealer for bulletins and information.

The Heald Machine Company

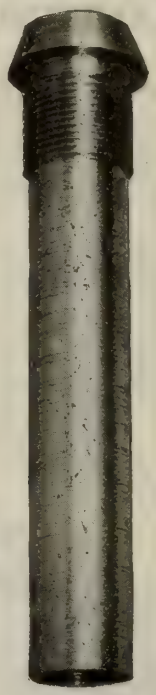
Worcester, Mass.







Warner & Swasey No. 6 Screw Machine



HERE is an example of forced output on a battery of 40 Warner & Swasey No. 6 Screw Machines. (This picture shows one of them) machining detonators—one every 2½ minutes, and the battery in operation day and night. The stock is 1⅞", is drilled 15-16" for a depth of 3 15-16", turned all over, and cut off, ready for the second operation.

Best for Detonators

Piece work is considered best by a great many manufacturers on straight run work of this sort, especially when under penalties for delivery delays. And only the best machines can hold their accuracy under such continuous operation.

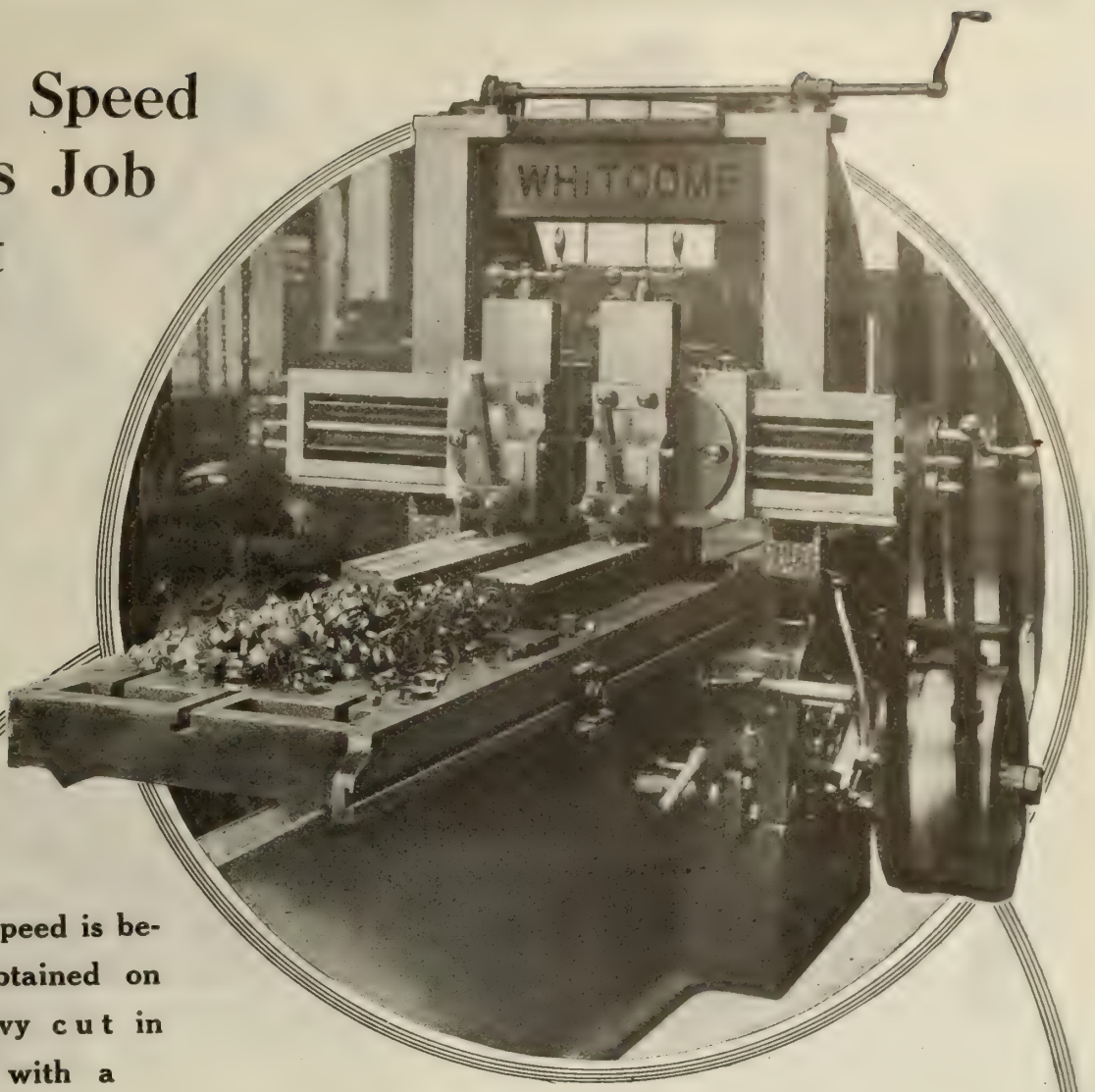
For unusual demands such as this, and for absolute certainty, in making delivery promises, specify Warner & Swasey Turret Lathes and Screw Machines.

THE WARNER & SWASEY COMPANY
CLEVELAND, OHIO

New York Office—Singer Building. **Boston Office**—Oliver Building. **Buffalo Office**—Iroquois Building.
Detroit Office—Ford Building. **Chicago Office and Show Rooms**—618-622 Washington Blvd.

FOREIGN AGENTS—Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Allied Machinery Company, Paris and Turin. Van Rietschoten & Houwens, Rotterdam. Yamatake & Co., Tokio. Benson Brothers, Sydney and Melbourne. A. Asher Smith, Sydney. A. R. Williams Machinery Co., Ltd., Toronto, St. John, Winnipeg and Vancouver. Williams & Wilson, Ltd., Montreal.

Cutting Speed on This Job 70 Feet Per Minute



That speed is being obtained on a heavy cut in steel, with a

Whitcomb-Blaisdell Planer

The Planer with the Second-Belt Drive

The smooth, easy action and rapid, yet gentle, reverse required for such rapid cutting rates is secured by the distinctive table drive of the Whitcomb-Blaisdell Planer.

There are many other Whitcomb-Blaisdell Planers operating at similar high speeds in steel. In numerous cases they are planing brass, copper and other soft materials at one hundred feet per minute.

The Second-Belt Drive—using a belt and pulley to convey power from the pulley shaft to the drive-pinion shaft—eliminates the usual bull wheel and the rapid running train of gears.

On the Whitcomb-Blaisdell Planer, the table is given a smooth, quiet, yet powerful drive. At the end of the stroke the belt transmission acts with a cushion effect and the planer reverses without shock or jar, yet with the utmost speed.

That is one reason why this machine attains the highest speeds without impairing the accuracy or finish of the work.

Write for Illustrated Catalog that tells all about it.
The big features of this machine will be of interest.

WHITCOMB - BLAISDELL
MACHINE TOOL CO.
WORCESTER, MASS., U.S.A.

LATHES PLANERS

If any advertisement interests you, tear it out now and place with letters to be answered.

No. 204-A
Angle Cutter Holder
No. 210—Rear Tool Holder
No. 206—Flanged Tool Holder
No. 203—Slide Tool
No. 204-B
Straight Cutter Holder
No. 204—Multiple Turning Head
No. 205-A—Pilot Bushing
THE WAR IS OVER
2-B UNIVERSAL TURRET LATHE
THE TIME OF KEEN COMPETITION IS HERE
It will, therefore, become increasingly necessary to watch your production costs.
The Foster 2-B Universal Turret Lathe, equipped with Foster Tools, will bring your production costs down to a minimum.
Our catalogue ought to be in your file. Write for it.
No. 206-B—Split Bushing
No. 206-D
Adapter for Forged Cutter
No. 201—Pointing Tool
No. 200—Multiple Cutter Turner
Push-Out Collet with Bushings
Scroll Chuck
No. 199—Single Cutter Turner
Foster Machine Company, Elkhart, Indiana, U.S.A.

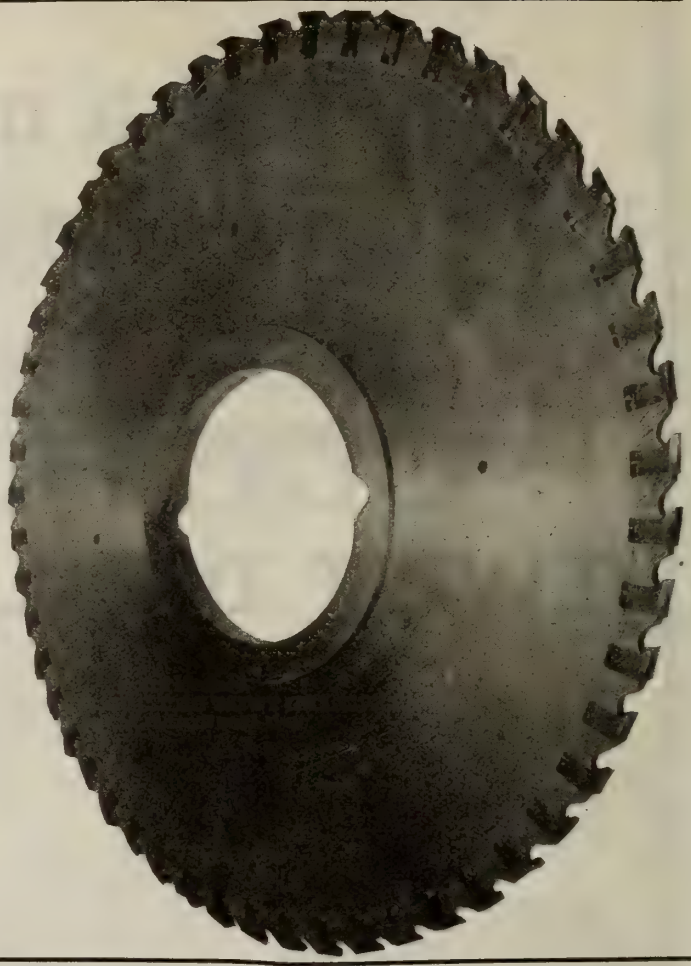
They're a mighty nice bunch to deal with

THE CLEVELAND TWIST DRILL CO. · CLEVELAND · NEW YORK · CHICAGO

Agents for Europe
CLEVELAND TWIST DRILL CO., (GREAT BRITAIN) Ltd.
36-37 Upper Thames St., London E. C. 4.

90-inches in diameter

Cut on right shows a Hunter Duplex Inserted Tooth Saw used by the Erie Forge Co. for cutting gun forgings. It is the largest inserted tooth saw blade we know of ever having been made in the United States or any other country —1″ plate, 1 5/16″ kerf, and contains 56 high-speed steel teeth, and weighs approximately 3,000 lbs.

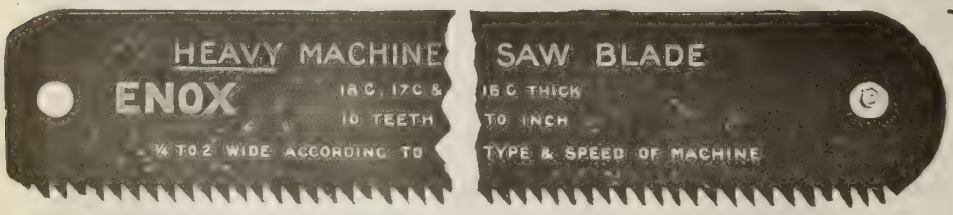


Hunter Duplex Saws

No matter what your sawing requirements may be, there is a Hunter "Duplex" Saw that is just right for the work. The discs are made of Chrome-Vanadium Steel, oil treated.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Grinders. Hardened Steel Specialties. Write for prices.

Hunter Saw & Machine Co.
Pittsburgh, Pa., U.S.A.



ENOX
Hacksaw Blades
ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10

Starrett Hack Saws

have the Stamina, the "Punch," and the Endurance. They are made of the **right stuff**—the finest tempered Tungsten steel, with milled teeth properly set; flexible or hard backs, so they can take a lot of punishment and abuse without calling "halt" or breaking down.

Mechanics, superintendents, and "bosses" endorse and recommend Starrett Hack Saws as the truly economical saws, because they give the maximum of service for the minimum of cost.

Write for Catalog No. 213. It shows many styles and sizes of fine precision tools and also hack saws.

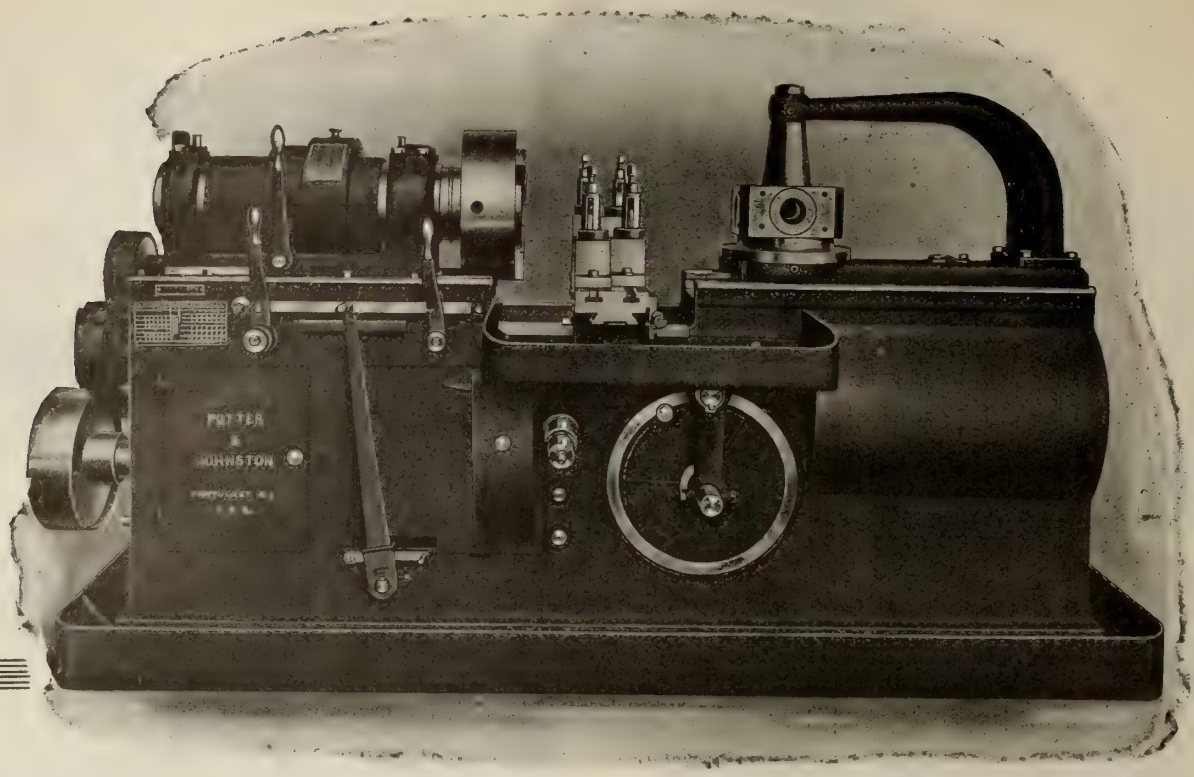
The L. S. Starrett Co.

The World's Greatest Toolmakers
Mfrs. of Hack Saws Unexcelled

ATHOL, MASS.

42-869

If any advertisement interests you, tear it out now and place with letters to be answered.



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cost, *both* are readily obtained on

Potter & Johnston Manufacturing Automatics

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

Catalog gives full particulars. Drop a card for it.

Canadian Offices : POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office : 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse : Galt, Ont., Canada

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Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting. Extruded shapes.

Seamless Brass and Copper Tubes.
Guaranteed Ingot Metals—Yellow, Red and Composition Ingots.
We are Purchasers of Copper Bearing Material.

Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

MADE IN CANADA

Malleable and Cast Iron
PIPE FITTINGS

Both Screwed or Flanged,
Black or Galvanized—All Sizes

MALLEABLE AND
GREY IRON
CASTINGS

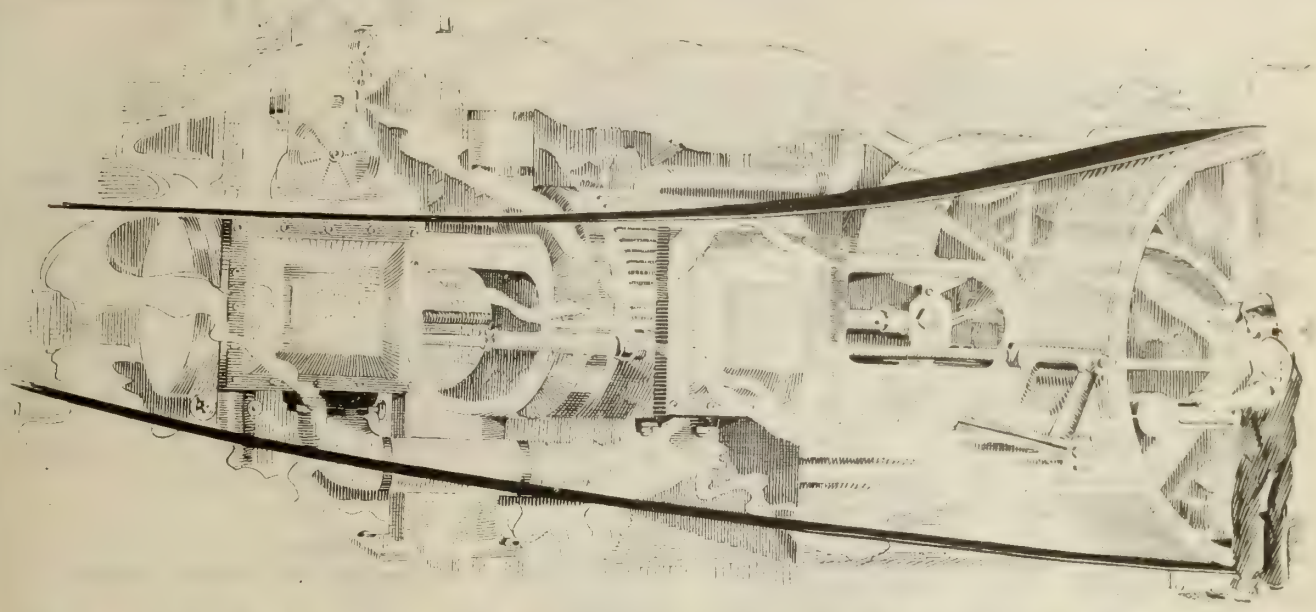
For General Machine Shop Work, for Manufacturers of Automobiles and Specialty Manufacturers.

Quality Products

We have the facilities for filling your orders with exceptional promptness. Annual capacity 6,000 tons.

Prompt Service

International Malleable Iron Co., Limited
Guelph, Ontario



Good Belting Service in Hard Places

IMPROVED service and lower belting costs have come wherever Goodyear Extra Power Belting has been installed in hard places—on drives exposed to the heat of furnaces, the live steam of engine rooms, the variable atmosphere around a lumber mill, or the outdoor conditions of a thresher outfit.

In the Wallaceburg plant of the Dominion Sugar Company, for example, there is a Goodyear Extra Power Belt that has won for itself an unusual record—and firm friends.

For it has solved a difficult belting problem. It has overcome conditions under which other belts and other types of belting have failed completely. Even under normal conditions the service this belt has yielded would be welcomed in many plants to-day.

Read the brief statement given us by Mr. F. W. Gonyan, their Chief Engineer:

"This belt is 46 ft. 4 in. of 7 in. x 8 ply Extra Power and runs on Screw Conveyor Drive. Load variable. *Belt always exposed to live steam.* A special. . . wouldn't start the drive; another type of belting lasted one week; . . . unsatisfactory——

——Extra Power has run *one year* and has *never been touched.*"

Similar testimonials have come to us from every province in Canada, proving that such trouble-free service is not exceptional—that on exposed drives such as this, Goodyear Extra Power Belting is winning a Dominion-wide reputation.

For example, duplicating the above statement of Engineer Gonyan, we have received the following from E. C. Farber, of the Beaver River Lumber Co., County Line, B. C.

"The conveyor belt runs direct from a small engine to the conveyor drive and is a six-inch, six-ply Extra Power Belt. *It is subject to steam and heat in the engine room and to cold and dampness on the outside.* Although it has been in use for a period of *five months* now under these conditions, there is no sign of deterioration and there is *no slippage.*"

Backing up these two testimonials comes this verdict from J. Mahhon & Sons, Calgary, who use Goodyear Extra Power on their threshing outfit: "Your Extra Power Belt is as good now as when the season commenced, and we had the hardest threshing we have had as long as we have been threshing."

• • •

Belting that gives good service and lower costs under abnormal atmospheric conditions is surely a better belt for all ordinary drives. The Goodyear Belting man has a big story to tell you. He's a man trained to discuss belting problems. Perhaps he may help you. His service or ours involves no obligation. Phone or write the nearest branch.

The Goodyear Tire & Rubber Co. of Canada, Limited

Branches—Halifax, St. John, Montreal, Ottawa, Toronto, Hamilton, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver.

Service Stocks in Smaller Cities

GOODYEAR

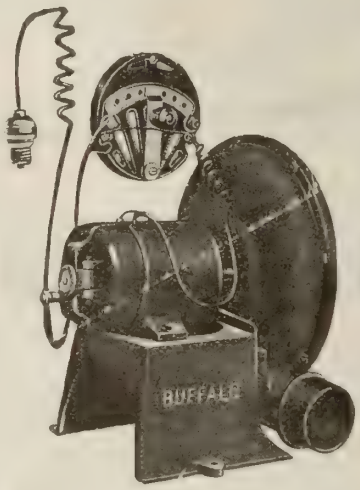
MADE IN CANADA

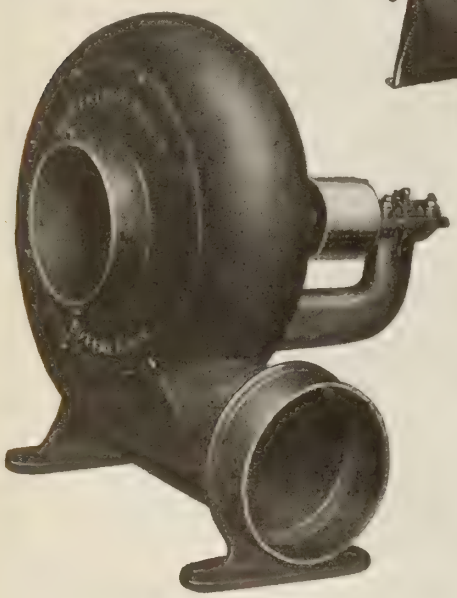
EXTRA POWER BELTING

Canadian

Fans, Blowers and Pumps for Acid Service

This direct-connected little blower is one of the handiest ever made for blowing forge fires, exhausting gases and fumes, dust from small grinders and buffing machines, blowing scale for power hammers and chips and sawdust from woodworking machinery.





"Buffalo" Acid Fans, Blowers and Pumps can be built of any metal or alloy that is most suitable for the special work demanded of them — cast iron, lead, bronze, monel metal, copper, tin, aluminum, etc.

Our long experience in building acid fans, blowers and pumps enables us to build the type of equipment best suited to meet YOUR requirements.

Consult us before buying. Our engineering department will be glad to give you complete information. Write to Department 16.

Canadian Blower & Forge Co., Limited
Kitchener, Ont.

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WHY P.H. and IMPERIAL FILES?

Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

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"ASK YOUR JOBBER"

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D F & Co. Quality & Service

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OUR Forge Plant compares very favorably in size with any on the Continent. Its efficiency is equal to that of any, and exceeds most. We can handle effectively practically any drop forging.

OUR Stamping Plants contain over 100 presses, including equipment to handle heaviest drawn work.

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WALKERVILLE, ONTARIO
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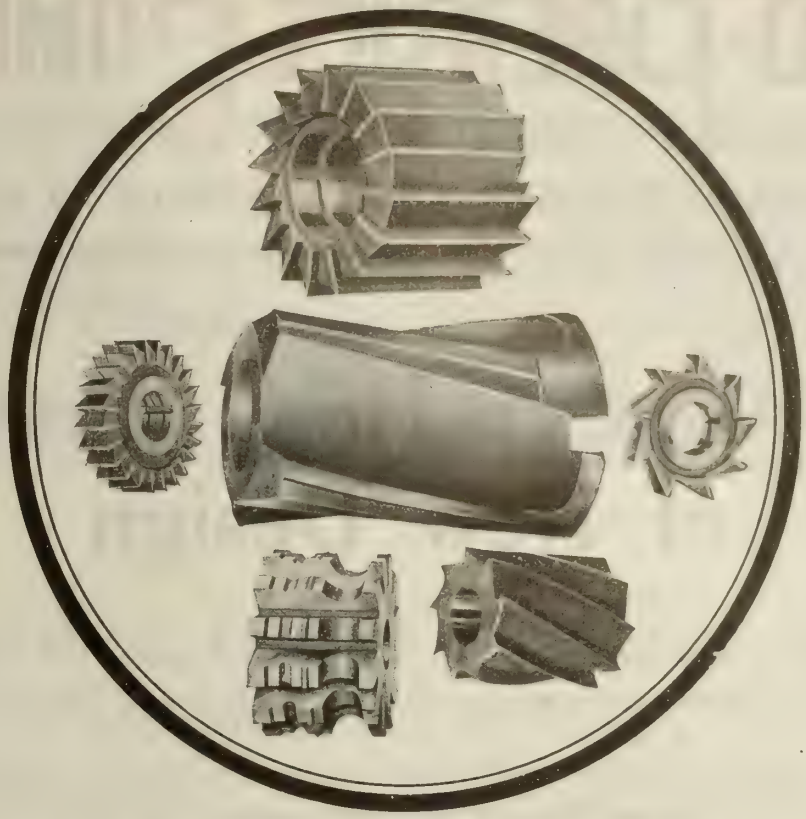

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HIGH SPEED STEEL TOOLS

such as pictured above, are establishing new standards in high speed tool efficiency. Made by the Davidson process, these tools possess a degree of toughness, cutting efficiency and resistance to abrasion such as was never before believed possible. Actual working tests have always proven 50% or greater increase in production.

SPECIAL SERVICE

To plants having their own tool making force we supply these tools in rough ground annealed form within approximately 1-32 of finish. Thus a tool that takes 20 hours to make from the solid bar can easily be finished from our blanks in 2 hours. This standard of comparison holds good as regards various styles and sizes of tools. The use of our tools in this form will establish new standards in tool room production. We guarantee against breakage in the hardening operation.

Send Drawings, Blueprints or Patterns and we will quote prices and quick deliveries.

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The Davidson Tool Mfg. Corporation

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REED-PRENTICE COMPANY

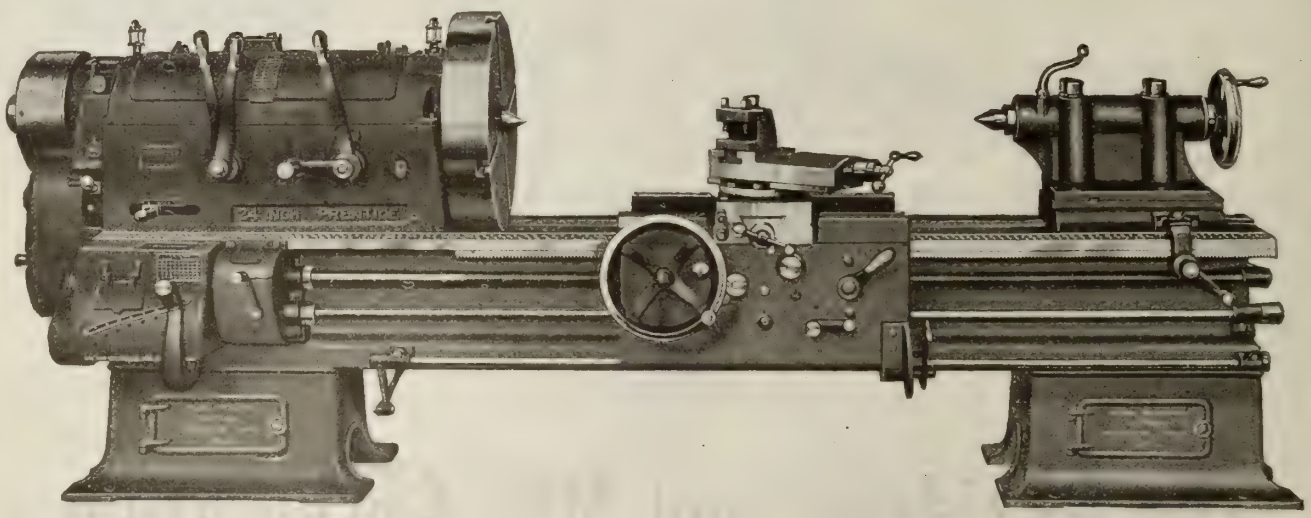
WORCESTER MASS. U.S.A.

A 24" Geared Head "Prentice" of New Design

All 12-spindle speeds are obtained through gears and quick-acting clutches which are operated by the levers on the head.

All speed, feed and screw-cutting changes can be made so rapidly that, in the course of every day manufacture, the operator can give you maximum production in record time.

Although of quite a large swing, this lathe can be used profitably on small work. Its versatility, ability and convenience will be a continual source of income to you.



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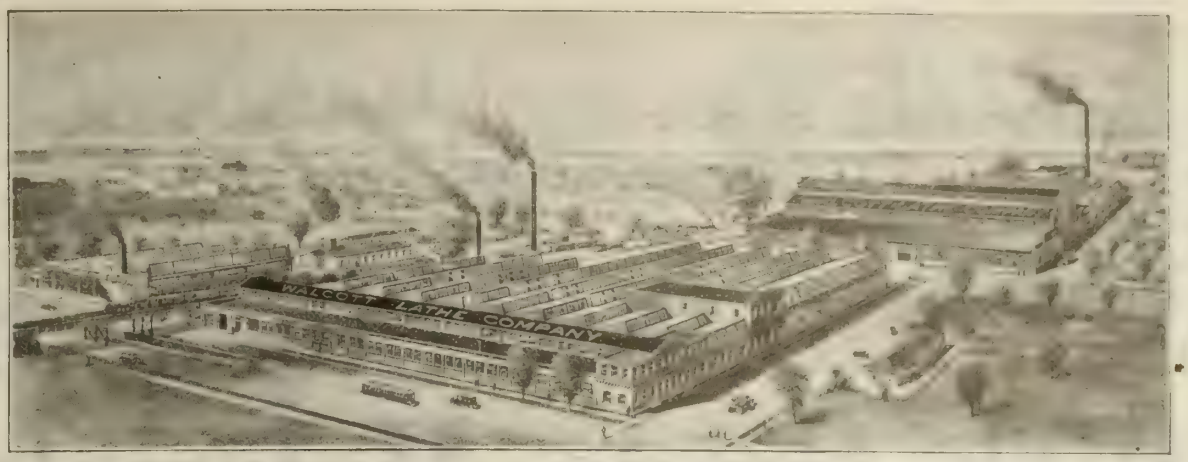

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Consider These Walcott Facts
When Contemplating a Lathe Purchase

The Walcott organization is headed by men of recognized ability whose business acumen and methods of square dealing is manifest in the product they build. The fact that the Walcott plant has grown from a small tinkering shop to one of the largest in the world, making Lathes exclusively is evidence of the responsibility of the makers and the quality of the product. Walcott Lathes have many mechanical virtues. Descriptive catalogue sent by request.

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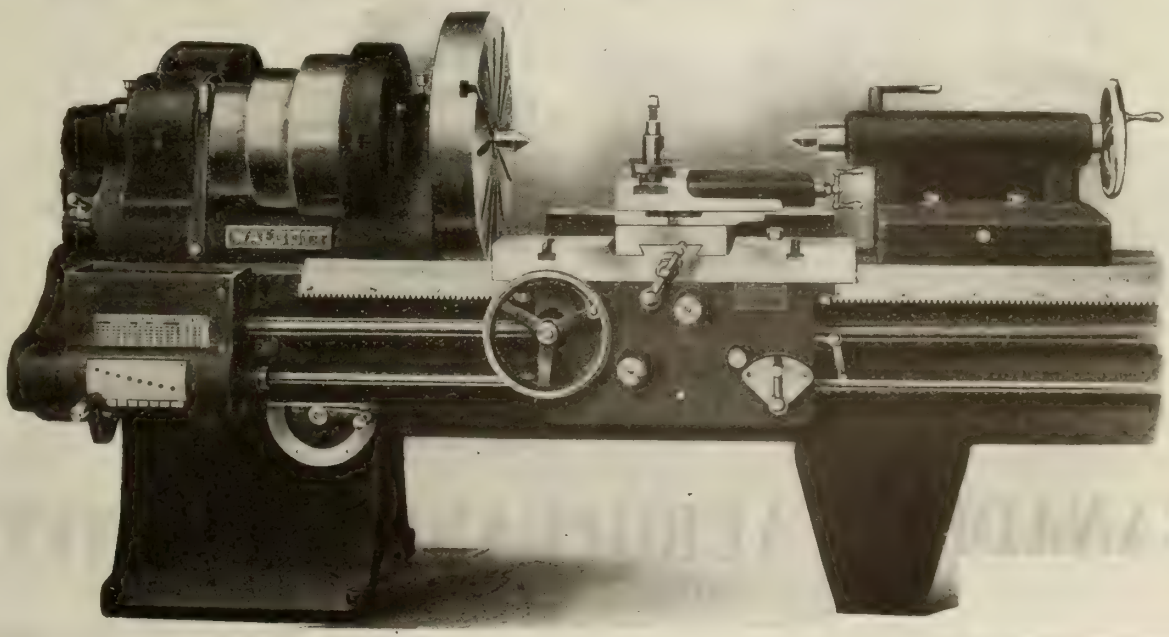

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$2,000,000 Stock of High Grade Materials

Purchased for the Manufacture of Aeroplanes, and the Following is

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HARD DRAWN PIANO WIRE

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EXTRA FLEXIBLE AIRCRAFT CORD

GASOLINE AND WATER HOSE

PAINTS, OILS, VARNISHES, ENAMELS

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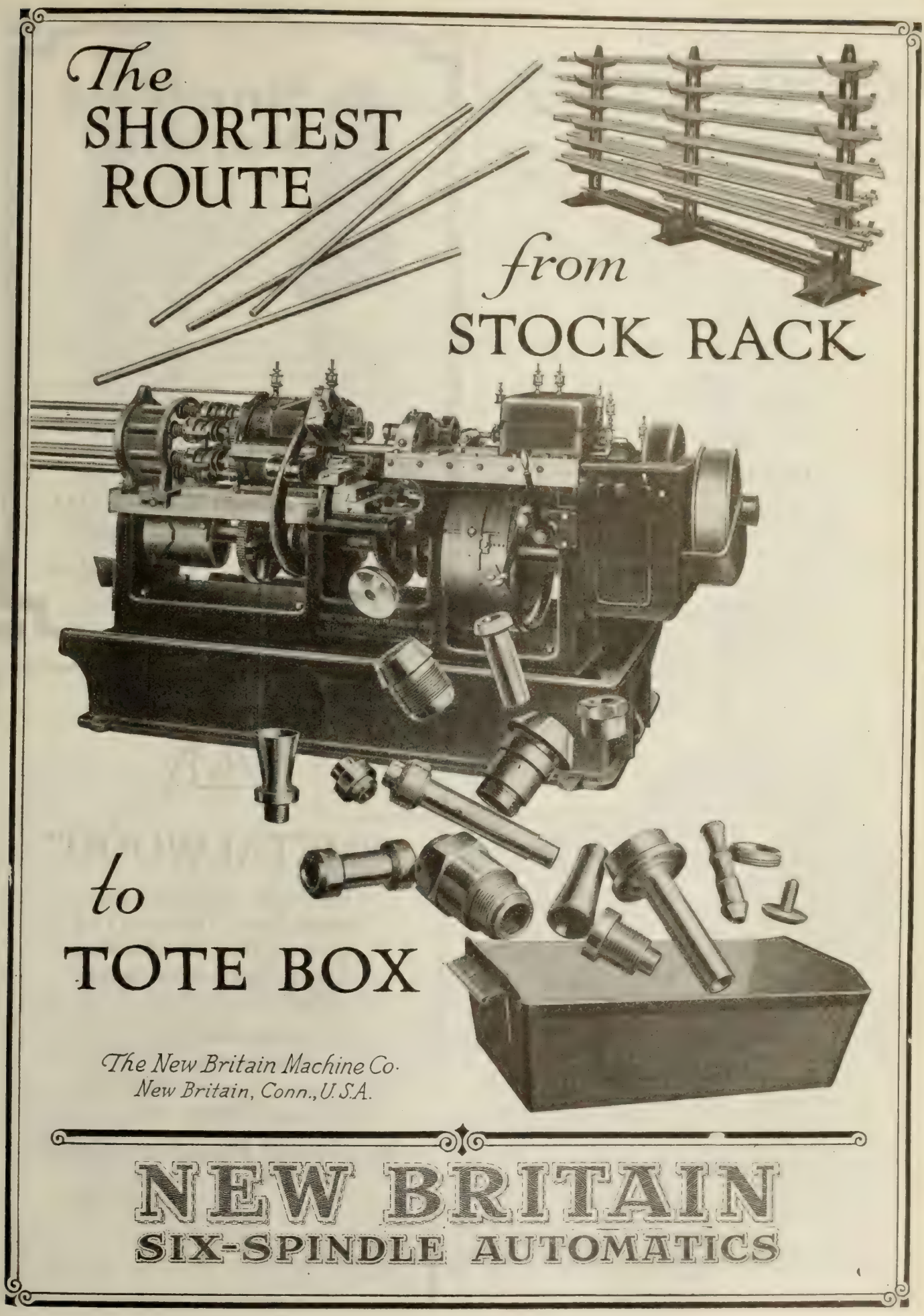
RUBBER MATTING

TOOL ROOM, MACHINE SHOP AND WOODWORKING MACHINES

Send Us Your Inquiries and We Will Quote You Attractive Prices

CANADIAN AEROPLANES, LIMITED

TORONTO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SHORTEST
ROUTE
from
STOCK RACK
to
TOTE BOX
The New Britain Machine Co.
New Britain, Conn., U.S.A.
NEW BRITAIN
SIX-SPINDLE AUTOMATICS

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 16A

TRIAL WHEEL TAGS

When wheels are sent out for trial for experimental purposes, they are tagged with a large blue tag 10½" long. The reason for this is that the wheel may be identified from others; that information may be given on the tag as to what operation it is intended for; that the operator or foreman may record a report on the action of the wheel, and the operator or foreman will have a satisfactory record for himself if he will fill in and retain the detachable end of the tag.

KEEP THIS TAG WITH WHEEL UNTIL USED

GRINDING NORTON WHEELS

Alundum

TRIAL WHEEL

RECORD TAG

Please return this tag to Salesman or to us direct when reporting on trial or duplicating order.

Norton No. 911051 Customer's No.

Size 10 x 3/8 x 3

Grain 80 Grade N Face

Tested at 3450 Rev.

Speed recommended - R.P.M. 1910 to 2290

Speed within above range is dependent on condition of machine, method of grinding and safety appliances used.

For grinding Rolls ½" dia. 3" long 70 pt. carbon - Firth - Sterling Steel - Open fire hardened

(Please record results by either putting a circle around words or entering figures when required)

Satisfactory Yes No

Life: Days Hours

Production: Pieces Per Hour / Total Pieces

Dressing: Once a day Pieces Per Dressing / Total Dressings

Cut: Fast Coarse Hard Loads / Slow Fine Soft Glazes

Remarks Wheel wear about .00025" to every .050" stock removed

Record of Previous Wheel Used:-

Grain 46 Grade L Abrasive Vit Alun

Life: Days Hours / Total Dressings

Cut: Fast Coarse Hard Loads / Slow Fine Soft Glazes

SEE OTHER SIDE

The accompanying tag gives the information required and tells in just what respect the wheel was satisfactory or unsatisfactory.

There are many such good tags that come back, but there are a great many that do not contain all of the information that is desirable and consequently those customers who are negligent in this respect cannot expect to get 100% efficient service from the grinding wheel manufacturer whose one thought is to ship the wheel that will produce the best all-round results.

NORTON COMPANY

NEW YORK STORE 151 CHAMBERS ST. — CHICAGO STORE 11 NO. JEFFERSON ST.

ELECTRIC FURNACE PLANTS

NIAGARA FALLS, N.Y. — CHIPPAWA, ONT.

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT. — NEW YORK STORE 151 CHAMBERS ST. — CHICAGO STORE 11 NO JEFFERSON ST.

NORTON

Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assures accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

Canadian Fairbanks-Morse Co., Ltd.

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.

Detroit, Michigan

Sales Representatives

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

Precision in Threading

Precision in threading can be attained only by the use of precision tools.

The "Gun" Tap

The "Gun" Tap holds all records for accuracy, speed and durability. Its shearing cut requires a minimum of driving power and is self-cleaning—it shoots the chips ahead.

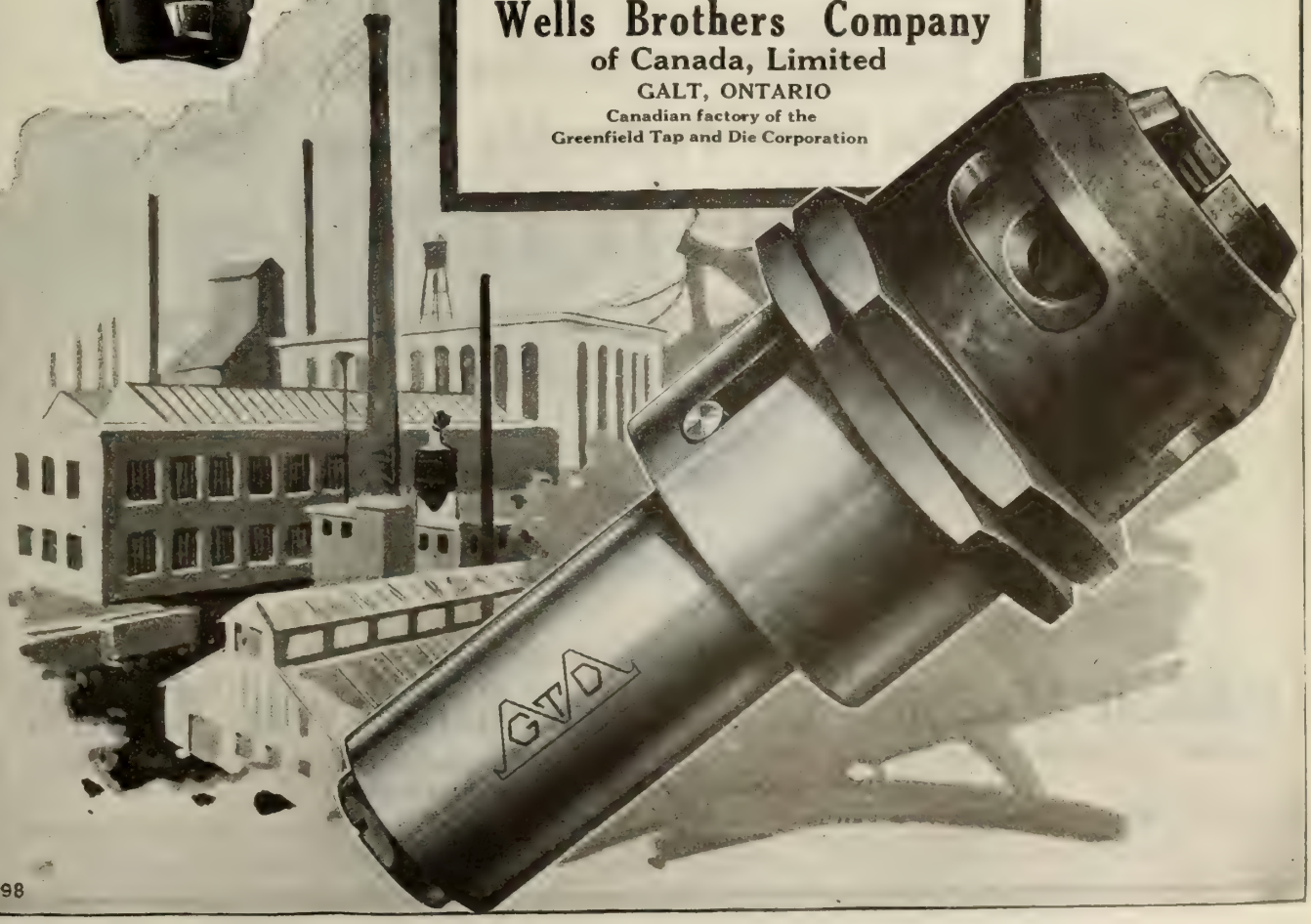
The "Gun" Tap maintains its size and lead in any material.

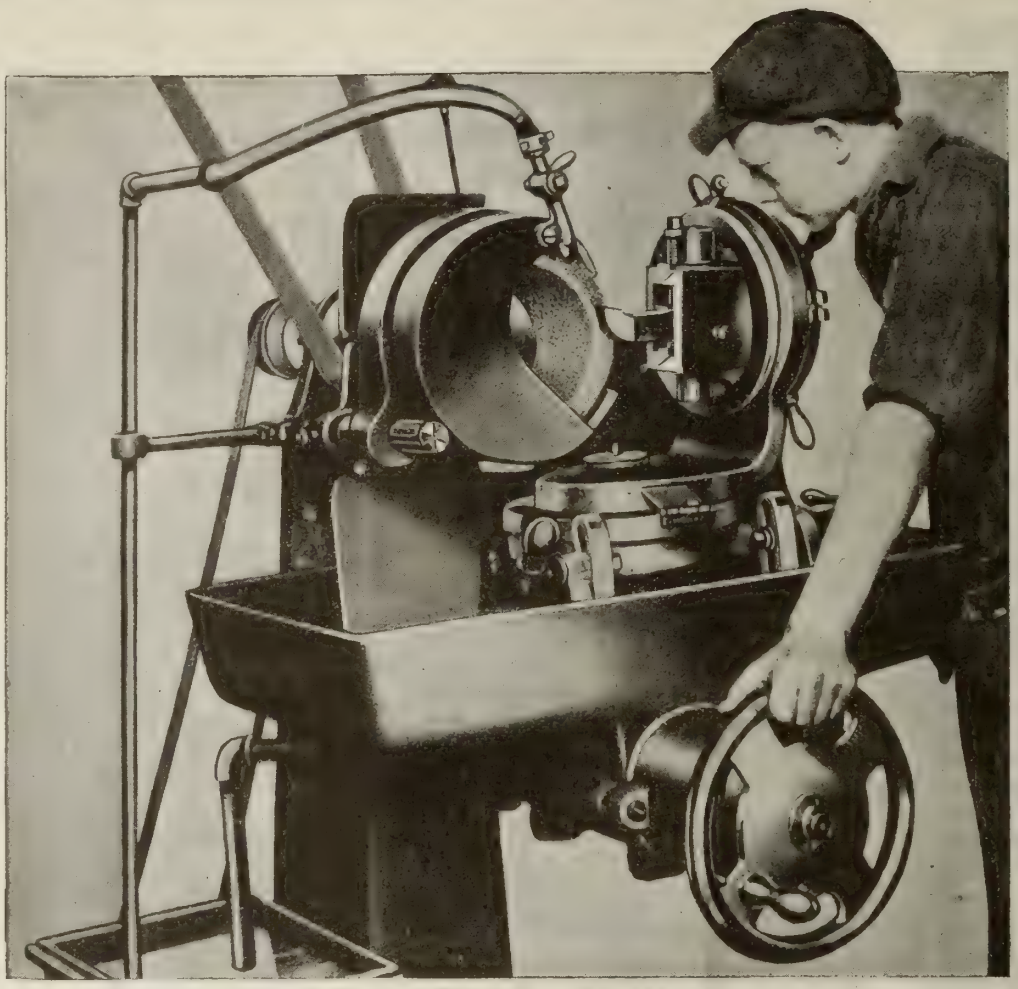
The Acorn Die

The Acorn Die is capable of a minute adjustment, holds its lead with accuracy, is absolutely rigid while cutting and will outwear a number of ordinary dies.

Nicely illustrated booklets describing the "Gun" Tap and the Acorn Die will be sent on request. Also new No. 40 Small Tools Catalog.

Wells Brothers Company
of Canada, Limited
GALT, ONTARIO
Canadian factory of the
Greenfield Tap and Die Corporation





The More Varied the Tools The More Profitable is the

GISHOLT TOOL GRINDER

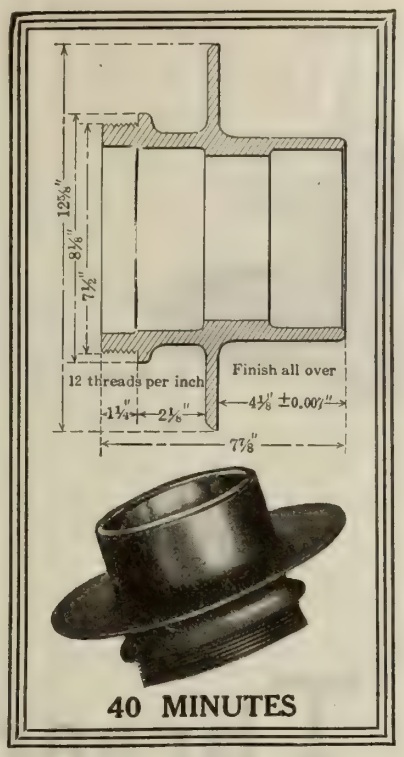
The greater the variety of tools and number of angles to grind the more apparent are the speed and accuracy of the Gisholt Tool Grinder. A boy can grind more tools with this grinder, and with less effort, than a skilled mechanic can grind by hand. He will duplicate angles perfectly. He'll jump from one tool to the next without waste effort or loss of time.

Ask for the complete Grinder story.

Gisholt Machine Co. - Madison, Wis., U.S.A.

Builders of Standard and Automatic Turrent Lathes, Vertical and Horizontal Boring Mills, Small Tool Grinders, Tools, Special Machinery

Canadian Agents: **The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Saskatoon, Calgary, Vancouver, Victoria**



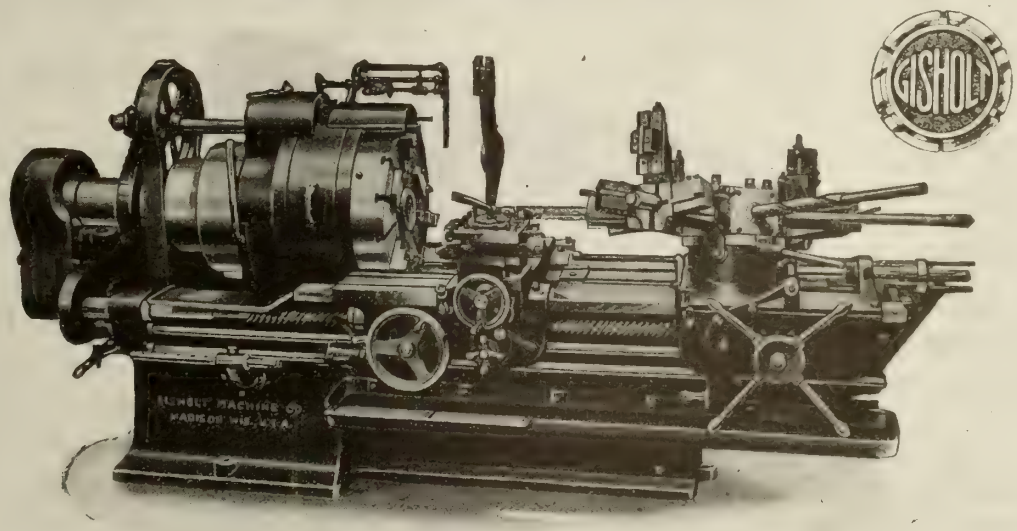
GISHOLT Turret Lathes

Another Gisholt Hub Job Forty Minutes

Standard Tools Lower Costs

Standard tools lower costs not only because they cost less, but because of the time they save. When a job like the above, for instance, can be produced with standard chucking tools, you will see the advantage.

Have you any work that is similar? Compare our production time with yours.



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Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

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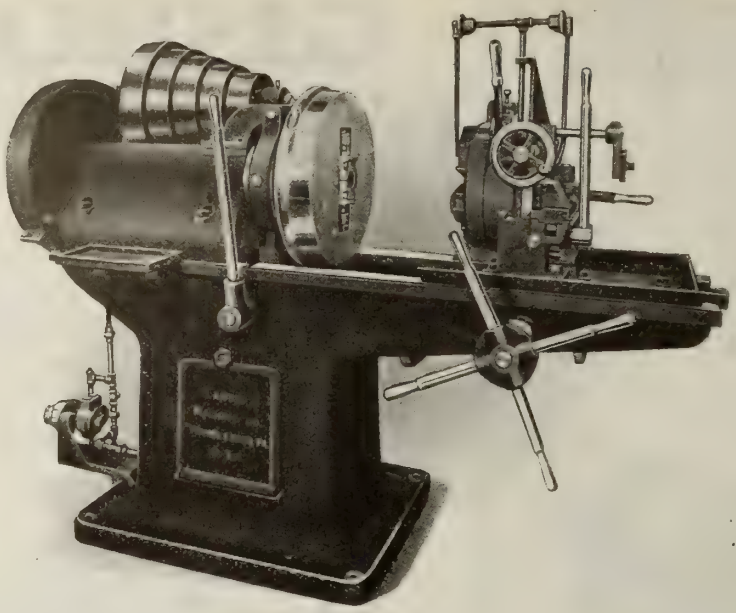


Landis Pipe Threader

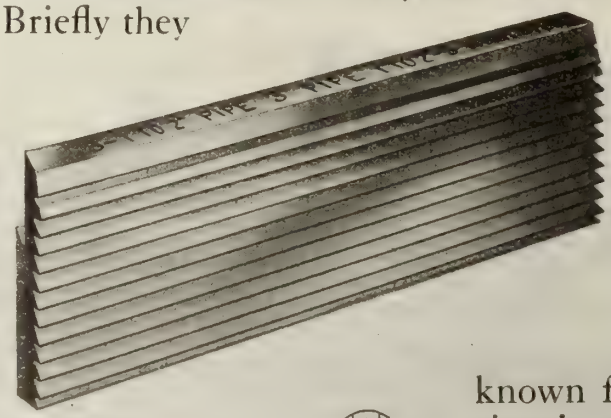
Built with the same well known Landis Die as used on Landis Bolt Cutters

The Landis Die has many points of excellence due to the unique design of Landis Chasers. Briefly they are—

Free Cutting Condition admitting of high speed.

Longer Life, no annealing, hobbing, or retempering required.

The *Rake* or cutting Angle can be ground to suit material to be threaded.



The Landis Thread Chaser

Wide Range and Interchangeability. Anyone of the Chasers can be removed without distributing the entire set.

Fixed Throat insures 10 to 20 times longer life than other dies.

Landis Pipe Machines are well known for their excellent design in every particular.

If you are already equipped let us quote on a Landis Die Head to fit your machine.

The Canadian Fairbanks-Morse Co., Limited

"Canada's Departmental House for Mechanical Goods"

HALIFAX ST. JOHN QUEBEC MONTREAL OTTAWA TORONTO HAMILTON WINDSOR
WINNIPEG SASKATOON CALGARY VANCOUVER VICTORIA

CANADIAN MACHINERY AND MANUFACTURING NEWS

Volume XXI. No. 1. January 2, 1919.

The Precision Measurement of Thread Gauges

In a Paper Before the American Society of Mechanical Engineers the Author Describes the Apparatus Used at the Bureau of Standards For the Measurement of Thread Gauges

By H. L. VAN KAUREN, Assoc. Mem. A.S.M.E., Chief of Gauge Section
Bureau of Standards

IN the production, test and use of thread gauges there has been during the past few years great development in the methods employed and the facilities available both in manufacturing plants producing thread products and in the inspection departments of the United States Government.

It will be realized that there is quite a difference in the procedure employed in various gauge-making shops, inspection organizations and Government laboratories, and that to give a resume of all the methods used by various authorities would be quite out of the scope of this paper. The methods given herein, therefore, are restricted to those which are in use at the Bureau of Standards at the present time and are the result of the process of elimination of the less suitable pieces of apparatus and the development of other instruments and methods which have taken place up to the present time.

In England the standardization of thread gauges has been carried to considerable refinement by the National Physical Laboratory and by the Engineering Standards Committee of Great Britain, an organization which cooperates with the National Physical Laboratory. At the time the United States entered the present war, one might say that the English were several years ahead in the development of the production and measurement of thread gauges. At the present times there are in the United States all of the important methods and devices used by the English, and in addition improvements have been made in the design of apparatus and new methods of measurement have been developed. In May, 1917, the Bureau of Standards was fortunate in being able to confer at Washington with Mr. C. H. Vidal, a representative of the National Physical Laboratory, from whom drawings were obtained of the various pieces of apparatus used by the National Physical Laboratory for testing thread gauges. Needless to say, the Bureau was quick to adopt the practices which had been found useful by the National Physical Laboratory, and although apparatus such as the projection lantern and pitch-measuring machine had been ordered from the National Physical Laboratory, immediate work was instituted in the construction of similar machines, and long before gauges were being produced in any quantities the necessary apparatus was available.

General Procedure Employed

In the testing of gauges there are two main considerations, namely accuracy and rapidity. While ordinarily the test of a thread gauge is not a precision measurement, the more accurate the methods of testing are, the less time and precaution need be taken by the operator. With reference to accuracy, it will be pointed out that the importance of securing apparatus which will clearly show the defects or errors sought cannot be overestimated. All apparatus should be such that the constant errors and variable errors of observation are relatively small as compared with the permissible tolerances on the gauge to be tested. A great many discussions arise due to the fact that assertions will be made that a particular gauge is within 0.0001 in. or 0.0002 in., when actually two men will differ in making micrometer measurements on the gauge by several times that amount, due to errors in instrument or method.

After precautions are taken for the reduction of personnel errors of observation and errors in instruments, gross errors are often made in the setting down of figures and in making computations. In this connection a system is

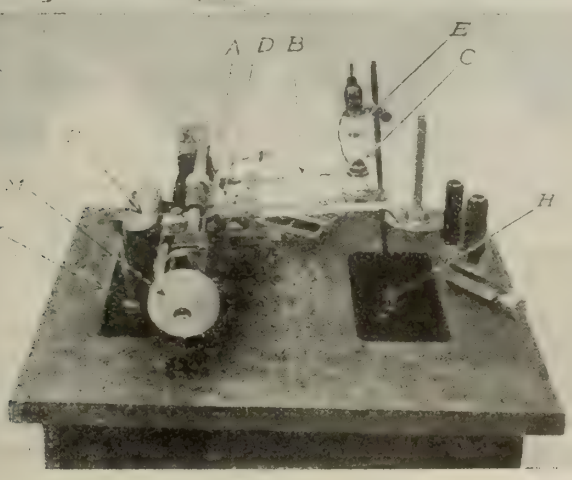


FIG. 1—PITCH MEASURING MACHINE ADOPTED BY THE BUREAU OF STANDARDS.

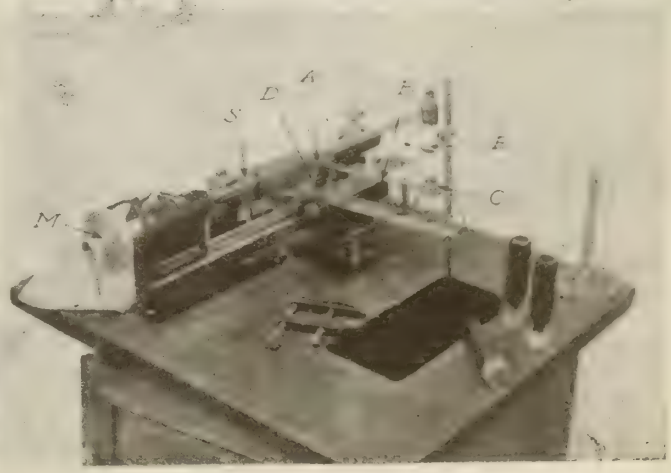


FIG. 3—ANOTHER VIEW OF PITCH MEASURING MACHINE.

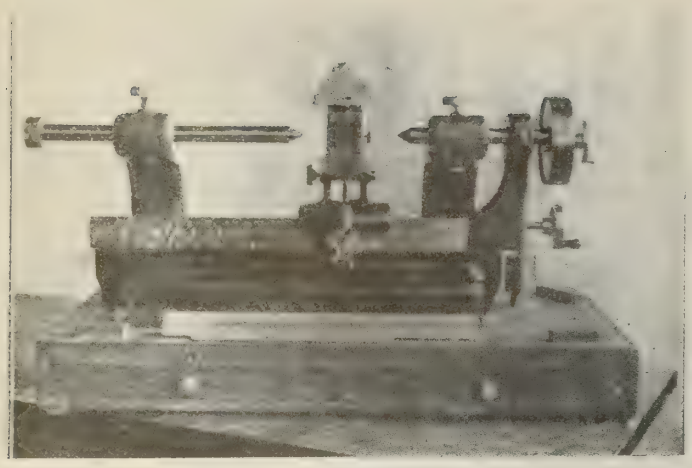


FIG. 4—PITCH MEASURING MACHINE DEVELOPED BY THE NATIONAL PHYSICAL LABORATORY.

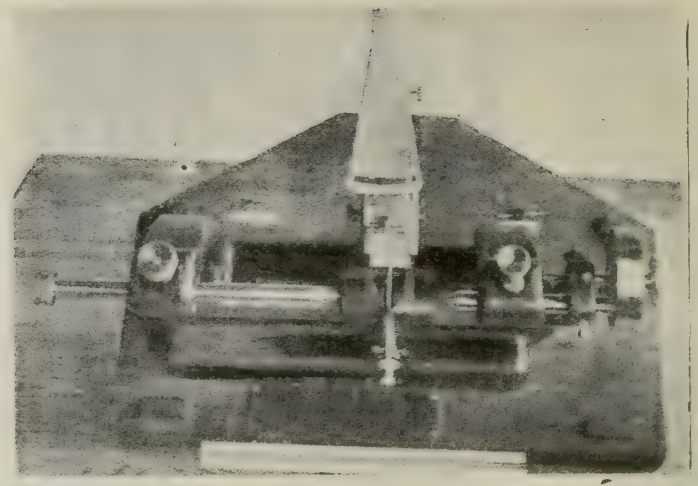


FIG. 5—ANOTHER VIEW OF PITCH MEASURING.

in use at the Bureau of Standards in which a gauge is tested by one man on a given piece of apparatus and then checked by a different operator who uses different instruments and oftentimes different methods. This checking method is most effective in the way of preventing mistakes and establishing the value of a given machine or method.

As in any reproduction problem, rapidity may be secured by systematizing the routine of test; by the elimination of small delays, and by the introduction of methods and apparatus especially designed for rapid operation without a sacrifice of the accuracy required.

In discussing the details of thread-gauge measurement, reference will be made first to male threads, as the explanation of the procedure in this case is not as complicated as in the case of female threads.

There are five distinct operations in the measurement of a plug thread gauge, namely:

(a) The measurement of pitch or lead.
(b) The measurement of form and angle of thread.
(c) The measurement of core diameter.
(d) The measurement of full diameter.
(e) The measurement of effective diameter.

When it is considered that an error of 0.0005 in. in the pitch or lead of a screw plug of the U. S. Standard form necessitates a reduction in the effective diameter of roughly twice that amount, or 0.0010 in., in order that the thread plug fit a ring of a given diameter, the importance of securing a gauge which is very nearly correct in the pitch or lead will be realized. There are numerous commercial devices designed to serve as comparators for comparing one screw with a standard and thus determine the error in pitch. These comparators are usually designed to measure the pitch over an interval of ¼, ½ or 1 in.

Measurement of Pitch

After trying various commercial machines for measuring pitch, the machine adopted for this purpose by the Bureau of Standards was of a design similar to that of the National Physical Laboratory of Great Britain. This machine, shown in Figs. 1, 2, and 3, is capable of making direct measurements of pitch, and furthermore is not limited to any one thread interval, but determinations of the lead between any two threads may be made. About twelve of these machines have been constructed and are in use at the various branch laboratories of the Bureau of Standards. There are incorporated in these machines special micrometer screws designed and constructed by Dr. J. A. Anderson, who is associated with Mount Wilson Solar Observatory, Pasadena, Cal. These micrometer screws are provided with aluminum heads which are graduated directly to 0.0001 in. and the screws have straight-line calibration curves to within 0.00002 in. They are therefore very well suited for the purpose for which they are used.

The operation of the Bureau of Standards pitch-measuring machine may best be explained by referring to Fig. 1, as follows: A ball-pointed stylus A rests in the thread to be measured. This is carried at the end of a floating arm B which at the other end carries a lens C. The arm B is supported by a flexible, flat steel spring D, and the movable support upon which the spring is carried is so adjusted that the spring D exerts a slight pressure on the floating arm B, which tends to cause the stylus A to rest firmly against the flanks of the thread. When the stylus is resting evenly on both flanks of the thread the lens C is directly beneath the lamp E and the image of the straight filament in the lamp E is projected by the lens C downward to a prism H, thence under the machine to the prism I, from where it is reflected to the screen S. When the image of the filament coincides with a reference line on the screen S, the reading of the micrometer M is recorded.

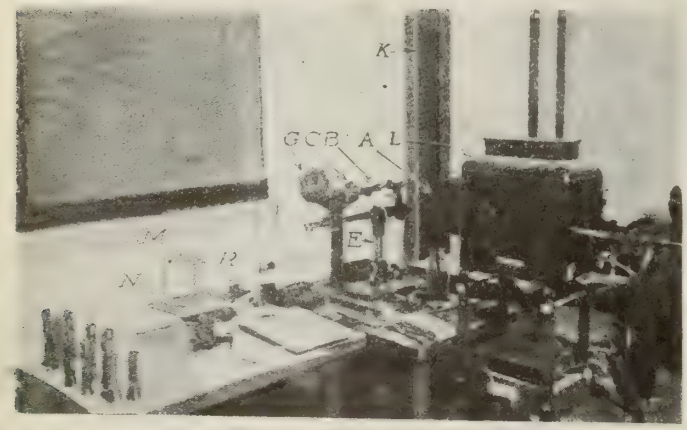


FIG. 6—ARRANGEMENT OF PROJECTION LANTERN FOR THE MEASUREMENT OF THREAD FORM OR THREAD ANGLE.

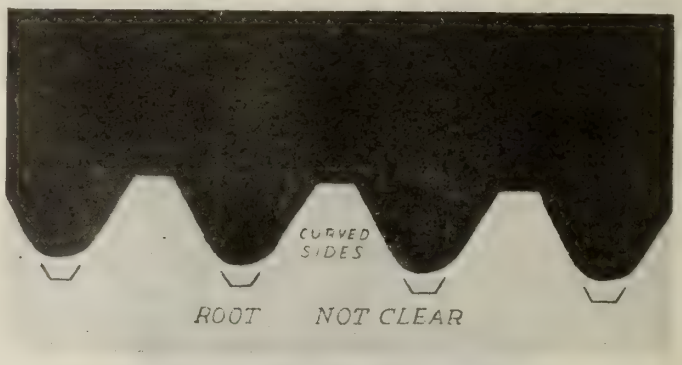


FIG. 7—PROJECTION SHADOW SHOWING THREAD NOT SUFFICIENTLY CLEARED AT ROOT.

The turning of the micrometer head M causes the carriage supporting the stylus, lens, lamp, prisms and screen to move with reference to the thread, which remains stationary. Upon moving the micrometer head an amount corresponding to one thread interval the stylus comes to a position in the next thread similar to the position in the preceding thread and the micrometer head is adjusted until the image of the filament coincides with the index line as before. The micrometer reading is again recorded. The difference between the two micrometer readings indicates directly the pitch interval passed over.

In a similar manner each thread interval may be measured and the pitch along the entire threaded portion may be investigated. The stylus, lens, lamp and screen form merely a sensitive optical indicator which serves to enable the pitch to be measured with a micrometer head. It is interesting to note that during the course of movement of the stylus from one thread to the next that it climbs up over the crest of the thread and down into the next groove. During this movement the image of the lamp filament is no longer confined to the screen, but the image is again brought back to the index point where the correct position in the next thread is obtained.

The optical indicating apparatus forms a convenient means of standardizing the micrometer head M. When this is done a thread gauge is inserted in the machine as if it were to be tested and flat-end standards or size blocks are inserted between the micrometer spindle and ball contact against which it rests, the carriage being kept stationary and the image of the filament brought back to the same point with the stylus in the same thread of the thread gauge at each observation.

Questions have been asked as to the result if a thread gauge is not concentric with the centres. If any such indication is present the screw can be revolved 180° and again tested, or it may be turned end for end in the centres of the machine. Experiments in which this procedure was taken with a large number of thread gauges indicate that the difficulties of this nature are of little importance.

Figs. 4 and 5 show a recent development of the National Physical Laboratory in a pitch-measuring machine. This is similar in principle to the one just described. The main difference to be noted is the use of a mechanical indicator which permits the machine to be operated in strong daylight, whereas the optical indicator requires a subdued light or a shade around the ground glass. The micrometer-head arrangement in this machine permits the lead error to be read directly. With regard to the micrometer head, it is to be noted that a graduated disk is supplied for each pitch of the screw to be measured. The graduations on these disks are such that the error in pitch may be read off directly from a scale instead of being obtained by subtracting two micrometer readings. This is an advantage where it is necessary to employ an unskilled operator, but it has been secured by sacrificing in the mechanical arrangement which prohibits the simple calibration of the micrometer head. The only way to verify this machine is to insert a screw, the pitch variations of which are known, and then check the machine from this screw.

Measurement of Form and Angle of Thread

In the measurement of thread form or thread angle various methods such as those employing microscopic devices, conical test points, and other forms of angular test pieces used in connection with visual inspection, have been investigated and tried out, but practically all of these devices have been discarded in favor of the projection lantern. A general idea of the arrangement used at the Bureau of Standards for the projection lantern may be obtained from Fig. 6.

The operation of the projection lantern involves the placing of the thread to be examined in a beam of parallel light, and, by means of a suitable lens system, the projection of the shadow of the thread on a distant screen. In the apparatus shown in Fig. 6, the light from a 10-ampere arc enclosed in housing L is emitted through the condensing lens A and directed toward the projecting lenses B and C. The screw is placed at the focus of the lenses B and C. The projection is then directed upward by a prism G to a mirror (not shown) which is supported about 10 ft. above the prism on the column K. The projection is then directed down by the mirror to the top of stage N which forms the screen and carries the standard angle M used in the examination of the thread form. As it is necessary that the parallel beam of light pass through the thread at the helix angle so that the shadow cast will be a true cross-section of the thread form, the lamp housing which carries the condensing lens A is pivoted about a point beneath the lens B. This insures that the beam of parallel light emerging from the lens A will always be directed at and fill the lens B.

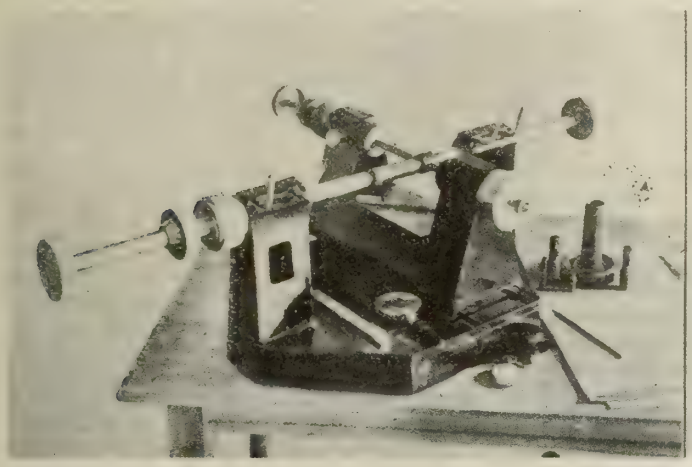


FIG. 9—APPARATUS FOR MAKING WIRE MEASUREMENTS USING TWO WIRES.

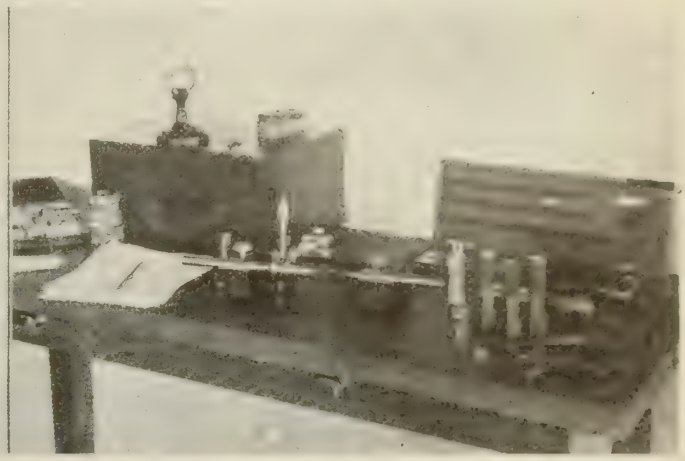


FIG. 8—BALANCED MICROMETER USED IN MEASURING GAUGES BY THE THREE-WIRE METHOD.

Adjustments for Examination.—The setting up of a thread gauge for examination requires but a slight amount of adjustment. The stand E is provided with a motion for raising and lowering the thread, a motion for focusing the thread, and another motion for moving it along its axis in order that various portions of the thread may be brought into the centre of the screen. The screw to be examined is supported by the spring centres which are carried on the stand E. For convenience in making observations it is raised until the centre of the beam of light is passing the under side of the thread. The lamp L is then turned about the axis of its support until the parallel rays of light emerging from the lens A pass through the helix angle, which happens when the fringe pattern formed about the image of the screw due to imperfect focus is symmetrical. The screw is then brought into focus by a slow-motion arrangement and the required adjustments are complete.

Measurement of Angle.—The examination of the thread angle is conveniently made with a device shown on the table in Fig. 6. With this arrangement the standard angle M, known to be 60°, is supported by three columns on the revolving stage or screen N, which rests on a graduated circle or protractor head. In the protractor shown in Fig. 1 the

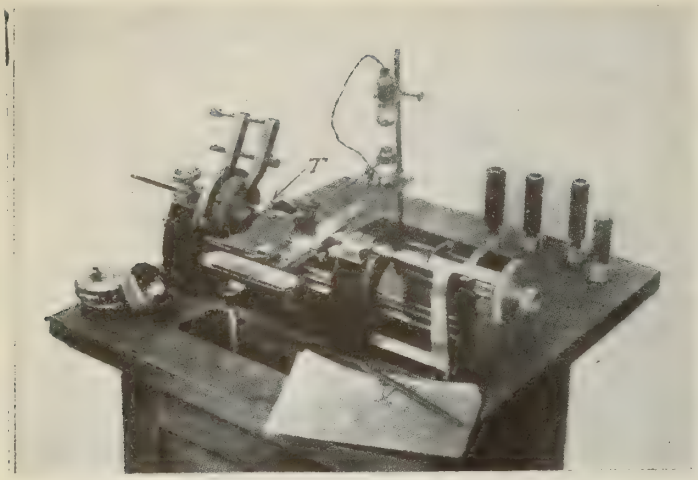


FIG. 10—APPARATUS FOR MEASURING THE PITCH OR LEAD OF A RING THREAD GAUGE.

FIG. 11—CASTS OF THREAD AND APPARATUS USED IN MAKING THEM.

graduated circle was obtained from a theodolite. During the examination of the thread angle, the opaque standard angle M is adjusted so that its shadow occupies the light space of the projected image which is cast on the surface below at N. The standard angle M is revolved so that one side exactly matches with the shadow of the thread as cast below and the reading of the graduated head is obtained through a magnifying glass. The gauge is then shifted parallel to its axis by means of a slow-motion device on the stand E until the image of the other side of the thread approximately coincides with the other side of the standard angle. The standard angle is then revolved by a slow-motion screw operating the graduated circle until it again lines up with the other side of the thread, whereupon a reading of the graduated circle is again obtained. The difference between the two readings shows directly the error of the included angle or thread if the standard angle M represents the correct thread angle.

Further application of the protractor arrangement is in the determination as to whether the thread is symmetrical about a line perpendicular to its axis. This may be verified by revolving the standard angle and matching it with the crest of the thread, or by matching a straight edge which is placed perpendicular to a bisector of the standard angle with the crest of the thread.

Accuracy of the Method.—It should be specially pointed out that the "shadow protractor" is an exceedingly effective device for the measurement of thread angles, much more so than any protractor, lying directly on the plane of the shadow, could be. This is because the eye is viewing two objects of similar character, namely, two shadows. When adjusting the gauge for a reading, the shadows of thread and gauge are made to approach and the protractor is angularly adjusted until only a faint, even thread of light remains between the two. Under these circumstances, an inaccuracy of but a few minutes is easily detected. Furthermore, the operation of the protractor is rapid. In case of particularly defective threads, exposures of the projection may be made on any photographic developing paper—with an exposure time determined experimentally—and a permanent record obtained of the condition of the thread.

Construction of Lantern.—The selection of the projection lens is important. It must be free from distortion over the portion of the projected shadow employed in making measurements. It is desirable also that a short-focus lens be employed in order that a reasonable magnification may be secured with a minimum distance between the lens and the screen.

A lens which satisfies these conditions very well has been secured by combining a 32-mm. aperture, 152-mm. focus, telescope objective (lens B), with a Tessar Series 11B, 4 x 5 photographic objective (lens C). These are mounted in a brass tube so that their separation can be adjusted to a point where the distortion effects are a minimum. When properly adjusted these lenses B and C have a combined focal length of approximately 100 mm., and a magnification of 50 is obtained with a screen at 5.6 in. from the lenses.

Another lens which has been used in place of both lenses B and C, is a Tessar Series I C, 75-mm. focus photographic objective. This lens will give a magnification of about 70 with the same screen distance as with the combination of lenses previously mentioned.

For the prism, it is necessary to secure one which has its three faces accurately flat to within about one wave length of light. The same degree of flatness is required in the mirror, and in addition the mirror must be silvered on the front.

Omitting the Prism and Mirror.—It will be found that prisms and mirrors of the required accuracy are expensive, and moreover, difficult to secure. However, convenience may be sacrificed and the prism and mirror omitted. The image is then thrown horizontally on to a vertical screen and the same measurements made. While the Bureau has not developed a form of shadow protractor for vertical images, it would not be difficult to arrange the protractor for that purpose.

Measurement of Core Diameter

The measurement of the core diameter of thread gauges is in most cases a simple matter. It is mentioned at this point because the examination of the diameter is generally included in the operation of investigating the thread angle and thread form while the gauge is in the projection lantern previously described. It is the practice in most specifications to call for thread gauges cleared or cut below the nominal flat required by the regular United States form at the root of the thread. This is done to facilitate lapping. In order to determine whether or not a gauge is properly cleared when examining the projected shadow, it is only necessary to insert a suitable templet corresponding to the pitch of the screw being measured. If the projected shadow of the thread shows that it is clear below the templet form, it is passed as being correct. Fig. 7 shows a thread which has not been cleared sufficiently at the root.

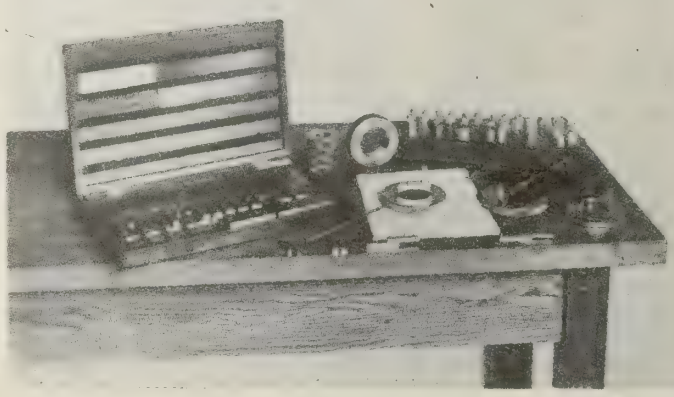


FIG. 12 THREE-BALL METHOD OF MEASURING THE EFFECTIVE DIAMETER OF A RING THREAD GAUGE.

Measurement of Full Diameter

The measurement of the full diameter of plug thread gauges is accomplished by the ordinary forms of flat-face micrometers or other suitable end-measuring instruments used in connection with properly authorized standards. These measurements are so simple and familiar to any one making gauge inspections that no further comment will be made in this connection.

Measurement of Effective Diameter

Of the various methods which have been proposed for measuring effective diameters of male thread gauges, the three-wire method is believed to be the most accurate and satisfactory. This method has been in common use for about fifteen years. In measuring screws by the three-wire method, cylinders accurately ground and lapped to size and diameter are used. These wires or cylinders are inserted in the thread two on one side and one on the other. A measurement is then made directly over the tops of the wires by means of an outside micrometer or other suitable measuring device. From this measurement and from the size of the wire the effective diameter of the screw can be computed.

Choice of Wires

In the choice of wires any size may be selected which will permit the wires to rest on the flanks of the thread and still project above the top of the thread. It is best, however, to choose wires of such a size that they touch the sides of the thread half-way down, or, in other words, at the mid-slope. In this case errors in the included angle of the thread have no effect on the measurement of an effective diameter. Moreover, the time spent in computations is greatly reduced. The best sizes of wire for various threads may be computed from the following approximate formula:

$$G = \frac{P}{2} \sec a$$

where G = diameter of wire, in.
P = pitch in in.
a = ½ included thread angle, deg.

For 60° threads this formula reduces to:

$$G = 0.5774 \times P$$

Specification of Wires

The following extracts are taken from specifications recently written by the Bureau of Standards for purchasing wires for measuring thread gauges: "The wires used are to be of steel. The working surfaces are to be glass-hard and lapped to a high polish. The working surface should be about one inch in length and the wire should be provided with a suitable handle. The handle should be provided at one end with an eye or hole for the purpose of suspending the wire when measurements are taken. On one side of the handle, which is flattened, there should be marked the pitch for which the wire is to be used as the best-size wire and the diameter of the working end of the wire. The working ends of the wires should be round to within 0.00002 in. and they should be straight to 0.00002 in. over any ¼-in. interval. One set of wires should consist of three wires, which should be of the same diameter to within 0.00005 in. This common diameter should be within 0.0001 in. of the size corresponding to the best-size wire for the pitch with which the wire is to be used."

Standardization of Wires

Before the wires can be used to measure effective diameters of threads it is necessary to know accurately their diameters. The wires should be standardized in a way which approximates, as nearly as possible, the conditions under which they are used. In order to accomplish this purpose the wires are standardized with a micrometer caliper by measuring the wire when placed over a standard reference disk, the diameter of which is accurately known. The object of measuring the wire over a cylinder is to approximate the condition of pressure which is exerted upon the wire when it is placed in the screw thread. The micrometer to be used for this purpose should be one which has graduations to ten-thousandths of an inch and upon which hundred-thousandths of an inch can be estimated. This can be secured in one of the similar forms of small precision bench micrometers. Care should be taken to make sure that the micrometer measuring faces are sufficiently parallel. If the wires differ appreciably in diameter, the two having diameters most nearly equal should be used on one side of the thread and the other wire should be used on the opposite side. In the computations the mean diameters of the three wires may then be safely used.

Computation of Effective Diameter

In the computation of the effective diameters of thread gauges, if the exact conditions are recognized the formula is quite complicated and the resulting computations are very laborious. The formulæ for computing effective diameters as given in most engineering handbooks involve the use of best-size wire and do not taken into account the complications introduced when considering the effects of the helix angle of the thread. These formulæ, as generally given, result in securing an answer which should check with the outside or full diameter of the screw being measured. The effective diameter is not mentioned in these formulæ and this often leads to confusion. Reference will therefore be made here to a simplified formula for 60° threads which results in the direct computation of the effective diameter. This formula is as follows:

$$E = M + \frac{0.8660}{N} - 3\,G$$

where E = effective diameter
M = measurement over the wires
N = number of threads per inch
G = diameter of wires

In the use of this formula the term 0.8660/N may be computed for various pitches and the computations simplified.

The general formula which may be used for any size of wire which will fit in the thread and which takes into account the helix angle of the thread for precision measurements, is as follows:

$$E = M + \frac{\cot a}{2\,N}\,G\,(1 + \sqrt{\operatorname{cosec}^2 a + s^2 \cot a})$$

where a = ½ the included angle of thread
G = diameter of the wires
s = tangent of the helix angle.

The above formula involves squares and square root of functions and therefore is awkward for making computations, and the following formula, which is an expanded aproximation but which is accurate to better than one hundred-thousandth of an inch, is more convenient:

$$E = M + \frac{\cot a}{2\,N}\,G\,\left(1 + \operatorname{cosec} a + \frac{s^2}{2} \cos a \cot a\right).$$

This formula is a general approximation which may be used for U. S. form 60° threads, Whitworth 55° threads, Lowenhertz 53° 8 min. threads, and for other threads of a similar nature. It should be noted that the error due to the first or simple formula for 60° threads in Par. 34 rarely equals 0.0001 in., and then only when the helix angle is large.

Precautions in Making Three-Wire Measurements

It has been claimed that measurements of effective diameter made by the three-wire method result in values which are smaller than those secured by other means, such as by thread micrometers. This contention is probably justified in some cases and may be due to insufficient care in making measurements. It is important in making measurements that as little pressure as possible be applied on the wires with the measuring micrometers. Since the wires rest in a V-thread, a given pressure exerted on the top of the wire will have a magnified effect of distorting the wire where the contact is made on the sides of the thread. This will result in the measurement over the wires being less than it should be. Furthermore, if the wire is standardized under a light pressure and then used with a larger pressure, the diameter of the wire which is substituted in the formula for computing the effective diameter will be larger than it should be. This difference is multiplied by the factor 3 in the formula and the tendency is to make the result small. Excess pressure is often placed upon the wires during the measurement by use of ratchet or friction stops on micrometers; or by an unskilled operator, and sometimes on account of the arrangement of the wires and the screw thread when the measurements are taken. It is poor practice to support the screw being measured on two wires which are in turn supported on a horizontal surface.

for if the screw is of large diameter the weight of the screw causes a distortion of the wires and interferes with the measurement.

One of the pieces of apparatus used in measuring gauges by the three-wire method is shown in Fig. 8. This apparatus is known as a balanced micrometer. In operation the screw is supported between centres as shown, and the micrometer is supported on a counterbalanced arm which is in turn carried on a cylinder resting in a V-groove parallel to the centres. As originally designed, as shown in Fig. 8, the micrometer was constrained perpendicular to the axis of the thread being tested and two wires were used. The arm supporting the micrometer was overbalanced so that a slight upward pressure was given to the micrometer in order to hold the wire at the bottom of the thread and allow the operator to insert the top wire and make a reading with ease and rapidity. After using this constrained micrometer for some time, it was found preferable to pivot the micrometer clamp on its supporting arm so as to allow a slight movement in a vertical plane passed through the axis of the screw thread and then use three wires instead of two. For this arrangement two wires are carried at the bottom and one wire inserted at the top of the thread as before. This apparatus is very simple in construction and is recommended as being very convenient where a large number of gauges are to be tested.

Another form of apparatus for making wire measurements using two wires is shown in Fig. 9. This instrument was specially designed and constructed for the Bureau of Standards. It embodies a precision bench micrometer accurate to within about two one-hundred thousandths of an inch, supported on a heavy base and carried by steel balls. Their support permits the micrometer uniform contact on the wires at either side of the thread. This machine has been found useful for threads of relatively large diameter. The instrument is of massive construction, and its rigidity, which is not common to ordinary measuring instruments, permits, when precautions are taken to avoid temperature changes, measurements which are accurate to within two or three one-hundred thousandths of an inch.

Testing of Ring Thread Gauges

The measurement of ring thread gauges presents many problems owing to the difficulties with which observations may be made on the various elements. While there are various ways and means of obtaining the measurements required, it is not possible in most cases to work to the degree of accuracy that is obtainable in measuring in plug thread gauges. Very often the special apparatus required for such measurements is not available in commercial shops and it then becomes necessary to judge the perfection of the ring thread by the way which it fits on a male check or checks. The various operations required for measurement are quite similar to those given for plug gauges. The procedure generally embodies the following operations:

a Measurement of pitch or lead.
b Measurement of angle and form of thread
c Measurement of full diameter
d Measurement of core diameter
e Measurement of effective diameter.

Measurement of Pitch or Lead

The measurement of pitch or lead of a ring thread gauge is accomplished as shown in Fig. 10. The same apparatus is employed for measuring ring threads as for measuring plug threads, with the exception that an extension stylus or attachment is provided to project into the ring and transfer the motion of the auxiliary stylus to the ball stylus used on the plug thread. This auxiliary device is shown at T, Fig. 10. Instead of being supported on centres as is the case when a plug is tested, the ring is clamped on a face plate and the operation then is exactly the same as previously explained for measuring the lead of the plug thread.

Measurement of Angle and Thread Form

The measurement of angle and thread form of ring threads is accomplished with the projection lantern in a similar manner to that employed in measuring angle and thread form of plug threads.

In this instance, however, it is necessary to obtain first a cast of the thread to enable the projection to be made. The casts usually used are made of a composition of sulphur and graphite containing about 7 per cent. by weight of graphite. The graphite is added to eliminate reflections which would be encountered on the surface of a plain sulphur cast in the process of projection. Then, in addition, the graphite has a tendency to reduce the shrinkage of the sulphur upon cooling. The procedure in making the cast is to clamp the ring in a vise, the jaws of which have been ground smooth, and pour melted sulphur into the ring, obtaining a cast which is a segment of a circle. The outfit required for this purpose and illustrations of the cast secured are shown in Fig. 11. The operation of pouring the casts with this method is very rapid. After the casts are poured they are immediately marked with a steel stylus with a number corresponding to the test number on the gauge. The measurement of the angle is made as soon after making the cast as possible, inasmuch as experiment shows that the cast warps but slightly during the first five or six hours, but that the warping is considerably greater at the end of twenty-four hours.

Measurement of Full Diameter

The measurement of full diameter is usually made part of the projection operation, as was the case of the measurement of the core diameter of plug gauges. Here again it is only necessary to insert a templet in the thread shadow to ascertain whether or not the thread has been properly cleared.

Measurement of Core Diameter

The measurement of core diameter is usually made with an inside micrometer, Johansson inside set-up, or by the use of go and not-go plain check plugs for this diameter. This measurement of a plain inside diameter requires no further explanation.

Measurement of Effective Diameter

The method which is usually employed for measuring the effective diameter of a ring gauge is by judging the fit of the gauge on a plug thread check. This plug check is ordinarily ground off at the crest of the thread in order to make sure that the plug touches on the sides of the thread instead of at the crest. It is usually considered that when the ring fits snugly on the plug that the effective diameter of the ring is the same as the plug. This assumption, however, is not strictly true, inasmuch as there always is certain variation between the lead or pitch of the plug and the lead or pitch of the ring, and furthermore, variations of angle between the plug and the ring are always present. Both of these variations necessitate the ring's having an effective diameter larger than the plug upon which it fits snugly. In most cases the amount actually required for fit, due to differences in pitch and angle, is appreciable, sometimes as much as several thousandths of an inch.

In order to ascertain the effective diameter where check thread plugs are not available, the three-ball method of measurement has been adopted. In making these measurements the ring is laid on a flat surface with the axis of the thread perpendicular. Two balls are then placed in adjacent threads and a third ball is placed diametrically opposite. The distance between these balls is then taken by inserting size blocks together with a taper parallel, as shown in Fig. 12. The effective diameter can then be computed in a manner similar to that explained for male screw threads, as it is necessary to change only the signs of the different quantities of the formula as previously given for wire measurements. The formula as corrected by the change of signs is then as follows:

$$E = M - 0.8660 \times p + 3\ G$$

where E = effective diameter
M = measurement between balls
p = pitch in inches
G = diameter of balls.

This formula applies in cases where the balls used touch nearly at the mid-slope of the thread.

Toronto.—Sealed tenders, addressed to the undersigned and endorsed, "Tenders for concrete piers, Quinte Division," will be received until 12 o'clock noon, Saturday, December 14, for the removal of the present substructures and the construction of seven concrete piers at the Trent River Crossing, mileage 43.5, on the Maynooth Subdivision, being situated at Glen Rose, about thirteen miles north of Trenton, Ontario. Drawings and form of contract may be seen and specifications and form of tender obtained at the office of the Engineer, Maintenance of Way, 68 King Street East, Toronto. C. N. Railway, 60 King Street East, Toronto.

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Converting the Lowest Grade of Scrap Iron Into the Highest Grade of Pig Iron—Its Practicability Clearly Demonstrated and Its Future Forecasted in a Favorable Light

By F. H. BELL

WORKS OF THE BOWANVILLE FOUNDRY CO.

THE Bowmanville Foundry Co., whose works are shown in the accompanying illustrations, can proudly claim the unique distinction of being the pioneers in Canada of melting gray iron for ordinary foundry purposes by electricity, and in doing so have demonstrated to their own satisfaction as well as to that of others who have seen the process in operation, that the electric furnace in the iron foundry has a future before it full of promise. As every foundryman is aware, the demands upon the available iron supply during the years in which the war was in progress were so great that it became necessary to conserve every possible pound of iron, either to be converted into steel or else to be used in such iron castings as were required to help in some way to win the war, and those foundrymen who were not engaged in turning out some line of war material found it an exceedingly difficult matter to secure supplies. Here was a company who had long enjoyed the enviable reputation for producing a line of high-grade light gray iron castings, including stove trimmings, piano trimmings, piston rings for automobile engines, hardware and novelty specialties, all of which required the highest grade of pig iron. In addition to this they had a department for the manufacture of light steel castings in which they had just recently installed an electric furnace of 500 lbs. capacity. They also have a nickel-plating and polishing department, a polished brass department, and a wire goods department, fully equipped with electric welding machines, etc., but, unfortunately for them, none of their lines could be considered essential from the standpoint of wining the war, and as a consequence they were debarred from securing the raw material with which to keep their works in operation. To all of this they cheerfully acquiesced, but in doing so they found themselves with only two alternatives to choose from. The one was to close down until after the war (a proposition which was not to be considered) and the other was to secure iron from some source, and in this they were successful. As has been previously mentioned, the class of work being turned out was such that nothing but high-grade pig iron could be used, and if good scrap could have been secured it would not have filled the bill, but even this was not easily procured, but the source from which they were enabled to draw was the cast iron turnings and borings of which every machine shop has an abundance, and which had hitherto been considered as of little practical value, and by utilizing the electric furnace the difficulty was solved.

Had this class of metal been charged into the cupola the bulk of it would have been blown out through the stack and the balance would have been mostly slag. With the electric furnace none of this trouble is experienced as there is neither blast nor fuel to contend with, and consequently no oxidizing, and very little carbonizing.

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The furnace, shown in the accompanying engravings, Figs. 1, 2, 3 and 4, as well as the control board (also shown in Figs. 1 and 2) and the transformers, were installed under the personal supervision of Mr. C. E. Rehder. The furnace was manufactured under Gronwall patents, and the control is of a type manufactured by the General Electric Co.

The electrodes are controlled automatically by d. c. reversible motors, with shunt field to act as a magnetic brake, but can be controlled by hand if so desired; control board is operated by 110-volt d. c. current, with raising and lowering control for each electrode.

This furnace operates on a two-phase circuit, each electrode carrying one leg of each phase and the bottom or hearth is conducting and acts as neutral or common carrier for other leg of each circuit.

The primary supply is three-phase, and is connected by a modified "Scott" connection to the two transformers. The transformers have a capacity of 75 k.v.a. each. The furnace, as we have 10-hour day will melt 4 heats, but if successfully handling 625 lbs., and in a 10-hour day with melt 4 heats, but if run continuously will melt 13 heats in 24 hours. To accomplish this requires 650 kilowatt hours per ton of cast iron, and an average of 8 lbs. of electrode per ton of iron.

For the benefit of the practical foundryman who is not familiar with electrical phraseology we will endeavor

FIG. 1—SHOWING CHARGING DOOR, ALSO CONTROL BOARD AND ELECTRODE LEADS.

to explain in as intelligible a manner as possible the construction and management of the electric furnace. It consists of a steel shell of the design shown and lined with what is known as magnesite brick, leaving a basin or crucible 24 inches by 36 inches and about 16 inches deep below the level of the door. The metal is charged into this brick basin through the end door shown in Fig. 1, and the electric current enters from the top through the electrodes, also shown in Fig. 1 attached to what would appear to be a jib crane. The manner of melting will perhaps be better understood if compared to an electric arc lamp with its upper and lower carbon, and the electric arc between them. If the bottom carbon is removed from an arc lamp and an iron one put in its place the arc would still form and cause light for a short time, but the iron would melt away and the top carbon would follow it until it was all melted. This is precisely what takes place in the electric furnace; the iron which is to be melted takes the place of the bottom carbon, while the electrode acts as the upper carbon. As the iron melts it falls to the bottom of the basin, and when all is melted, silicon, and whatever other elements are required to bring the metal up to the proper chemical analysis are introduced through the charging door and are rapidly absorbed by the melted iron. The electric current keeping the metal in continuous motion, thoroughly mixes it and at the same time purges it of impurities. Lime is used as a flux and to form a slag, while fluorspar is used to regulate the fluidity of the slag. When the metal is melted to the proper temperature the electric current is turned off and the slag is drawn from the door shown in Fig. 2.

In Fig. 3 is shown the tilting mechanism on the side, also the spout at rear end with workman opening the tap hole preparatory to pouring.

Fig. 4 shows method of pouring into pig bed; the furnace, resting on trunions, is tilted by means of hand wheel and gear on the side. This iron was poured into pigs, which were later melted in the cupola in the ordinary way, the double melting entailing extra expense, which would be unnecessary if the furnace had been installed with a view to being used in the gray iron foundry, and the company has plans for an overhead carrier system to deliver the iron to the molders and do away with the second melting.

FIG. 2—SHOWING WORKMAN SKIMMING OFF THE SLAG

That the electric furnace will become a successful competitor with the cupola furnace is certain on account of the ease with which special mixtures can be melted and the quality of the resultant metal. The one outstanding drawback is the original cost. On this point we will quote abstracts from a paper by John A. Crowley of Detroit, an expert on the subject. He says: "A volume might be written on the subject of furnace design, yet in this paper I wish to touch but briefly on the mechanical and electrical characteristics of the furnace designed for foundry operation. It is often difficult for a foundry man to appreciate the cost of building an electric furnace, and when shown the figures, the average foundryman considers the price as exorbitant. In discussing furnace design, one furnace operator remarked, and very aptly so, " Give me a furnace of workable design, one easy to manipulate, with good electrical characteristics, and I will show you a furnace that will pay handsome dividends." From this, as well as from Mr. Rehder's experience, we bespeak for the electric furnace a successful career.

New Deaf Mute Institution. — The Manitoba Government, through Hon. A. Grierson, Minister of Public Works, announced recently their intention of building a home for the deaf and dumb. The institution, which will cost approximately $500,000, will be started as soon as plans are prepared.

FIG. 4—SHOWING METHOD OF POURING INTO PIG BEDS

FIG. 3—SHOWING TILTING MECHANISM, ALSO SPOUT AT REAR

Canadian Industries and the Export Trade

Canadian Government in the Past Neglectful of Opportunities —Alive to Present Possibilities—German Credit Methods of Fostering Export Trade Resulted in Enormous Business

By J. F. HEFFRON

WHAT methods will Canada use to extend her foreign trade markets after the terms of peace have been definitely settled? In what manner will Canadian manufacturers attempt to gain their fair share of trade in the commercial markets of the world now turned topsy-turvy by the exigencies of war, and in which markets a gigantic readjustment is bound to occur when the world returns once more to a normal peace basis?

The action that will be taken in regard to these questions holds a vital relation to the future commercial development of the Dominion, a future pregnant with many wonderful possibilities, and the present is the psychological time at which these questions should receive the close consideration they demand, for the immediate future promises to place before the Canadian manufacturer certain opportunities the energetic and scientific encouragement of which may develop a vast business that will exercise a steadying influence on Canadian trade for all time.

In the past, Canada has been lax in the matter of developing foreign trade. She has been content for the most part to supply only such demands as have generally been directed her way by outside forces. Too frequently our Governmental departments supposed to look after this phase of our commercial activity have given proof in such matters of an indifference only equaled by their incompetence. Our administrations have seemed totally destitute of the commercial and industrial sense in any large or broad form. When in the past they have tried to intervene in such questions they have often done so with a clumsiness which almost made their abstention preferable.

During the course of the war, and at present, our Government has taken some steps in the right direction towards obtaining a share of the requirements of the Allied nations. An attempt is now being made to broaden out the machinery originally built to take care of war requirements so that it may continue its operations indefinitely. If this work on the part of our Government is directed intelligently much good should result, but so far, its scope is confined to Great Britain and her allies. The creation of a new Canadian trade commission has just been announced. This commission will have its headquarters at Ottawa and will co-operate closely with the Canadian mission in London with a view to securing for Canadian producers a share in the business arising out of the reconstruction work in France and Belgium and other war devastated parts of Europe. If the commission be given proper powers and be permitted to use them, working in an energetic manner they should be able to do a great deal towards extending our markets, they can do a great deal in making known to the people of Europe the products Canada has to offer for sale; this in itself will be a great step in the right direction.

Our Minister of Trade and Commerce has also applied for thirty booths at the next Lyons Fair, which opens on March 1, 1919, and continues for two weeks. Some of the booths will be used for a general Government exhibit of agriculture, forestry and fisheries, minerals and metals, but most of the booths will be placed at the disposal of the Canadian manufacturers for a display of products available for exportation to France. The expense in connection with this exhibit will be assumed by the Dominion Government. This action on the part of our Government will go far to remove the lack of knowledge the French people have regarding Canadian products. While they are well acquainted with the prowess of Canada's soldier sons, they know nothing of the products of the commercial or industrial life of our country. This lack of knowledge on the part of our prospective customers has been a great handicap to the extension of our foreign markets.

Some Canadian manufacturers, it is true, even before the war, had experienced a certain measure of success in securing business outside the borders of the Dominion, but our normal export activities have been directed almost exclusively to foodstuffs and raw materials with which we are well equipped by nature to supply.

Having at our disposal the raw materials and the power with which to manufacture products, the next step to be accomplished will be to find producers. It is almost certain that peace will see an influx of emigration into the Dominion unparalleled in our history. No doubt it would be well to observe that our immigration system will require revision. Instead of dragneting Europe for people and testing their fitness to be Canadian citizens after they arrive, there should be a scientific sifting at the ports of emigration or at Government depots established abroad. However, with our present population, with our returning soldier sons, and the looked-for newcomers, we should be able to organize a force of workers, engineers, chemists, business directors and travellers second to none in the nations of the world.

Could we now direct our concerted industrial efforts, or even one-half of the concerted effort displayed during the war, to the development of our foreign commerce. Could we direct this effort towards this new problem in an energetic and scientific maner, the future commercial life of our country holds for us a vista more rosy than that conceived of by our wildest dreamers heretofore.

The manner in which poverty-stricken Germany of 1870, holding scarcely a place in economic geography, was able in some forty years to become one of the great forces of the economic world, presents certain phenomena of unparalleled interest to any consistent person interested in the problem before us.

The German Method

The methods employed by Germany in the field of international trade and finance are little known although every manufacturer has heard of the wonderful development achieved by German industry in a relatively limited period of time.

With an external trade of $5,000,000,000, the German Empire occupied on the eve of war a position second only in importance among the mercantile states, with the first place held by Great Britain. She had become the second largest producer of pig-iron and iron, exceeding even the output of Great Britain, while as a producer of steel she was again the second largest in the world. Her merchant marine, inferior in 1870 to that of Canada at present, was in 1913 outnumbered only by those of England and the United States.

From the fact of her late entry into the field of foreign trade, both necessity and competition made Germany inventive. Being one of the last to enter the world's arena for international business, she was forced to devise and use new means by which to secure trade.

International Banking

The Germans early became aware that the function of financing trade is of predominant importance. They had before them on the one hand the experience of British importers of whose trade methods they were quick to take advantage, while on the other hand they found as though prepared for them, the machinery of British banking institutions which they used for the extension of commercial credits.

The Germans financed their foreign trade largely through London, although they occasionally used Paris and other money markets. Sometimes they financed their transactions through the country to which they were exporting. In doing so they were relieved of the financial burden of trade but were under the obligation to allow their transactions to pass through the hands of foreign banks, thus revealing some of the details of their work which they preferred for obvious reasons not to disclose. Thus they early understood the necessity of entering the field of international banking on their own account.

They realized at an early date that in many instances a British bank could not, for example, be expected to give them the necessary information and ad-

vice they required because, leaving aside patriotic considerations, doing so necessitated the bank's encouragement of German competition at the expense of an old customer engaged in the line investigated and so eventually worked harm to itself. In the same measure as the old customer lost trade the bank would weaken its own position in exchanging an old and tried customer for a new and untried one.

This problem of information that is so vitally important in foreign trade—since Germany conducted her business on a credit basis—was partly solved by the creation of powerful credit organizations having branches all over the world.

Entrance into the field of international banking possessed other attractions besides. First, it was a profitable gap to be filled in the world's money-changing machinery, and thus offered profits as a business in itself. It further offered the attractive possibility of dealing in credits, thanks to the machinery of the British open-discount market. Again, banks in far-away countries had a distinct advantage of time and place. Money rates are usually high in countries very distant from the big money markets—that is the advantage of place. To instance the advantage in time, a draft drawn on a European centre from such a distant country is paid only on arrival, some twenty or thirty days later, during which time the buying house can use the money gratuitously. International branch banking is the highest form of efficient banking from the superiority of its central organization. Germany quickly took advantage of this since she could supply very little capital of her own to the country with which she was doing business, but could find the money either in the importing country itself or in the large money markets of the world. Her success proves that much still remains to be done in developing this branch of our international activity. The scope attained by Germany's trade development was due in great measure to the fact of having brought to life an elastic financial machinery so as not to be handicapped by inadequate financial instruments.

As Creators of Demand

The Germans offered credit to their customers primarily because other merchants sold chiefly on a cash basis. They soon found that credit is a creator of demand and therefore an incentive to consumption and at the same time a stimulus to production and the saving of capital. In the early stages of their experience and even later, at the height of their activities, the Germans naturally learned some costly lessons as a result of carrying too far their credit liberality. This is seen clearly in the case of Japan.

When the Germans entered the Japanese field they offered Japanese merchants credit inducements which were, as a rule, unknown at that time in that country. Japan's trade had been strictly on a cash basis until then, i.e., deposit with order, balance against documents on delivery. In 1906, when numerous failures followed the great Japanese boom, the Germans suffered heavy losses. Allowing the Japanese excessive credit and extending their indebtedness more and more, the Germans had gone far beyond the real necessity of credits and thus made the buyer overbuy. At that time the Japanese buyer, so far as the middle class was concerned, stood far beneath the European merchant. Germans had overlooked that important point. Their work accordingly had rather a corruptive influence. By straining the buying capacity of the dealer, the German credit accommodation disorganized the market rather than assisted it.

Where business ethics are undeveloped and the merchant is unacquainted with such arrangements even in his domestic trade, credit facilities may well constitute a danger. In such a country the dealer is inclined to consider goods which he does not pay for immediately as having been acquired by his own artfulness. Being unable to realize what a commercial obligation is, he will necessarily try to deceive his creditor.

Credit to be sound must be self-liquidating. In normal conditions, if less time is allowed than is necessary for the merchant to dispose of his goods, it will mean putting obstacles in the importer's way to his merchandising, and will eventually lead to underestimating his ability and thus limit his activity to the actual amount of his cash or his own limited financial arrangements. Allowing too much time to the importer means encouraging him to neglect his obligation and consequently to overbuying and speculation. Sometimes it will even make him actually forget the existence of his debt and make him fall a victim of his own embroilment and exaggeration. The Germans, however, in according their credits, took into consideration the conditions of the country. In Russia, for instance, which was known as a country of small turnovers and slow liquidations, long credits were of vital necessity, especially in Siberia and other less civilized Russian regions. As a rule German terms were 90 days sight draft or open account for the same time.

The Germans reasoned somewhat as follows: In a small German town, in every line of trade there is a certain number of small dealers who are good for a credit of a certain amount. As there are many such towns in Germany there are plenty of these small good credit risks. Now, if that is true of Germany it is true of other countries and of all the world. In business, as in philosophy, and, shall we say, in war, the Germans like to embrace the whole of the universe.

This was really something new in foreign trade. The English exporter for instance would deal only with first-class, big concerns which were already known as large importers. The idea apparently did not creep into the English exporter's head that there were other merchants besides these. The Germans thus discovered a new working class of importers. To give these smaller dealers such facilities as would enable them to buy and to pay, just as the Germans did with their domestic trade, meant, according to the theory of probabilities, to build up a sure, conservative clientele of "geographical distribution" as the financier would say. The individual units were good because small and conservative, and because credit granted them was only such as their character and ability warranted. The number was still better, since the magnitude of the number of units made it possible to depend less on any one of them.

The Merchant Marine

The Germans early understood that to own a powerful merchant marine is a condition *sine qua non* for a country which aspires to become a prominent factor in international trade. To find what is known among exporters as the "material carrier" is therefore of the greatest importance. In our Canadian export trade heretofore we have been obliged, in most cases, to either charter a vessel or use such ships in the British or other carrying trade as call at our ports. It is gratifying to know that our Government has now in course of construction thirty-nine steel vessels, two of which, the Pioneer, of 8,100 tons and the Voyageur, 4,350 tons, are nearing completion. If the good work the Department of Marine is carrying on in this connection is permitted fullest extension we may soon see the flag of Canada's merchant marine in the important seaports throughout the world.

Returning to Germany's merchant marine, it is not necessary to dilate here upon this subject. For the vast development of this line of her endeavor to capture the world's trade, she has given too much publicity for it not to be known. However, in order to give a clear idea of her progress as a sea power, these brief statistics will be of interest.

From 1886 to 1908 her commercial tonnage rose from 298,000 tons to 1,982,000, almost seven times its former capacity.

Clearings of German vessels at German ports only, and bound for foreign ports, rose from 7,900,000 tons in 1883 to 66,000,000 tons in 1906, more than eight times their quantity.

Articles for Export

The Germans did not stop at their expansion of international branch banking, credit of facilities, at their discovery of a new class of importer, nor at the building of their own merchant marine. They went further even than this. They discovered new articles to sell.

Perhaps the most characteristic feature of their export trade was a huge mass of articles for export, such as were frequently absolutely unknown in Germany, and which were manufactured solely for the use of customers in foreign countries, or in certain regions of a country, in accordance with their national needs, studied in advance.

When the Canadian or American salesman came back from a business trip as he often did, with the melancholy assertion that there was nothing to do with a certain country or section of

country for his manufacturer's goods, the Germans worded the same impression otherwise. They said instead: "The country needs such and such things. Can we offer them?" While the Canadian and the American looked to see if there was anything doing in his line of business the German looked to see what line of business there was in which he could do something. He was willing to adopt samples and to undertake the manufacture of articles for which he himself had no use in his own country. It was a difference in point of view of great consequence to the exporter. The German discounted the possibilities and opportunities, thé Canadian and American on the contrary were more on the side of conservatism and statics.

An authentic story is related by Prof. Henri Hauser, of the University of Dijon, which well illustrates this attitude of the German exporter. In Dijon, France, a certain kind of mustard tray, representing pigheads in Prussian casks, were on sale. German diplomacy becoming aware of this lèse-Prussian fact, made a protest. The ensuing investigation showed that the trays came from Germany. A French dealer, bothered by the incessant visits of a German traveller, to get rid of him gave this order, which was accurately executed.

The German went to a country with the confident idea of doing business, and since there is business in every country, he was sure of success because he was willing to satisfy the buyer as to goods, to conditions, and to terms. What he had to do was to find out what goods in his line were needed and for which there was already a demand, or for which a demand could easily be created. Whenever such goods could not be manufactured by himself he was ready to buy them in any other country in order to make sales as a broker. The Canadian and American as well as the English exporter sent his samples, very often unwillingly, in an inadequate, haphazard form, and was deeply dissatisfied when people abroad failed to recognize the usefulness of such goods.

I have been told by a Brazilian, well acquainted with the attempts of English exporters to maintain and extend commercial relations in Brazil, that the inflexible, stubborn manner in which the English merchants refuse to yield or to adapt themselves to the customs and usages of those with whom they may be dealing, accounts in great measure for the difficulties they encounter in the extension of their business.

To illustrate by example what has already been said, there are certain imported articles of commerce that the Brazilian merchant desires should be prepared, or got up in a certain way, in order to please the ultimate purchaser or consumer. If this particular way does not happen to be in accordance with English custom, or English modes of manufacture, the request is entirely disregarded. This attitude causes frequent complaints, and undoubtedly has resulted in a considerable loss of business. The motto of English merchants, judging by some, at any rate, who do business in Brazil, seem to be, observed my friend, "You must take it our way or go without," and before the present war they did go without, as to the English goods, usually getting them from Germany instead.

According to this Brazilian, the Germans impressed them as being most accommodating and adaptable on this point,. Their travellers went about studying the markets to learn what goods were required, and how they were required, and in whatsoever way they were preferred; that way was adopted by them. Sometimes the matter was a very trivial one to comply with, but, if it pleased the consumer and influenced the sale of the article, it is surely worth considering. This experience in merchandising is not confined to South America alone, it is true throughout the world. Any salesman having wide experience knows that a possible purchaser may come to a decision for or against a given article merely from the way in which it is got up, quite apart from its quality.

It will always be true of our transactions with other people, in order to get the most profit for ourselves, we must think more of the other and less of ourselves. That was the German merchant's psychological policy, and it was found in the smallest details and technicalities of his work in international trade and finance. It was in the German merchant's readiness to satisfy any reasonable demand of the customer. It was in the adequate and desired packing, in prompt, accurate delivery, and shipping, in punctilious performance. It was perhaps, before all, in the courtesy of not only refraining from sending to a country a man unfamiliar with its language, or of sending one speaking the language but without business education, at least concerning his line, as did other merchants, but of avoiding as well corresponding in any other language than the buyer's.

The German Valnays printed catalogues in the language of the country to which he sent them. There are still many people who do not understand that it is a waste of time to address a foreigner in any language other than his own, for, even though he understand it, he comprehends with difficulty, and the message is not as clear to him as when written in his native language. Moreover, a German catalogue in two different languages was not a mere copy from one language into another. It was a real adaptation, not only in style but in substance, and in the selection of goods presented. The adaptataion was made according to the needs of the buyer. Thoroughness was disclosed in this feature as in other work.

This success of the German exporter was also due in great measure to his custom of quoting laid down prices in the town of buyer, and in his money, as well as in terms of his own weights and measures, thus giving him an exact idea as to the total cost of his goods, an advantage which other importers overlooked.

The German exporter endeavored to reduce the effort of the buyer to the minimum, leaving to him his only natural function—selling—and taking up all others, such as the custom broker's, the commission merchant's, who previously bought for cash and resold on credit to the merchants, they made the dealer more or less independent in his function of merchandising and opened his way to success. By all these methods they abolished that grim spectre of the smaller merchant, the wall between foreign and domestic trade. All this of course was not done for charity's sake but because the German realized that his prosperity had only one basis, namely, the friendship, interest, and prosperity of his buyers.

Cheapness of German Goods

The cost of German labor, contrary to the popular belief, was at least as high as in France, and only a little lower than in Great Britain. It was higher than in all other countries of Europe. In order that we may not wrongly conclude that with our high cost of labor in Canada we cannot hope to compete in countries where labor is lower in price, we may note that the higher cost of labor in Germany did not prevent Germany from conducting successfully business with countries where labor was incomparably cheaper: Italy, Austria, Russia, Spain, etc.

The cheapness for which German goods were famous lay in the fact that the Germans, like the Americans, indulged more and more in manufacturing on a vast scale, although they did not go as far as the Americans, among whom it is common to refuse an order which slightly departs from the standard.

The Germans' chief reliance was on research, since their genius knew but little of inspiration and real inventiveness. On the contrary, it was the country of application, assiduity, and thoroughness. In the course of their tremendous self-growth they became aware of the disorganizing, conflicting contradictions of our social life which results in waste of every kind. The reason for this waste lies in the fact that a million wills are freely directed towards different vaguely determined ends, and the resultant force of these conflicting cross-purposes is what determines our social regime.

This waste of energy is to be seen in all the activities of our social and industrial life, in the mills and in the schools, in our science as well as in our religion, in our family as in our everyday life.

It is because there is too little organization of any of our activities, except as they have been organized under Government control for the success of the nation at war, which action on the part of our own and the other allied governments during the course of the war seems a sufficient proof that our former methods lacked the efficiency that is to be attained through co-ordination.

It is easy to understand that the correction of this waste should begin in the economic field. In business, in the factory, it means a saving of money. The business interpretation of energy is

money. It is there that it was first discovered because these every-day arguments for competition are sought. Time and motion studies mean a paying argument in the hands of a manufacturer. Once this is begun it will naturally continue and spread to all of our activities.

As an instance of the beneficial results shown by these efficiency methods, we may point out that Germany had fifty blast furnaces less than England, yet in 1907 Germany was able to produce 2,000,000 more tons of pig iron because of her system of distributing labor, her co-ordination of industries, and her mechanical improvements, and yet it was not long ago that the iron industries in Germany were conducted by English mechanics and engineers.

We talk of efficiency and system, but the Germans not only talked, they did them.

It is true that perhaps no other nation could unite the different contradictory wills of its members so efficiently. The reason for this lay primarily in the German character accustomed to discipline and obedience. That is why the orders elaborated and sent from above were so diligently and emphatically executed by the people. Other nations were undoubtedly eager to develop, but the ways and means employed by them to bring about such development have been entrusted to politicians rather than to experts. The Germans looked for the practical benefit-bearing side of a science, for science applied. German international policy was an international enterprise, a business enterprise conducted on a scientific (logical study) basis under the benevolent auspices of the Government.

There are too many features involved in this assistance given by the state to German concerns in their foreign trade enterprises to treat of it in this article. Perhaps we may doubt the value of the German system since it became the blind tool of an imperialistic ambition in the German plan of international politics. But this need not be the necessary outcome of such a system properly applied. We have written of the good points in the German system, and many of these, were they incorporated in our own social and industrial structure, would undoubtedly redound to our own material advantage.

It is our hope that these few details of the great structure which comprised the German international trade policy will have been of interest to the reader who has followed us thus far. We hope also that our Canadian manufacturer will insist upon some practical form of Imperial co-ordination in trade. This it would seem can only be attained by securing the close and untiring interest of Canadian manufacturers who will insist upon an efficient political administration, and who will develop their future expansion along scientific lines. If this be intelligently and scientifically done we may look forward to a greater future for the greatest overseas Dominion under the British flag.

WOOD BLOCK FLOORS

It is of the highest importance that the ground beneath a wood block floor should be prepared absolutely firm and unyielding, and the surplus earth from the foundation trenches should be evenly distributed over the whole surface so that by exposure to rain before the building is covered in, and the constant traffic of the workmen for a period of several months, the bottom will become thoroughly hardened and consolidated.

When the ground is firm enough the surface should be levelled off at a depth below the floor level equivalent to the combined thickness of the gravel filling, the concrete bed, the cement floating, and the wood blocks, so that the face of the latter may finish at its proper level. On the levelled bottom a filling either of broken brick or of rough gravel should be laid to a thickness of not less than 6 to 9 inches; if dry gravel is used it should be well damped and then rammed down to its proper level.

Next comes the bed of concrete which should be not less than 4 inches thick, and as it is necessary to bring this to a true face, pickets should be driven in in rows about 9 ft. apart and levelled to each other so that their height above the gravel filling is equal to the thickness of the concrete. These pickets will act as guides to which screeds can be laid, and when the concrete is filled in it can be struck off level from the screeds with a 10-ft. straightedge.

The concrete should be gauged 5 to 1, that is, five parts of clean washed gravel to one part of cement; these proportions should be carefully measured and not merely approximated. It should be seen that the gravel is really clean, and that gravel and cement are thoroughly mixed together while in the dry state, which can only be secured by turning the mass over at least twice.

When ready for wetting, supply the water through a watering-pot or a hose fitted with a fine rose; water poured from a bucket or from a watering-can without a rose is so irregularly and unequally distributed that much of the cement is washed out and lost. The common practice of flooding the concrete with water to save another turning over should not be tolerated; satisfactory results can only be obtained by steady watering, even though this may entail an extra turning over to bring the mass to a proper consistence.

When the concrete has become firm enough to walk upon, the cement floating should be done; it should be from ½ in. to ¾ in. thick, and gauged 1 part of cement to 3 of good sharp sand, thoroughly washed. Dots should first be levelled and screeds run about 9 ft. apart, and as soon as the screeds have become steady the body of the floating should be laid in and struck off level from the screeds with a long straightedge. No attempt should be made to finish the face with a hand float or hollow places would result; as soon as a room is completed it should be barricaded, and when the floating has firmly set, scaffold boards should be laid down so that the cemented surface may not be damaged by walking upon it. The laying of blocks should be deferred as long as possible in order that the cement may become thoroughly dry. The time taken in drying will depend upon the weather and the time of year, but in any case several weeks will be required.

If the laying of the blocks is deferred to the latest possible moment they will not be so likely to sustain damage or to lose their freshness in consequence of traffic over them with dirty and heavy boots, for although the floor, after being cleaned off should be thickly covered with clean sawdust, which should be kept on to the last, currents of air will expose portions of the floor, which are pretty sure to be walked on, and stains and nail marks will be the result. For these reasons it is better that the blocks should not be delivered and laid till they are actually required. They are very dry, and therefore very sensitive to moisture, and if allowed to get damp before they are laid, especially in the winter time, open joints may be expected in the following summer; if, on the other hand, the blocks, though perfectly dry, are laid upon a damp bed, no surprise need be felt if the floor rises.—M.E.

HETEROGENEITY OF STEEL

It is explained that if a section of steel be polished and treated with dilute sulphuric acid the markings will be dependent on the rolling, while iodine will color the impurities and a cupric solution will leave stains. The results visible to the naked eye are designated "macrography" in contrast to "micrography," which shows quite different results.

In the tests specially described in this article the authors state that they believe the macrographic heterogeneity of the steels is due to oxygen left in a solid solution in the metal, and they give the reasons for this opinion. The tests were made upon electrolytic iron alone and with the addition of sulphate or phosphate of iron in silica tubes heated in a gas furnace with a blast which raised the temperature to the fusing point of iron in 40 seconds. The chemical composition of the test pieces was as follows:

(1) Electrolytic iron melted alone; (2) iron oxidized during fusion; (3) iron containing 0.136 per cent. of phosphorus; (4) iron oxidized and containing 0.168 per cent. of phosphorus; (5) iron with Fe_2O_3 added; (6) iron oxidized and containing 1.19 per cent. of sulphur.

The existence of oxygen in solid solution in the iron may afford an explanation of a fact pointed out some time ago by Mr. Mahler—e.g., the electrical resistance of merchant steels can be calculated very exactly from their chemical composition and by allowing a determined resistance for each of the foreign bodies in the iron. (Comptes Rendus, September 30, 1918.)

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

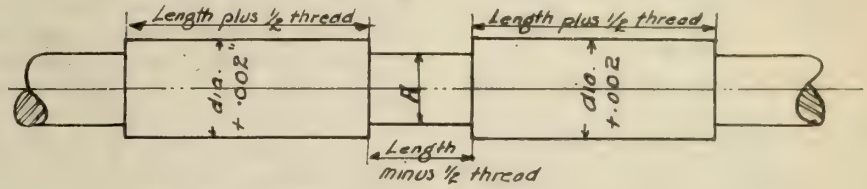
RE-DRAAWING STEEL IN THE MACHINE SHOP

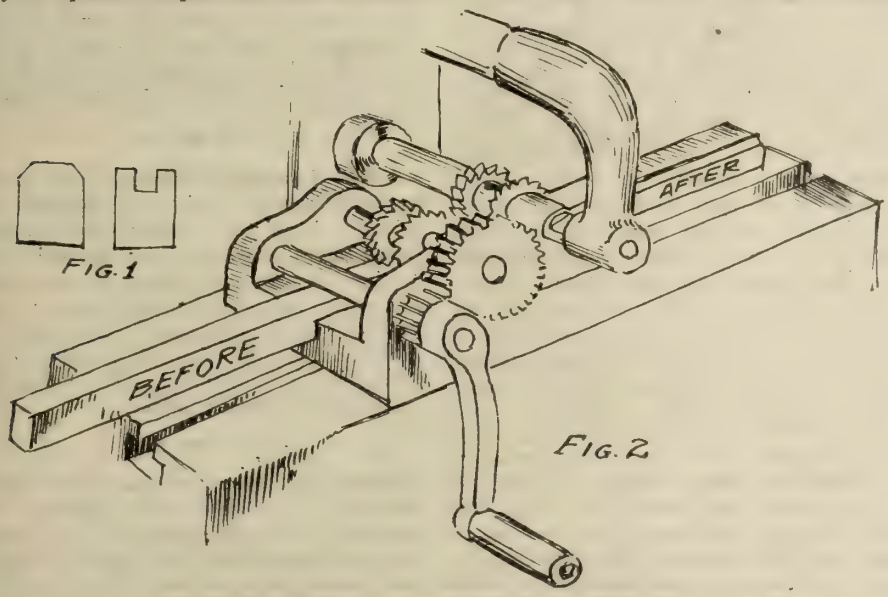
By D. A. MIDDLETON

THERE was a time when manufacturers could get two hundred pound lots of cold drawn steel of odd sizes and shapes, and get it at a month's notice. But that was before 1914. Numerous manufactured articles were built up around a piece of steel so cleverly drawn that a piece machined to the same shape could not compete with it. When the mills got to where they could no longer handle special work, many of these articles disappeared from the market.

A device for converting standard shapes of steel into specials—redrawing it, as it were—is shown by Fig. 2 and in Fig. 1 will be seen two of the simpler forms that by its use were made possible at low additional cost. In this case, the bars as received from the mill in the form of specials had always been put into saws and millers and cut up into the desired lengths, which varied from one-half to one inch. It would have been manifestly too expensive when the supply of special shapes was cut off to cut up regular stock and then mill the pieces to the required form as previously drawn, but, by the use of this device, mill length bars were run through and shaped before they went to the milling machines.

Reference to the drawing shows that the work was done on a milling machine. The machine is set up for producing the piece shown to the left in Fig. 1. Two bevel cutters correctly spaced on the arbor assure a duplication on all the bars. The bar to be shaped is fed against the cutters much as if it were held in the vise, but the table does not move in this case. The bar is fed through a slot in a shoe of cast iron bolted to the table, fed by turning the crank at the side, which drives a pair of 45° cutters that bite into the corners of the bar just enough to drive. Feeding at the rate of twelve inches per minute transforms standard shapes to specials at a low figure. An adjustment is provided for different widths of bar. With the shape at the right of Fig. 1, the corners are not taken off and the feed cutters leave their mark, which is not objectionable in this case when the burr is filed off. Sometimes the desired shape can only be made by running the bars through twice. It has proven to be a quick method of getting what was wanted when it was wanted, and at no great initial expense.





MILLING MACHINE USED TO SHAPE BAR STOCK.

MAKING TWIN SCREWS FOR TWO JAW CHUCKS

By H.R.H.

This is a job which often causes the average machinist more or less concern. Both right and left hand threads on the one bar, both start at the same line to insure a true gripping at the jaws of the chuck.

First operation. Center and turn the stock to size plus .002" in the portion to be threaded, turn ends and center journals, not to size, but to outside diameter of screw minus the double depth of thread to be cut; make length of threaded portions one-half thread longer than required, as described below.

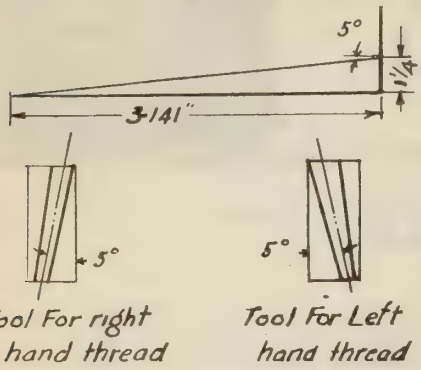
Second operation. Place in lathe centers and scribe a line from end to end, Then starting to cut thread with the tool cutting edge dead on the center line, and a full width inside of the end, doing same for both right and left hand threads, cutting until the reduced portions are merely touched. Finish journals to size.

HINTS ON CUTTING SQUARE THREADS

By H.R.H.

Considerable difficulty is often experienced when cutting square threads, because the back of the thread is often torn by the tool, when near the proper depth. This can be entirely overcome by the following rule: Strike a line the

exact length of the circumference of the screw to be cut, then a line square to it at the bottom; on this strike off the length equal to the pitch of the required screw; join this point and the top end of the circumference line; this gives the angle at which to grind, or



TOOLS FOR SQUARE THREADS

set the tool over to prevent tearing. Thus: If we want to cut a thread one inch diameter four pitch, the circumference of the one-inch circle is, 3.141"; the pitch is ¼ in.

PATENTS AND CONTRIBUTIONS

By A. S. H.

It is a debatable question as to how to make the best use of a new idea, that is from the point of view of its originator. When the bright and glittering thought or improvement first swims into consciousness one is apt to look carefully round in a rather suspicious maner to make quite sure that no halo of glory betrays its existence to the onlooker. With stealth therefore we nurse the new found infant until leisure gives time to reflect. Of course difficulties will arise since it must be tried out and probably adjustments and amendments are still to make. However, there is a positive conviction we are on a good thing and the query is how to get the most out of our discovery and turn original thought to best personal advantage. The next scare is whether our device is first in the field and how many promising first thoughts have come to grief upon the obstacle of prior discovery it would be gratuitous to count, the number would be endless. Exploitation of a new device is essentially costly and troublesome, marketing and selling is to the mechanic a new untried and doubtful field. We do not wish to give anything away, and ideas submitted to an employer have ever been suspect, or rather good faith for valid reason if it's suspected in this connection.

It is necessary to decide therefore whether the idea is patentable, if a market exists and again the economic possibilities open, at this assuming that the idea is sound.

A first patent is a very precious thing but essentially costly if of real mechanical importance, apart from state dues and agents' fees. The amount of time consumed in getting the thing in a really practicable and economic condition is considerable. Trying to break down the iron wall of prejudice is a lengthy proceeding, and all the world in the shape of manufacture seems in league to destroy confidence in the inventor. Considering that 95 per cent. of patents do not produce enough to pay renewal fees and that probably only one per cent. brings home substantial returns, it is questionable whether patenting even a device showing promise, all things considered, is worth while.

Even the basic patent which starts a new industry rarely returns anything at all to its originator; he does missionary work, breaking inveterate prejudice for little if any return. If the device is an improvement the existing device probably fills its purpose in a sufficient manner that no one is willing to pay the royalty involved for the new design. Collaboration with an employer is beset with many pitfalls and the inventor can hardly hope to compass affluence in this wise. It must be always remembered that the majority of improvement patents are in restraint of trade to prevent flagrant copying by competitors.

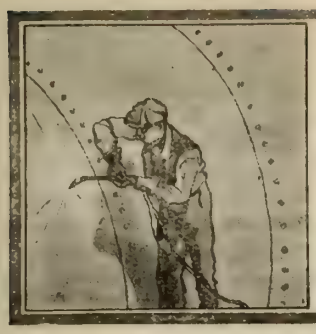
The fact remains, however, that most first rate mechanics have at some time or other been bitten; at first they were afraid to give details save under the seal of secrecy. Later on in desperation they would be glad if some enterprising individual were to steal the idea; something might be made out of infringement.

The total revenue of the business of patenting has never been disclosed; agents' fees, state dues, experimental work, time absorbed and advertising expenses must total a huge sum. It is doubtful in the writer's opinion whether the total business return (which is a penalty laid on the community at large) equals the expenditure. Yet the community as a whole benefits from the industry of patenting. It may be a lottery to the inventor but it is the patent office files which blazon the path of mechanical evolution. The state makes a profit out of the fees and by citing interferences helps to clarify the ideas and the original work done educates the inventor. but the effects are largely intantor. Thought, like matter is indistructible, but the effects are largely intangible, for the material returns do not balance the outlay. In all probability without the bait of possible large returns (the exceptional instances are for many reasons prominent) mechanical art would not have progressed in the same rapid maner. There is an alternative to patenting, whose returns are certain if not large, the worries of which are infinitesimal, there are no state dues to pay and the originator of quite a simple improvement gets due credit: **Sell your ideas to the technical press.** It is quite a while since the writer came to the conclusion that it is better to publish than to patent. Moreover, ideas have a value expressible in tangible form and the technical press exists to ventilate them. He frankly confesses his failure as an inventor, inasmuch that his attempts, which were submitted to various critics, elicted commendation at all events in those quarters not likely to manufacture. His failure in the business of marketing led him to the belief that sale in the form of contributing was at all events the more profitable plan. He believes his views are shared by others; at all events the returns are prompt and secure and involve neither renewal fees nor agents' accounts.

The Heald Machine Co., Worcester, Mass., have recently issued a new catalogue on their magnetic chucks. The use of magnetic chucks for holding work to be machined has greatly increased during the past few years, and this catalogue deals with many applications of the chuck and the different varieties needed for various classes of work. It is stated the adoption of magnetic chucks will often increase the production of a machine 50 per cent. or more by the elimination of lost time in setting up the work. Another benefit attained by the use of these chucks is the greater accuracy of the work produced or when firmly holding thin pieces the chuck does not warp the work as is so likely to happen with ordinary holding devices. Illustrations and descriptive matter given show very clearly the use of the Heald magnetic chuck for quantity production and for the holding of work which has to be machined by the taking of heavy cuts. The chuck is shown holding thin pieces of work and holding other work of similar nature for quantity production. The mechanism of the chuck itself is very clearly explained by numerous illustrations and descriptive matter and arrangements for different classes of installation are also dealt with very fully. In many cases it is advantageous to have the chuck so held that it may be pivoted about one or more centres as desired, and for this purpose the Heald Company manufacture a taper and Duplex holder for their rectangular chucks.

Large Locomotive Order.—The Montreal Locomotive Works have recently received a large order from the Canadian Government Railways for several locomotives of the type known as the Santa Fé, which are considerably larger than the well known Mikados. They are the heaviest type of locomotive used on the Canadian railways and are noted for their great hauling power.

Comes to the States.—The James Howden Co., a well known English firm engaged in the manufacture of forced draught apparatus for marine boilers, also water tube boilers, have opened a factory and office at Wellsville, New York State, where they will carry on the manufacture of their various lines. They have fitted a number of the ships for the Imperial Munitions Board with their boilers and forced draught systems.



WELDING AND CUTTING

DIFFICULT REPAIRS SUCCESSFULLY ACCOMPLISHED BY WELDING

THIS article and illustrations are descriptive of repairs effected by the oxy-acetylene welding on a crank shaft and piston. The crank shaft, which belonged to a compound three-cylinder hydraulic pump, working against a pressure of 900 pounds per square inch, had developed a crack across the web of the high-pressure crank. This may have been caused in any one of several ways, which are immaterial here. An attempt was made to repair it by making long clamps to fit over the length of the web, and shrunk on to draw the crack together. The clamps were bolted as shown by small bolts, ⅝ inch diameter, which served to hold the clamps in their place. This was not a successful remedy, needless to say, as it was but a short time until the working of the crank caused the clamps to get slack, and allowed the crack to open and close at each revolution. This went on until the crack had gone right through the web, the crank shaft then being in two parts. It was decided to have the shaft welded, it being impossible to get a new shaft for some months, deliveries being so uncertain. The shaft was about 10 ft. 6 in. long, with three cranks, and about 4½ in. diameter, and weighed about 1,200 pounds. The welder elected to perform the job with the shaft on end, as he could work it more easily in that way. One end was put in a pit and shored up solid, and the part of the broken web on that piece beveled off. The other half of the web being beveled off to make a V when the shaft was put together, the other end of the shaft being lifted up by a pair of chain blocks and the halves of the web brought together. The job was now ready for blocking up, and this was done by leaving the top half hanging on the chain blocks and shoring from the wall to prevent moving. The welding then took place. The actual time for preheating, forming the V and welding, not including the setting up, was five hours. The next job was putting the shaft in the lathe, and when this was done it was found to be out of true. The torch was applied to the crank pin of the welded crank, and when warmed up to a red heat the shaft was tapped on the high spots till practically true. The bearing journals were then touched up in the lathe, about 3-64 in. being taken off the outermost bearings to nothing at the centre ones. This job lost something of its success by faulty machining, as after the shaft was put back in the pump the high-pressure crank pin was found to be slightly out of true, a fact which gave considerable trouble in the running. The welding itself was a strong and well finished job, and as far as it was concerned the shaft was as good as new.

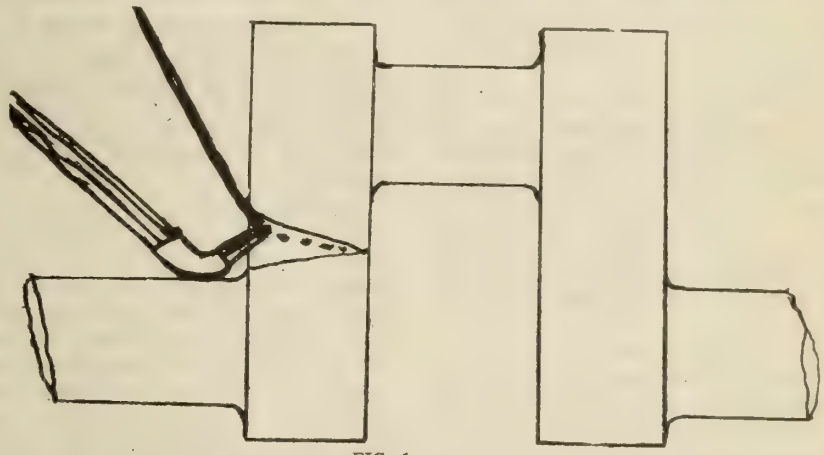


FIG. 1

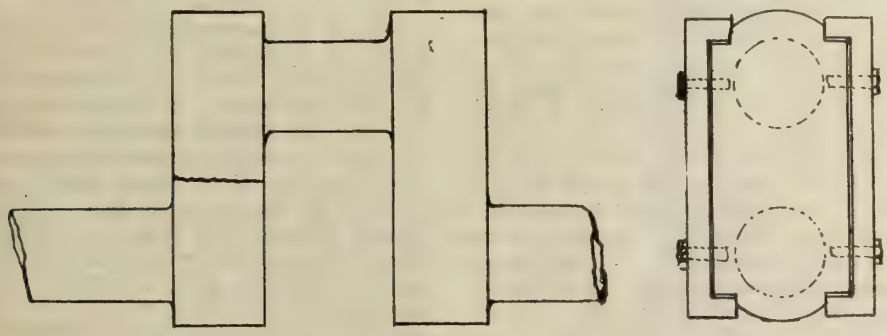


FIG. 2

The accompanying illustration (on page 16) shows a broken piston follower plate, which belonged to the auxiliary hydraulic pump and had the bad taste to get the follower plate broken in three places while the shaft of the main pump was away getting welded. This occurred through one of the follower plate cap bolts working out and fouling the piston, breaking the follower plate and a piece out of the piston. The break occurred on Saturday morning and the pump had to run on Monday or put a large part of the factory out of business. The factory being situated some thirty miles from town, and no welding facilities being available on the spot a long distance call was sent to the welding company in town. They were instructed to have everything ready to start on the job as soon as it arrived in their shop, and to get it finished and ready to ship out again the same night. The job arrived at the welders at 2 o'clock and left there again at six, completed. The piston was a 16 in. diameter, and the follower and piston together weighed 150 pounds. It had to be welded carefully so as to go back in the cylinder without turning or fitting, and these conditions were fulfilled and the pump put together Sunday morning. This shows the possibilities of welding in emergencies and the value of having an outfit on the premises if the size of the plant warrants it.

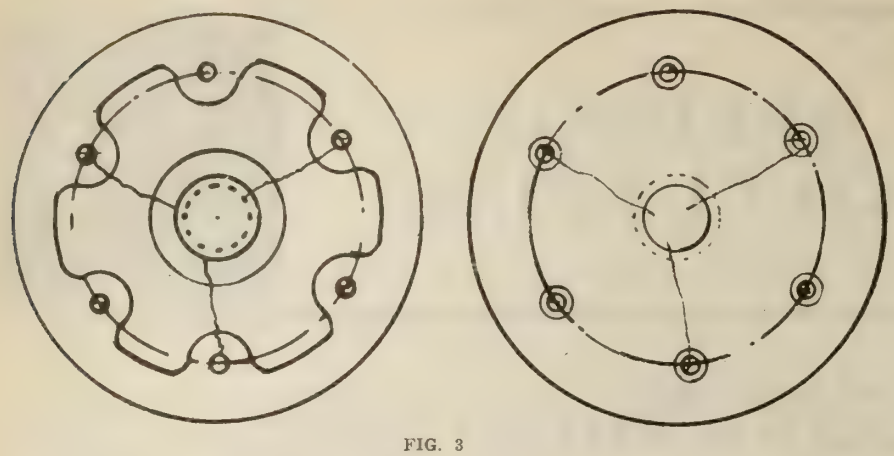


FIG. 3

PURCHASE AND SALES

By A. L. H.

"Well bought is half sold," is an axiom of business so true that its quotation would be superfluous unless there were good reasons for its mention. For some hidden and esoteric mystery, purchase is apt to rest almost entirely with the clerical staff.

Few, indeed, are the firms who delegate a qualified technician to do their buying, though there seems ample justification for such a counsel of common sense. We hear much about the sales engineer, his training and functions, but the department upon whose economic functions rests the ultimate price of the finished goods has received less attention.

The reason why commercial travellers are a separate and peculiar caste, in few instances having definite and first-hand knowledge of the wares they offer, is a most puzzling problem. Is it because the technician is hedged around with technicality that he rarely makes an expert salesman, or is it mainly because he will not submit to the treatment meted out by a large number of firms, who make the less brass bound feel like a small boy guilty of misdemeanor? Some firms whose own representatives are expected to bring home orders are the reverse of courteous to the representative of another firm calling upon them.

New Standards Needed

Buying is certainly an art at least of equal importance with sales, and, in fact, the buyer and seller are so intermixed in a large number of instances that it is difficult to sort out where one activity ends and the other begins. Few firms are buyers or sellers only—most are both, and as a consequence there is no valid reason why a new attitude should not be displayed. Possibly one of the reasons why the selling representative gets such short shrift is because his limitations are obvious to the buyer. There is a new standard wanted of real qualification on both sides—the buyer qualified to know value and the seller qualified to meet expert questions upon level ground. It is possible also that commercial representation in a personal sense has been much over-done, and too much accorded to the breezy personality of the man who travels.

In engineering buying, if engineer meets engineer less time is wasted than if the usual representative meets the usual buyer, neither of whom is competent to discuss, without further references, the finalities of the deal.

Discrepancy in Prices

One thing which puzzles the buying engineer is the enormous and disproportionate prices tendered for identical material, where the requirements are explicit and the tenderers are keen for business.

Between highest and lowest bids for identical material there is sometimes as much as 100 per cent.; such a disparity points to a loose screw somewhere. Many firms resent it if they know they are put in competition with others, and expect naturally to obtain subsequent orders merely because they have been favored previously, but right buying consists in selection and elimination—not in precedent. It is, of course, difficult to place competitors on the same basis, but right buying consists in seeing that bids are obtained for identical material. Where the credit of the purchaser is good and payment prompt there seems little excuse for differing prices, if the quantity be equal; yet such disparity is too often found. It implies that the buyer is less keen, that his instincts are less acute and that the vendor is piratical in intention. Nearly every traveller will, if present, shade his price somewhat, and this presure is in essentials a vicious thing. Equal price for equal quantity to all customers is the correct attitude; if the price be altered it should be to all alike. The point is raised because it is by no means universal practice; in fact it is rarely practised at all. To take advantage seems commerce, as understood by most of its exponents, and it is submitted that there is, or can be, no justification for such an attitude. It is, moreover, obvious that in a concern of some magnitude a single purchase authority must buy. Its first function is to obtain explicit requisition, quality, quantity and precise conditions are obvious, and it is the technical end which must settle these points. The chief of the purchase department in an engineering or metal working concern should be a broad-minded, common-sensed, trained and qualified engineer; he should have the commercial experience in some shape or other, but this is by no means indispensable. It is part of his functions to be responsible for stock and stock keeping of all material; he should in effect be the store's superintendent.

It is also part of his business to suggest that where expensive material is in question other material equal for the purpose might be tried. It frequently happens that the designer whose acquaintance with prices is very remote, specifies material, and in many instances may be led to revise his views by moral persuasion. The substitution of cheaper material has in many cases led to large reductions in cost.

The Right Buying

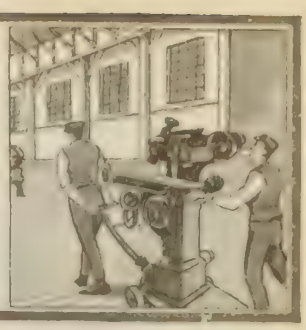
However, premising that the cost is justified, hand-to-mouth buying is the most expensive method. Incremental buying for regular delivery in specified amounts at due intervals, from a basis fixed for periods of months, is the wiser course. Obviously, it is unwise to keep large capital tied up, and for this reason alone the purchase department needs to exercise care. The buyer may shade the price 2½ per cent. if he stocks up for a couple of years, but the money so expended ought to be charged interest. There is one asset every buyer believes he has, this is intuitive fore-knowledge of market-changes, but a man so blessed should be in the financial world pure and simple. For the manufacturer there is only one counsel—when in doubt follow the market.

The Trade Press

The main raw materials of manufacture anywhere gets prime consideration, but the less prominent deserve at least as much consideration. The hardware requirements of an engineering firm often involve quite large aggregate sums, and it will pay any purchase engineer to become acquainted with the trade press. By this is meant not so much the technical journals, which deal directly with engineering products and material, as those which are erroneously assumed to belong to a different category.

Perusal of these often serves directly to impart information of source of supply otherwise outside the knowledge of the purchase agent. It is very curious how the odd bits of knowledge become vital over a lapse of years, even the most casual reading of the trade press helps to keep the buyer up to date. At the present moment more than ever, diligent search through advertisements will uncover possibilities quite unrealized. Yet many firms with some false notion of economy have chosen the present time to save by withdrawal of subscriptions and rigid cutting down of the journals taken. The fact is that the present moment is one to extend the list, the price of a subscription is more than covered if a single pointer proves of service. The problem at the moment is not selection from many alternatives, but the discovery of some source from which delivery at a reasonable date may be expected; hence the value of trade press advertisements and notices.

DEVELOPMENTS IN SHOP EQUIPMENT



Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

TRAVELING RADIAL AUTOMATIC SCREW DRIVING MACHINE

THIS machine has been designed for work that is too large or heavy to manipulate by hand, but which comes within a convenient range of dimensions where it can be served by a machine of the traveling radial type.

For a class of work that may be built up on a bench or special form and that has screws driven before removal from bench or form, a movable or traveling machine can be used to advantage. The machine illustrated is entirely controlled by one operator.

The usual spindle bearing driving mechanism and magazine are mounted on a head which is carried on an I-beam. This I-beam being attached to a pivot bracket that turns in pivot bearings in a saddle which is mounted on a column and is adjustable for a height within any convenient working range.

The head carrying the magazine and spindle mechanism is mounted on the I-beam wtih roller bearings, making it very easy of operation for lateral adjustment.

The Reynolds No. 5 radial can be equipped to handle a range of screws varying from No. 2, ⅜-inch in length, to No. 8, 1 inch long. Power is provided by electric motor mounted on pivot bracket and coupled direct to the spindle shaft carried under the beam.

The carriage or base has wheels mounted on ball bearings. The carriage is moved by hand cranks placed at end of beam near operator's usual position, the connection to the axle being by shaft and universal joints.

In operation the driving of screws can be started at either end of work and longitudinal lines of screws driven by combining swing of arm, movement of head on arm and movement of carriage, and the lateral or angular lines of screws are driven by movement of head or arm, swinging the arm and moving the base to new position as required.

While any range of action within reason may be secured, this machine will cover a width of 36 inches, giving angles of 30 degrees, or a width of nearly 4 feet in direct cross lines at right angles to column. Obviously any reasonable length can be secured by making provision for electric wires. The controller for operating machine is carried by the same bracket that carries motor, thus bringing it within easy reach of the operator.

Reynolds screw driving machines are all power driven, thoroughly automatic magazine machines—dump a gross or more of wood or machine screws promiscuously into a hopper, press a lever and the screw is driven quickly without marring, to any desired depth, by a spindle running from 600 to 800 R.P.M.

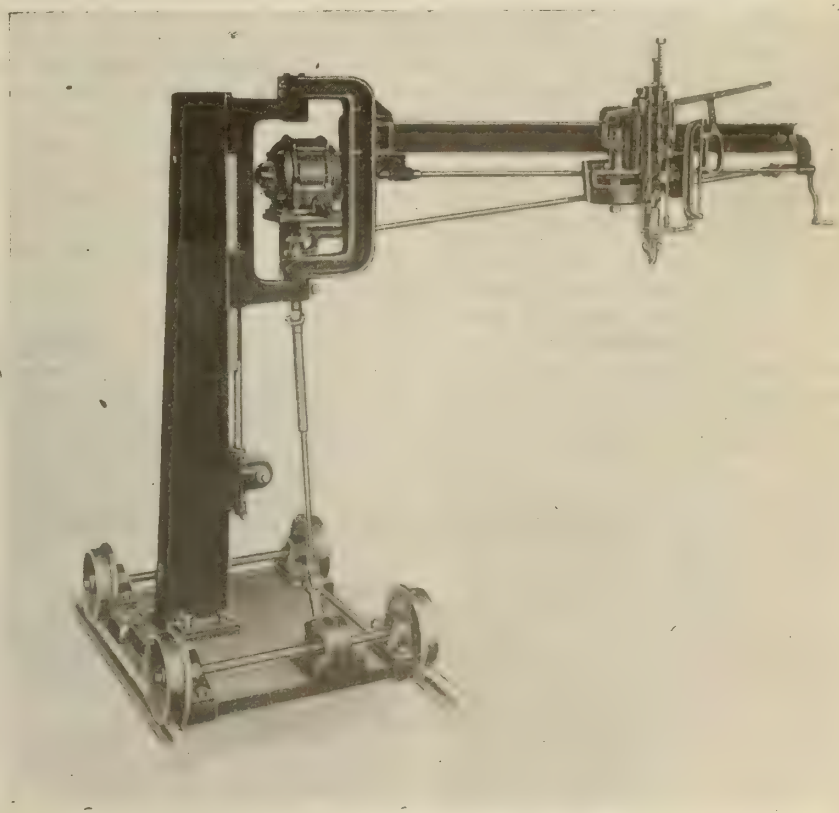
Reynolds screw driving machines are all equipped with friction-driven spindles, permitting screws to be set as tight or as loose as desired.

This machine is also manufactured with a fixed base, retaining all the features of the traveling radial with the exception that the machine remains stationary and is used where work can be carried by truck or otherwise placed within range of the radial arm.

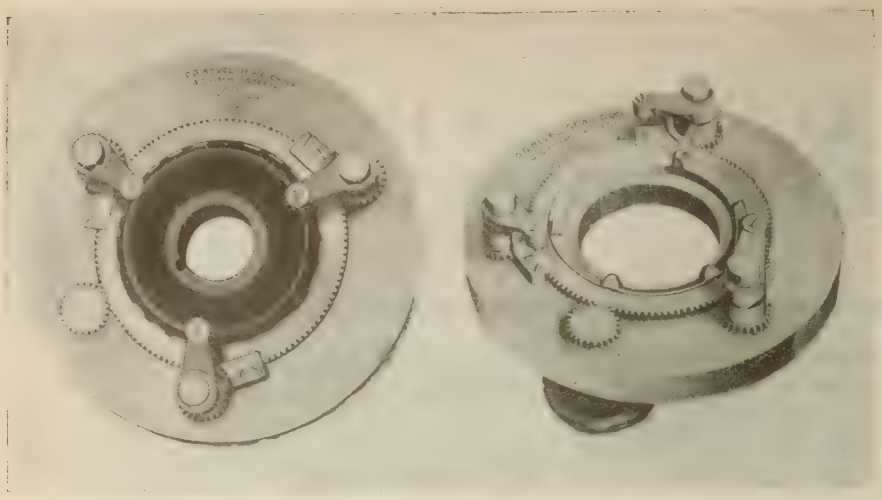
The machine is manufactured by the Reynolds Machine Co., Massillon, Ohio.

BEVEL GEAR CHUCKS

The illustration shows a new chuck designed by the Garrison Machine Works, Dayton, Ohio, for the holding of bevel gears. The gears are held by means of the chuck true with pitch diameter for grinding or re-machining of the holes or integral parts of the gears. The actual chucking time of a gear of 6 inch pitch diameter is only 5 seconds. No measuring, truing up, indicating, or experienced being required of the operator. A knob is turned on the back of the chuck after the gear is inserted in it and it is automatically located, absolutely located, absolutely true, and clamped up perfectly rigid without the least care or exertion. The design of the chuck is such that it is beyond the control of the operator to put any undue strain on any part of the chuck or any part of the gear being chucked. Neither is there any means of mutilation through the improper handling, unless it is de-



RADIAL SCREW DRIVING MACHINE



BEVEL GEAR CHUCK

liberate. The chuck can be applied to any grinder in the same manner and as readily as the ordinary 3 or 4 jaw chuck. These chucks are counterbored in the back to be located perfectly on the spindle. These chucks were designed owing to the insistent demand for a chuck which would be suitable for the holding of bevel gears, and were developed by the manufacturers through their making the Johnson gear chucks for straight-faced gears. The bevel gear chuck is as rapid and as simple to operate as the other.

DOUBLE SPINDLE SHAPER

The Oliver Machinery Co., of Grand Rapids, Mich., has invented a new and very useful as well as compact motor drive for double spindle shapers, using standard vertical motors.

As shown by the attached illustration a separate motor is used for each spindle. Each motor is mounted on vertical gibbed ways, adjustable by means of hand wheel and screw so that the motor can be located at any height desired shown by the scale as called for by the height of the spindle to suit the work.

Each motor stand is independently adjustable to and from the shaper to suit the length of belt, to allow the use of a straight vertical belt and to have means of taking up the stretch of belt so as to make belt tighteners and similar devices absolutely unnecessary.

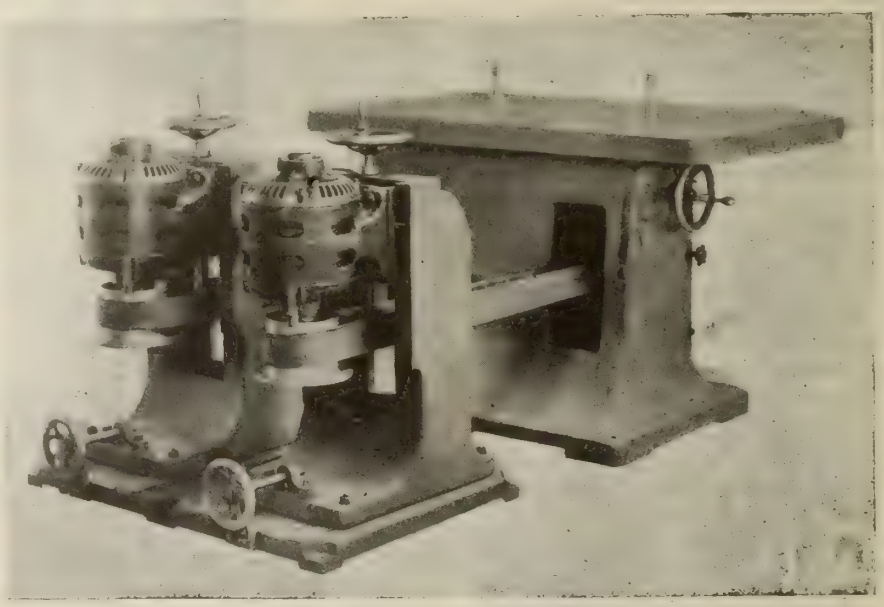
Either shaper spindle can be run independently by merely throwing out the switch for the motor operating the other spindle.

This new motor drive arrangement takes up far less room on the factory floor, because a distance of only 5′ between centers is required, making the actual floor space about 7′ long by 5′ wide, the only amount that is taken up by the machine.

This arrangement uses standard vertical motors of any kind as called for by the electric current in the factory doing away with the need of highly specialized built-in motors. This motor drive arrangement can be furnished not only with new shapers, but for shapers now in use. Any kind of starting units for the motors can be furnished.

The Chemical Catalogue Co., Inc., 1 Madison Ave., New York City, have issued the third edition of their chemical engineering catalogue containing 836 pages, 9x12 ins. The work is a book of reference for chemical engineers, buyers and others seeking information on chemical and and metallurgical equipment, machinery, chemicals and supplies. More specifically it is a collection of catalogue material and indexed data relating to the above subjects, and is the equivalent of a shelfful of miscellaneous catalogues condensed into a single book. It is published annually under the supervision of a committee appointed by the American Institute of Chemical Engineers, the American Chemical Society and the Society of Chemical Industry. The list of materials, equipment and chemical supplies is as broad and comprehensive as chemical science itself, and includes chemical engineering equipment and supplies, heavy and light chemicals, dye stuffs, alloys, ores, oils and raw materials for manufacturing industries. Two hundred and nine pages are devoted to a classified index of equipment and materials, and the variety of subjects covered is indicative of the enormous growth of the chemical industry in America during the past few years. The condensed catalogue section contains the announcements of the majority of firms either manufacturing chemicals or equipment for the chemical industry including the scientific and laboratory apparatus required for the accurate control of industrial processes. The chemical and materials section includes the principal manufacturers and important handlers of heavy and light chemicals, dyestuffs, adhesives, oils, alcohols, starches, soaps, sizings, ores, alloys and raw materials required in the various industries of today. In this edition a technical book department has been added at the request of a large number of users of the catalogue. The list gives selected titles of technical and scientific books bearing on the chemical industry and related branches of engineering, arranged alphabetically under the author's name. The author, title of book publisher, and price are given, as well as a synopsis of the contents. Those desiring to obtain can order directly from the Chemical Catalogue Co. and the books will be sold at the publishers' price. A copy of the Chemical Engineering Catalogue will be lent, without charge, for a period of one year to any chemical engineer, chief chemist, industrial plant superintendent, works manager, buyer, or head of a chemical department in a university or college. On the issuance of a new catalogue the old one will be recalled and the new one substituted. To others than those included in the above classification the charge is $5.

Halifax, N.S.—The "Olympic," of the White Star line, left Halifax on her return to England on December 21. She carried among her passengers Admiral Chambers, of H. M. Dockyard, Halifax, and a number of naval officers and other ratings.



OLIVER DOUBLE SPINDLE SHAPER

BEST WAY TO DEAL WITH THE WAR MACHINES IS BEAT 'EM INTO PLOWS

By WM. EARNEST

THERE is a good deal of babble going on these days with regard to the disposition of machinery, now that the war is over. Many suggestions have been made, which show real sense in some instances, and in others a real lack of appreciation of the business end of the deal. It has been suggested by someone that the Government take upon itself the task of storing all this war machinery as a preparedness measure. This reminds me of a chap I used to know who achieved considerable fame in our locality in the horse dealing profession.

Having been a down-and-out at one time, and after connecting himself with a religious body, cutting out the booze, etc., he straightforward went into the carting business. For the nominal sum of twenty-five beans, this worthy gent bought an old plug of a horse that had been, at one time, years ago, the mainstay of a coal and ice firm, and also an old pair of sleighs.

All the townspeople were delighted to see our friend's conversion, with the result that business boomed. The poor old plug worked six days a week and overtime, and would have worked on Sundays but for obvious reasons. However, the end to this state of things came at last, followed by evil days, and the poor gee-gee developed a bad case of heaves. Now, our friend was, let it be understood, first and last a business man, and at the psychological moment — this being Spring time—charitably renounced all rights vested in this blessed beast, by driving home a deal, for the princely sum of one dollar, with a widow woman who ran a truck garden. As a result, the good woman got a whole lot of Spring plowing done cheap, but that was all, for the old brute passed to the great beyond before all the snow had gone from the fence corners.

Being, as I explained before, essentially a business man, our old friend the carter paid a second visit to the dear widow lady, and after extending sympathy, offered to dispose of horsie free of charge; but I might explain, that this act of generosity was only committed after an interview with the manager of a local tannery. This is about how matters stand with regard to the Government and all this machinery. Whilst not trying to slam either Government or manufacturer, is there not somewhat of a parallel with our carter friend? Take for instance the manufacturer: After proving his ability to make munitions, he receives lucrative orders from the Government, after which he purchases machinery, good, bad, or indifferent, much of it of the single purpose type, and sallies forth to achieve records, and incidentally make good profits.

Now some, foreseeing that the business had got to end sooner or later, got rid of all they could do without before the final reckoning came, and very wisely so, for many a small manufacturer got his "spring plowing done," so to speak, and made quite a profit from the old machines, and in a few instances some charitable junk dealer would cart the last remains away.

Now that we have won the war, and above all things we hate to anticipate another, I should think the Government will not be out to buy dead horses.

The best thing to do with this bulk of metal is to figuratively beat it into ploughshares. If perchance another war comes, we will be equal to it, for after all, has not the glory of the war been in the fact that we have triumphed over seeming impossibilities, for a righteous cause?

Bringing the matter down to a dollar and cent basis, what is more valuable to a good going concern than a miscellaneous scrap heap? Of course, much machinery will be really useful for years to come, but not the single purpose kind. However, take one of these machines, and analyze the make-up thoroughly. First of all, there are many bolts, screws and washers, and standard pieces, that any manufacturer may put into his storeroom and save that much. Then babbitt bearings, if any, would save the purchase of new material. Much steel also enters into the construction of these machines, much of which is quite capable of being easily cut up into gear blanks and a hundred other small parts. Then another item is the bulky casting that constitues the bed or body of this equipment, which is about the worst proposition to cope with. There is much cast iron that could be used for jigs, fixtures, etc., with a little extra machining and thus save the cost of patterns and molding. Shafting, pulleys, and other material can, if manufacturers keep in mind the "single purpose" idea, be utilized very profitably in the future in various machines of their own invention, with little outlay for labor on the same. If this course is adopted, all this material will soon be "butchered up" beyond recognition, and be profitably used to good ends. One thing is certain, that if any attempt is made to truck and trade in this line of goods as useful machinery, bulky as it is, with freight rates so high, someone is going to be stung, and as is usual in most things, the man who handles them last will lose most.

FUTURE OF BRITISH SHIPBUILDING

In the course of his presidential address to the North-East Coast Institution of Engineers and Shipbuilders Mr. Edwin L. Orde discussed the question whether our shipbuilding and marine engineering industry is to be remodelled in the direction of bulk production, or by the highest possible development of pre-war methods and practices.

He remarked that fabrication, a word which now enjoys a happier reputation than was its lot a few years ago, has been adopted by so many writers and speakers on shipbuilding subjects that it may be taken to have earned a place in our elastic and not very precise shipbuilding vocabulary. It is understood as meaning the building of parts of ships in one place so that they may be erected in another. How far is this process likely to increase the rate of production in this country?

The ideal shipbuilding establishment for rapid and economical production would be a long strip of ground with coal and ore mines, steel works, rolling mills, engine works, and shipyards all arranged under one roof at such short and convenient intervals as to permit continuous progress from ore to finished ship. But ideal conditions cannot be attained or even approached by adapting to new methods appliances and facilities which have been designed for, and fulfil more or less satisfactorily, another set of conditions, so that new shipbuilding yards seem to be essential to the scheme. The lay-out of these yards should provide for the even routine passage of the various parts from the fabricating to the shipbuilding establishment. How far can these conditions be fulfilled in this country? Sites for shipyards at comparatively short distances from the sources of the essential materials may not be difficult to find; it may be possible to arrange marshalling yards at the rolling mills, fabricating works, and shipyards on such a liberal scale as to produce an uninterrupted flow of parts; but when all this has been done, has any great advance been made in economy or rapidity, or both? The economy of the system depends almost entirely on the distances that separate the rolling, fabricating, and erecting plants. When, as in America, these are long, the large reduction in the weight of the material after fabrication may, probably will, effect a saving in freight more than sufficient to cover the cost of the extra loading and discharging. Rapidity depends on two factors, which are to some extent opposed to the usual restrictions under which shipbuilding is carried on in this country—(1) a very large supply of semi and unskilled labor; and (2) a railway organization which will secure the constant transfer of fabricated parts with mechanical precision.

The important conditions that affect the standardized fabricated ship may be indicated by a few questions. How far can bulk production of ships and engines meet (a) the immediate requirements for tonnage, and (b) the future developments of shipping? and how far can it be reconciled with (c) the apparent desire to shorten the hours of labor, and (d) the aspiration to raise the intellectual standard required of labor in industrial process?

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Help This New Feeling Along

THERE is undoubtedly a new feeling arising in regard to the conditions that should exist between capital and labor. In fact, the new feeling is such that it will likely put the boots to that phrase "capital and labor."

It's a poor phrase at best. It draws a line right at the starts that hurts insteads of helps.

It survives the old days when the man in the office looked upon the man in the shop as the human part of the machine.

There has been a wonderful softening influence in the last few days and years.

The son of the man in the shop has gone under in France, and the son of the man in the office marched away and will not return.

The employer who has had much to do with turning out munitions in the last three years in Canada has learned that it is good policy for the people in the shop to make good wages.

An employee who is making good wages is likely to be contented. The employee who is kept down to the lowest possible wage is not going to be contented. He will quit just as soon as the chance comes, or if he stays he will be looking for a chance to strike.

It is only human nature. In these days of living at its highest point, with the purchasing power of a dollar shot to pieces, the man who cannot provide for his home in decency is going to listen hard to the doctrines of Bolshevism. He will become an agitator, whereas decent conditions and a square deal would have made of him a good citizen, and of his home a centre for good influences in the community.

Manufacturers are realizing this point. They are speaking of it openly. They have had a demonstration of the fact that good wages and good conditions will iron out more trouble in the shop than all the deputations and labor departments in the world could ever hope to do.

It is well that this feeling should start now and grow with the new industrial Canada that is coming. Encourage it. See that it gets a chance to develop. It will do more to prevent strikes and lockouts than all the legislation that could ever be piled into the books of the country.

The bigger the margin that can be maintained between the worker and starvation the greater the efficiency of the worker and the success of the concern with which he is connected.

Reporting the Peace Conference

NEWSPAPERS from this continent are sending some 1,500 correspondents to "cover" the peace conference in Europe. No doubt each and every one is going over primed with the notion of writing a story that will set the people by the ears.

There's nothing now to hinder them scribbling away as hard as they please. They can blaze ahead and burn up the heather in advance, but the wild scramble is yet to come. When the conferences really start in earnest there will be a demand at home for cabled stories at the close of each session.

Remember, there are some 1,500 correspondents. After official and commercial business for the day gets off the cables there are some half dozen wires open for the correspondents. Of course correspondents, like reporters, are apt to stand aside and beg of their rivals to step in and send their stories first.

It looks from here as though these 1,500 correspondents with six wires amongst the lot would be sufficient to start the war all over again.

Here's a New Election Card

ABOUT this time of year a person's apt to hear quite a heap about the candidates who run for office in the municipal field.

If a man's had a shady chapter in his history he can take it for granted that by the time he's been in the field for a month or so that the shades will be a hang side darker than his most active conscience ever thought possible.

The election cards and appeals are, as a rule, the finest collection of junk that one could well imagine. They are no humble recital of the fact that "I have left undone those things that I should have done."

They, at times, speak of the "best interests of the city." In fact an election card that can't warm up that phrase a couple of times is about as flat as the day when dad leaves the salt out of the oatmeal mush.

But there's one chap running for office in Guelph this year who is out to blaze a new trail. They're trying out a new system in that city this year. Instead of electing a mayor and council—12 in all—they have 18 running for aldermen. When this dozen and a half are elected they all jump into the hopper and fight it out for the mayor's position, and may the best man win.

But this one candidate in particular, Lane by name has an election card in print that reads thusly:

WHO'S
LANE
Never Mind Who He Is
VOTE
FOR
HIM

Never mind who he is. Vote for him. Well, it may be that every person in that agricultural hub knows who Lane is, and that it's not such a genuine game of blind man's buff as might appear on the surface.

But for the man who's on the outside looking in it surely does look like a brand new era in civic politics. "Never mind who he is. Vote for him."

How could a man have a Merry Christmas wearing the necktie his mother-in-law gave him, and smoking the cigars of his wife's selection?

President Wilson is having the time of his young life in London. In fact for a democratic President he's taken to the ways of kings and queens in remarkable style. It may be that they'll have him dressed in knee breeches with silk stockings before he gets away from "Lunnon."

Speakin' of Dancin'

When I was young we used to like to have a good old dance—and see the folks enjoyin' it, and watch 'em jump and prance. And when some chap with slippery feet could do a buck and wing—we used to think that that there jig was one spektac'lar thing.

And when he'd get up on his toes and then pound with his heels, it used to rouse our dancin' blood until a person feels like keepin' time and joinin' in and shakin' up the dust, and keepin' all yer joints and limbs from gettin' touched with rust.

But nowadays, we see a show, and, land, all things are new; they can't go poundin' with their feet like what they used to do.

They get pianers on the stage, and then they get some chairs, and the man what runs the orchestra turns on some dreamy airs.

And then the folks begin to dance—they're stripped for action, too—to wear less duds than them there folks, good grief, 'twould never do. They slide around the pianer stool and hurdle o'er a chair, and go awaltzin' by themselves as though they didn't care.

They slide like Kelly for a base, they swing their fists around, then put their feet up in the air 'bout ten feet from the ground.

And then they circle round a chair in steps like turkey trot, and jump as though they took a bite of taters good and hot. They chase each other round the ring, these flimsy dancin' dames, and try to land their hoofs, by heck! right through the picture frames.

Perhaps I'm ancient in my views, likewise backwoods and rough—or else I'd sit admirin' this new fandangled stuff.

Give me the fiddler who can squat upon the kitchen chair, and rasp "The Turkey In the Straw," that grand familiar air—and who can yell a square dance through and fiddle quick and deft, and shout, "Now grab your partners and swing 'em right and left!"—ARK.

In an interview given the representative of the United Press by Mr. Hurley, chairman if the Shipping Board of the United States, he declared that the American Merchant marine flag must fly in every corner of the world. He announced that the United States would soon be able to build ships as cheaply as England. In addition to this the American merchant mariners would all wear uniform, and have fine living quarters. Mr. Hurley did not say if they were to have a gramophone for every two men, or one grand piano for the whole crew, but these details will no doubt be worked out later. It is expected that when the scheme is worked out thoroughly American ships will carry two crews, one to uphold the dignity of the American sailor, and the other to work the ships. The mere fact that all sailors will be uniformed will be enough to eliminate competition from ships with non-uniformed crews, as we cannot conceive of anybody shipping goods without the protection from damage conferred by the wearing of the official dress. Perhaps Mr. Hurley is influenced by the sentiment of the old song which says, "I Knew He Was a Sailor 'Cause He wore a Sailor Hat."

GAS WELDING FOR BOILER TUBES

"Bagged" and leaky boiler tubes may be repaired by oxy-acetylene welding. As many as fourteen welds have been made in one tube before discarding the latter. The "bag" on the tube is heated slowly by the torch until it is a bright cherry red and then driven back, beginning at the edges and working towards the centre. The leak, if any, is first welded up. Sections of sound tube are welded on to damaged tubes. Including labor, material, and cost of setting up, the total cost is about 75 cents per weld. The oxy-acetylene torch may be used to anneal crystallized tubes.—Electric Railway Journal.

USE FOR OLD FILES

Economy in the use of materials will claim attention in the future. Worn-out tools will not in all cases find their way directly to the scrap heap. Files, for example, which are made of the best crucible steel, when no longer serviceable as files, may, with very little alteration in form, find new uses in another category of tools.

Flat files of all sizes may be sharpened and used as chisels; triangular files may be easily converted to centre-bits. The flat file needs but little labor expended on it to make it an efficient screw-driver. Though not always necessary, it may be desirable to grind the face of the file smooth, mainly for the sake of appearance. In most and cost of setting up, the total cost is about 75 cents per to make the change of form easy. For this, heat to a dull red and allow to cool slowly. When formed, the new cutting edge may be again hardened to suit the use for which it is intended. For tools other than files a secondary use may be found with very little trouble for their conversion

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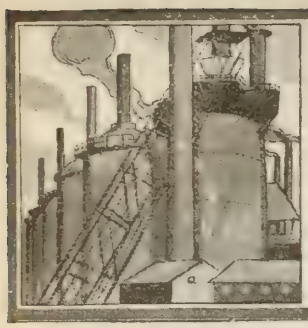
LEAD-WOOL FOR CAULKING GASPIPE JOINTS

Gas engineers admit that about 6 per cent. of the gas manufactured is lost through leaky joints. The Detroit City Gas Company have carried out a series of experiments to test the merits of various materials on the market for caulking cast-iron pipe joints. The most interesting fact developed was the strength of a lead-wool joint. The difficulty in breaking the joints led to the belief that cast-iron pipes could be caulked alongside the trench and lowered in without disturbing the joint. This was tried on 16-in. pipes, and three lengths at a time were successfully handled in this way. In making a joint with lead-wool, the jute is first driven in as tightly as possible, then the lead-wool, rope by rope. Each blow upon the lead expands it in the pipe and at the same time drives back and holds the jute so that the lead completely fills the lead space. The result is a joint that can shift several inches without leaking.

Racey, in "Montreal Star"

DROPPING THE PILOT



MARKET DEVELOPMENTS

Marine Work Helps the Situation Now

Contracts Placed For Equipment of a Number of Small Ships—Plate Contracts Here Are Based on the U.S. Base Price of Three Cents, Which Seems Likely to Hold Until July

THE placing of contracts for equipment for a number of small French vessels is keeping a number of shops and warehouses fairly well supplied for the present. Marine activity is just now responsible for the largest part of the business moving in supplies and raw materials. The completion of the contracts will call for a fairly large quantity of plate, boiler tubes, marine forgings, etc. Nearly all contracts that are quoted on now for plate are on the 3c base price. The chances seem to be that this price for plate will stand until July of 1919, after which there may be another alteration, depending on the response that the 3-cent price has brought. The pre-war base price was $1.40, so there is quite a margin there yet, but one that will not be entirely taken up unless all signs fail. Students of the situation look for a recession from the three-cent rate, claiming that the market will eventually find its level around $2.50, below which they do not look to see it go.

Several manufacturing concerns have pretty well defined ideas regarding the plans they intend to follow for after-war work. They are not making many announcements yet for several reasons, the principal one of which is that they do not wish to invite competition in the lines which they are investigating at their own expense.

The scrap metal situation remains in the same position, one very close to stagnation. As has been stated for several weeks past, there is no scrap metal market now that will furnish an accurate idea of the trading values of the different lines. Unless some person wants to sell at a suicidal price dealers are not going to come into the market to buy. They are advising those with whom they do much business to hold their material until there is some improvement in the situation.

There has been no drop in the price of high speed steel supplies. During the war there was a great demand for this for munitions work, and standard lines were neglected. Some dealers have large stocks of special shapes in stock which will be useless, as there is no other operation requiring such a fixture.

STEEL OUTPUT MAY TAKE DROP UNTIL THE SPRING HAS ARRIVED

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Jan. 2.—Practically all branches of the iron and steel market have been very dull, if not stagnant, with the exception of sheets, in which line there has been such a demand, chiefly against old contracts, that the mills expect to be able to operate at about 85 per cent. of capacity during January.

The past fortnight has not, of course, furnished any rigid test of the market, because the market is always quiet over the holidays. Buyers have been busy with inventories and various other accounting affairs and would hardly figure in the market no matter what the basic conditions might be. The same condition normally obtains during the first fortnight of January, and thus the real test of how active or quiet the market is going to be for a while will come after the middle of the month.

Finished steel prices are quotable firm at the recent reductions, which averaged about $4 a net ton, considering that while the reductions were fairly general they did not include wire products. The reduction was, of course, a very small affair, considering that the Government prices were about $40 a ton above the average prices quoted during the ten years before the war, 1904 to 1913 inclusive. It is clear that the reductions are a factor chiefly by way of furnishing a basis on which invoice prices can be adjusted when shipments are made under old contracts, such as tacitly or by specific arrangement involve a guarantee against price decline.

Pig Iron Prices Are Firm

Pig iron prices have not come down to any extent. It will be recalled that the steel price reductions occurred after the publication of a schedule of reductions that had been prepared on the basis of their being submitted to the War Industries Board December 11, but which the board refused to consider as it did not intend to set any prices for the first quarter of the new year. That schedule included a blanket reduction of $3 in pig iron. No general reduction has occurred. Some of the Alabama furnaces have reduced prices $3 a ton, to $31, Birmingham, for No. 2 foundry, but that does not mean that northern iron in general has any occasion to come down from $34 at furnace, when the freight Birmingham to Pittsburgh is $5.70 and to Chicago $5.00. A reduction in the Ironton district will probably be forced, however, by southern competition, freight to Cincinnati being $3.60 from Birmingham and $1.80 from Ironton, so that Ironton would have to come down to $32.80 at furnace to equalize at Cincinnati with Birmingham at $31. Some resales of iron are being made in this territory at various cuts, usually $3, but such transactions can hardly be regarded as making a reduced market, since in many, if not all cases, the iron is being sold in order to have the loss fall before January 1, when inventories must be made up and with no open market to make an inventory price below the Government level it is better to get the loss established at once, since taxes for 1918 will doubtless be higher than for 1919.

Cycles of Activity

Generally speaking, the iron and steel market, despite the fact that the occasion is the ending of the greatest war in history, is in much the same position as has existed at the close of every period of great activity in the past. There was the "boom" of 1899, with a collapse in 1900, the activity beginning late in 1901 and lasting until early in 1903, with dull times thereafter until late in 1904, the protracted period of activity lasting until nearly the close of 1907, with very light demand thereafter, while the "Gary dinner movement" held prices fairly well until buyers were ready to take hold again in a large way, the rise of 1909, with very slack demand in 1911 and finally the rise of 1912, which kept the mills busy until the latter part of 1913, when buying became light until in 1915 the war demand took charge of everything.

In all these cases buying had run its course, and buyers even for moderately early delivery were not willing to take hold, while investors, those who engage in works of permanent construction, were absolutely out of the situation, waiting for more settled and promising conditions. In each instance the blast furnaces and steel mills had large quantities of contract business on books, and by maintaining prices they could squeeze a great deal of tonnage out of these contracts, while by letting the market break they would book very little business as everyone would be all the more disposed to wait for the bottom to be reached. In all these historic cases the deliveries on old contracts greatly exceeded the new buying, and when the contracts had been worked to the limit and at the same time it looked as if a fresh buying movement could be started, prices fell, a bottom was found, and then recovery started, each price advance encouraging buyers to take hold still more freely

Labor Efficiency Is Low

There is no particular reason for supposing the general order of things will be different at this time, except that there are more readjustments to be made before investors will be disposed to take hold. The reference is not to steel prices, as the steel mills would meet any situation as presented and would not hold prices up if they saw they could do more business by reducing them. The reference is rather to the general prospects for investments, in bridges, buildings, hydro-electric development projects and a wider range of construction jobs, and also to the cost of carrying through such projects. No matter what the cost of the steel, it costs money to put it into employment, and the investor considers the cost of other building materials that are needed besides steel, as well as wage rates and the amount of labor one gets by paying for an hour's time or a day's time. It is generally asserted that at present labor efficiency is very low. That must be adjusted even if wage rates are not going to come down, but there will probably be some declines in wage rates on construction work, though it seems unlikely that there will be any general reduction in basis wage rates in the iron and steel manufacturing industry proper.

The trade is rather optimistic, and looks for a period of great and protracted prosperity, to start in the not distant future. The common guess, when one is made, is that this will start "in from three to six months." This means that April, being a spring month, is a favorable time for construction jobs and other undertakings to be inaugurated, and that if things do not open up in the spring expectations must be deferred over the summer until September or October. Meanwhile it is a question whether the mills will be able to keep up their present rate of operation, since some of the demand now being experienced is by way of the accumulation of wants during the period of steel delivery restrictions. This may possibly be worked out in a few weeks to such an extent that the mills may drop to a 70 per cent. or even a 60 per cent. operation. There might be an accident and a break in the market, but the mills would hardly be disposed to reduce prices merely because they were operating light; they would have to see that reducing prices would stimulate demand. Just now reductions would not act as a stimulus.

POINTS IN WEEK'S MARKETING NOTES

Contracts for small French vessels placed in Canada are making business better for some of the shops and a number of warehouse interests.

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Estimates for steel plate being made on Canadian contracts now are at the U. S. base price of 3c per pound. This price will hold until July in the belief of the steel group. A slight recession may take place then but not to the pre-war level of 1.40c per pound.

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Scrap dealers state that there is no improvement in the situation, and that they are not buying anything unless it be at very exceptional prices.

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Advices from Nova Scotia show that the impression prevails there that there will likely to a falling off in the production of steel before buying becomes active enough to help the situation to any great extent.

—

Contrary to expectations there has been no drop in the price of high speed steel goods. Standard lines had been neglected while the rush was on for munitions factories. There is no other use for hobs, chasers, and some of the boring tools.

—

A number of Canadian firms have plans well under way for the bringing out of new lines. At present they have nothing to say of a definite nature, as in most cases they are not ready to go ahead.

LITTLE BUSINESS MOVING THIS WEEK

Dealers Getting Things in Shape for the 1919 Selling Campaign

TORONTO.—The week between holidays has been quiet. Little business has been moving. Dealers are just clearing up orders on their books, and making certain that business they are carrying on as good is still in that class, not having been rendered useless by the passing of munitions manufacturing.

Machinery Trade Quiet

Dealers are engaged in many cases now in getting their statements of the year's work in shape, and in otherwise getting things in shape for the work to be undertaken during 1919. Several conferences have been called of selling forces to be held during the week when plans will be made for the campaigns in the coming year.

Prices of high speed lines do not show a tendency to come down, although it might have been supposed that following the war work the prices would take a slump. High speed steel was much in demand when munitions making was the big item, and a large amount of this material was turned into special fixtures that are absolutely useless now, as there are no commercial operations that call for the same operation. Some of the supply houses have quite a lot of this stuff on their shelves—too much in fact. The way in which special designs were turned out meant, in many cases, that standard lines were not looked after as usual, so it is likely that just now there is not an over-supply of the material on hand.

Marine Work Helps Now

Contracts that are being let by the Fabricated Ship Corporation for orders for the French Government are helping to keep business brisk in marine lines. There are some 38 of these vessels in all, and warehouses report that there is, in consequence, quite a demand for plates, boiler tubes, marine forgings, etc. Some of these contracts have been definitely placed, and orders are following for the filling of them.

Plate for these contracts is being quoted now at the base price of 3c at U. S. points. This price, it is thought, will hold until July of 1919. It is pretty well in the hands of the U. S. Steel Corporation to make or unmake the price, and there seems to be small chance of any reduction before July. When

July comes one guess is about as good as another as to which course the prices will take. Some who are quite closely in touch with the situation claim that the base price of steel is likely to work below the 3c mark, probably finding its level around the 2.50 point. As a matter of fact it can be recollected that at the start of the war the base price at Pittsburgh was down around $1.40 per hundred pounds.

Some of the dealers report that there is a fairly good demand apart from marine activities. Plenty of business is in sight, was the opinion of one house, adding that the present was hardly the time of year to close it up.

Scrap Market the Same

Prices quoted elsewhere in this paper do not represent buyers' prices, although they are supposed to. It was suggested to one of the dealers this week that a corrected list should be used, and the answer came like this: "How can we correct the list when there is nothing to go by. We are not buying, so how can we name the price at which we will buy. Copper is still down at around 24c, while Montreal has the price as 18½c. As a matter of fact we do not want to take any into stock at either price, so one might just as well stand as the other." Dealers do not know what is going to be done with the scrap that has accumulated in such large quantities. A New York report, speaking of scrap, says:

A factor for weakness in the present market for heavy melting steel is the possibility of heavy tonnages of shell steel being offered for resale as scrap. A lot of 20,000 tons has just been offered in this market by a Canadian munition maker, and similar large tonnages are expected to come out in this country as soon as cancellations become more fully adjusted. Although billets and some other such material may possibly be brought into competition with products of the mills, it is believed that much of the shell steel will undoubtedly be sold as scrap. It appears the Government probably will act as selling agent in many instances, the difference between the original cost of the material and the selling price being refunded to the shell maker. The Government is offering 1,210 airplanes and 2,000 airplane motors for bids Feb. 1.

SCOTIA REPORT LOOKS FOR A SLACKENING OF STEEL PRODUCTION

Special to Canadian Machinery.

NEW GLASGOW, Nova Scotia, Jan. 2. —The probability of a slackening in demand for steel products is becoming clearer, and within the next few months unemployment affecting a large number of men seems tolerably certain.

A vague impression has been abroad that a demand for steel materials for reconstruction work in Europe would help out the steel situation on this side of the Atlantic, but there was never any real justification for this impression. In the first place, steel is not largely used in building construction in Europe. Buildings of the sky-scraper type are the exception in Europe, and the use of rolled shapes and what is known as structural steel is very limited on the other side. The conditions under which the Armistice was concluded has also resulted in very much less damage to the occupied territory of Northern France and Belgium than at one time seemed possible. The totality of actual demolition is confined to a comparatively narrow area, and the small amount of steel that will be required to repair the damage in this area can easily be supplied by Europe itself. It has not been realized how tremendous has been the increase in Britain's capacity for steel production, and now that both coal and iron deposits are freed from the grasp of the German, France and Italy can both make notable contributions to steel manufacture. The same is true of Belgium, where, by a modern miracle, the complete destruction that was once threatened has been in large part averted.

The Real Situation

There will be a remarkable change in the attitude of all the Entente Nations towards future industrial expansion. France, now once more in possession of her Lorraine ores, freed from the nightmare of the Westphalian monopolists, and assured of national boundaries that will give her commercial strength just as assuredly as they will diminish the commercial strength of Germany, and strengthened in the world's esteem and her own by the manifestation of financial strength and military potency that the war disclosed in her, will enter upon commercial activities with renewed aggressiveness and resources. The industrial renascence of Belgium will be not less remarkable. Britain has discovered unsuspected possibilities for production within her own borders, and it is not probable that she will allow herself to be relegated to third place by German production of coal or iron, as had happened before the war.

While the tremendous production of coal in the United States presents a new world phenomenon, yet it should not be forgotten that Britain, next to the United States, is the largest producer of coal in the world.

Room for Machinery

Generally, there seems to be very little real basis for anticipating large future shipments of steel products to Europe. There will be, as there has been, a large market in Europe for American and Canadian machinery and harvesting devices, but no one has yet made it very clear why there should be any large shipment of steel in the shape of billets, rails, structural shapes, etc.

There may be a permanent market on this side for grades of steel that were once the peculiar product of Europe, such as high grade crucible and tool steel, which are now being manufactured on this side, in many instances by branches from European houses.

There has been a significant growth in the manufacture of fine cutlery in the eastern portion of the United States, but so far no particular advantage has been taken in Canada of a very obvious opening for the manufacture of high grade cutlery in Canada.

Very few people, except possibly those who hailed from Sheffield and were cranks on the subject of German cutlery, were aware of the tremendous hold that German cutlery had on Canadian markets. Many people were genuinely under the impression that Boker goods were British made, largely because this astute German house enclosed their knives and razors in a paper covering which stated them to be made from Sheffield steel. They were made in Germany nevertheless, and on the whole they were goods of excellent quality, admirably adapted to suit Canadian ideas, even to the adoption of such names as "Strathcona" on hockey skates. Even in houses in Montreal, whose chief boast is that they are branches of famous English concerns in the cutlery business, would offer customers German made scissors and manicure implements. In the majority of Canadian hardware stores, it was before the war, and still is extremely difficult to obtain a "Sheffield blade." The gap in supplies from Germany has been filled by American cutlery, which is usually good, and by Japanese cutlery, which so far is generally bad. There is an obvious opening for Canadian enterprise in the cutlery business.

The main hope of the Canadian steel producers is in the supplying of railway equipment, namely, steel, rails, fastenings, spikes, and freight car and rolling stock parts. Shipbuilding is the other possible outlet, but if the Government has anything to give out for either railway or shipbuilding purposes, now is the time to do it, because serious and grievous unemployment is imminent otherwise.—F. W. G.

The Scrap Market.—Speaking of conditions in the scrap market for 1918, Frankel Bros. at Montreal report: "While there has been a large volume of business, profits have only been nominal, owing to fixed prices of raw materials by the Governments. The war has effected great changes in different markets, and the sudden post-war period will introduce problems which we can, however, overcome. At the present time the market is practically at a standstill, owing to the vast change which is taking place, but it is our candid opinion that before very long confidence will again be restored, and that we will see considerable activity. While we cannot predict the future, we may say that we are in receipt of inquiries from several large consumers, for material to be delivered early in 1919."

HAVE NOT YET REACHED THE BOTTOM OF SCRAP METAL PRICE

Philadelphia.—Making deliveries on contracts and chiefly on those of recent date constitute the principal activities of scrap dealers here. Mills are expected to cancel the undelivered balances of contracts recently placed at the end of the year. There are a good many contracts for heavy melting steel at $21 to $23, and dealers are in the hope of completing these without much loss. The belief among dealers is that a buying movement is due in about three months from now, as they feel that a settling of the scrap market will come much sooner than in finished iron and steel.

Chicago.—Further declines of $1 to $2 per ton were noted at the beginning of the week, showing that in spite of the heavy declines already registered, the lowest level has not yet been reached. There is no scrap remaining at the former Government level, and the general level is far below that of a month ago. Owing to reduced operations at the plants of some of the consumers their need for scrap has been reduced also, with no consequent effect on the market. There are practically no consumers in the market. Chicago, Minneapolis, and St. Paul offer 400 tons, and the Kansas City Terminal offer 200 tons.

Pittsburgh.—There is no evidence of change in the scrap metal market here. Dealers are confining their attention to getting their shipments for the contracts which expire at the end of the year. There is some steel coming from shellmakers who have had contracts cancelled, and rejections of shipments of iron on contracts are also reaching the market. There is some demand for this from dealers who are short on contracts, and they are picking up supplies at considerably less than Government prices. The market is normal, but with a rather weak tone. Bundled sheets are bringing a maximum price of $27 delivered, while stove plate is bringing the same price as heavy melting steel, and the top price on heavy axle turnings seems to be $22, delivered. Low phosphorous steel is quoted around $37, but there are more sellers than buyers at that price.

New York.—Prices are still on the decline here, with the market practically at a standstill. Heavy melting steel is down to $18, New York, and this price could be lowered still more on a good sized order. Prices for borings and turnings hold fairly steady, and they seem to be the only materials that are doing so. Cast scrap is quoted at $27 to $28, and grate bars at $21. A lot of 12,000 tons was recently disposed of by the Pennsylvania Railroad, most of which went to one dealer.

Buffalo.—Prices on practically every grade has dropped about $2 during the past week, and there is no buying movement expected before the first of next month. Consumers evince but little interest in scrap, being mostly engaged in taking inventory. As there are no large stocks on hand anywhere, prices are bound to strengthen on any buying movement of respectable size.

Cleveland. — Market quotations are mainly unchanged, and what there are are nominal, as there is no trading. Dealers are inclined to fight shy, as they feel that the conditions are such that the less scrap they handle for the first six months, the less chance they will have of losing money. There are no consumers in the market, while some dealers are picking up a little scrap here and there for their yards. Some steel was offered to consumers here this week by Eastern dealers at $26, but was not taken up. Borings are keeping close up to the prevailing Government standard, some contracts being closed for first quarter contracts at the last Government quotation.

Birmingham.—Except on old contracts, busines is at a dead stop here. Orders placed some time back have not all been cancelled, and the consumers are taking their supplies steadily, which is gradually cleaning the yards out. The scrap market is very weak, and published prices are not being realized in trading.

St. Louis.—The situation existing here is one in which there are any number of sellers, but practically no buyers, which has brought about the inevitable result, prices being still on the decline. The market has never known anything like the sensational break experienced during the last six weeks. The leading rolling mill interests are out of the market, being under embargo, and the National Enamelling & Stamping Co. are experiencing labor troubles, which has removed them temporarily from the market. There is some difference of opinion as to the outlook, some members of the trade thinking that the next couple of months will bring more stable conditions, while others think that at least six months will elapse before that desirable condition is realized. There is not a large total amount of scrap in the country, and the break is ascribed more to a lack of buying than an overabundance of material.

Cincinnati.—The market is quiescent, waiting for the year to end and the new year to begin. Scrap dealers are having a little trouble on cancellations, though most of these have been disposed of. Dealers who take small lots from the small collectors are taking what comes along, but are advising their small collectors to take a holiday till after the new year. There have been no cancellation orders turned in from steel mills.

HAS MANY INTERESTS IN EASTERN CANADA

Stanley E. Elkin, M.P., Has Been Appointed Director of the Union Bank

STANLEY E. ELKIN, M.P., manager of the Maritime Nail Company, St. John, N.B., who has been elected a director of the Union Bank of Canada, is only 39 years old.

Beginning his business career when he left high school in an insurance office. Mr. Elkin soon afterwards became purchasing agent for the Dominion Iron and Steel Company in Sydney. His next move was to Chicago, where he became assistant to the vice-president of the American Glue Company, during this period also acting as representative of a syndicate of New York bankers in Mexico.

STANLEY E. ELKIN, M.P.

In 1905 he established the Maritime Nail Company, Ltd., of which he is managing director.

Among his other activities are the following: President, Motor Car & Equipment Co., Ltd., St. John; vice-president, Wilson Box Co., Ltd., Fairville, N.B.; vice-president, Canada Nail & Wire Co., Ltd., West St. John; director, Nova Scotia Trust Company, Halifax; president, Rodstan & Co., London, England, and partner, St. Martins Shipbuilding Co., St. Martins, N.B.

Although entering the House of Commons only at the last general elections he was selected as one of the members of the commission to Washington to investigate the U.S. war organization and make recommendations to the Canadian Government.

It is the busy man often who finds time to do things, and during the recent Victory Loan campaign Mr. Elkin was the energetic head of the committee for St. John city and county, which rolled up a 50 per cent. surplus over its allotment.

FURNACES MAY BLOW OUT RATHER THAN PRODUCE AT NEW PRICES

THE recommendation of the American Iron and Steel Institute with regard to pig iron prices has not been received with unanimous approval by the Pittsburgh producers. While low cost furnaces can produce profitably at the prices arranged, some of the higher cost furnaces will be obliged to blow out, it not being possible to operate at a profit. If a condition prevails under which a number of furnaces are obliged to shut down, a falling off in output is bound to result, and as there is a marked shortage of pig available, this in itself would operate to bring prices back to the higher level. The following reports from points in the United States will show the situation in the pig iron industry.

Pittsburgh.—The feeling among producers here is that they will suspend operations rather than try and keep going at prices that show little or no profit. There has been no success so far of the endeavors to get the fuel administration to reduce the price of coke, the fuel administrator taking the attitude that since no more price fixing of iron and steel is to be made for the Government, he should not make any attempt to fix coke prices. Inquiries for iron are scarce, for buyers seem to be of the opinion that after the 1st of January they will be able to secure iron at a lower price than possible to-day. A sale of a small quantity of malleable at the new price has been reported for delivery after Jan. 1st, but enquiry for foundry No. 2 for delivery early in the year, elicited only an offer for the price that is to run to Jan. 1st. There has been some attempt to cancel unfilled operations of contracts, but the furnace interests are refusing to consider such attempts.

New York.—It is thought here that Eastern furnaces will recognize the prices agreed on by the committee of the American Iron and Steel Institute, and recommended by them to the price fixing committee of the War Industries Board. Developments are awaited in view of the fact that the price prepared for recommendation is merely a suggested level. It is felt that an adjustment from a peace basis of the market will ultimately result in the abandonment of Pittsburgh and Birmingham as bases for Eastern and Southern iron. The return to normal conditons should have an effect on the revision of the differentials for manganese, which, prior to the war, either did not exist or were much lower than the present ones. There are some hopeful developments in the Eastern market, some large consumers who were thought to be provided for their first half year's requirements being found to have only a couple of months' supplies. Some others, who were expected to have reduced requirements. have sent in a hurry call for shipments, as they would have to shut down unless they got iron promptly. There are a good many enquiries for export in the market, though no eagerness to close them is shown. It is thought that a large amount of foreign buying will develop out of the needs of European countries whose iron making capacity is not as large as their steel making.

Philadelphia.—Pig iron buying has been halted by the recommendation for reduced prices, and no furnaces are offering iron at the new rates. In any case, most of the furnaces have such a large amount of orders on their books that they do not want any more at the present time. The large number of enquiries from Japan constitute a feature of the market, it being said that Japan needs 60,000 tons for immediate delivery. A permit to a Japanese buyer for 5,000 tons foundry iron for export was issued last week, and 2,220 tons for a Japanese consumer were allocated to Eastern furnaces at the request of the Emergency Fleet Corporation. Some Eastern furnaces are short of coke and cannot get any.

Buffalo.—Furnacemen generally are of the opinion that there will be a period of quietness till the spring, and that a great expansion will come then. The New York agreement for a reduction in prices meets with favor here, it being felt that it is a good move and will help to stabilize the market. There is not much business being done, as neither producers nor consumers are anxious to force the issue in prices for next year. The small amount of tonnage being dealt in is limited to delivery in the first half of the year.

Cleveland.—There has been one small sale at the new price of $31 by one of the makers in this district. There has been very little enquiry, and no particular wish to quote when there are enquiries, but there is no question that the new prices will be quoted for any business coming up for delivery after the 1st Jan. The question of whether contracts made for the first quarter delivery shall share in the reduced prices is occupying the minds of both buyers and sellers. Had the Government adopted the lower price as the official schedule for the first quarter, the buyer would have received the benefit of the reduction, and there is some feeling that the producer has a moral responsibility to give the buyer that benefit. There have been a few cases where small sales of iron for this year's shipment have been made on which the present fixed prices have applied. Allocations were brought to a close last week with 14,000 tons for Japanese interests being placed on the account of the Emergency Fleet orporation. The lots for Japanese export were foundry grade for prompt shipment, and were made at the present fixed price. With the week's addition, the total allocations for the period of the war amount to 2,000,000 tons, of which 1,965,000 was placed since 1st May.

Cincinnati.—The future market conditions are shrouded in doubt, and can only be the subject of speculation. There is nothing to show that the proposed reduced prices have been accepted, or that any iron has been sold below the maximum prices hitherto prevailing. Some small sales of high sulphur iron that does not figure in the regular price schedule have been made, but outside of these the sale of iron for immediate delivery has been stopped.

St. Louis. — Waiting developments after Jan. 1st seems to be the situation here. Buyers are not enquiring and sellers show no disposition to push sales. As most of the producers are sold far ahead, they can adopt an independent position, and leave the future to itself. Melters who have been in the non-essential class, are anxious to get supplies, but on the other hand are also waiting to get the lower prices, and in the meantime are waiting. Furnaces are not unwilling to book orders for next year, but they are not in the mood to grant any concessions, and are being governed in their commitments entirely by the matter of price.

Birmingham.—The situation here is such as to give confidence in the future. Furnace companies in the South have their books filled with orders, and more enquiries are coming in. There are a very small amount of cancellations on business allocated several months ago. Deliveries on foreign business that has been started since the armistice will be made at once, a good deal of it being shipped through New Orleans and other southern ports.
the last budget.

The Price of Copper.—The fixing of 23 cents a pound as the export price on copper by the Copper Export Association of the United States possesses significance for the Canadian industry. Such a course of action was not unexpected, since buyers have been holding off from making purchases at the fixed price of 26 cents a pound. Bids had been entered at 19 to 23 cents, so it is believed that producers and consumers came together to arrive at the final figure. Commissions representing foreign interests have been making inquiries recently in the United States, and the settlement of a price is believed to be a prelude to the transaction of considerable business with Europe. Price reduction has its bearing on the labor situation. Workers in the mines have been securing the benefit of a sliding scale, based on the price of copper. Prior to the lowering of the price they asked for a minimum wage based on 25-cent copper, and this was refused by the producers.

Want Tax Removed.—A deputation representing the organized automobile industries of Canada waited on the Government to urge the removal of the excise tax on automobiles. This is a tax of 10 per cent. on all cars imported or made in Canada, which was imposed in

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$32 75
Lake Superior, charcoal, Chicago	37 50
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	37 25
Basic, Valley furnace	33 40

Government prices.

	Montreal	Toronto
Hamilton	.....	.....
Victoria		50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Steel bars, base, Toronto	4 90
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	*2 90
Tank plates, Pittsburgh	*3 25
Structural shapes, Pittsburgh	*3 00
Steel hoops, Pittsburgh	*3 50

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

*Government prices.

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$ 29 00	$ 29 50
Electro copper	29 00	29 50
Castings, copper	26 50	28 50
Tin	80 00	83 00
Spelter	9 50	11 00
Lead	9 50	10 00
Antimony	11 00	16 00
Aluminum	43 00	50 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 8 00	$ 7 00
Plates, 3-16 in.	8 50	8 40

WROUGHT PIPE

Price List No. 37

	Black	Galvanized
Standard Buttweld	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	5 22	7 35
⅜ in.	5 22	7 35
½ in.	6 63	8 20
¾ in.	8 40	10 52
1 in.	12 41	15 56
1¼ in.	16 79	21 05
1½ in.	20 08	25 16
2 in.	27 01	33 86
2½ in.	43 29	54 11
3 in.	56 61	70 76
3½ in.	71 76	88 78
4 in.	85 02	105 19
Standard Lapweld		
2 in.	31 82	38 30
2½ in.	47 97	58 21
3 in.	52 73	76 12
3½ in.	78 20	96 14
4 in.	92 65	114 00
4½ in.	1 12	1 37
5 in.	1 30	1 59
6 in.	1 69	2 06
7 in.	2 19	2 68
8L in.	2 30	2 81
8 in.	2 65	3 24
9 in.	3 17	3 88
10L in.	2 94	3 60
10 in.	3 79	4 64

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Montreal	Toronto
Copper, light	$15 00	$20 00
Copper, crucible	18 50	24 50
Copper, heavy	18 50	24 50
Copper, wire	18 50	24 00
No. 1 machine composition	19 00	22 00
New brass cuttings	10 00	15 50
Red brass turnings	13 00	18 00
Yellow brass turnings	9 00	13 00
Light brass	7 00	9 50
Medium brass	9 00	12 00
Heavy melting steel	20 00	22 00
Shell turnings	9 00	12 00
Boiler plate	21 00	20 00
Axles, wrought iron	30 00	24 00
Rails	26 00	23 00
No. 1 machine cast iron	30 00	33 00
Malleable scrap	25 00	20 00
Pipe wrought	18 00	17 00
Car wheels	38 00	30 00
Steel axles	34 00	35 00
Mach. shop turnings	9 00	8 50
Stove plate	22 00	19 00
Cast boring	11 00	12 00
Scrap zinc	6 50	6 50
Heavy lead	6 00	8 00
Tea lead	5 50	5 75
Aluminum	16 00	20 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent.
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$47 50
Open-hearth billets	47 50
O.H. sheet bars	51 00
Forging billets	60 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅝ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 16
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... **list plus 40%**
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 50
Sheets, black, No. 10	10 00	8 50
Canada plates, dull, 52 sheets	9 00	9 15
Can. plates, all bright	9 50	10 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	10 70
Premier, 10¾ oz.	.....	11 00
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$36 00	$.....
1¼ in.	40 00	.....
1½ in.	43 00	36 00
1¾ in.	43 00	36 00
2 in.	50 00	36 00
2¼ in.	53 00	38 00
2½ in.	55 00	42 00
3 in.	64 00	50 00
3¼ in.	.....	58 00
3½ in.	77 00	60 00
4 in.	90 00	75 00

Prices per 100 ft., Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.		Cts. per lb.	
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

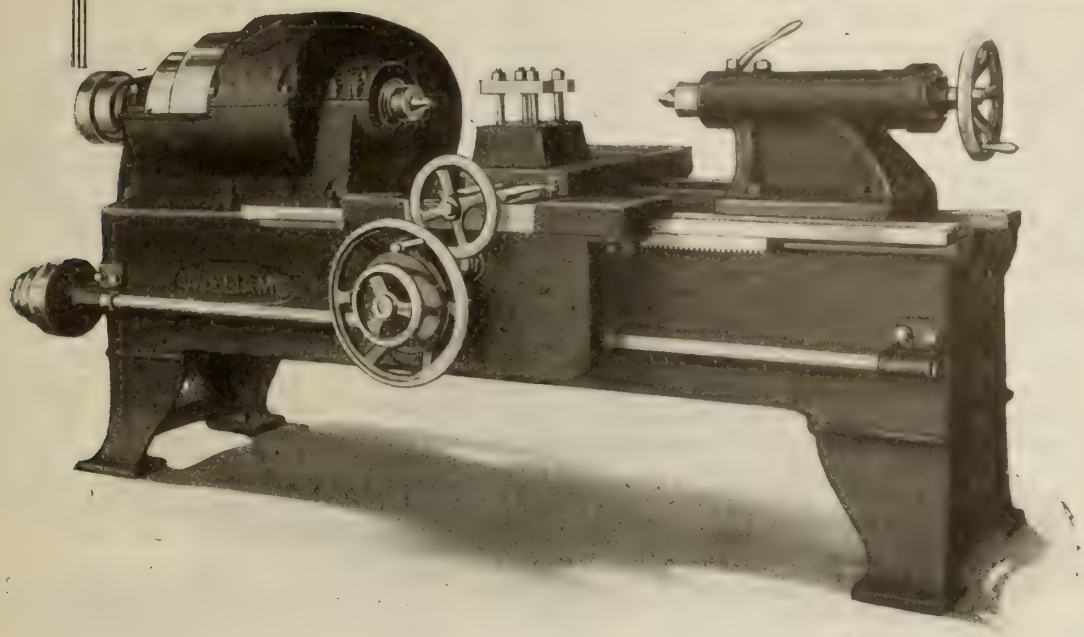
Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

The "WILLIAMS" 24" Heavy-Duty Lathe

will give you a substantial increase in production on Second Rough Turning and Finish Turning operations.

Its Rugged proportions, Ease of handling, Steel gears running in oil and Unbreakable Apron are features into which you should look.



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High-Grade Electric Furnace Steel Castings

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Limited

Steel Foundry Division:
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Head Office:
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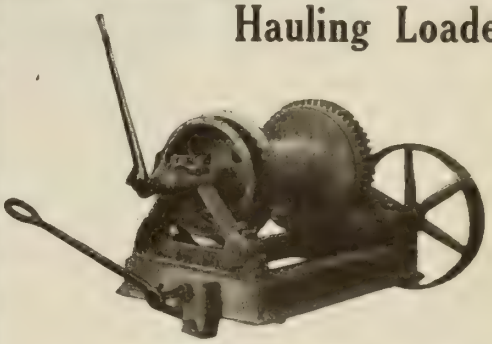
For Hoisting Heavy Materials or Hauling Loaded Cars



Made in 7 Sizes

10 H.P.
15 "
20 "
25 "
32 "
40 "
50 "

Made with two drums also if desired.

We can also supply this Hoist geared for direct connection with an Electric Motor. Let us send you photograph or catalogue.

May we submit a tender on your Castings and Steel Plate Work?

Marsh Engineering Works, Limited

Established 1846

Belleville, Ontario

Sales Agents: Mussens Limited, Montreal
Winnipeg and Vancouver

RUSSELL MOTOR CAR CO. HONOR WOMEN FOR FAITHFUL SERVICE

FOR continuous and faithful services, covering a period of over two years in the manufacture of munitions at the plant of Russell Motor Car Co., Toronto, 180 women received solid gold badges at a meeting held in the plant on Sunday afternoon, December 29. That portion of the former shell shop, fronting on King street, had been cleared out and decorated for the occasion. A platform was erected on one side of the room, on which were seated Hon. Dr. Cody, the guest of the afternoon; T. A. Russell, vice-president and general manager of the company; J. F. MacKay, treasurer; Mrs. Russell and her daughters, Col. Alby and Lieut. Tenny, who are connected with the U.S. Ordnance Department in this country. Selections by an orchestra, and songs by Frank Oldfield completed a splendid programme.

The presentation to the women was made by Mr. Adams, factory manager of the Toronto works. The badge is of solid gold. It is made to represent a wreath of maple leaves surrounding a 9.2-inch shell, upon which is embossed a replica of the factory building. Upon the reverse side is the inscription: "Presented to ——— by the Russell Motor Car Co., Ltd., for two years of faithful service making munitions."

T. A. Russell, in a short address, paid tribute to the manner in which the women had played their part in the manufacture of munitions. "Three years ago on New Year's Day, Mr. Harris, Mr. Burt and myself decided to go into the manufacture of munitions, and in the month of April following the first shipment was made from here." Canada had provided 55 per cent. of all the shrapnel used by the British army. In the manufacture of fuses there had been an enviable record, as from this country had been sent 12 per cent. of all the time fuses used for British high explosives and shrapnel. In the turning out of six and nine-inch shells on British order the same held true, and from this country had gone half of the nine-inch shells used on the British front in France. The Russell Co. had been the pioneers in the employment of women in the making of munitions, the start being made in January of 1916, and some of these women had remained with the company until the last day on which munitions were turned out on the premises. "In the last few years employers have had a chance," stated Mr. Russell, "to see the advantage of good working conditions and good wages. It does not pay to hold back your best efforts in anything you may undertake. It does not pay to hold back production. The more that is produced the more there is to divide. We hope to turn to something in the peace lines in the near future that will enable us to provide employment again for those who have been associated with us during the past two or three years. I have just learned that one girl, one of the first to be employed here, has made provision for the future in a splendid way. She has got married, and I consider this a most far-sighted method of providing for the period of reconstruction," concluded the vice-president amid laughter.

"This gathering is unique," remarked Hon. Dr. Cody, "in that it sets forth the relations that should exist between employers and employees. There can be no satisfactory development except by co-operation, and the spirit that has prevailed here is the spirit that should prevail in the future." Dr. Cody expressed the opinion that the peace of the world depended now on the league of English-speaking nations. "This has been," he continued,"a war of elaborate machinery. At the start the Old Contemptibles had to fight with bare arms against German preparation of years. By and by, in May of 1915, we found out that we needed high explosive shells, and then it was that Lloyd George organized the Munitions Board. It is almost impossible to realize the change that has taken place since then. At the start there were only three state arsenals in England. To-day there are 180. The whole system was transformed to make munitions, and it is due to two things that it was possible. The first of these was the British genius for organization. There was a time when the Germans used to tell us that they were the only people who had a genius for organization, and for a long time we made the mistake of believing that this was the case. The second factor was British womanhood. In 1914 there were 18,000,000 manual workers in Britain. Six and a quarter million from the ranks of British labor joined the army, and in view of that record let no one ever state that labor in Britain was not loyal in the war. Four million went to the munitions shops and allied industries, leaving seven and a half million to carry on trade and commerce, and yet it was done. But how? By the help of the womanhood of Britain, who turned in and did 1,701 different kinds of work that had been done by men before the war. One million women went to the munition plants, half a million to the chemical and explosives plants, and 300,000 went as farm laborers, all that liberty and decency might live. To-day we are here to thank God for the victory, for no other power could have won it. We are here to pledge ourselves afresh to our country and our God."

Speaking, in conclusion on the lessons of the war, Dr. Cody claimed that we should have learned the value of thrift. Our habits of waste had been the product of our land of plenty. There is also need of more intelligence on the part of the great masses of the people, as there is nothing that would assist so much in the future. Factories had learned the value of unlimited production and high wages, his contention being that there could be nothing more shortsighted than a policy that limited production and kept down wages. "Canada was worth the lives of our soldiers, it was worth fighting for, it was worth working for, and let us never forget that it is worth living for."

The addresses of the afternoon were followed with very close attention, and the entire afternoon was one that will long be remembered.

FOX CHAIN CO. TO LOCATE IN HAMILTON

Expect to Be in Shape to Commence Operations Inside of the Next Few Months

Hamilton.—The Fox Chain Company of Canada, an industry capitalized at $200,000, has been secured for Hamilton by C. W. Kirkpatrick, Commissioner of Industry, and has already commenced to install a plant, which will be in operation by the first of the new year.

F. A. Fox came to Hamilton about three years ago and started in business in a small way, locating himself in a small factory on Yorke Street. Handicapped by lack of financial backing he was compelled to close the place down, selling out his interests, but retaining his patent rights. He returned to New York City and interested financiers there, and has secured capital enough to carry on a business.

After leaving Hamilton three years ago, Mr. Fox engaged considerable time on inventing a new appliance for tire chains, and has found a new snap that will prove a feature in the new Fox chains. A few days ago negotiations were completed for the new concern to take over the plant of the Ford-Smith Machine Company on Princess Street. This does not mean that the Ford-Smith people are decreasing their plant, but that they are erecting a new building which will house their entire business instead of having several small plants scattered through the city.

The new local concern will employ 40 to 50 men to commence with, and by spring will have about 100 on the pay roll. Frank A. Fox is president; Wilfred North, New York City, vice-president; Frank G. Cornish, New York City, secretary-treasurer, and T. C. Binkley of Hamilton, director.

Both Welland and Toronto made efforts to secure the industry for their city, however. Mr. Fox announced that Hamilton was the choice of his company and had already located himself here.

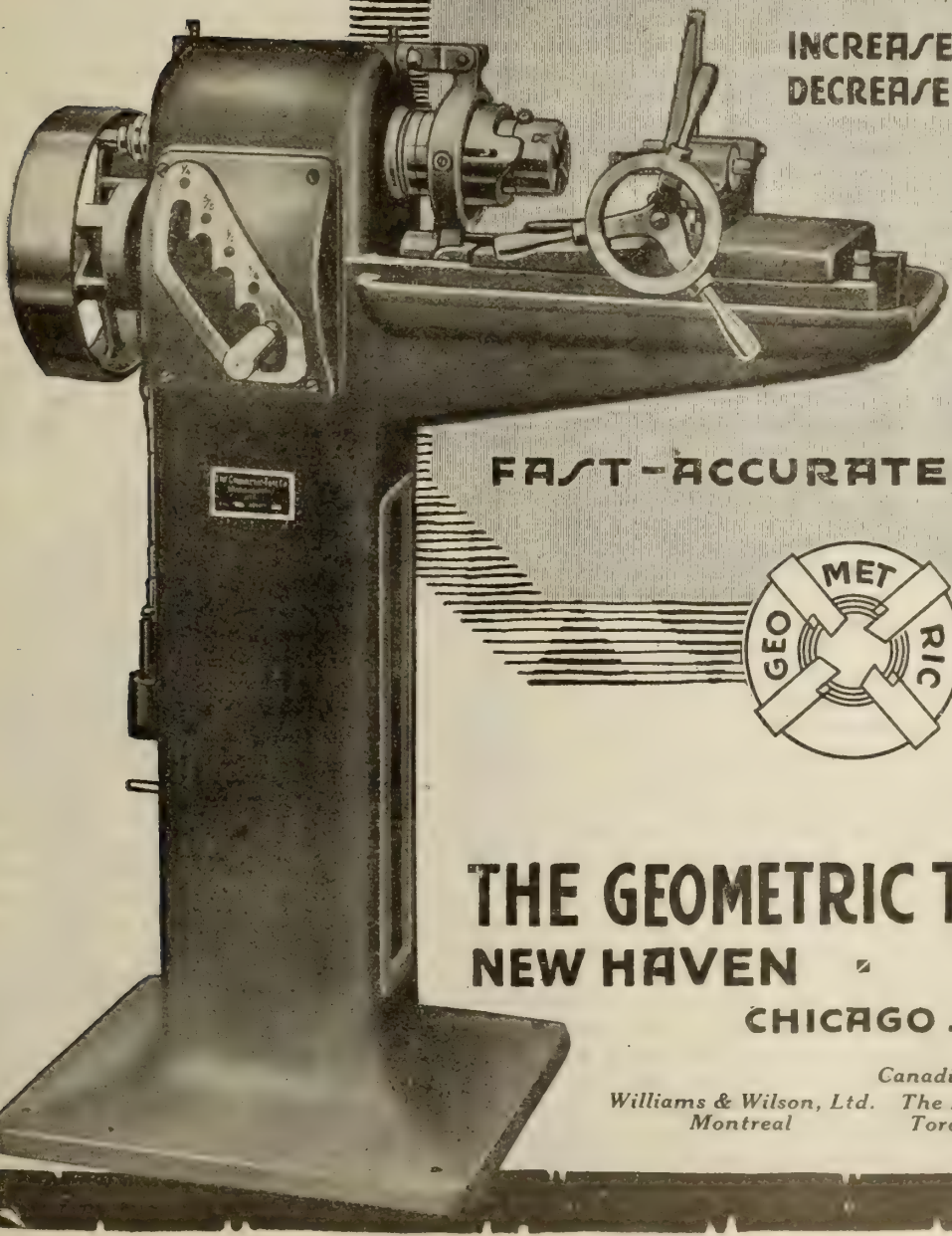
Trouble With Gas

Hamilton.—Due to a recent order of the Commissioner of Gas instructing the United Gas and Fuel Company to cease supplying manufacturers without permits with gas, this order has affected about thirty local firms, and in some cases it is a hardship. It has been the custom to issue monthly permits for the use of natural gas, and the commissioner cut off thirty firms between November and December of this year. P. V. Brynes, president of the gas company, has taken the matter up with the Commissioner in the hope that the affair will be remedied.

GEOMETRIC

THREADING MACHINES

INCREASE THE OUTPUT
DECREASE THE EXPENSE



FAST-ACCURATE-SIMPLE

GEO MET RIC

THE GEOMETRIC TOOL COMPANY

NEW HAVEN • • • CONN.

CHICAGO STORE

Canadian Agents:

Williams & Wilson, Ltd. Montreal

The A. R. Williams Machinery Co., Ltd. Toronto, Winnipeg and St. John, N.B.

If interested tear out this page and place with letters to be answered.

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

TRADE GOSSIP

New Pulp Mill for Chicoutimi—The Price Bros. Ltd. are about to construct a large pulp mill at Chicoutimi, on the Saguenay River, a few miles west of the village. Power for the new mill will be obtained from the Shipsaw River.

Vancouver.—The sixth vessel to be launched from the Coughlan yards was launched on the Wednesday preceding Christmas. The vessel was named the "War Convoy" and makes a total of 52,800 tons that Manager John Lockhart has seen completed and placed into the water under his direction.

Complete Section of Canal—Work will be continued on an early date on the third section of the Welland Canal, the contract having been let to Doheny, Quinlan and Robinson. This is one of the most expensive sections of the work, the cost being estimated at approximately $9,000,000.

McPherson Manufacturing Co., Ltd., with a capital stock of $50,000 divided into 500 shares of one hundred dollars each, has been formed at Hamilton. The new company will operate the business now carried on by J. A. McPherson, as general iron and steel manufacturer, enameller, galvanizer, etc. The head office will be at Hamilton.

Start Work Again—The Motor Truck Works in Brantford, which was the last plant in Canada engaged in Munition work for the U.S. Government, suspended work a few days ago. Orders have been received from the U.S. to go ahead again on the work which was suspended, and it is believed that the contract will be completed here. The contract is for 9.5 shells.

Cleaning Up.—The Imperial Munitions Board have quite a number of details to clear up before finally disbanding. Many of the plants carrying on work for the Board have written off the cost of their original buildings and machinery, but some have made large expenditures recently, in expectation of the continuance of hostilities. The claims arising out of these cases have got to be adjusted, and these adjustments are being carried on under the direction of Mr. F. N. Southam, Director of Steel Production.

To Wait Three Months.—The question of freight and express charges and credit arrangements was fully discussed at a meeting composed of representatives of the manufacturers, the secretary of the Railway Board, and officers of the accounting departments. It was agreed that the regulations should not be put in effect till March 1st next. In the meantime the Manufacturers' Association will appoint a special committee to study the question and make a counter proposal to be presented to the Board before March 1st.

Jas. Arnold, well known in Imperial Munitions Board circles, and more recently with the Turnbull Elev. Mfg. Co., Toronto, has been appointed works manager of the Canada Foundries & Forgings, Ltd., plant (Jas. Smart Mfg. Co.) at Brockville, Ont.

CANADIAN SHELL SHOPS PROVED EYE-OPENER TO ENGLISH ENGINEER

"To me, as an engineering man of some 30 years' experience, the Canadian shell shop was a revelation. Canada could not learn anything from the world in the production of shells. I have been in practically every shell shop of any importance in the Allied countries, and from that point am able to appreciate the work that has been going on in this country."

Such was the statement of the representative of one of the greatest British industrial concerns, at present in Canada on a special mission, when speaking to MACHINERY this week. We are not, for the present, permitted to state the name of the firm he represents, nor the nature of his business, which has kept him in United States and Canada for the last four months. It is sufficient to state, however, that there will be an announcement of considerable importance from his firm before many weeks, which will mean much to the industrial life of this country. It will also serve to bring this country and the Old Land closer together in many ways.

The After-War Problems

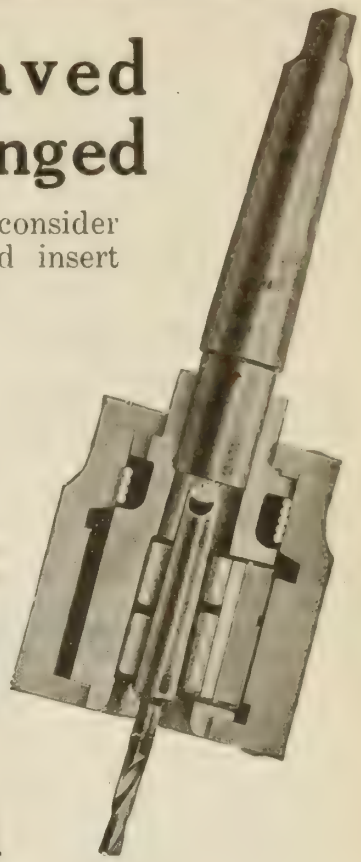
"Britain is in good shape for the after-war business," remarked the "Londoner." "The manner in which some of the first large orders for steel have gone to the mills of England has shown this very plainly. It is as long as a year and a half ago that work was started on the lines of reconstruction, and it has been going on ever since in a very direct manner. Questionnaires were sent out all over the country, and an enormous amount of information was secured. For instance the number of steel angles, beams, etc., that would be required in every centre was very carefully estimated for the first three months following war, for the next three months, etc. The same plan was followed in every commodity, and in this way it was possible to get a pretty fair idea of the men whom it would be necessary to release from active service first on the cessation of fighting. Lines that were found not to be in demand would indicate that those skilled in this direction would be retained longest in the service. The plan has worked well, and although some of the critics seem to consider it rather unwieldy, it is serving the purpose and securing results.

Condition of the People

"One notices a great change in the people of Britain," continued our informant. "When I discuss this matter I want you to understand that I speak as a Conservative. There has been an understanding of each other's problems brought about by the war that could not possibly have come in any other way. The aristocratic employer of labor, the master of the old school, has come down from his unreasonable position. The radical, unreasonable labor man has come down from his impossible stand, and these forces have met as they never have met before. Even after the removal of the necessity of the winning of the war, this feeling is still very marked, and it is the greatest thing that ever happened in our country. In our own concern, I have seen shop deputations sitting in the office of Sir ——, the head of the business, reasoning with him, and he with them, over their problems and difficulties. Such a thing a few years ago was absolutely unknown. When the call came for more food every man went to work. Within a few miles of London I grew one thousand bushels of potatoes. Several artisans had plots along by mine. We became well acquainted. I learned their point of view, and they learned mine. That condition was repeated thousands of times all over the country, and it is going to have its effect. Moreover the industrial managers of the old land have found out that the way to get real results from the men in the shops is to pay them enough wages to make them happy and satisfied. There is a good future ahead of industrial Britain."

Consider the Minutes Saved Every Time a Tool is Changed

To understand the worth of this Automatic Chuck to you, consider that it will enable your operator to remove one drill and insert another **in two seconds without stopping spindle.**



Aikenhead's Wahlstrom Chuck

automatically centers the tool, and the entire shank grip of the jaws makes slippage absolutely impossible.

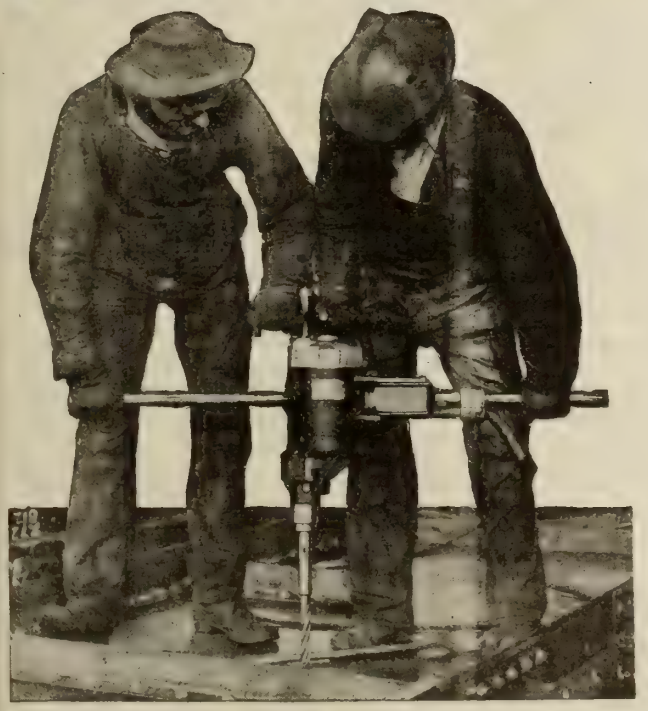
This Aikenhead Wahlstrom Chuck increases output by saving 50% on time and labor.

Write for Booklet.

Aikenhead Hardware Limited
17 Temperance St. TORONTO

Aikenhead's Van Dorn

ELECTRIC TOOLS



Portable Electric Drills

are as proof against fool usage as an electrical device can be built, and they are so constructed that they work in the open, summer and winter, in rain and snow storms, without developing the slightest trouble.

Van Dorn Electric Drills cut neat, clean and fast through every material from wood to steel. They are guaranteed to drill 50% more holes, at one-third the cost for power, than the best pneumatic drill of similar rated capacity.

Capacity in Solid Steel

DAOOO	3-16 in.
DAOO	¼ in.
DAOOX	5-16 in.
DAO	⅜ in.
DA1	½ in.
DA1X	⅝ in.
DA2	⅞ in.
DA2X	1 in.

Write For Catalogue

Aikenhead Hardware Limited
17 Temperance St. TORONTO

New Telephone Plant.—The Bell Telephone Co.'s new building at Collingwood being nearly completed, the company are now receiving the plant necessary for changing over from the present equipment to the more modern system. Installation will be commenced at the first of the year, and the office will be transferred to the new quarters at the beginning of March.

London Saves Money—The general manager of the Hydro-Electric Power Department of London in his report shows that London saved about $15,000 by the enforcement of the power conservation regulations during the past year. The normal peak load of 10,000 horsepower was cut to 8,000 horse-power, but since the signing of the armistice the 10,000 is again being used.

Rumor of Bonus—There is a considable amount of talk in railroad circles as to the probability of the Canadian Locomotive Company declaring a bonus or an extra dividend. This was not discussed at the meeting, the regular dividend being declared, it being thought it was just as well to defer any action of that kind until something definite in the way of contracts from the Canadian Government were received.

Elevator Burned Down—The elevator of Woodward & Co. at Portage la Prairie was destroyed by fire last week with a loss estimated at $450.000, fully covered by insurance. The capacity of the elevator was 165 000 bushels, and it was nearly filled with grain at the time of the fire, but it is thought that a large portion of this may be salved. Nine loaded cars and seven empty cars were destroyed at the same time.

Government Hospital Addition. — A permit has been secured from the Toronto City Architect's Department for a $50,000 extension to the Military Orthopedic Hospital, Christie stret. The new wing will be for kitchen purposes. The land has been secured, and construction will be rushed. Since last summer the Department of Public Works has added one large wing and several storeys to the existing building.

Superintendent Gives a Banquet—The employees of the St. Thomas Construction Co. were tendered a banquet by George C. Kaiting, superintendent of the shell department. About 15 guests were present, and were entertained most royally by the. genial superintendent Following the meal, some short addresses were given, after which a varied and pleasing musical program was given. The affair was to mark the closing of the shell-making operations of the company.

Resume Private Trade—The War Trade Board of the United States has announced through Chairman McCormick, that special consideration will be given to trade with Alsace-Lorraine, and a rapidly broadening program of trade with many nations will be developed. The general resumption of trade now in prospect embraces countries from the Arctic Ocean to the Tropics, and resumption of trade with Finland under adequate control is receiving strong consideration.

Government Announcement. — Additions to federal buildings throughout the country, which had been planned before the war, will soon be started, according to an announcement from Ottawa. The Government bought, just before the war, property on the northwest corner of John and Main street in Hamilton, for an addition to the Custom House, and it is surmised this work will be included in the work mentioned in the announcement.

Lyons Fair Interests.—The big international fair, to be held at Lyons in March, will have a big representation of Canadian manufacturers exhibiting their products. The Canadian Manufacturers' Association announce a list of fifty-one firms, nine of whom are Montrealers, who have decided to have an exhibit at the fair. This fair has taken the place of the historic fair which used to be held at Leipsic before the German people went mad.

New Marine Equipment Shop.—Wm. Kennedy and Sons, Ltd., of Owen Sound, have nearly completed a large addition to their factory. The new building is 50 feet by 100 feet in the ground area, and about 33 feet high. It is well built, steel and concrete construction being employed, and will be equipped with an electric travelling crane of 20 tons capacity. The shop will be used as an erecting shop for marine machinery, which the company are manufacturing.

Open New Office.—On January 1st, 1919, Canadian SKF Co. of Toronto will open a sales office at 412 St. James St. W., Montreal, Que., under the direction of Mr. Geo. F. Shepard. The growth of the S K F Companies has been remarkable. Commencing in 1907 in Sweden with an initial staff of twenty people, it now comprises a plant employing 15,000 persons, controlling three mines where the special grade of ore for this product is mined. Plants are also established in France; Luton, England; Hartford, Conn.; Philadelphia, etc."

Chemical Director Talks—The director of the Chemical Division of the War Industries Board of the United States, Mr. C. H. McDowell, has recently revealed the reason why American farmers received only 66,778 tons of nitrates instead of 100,000 tons through the $10,000,000 appropriation made by Congress. The remaining 42,000 tons were commandeered by the War Department when the German drive became a menace last spring. Military necessity has kept the details a secret hitherto, but it can be told now that the sacrifice of the fertilizer made possible a much greater supply of explosives.

Not Satisfied With Bonus.—The decision of the Imperial Munitions Board to grant bonuses to those who were in their employ on November 11 only, was taken strong exception to at a meeting called by an examiner and two inspectors of the Munitions Board for the purpose of discussing the matter. A committee of eight men was appointed with Inspector Watson as chairman to interview the Provincial representatives at Ottawa, and other men of influence, with a view to sending a deputation to Ottawa to interview the Imperial Munitions Board on the matter.

Too Much Lead—There is a surplus of lead in Canada without the support of a large demand for munition purposes, and the price has dropped materially in consequence. Mr. J. J. Warren, of the Consolidated Mining and Smelting Co., which operates largely in British Columbia, says the condition is serious. In addition to approximately 8,000 tons of pooled lead unsold, there is a large quantity remaining in the hands of the Imperial Munitions Board.

Toronto v. Express Companies—When the representatives of the city of Toronto and those of the express companies appear before the Dominion Railway Board next month, one of the biggest fights of recent years will be on. Elaborate preparations are being made on both sides. The express companies are appealing against the recent order extending the area of free delivery to St. Clair and Danforth avenues, but the city is asking that the zone of free delivery shall include every district within the city border. The companies will endeavor to show the unprofitablenss of the present system, and that deliveries thought the sparsely populated districts means a distinct and heavy loss.

Ferry Service.—The train ferry service between England and France has been one of the interesting developments of the war. The scheme was approved by the British Cabinet in January last and has been in operation only eight months, but during that time it has carried across the Channel 17,686 ten-ton railway waggons, or their equivalent in linear measurements, and 237,733 tons of gross dead weight. The train ferry is in great demand since the signing of the armistice to bring back stores and troops from France. This form of ferry, though familiar enough on this side of the Atlantic, is a development quite new to the British Islands, and its successful operation over so bad a strip of water as that between Dover and Calais is something of an achievement.

Sault Ste. Marie.—The report of the United States engineers shows a marked decrease in the amount of traffic passing through the canals here during 1918. The total movement of freight of all kinds amounted to 85,680,327 short tons, the lightest movement since 1914. Wheat shipments totalled 122,718,146 bushels, and grain other than wheat 30,000,621 bushels. The volume of flour handled was 8,228,844 barrels. Coal shipments came to 17,981,510 tons, of which 15,770,560 was bituminous. Iron ore shipments totalled 60,551,296 tons, and copper ore 86,078 tons. The amount of copper shiped was the lightest since 1913.

Shell Plant Closes. — The Lougheed Shell Co., Sarnia, closed down two weeks ago. This company has been engaged manufacturing the 18-lb. shrapnel shell, and for two years and a half 50 men have been working day and night, and about 400,000 shells have been made.

Ottawa.—Referring to the statements made in connection with the loss of the "Princess Sophia" in Alaskan waters, that the salvage laws prohibited Canadian vessels performing salvage in American waters, and vice verse, Mr. A. Johnston, Deputy Minister of Marine, said this did not apply to saving human life. The laws applied only to the salving of wrecks, and not to rescue work from ships in distress.

Oil in Alberta.—The Shell Transport and Trading Co. has an application under consideration by the Federal Government for a concession to develop the whole of the oil-bearing lands in Alberta north of the Athabasca River. This concession is to be in the form of a monopoly for five years, respecting, of course, the rights of the leaseholders and prospectors already in the fields. In return for the concession the company will pipe the oil to Vancouver or the head of the lakes, and after receiving six per cent. on its investment, divide the remaining profits with the Government.

Toronto—Attention is being given in many quarters to the difference in cost of building ships on this continent and those built in Great Britain and Europe. This is not a new condition, but one which has prevailed for many years, and is the principal reason why the United States and Canada have in the past had practically no mercantile marine. Another feature is the higher cost of operating ships which are registered in Canada or the United States, particularly the States, and thirdly the enormously inflated cost of overhauling and repairs on this side over those prevailing in Europe.

Detroit.—The project of making a deep waterway from the Great Lakes to the St. Lawrence and Atlantic Ocean has been brought again. A resolution was introduced into Congress by Senator Townsend of Michigan recently, for an investigation of a deep water project which would allow ships of deep draught to enter the harbors of Duluth, Chicago, Milwaukee and other Great Lake ports, after direct passage from Atlantic ports of this and other countries. Several American and Canadian Great Lake ports are taking up the idea with eagerness, and many engineers think the scheme quite feasible. This would give the shortest route to Europe and eliminate the rail haul so much in use now, with its attendant troubles of transhipment.

Ottawa.—The Marine Department has closed further contracts for six steel vessels. Two vessels of 8,100 tons each will be built by John L. Mullen Construction Co. of Prince Rupert, B.C., a Pittsburgh concern, which has leased its drydock and shipbuilding facilities from the Grand Trunk Pacific, and contemplates carrying on extensive work at that port.

Vancouver, B.C.—The alleged refusal of the Coughlan Shipyards to reinstate a returned soldier caused 2,000 men to quit work.

The Port Arthur Shipbuilding Co. will build two more vessels of 4,250 tons each, which will have to come through the canals in two sections and be joined together at Montreal or Quebec. New Glasgow gets two ships of 2,800 tons each, which will be built by the Nova Scotia Steel Co., specially designed for the West Indian trade.

Quebec.—The American Shipping Board officials, who have been in Quebec all summer looking after the rejoining of ships for the United States Shipping Board, which had been cut in two for coming down from the lakes, are expecting to remain in Quebec for the winter. They were expecting five ships down from Montreal this week, which would be placed in the dry dock at Lauzon There were three vessels in the Levis dock being put together, each of 4,800 tons, two of which are expected to come out soon and proceed to Sydney, B.C., for cargoes of coal.

Ottawa. — A deputation representing the Toronto Harbor Commissioners, received assurance from the Minister of Public Works that work on the Toronto harbor would be carried on in 1919. It is estimated that the work to be proceeded with would give employment to more than 800 men during the season of 1919.

Ottawa.—The number of ships built in Canada during the war, up to the end of November last, was 381. These were divided between sail and steam, the sailing vessels aggregating 199 with a gross tonnage of 44,135, and 182 steamers. 160 of these steamers were for Canadian registry, and their gross tonnage was 69,612, while the remainder were built for the Imperial Munitions Board.

Air Service for P.E.I.—A company is planned, to be known as the Prince Edward Island Aerial Transportation Co., capitalized at $25.000. The initial route planned was Moncton, Summerside, Charlottetown, Pictou, New Glasgow and Halifax, with a double daily service, summer and winter. Mail and express to be handled first, and later passengers. Major Kennedy, R.A.S., expert of the Aircraft Company, London, submitted the proposal to the meeting.

Last Contract Closed.—Motor Trucks, Ltd., of Brantford, received word last week that work on the 9.5 shells for the U. S. Government was to be suspended. This was the last U. S. contract in Canada. About 500 men were laid off as a result of the cancellation, but it is thought they will be absorbed by other local factories.

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Co-operation in Research—The Advisory Board of the Council for Scientific and Industrial research is co-operating with the newly formed Guild for Research formed by the Maritime Provinces' Fish Canning Association. The Guild has arranged an appropriation of $5,000 for investigating the fish preserving problem, and the Advisory Council has given a grant of $2,000 to this work. The Advisory Council is also arranging to publish a reference bulletin on Canadian building stones, giving very full data on their properties, and is also studying through a special committee ways and means of aiding scientific publications in Canada.

Unemployment Figures—A statement from Mr. John Young, of the International Association of Machinists, on behalf of the union in Toronto districts, is to the effect that there are 35,000 unemployed workers in Toronto and vicinity. He contends that the speech of Hon. A. K. MacLean, made in the Chateau Laurier, Ottawa, recently, is far from correct, and that there are more men unemployed in Toronto district than the Hon. A. K. MacLean credited to the whole of Canada. Mr. Young states that the exact number of unemployed is being compiled by his organization, and will be furnished to the Labor Department at an early date.

Returns Bonus—When the British Chemical Co., one of the plants of the Imperial Munitions Board, located at Trenton, the town gave a bonus of $10,000. The shutting down of the plant, due to the armistice made it impossible for the plant to carry out their part of the agreement with the town, so the company have handed back without question the $10,000 they had received. The outlook for a resumption of operations is very favorable, several experts of the British Chemical Co., having been engaged by a large syndicate to make investigations into the possibilities of using the plant to manufacture fertilizers and commercial acids.

New Patents.—The following is a list of Canadian patents recently issued through the agency of Messrs. Ridout & Maybee, 59 Yonge Street, Toronto, from whom further particulars may be obtained: Hugo Gronroos, molds for casting building blocks; James W. Moffat, processes of treating metallic oxides; Bernhart Zwillinger, apparatus for converting beehive ovens into by-product coke ovens; Wm. R. Holliday, steam turbines; Bennet Emerson and Henry C. Morris, gas meter valve protector; John G. A. Kitchen, means for reversing screw-propelled boats; Minerals Separation North American Corporation, ore concentration; Alfred Darker, brush and terminal contact mechanism of dynamo electric machines; Henry W. White, apparatus for dispensing liquids; Charles Gilliett, fuse controls for multiphase circuits: Robert S. Stratton, anti-skid tire treads; Bartholomew Bowler, artificial hands; Gutta Percha and Rubber, Ltd., half soles for boots and shoes.

PERSONAL

The death of Edward V. McConville, secretary and sales manager of the Modern Tool Co., occurred on Tuesday, November 26.

George Gray, assistant general manager of the Acadia Coal Company, Halifax, was presented by the company and staff with a chest of silver and an address signed by the executive management and his fellow officials. The occasion was the thirty-fifth anniversary of Mr. Gray's connection with the coal mining industry in Nova Scotia, and particularly with the Acadia Coal Company.

Joseph Bourque, a well-known contractor of Hull, Quebec, died at his residence in that city last week after a brief illness. Mr. Bourque had lived in Hull for the past thirty years and had carried out some notable works, among them being the Church of the Sacred Heart, Ottawa; Notre Dame de Grace, Hull; Court House, Hull; Montreal Central Post Office, and the new High School, Montreal. Mr. Bourque was a native of L'Assomption, Que.

J. J. Coughlan, the well-known Vancouver shipbuilder, in speaking of the prospects of shipbuilding in Canada, gave it as his opinion that about three years would be the extent of the present boom in shipbuilding. When the more pressing requirements of the world are met and shipping is normal, the only opening for business here would be for rush orders, and he did not anticipate many of these. Mr. Coughlan's opinion is based on the relative cost of construction here and abroad.

Victor VanderLinde and Samuel Adinoff were the speakers at the Enginers' Club of Toronto monthly dinner at the club quarters on King Street. Mr. Adinoff, who for some time was with the National Synthetic Chemical Company of New Jersey, spoke on the manufacture of picric acid, which, he declared, now that the war was over, to be a dead industry. Mr. VanderLinde spoke on the development of lighter-than-air craft in this war, and their possibilities for the future. He said that dirigibles, and kite balloons had been particularly valuable in naval operations.

William J. Galbraith, a well known Montreal civil engineer, died at his residence, 4145 Dorchester street, Westmount, on Dec. 21st from pneumonia. The deceased gentleman, who was only 32 years of age, had enjoyed a very successful engineering career. He graduated from McGill in 1909, and at the beginning of 1910, was engaged in the Rocky Mountains with the Geological Survey, and in the fall of the same year, he entered the firm of M. P. & J. T. Davis, as assistant engineer on caisson work for the Quebec bridge, remaining there till the spring of 1912. He then started in construction work for himself, and carried out many important works for the Dominion Government. At the outbreak of war he entered the Foundation Company of New York as superintendent of construction, in which position he remained until his death. He was a member of the British Institute of Civil Engineers, and leaves a widow and one daughter.

H. E. Rice has issued a formal announcement of the appointment of W. H. Graham to the position of superintendent of construction at the Dominion Steel Corporation at Sydney, N.S. This is a new department which will have the supervision of all the work now in progress in the way of construction of new plant and extensions of the existing plant. This includes the new ship plate mill and a number of other important items and will give Mr. Graham ample opportunity for the exercise of his powers of organization. The appointment of Mr. J. H. Fraser to be assistant superintendent of the new department is also announced.

TENDERS

St. Anne de Bellevue, Que.—Separate tenders, addressed to the undersigned, will be received until noon, December 24th, for the construction of guard house, recreation buildings physiotherapy building and special service building, military hospitals Ste. Anne de Bellevue, P.Q. Plans and specification can be seen and forms of tender obtained at the office of the Chief Architect, Department of Public Works, Ottawa; the Superintendent of Military Hospitals, Ste. Anne de Bellevue, P.Q., and of the Overseer of Dominion Buildings, Central Post-Office, Montreal, P.Q. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

Toronto.—Tenders will be received until noon, December 24th, for the construction of boiler-house, power plant, laundry, garage and mortuary, military hospitals, St. Andrews, Toronto, Ont. Plans and specification can be seen and forms of tender obtained at the office of the Chief Architect, Department of Public Works, Ottawa; the Clerk of Works, Postal Station "F," Toronto, Ont., and of the Superintendent of Military Hospitals, Toronto, Ont. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

Ottawa.—Tenders will be received from any Provincial Government, Municipal Council, Harbor Commission, Shipping Company or Railway Company, up until noon of the 27th of December, 1918, for the lease of the Government Wharf at Windsor, Ontario, for a period of three years dating from the first day of April, 1919. Tenderers must quote an annual rental for the property, to be payable in advance each year, it being understood that the public use of the wharf shall not be interfered with and that no wharfage tolls or dues in excess of those established by Government regulations shall be charged. A. JOHNSON, Deputy Minister of Marine, Department of Marine, Ottawa.

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Ottawa.—The Government will organize a stock company, holding all the stock itself, to operate the new steamers which are being built for Canada. It is planned to put a thoroughly practical shipping man at the head, and leave him free to act. Lines on the Atlantic, Pacific and Caribbean are planned, and also a Great Lakes service. These will all work in conjunction with the Government Railways.

Mr. C. N. Barclay, manager of the British Chemical Co., Trenton, was entertained by about 100 of the business and professional men of the town at the Hotel Gilbert. The plant was built in November, 1916, and manufactured guncotton, smokeless powder, and T.N.T. It belonged to the Imperial Munitions Board.

Extension of Time.—The pig tin committee of the American Iron and Steel Institute, announce extension of the period during which the base prices of pig tin are to be maintained. The prices, which were announced to extend through January, will now be continued beyond that month, until such time as the 10,000 tons allocated by the British authorities for American consumers have been distributed.

Montreal.—The wily Hun is already trying to resume business relations with the people of the British Empire. A circular has been received from a firm of Hamburg shipbrokers, through their branch office at Christiania, Norway, offering their services as shipbrokers to any firm sending their vessels to North Sea or Baltic ports. It will be surprising if relations are resumed so easily as this firm seems to think possible.

Director of Labor.—An official position is created by order-in-council of "Director of Labor, Research and Employment Service." The duties will be to supervise labor clearing houses, to negotiate between Provincial and Federal Governments, and to study and report on ways and means of lessening unemployment, including adjustment of wages, hours, etc.

New Industrial Plan.—At a meeting of the officers and employees of the Imperial Oil Co., Mr. W. J. Hanna, the president, outlined a new relationship to be introduced between the company and its men. Regularly elected representatives of the men will have regular conferences with the executive, at which all questions of wages and working conditions will be settled. An insurance plan, old age pension, and a sick benefit fund are among the changes proposed to be introduced. Mr. Hanna strongly emphasized the fact that there was no intention of philanthropy in these schemes, the idea being purely a business policy to promote continuity of service and eliminate the labor turnover problem.

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MARINE

Colchester.—The last grain boat having passed down, navigation at this end of Lake Erie can be considered closed The lightkeeper and his assistant have come in from the light.

Bordeaux, France. — The American steamer "Lake Bloomington" is stranded at Point de la Coubre, near Bordeaux, and is in danger of breaking up, owing to the heavy seas.

Kingston, Ont.—The Clayton Shipbuilding and Boatbuilding Corporation have launched three harbor tugs for the Canadian Government, and have laid the keels for four Government canal boats.

London, Eng.—Incoming steamers report very heavy weather in the North Atlantic. The British steamers "Linmore" from Portland, Me., and the "Aras" from Philadelphia, both arrived in a damaged condition from the heavy seas.

Halifax, N.S. — The captain of the Canadian steamer "Strathcona," Capt. C. O. Allen, has cabled to his wife from Copenhagen saying he was safe and well. He was taken prisoner in April, 1917, when his ship was sunk by the submarine U-48, and has been in German prison camps till just recently, when he was repatriated.

Vancouver—Still another 8,800 ton vessel was launched from the yards of the Coughlan Shipbuilding Co. last week. This was the "War Convoy" and she was the sixth of the vessels built for the Imperial Munitions Board by this firm. The others were the Alaska, War Camp, War Noble, War Chief and War Charger.

Paris.—An important meeting will be held to determine the shipping needs of the United States and the Allies. It is believed that arrangements will be made by which tonnage will be apportioned as follows: First for European relief; second, return of troops; and third, commercial business.

Washington—The estimated cost of the great shipbuilding plant at Hog Island was estimated recently by Charles Piez, the president of the Emergency Fleet Corporation, to be in the neighborhood of $63,000,000. The yard, he said, has delivered one ship and has laid the keels of fifty more. The approximate cost of the ships being built would be, according to Mr. Piez, in the vicinity of $225 per ton. This is considerably higher than the prices ruling in other countries.

Chicago—The old scheme for converting the Chicago drainage canal into a deep water canal has been revived by the Chicago *Daily News*. Chicago has for a long time been desirous of securing a canal to connect Lake Michigan to the upper waters of the Mississippi, which would give them direct connection by water with the Gulf of Mexico and the Atlantic Ocean. The objection of the Governments, both Canadian and United States, to the scheme, is that it would interfere with navigation on the lower lakes, and affect very adversely the many hydro-electric propositions on the St. Lawrence.

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The Financial Post on Activity in Canadian Industry

"FOLLOWING the reorganization of the Canadian Manufacturers' Association there are indications of a new era of activity, to commence with the opening of another year, under the general managership of J. E. Walsh. Already constructive steps are being taken towards the arrangement of a comprehensive program to deal with such problems as standardization of output, export marketing and attendant financing, relations of capital and labor, social welfare in industry, rail and water transportation, inland and overseas, informing of the public, etc. The opportunities are great and the time ripe for action along the right lines to put Canadian manufacturing in its rightful place in relation to national prosperity and to strengthen that position by developing export trade which will bring the highest possible return for those natural resources and products which represent our greatest assets."

Besides the important article of which above is the opening paragraph,

THE POST
THIS WEEK CONTAINS:

How Marconi Has Weathered War Conditions.
Southern Power Higher Earnings—Wider Field.
Trade Total Less for Current Year
Developments in Railway Affairs of Hamilton Co.
Uniform Laws Would Be Boon to the West.
Big Export Order for Canadian Paper.
Bank of Ottawa Aided the Nation.
Selling Safety Deposit Boxes to Customers.
The Skidmore Affair (Editorial).
Need for Tariff Commission (Editorial).
Bond Market Has Christmas Lull This Week.
Will Exchange $50 Bond Lots to Uphold Price.
Thrift Organized in Quebec Province.
Money Bylaws More Numerous This January.
Sir Thomas White's Taxation Offer Criticized.
Various Plans Advocated to Stop Fire Waste.
Insurance Tendencies Discussed by Supt. Finlayson.
Important Property Transfers Made in Montreal.
House Shortage Declared to be Only Temporary.
Bank of Commerce Plays Big Part in Foreign Trade.
Bank of Toronto Increased Profit, and Its Service.

Above mentioned are a few of the more important contents of this issue of THE FINANCIAL POST. Send a subscription to THE POST and note its business value to you. Use this form in sending subscription which is $3.00 per year.

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Trenton, Ont.—Local navigators are about to petition the Marine Dept. with a view to getting a wireless station on Duck Island. This is due to the large number of wrecks which have occurred in this vicinity, the steamer Minola being the latest. It is felt that the installation of a wireless plant would afford a means of securing assistance to a vessel in distress.

Paris, France. — Arrangements have been made by which the release of 1,000,000 tons of shipping will be brought about. This tonnage will be taken from the army supply service, and diverted to American export trade, to aid in changing the home industries from a war to a peace basis.

Vancouver, B.C.—The "War Storm," the third of the 4,800 ton steamers being built at the Wallace Shipyards, ran her trial trips last week with very satisfactory results to the owners and builders. The trial gave a maximum speed of 11.92 knots and an average of 11.03 knots. The engines were built in the Wallace Yards. The ship was in charge of Captain W. Ettershank, the veteran pilot.

Collingwood—A launch took place last week at Collingwood, from the yards of the Collingwood Shipbuilding Co., of a 3,500 ton steamer. This was the "Canadian Warrior," the first of the steamers to be built for the Dominion Government on the Great Lakes. The vessel is Canadian-built throughout, the boilers, engines and auxiliary machinery having all been built in this country.

Quebec—The new drydock at Quebec, which is now practically completed, is one of the largest of this type of dock in the world. Its construction has occupied the last four years. Situated on the south bank of the St. Lawrence, it has a length of 1,150 feet and a breadth of 120 feet, and is divided into two compartments, the inner of which is 650 feet long. The interior entrance is closed by a floating caisson, while the outer one has a rolling caisson. It is equipped with pumping machinery capable of emptying it in two and a half hours.

Vancouver, B.C.—The enquiry by a Royal Commission into the differences between the members of the Merchant Service Guild and the shipowners, is now proceeding. The investigation has extended over a considerable length of time, during which a tie-up of the shipping on the coast was caused for a period of 48 hours. The guild consented to lift the tie-up only after being promised a speedy finding by the commission, and an agreement by the legal representative of the companies that they would recognize the finding and abide by it.

London—The Admiralty announces that Admiral J. Jellicoe will shortly visit such of the overseas Dominions as express a wish for his services to organize a scheme of naval defence. The decision of the Dominion Governments to build and maintain navies, which will be trained and organized on the same lines as the Royal Navy, will be a great factor in the maintaining of world peace in the future.

Halifax. — The steamer "Regina," which has just arrived at Halifax with troops is the latest acquisition to the fleet of the White Star Line. She is a vessel of 28,360 tons displacement, and is 600 feet long by 68 feet beam, and an average speed of 15 knots an hour. She is intended to carry only two classes of passengers, cabin and third class, and is the largest steamer of her class trading to Canada.

Montreal.—The "Empress of Russia," and the "Empress of Asia," will soon be returned to their former runs, according to Mr. C. E. Benjamin, passenger traffic manager of the C.P.O.S. These two vessels were taken from the Pacific to the Atlantic for service as troopships, and are now being refitted in England in order to resume their passenger service to the Orient. The "Empress of Russia" will proceed to the East by the Suez Canal, while her sister ship will go to the West Coast via the Panama.

Collingwood, Ont.—The first ship built on the Great Lakes under the Government shipbuilding plan was successfully launched from the yard of the Collingwood Shipbuilding Co. Saturday last . The vessel was named "Canadian Warrior," and is the first of four vessels to be built here for the Department of Marine. The following vessels will be named: "Canadian Recruit," "Canadian Signaler" and Canadian Gunner."

Montreal, Que.—J. W. Norcross, vice-president and chairman of the Canada Steamship Co. reached his office from London on Monday, where he has been in conference with the British Advisory Board regarding the plans of the company during reconstruction. He announced that the Canada Steamship Lines would make arrangements for its own connections on the Atlantic. With regard to the steamers of the line now on the Atlantic, Mr. Norcross said that most of them were under charter till six months after peace was signed, and as there was not much chance of peace being declared till June next, that would mean that the vessels would be under charter till the end of the year, and earning good returns.

Toronto.—The "War Aquila" was launched from the yard of the Polson Iron Works on Sunday last. She was to have taken her initial plunge on Saturday, but owing to the ways sinking into the soft ground, the bow refused to move, and the launch had to be postponed until the ways could be blocked up, the launch taking place the next day. The "War Aquila" is a sister ship to the "War Hydra" and the "War Taurus" and is the fourth freighter to be launched by the Polson Co. for the Imperial Munitions Board. She is 261 feet long, by breadth moulded 43 feet 6 inches, and depth moulded 23 feet. Deadweight capacity is 3,500 tons, and her engines are of the triple expansion reciprocating type. She has two Scotch boilers, 12 feet long and 14 feet diameter, working at 180 pounds per square inch. There are four more steamers under construction at the yard of the Polson Iron Works, all for delivery early in the coming year.

Kingston, Ont. — The whaleback steamer "Atikokan," which came east from Lake Superior, is to be placed in the dry dock of the Collingwood Shipbuilding Co. for structural alterations before being put together. The design not having proved entirely satisfactory some changes are to be made.

Port Huron—The two halves of the "Paipoonge" which were brought here from Collingwood, will be joined together in the Foundation Co.'s dock, and the ship will be lengthened by 50 feet. It was originally intended to take the two sections through the Welland Canal to the coast, but the end of the war changed the plans of the owners.

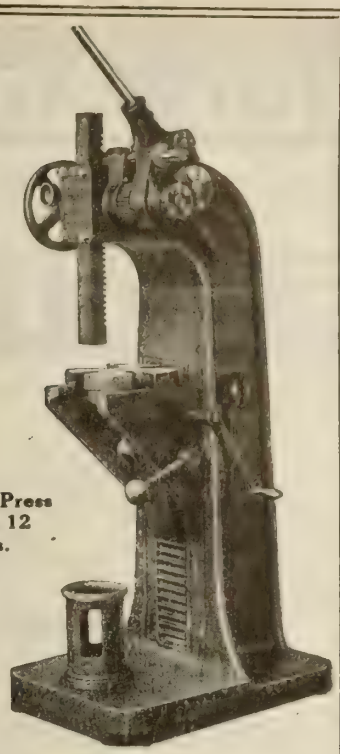
Sarnia—There are quite a number of steamers wintering here, and so far Lake Huron is quite free of ice. Pond nets are still being used in Lake Huron which is very exceptional at this time of the year. The steamers here are Overland, Brainard, Hall, Calvert, Imperial, Manistique, A. Harrison, Smith, Thousand Islander, Huronic, Hamonic, Waubic and Noronic.

St. John, N.B.—The spirit of the old time wrecker still lives, as is shown by the looting of the C.P.O.S. steamer "Corinthian," ashore in the Bay of Fundy. When Capt. Walsh, marine superintendent of the C.P.O.S., arrived at the wreck, he found about 100 motor boats, whose owners were busy removing everything from the ship that was not too heavy to carry. These worthies evidently thought Capt Walsh and his steamer were rival pirates, for they very coolly ordered him away.

Montreal.—Navigation is continuing open much later this winter than was the case last year. The last steamer to leave the harbor last year was the War Castle, on the 7th of December. There were four ships of the United Shipping Board in the harbor on the 10th December, and four more in the canal. If the present mild weather continues, the port may be open for another week, but if a cold snap succeeds, a couple of days might see the close of navigation.

Cleveland.—With the sailing of the G. W. Pollock the last of the hard coal shipments from Buffalo to Lake Superior has been made. There is some hard coal on the market for Chicago, and a Cleveland steamer was placed for that port at 41, with the understanding that if a higher rate was paid, she would get it. Two steamers were offered for Lake Michigan at 41¼, but were not chartered, so they were ordered from Buffalo to Ohio ports to lay up.

Ottawa.—It is stated that one result of the investigation into harbor conditions at Vancouver, carried out by Mr. A. D. Swan, has been the recommendation of a dry dock. In connection with this it is rumored that application will shortly be made to Dominion Minister of Public Works by a strong company for leave to construct a dry dock at a cost of several million dollars. It is understood that the Lyall Shipbuilding Co. will be interested with other Vancouver firms.



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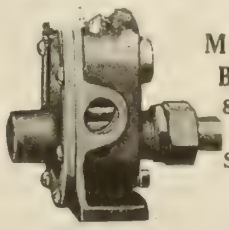

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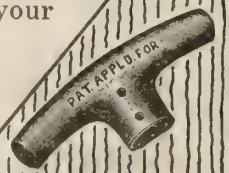

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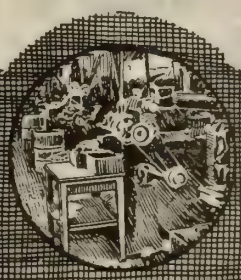
Toronto Tool Company

516 Richmond St. West Phone Adel. 1181



HIBBERT & PHILLIPS

281 Emerald St. N.
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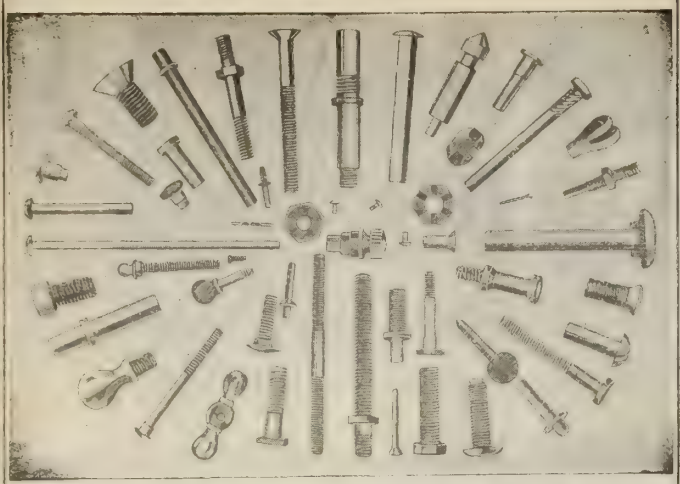
H&P

Special Machinery Builders

Repair Work

Die Makers and Special Machinery Builders



Automatic Screw Machine

ACCURACY **Products** QUALITY

Our Mechanical Engineers are at the service of our Clients.

United Brass & Lead, Limited

St. Helen's Avenue, - Toronto

W. L. TOBIAS, *Superintendent*

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SPECIAL MACHINERY

You require *Expert Work.*

Our *Experience* and a *Full Equipment* are at your service.

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Accuracy WE MAKE **SPECIAL EQUIPMENT** *Reliability*

SPECIAL TOOLS, JIGS, FIXTURES AND CUTTERS

LIMIT A fully equipped tool-room and machine-shop with a competent staff are at your service. **GAUGES**

THREAD, PLUG, RING AND SNAP GAUGES

MARTEN MACHINE CO., Main St. and Gage Ave., HAMILTON, ONT.

Grey Iron Castings

We are in an excellent position to give quick delivery on high grade castings up to 10,000 lbs. in weight. Send your Blue Prints for quotations.

Our up-to-date Pattern Shop can handle your Pattern Work expeditiously and well

Welland Machine & Foundries, Ltd., Welland, Ontario

WE ARE ENLARGING OUR PLANT

Hull Iron & Steel Foundries, Limited

"HISCO" will shortly have an increased capacity which will make it the largest foundry of its kind in Canada.
Two big new electric furnaces are being added to our present large equipment. And cleaning and annealing department measuring 300′ x 100′ is about to be completed.
This will place us in a position to handle orders big and small with unequalled facility.

We make steel, Chrome, Manganese and Nickel Steel Castings—annealed and unannealed.
Cement Mill and Mining Machinery Castings; Stamp Mills, Crushing Plants, and Excavating Outfits.
Steel Car Wheels, Locomotive Driving Wheels and Frames, and all Castings for car builders and locomotives.
GEARS—Machine moulded, any size up to 18 feet without patterns.

Hull Iron & Steel Foundries, Limited, Hull, Que.

Dominion Cast Steel Parts

Open Hearth Products

Machinery Castings of all kinds, Motor Frames, etc., for electrical trade, Pedestal and Miscellaneous Bridge Work, Rolling Mill and Blast Furnace Castings, Gears and Gear Blanks.

We are also prepared to furnish steel plate to 20″ wide — for prompt delivery.

We have recently increased the capacity of our plant and can guarantee quick delivery on castings weighing anywhere from 100 lbs. to 50,000 lbs.

Quick Deliveries

Quality and Economy

THE DOMINION FOUNDRIES & STEEL, LIMITED

HAMILTON - - ONTARIO

The MacLean Business & Class Publications in Canada

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Serving the Grocery, Provision and Foodstuffs Trades. Published weekly.

Hardware and Metal (Est. 1889)
Serving the Hardware, Stove and Metal-working Trades. Published weekly.

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Serving the Dry Goods Trade generally; Wholesale, Retail, Manufacturing and Department Stores. Published monthly.

Men's Wear Review (Est. 1898)
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Serving the Machinery, Metal-working, Iron and Steel, Foundry and Allied Trades. Published weekly.

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Serving the Operating and Consulting Engineers and Power Superintendents, Devoted to the Generation, Transmission and Application of Steam, Gas, Electric, Air and Water Power; and to the operation of Refrigerating Machinery. Published monthly.

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The Sanitary Engineer (Est. 1907)
Serving the Manufacturers of Sanitary, Heating and Ventilating Machinery, Systems and Equipments, and those installing them. Published semi-monthly.

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Canadian Foundryman (Est. 1909)
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A popular family and literary magazine; the most important in its field in Canada. Published monthly.

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This fact may interest you: namely, the MacLean organization is the largest concern of its kind in the British Empire. The output of its mechanical department every working day is the equivalent of a 125-page publication of the size and type of this copy of *Marine Engineering*.

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For over 20 years the MacLean Publishing Company has maintained a fully-staffed London office, and has rendered British and Continental manufacturers, shippers, and traders an invaluable service in many directions.

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The MacLean Publishing Co., Limited

143-153 University Avenue Toronto, Canada

The Newest of the "OTT" Line

and SOME PRODUCER too

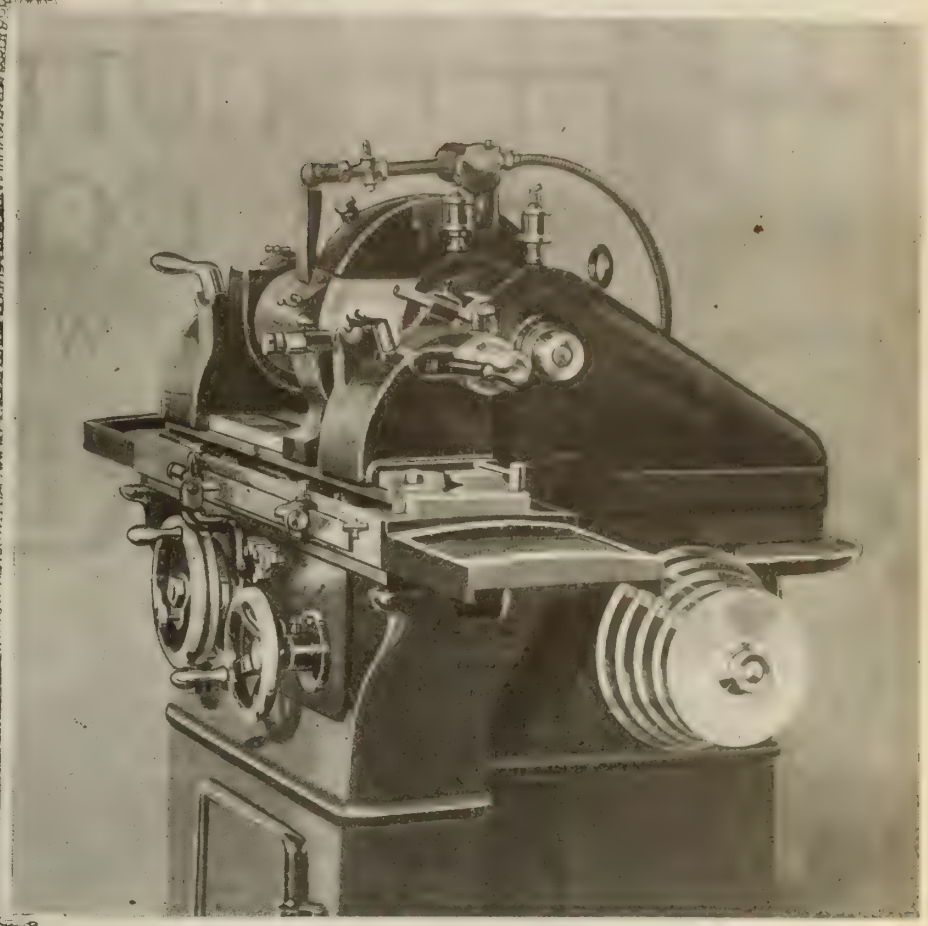


Illustration shows our 5" x 18" Plain Grinder.

It has automatic feeds, bearings of Non-Grain Metal, large self-feeding oilers and Hyatt roller bearings on the countershaft. It is especially adapted for the rapid and economical production of large quantities of small duplicate, straight or taper cylindrical parts requiring close limit grinding.

Fifty-seven varieties of work, more or less, from cast iron bushings to high-speed steel cutters, take their accurate finish from Ott Grinders; and the intitial machine in any plant—no matter what it makes—invariably recommends others.

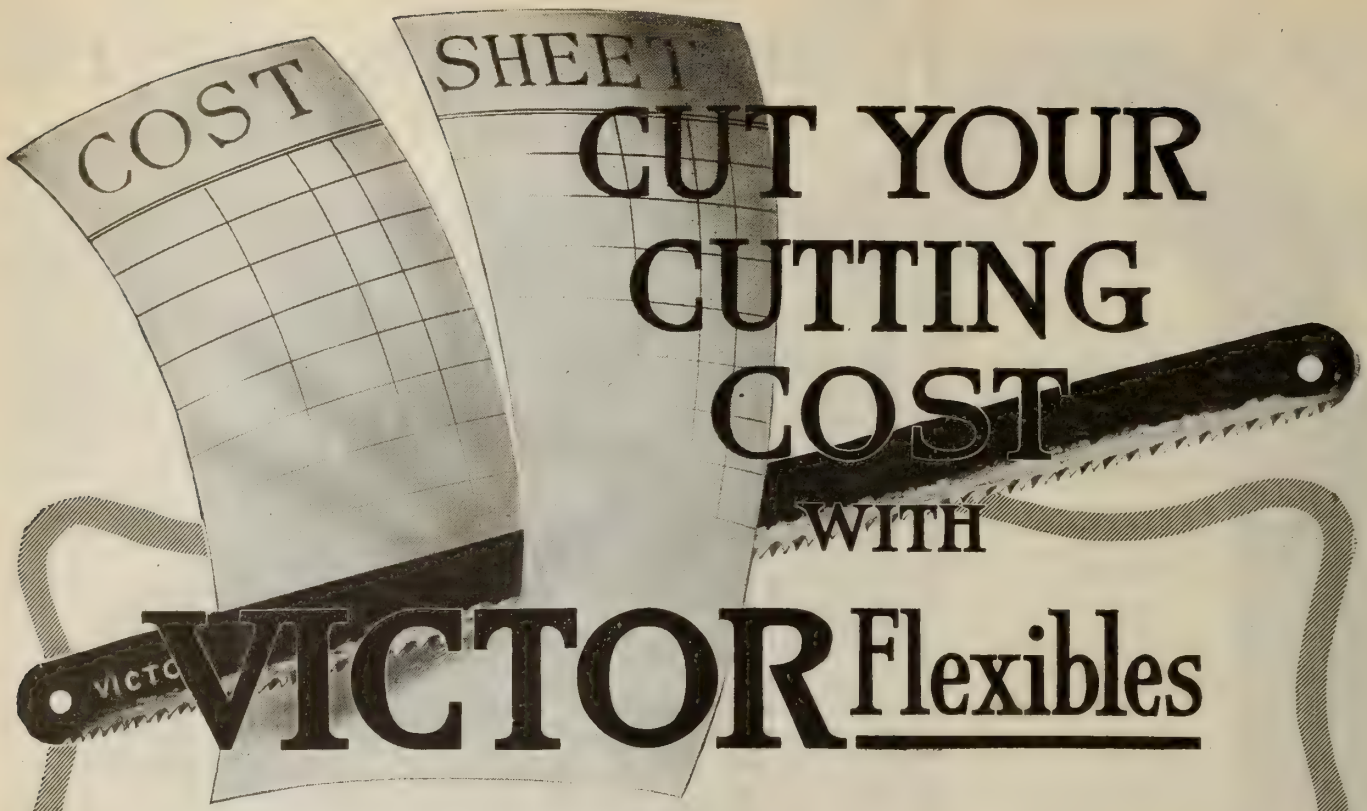
It occupies but 31" x 68" floor space. Its production capacity is worthy of larger and costlier machines.

Let Us Send the Full Description

Ott Grinder Company

INDIANAPOLIS, INDIANA, U.S.A.

If interested tear out this page and place with letters to be answered.



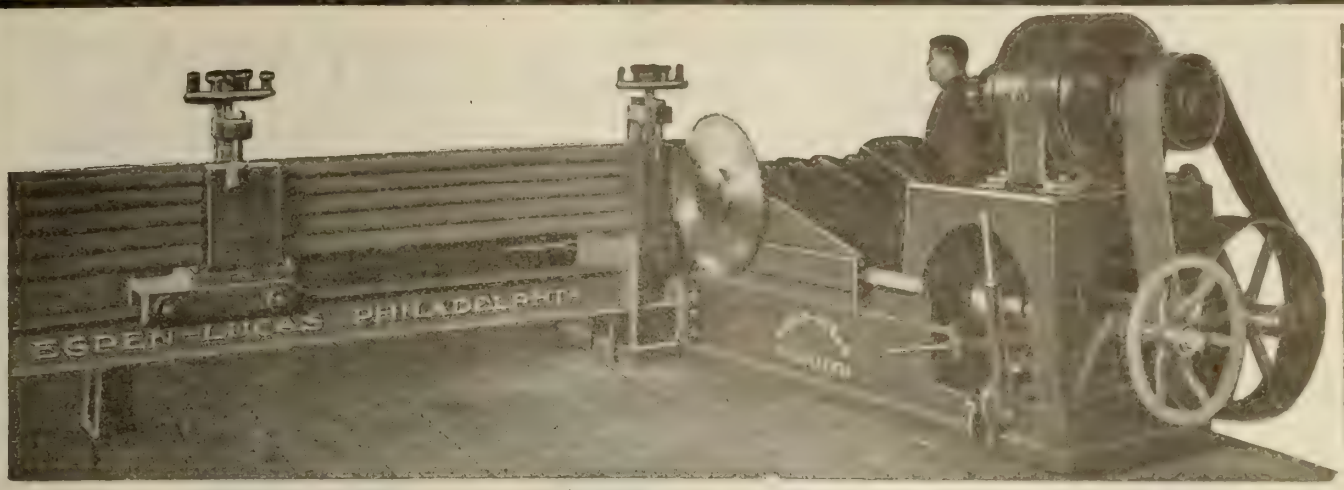
The high cost of tools should emphasize more than ever the importance of quality.

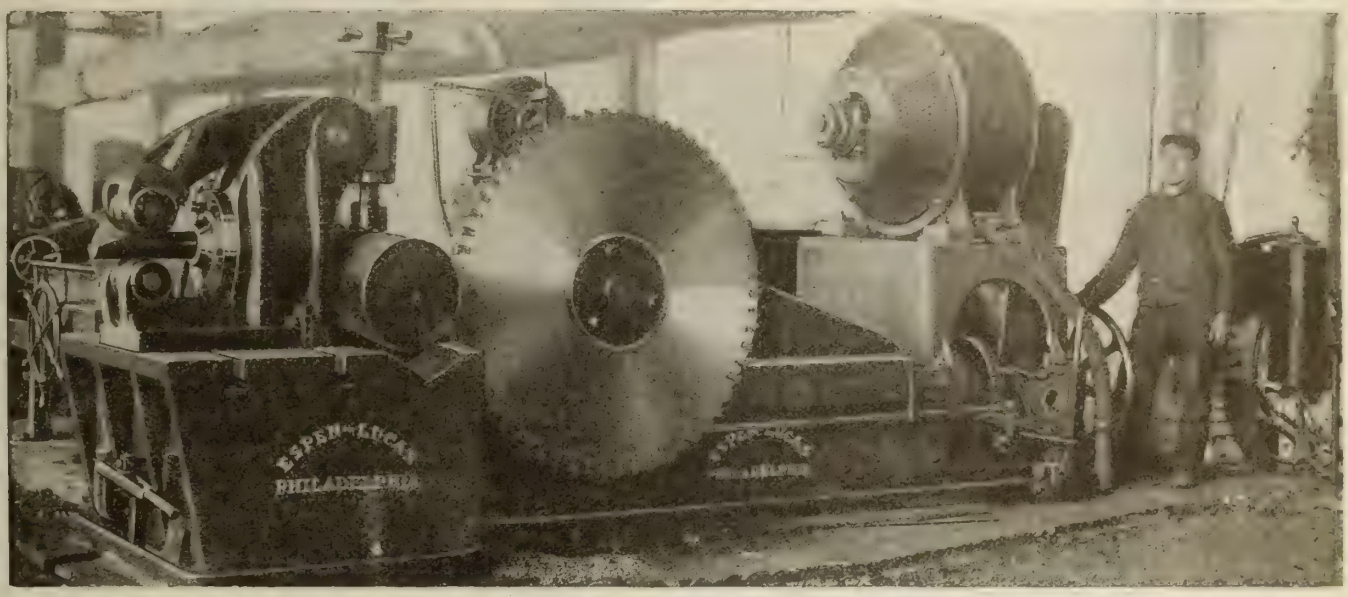
The high cost of hack saw blades ought to drive every hand blade user over to the saw that does not break in ordinary hand work.

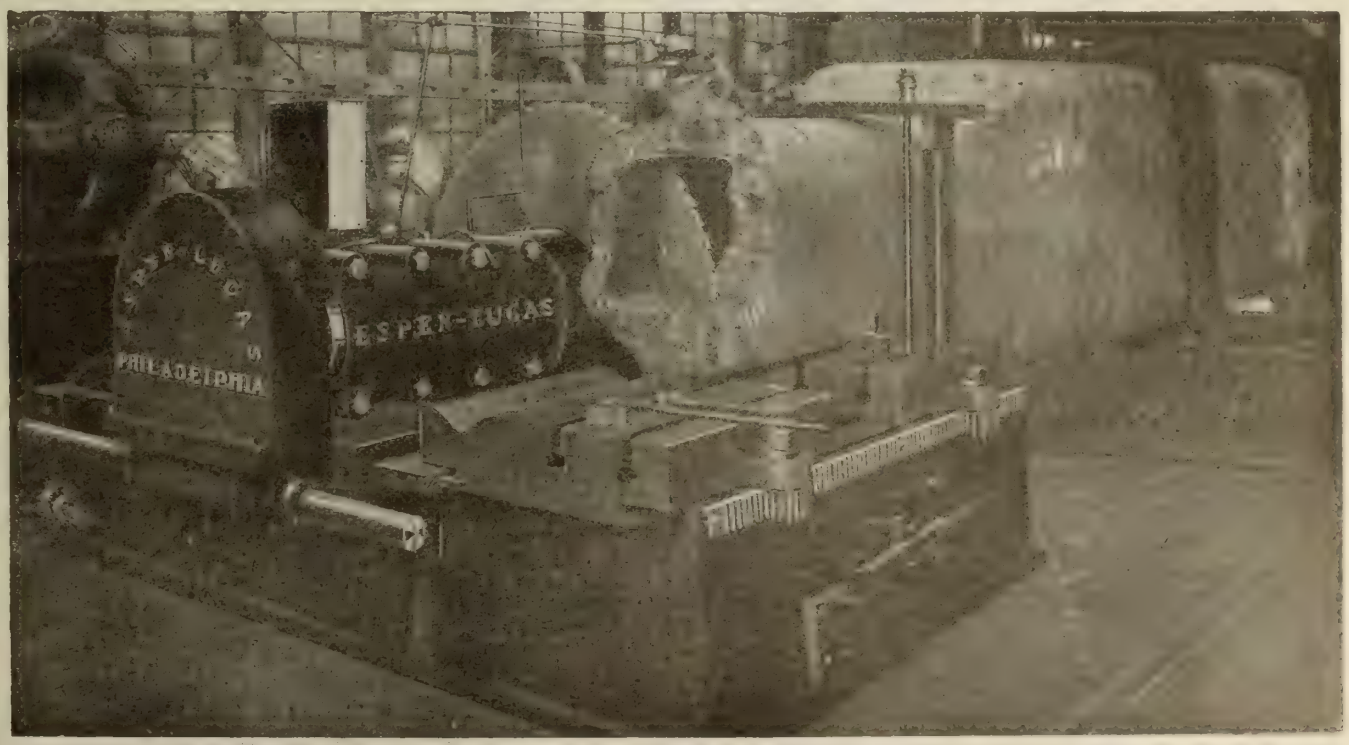
VICTOR FLEXIBLE HACK SAW BLADES have exactly the same cutting power as the finest All-Hard on the market, and that they cannot be broken in use except by intentional abuse is an undisputable fact—which will represent a saving from twenty-five percent to thirty-three and one-third percent in breakage alone.

Seventy-five percent of the All-Hard blades used in hand frames break before they are worn out. Watch the All-Hard blades in your own shop and see the enormous amount of breakage—then use VICTOR FLEXIBLES and note the economy.

VICTOR SAW WORKS LTD - HAMILTON, CANADA







THE ESPEN-LUCAS MACHINE WORKS, FRONT & GIRARD AVENUE PHILADELPHIA, PENNA.; U.S.A.

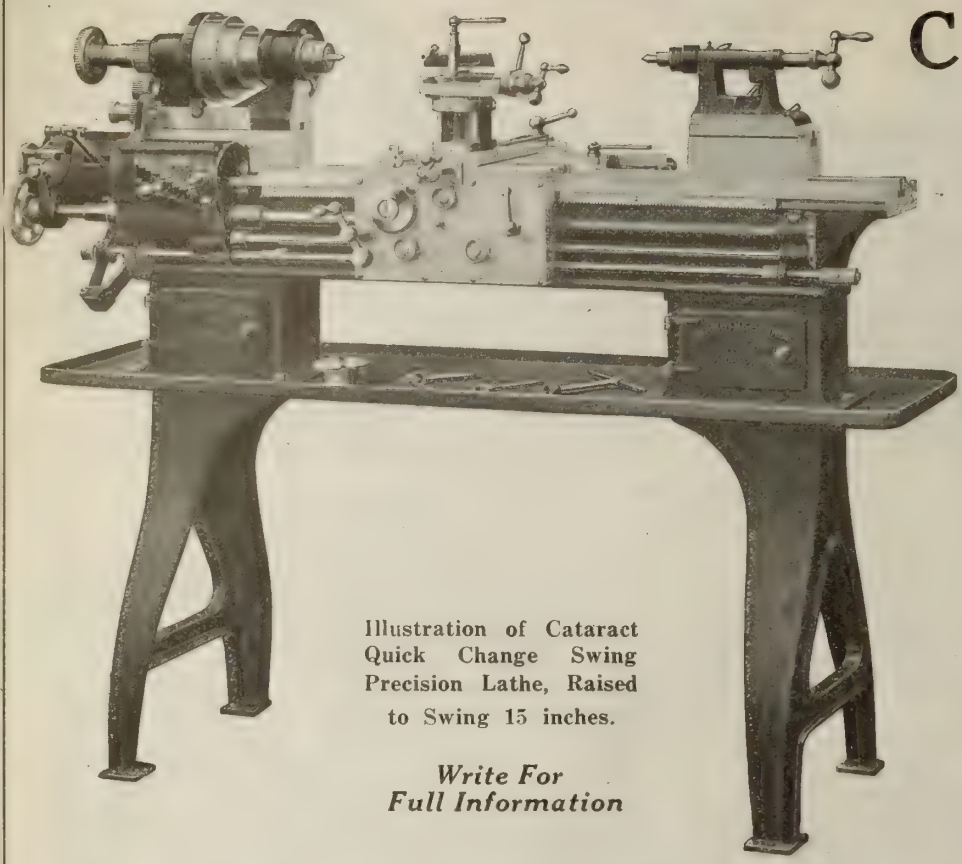


Illustration of Cataract Quick Change Swing Precision Lathe, Raised to Swing 15 inches.

Write For Full Information

CATARACT

QUICK-CHANGE PRECISION LATHE

Ideally designed for both ordinary and specially fine work. This Cataract lathe has accomplished so much in so many plants we'd particularly like YOU to know all the particulars of its unusual record.

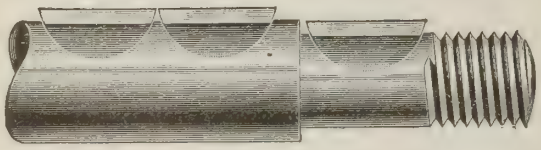
Length of Bed .....52"
Total Length of Lathe .....65"
Distance Between Centres...28'
Swing .....9" and 15"
Swing over Carriage
5½" and 11½'
Diameter of Lead Screw
1" x 6 pitch
Diameter of Front Cover.2 1-32"
1 Diameter of Rear Bearing 1⅛"
Length of Spindle .....15"
Hole through Spindle.....1¼"
Draw-in Chuck Cap.1" maximum

Hardinge Bros., Inc.
1770 Berteau Avenue
Chicago, Ill., U.S.A.

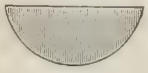
"WHITNEY" MACHINE KEYS

For the

Woodruff System of Keying



If you are not already using the "Woodruff System" write us at once. Remember that the operations of cutting the Keyseats and inserting the Keys require no skilled labor. Used by all manufacturers to whom economy, rapidity, and interchangeability are essential.



Furnished in our Special Carbon Steel

Furnished in Nickel Steel. Heat Treated

The Whitney Mfg. Co.
HARTFORD, CONN.

Chains Keys and Cutters Hand Milling Machines

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

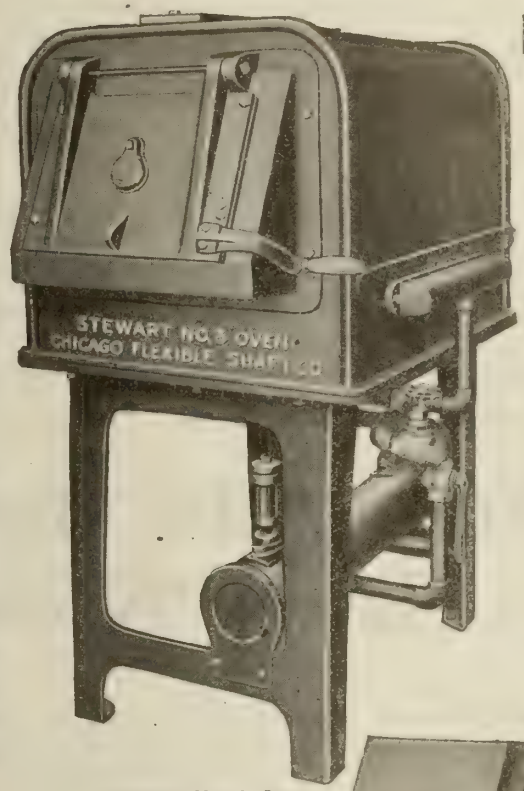
Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

STEWART FURNACES

Precisely meet modern shop practice and steel heating requirements

Stewart Oven No. 1



Stewart No. 3 Oven

TEMPERATURE controls the vital factor in successful heat treatment of metals. If you have no positive control you cannot be certain of results. STEWART FURNACES GUARANTEE POSITIVE CONTROL. Put any kind of heat-treating work up to Stewart Furnaces and it will be done precisely as you require it.

Gas or Oil Fired

Stewart Furnaces are either gas or oil-fired, and construction is such that an even temperature control is possible at all times.

And you shut off the Gas or Oil when you are through with the heat—you can no longer afford to do your heat-treating by coke or coal—it is far too risky, costly and inefficient.

Whatever your heat-treating problems may be we can supply you with a furnace to fill the bill. Made in over 100 standard types and sizes. If none of these meet your requirements exactly, we will build one that will. Write for catalog showing full line.

Stewart No. 28 Bench Oven

Canadian Distributors:

General Supply Company of Canada, Limited
TORONTO OTTAWA MONTREAL

Chicago Flexible Shaft Co.
CHICAGO, ILL.

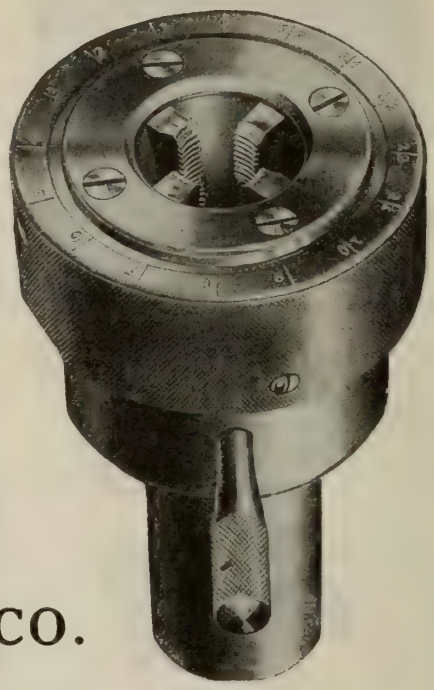
The Murchey Way!

The "Murchey Way" is to keep well in advance in the matter of all things pertaining to the **accurate** production of their well-known **Collapsing Taps** and **Self-Opening Dies.**

Every tool that comes out of the Murchey shop is the very best that modern machinery, modern ideas and years of experience can make it.

Murchey Taps and Dies last longer, do better and quicker work than ordinary tools. They combine cost-cutting feature seen on no other tools of their kind.

Sixteen years of experience in making Collapsing Taps and Self-Opening Dies places us in a position where we can make valuable suggestions on special threading tools. Write.



MURCHEY MACHINE & TOOL CO.

75 Porter St. Detroit, Mich.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
Fenwick Freres & Co. 16 Rue Fenelon Paris, France

Here's Hoping the Best of Luck And a Happy New Year

We are going to build many good Cisco Lathes for our Canadian friends this year. The same good lathes we have furnished in the past. If we can, we will make it better, but you can always count on it being accurate, strong, rigid and effective.

The Best Lathe Ever Built

That's our claim, and some time you will agree with us. Best in satisfaction; best in economy; best in lasting results. They're built in 14", 16", 18" and 24" sizes.

WILLIAMS SELLS
The Lathe with the Pull
The Lathe of Simplified Accuracy

Made by

The Cisco Machine Tool Co.

Cincinnati, U.S.A.

RICKERT-SHAFER TAPPERS

Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on 5/8-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.

Write for specifications

The Rickert-Shafer Co.

ERIE, PA., U.S.A.

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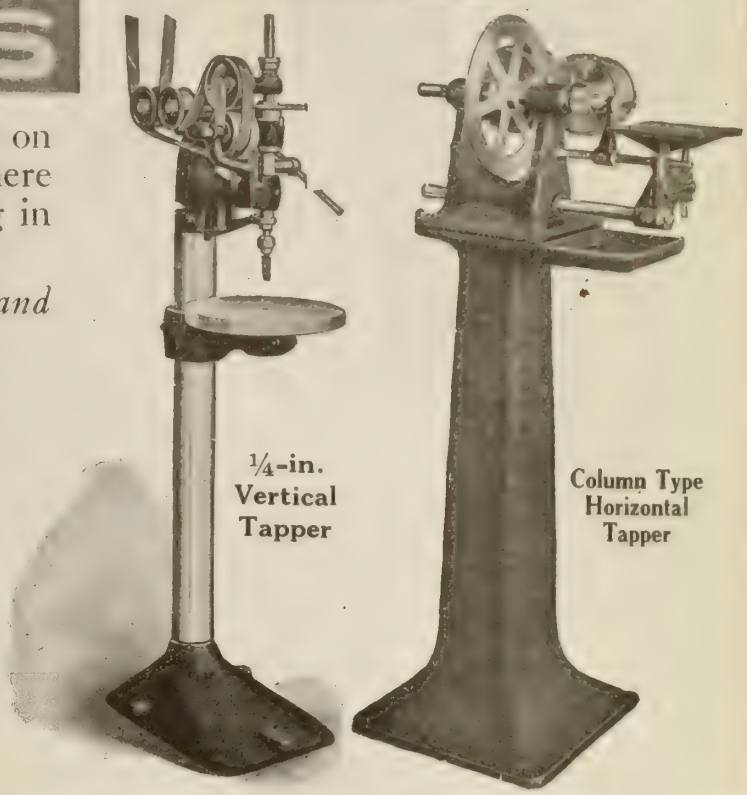
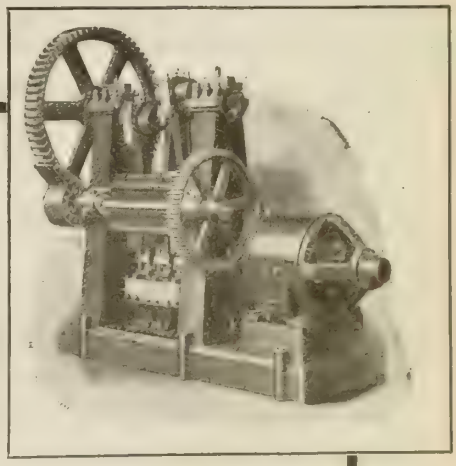


Heavy Duty Triplex Pumps

BELT DRIVEN OR DIRECT CONNECTED

DIRECT CONNECTED OR BELT DRIVEN. ANY PRESSURE UP TO 5,000 POUNDS. SIZES AND CAPACITIES UP TO 4½ IN. x 14 IN.—125 GALLONS PER MINUTE.



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HYDRAULIC PRESSES, ACCUMULATORS, VALVES AND FITTINGS FOR MUNITION PLANTS AND ALL OTHER PRESSING USES.

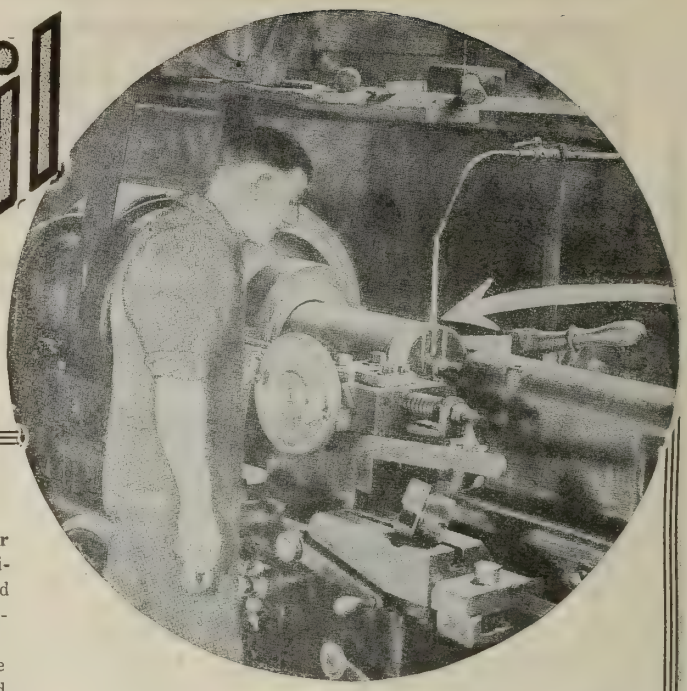
CATALOG "B" TELLS THE STORY

OUR SKILLED ENGINEERS ARE AT YOUR SERVICE TO HELP WORK OUT YOUR PRESSING PROBLEMS

The Hydraulic Machinery Co., Limited

MONTREAL CANADA

ELM Cutting Oil



To keep tools at their maximum cutting efficiency it is necessary to flood them constantly with high-grade cutting oils.

Elm Cutting Oil will not only enable you to speed up your production and get clean-cut threads, but eliminates repeats and greatly lessens the breakages of dies. **Once known, always used.**

ELM MOTOR OIL

Another quality line. Absolutely carbonless and reduces friction. Maintains its body regardless of temperatures. Made in three grades: light, medium and heavy. Get acquainted with something really good. Try it.

Cutting, Drawing, Motor and Floor Oils
Linseed Oil Soaps and Cup Greases

Elm Cutting Oil Co.
645 East King St., TORONTO

Quadrupled Driving Gears

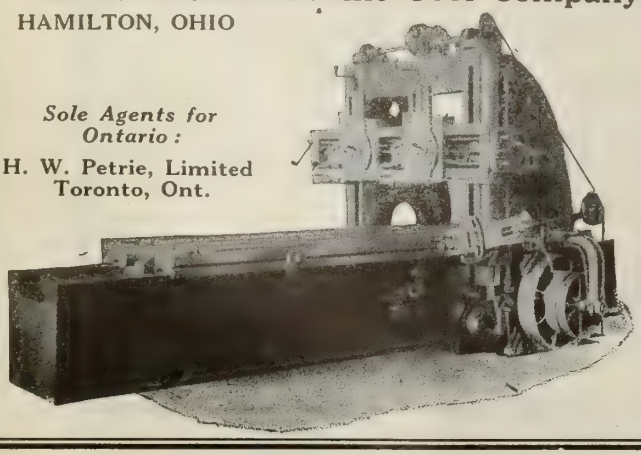
and driving mechanism of great strength and weight insure **power**; and the wide, extra heavy housings extending to the floor and secured to bed by tongue and groove joints in addition to bolts and dowels insure **rigidity.** It is this power and this rigidity that **make "Hamilton Planers,"** 48" x 48", rapid producers on heavy precision work. For more particulars

Rapid Production HAMILTON Machine Tools

Write

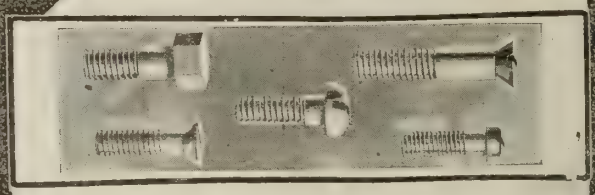
The Hamilton Machine Tool Company
HAMILTON, OHIO

Sole Agents for Ontario:
H. W. Petrie, Limited
Toronto, Ont.



Wood Screw Making Machinery

SEND FOR CATALOGUE
Series B6



For sixty years we have constantly manufactured machinery for making screws, always studying to improve and refine our product.

Write or Wire us.

Cable address: "Cook," Hartford, U.S.A.

Codes: Liebers
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Asa S. Cook Co.
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New York Office:
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The Hammond Steel Co., Inc.
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High Grade
Crucible and Electric Tool
and
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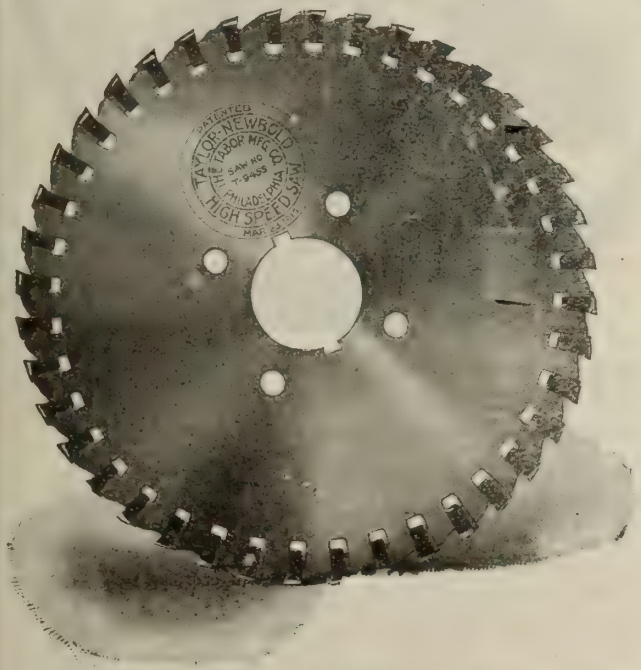
Equipped to Meet all Demands

Piercers
Punches and Dies

Made from Special Chrome Vanadium for Shell Piercing

Army and Navy Specifications
All Classes

THE IMPROVED
TAYLOR-NEWBOLD



INSERTED TOOTH COLD SAW
WRITE FOR BULLETIN T-S
Tabor Mfg. Co., Philadelphia, U.S.A.

Electric Steel Castings

E S&M
BRAND
Stands for Quality

High Grade Steel Castings
Of Every Description
For Bridge, Dock and Harbor Construction
Machinery Steel Castings, Etc.
Manganese Steel
Crusher Jaws, Check Plates, Toggles, Granite Rolls, Ball Mill Wearing Parts, Tube Mill Wearing Parts.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
WELLAND ONTARIO

Conserve Labor

Everyone possesses some degree of energy. That energy expressed is **labor.** Without **labor** the world would suddenly stand still. Production of any kind would be absolutely impossible. Humanity would perish.

Labor is, and will continue to be scarce.

Labor is costly.

Expenditure of **labor** through inefficient methods is a waste not only of **labor,** but of time and money, all of which should be expended more profitably.

BOWSER ESTABLISHED 1885

SYSTEMS THE STANDARD ALWAYS

for the storing and handling of oil and gasoline will conserve

70%

of the **labor** necessarily expended by less efficient methods.

They also conserve—

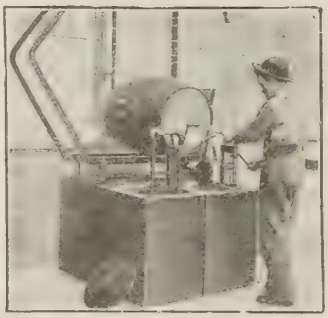
Time	**Machinery**
Space	**Lives**
Capital	**Property**
	Material

BOWSER ESTABLISHED 1885

SYSTEMS

ARE

Leak-proof
Loss-proof
Fire-proof
Dirt-proof
Deterioration-proof
Evaporation-proof



An inquiry carries no obligation whatever. Let us help you **conserve labor.**

A System for every requirement.

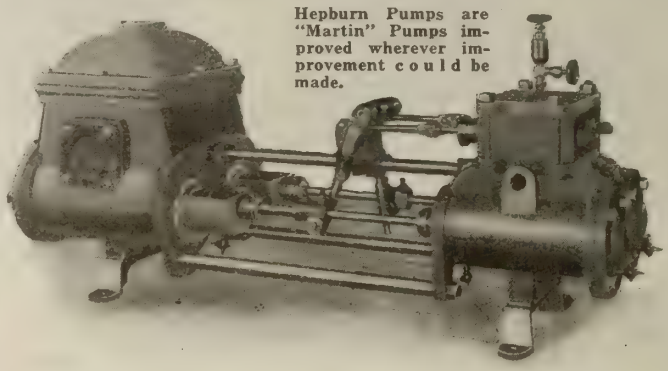
S. F. BOWSER & COMPANY, Inc.

TORONTO, ONTARIO

Sales Offices in All Centres Representatives Everywhere

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario

ROTARY GEARED PUMPS

The Utmost in Efficiency and Durability

Trahern Positive-drive Rotary-geared Pumps shoot the lubricant into deep bores or other work difficult to cool. Never need to lessen the speed of the cutting tools for the reason that Trahern Pumps, even at slow speed, flood the cutting tool with abundant coolant.

Let us send a sample pump free of charge—to prove that Trahern Geared Pumps are preferable.

Trahern Pump Company

ROCKFORD, ILLINOIS

Canadian Agents:

A. R Williams Machinery Co., Toronto

Change the Metal Shapes You Cut---

as often as you will. You can saw them all with a 10-tooth, 18-gauge Star Power Blade without changing the blade except for very thin or very heavy work. You can do this with the Star because it is the standardized blade that cuts the widest range of shapes and metals. This standardized service is made possible by the cutting angle, clearance and strength of teeth of the Star Blade and by its higher percentage of Tungsten and greater toughness of steel.

Don't use a saw that requires constant shifting of blades every time you change your work. Constant change of blades means lost motion, lost time and lost money—and the inevitable wrong blade selection adds still further to the cutting loss.

STAR HACK SAW BLADES

made of Tungsten Steel

Machine and Hand

Frederick Taylor and the other authorities on metal cutting are all agreed that a standardized tool is the basis of metal cutting efficiency. Hack saws with a multiplicity of gauges and pitches are wrong in theory and practice.

Once you try the standardized Star Blade you will never be satisfied again with the ordinary blade with its confusing number of gauges, pitches and sizes. You will appreciate the time-saving convenience of the Star and realize that its faster cutting and longer cutting give you a far lower cutting cost which after all is what you are buying.

The most efficient plants of the country, such as

Flexible and All Hard

Bethlehem Steel, Standard Oil, Fore River Shipbuilding, Thomas A. Edison, Inc., and Pennsylvania Railroad are Star Blade users.

You, too, will be a Star user when you find out all the facts.

Our Engineering Service on metal cutting is at your service no matter what blades you are using. Put your problems up to us and let us help you. Write for "Hack Saw Efficiency." It is a valuable handbook for anyone who cuts metal. Free on request — 230 River St., Millers Falls, Mass.

Manufactured By
CLEMSON BROS. INC.
MIDDLETOWN, NEW YORK

Sole Distributors
MILLERS FALLS CO.
MILLERS FALLS, MASS.

ANGULAR GRIT

Saves Labor
Saves Time
Saves Costs

Quicker and Better

One ton of Angular Grit equal carloads of sand

ANGULAR GRIT offers you the most advanced and economical method of cleaning castings, etc. Its angular and irregular cutting points clean raw castings and forgings more thoroughly and with greater speed than either sand or shot.

ANGULAR GRIT dispenses with sand bins and sand dryers, and there is no dust nuisance where it is used.

If you are using sand, think of the labor you can save by adopting ANGULAR GRIT in its place.

Used for all kinds of cleaning operations—best materials for cleaning shells. Prove its superiority by giving it a trial.

Pittsburgh Crushed Steel Co.

Established 1888

Pittsburgh, Pa., U.S.A.

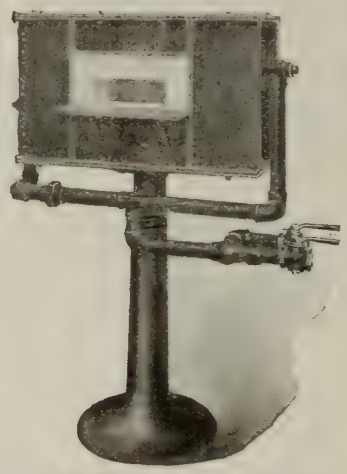
Canadian Representatives:

Williams and Wilson Ltd., Montreal, P.Q.

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.



Red End Furnace or Cutting Tool Type

For

Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting
Shell Types

Furnaces built for special requirement

TORONTO OFFICE:

Standard Fuel Engineering Co.

W. H. KIRK, Manager
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STANDARD FUEL ENGINEERING CO. · DETROIT, MICH. ·

USED STEAM ENGINES

FOR SALE

One Left-Hand Improved Horizontal Simple Automatic Laurie Corliss Engine.

Diameter of Cylinder	28″
Length of Stroke of Piston	48″
No. of Revolutions per minute	75
Fly Wheel	18′ x 12½″ Face
Weight	40,000 lbs.
Rated Horse Power	625
I. H. P.	700
Max.	950

One 25″ x 50″ Left-Hand Wheelock Engine.
One 20½″ x 46″ Left-Hand Wheelock Engine.

These engines are in excellent condition.

Photograph and full particulars will be sent on application to

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LIMITED

Toronto, Canada

Philadelphia GEAR Works

VINE STREET PHILADELPHIA, PA.

Spur, Bevel, Herringbone, Spiral and Intermittent

Gears and Pinions

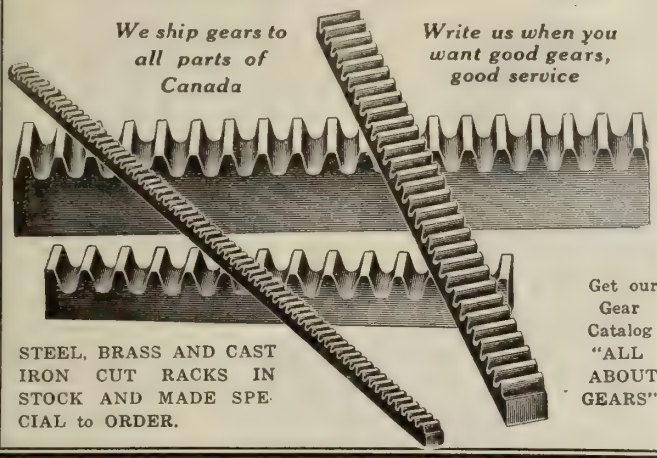
Made in all kinds of metals, rawhide and fibre

SPROCKET WHEELS made to order.

DIAMOND CHAINS for Power Transmission, Machinery, Motor Trucks, Motorcycles and Bicycles.

We ship gears to all parts of Canada

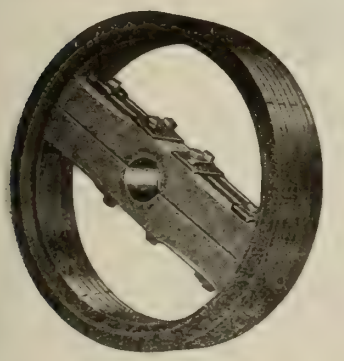
Write us when you want good gears, good service



STEEL, BRASS AND CAST IRON CUT RACKS IN STOCK AND MADE SPECIAL to ORDER.

Get our Gear Catalog "ALL ABOUT GEARS"

BERNARD



Wood Split Pulley

With greatest care we select and treat the materials to be built into the BERNARD WOOD SPLIT PULLEY. It is bound to give you entire satisfaction for years. Write for price and service particulars.

The A. Bernard Industrial Co.

Manufacturers of High Grade Power Transmission Appliances

Office and Works: Fortierville, Que., Canada

Carried in stock by

The General Supply Co. of Canada, Ottawa and Winnipeg
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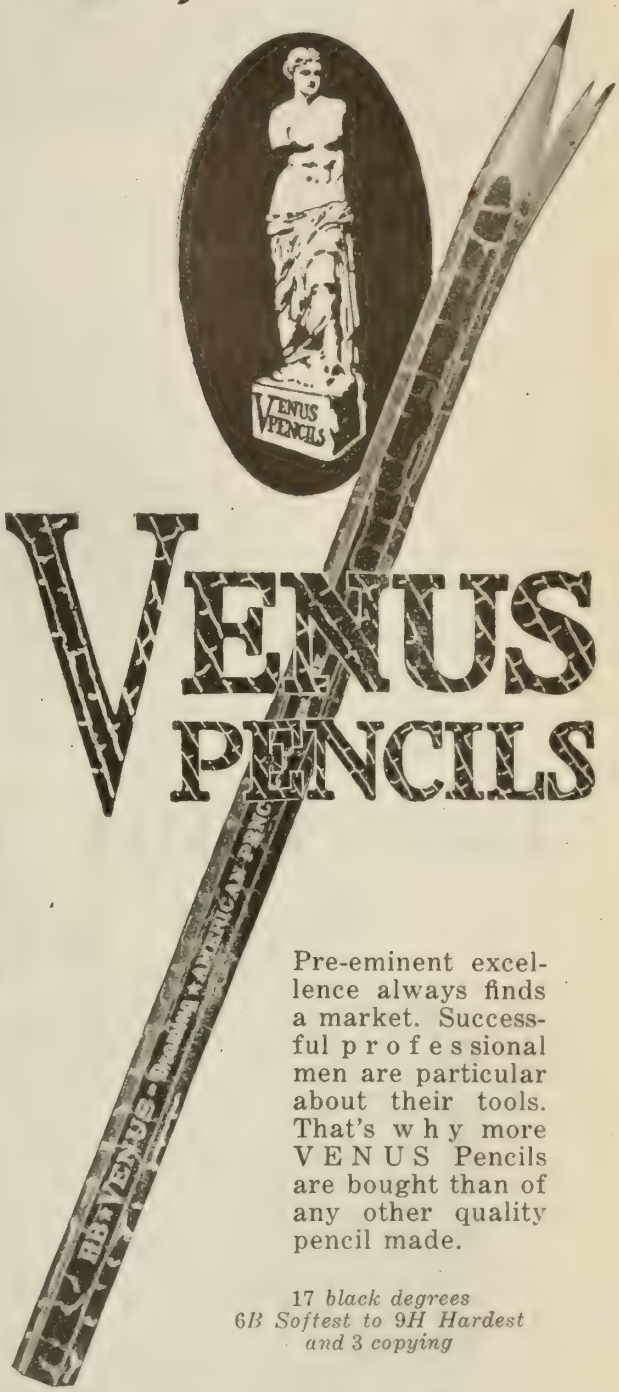
The Largest Selling Quality Pencil in the World



Pre-eminent excellence always finds a market. Successful professional men are particular about their tools. That's why more VENUS Pencils are bought than of any other quality pencil made.

17 black degrees
6B Softest to 9H Hardest and 3 copying

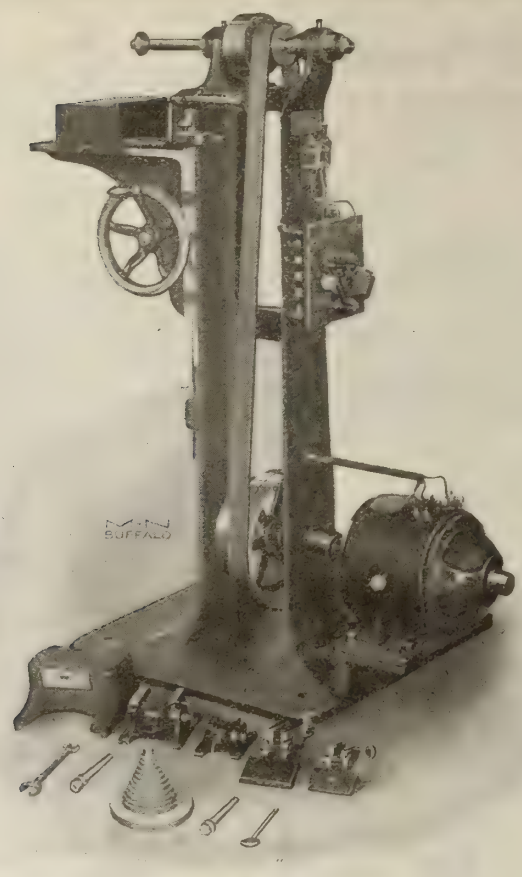
Special 14c. Offer

Send 14 cents in stamps for 3 trial samples, mentioning degrees you want. After you find how perfect VENUS Pencils are, buy them regularly at any dealer.

American Lead Pencil Co.

238 Fifth Avenue, New York

also Makers of the famous Velvet Pencil



The "MODERN" Die Chaser Grinder

Let Your Die Troubles End Right Here

Why let Die Trouble stand between you and maximum production?
In the

Modern Die Chaser Grinder

you will have a machine that does away with die trouble—because its output is **marvellously eccentric.**
Made for belt drive or a complete motor-driven unit. Special attachments for grinding Spring Dies, Pipe Dies, Reamers, Taps, Hobs, Spiral and End Mills, Milling Cutters, etc.; can be furnished with the regular equipment.

For Fast Accurate Work

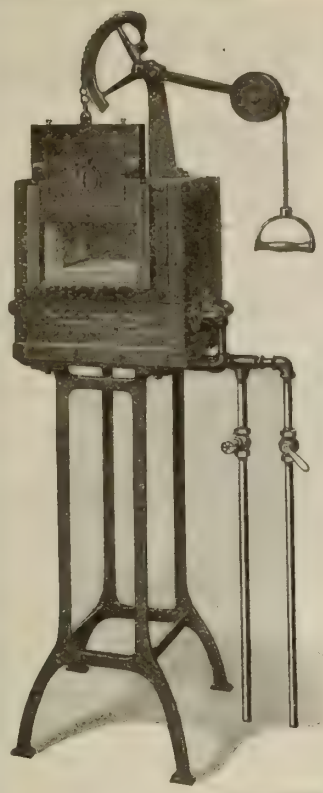
Bulletin C. G. will give you full details.
We would also be pleased to send you full particulars re **"Modern" Self-Contained Grinding Machines.** Tools splendidly adapted to meet the present demand for large production.

Modern Tool Company

Main Office and Works: State and Peach Streets, Erie., Pa., U.S.A.

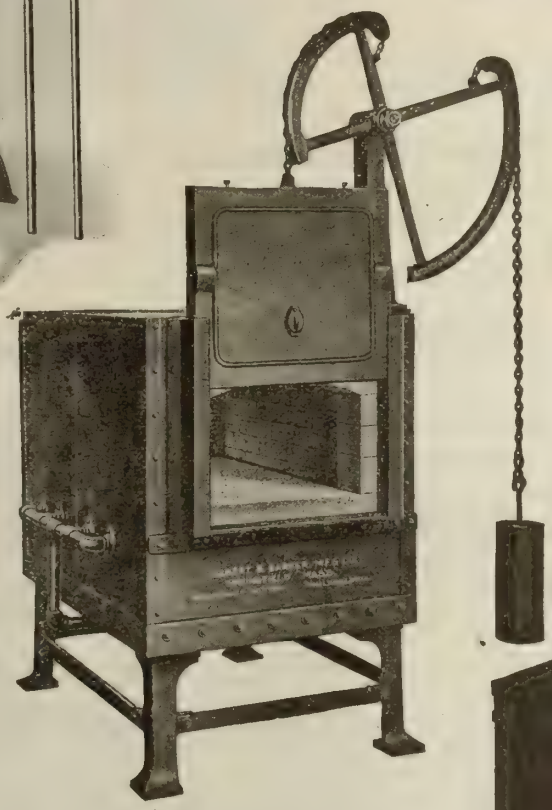
Canadian Agents: Rudel Machinery Co., Toronto and Montreal

New York Office: - 50 Church Street
Chicago Office: - 32 N. Clinton Street
F. Wesley Parker, Resident Engineer and Export Agent, 2 Rector Street



Gilbert & Barker Furnaces

For Immediate Deliveries

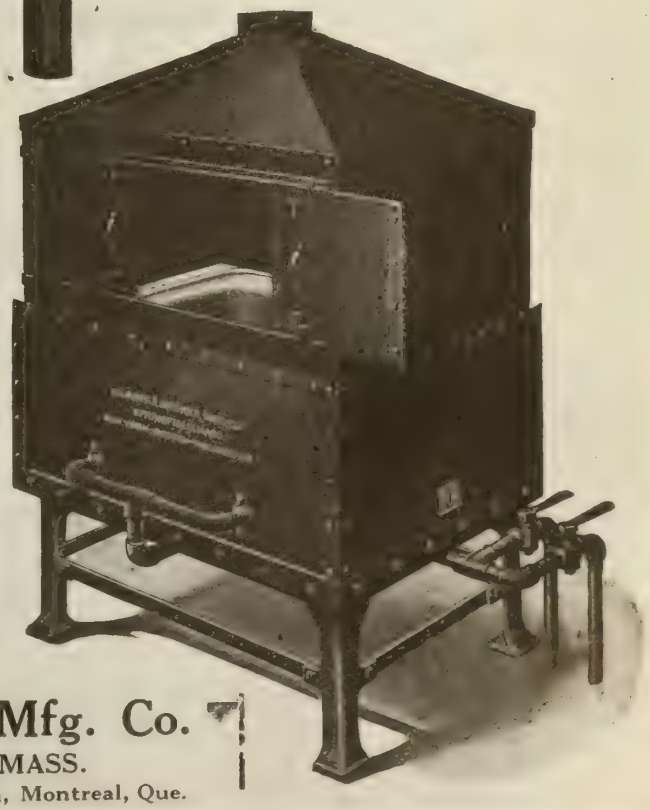


WHEN you require a heat treating furnace delivered to you promptly specify G. & B. in your order. Extensive manufacturing facilities enable us to keep ahead of the demand and you can secure certain standard types of furnaces for hardening and tempering directly from our stock.

G. & B. Furnaces Assure You 100% Efficiency In Heat Treating

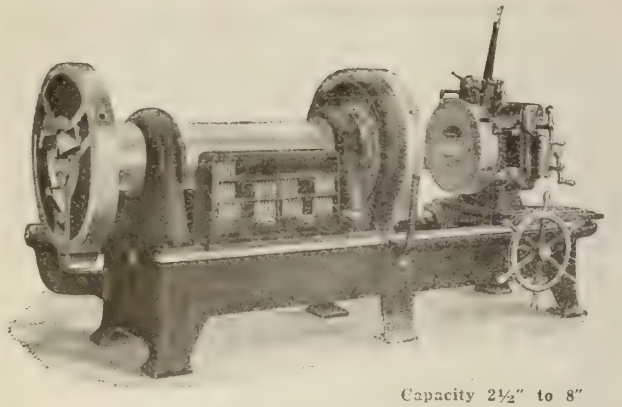
The "C" type—especially designed for hardening taps, dies, milling cutters, etc., may be had in two sizes; one has a heating chamber 24 x 36 x 12 in. and the other 25 x 58 x 12 in.

The "K" type meets every requirement in the heat treating of high speed steels. Despite the fact that temperatures up to 2,600 deg. Fahr. may be obtained and maintained uniformly — this furnace rates very low on fuel consumption.



Enquiries Promptly Answered

Gilbert & Barker Mfg. Co.
WEST SPRINGFIELD, MASS.
Canadian Agents: Williams & Wilson, Montreal, Que.



Capacity 2½" to 8"

15 Distinctive Hall Features

1 Single Pulley Drive, through.
2 Dodge Friction Clutch, on machine.
3 Clutch Lever at operator's left hand.
4 Rigid Bearing Brackets on drive shaft.
5 Gear Box Drive away from operator.
6 Individual Adjustment for each bearing.
7 Large Spindle Bearings are ring oiling.
8 Compact Control Levers on operator's side.
9 Large Die Cabinet and Tool Tray.
10 Substantial oil trough around top of ways.
11 Specially constructed reservoir and filter.
12 Low-down Sliding Head.
13 Rotary Geared Pump reversible for left-hand thread.
14 Specially designed Carriage to drain off oil and cuttings.
15 All Gears amply protected.

THE HALL GEAR BOX DRIVEN—Duplex Improved Pipe Threading Machine

Heavy duty Construction, Economical Up-keep, Radial Production, Perfect Threads, Workmanship and Finish Unsurpassed. All sizes—⅛" to 18".

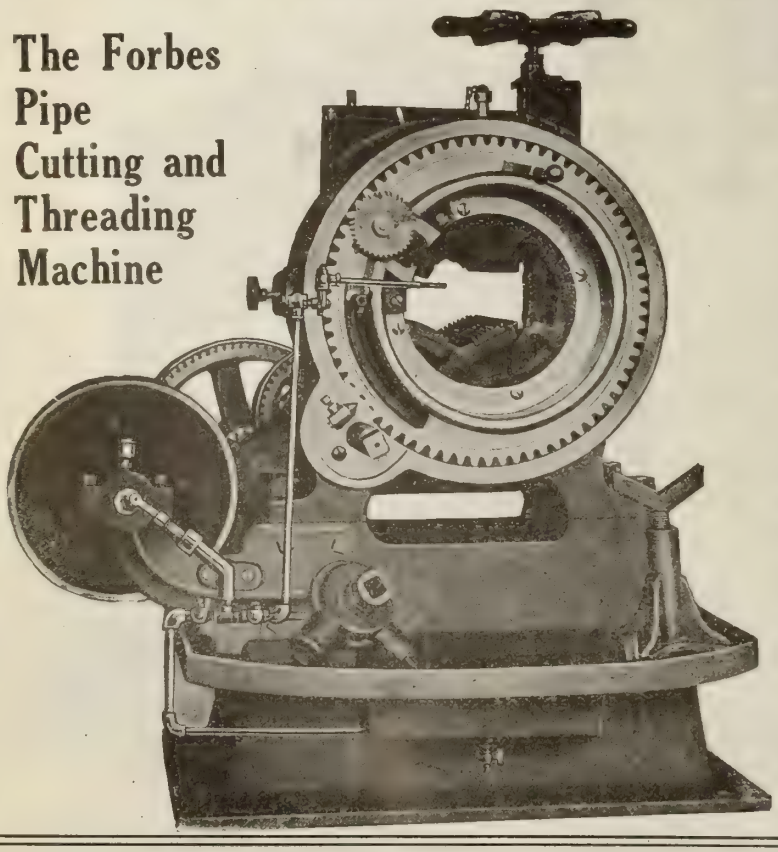
Pipe Threading Machines, Nipple Machines, Roller Pipe Cutters Special Machinery

Catalogue and Prices on Application

JOHN H. HALL & SONS, LTD., Brantford, Can.

CUTS THREADS FAST, CLEAN and TRUE

The Forbes Pipe Cutting and Threading Machine



One man can do the work of six against old Stock and Die method of cutting

These are not exaggerated statements—they are facts that are being proven every day by Forbes' Users. Inquire for yourself. Investigate its performance closely and you can't help but admit its labor-saving, perfect-working value.

Inexpensive to Operate

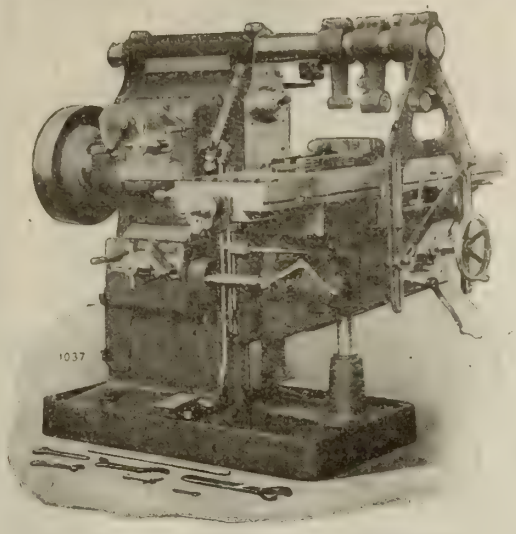
It is simple, compact, self-contained, and all wearing parts are adjustable. One man can operate it and for heavy pipe work it can be taken right to the job. Fitted with self-centering vise that holds the heavy pipe stationary, while the dies turn around it. The latter are clamped and released by a throw of the lever.

Write for our latest bulletin giving full details

THE CURTIS & CURTIS CO.

Garden Street, Bridgeport, Connecticut, U.S.A.

Cincinnati High Power Millers



One of our 9 High Power Single Pulley Plain Millers. We also make 9 cone driven plain machines, and a full line of Universals.

Unusual Spindle Power

Heat Treated Alloy Steel Gearing for the Spindle Drive

Flanged Spindle End

which makes Face Milling Cutters Interchangeable in all sizes of Machines

Handy and Easy to Operate

These are some of the reasons why you should use

Cincinnati High Power Millers

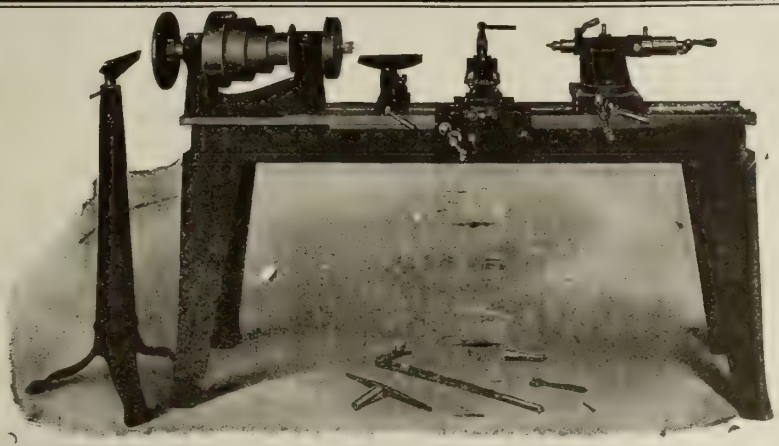
ASK FOR CATALOGUE

The Cincinnati Milling Machine Company

CINCINNATI, OHIO

Canadian Agents.:

Taylor Engineering Co., Ltd. - Vancouver, B.C.
H. W. Petrie, Ltd. - - - Toronto, Ont.
H. W. Petrie, of Montreal, Ltd., Montreal, Que.
General Supply Co., of Canada, Winnipeg, Man.



A Favorite—

Blount Pattern-makers' Lathe

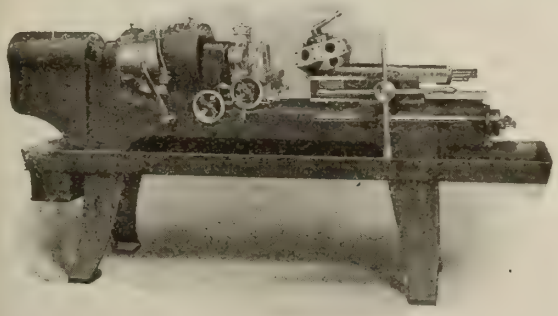
FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catalog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY
EVERETT, MASS., U.S.A.

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



INVESTIGATE!

SEND FOR

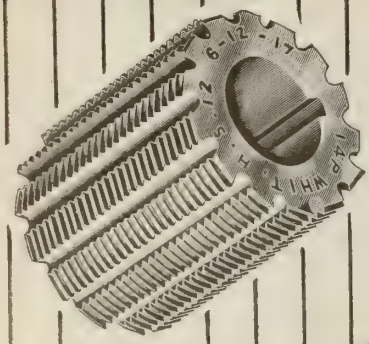
CATALOG "C"

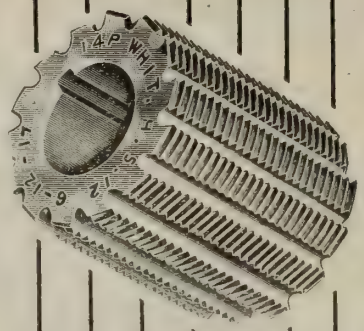
OR

ASK THE USER

FIFTEEN YEARS OF SATISFIED USERS

WOOD TURRET MACHINE CO
BRAZIL INDIANA USA





Butterfield

TWIST DRILLS GEAR AND MILLING CUTTERS

(Carbon and High Speed Steel)

Quality

Prompt Delivery

They're the happy result of a great combination of specially trained men and the finest special machinery—these Butterfield carbon and high-speed steel Twist Drills, Gear and Milling Cutters, Side Mills and End Mills, with straight or spiral flutes and plain or nickeled teeth. Their ability to serve accurately and long equals that of Butterfield Taps, Dies and Reamers — the sincere praise of a thousand users wouldn't be a better recommendation.

The Butterfield Catalog, just off the press, fully describes these better tools and how they increase production. Write for your copy.

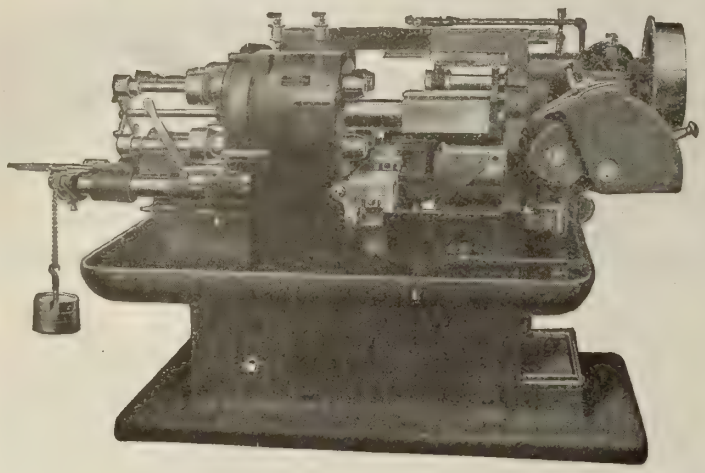
Butterfield & Company, Inc. - Rock Island, Quebec

Toronto Office: 220 King Street West

Detroit Store, 997 Woodward Avenue. Represented by Lewis G. Henes, Monadnock Building, San Francisco, and Title Insurance Building, Los Angeles.

FOR THE WORK AHEAD

WHY NOT GRIDLEY AUTOMATICS?



To meet the production demands that are ahead of you, you will need more automatic machines.

The use of Gridley Automatics means continuous production of accurate parts—less dependence on a limited labor supply—satisfactory filling of orders.

Isn't it the kind of production that **you** desire?

Let us quote production of your work from samples or blue prints.

Capacities:

Multiple Spindle.....up to 2⅝″ diam.
Single Spindle .....up to 5″ diam.

THE NATIONAL ACME COMPANY

GENERAL OFFICES CLEVELAND — WINDSOR, VERMONT — CANADIAN SCREW PLANT MONTREAL, P.Q.

BRANCH OFFICES

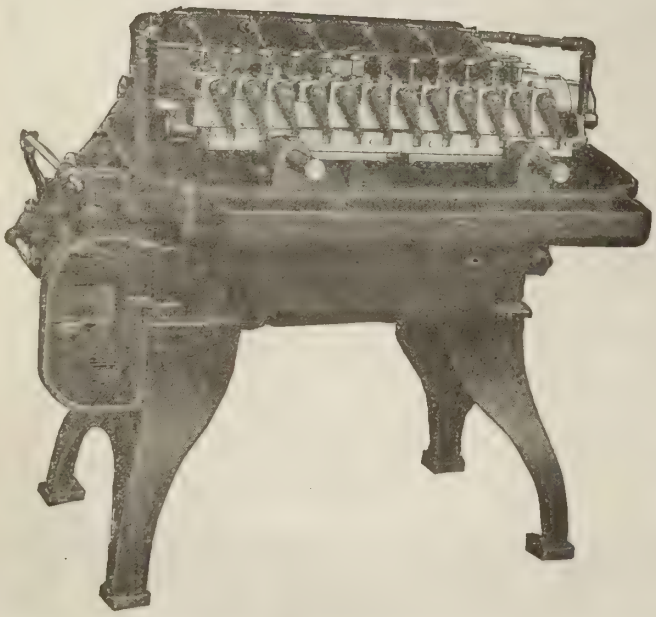
NEW YORK BOSTON CHICAGO DETROIT ATLANTA SAN FRANCISCO

WAREHOUSES: NEW YORK AND CHICAGO — FOREIGN REPRESENTATIVES

Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, Ohio

DRILLING HOLES

Six at a Time



On a Namco Six Spindle Driller

Continuous operation is effected by the use of twelve holding chucks, and six pieces are drilled while six are extracted and replaced. All operations are **fully automatic** except feeding the pieces.

Fast and continuous drilling means lowered costs per piece.

Quotations on **your** work. Capacities up to ¼″ drill.

THE NATIONAL ACME CO.

New England Plant Windsor, Vt. — CLEVELAND, O. — Canadian Screw Plant Montreal, P.Q.

Branch Offices:

New York Boston Chicago Detroit Atlanta San Francisco

Warehouses—New York, Chicago. With Foreign Representatives.

Makers of Gridley Single and Multiple Spindle Automatics at Windsor, Vt. and Acme Automatics, Threading Diess Collapsing Taps and Screw Machine Products at Cleveland, Ohio

ESTABLISHED 1860

Sole Canadian Rights to Manufacture the

"HYDE"

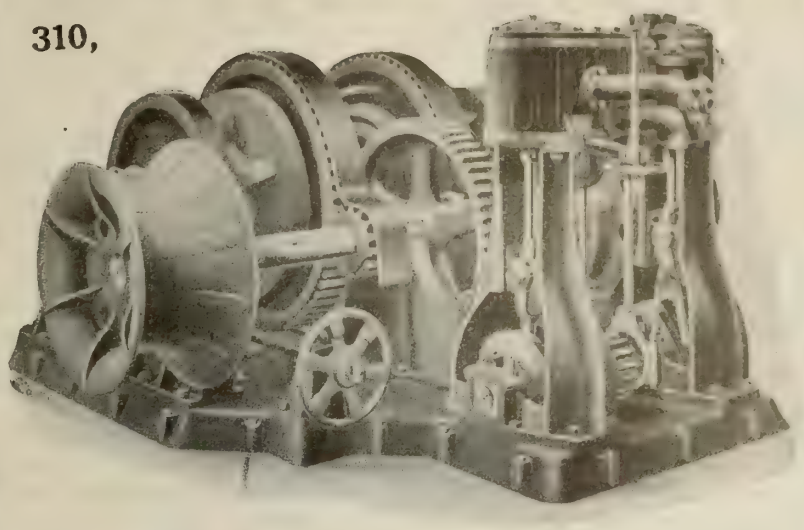
Anchor-Windlasses

Steering-Engines

Cargo-Winches

Which have stood the test of 50 YEARS

310,



The "HYDE" Spur-Geared Steam Windlass

Propeller Wheels

Largest Stock in Canada.

Heavy Gears, Mill Repairs, Water Power Plant Machinery

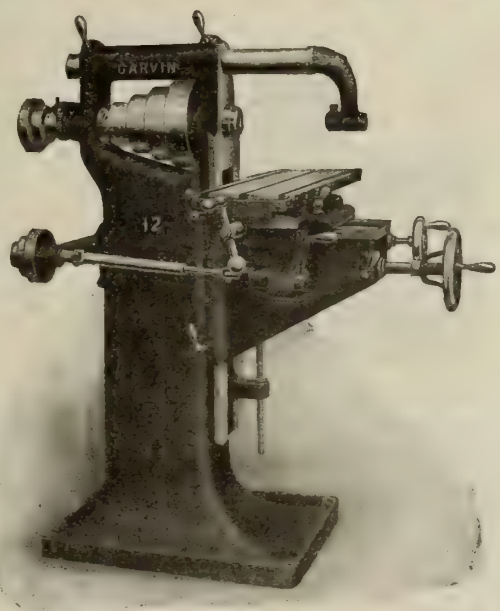
Steel Castings

Manufactured by

The Wm. Kennedy & Sons, Limited

Owen Sound, Ontario

GARVIN



No. 12 Plain Milling Machine - Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rapidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....18 x 6 x 15 in.

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

The PHOTOSTAT—A Thrift

TRADE-MARK REGISTERED

The Troy Laundry Machinery Co., Chicago, says:

"Our machines going to the United States Army 'over there' must be transported 'knocked down.' That means setting them up by inexperienced men upon their arrival 'at the front.' What suggested itself as a real problem has been solved easily by the PHOTOSTAT—and has eliminated lost time, motion, and labor for the soldiers who do the 'setting up.'

"We make photographic copies of all parts—and their assembly. Then the soldiers merely take these photographic copies as a set of directions—and the job is completed in no time.

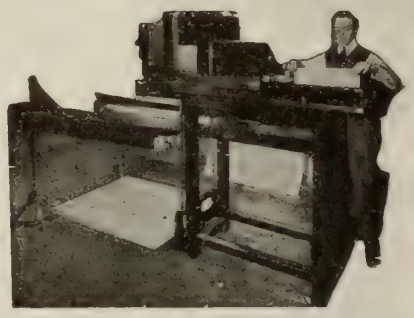
"But this is just one use we make of this real efficiency device. Here are a few others:

1. Specifications from the Government.
2. Samples of inventions to be tried out in our factory.
3. Parts of catalogs—which would take a stenographer hours to copy.
4. Cuts of machinery that are sent with bids.
5. Parts to be repaired when the original part can't be spared.
6. Posters from the Government reduced and sent to salesmen for advertising.
7. Illustrations for wiring in setting up machines.
8. Letters containing contracts.
9. Blue prints and tracings.

"We hope in the near future to use the machine for all routine work of the factory."

The PHOTOSTAT, which is manufactured by the Eastman Kodak Co., is a combined camera and copying machine. The copy is made directly onto a roll of paper. No intermediate glass plate or film or other negative has to be made. By copying thus directly onto the paper, the copy is made very quickly and at a low cost. Also the copy is a facsimile of the original, so that there can be no mistake in it. The print is developed and fixed right in the apparatus itself; this part of the process, as well as the focusing and exposing, all being mechanical. The print is then removed to a tank of running water, in which it is washed free from chemicals. Finally the print is taken from the water and dried and is then ready for use. The whole process is a rapid one, the average speed per print being from one to five minutes.

The PHOTOSTAT makes rapid, inexpensive and facsimile copies of Pencil Drawings, Ink Drawings, Tracings, Blue Prints, Maps, Sketches, Documents, Letters, Telegrams, Specifications, Data Sheets, Tabulations, Record Cards, Pages from Books, Insurance Records, Shipping Lists, Reports, Contracts, Illustrations for Salesmen, Cuts and Drawings for Advertising, etc., etc.



This cut shows the operator examining copy of a 36-in. drawing which he has just made in less than a minute.

A small book giving detailed description will be sent to you upon request to the

COMMERCIAL CAMERA COMPANY

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AGENCIES:
ALFRED HERBERT, LTD., COVENTRY, ENGLAND
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Insist THAT YOUR MEN WEAR

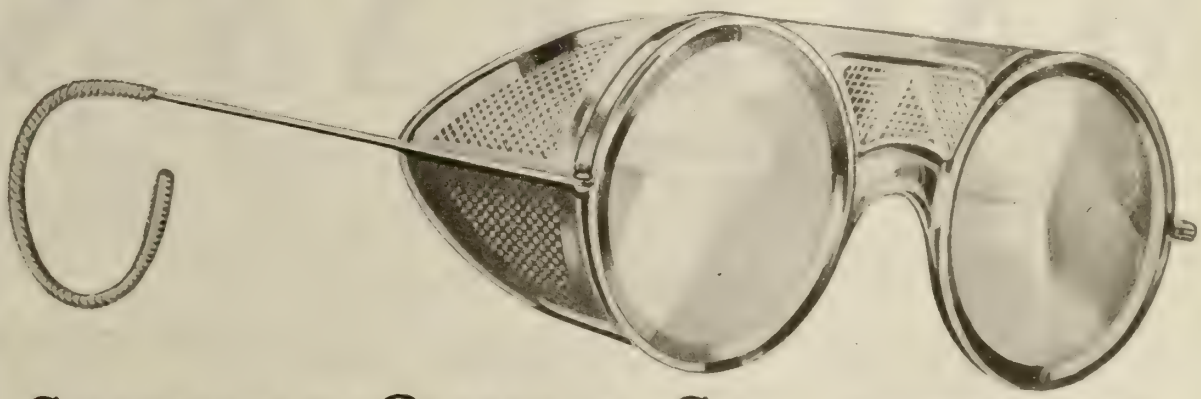
STOCO SAFETY GOGGLES

Accidents are always costly—nowadays they are also unpatriotic.

You can minimize the dangers to eyesight in your plant by using the STOCO Safety Goggle. It has exclusive protective features that insure safety and comfort for your men.

Best of all, you'll find your men will wear it without protest. The broad bearing surfaces make it easy to wear and the easy, flexible bows will not cut the ears. Also supplied with headbands if wanted.

If you are not familiar with the STOCO Safety Goggle, send for free trial sample and give it a trial.



STANDARD OPTICAL CO. GENEVA, N.Y.

...it w... ...ecided that Baun... ...been injured in the perform... ...his duties.

While working for a firm of contractors, Sam Divota, of 20 Merle street, was struck in the eye by a piece of steel which flew up when he was using a pickaxe. The sight of the eye was lost, and Commissioner Phillips made an award of $1,477.12, covering a period of 128 weeks, payable bi-weekly.

For a lost thumb, Mike Somik, employed by the New York State Railways, was awarded $589.40 for 60 weeks, payable weekly.

Clyde W. Walbridge, working in the Pennsylvania shops at Elmira, has been awarded compensation for 128 weeks, totaling $2,314.24, payable weekly, for the loss of right eye. Walbridge was drilling holes in an iron girder to be used in a bridge on the company's lines when the drill caught and particles flew in his eye, destroying the sight. An interesting feature of the case is that Walbridge had a pair of goggles in perfect order with him at the time, but had neglected to put them on. He was awarded compensation only because the law does not take this sort of neglect into consideration.

THE "NEW" MACLEAN'S

Starting with the January issue, MACLEAN'S MAGAZINE comes out in a new size—11 x 14¼—same size as *The Saturday Evening Post.* This change will enable us to give readers more entertaining articles and stories, and a very much enlarged "Review of Reviews" Section. You will find this January issue of MACLEAN'S more pleasing and instructive than the great majority of magazines you find displayed on news-stands—and

contents are carefully censored—no sex stories—you can take it into your home with the utmost confidence.

A word about the contents—

"Why Laurier Will Wait"

In discussing the policy of the Liberal leader during the coming session of Parliament, J. K. Munro predicts, in January MACLEAN'S, that Laurier will allow Union Government a free hand. In this policy of inactivity "he sees the way open to the accomplishment of all his purposes. If he is half the politician his friends believe he is, he will sit and smile and wait—yet a little longer."

All Canada is interested in what is going to happen in Ottawa. J. K. Munro, veteran press gallery man, is a shrewd observer, and his political articles in MACLEAN'S have stirred up more comment than anything else appearing in the press of the country. He knows politics from the inside. "Why Laurier Will Wait" is a forecast of the near future that bristles with interesting points. A few of the other "head-liners" in this issue:

Bolsheviks at Work in Canada

A senstaional article on activities in subterranean circles. There are foreigners in Canada ready to wave the red flag.

Achievements of the Canadian Army

Since the Canadian Division was formed, they have not retired a foot nor lost a gun—a marvellous record. An inside story of how this great army was handled and controlled is told by H. F. Gadsby who spent a month at Headquarters during the last great offensive.

The Grave Dangers of Peace

An article by Agnes C. Laut on the insidious new propaganda being launched by the Germans to split the Allies.

Jock in a Juggernaut

The most interesting war article in a long while, because it is new—it deals with experiences in the tanks.

AND THESE AS WELL:

The Dance Halls of Dawson - By E. Ward Smith

My Hour - - - By Robert W. Service

The Strange Adventure of a Rialto Rainstorm - By Arthur Stringer

Old Times in Canada - - By Walt Mason

The Minx Goes to the Front - - - - By C. N. and A. M. Williamson

The Three Sapphires - - By W. A. Fraser

Mr. Craighouse, of New York, Satirist - - By Arthur Beverley Baxter

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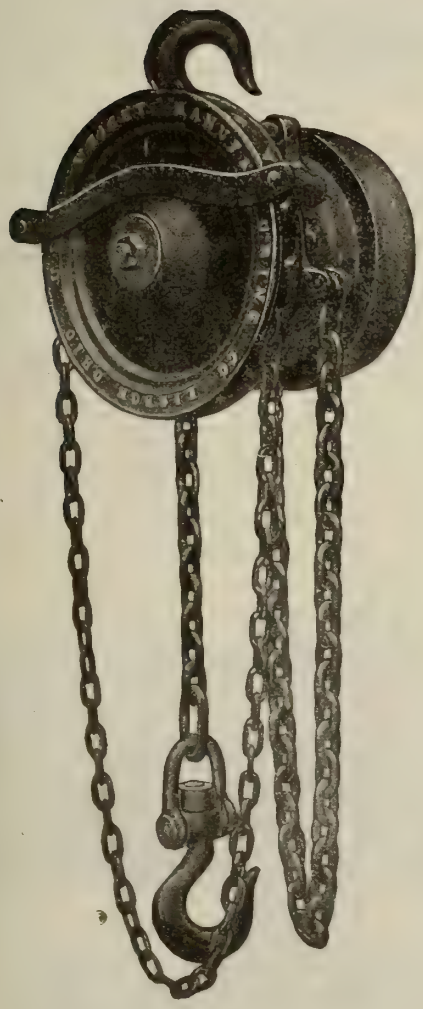

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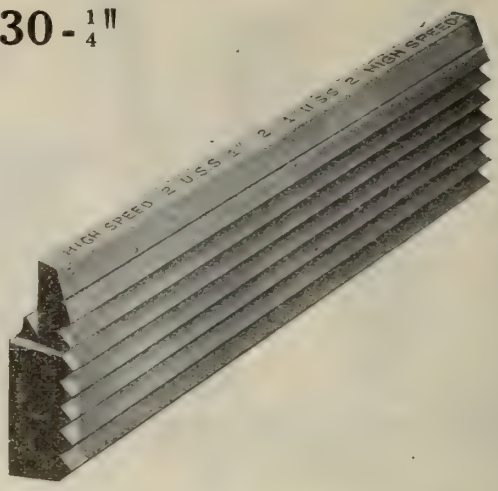

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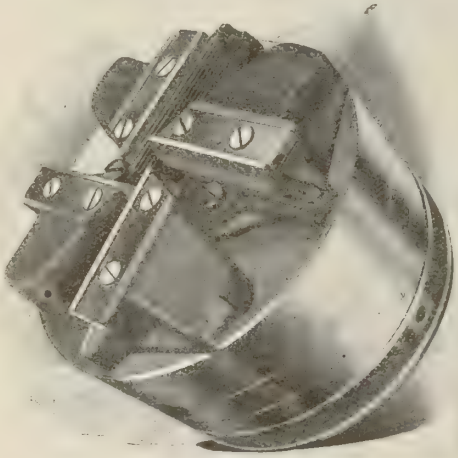

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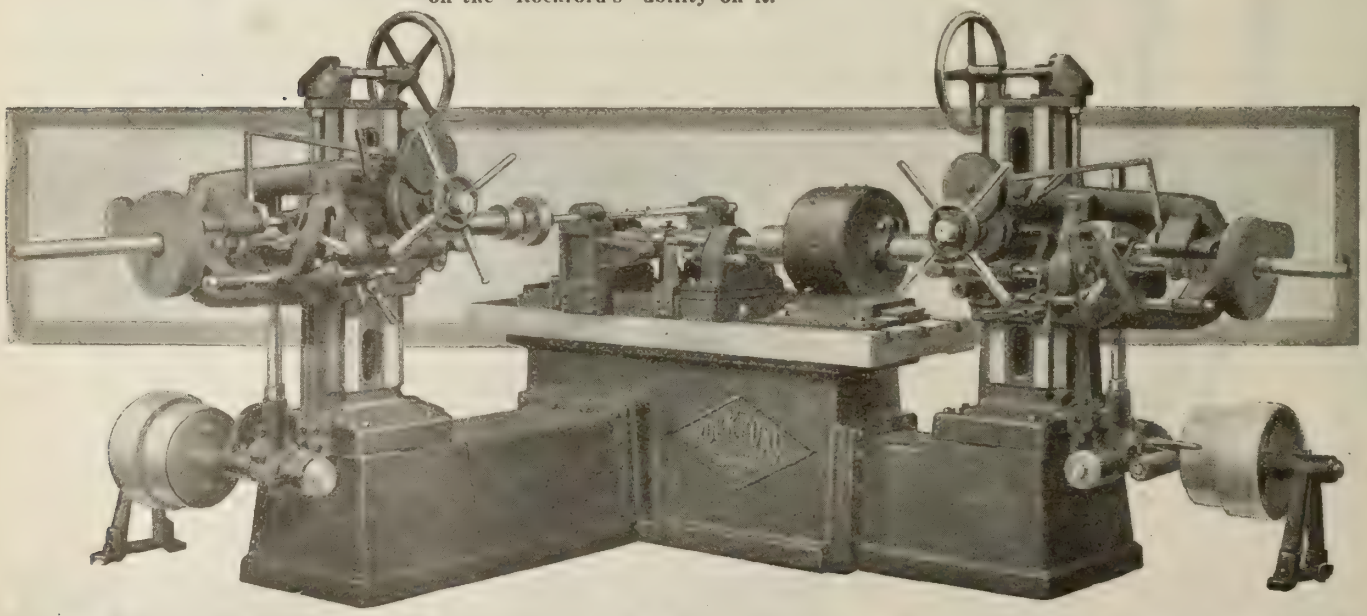

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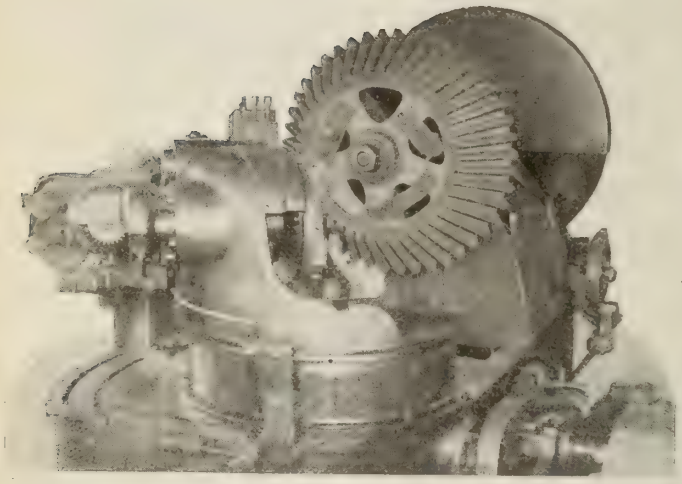

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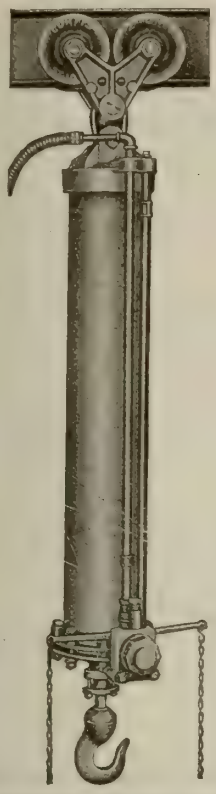

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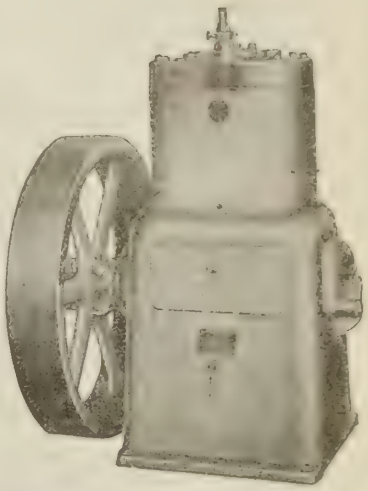

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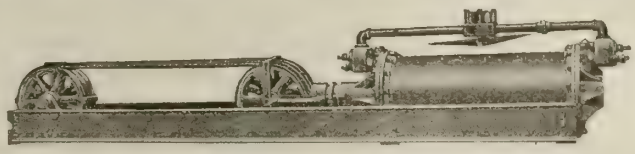

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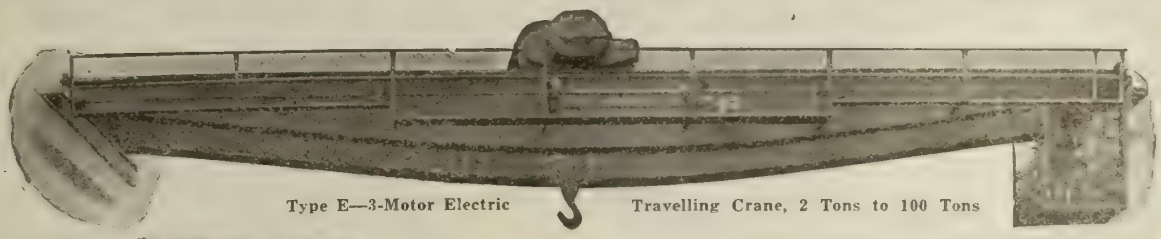

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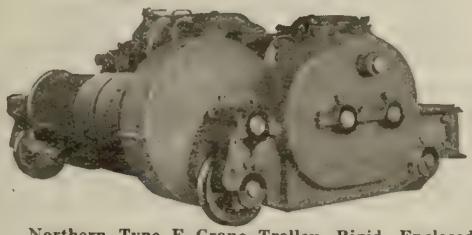

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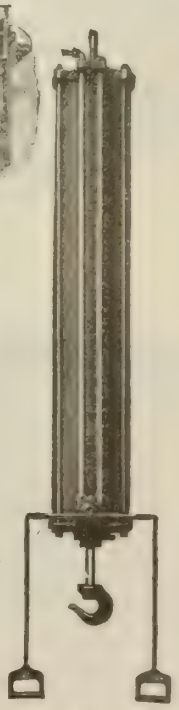

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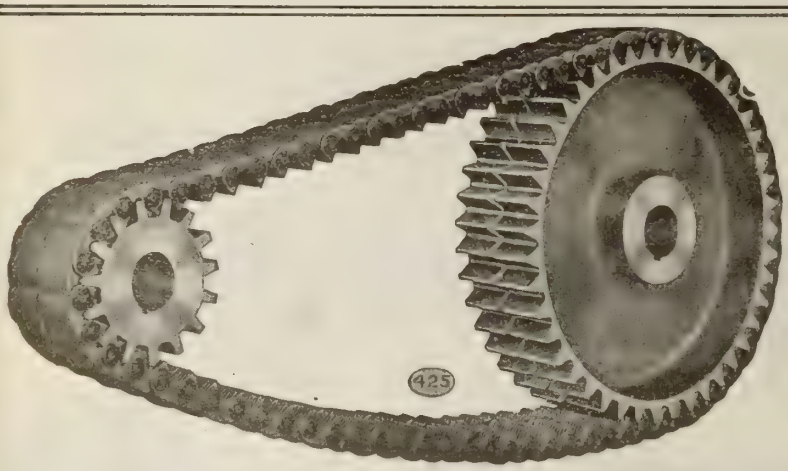

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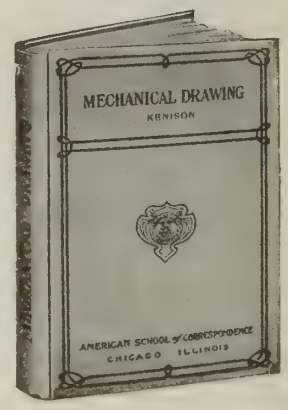

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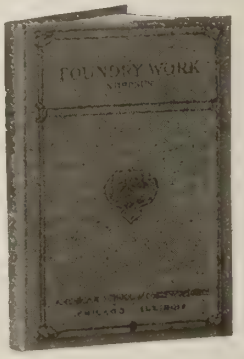

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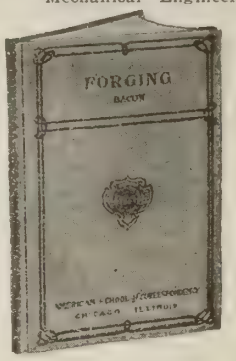

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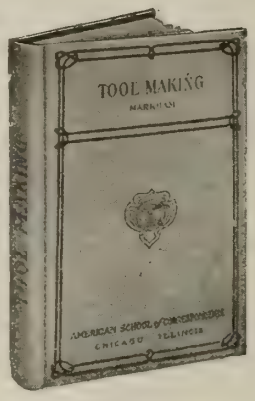

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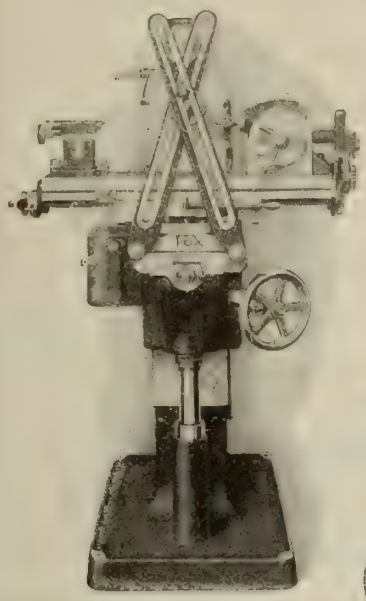

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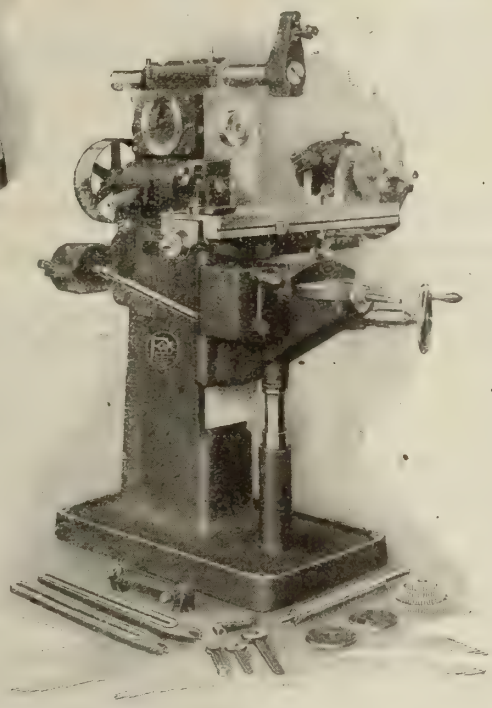

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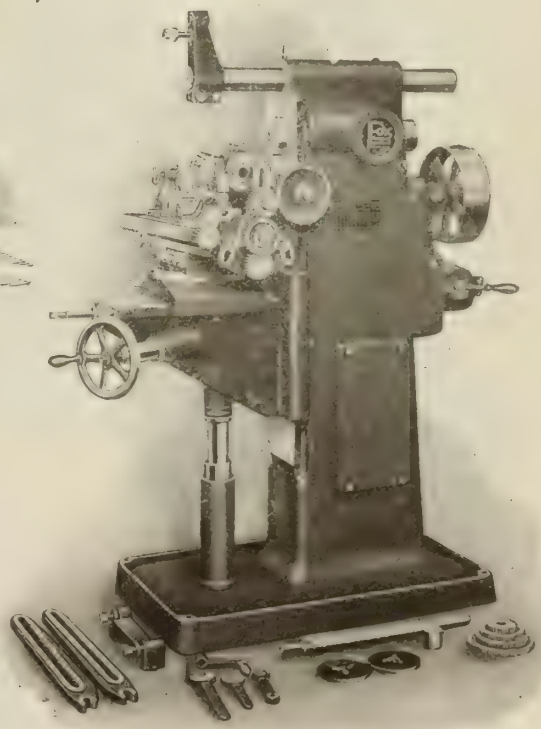

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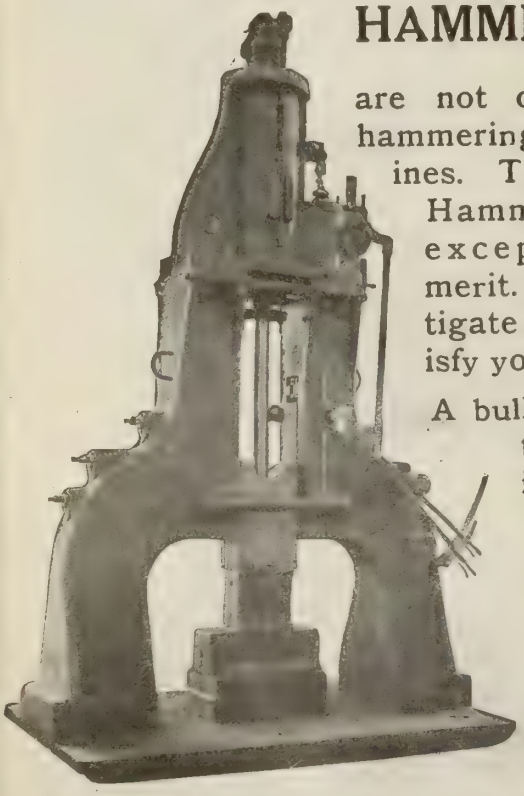

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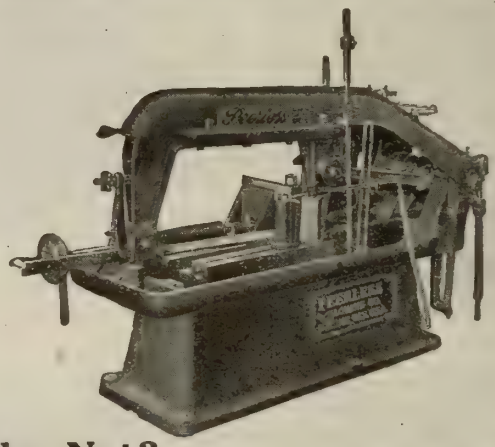

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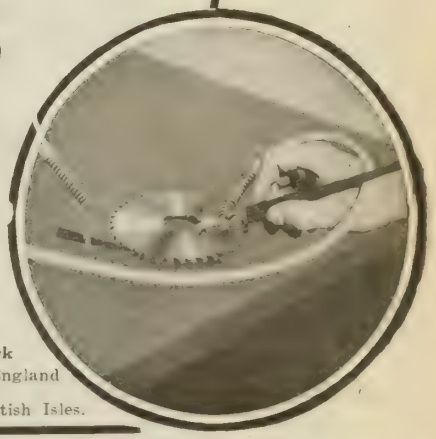

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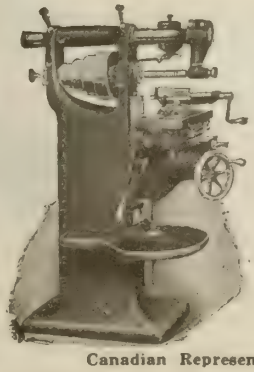

Large Planers for large work —STEPTOE SHAPERS for small work.

Will result in increased production; less money invested in machinery, and increased profits.

THE JOHN STEPTOE COMPANY

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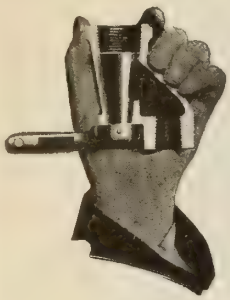
Canadian Representatives: Garlock-Walker Machinery Co., Toronto, Ont.

CLECO AIR HOSE FITTINGS



Valves, Couplings, Clamps, Nipples, Menders, Hose

Everything required from "Pipe Line" to "Air" Tool

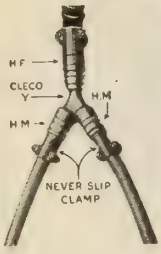
All Fittings Furnished are Interchangeable and Air Tight

CLECO AIR-SEATED VALVES

The CLECO Air Valve has but three parts: Body, Valve Plug and Handle; no Packing required, has Waste arrangement.

The CLECO Valve, style P.O., is made in sizes ½-inch to 1½-inches, with standard pipe thread. Style F.O. is made in one size only; 1-inch pipe thread inlet, and ¾-inch Female Bowes Coupling Outlet and is interchangeable with Male Ends from ¼-inch to ¾-inch.

CLECO "Y" HOSE FITTINGS



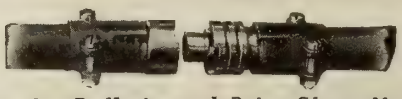
The Hose Section illustrated shows "Y" Fitting connected. The "Y" permits use of two Leader Hose Lines and Two Air Tools. Designed for Ship Yards use. Are made in four styles with Male or Female Outlets or Inlets and interchange with Bowes Male or Female coupling ends; sizes ¼-inch to ¾-inch inclusive. The two "Y" fittings illustrated are the plain style. The other two styles are each equipped with a valve having same features as Cleco Air Valves described above.

Y-Fittings may also be used in Boiler and Locomotive Shops.

BOWES AIR HOSE COUPLINGS

Over 2,500,000 in general use.

The Bowes is instantly connected or disconnected by ¼-turn.



The Bowes is absolutely Air Tight under all pressures

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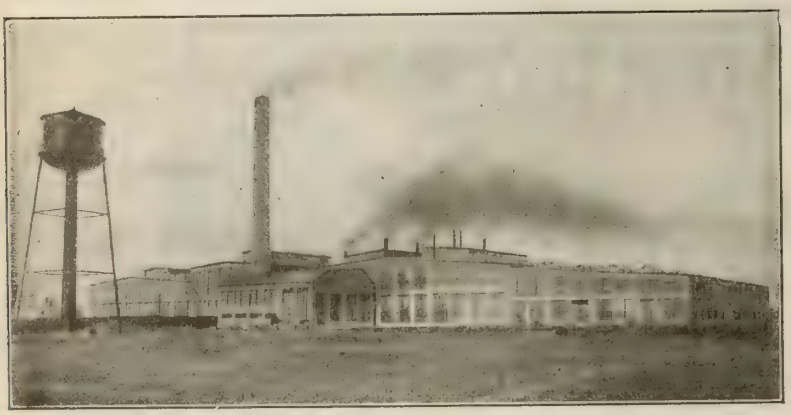

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Electric Drills

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Thor Universal Electric Drills, licensed under Burke's Universal Motor Patent, will enable your men to do more work and to do it well. These drills are most durable because practically fool-proof and because built with ample strength in every part to stand hardest service.

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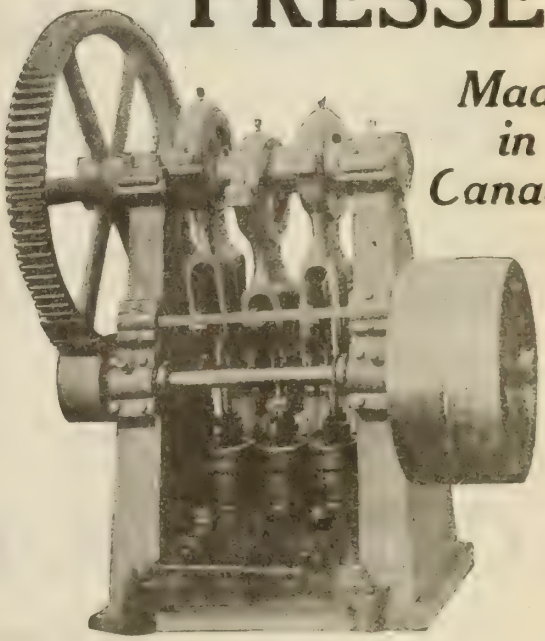

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The Dodge features—only in our lathes—minimize floor space—cut out long and superfluous belting—reduce shafting, hangers and pulleys—stimulate the operator—increase production—reduce manufacturing costs.

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Machinery Manufacturers
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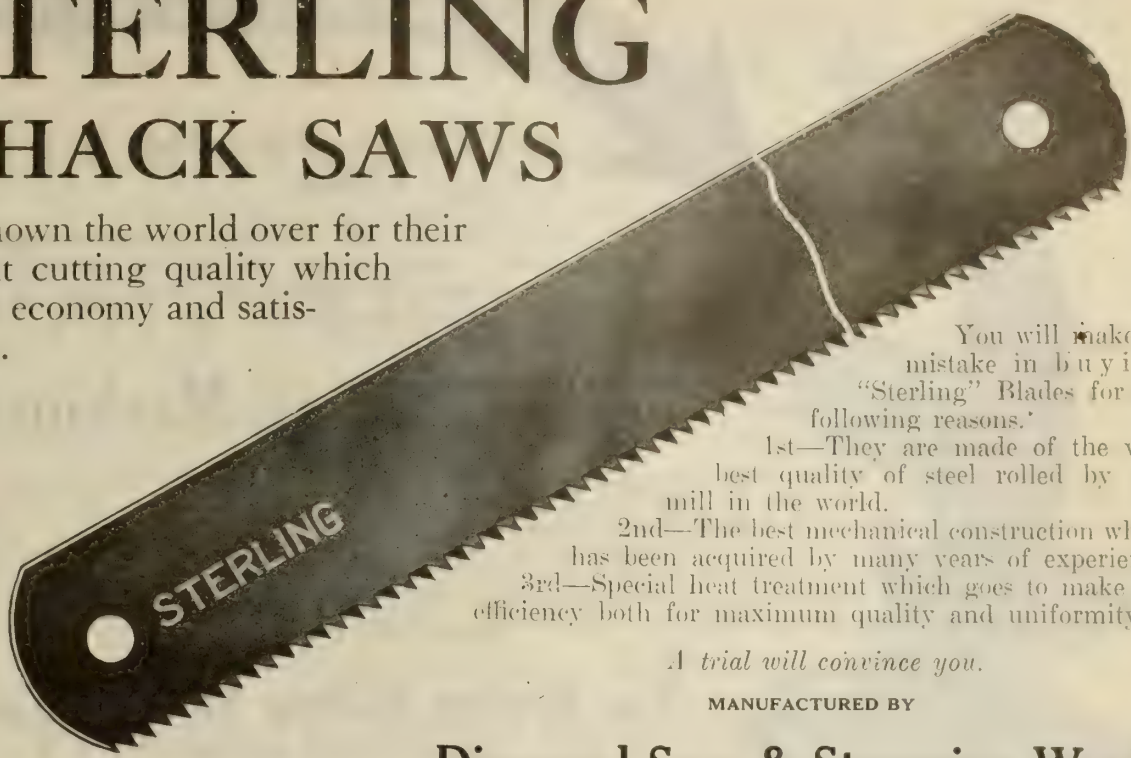
Are known the world over for their efficient cutting quality which insures economy and satisfaction.



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1st—They are made of the very best quality of steel rolled by any mill in the world.

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3rd—Special heat treatment which goes to make the efficiency both for maximum quality and uniformity.

A trial will convince you.

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For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

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These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

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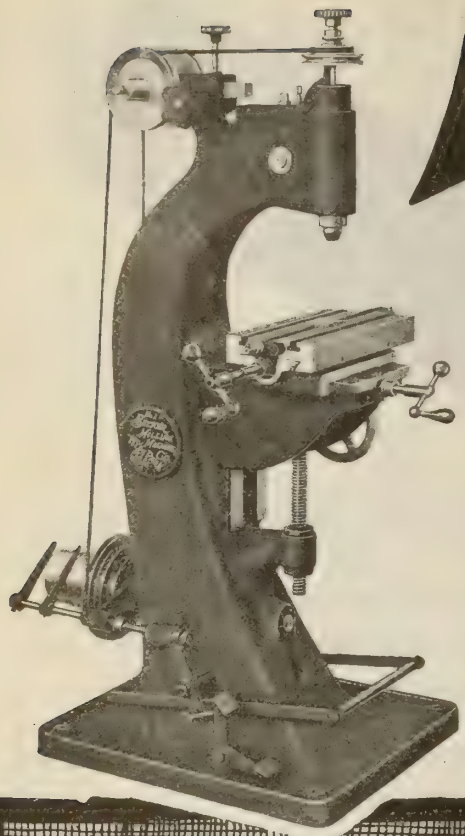

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are made in fourteen types and twenty-four sizes. We can make quick deliveries on the following smaller sizes:
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The Grand Rapids No. 2

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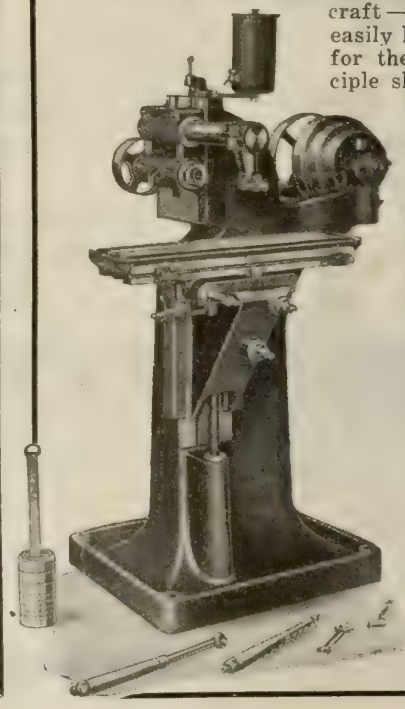
Battleships steamed for the harbor when enemy submarines were about. That's where they belonged. The work of fighting the deep sea pests was left to smaller craft — they were quicker, more easily handled and more capable for the work. The same principle should apply in your shop practice.



U.S. MILLER

should be used for milling small parts. They too are quicker, more easily handled and more capable for this work than big tools. You can actually reduce your milling costs one-third to one-half on each part by the use of the U. S. Hand and Weight Miller. Finely built to combine speed, accuracy and durability.

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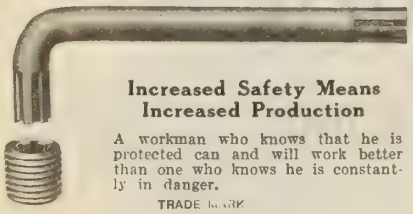

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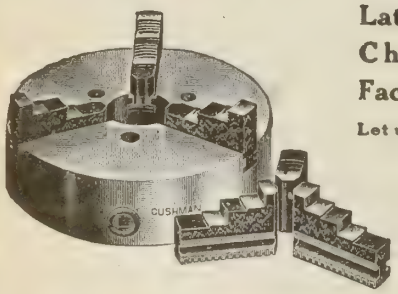

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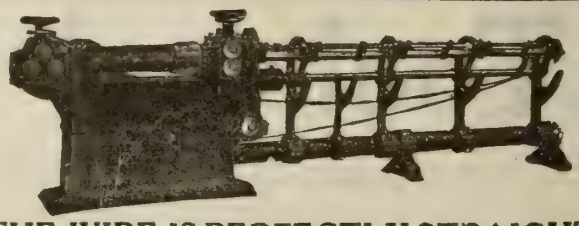

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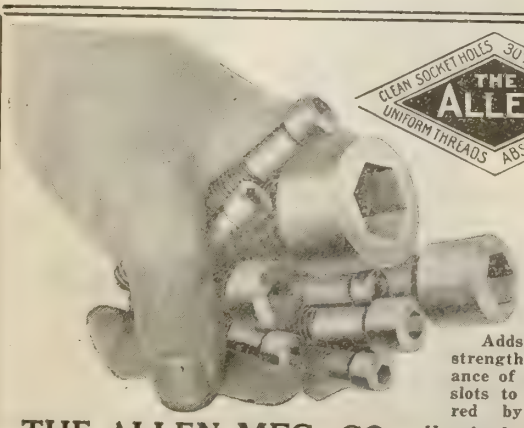

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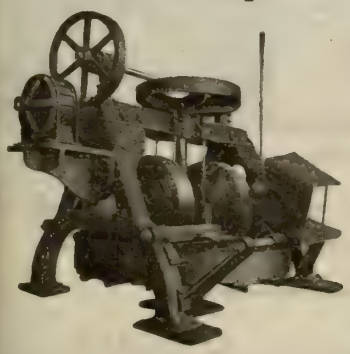

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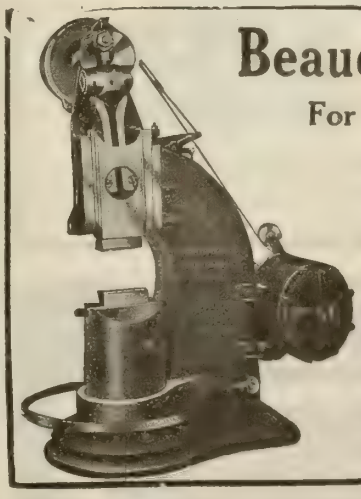

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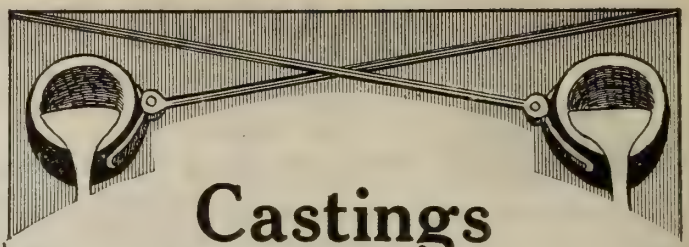

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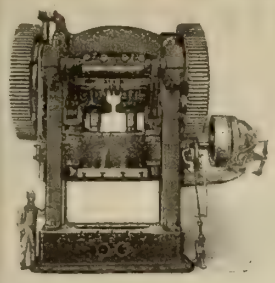

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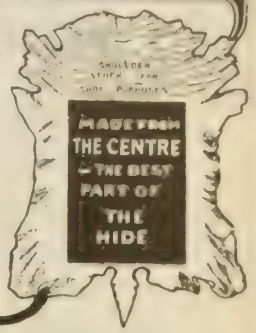

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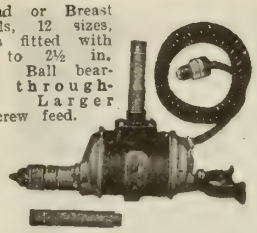

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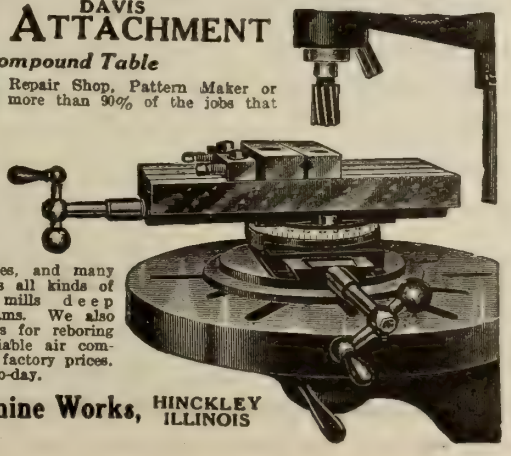

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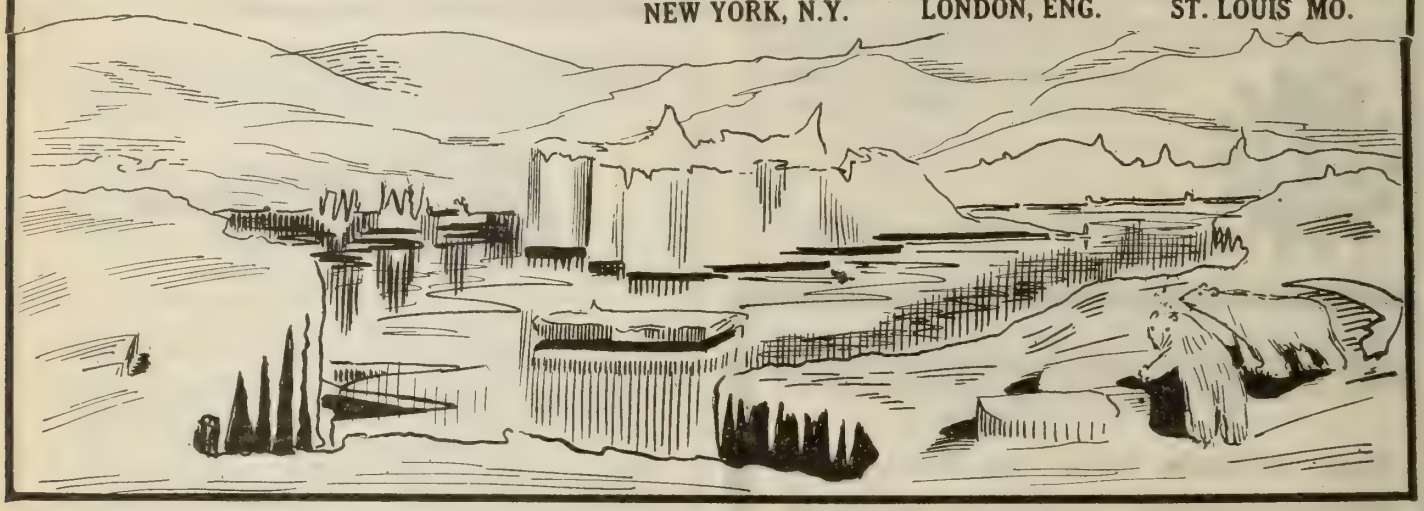

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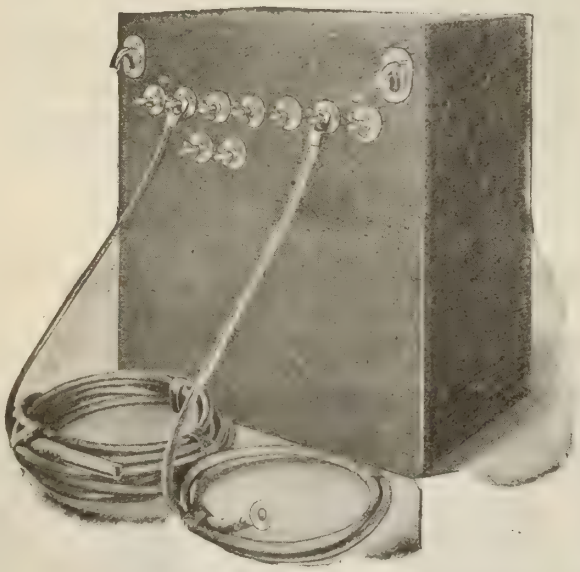

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Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
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Cleveland Wire Spring Co., Cleveland.

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Algoma Steel Corp., Sault Ste. Marie, Ont.

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United Brass & Lead Ltd., Toronto.
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Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Magnet Metal & Foundry Co., Winnipeg, Man.
Marsh Engineering Works, Belleville, Ont.
Plessisville Foundry Co., Plessisville, Que.
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Katie Foundry Co., Galt, Ont.
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Reading Chain Block Mfg. Co., Reading, Pa.
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Knight Metal Products, Ltd., Toronto, Ont.
Manufacturers Equipment Co., Chicago, Ill.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
D. & W. Fuse Co., Providence, R.I.
F. Pratt & Co., Halifax.
Heald Machine Co., Worcester, Mass.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
F. Pratt & Co., Halifax.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
F. Pratt & Co., Halifax.
Thomas Elevator Co., Chicago, Ill.

CHUCKS, SPLIT
Rivett Lathe & Grinder Co., Boston, Mass.

CHUCKS, DRILLS AND TAPS
Bicknell-Thomas Co., Greenfield, Mass.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A.

CLAMPS
Preston Woodworking Machine Co., Preston, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLEANERS, BOILER TUBE
Goldie & McCulloch Co., Galt, Ont.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES
Goldie & McCulloch Co., Galt, Ont.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston, Mass.
Manufacturers' Equipment Co., Chicago, Ill.
Rivett Lathe & Grinder Co., Boston, Mass.
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Riverside Machinery Depot, Detroit, Mich.
Smart-Turner Machine Co., Hamilton, Ont.

CONCRETE MACHINERY
St. Clair Bros., Galt, Ont.

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found's & Forgings, Ltd., Welland, Ont.

CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Homer & Wilson, Hamilton, Ont.
Katie Foundry Co., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Welland Motor & Machine Co., Welland, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS AND STARTERS
Williams Machy. Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co, Harvey, Ill.

CONVEYING MACHINERY
Brown Portable Conveying Mach. Co., Chicago.

CONVEYORS, BELT AND CHAIN
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

COPING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

COPPER, BUS BAR, SHEET, PLATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.

COUNTERSHAFTS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Baird Machine Co., Bridgeport, Conn.
Foster Machine Co., Elkhart, Ind.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.

COUPLINGS, SHAFT
Goldie & McCulloch Co., Galt, Ont.
W. H. Nicholson & Co., Wilkesbarre, Pa.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES
Pollard Mfg. Co., Niagara Falls, Can.

CRANES, JIB
Pollard Mfg. Co., Niagara Falls, Can.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Found's & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
J. C. Wilson & Co., Belleville, Ont.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUCIBLES
Hyde Engineering Co., Montreal, Que.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLA BLOCKS
Hyde Engineering Co., Montreal, Que.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
Zenith Steel & Coal Products, Montreal, Que.
J. C. Wilson & Co., Belleville, Ont.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.
Elm Cutting Oil Co., Toronto.
Ontario Lubricating Co., Hamilton, Ont.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.
Yates Machine Co., P. B., Hamilton, Ont.

CUTTING AND WELDING PLANTS
Canadian Welding Works, Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies, Ltd., Montreal, Que.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont.

CYLINDERS, AIR
Manufacturers Equipment Co., Chicago, Ill
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co. Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
M. Beatty & Sons, Ltd., Welland, Ont.
Dominion Bridge Co. Montreal.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DERRICK IRONS AND FITTINGS
Pollard Mfg. Co., Niagara Falls, Can.

DIAMOND TOOLS
Wheel Trueing Tool Co., Windsor, Ont.
Anderson & Co. of Can., Geo., Montreal, Que.
Wheel Trueing Tool Co., Detroit.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DISCS, LATHES, ETC.
Leather Products of Canada, Hamilton, Ont.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.

DIES, NOSING
Marsh Engineering Works, Belleville, Ont.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa

DIE SINKERS
Becker Milling Machine Co., Boston, Mass
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Wells Brothers Co. of Canada, Galt, Ont.

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que.
Firth & Sons, Thos., Montreal, Que.

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Ltd., Montreal.

DIRECT CONNECTED UNITS
MacGovern & Co., Montreal, Que.

DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

DREDGES, DIPPER, HYDRAULIC AND CLAMSHELL
M. Beatty & Sons, Ltd., Welland, Ont.

DRESSERS, GRINDING AND EMERY WHEEL
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Wheel Trueing Tool Co., Windsor, Ont.

DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Burke Machine Tool Co., Conneaut, O.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Stow Mfg. Co., Binghampton, N.Y.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.

DRILL CHUCKS, QUICK-CHANGE
The McCrosky Reamer Co., Meadville, Pa.

DRILL RODS
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLS
W. T. Whitehead, Son & Co., Montreal, Que.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont

Landis Tool Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
W. T. Whitehead, Son & Co., Montreal, Que.

DRILLING MACHINES
Universal Boring Mach. Co., Hudson, Mass.

DRILLING MACHINES RADIAL AND TURRETT
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.

DRILLING MACHINES, BALL BEARING
Cincinnati Pulley Mach. Co., Cincinnati.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

DRILLING MACHINES, WALL RADIAL
Lynd-Fairquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Millers Falls Co., Millers Falls, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Millers Falls Co., Millers Falls, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

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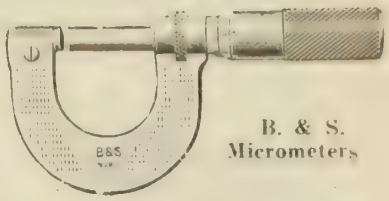

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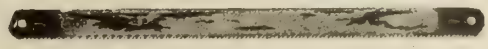

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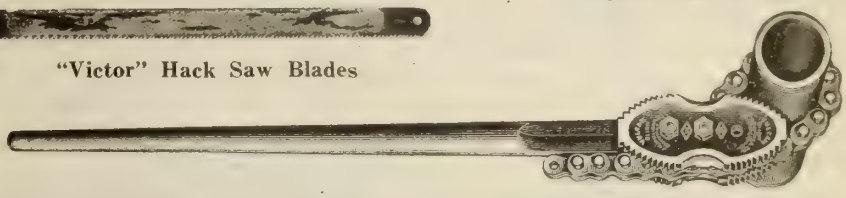

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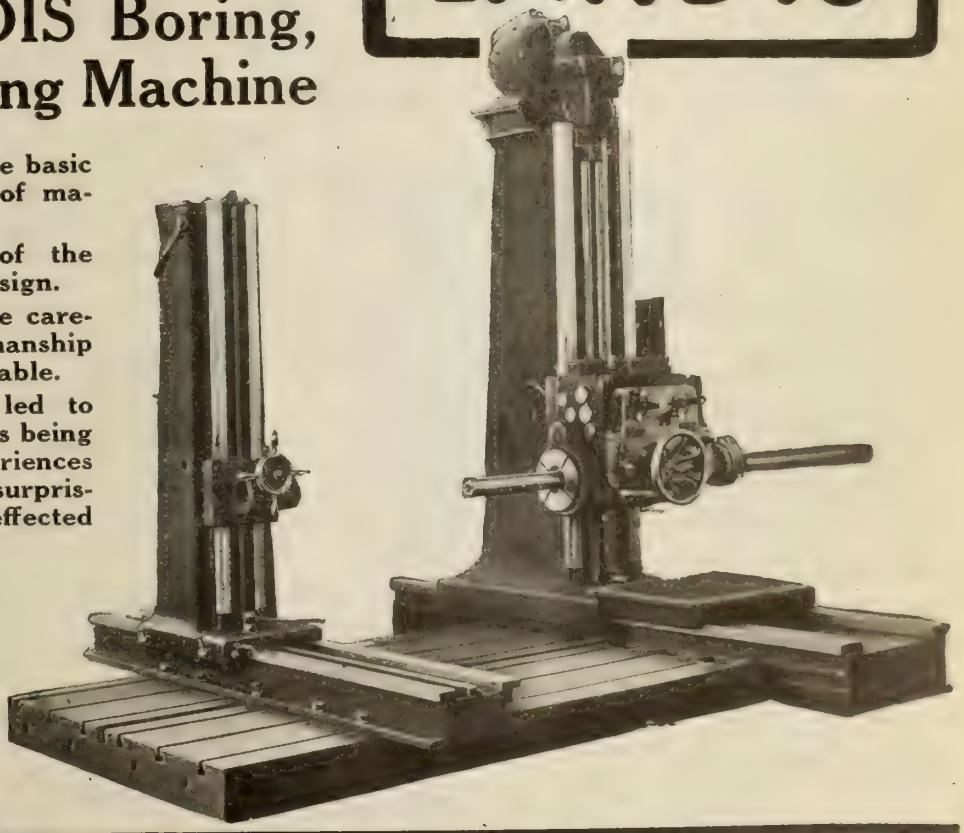

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High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
M. Beatty & Sons, Ltd., Welland, Ont.

HAMMERS, FORGING AND CUSHIONED HELVE
C. C. Bradley & Son., Inc., Syracuse, N.Y.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh, Pa.

HAMMERS, NAIL MACHINE
Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston Mass.

HAMMERS, STEAM
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Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
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Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.

HARDNESS TESTING INSTRUMENTS
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Sheldons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

HIGH SPEED STEEL
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HIGH SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.
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Illinois Tool Works, Chicago, Ill.

HINGES
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HOBS
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

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Butterfield & Co., Rock Island, Que.

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HOISTS, AIR
St. Clair Bros., Galt, Ont.
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Can. Matthews Gravity Carrier Co., Toronto, Ont.
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Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, CHAIN AND PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Marsh Engineering Works, Ltd., Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Wright Mfg. Co., Lisbon, Ohio.

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HOISTS, "MONO RAIL" & STATIONARY
Volta Mfg. Co., Welland, Ont.

HOISTS, ELECTRIC
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Pollard Mfg. Co., Niagara Falls, Ont.
M. Beatty & Sons, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.

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Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

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Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

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Gutta Percha & Rubber, Ltd., Toronto, Can.
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HOSE, STEAM
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Metalwood Mfg. Co., Detroit, Mich.
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William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.

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Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

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L. S. Starrett Co., Athol, Mass.

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Garvin Machine Co., New York.

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Homer & Wilson, Hamilton, Ont.
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Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
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Williams & Co., J. H., Brooklyn, N.Y.

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MacKinnon Steel Co., Sherbrooke, Que.
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Acme Machine Tool Co., Cincinnati, Ohio.

LATHE CHUCKS (SEE CHUCKS)

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Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

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Garvin Machine Co., New York.
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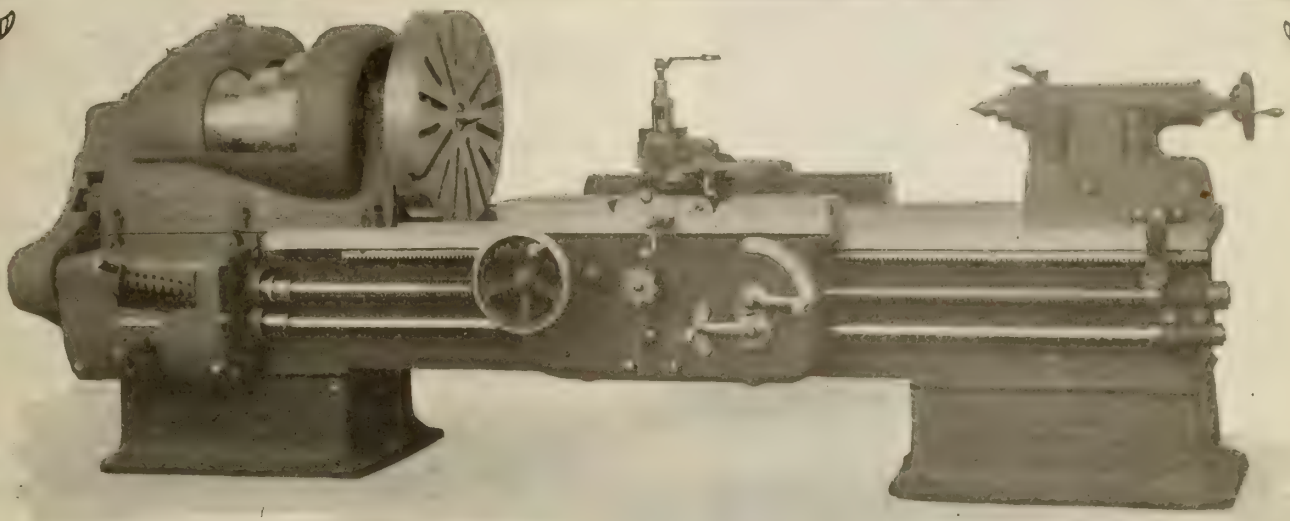

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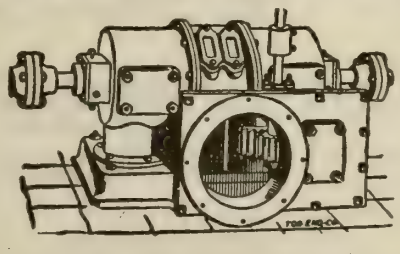

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Cincinnati Milling Machine Co., Cincinnati.
Cleveland Milling Machine Co., Cleveland, Ohio.
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Hendey Mach. Co., Torrington, Conn.
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Ford-Smith Mach. Co., Hamilton, Ont.
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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kempsmith Mfg. Co., Milwaukee, Wis.
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Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.
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Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.

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Pratt & Whitney Co., Dundas, Ont.
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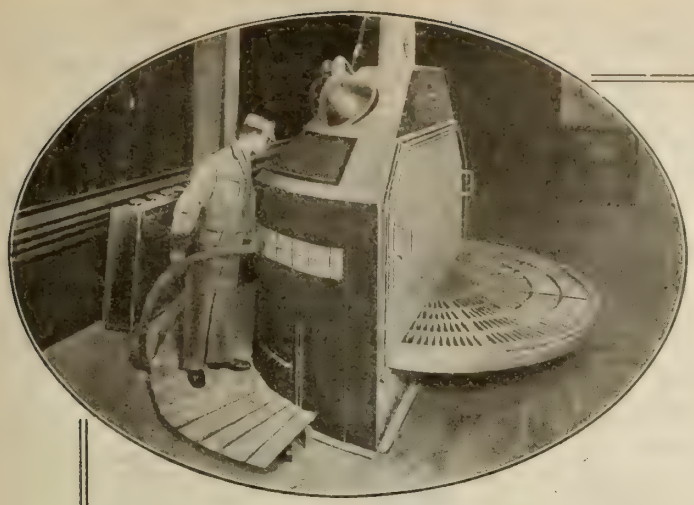

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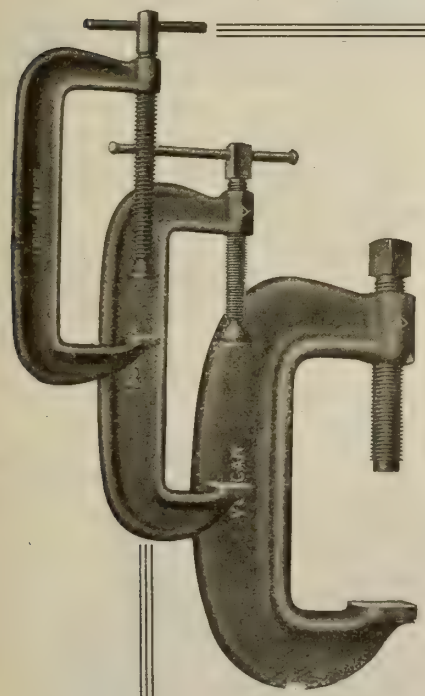

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The McCrosky Reamer Co., Meadville, Pa.
The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
McKenna Brothers, Pittsburgh, Pa.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER AND SELF-FEEDING
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REGULATORS, AUTOMATIC
Electric Steels & Metals, Ltd., Welland, Ont.

REGULATORS, PRESSURE TEMPERATURE
Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIP SAW MACHINERY
Preston Woodworking Machine Co., Preston, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Harvey & Co., Arthur C., Boston, Mass.
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

RODS
General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich.

ROLLER CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont.

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RUBBER GOODS
Dunlop Tire & Rubber Co., Toronto.

RULES
Brown & Sharpe Mfg. Co., Providence
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

SAND BLAST GLOVES
Hickory Steel-Grip Glove Co., Chicago, Ill.

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto, Ont.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Cowan & Co., of Galt, Ltd., Galt, Ont.

SAND BLASTING MACHINES
Richards Sand Blasting Machine Co., Montreal.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Preston Woodworking Machine Co., Preston, Ont.
Cowan & Co., of Galt, Ltd., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.

SASH WEIGHTS AND WRENCHES
Fittings, Ltd., Oshawa, Ont.

SAWS, CIRCULAR METAL
E. C. Atkins & Co., Indianapolis, Ind.
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)
E. C. Atkins & Co., Indianapolis, Ind.
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, SLITTING
E. C. Atkins & Co., Indianapolis, Ind.
Taylor, J. A. M., Stair Bldg., Toronto, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCREENING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

SCREW MACHINE PRODUCTS
Galt Machine Screw Co., Galt, Ont.
Knight Metal Products, Ltd., Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

SCREW MACHINES, HAND, AUTOMATIC
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Rivett Lathe & Grinder Co., Boston, Mass.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.

SCREW MACHINES, AUTOMATIC MULTIPLE SPINDLE
National Acme Co., Cleveland, Ohio.
Cincinnati Automatic Mach. Co., Cincinnati, O.
New Britain Machine Co., New Britain, Conn.
Riverside Machinery Depot, Detroit, Mach.

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Can. B. K. Morton, Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SCREW SLOTTERS
Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

SCRAP METAL
Pullan, E., 20 Maud St., Toronto.

SEARCHES
Wm. P. McFeat, Power Bldg., Montreal.

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The Geo. F. Foss Mchy. & Supply Co., Montreal.
Riverside Machinery Depot, Detroit, Mich.

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Pangborn Corporation, Hagerstown, Md.

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Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn., U.S.A.
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

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John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
American Tool Works Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Rhodes Mfg. Co., Hartford, Conn.
Stentor Co., John, Cincinnati, Ohio.
W. T. Whitehead, Son & Co., Montreal, Que.

SHAFTING
Algoma Steel Corp., Sault Ste. Marie, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
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Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton, Ont.

No. 4

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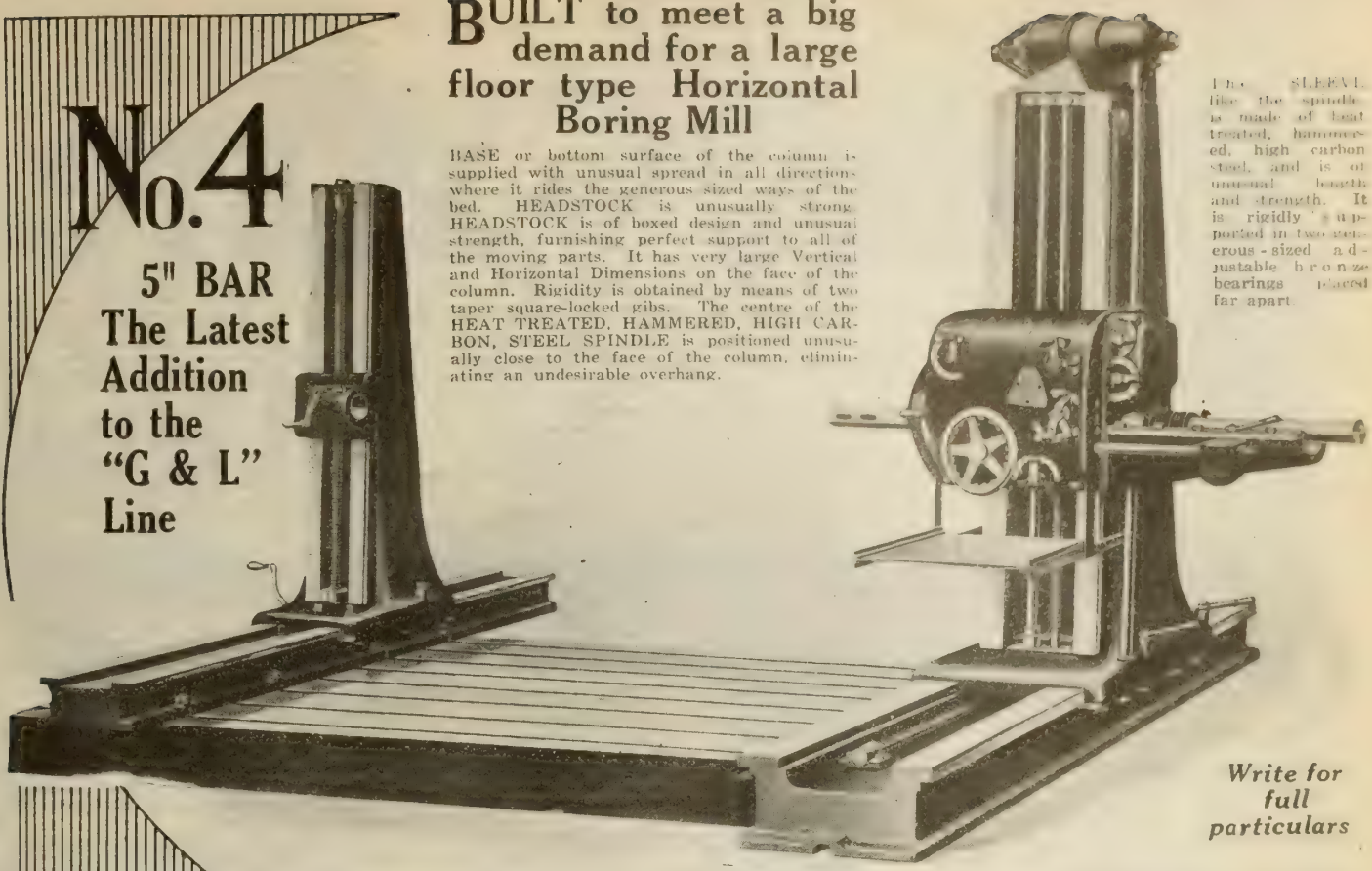
BUILT to meet a big demand for a large floor type Horizontal Boring Mill

BASE or bottom surface of the column is supplied with unusual spread in all directions where it rides the generous sized ways of the bed. HEADSTOCK is unusually strong. HEADSTOCK is of boxed design and unusual strength, furnishing perfect support to all of the moving parts. It has very large Vertical and Horizontal Dimensions on the face of the column. Rigidity is obtained by means of two taper square-locked gibs. The centre of the HEAT TREATED, HAMMERED, HIGH CARBON, STEEL SPINDLE is positioned unusually close to the face of the column, eliminating an undesirable overhang.



The SLEEVE, like the spindle is made of heat treated, hammered, high carbon steel, and is of unusual length and strength. It is rigidly supported in two generous-sized adjustable bronze bearings placed far apart.

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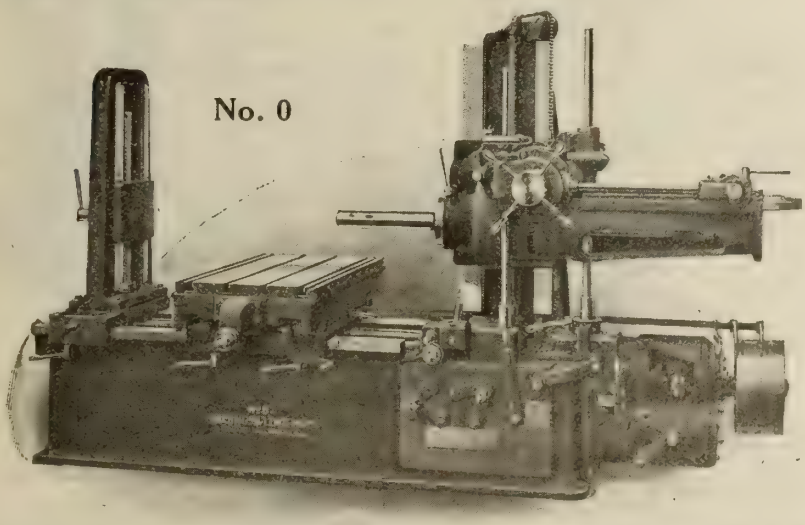

No. 0

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Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.

SHARPENING STONES
Norton Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

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Bertrams, Ltd., Edinburgh, Scotland
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

SHEARS, POWER
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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
A. B. Jardine & Co., Limited, Hespeler, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo

SHEARS, PNEUUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.

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SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.

SHEET METALS
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SHEET METAL WORK
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Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Steel Bending Brake Works, Ltd., Chatham, Ont.
Stoll Co., D. H., Buffalo, N.Y.

SHEET METAL STAMPINGS
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SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.

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Dennis Wire & Iron Works, London, Ontario.

SHELL FINISHING TOOLS
National Tool Co., Cleveland, Ohio.

SHELL BANDING MACHINES, HYDRAULIC
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHOP FURNITURE
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New Britain Mach. Co., New Britain, Conn.

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Can. B. K. Morton, Toronto, Montreal
Williams & Co., J. H., Brooklyn, N.Y.

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Jones & Glassco, Montreal.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilkinson & Kompass, Hamilton, Ont.

SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.

SMOKESTACKS
Canadian Welding Works, Montreal, Que.
Marsh Engineering Works, Belleville, Ont.

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Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice, Lewis & Son, Toronto, Ont.

SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto

SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton
United Brass & Lead, Ltd., Toronto.

SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

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Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.

SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.
Banfield, W. H., & Sons, Toronto.
Beaver Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Crescent Mach. Co., Ltd., Montreal.
J. C. Wilson & Co., Belleville, Ont.
Cowan & Co., of Galt, Ltd., Galt, Ont.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont.
Can. Barker Co., Sault Ste. Marie, Ont.
Can. Rumely Co., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
National-Acme Co., Cleveland, Ohio.
Mulliner & Eulund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co, Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Smart-Turner Machine Co., Hamilton, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.

SPECIAL TOOLS
National Tool Co., Cleveland, Ohio.
Cleveland Milling Machine Co., Cleveland, O.

SPRAY COOLING EQUIPMENT
Spray Engineering Co., Boston, Mass.

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

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Can Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

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Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.

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Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.
Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.
Noble & Westbrook Mfg. Co., Hartford, Conn.

STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

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STARS, WHITE IRON
Katie Foundry Co., Galt, Ont.

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Canadian Morehead Co., Woodstock, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

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Hammond Steel Co., Inc., Syracuse, N.Y.
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Illingworth Steel Co., John, New York, N.Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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Armstrong, Whitworth of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Latrobe Electric Steel Co., Latrobe, Pa
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Zenith Coal & Steel Products, Montreal, Que.

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Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.
Swedish Crucible Steel Co., Windsor, Ont.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS
Smart-Turner Machine Co., Hamilton, Ont.

STEEL DERRICKS
Pollard Mfg. Co., Niagara Falls, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

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Firth & Sons, Thos., Montreal, Que.
Harvey & Co., Arthur C., Boston, Mass.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL FORGING BILLETS
Andrews Steel Co., Newport, Ky.

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Atkins & Co., Wm., Sheffield, Eng.
Kayser, Ellison & Co., Ltd., Montreal.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.
Zenith Coal & Steel Products, Montreal, Que.

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Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

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Armstrong, Whitworth of Canada, Montreal, Que.

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Hammond Steel Co., Inc., Syracuse, N.Y.

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Deloro Smelting & Refining Co., Toronto, Ont.

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STEEL, VANADIUM
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Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
New Britain Machine Co., New Britain, Conn.

STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wills Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain, Conn.

STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.

STRAND
Page Steel & Wire Co., Adrian, Mich.

SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.

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Sleeper & Hartley, Inc., Worcester, Mass.

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Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies, Ltd., Montreal, Que.

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Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
Goldie & McCulloch Co., Galt, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.
Welding & Supplies, Ltd., Montreal, Que.

TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.
Welding & Supplies, Ltd., Montreal, Que.

TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.

TAPPING MACHINES (PNEUMATIC)
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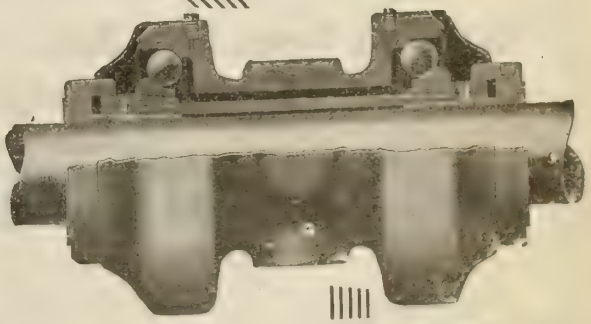

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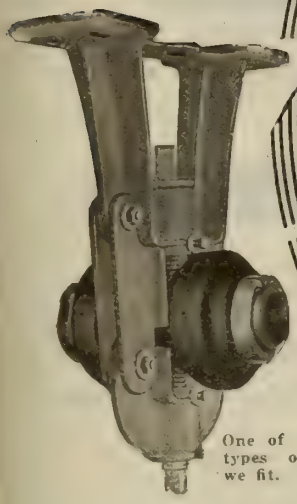

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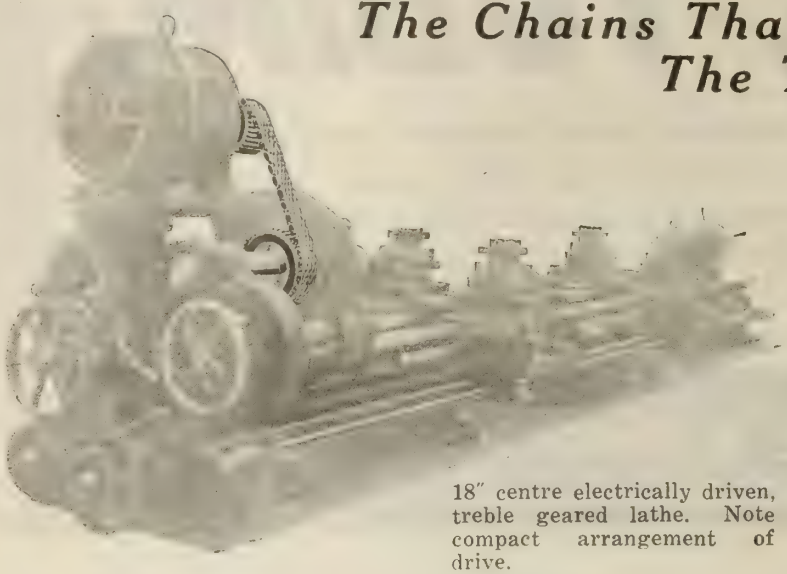

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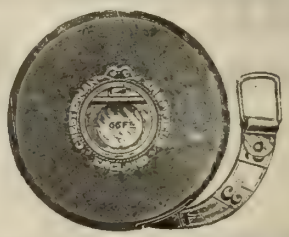

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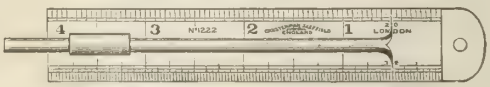

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CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI. TORONTO, JANUARY 3, 1919 No. 1

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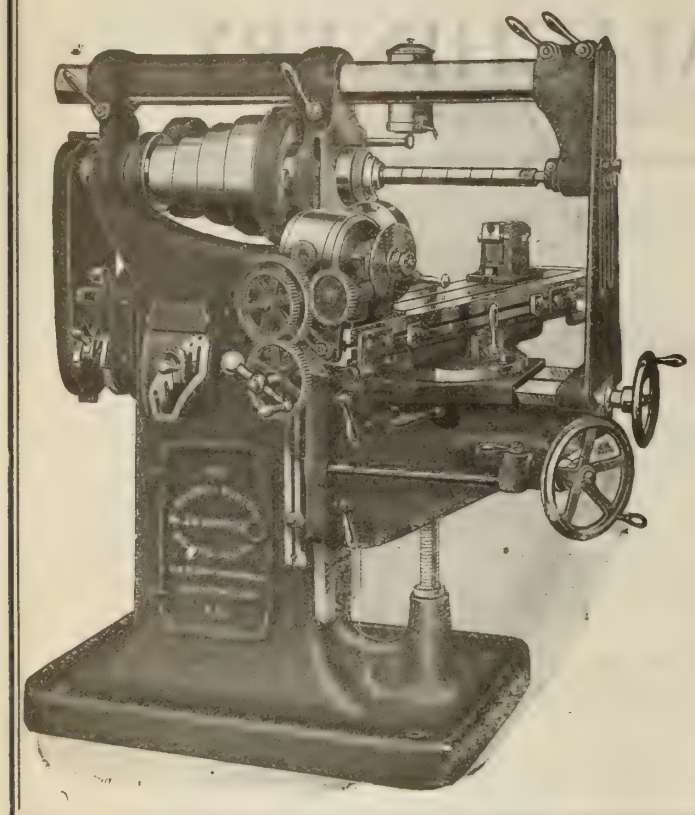

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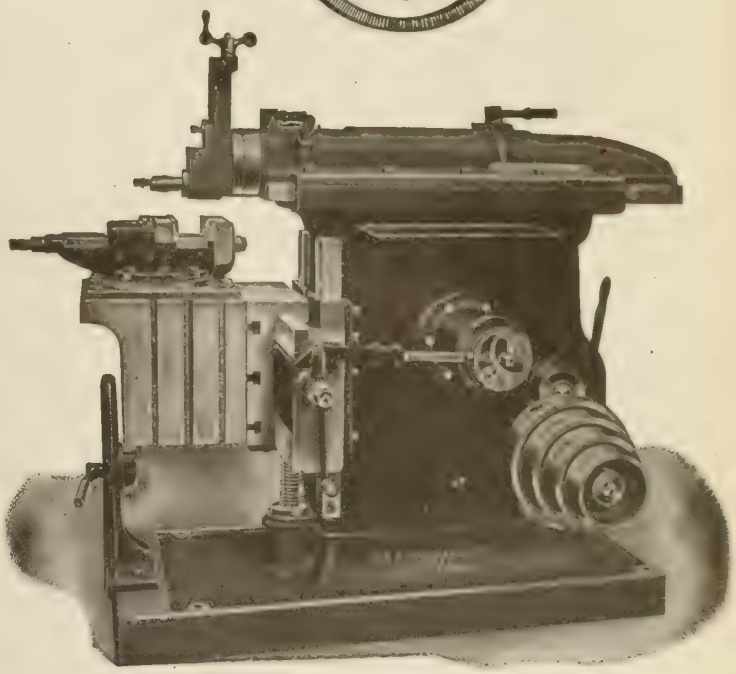

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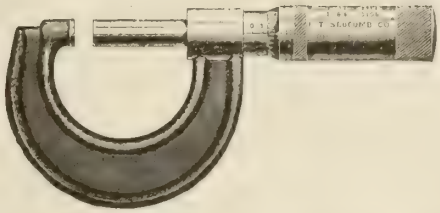

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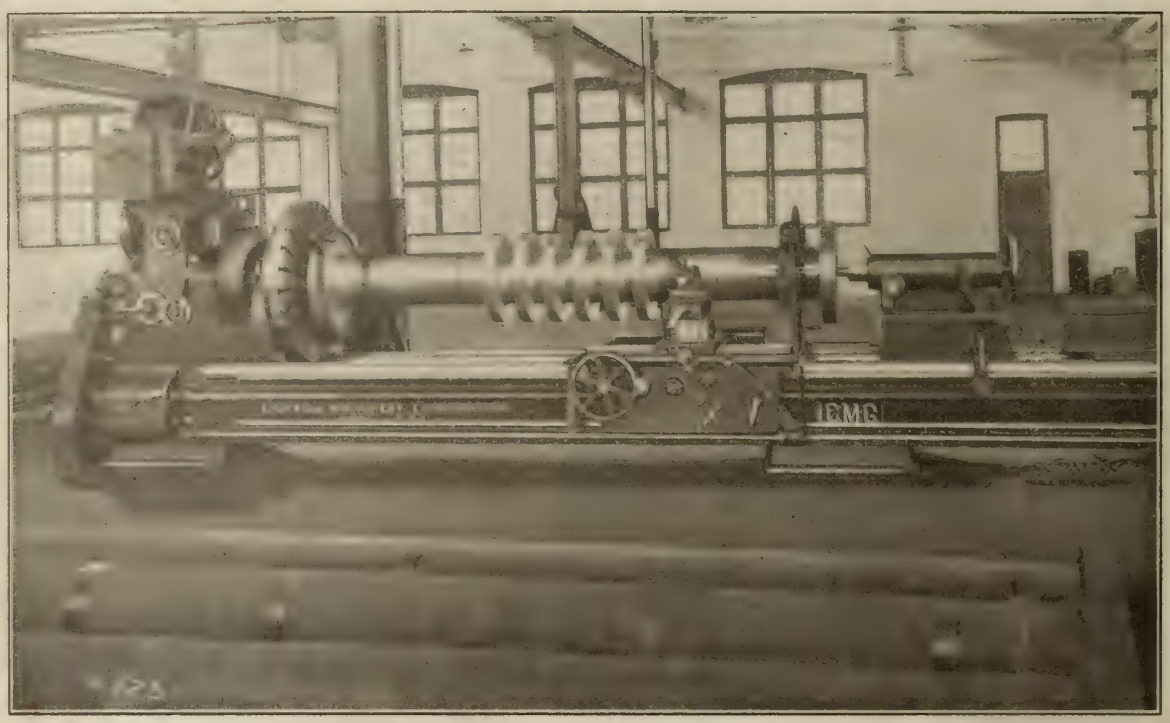

C.M.C. Lathe turning marine thrust shaft

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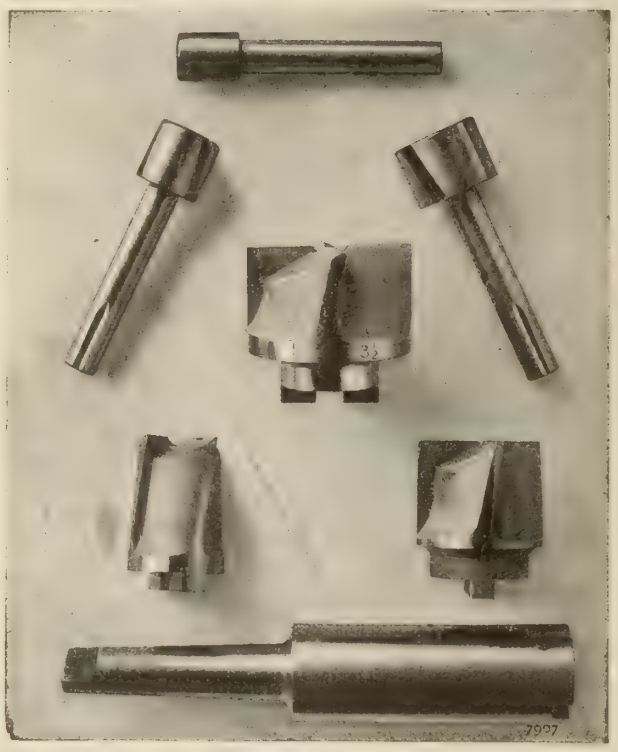

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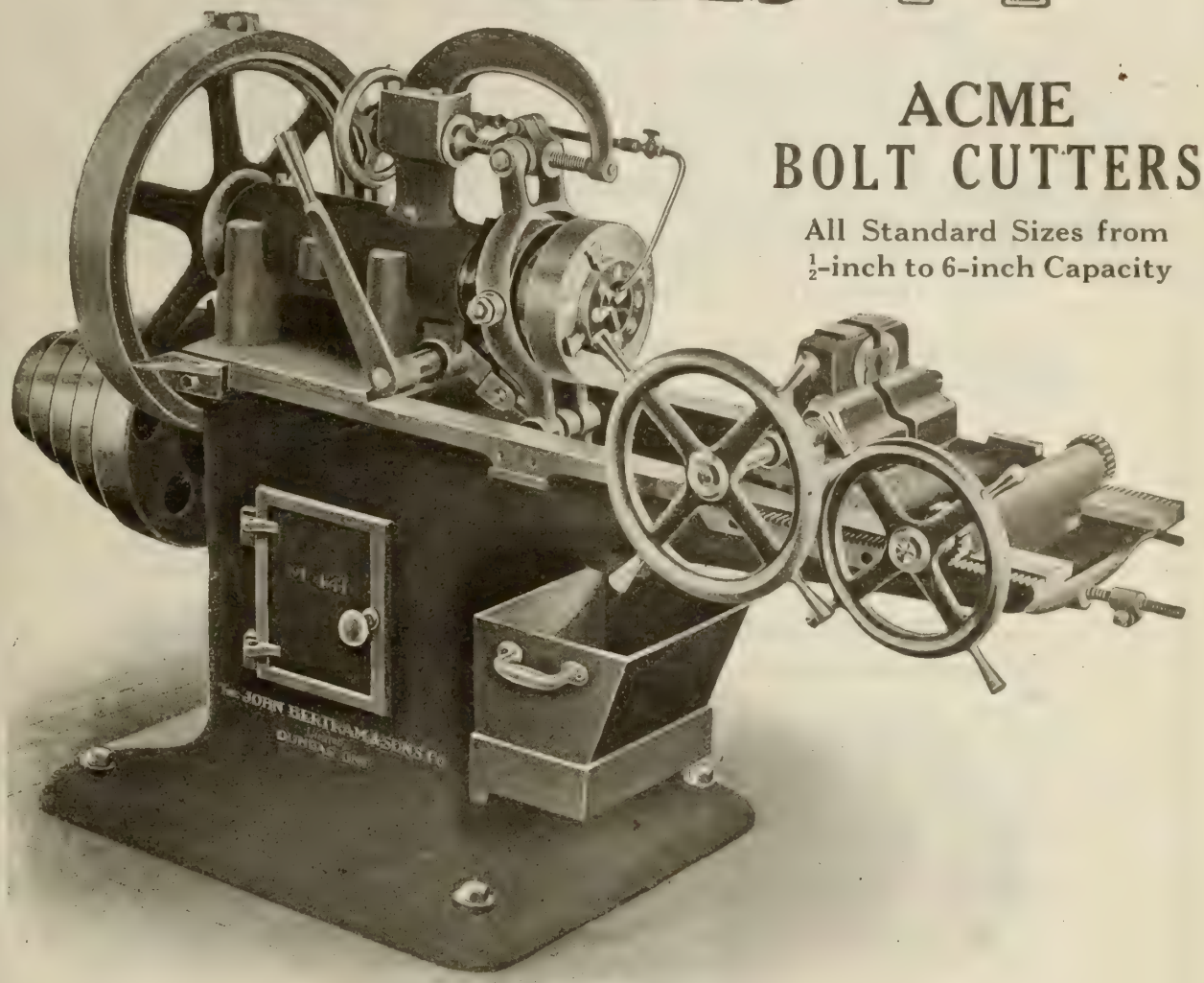

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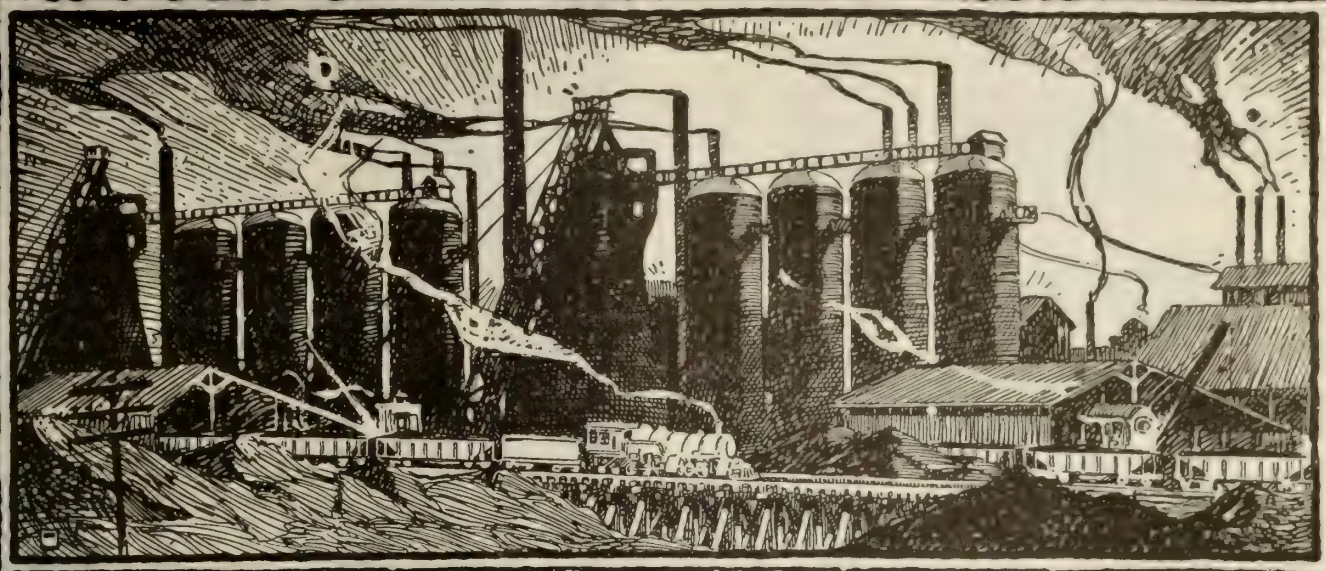
Think them over, Mr. Owner, when you are about to put your O.K. on your superintendent's requirements.



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MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times.

Are your Tools made of Red Cut?

VANADIUM-ALLOYS STEEL CO.

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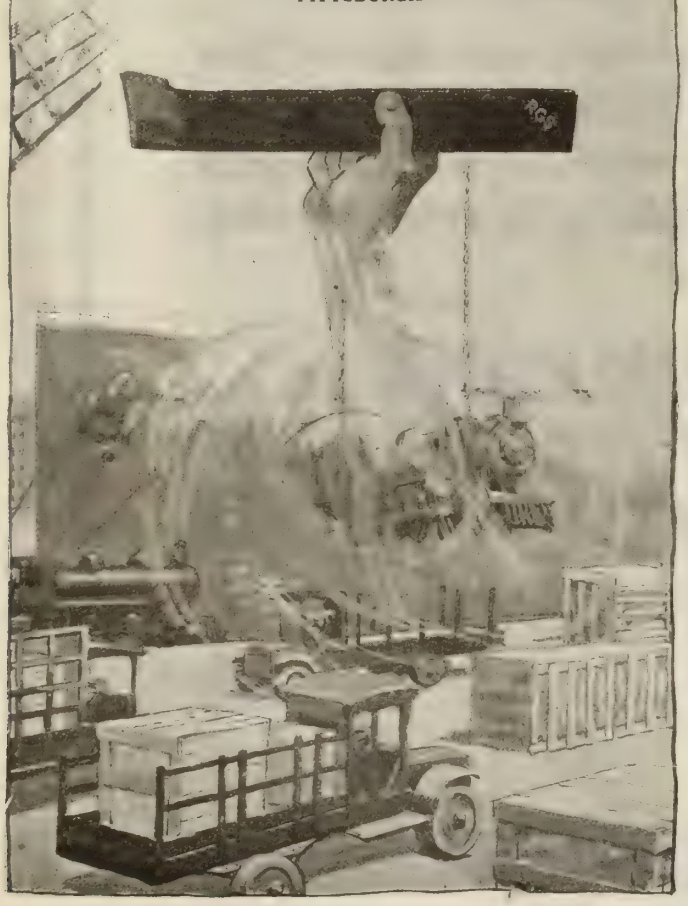

Swedish Steel & Importing Co., Limited

Montreal
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Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO.
ESTABLISHED 1900
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Represented in Canada by Messrs Norton Callard & Company
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Strong in the Neck

URANIUM

HIGH SPEED STEEL

If your lathe and planer tools must take deep cuts in hard stock and are frequently subjected to strain these tools should be URANIUM. They last longer.

The presence of URANIUM makes the steel tough enough to permit machines operating at high speeds.

We'll send you a piece for trial.

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PITTSBURGH **PENNA.**

Crucible

AND

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"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.

1856

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Electrite

Electric furnaces, automatically regulated, the most modern methods, and **the introduction of Uranium** — make this a steel of truly remarkably cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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ELECTRIC STEEL CO.
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High Speed Steel

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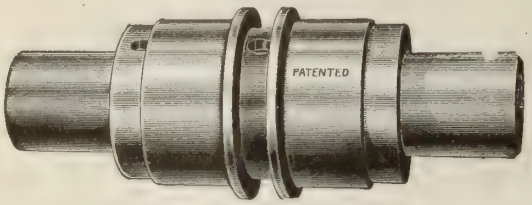
THE JOHNSON FRICTION CLUTCH

In the "Snyder" and a Host of Other Drill Presses

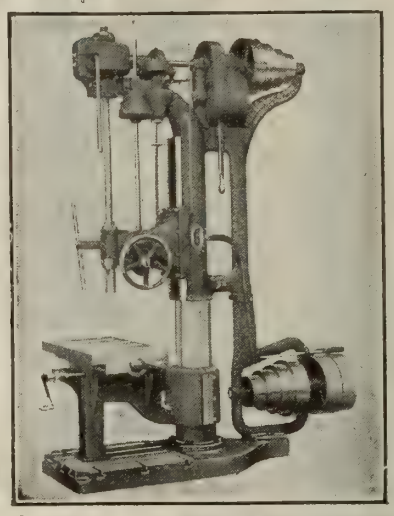
HERE

We feel justified in saying that Johnson Friction Clutches are in use wherever efficient drilling machines are manufactured. Every day sees new names added to our long list of machines which have Johnson Friction Clutches in their design. This wouldn't be so if there wasn't something a little better than ordinary about Johnson Friction Clutches. A simple request for information about your own proposition will bring surprising details and prices.



Double Clutch—Exterior.

Write us for our Yellow Data Sheets



Courtesy of J. E. Snyder & Son, Worcester, Mass.

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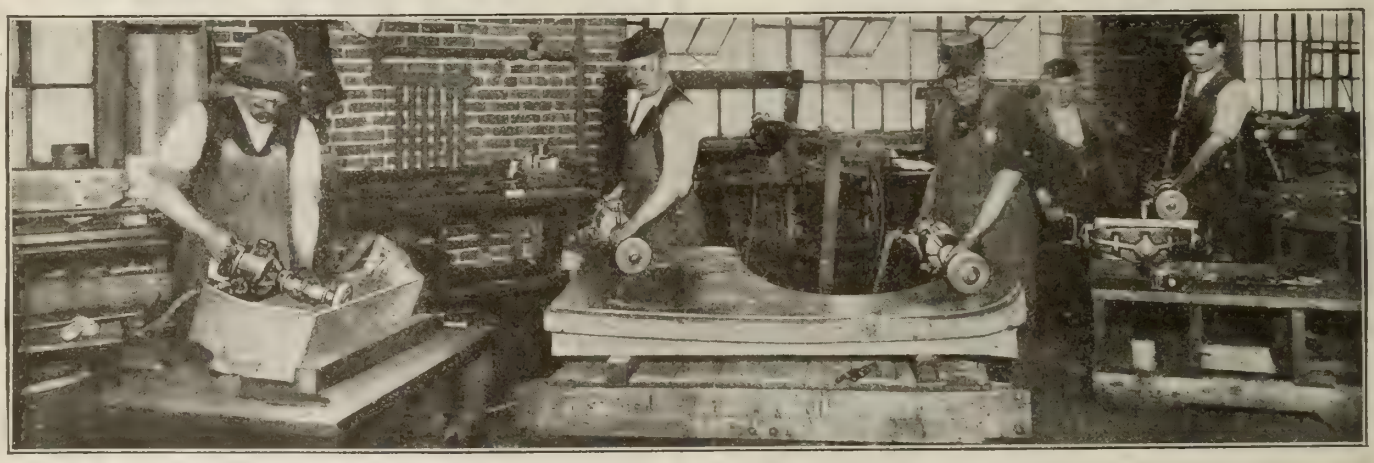
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



How One Plant Uses The "LITTLE DAVID" GRINDER

CANADIAN INGERSOLL-RAND CO., LTD.

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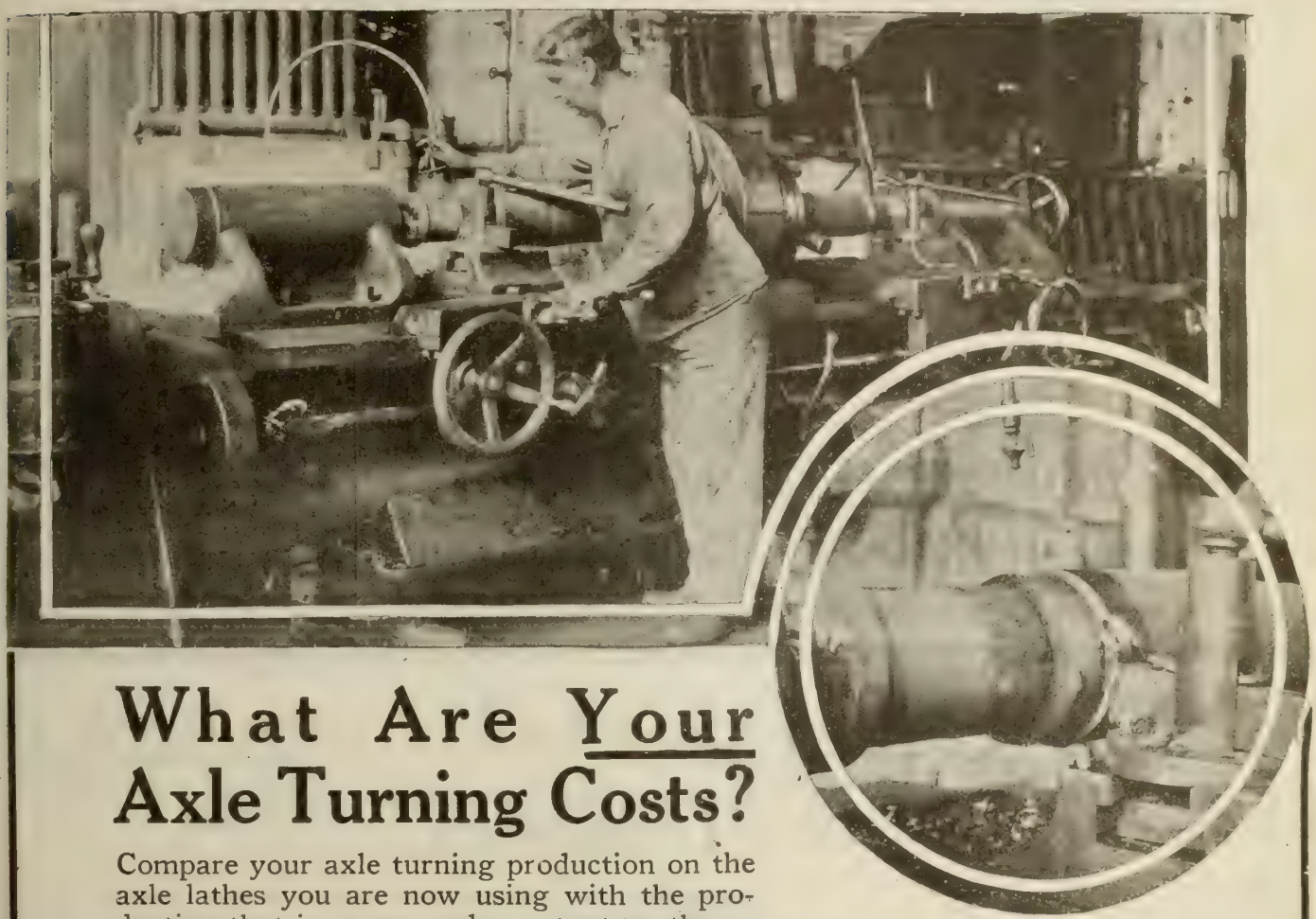


What Are Your Axle Turning Costs?

Compare your axle turning production on the axle lathes you are now using with the production that is an every day output on the

Bridgeford Heavy Axle Lathe

For example, in the Western Avenue Shops, Chicago, of the C. M. & St. P. Ry., car axles are actually turned to size from rough turned axles in 21 min. and 50 sec. per axle. The actual machining operations are as follows:

1. Setting up	3	min.	35	sec.
2. Turning dust collars	2	"	35	"
3. Roughing cut on journal	3	"	10	"
4. Finishing cut on journal	3	"	35	"
5. Rolling journal (special tool)	3	"	30	"
6. Polishing journal			55	"
7. Turning wheel seat	2	"	15	"
8. Taking down	2	"	15	"
Total	21	min.	50	sec.

This is not a "framed up" job, but the daily production output—a production that has been consistent since the lathe was installed 3½ years ago.

Put your axle problems up to us. We have some interesting facts that will show you how you can reduce your axle turning costs.

BRIDGEFORD MACHINE TOOL WORKS

161 WINTON ROAD, ROCHESTER, N.Y., U.S.A.

Heavy Engine Lathes Heavy Axle Lathes

Secure our estimates on your requirements in shape of

SPECIAL MACHINERY

We employ only expert machinists who have had wide experience with us in building Special Machines, outside

OUR REGULAR LINES OF

Milling Machines, Motor Driven and Belt Driven Grinders, Polishers, Disc Grinders, Swing Grinders, Hack Saws.

Our Engineering Staff is ready to advise on your problems.

THE FORD-SMITH MACHINE CO., Limited

Hamilton, Ontario, Canada

Smalley General Thread Milling Machines

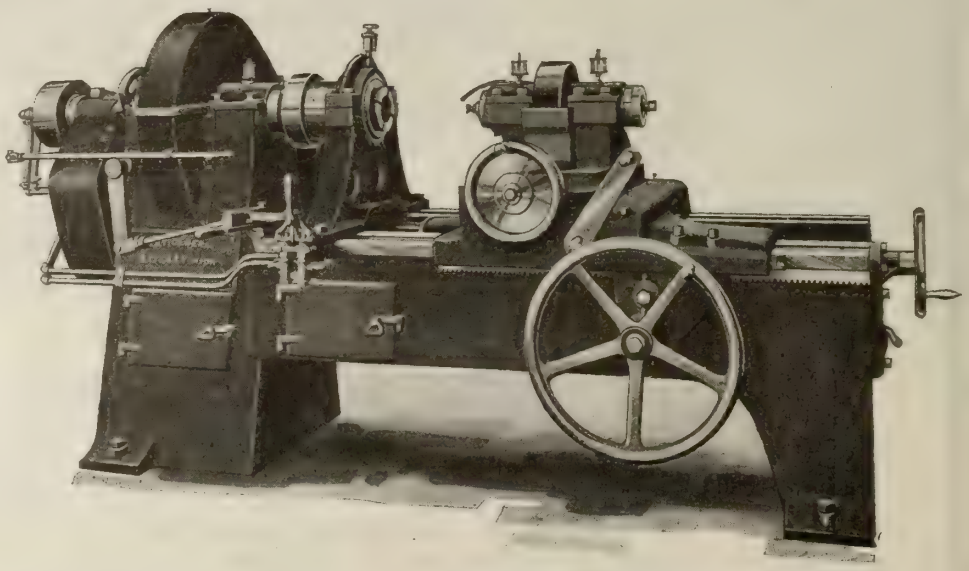
Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

Write for Bulletin.



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Canadian Agents:
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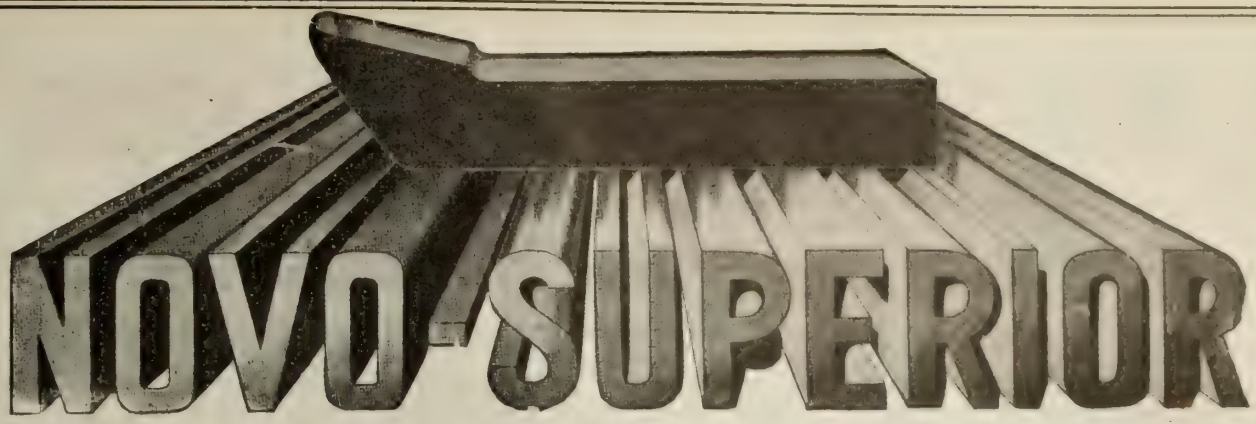

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INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc., Music Wire for Springs, Steel Balls. Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws – for wood and for hot or cold metal cutting

Machine Knives – for cutting wood, paper, tobacco, agricultural.

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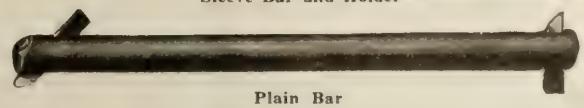
Williams' "Agrippa" Boring-Tool Holders for Multiple Bars

Raise no bar against the selection of Bars. The choice is yours.

Sleeve Bar and Holder



Plain Bar

The "twin-screw" fastening with V groove at top and bottom accommodates any size of bar within its range without the use of bushings or shims.

We furnish two types of Standard Bars, Sleeve and Plain, as illustrated—they are interchangeable in the Holder.

In the *Sleeve-Bar* the Cap admits a straight or angular Cutter; either can be quickly inserted at the business end of the Bar without removing the Cap or disturbing the setting of either the Bar or the Holder.

The *Plain-Bar* provides for the use of both styles of Cutters in the simplest manner possible.

Ask for Machinists' Tools Booklet

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Agents for Manitoba, Saskatchewan, Alberta and British Columbia.

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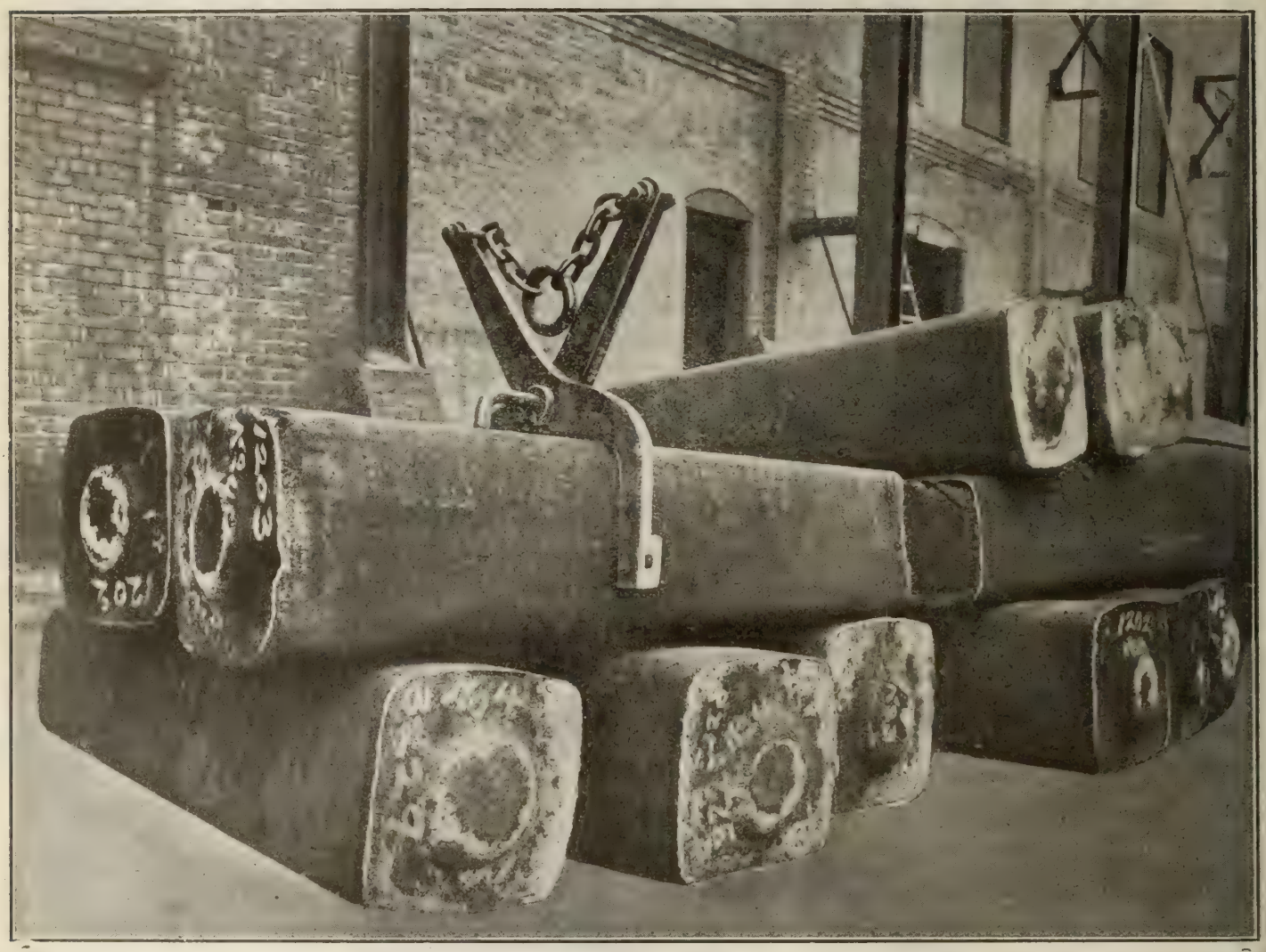
Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada



THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

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FOUNDRIES & FORGINGS
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TOOL HANDLES

Made from Canadian Hardwoods

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CONSULTING ENGINEERS on all kinds of welding. Breakdown repairs handled at once, just 'phone us and we will be on the job by next train.

OXY-ACETYLENE WELDING of heavy cast iron frames, cylinders, gears, water wheels, etc.

STEEL, any kind of welding on parts of large or small machines, tanks, digesters, boilers, shafts, brackets, etc.

Can be welded in place when necessary.

ELECTRIC WELDING on boilers, digesters, leaking tanks, etc.

MARINE REPAIRS undertaken by our Marine Welding Tug which is equipped with Electric and Oxy-Acetylene Welding Apparatus with Compressed Air Plant complete.

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PORTABLE WELDING APPARATUS of all kinds with trained operators always available to repair your breakdown at once.

THERMIT WELDING on all classes of work is a special feature of present activities.

Manufacturers of Steel Tanks, Air Receivers, Welded Tanks, etc.; Electric Welders, Oxy-Acetylene Welders, Boiler Repairs, Lead Burning and Thermit Welding.

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Steel Castings

High Grade STEEL Castings

Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

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"WACO"

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High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

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RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

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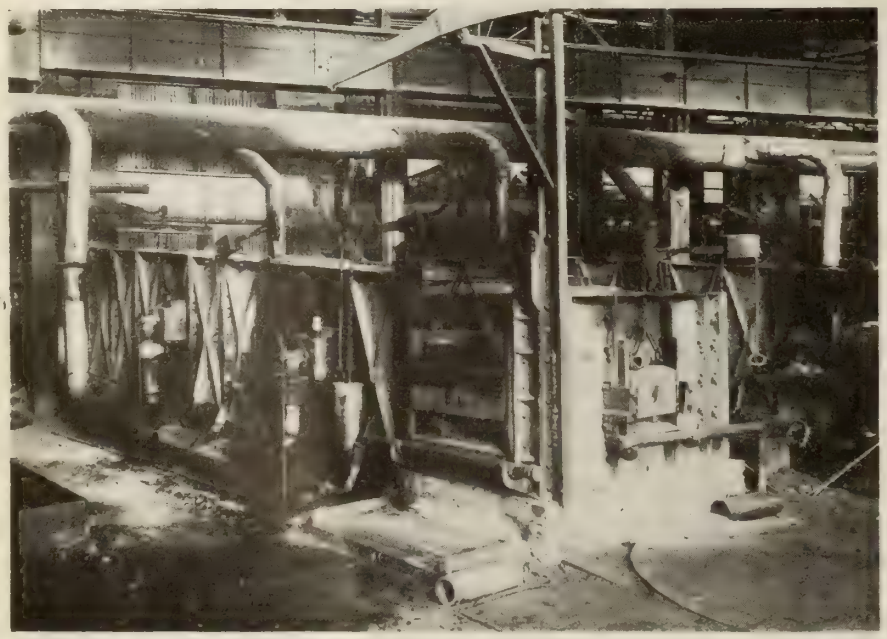
Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering
Company, Limited
Three Rivers, Quebec, Canada

STELLITE

"Not Steel but its Master"

Reconstruction Period

The part played by STELLITE in the winning of the war has been no small one. It was due to the use of STELLITE and the determination of our manufacturers that Canada was able to make such an enviable record in shell production.

What Canada has done in war she can do in peace, but she must continue along the lines of rapid production and efficiency.

By the use of Arc-Welded Tools of STELLITE your production can be increased and your tooling costs reduced.

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200 King Street West

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MONTREAL
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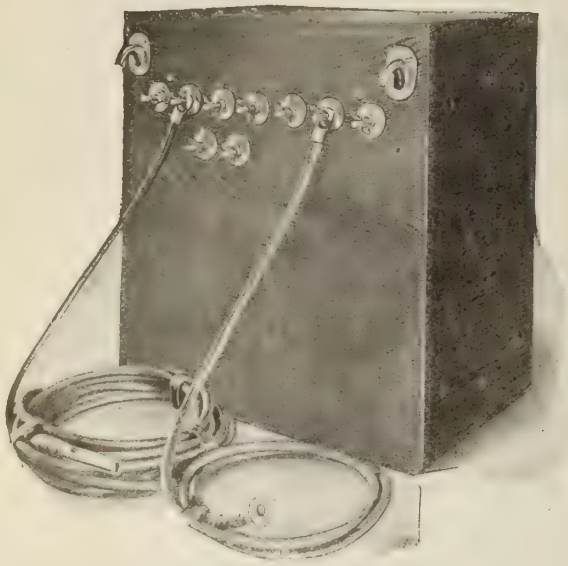
Alternating Current Arc-Welding



The

"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

Reduces welding costs to minimum
Does not require expert to operate

The Arcwell Corporation of Canada, Ltd.

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WELDING AND CUTTING

OXYWELD

We Weld—
- Steel
- Cast Iron
- Brass
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QUICK SERVICE REASONABLE CHARGES

EXPERT WELDERS

If necessary we will send a portable plant to your premises for heavy work

One of the Oldest Welding Plants in Canada.

Send us—
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- Gear Wheels
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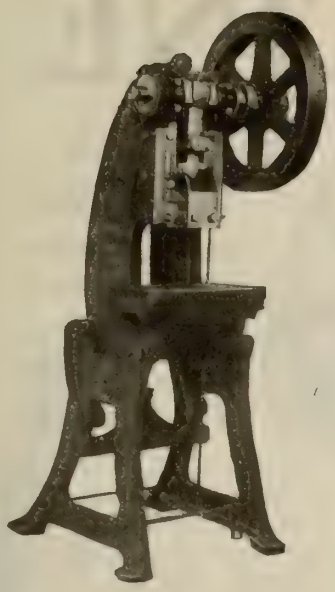

A Time Saver— Can You Beat It?

HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, when properly tightened, will not break away, or slip.

If you break it we will furnish a new one free of charge.

Consolidated Press Company

HASTINGS *LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.* MICHIGAN

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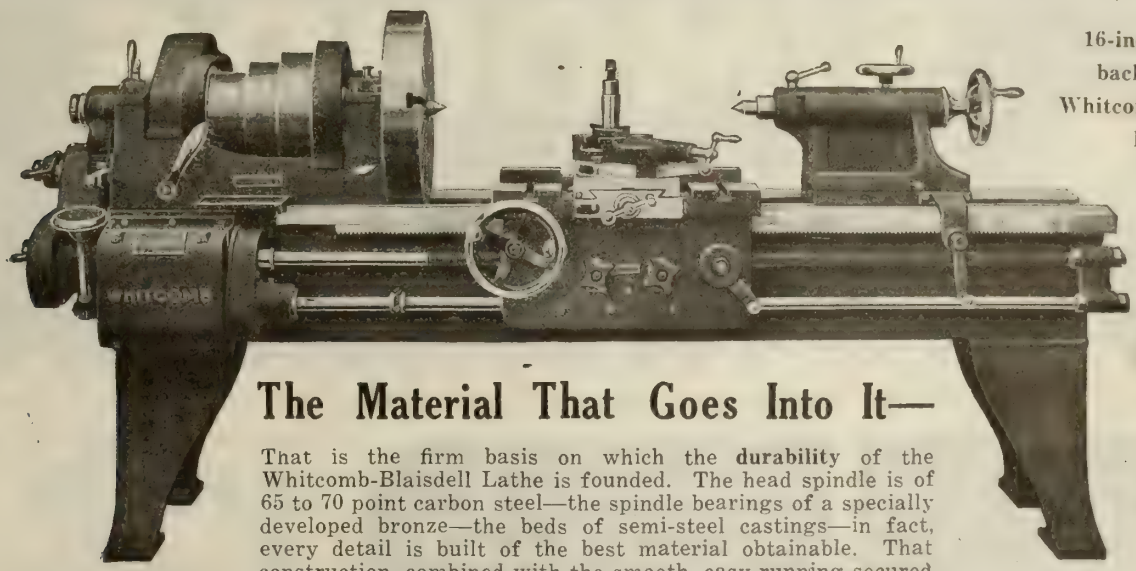

16-inch double back geared Whitcomb-Blaisdell Lathe

The Material That Goes Into It—

That is the firm basis on which the **durability** of the Whitcomb-Blaisdell Lathe is founded. The head spindle is of 65 to 70 point carbon steel—the spindle bearings of a specially developed bronze—the beds of semi-steel castings—in fact, every detail is built of the best material obtainable. That construction, combined with the smooth, easy running secured by close accuracy, gives every Whitcomb-Blaisdell Lathe the ability to **stand up** under long, hard service.

Write for Catalog covering the entire line

LATHES From 14" to 30" SWING

WHITCOMB-BLAISDELL MACHINE TOOL CO.

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PLANERS From 17" to 48" WIDE

The "RACINE"

For Speed

For Accuracy

For Quantity Production

For Saving in Blade Costs

For Saving in Material

Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

RACINE TOOL & MACHINE CO.

Melbourne Avenue

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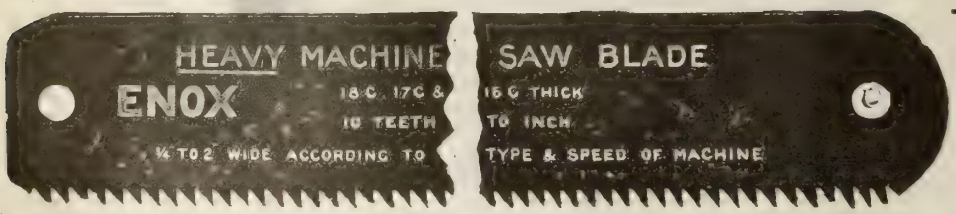
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

ST. JOHN MONTREAL VANCOUVER



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Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

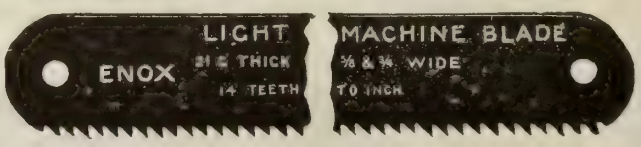
Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

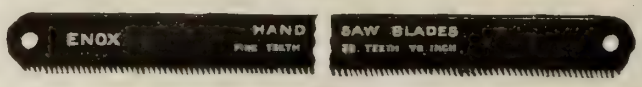
Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10





Compare the Starretts

We want you to choose the Starrett Hack Saws on this strict basis of comparison. How **fast** they will cut a given piece of material, how **economically;** how much better they stand up under strenuous work.

Starrett Hack Saws

are the **right** saws to use. Made of the finest tungsten steel, with properly milled teeth; flexible or hard backs. Starrett Hack Saws cut saw costs because they save time and labor.

STARRETT HACK SAWS CUT QUICKER & LAST LONGER

Send for Catalog No. 213. It shows many styles and sizes of fine precision tools, and also hack saws.

THE L. S. STARRETT CO.

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

ATHOL, MASS.

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Starrett Hack Saws

Immediate Deliveries!

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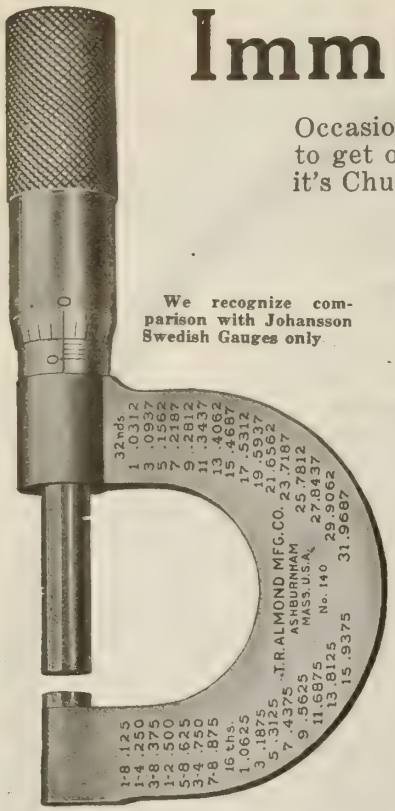


We recognize comparison with Johansson Swedish Gauges only

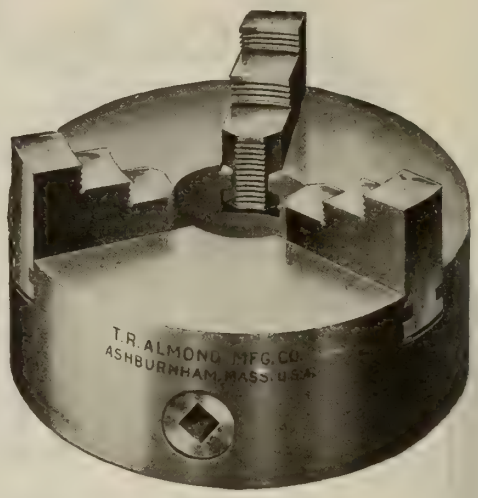
Almond

We are in a position to fill your wants for Micrometers, Drill Chucks (all sizes) and Lathe Chucks of the smaller sizes, 5", 6", 7½" and 9".

ALMOND CHUCKS are powerful, accurate and durable and cost less to operate.

ALMOND MICROMETERS — **Recognize Comparison with Johansson Swedish Gauges Only.**

Made in English measurements, 1", 2" and 3", by thousandths and ten thousandths; metric measurements 25 mm., 50-mm. and 75-mm. by 1/100-mm.

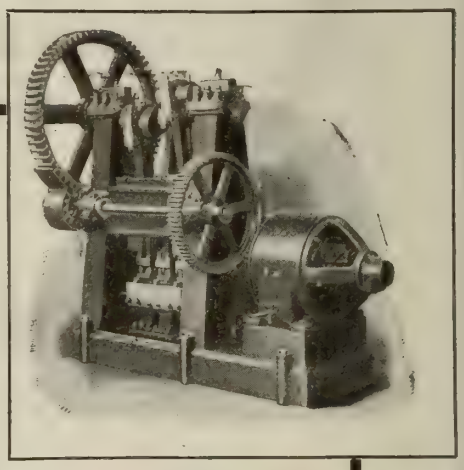


Pleased to send you full information about these quality Tools.

T. R. Almond Manufacturing Co. 5 MAPLE AVENUE **Ashburnham, Mass.**

Heavy Duty Triplex Pumps

BELT DRIVEN OR DIRECT CONNECTED



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ALSO FULL LINE OF

HYDRAULIC PRESSES, ACCUMULATORS, VALVES AND FITTINGS FOR MUNITION PLANTS AND ALL OTHER PRESSING USES.

CATALOG "B" TELLS THE STORY

OUR SKILLED ENGINEERS ARE AT YOUR SERVICE TO HELP WORK OUT YOUR PRESSING PROBLEMS

The Hydraulic Machinery Co., Limited

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If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

Any Cut a Machine Can Pull or a Tool Stand, the "Knight" Chuck Can Hold

The "Knight" Three-Jaw, Universal Geared Chuck is solidly constructed, its properly proportioned jaws are exceedingly powerful, and the scrolls are very strong.

Characteristics, ease of control, prompt adjustment, adaptability and great gripping power.

Knight Metal Products, Limited

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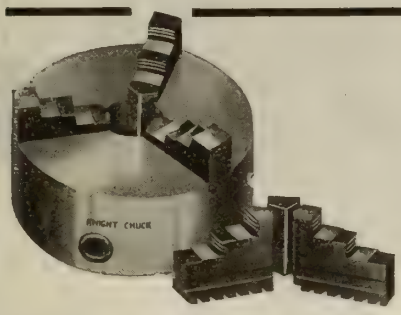

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"BOTH these operations and half another—I'll show you later—completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smoot . And it was pleasant to hear.

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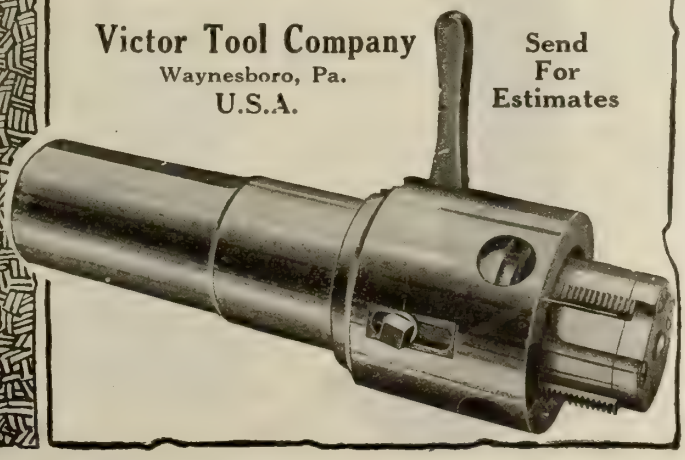
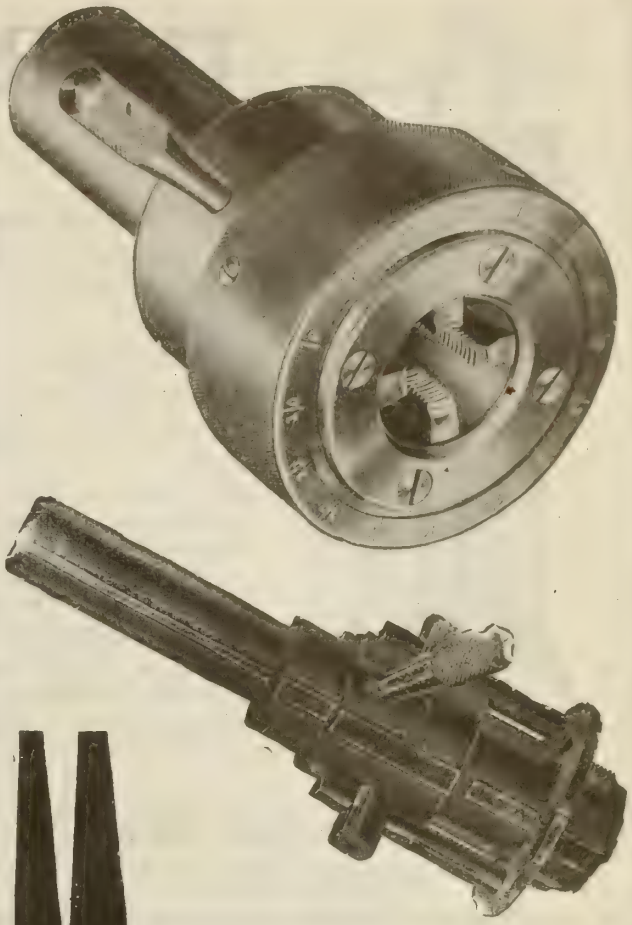
U.S.A.

Send For Estimates





MURCHEY

Collapsing Taps and Self-Opening Dies

No reversing—no stripping; no need of taking the shell out of one lathe and putting it in another machine.

Fifty per cent. faster and more accurate than solid tools. No chance of work getting off centre.

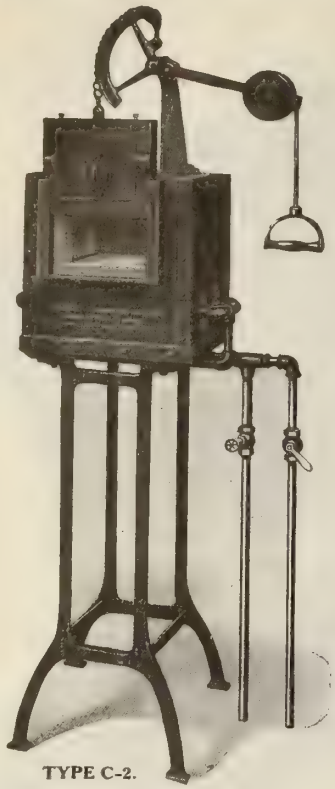
Murchey Machine & Tool Company

DETROIT, MICH. - U.S.A.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England; Glasgow, Newcastle-on-Tyne.

FENWICK FRERES AND CO., 15 Rue Fenelon, Paris France.

The Right Furnace For Every Purpose



TYPE C-2.

THE types shown are only two of over one hundred types and sizes of Gilbert & Barker Furnaces—a furnace for every purpose.

G. & B. Furnaces are built right. Their construction and design have been perfected by our half century of experience.

We offer you the benefit of this experience and thorough knowledge of modern heat-treating methods through our engineering department. The service is free. Put your problems up to us.

Just now we are making prompt delivery of these two types and many others. Send for Stock List 24.

TYPE C-15.

Gilbert & Barker Mfg. Co. West Springfield Mass.

Canadian Agents: Williams & Wilson, Montreal, Que.

New York Office: Room 1107, 26 Broadway

Quadrupled Driving Gears

and driving mechanism of great strength and weight insure **power**; and the wide, extra heavy housings extending to the floor and secured to bed by tongue and groove joints in addition to bolts and dowels insure **rigidity**. It is this power and this rigidity that make "Hamilton Planers," 48" x 48", rapid producers on heavy precision work. For more particulars

Write

Rapid Production HAMILTON Machine Tools

The Hamilton Machine Tool Company
HAMILTON, OHIO

Sole Agents for Ontario:
H. W. Petrie, Limited
Toronto, Ont.

Your Riveting?

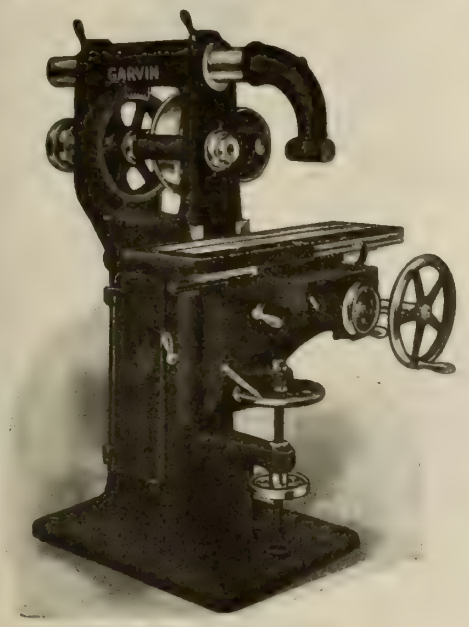
How is it done? Are you getting the necessary speed? Is the quality of the highest character? How much is it costing you?

The Grant Rivet Machine has established the records of one clean, perfectly finished rivet per second. Is that speedy enough, or is it too speedy? This is the fastest any similar machine will work and if too speedy it could be worked in conjunction with some other work. Our catalogue is worth writing for. There is one for you.

THE GRANT Mfg. & Machine Company

Holland Ave.
BRIDGEPORT, CONN.

GARVIN No. 11 Plain Milling Machine



No. 11 Plain Milling Machine
Use Code . . . . Abode

Adapted to the lightest kinds of small milling and light manufacturing and suitable for jewelers, makers of electrical goods, brass workers, sewing-machine manufacturers and others.

The Features of the Machine Are:

Telescope Arm.
Hardened and ground Tool-steel Bearing for arbor in arm.
Spindle Bearing Taper, with adjustment.
Power Feed driven by vertical worm shaft inside of column, which drives a worm gear clutched to the pinion shaft in the knee.
Feed Works located and protected inside of column.
Quick and sensitive movement of Table by Adjustable Lever and Rack Pinion.
Micrometer adjustments of Knee and Saddle.
Oil Pan around table.
Elevating Screw does not pass through the floor.

Power Feed of Table	12½ in.
In and Out Adjustment	4½ in.
Vertical Adjustment	10 in.
Net Weight, Skidded	600 lbs.

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) **50 Years New York City**

IMPERIAL GENUINE BABBITT METAL *The Highest Grade Manufactured*

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

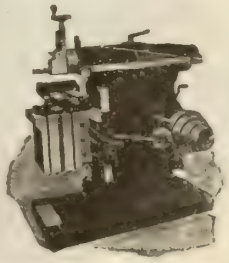
Don't Crowd Your Large Machines

You cannot manufacture small parts economically on a large machine. Steptoe Small Power Feed Millers and Hand Millers are especially adapted for that kind of work, a stiff, heavy tool that can be quickly handled and crowded to the limit. That is the machine to buy for small parts.

If your Planers are crowded take the small jobs and put them on a Steptoe Shaper and you will do them quicker and you will have less money invested in equipment.

STEPTOE SHAPERS "Just a Little Better."

CIRCULAR ON REQUEST.



John Steptoe Co., Cumminsville, Cincinnati, Ohio, U.S.A.

Canadian Representatives: Garlock-Walker Machinery Co., Toronto, Ont.

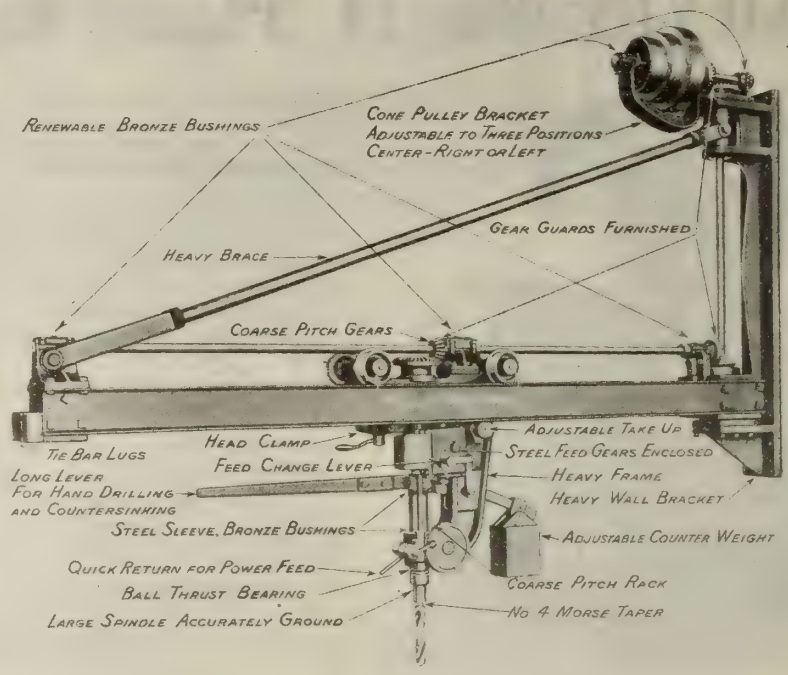
Here's a Drill You Want

The Lynd-Farquhar Wall Radial Drilling Machine is a real machine tool, carefully designed and made from the best material. The entire control of the drill is within easy reach of the operator. The arm is constructed of extra heavy channels and is supported from the outer end to the top of the wall bracket by heavy steel brace bars. The head is exceedingly rigid. It is mounted on four flanged wheels, fitted with roller bearings, and moves with extreme ease from end to end of the arm.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue BOSTON, MASS.

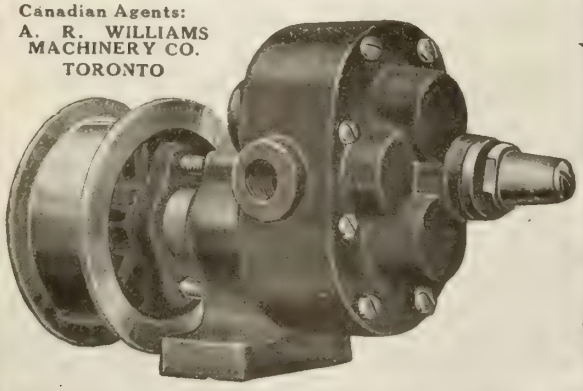
TRAHERN

ROTARY GEARED PUMPS

Use the Individual Pump Different classes of work require different compounds. By using the individual system, as many different compounds as desired may be used. This is a valuable feature. Trahern Rotary Geared Pumps. Would you like to try one? Write.

Trahern Pump Company, Rockford, Ill.

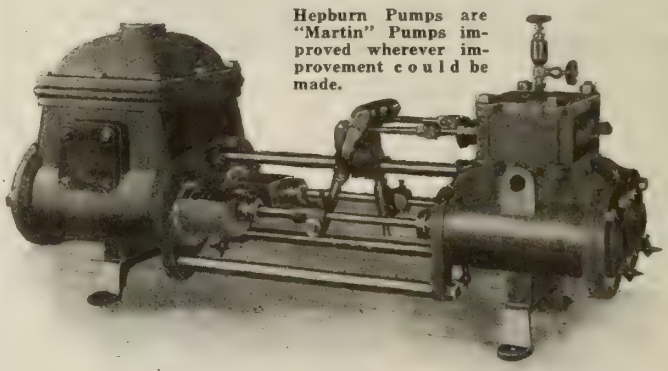
Canadian Agents:
A. R. WILLIAMS MACHINERY CO.
TORONTO



Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario

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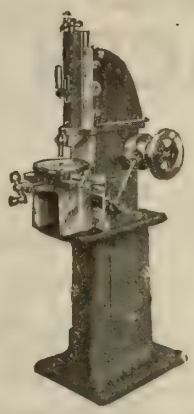
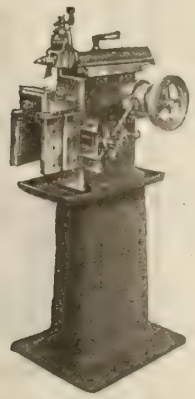
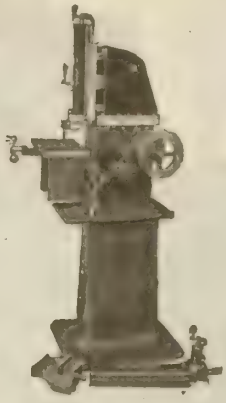


3½-inch Slotter



7-inch Shaper



Three of the machines that by their cost-reducing features have established themselves "solid" with the home users and by these same merits are reaching out in foreign countries. A silent, but powerful message of the Rhodes efficiency.

Their capacity is greatly promoted by the adjustments which may easily and quickly be attached. For shaping, slotting, die making, tool making, etc., these machines stand paramount. An inquiry on your stationery will receive prompt attention.

The Rhodes Mfg. Company

Owned and Operated by the Jacobs Mfg. Co.

Hartford, Conn., U.S.A.

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

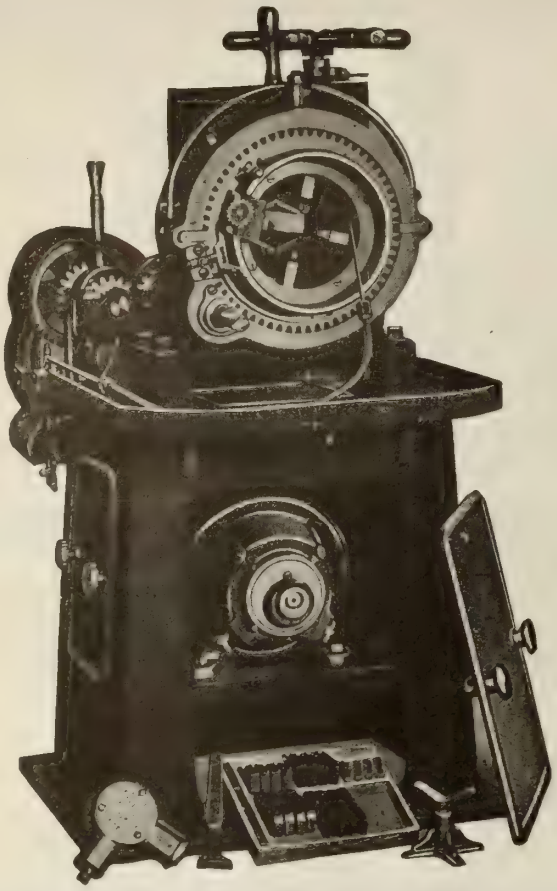
Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

Marshalltown, Iowa

U. S. A.



"Forbes Facts"

1. One man can do the work of six against the old stock and die method of cutting.
2. It is the only machine on the market with receding gear.
3. It is self-contained and motor-driven.
4. It is portable.

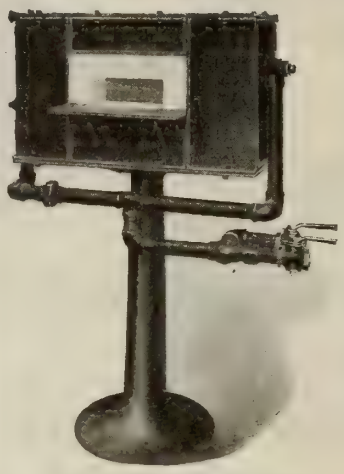
These are convincing arguments for the construction and utility of this machine. Thread cutting can be performed fast, clean and true. Equipped with self-centering vise.

The Curtis & Curtis Co.
115 Garden Street Bridgeport, Conn.

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.



Red End Furnace or Cutting Tool Type

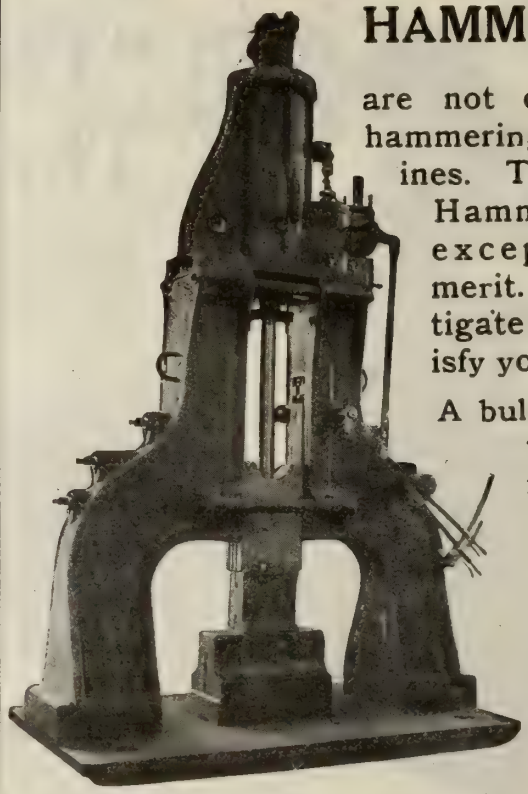
For
Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting
Shell Types

Furnaces built for special requirement

TORONTO OFFICE:
Standard Fuel Engineering Co.
W. H. KIRK, Manager
909 Excelsior Life Building
Phone Main 385

STANDARD FUEL ENGINEERING CO. · DETROIT, MICH. ·

"ERIE" STEAM FORGING HAMMERS



are not ordinary hammering machines. They are Hammers of exceptional merit. Investigate and satisfy yourself.

A bulletin for the asking.

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA, U. S. A.

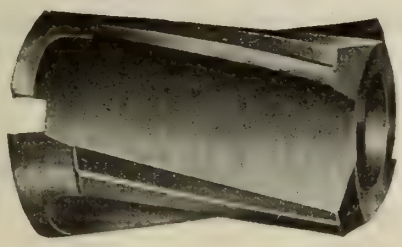
We profess

to make the highest quality

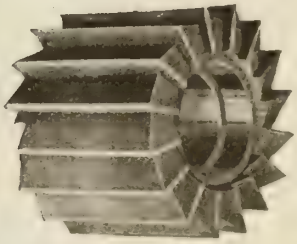
High Speed Steel Tools

in the world from

"DAVIDSONIZED" HIGH SPEED STEEL



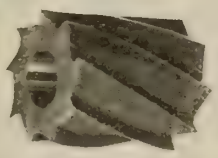
DAVIDSONIZED DTM CORP. STEEL



THE DAVIDSON TOOL MFG. CORPORATION

120-124 Maiden Lane, New York City

Works: 58-62 North Sixth Street, Brooklyn, New York



SELLING AGENTS FOR CANADA:

The CANADIAN FAIRBANKS-MORSE CO., Ltd.

Ottawa Toronto Hamilton St. John Quebec Montreal Windsor
Winnipeg Saskatoon Calgary Vancouver Victoria

Long Efficient Service

is insured by FAMOUS FIVE FILES.

The steel—the real basis of the file—is the best obtainable for this purpose, and we make well balanced files of the right cut and shape.

The right "cut" weight and shape of a file produces the best work and insures the longest efficient life for the file.

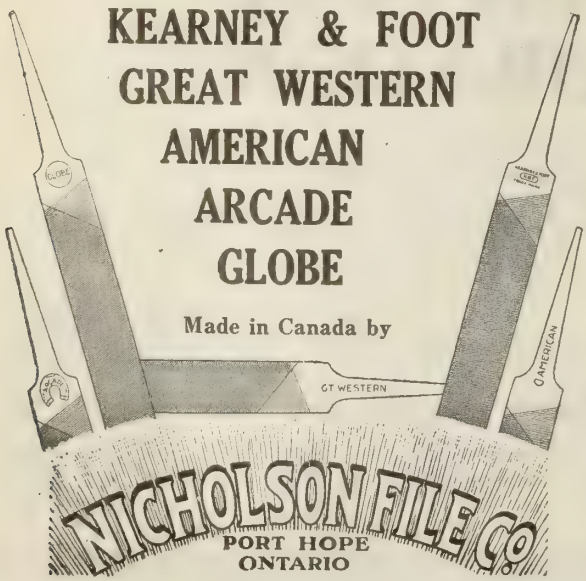
It pays to buy Famous Five—the line that provides such a wide range to select from.

Specify them when ordering.

They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by



P X H

TRADE MARK

WHY P.H. and IMPERIAL FILES?

Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

Because they are processed entirely by the most expert workmen in this highly specialized trade.

Because they are made in Canada by Canadian Capital and Canadian Labor.

and

Because

"They Cut Faster and Wear Longer."

Port Hope File Mfg. Co.

LIMITED

PORT HOPE - - ONTARIO

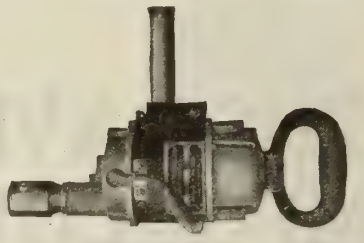
"ASK YOUR JOBBER"

IMPERIAL

TRADE MARK

U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

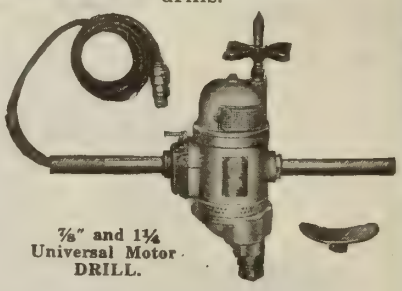
3 SIZES

3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅞" and 1¼ Universal Motor DRILL.

For Sale By

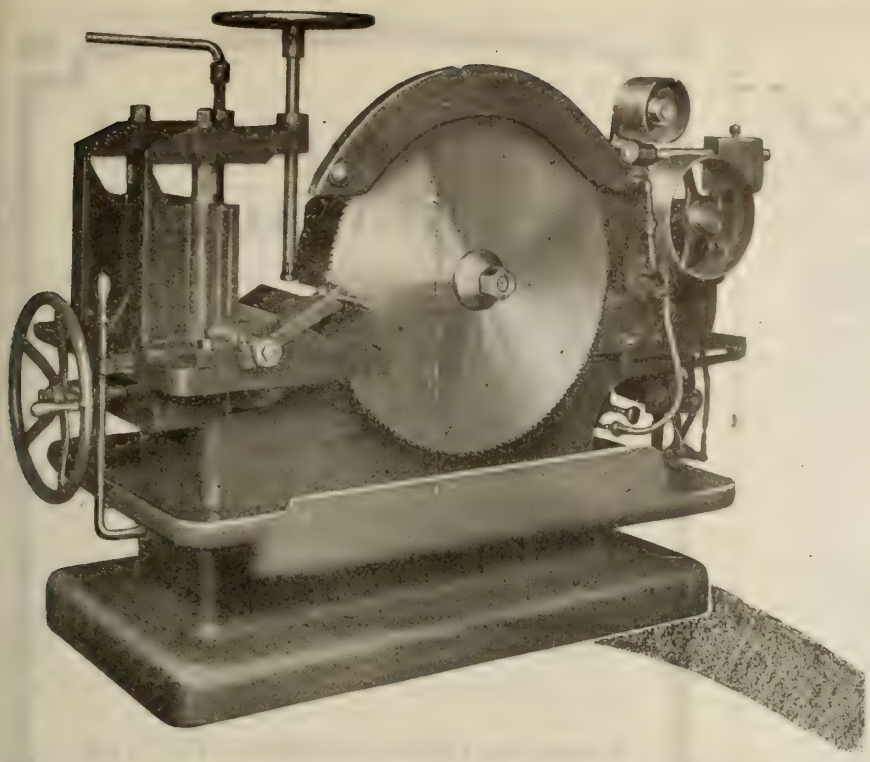
The Canadian Fairbanks-Morse Co., Limited

Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver

THE UNITED STATES ELECTRICAL TOOL CO.

CINCINNATI, OHIO

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.



Save Every Ounce of Metal

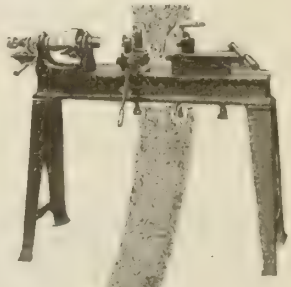
NUTTER & BARNES
Cutting Off Machines Help

GTD

Due to the compactness of the transmission, this Nutter & Barnes Automatic uses a much smaller saw than other machines of the same rating.

This means a narrow kerf and a material saving of metal. It also greatly reduces the cost of saw renewals—the main item in the maintenance of cutting-off machines.

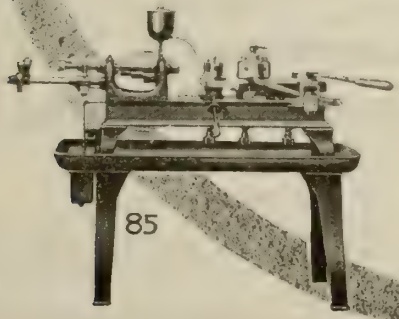
To save the utmost in time, labor and materials, use machines bearing the G. T. D. mark. They can always be depended upon to be superior in efficiency and economy, and absolute in accuracy and precision.

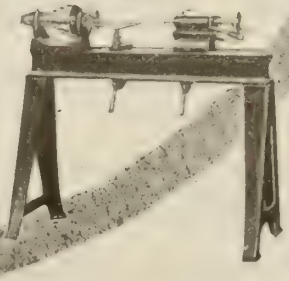


Machine Tool Division

Greenfield Tap & Die Corporation

Greenfield, Massachusetts





Canadian Agents:

Wells Bros. Company of Canada, Limited

GALT, ONTARIO

85

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 17A

Wheel and Work Speeds

The relation of wheel speed to work speed is most important. In cylindrical grinding, for example, if the surface speed of the wheel is within the limits recommended on the wheel tag and you find that the wheel spindle boxes require frequent renewing—that the surface is bluish gray when it should be light gray—that you have feed lines and chatter marks—you can be reasonably sure the wheel is too hard. You can frequently overcome this difficulty by decreasing the wheel speed or increasing the work speed, or both.

KEEP THIS TAG WITH WHEEL UNTIL USED

GRINDING NORTON WHEELS

Alundum

TRIAL WHEEL

RECORD TAG

Please return this tag to Salesman or to us direct when reporting on trial or duplicating order.

Norton No. 911051 Customer's No.

Size 10 x 3/8 x 3

Grain 80 Grade N Face

Tested at 3450 Rev.

Speed recommended - R.P.M. 1910 to 2290

Speed within above range is dependent on condition of machine, method of grinding and safety appliances used.

For grinding Rolls 1/2" dia. 3" long 70 pt. carbon Firth-Sterling Steel - Open fire hardened

(Please record results by either putting a circle around words or entering figures when required)

Satisfactory (Yes) No

Life: Days Hours

Production: Pieces Per Hour / Total Pieces

Dressing: Once a day Pieces Per Dressing / Total Dressings

Cut: (Fast) Coarse Hard Loads / Slow Fine Soft Glazes

Remarks Wheel wear about .00025" to every .050" stock removed

Record of Previous Wheel Used:-

Grain 46 Grade L Abrasive Lit. Alum.

Life: Days Hours / Total Dressings

Cut: Fast Coarse Hard Loads / Slow Fine (Soft) Glazes

SEE OTHER SIDE

If the micrometer shows that you are not obtaining duplicate pieces with the index wheel at the same point, you will probably find that you are using a wheel too soft in grade. Often you can overcome this by increasing the wheel speed or decreasing the work speed, or both.

Norton Company has issued a chart for quickly determining the surface speeds of wheel and work. One of these will be sent upon request.

NORTON COMPANY

NEW YORK STORE 151 CHAMBERS ST. — CHICAGO STORE 11 NO. JEFFERSON ST.

ELECTRIC FURNACE PLANTS

NIAGARA FALLS, N.Y. — CHIPPAWA, ONT.

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT. — NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 11 NO JEFFERSON ST.

TRADE NORTON MARK

Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assures accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

Canadian Fairbanks-Morse Co., Ltd.

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.

Detroit, Michigan

Sales Representatives

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

Your Grinding Problem Solved

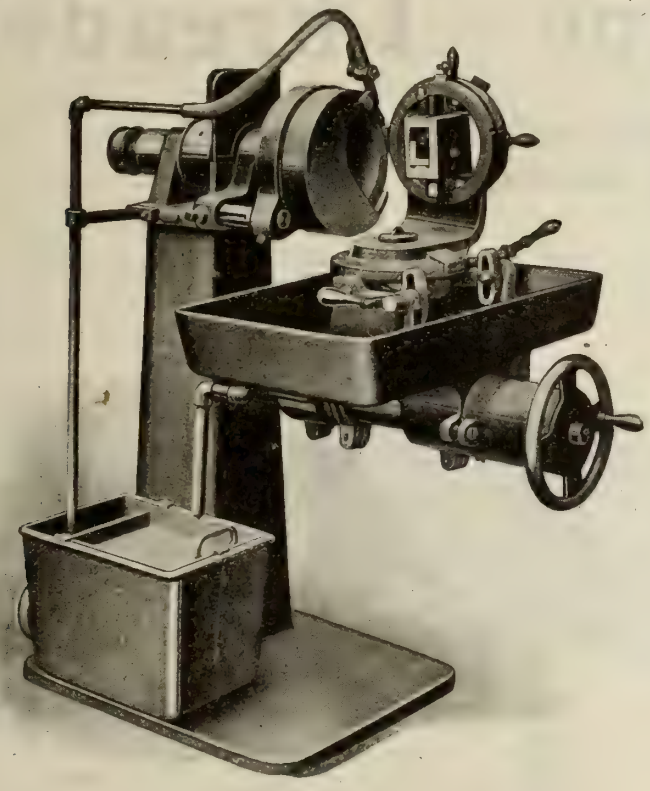
Why make your men waste their time like this?

Every time a number of workmen congregate around your old-style Tool Grinders, each waiting his turn, your production suffers accordingly.

Why not install a Gisholt Universal Tool Grinder in a conveniently located tool room and let a boy or older man grind all the tools for your entire plant?

It is the modern way; the economical way; the efficient way.

It enables you to get full working time on every lathe, planer, shaper, boring mill, screw machine and turret lathe.



The Gisholt Tool Grinder

—Means no lost time for machines and operators while tools are being forged and ground.

—Insures increased production by removing the excuse for workmen to use dull tools.

—Makes your investment in machinery more productive.

—Reduces your investment in high-priced tool steel.

—Makes tool grinding a systematic factor in production instead of a hap-hazard drawback to it.

—Requires no expert operator, thus permitting perfect grinding to be done by a boy.

It will pay you well to get the full details of the Gisholt Tool Grinder. We have some interesting literature which we will gladly send on request.

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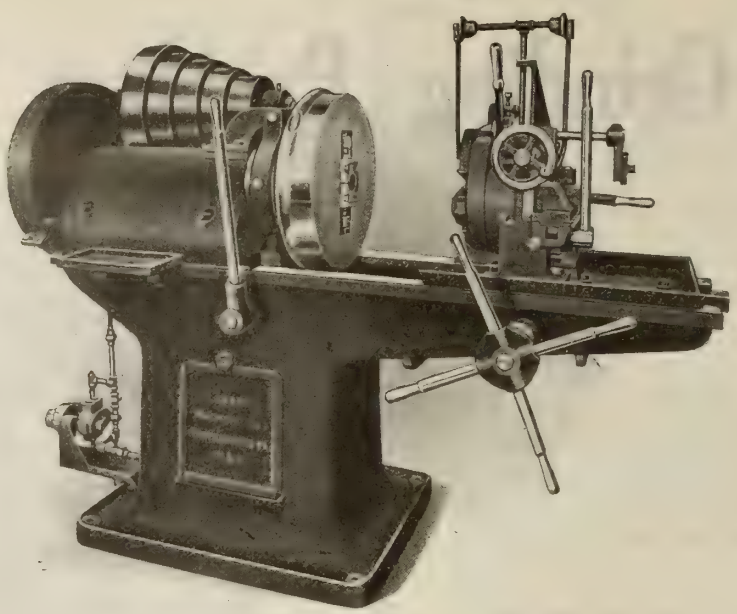

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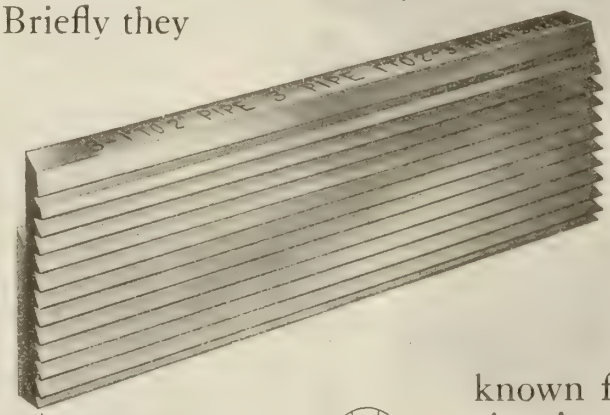

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Foundations for Various Types of Planers

Proper Foundations For Accurate Work—Various Designs For Varying Types of Machines—The Use of Levelling Blocks is Essential to Proper Work—Concrete Best For Foundations

By TERRELL CROFT

IT IS essential for accurate work that an adequate foundation be provided under every planer. This statement, in general, holds not only for planers but for nearly all other machine tools, particularly the larger ones. Often a tool is held responsible for inaccurate production when actually the tool itself is capable of doing the work, but the foundation on which it rests or the method adopted in setting it up is the cause of the difficulty. Although it does not appear to be well recognized, it is a well-established fact that foundations supporting a planer and the accuracy of leveling and alignment of its bed are as important elements in the production of good work as is the workmanship and construction of the tool itself. Planer tables are, in reality, quite sensitive, and may, with relative ease, be warped so that the close machining of metal held on them is impossible. It follows that the practice of using a planer table as a plane surface upon which to hammer things in order to straighten them, is reprehensible. When castings are to be placed on a planer table they should never be permitted to fall on to it but should always be let down easily.

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The author desires to acknowledge the assistance rendered by Arthur Pierce, foreman of the Fulton Iron Works of Saint Louis, Missouri, in the preparation of this article. Mr. Pierce has just returned from a trip through the machine-tool-building plants in the East whereby he became acquainted with the very latest developments in planer-foundation construction. He kindly offered a number of valuable suggestions and read critically the rough draft of the manuscript.

If a Planer Bed is Not Given Adequate Support it may warp out of shape, due to its own weight, thereby the alignment of the ways will be affected and the accuracy of the product will be decreased accordingly. The concrete foundations, the installation of which is now standard practice, will, if properly designed and installed, eliminate the possibility of difficulties of this character. It is the purpose of this article to describe modern planer foundations and the method of installing planer beds on them.

The Requirements for Accurate Planer Work, in so far as the foundations are concerned, are these: (1) A planer bed should bear uniformly on the foundation and should be adequately supported by it; (2) The bed must be true and set level on the foundation and must have its centre line located at right angles to the line shaft which will drive the planer.

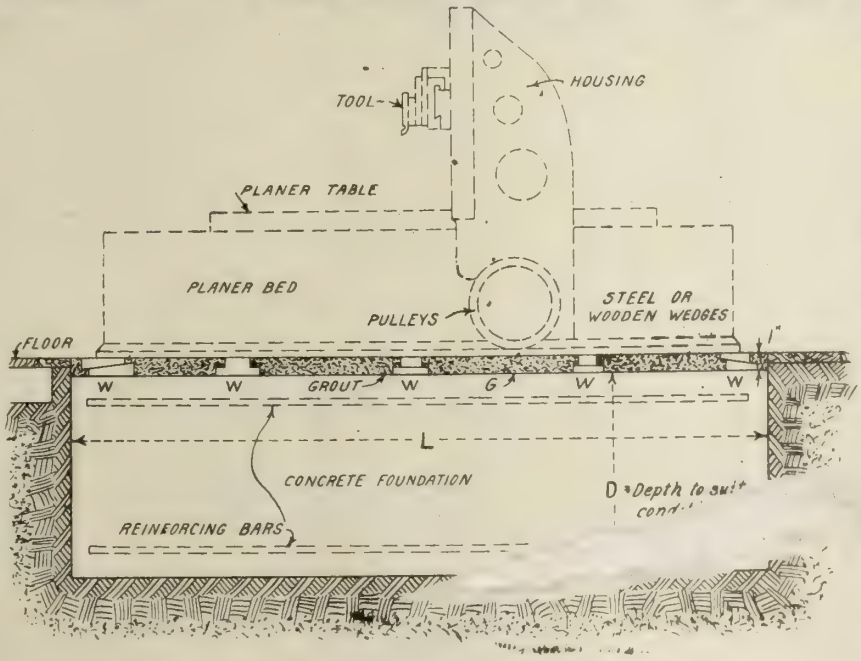


FIG. 1—GROUT BEDDING UNDER A PLANER.

Planer Tables are Now Given the Final Planing Before the Tool Leaves the Factory. It was the general practice several years ago to make no endeavor to plane the face of the table accurately until after the tool had been erected finally in the position in which it was to operate, then the final cut was taken. Experience has shown that with the modern accurate manufacturing methods it is much more satisfactory and economical to arrange to have the tool plane its own table before it leaves the factory. It is, in general, entirely unnecessary to have a modern tool plane its own table after it is set up in position, if the methods of leveling the bed (which are described below) with leveling blocks or wedges are followed. In fact, if it appears necessary to have a planer plane its own table it may be taken as an evidence of inaccurate installation.

In Installing the Planer Bed on the Foundation Its Longitudinal Centre Line must, as suggested above, lie exactly to right angles to the line shaft. This is the first consideration. If it is not satisfied, driving belt difficulties will be encountered. For the next step the bed should be leveled both longitudinally and transversely, as described in a following paragraph.

It is Often Desirable to Remove the Feet From a Planer (assuming that the planer was provided with feet, as some small planers are) before installing it on its foundation. This is particularly true if chip or shaving pockets, which will be described later, are provided. The wedges or leveling blocks used for leveling the bed should be located at the points from which the feet are removed.

Fig. 1 shows a small planer, from which the feet were removed, which has been mounted on a foundation. Usually, where the feet are taken off it is necessary to extend the foundation above the floor line for a disance equal to about the height of the feet so that the planer table will lie a sufficient distance above the floor line to insure convenience in working.

A Planer Bed Should Never be Bolted Down to Its Foundation. In the words of George Langen, works manager of the Cincinnati Planer Company, "The objection to bolting down a planer is that it forces the bed to settle with the foundation, no matter what direction it may distort and even the best of foundations are continually changing." If a planer has enough metal in it to satisfactorily perform its functions it will not shift at reversal, nor can any stress which its belts will impose upon it raise it from the floor. If anchor bolts are provided, an ignorant mechanic may endeavor to draw the planer bed into alignment by turning the nuts on these bolts. Obviously, the only effect of such a procedure is to warp the bed, which will render matters worse, rather than better. Nor should a small planer, for which it may be deemed inadvisable to provide a foundation, be bolted to a wooden floor. If it is so bolted a heavy weight placed on the floor near the tool may distort the floor boards and they will, by virtue of the bolt connection, bring down a portion of the planer bed with them. Distortion of the bed and excessive internal strains in the metal will result. It follows that if a planer bed is bolted to its foundation, and this applies particularly to the very long beds (possibly 80 feet long) which are now in use, a settling of one corner or

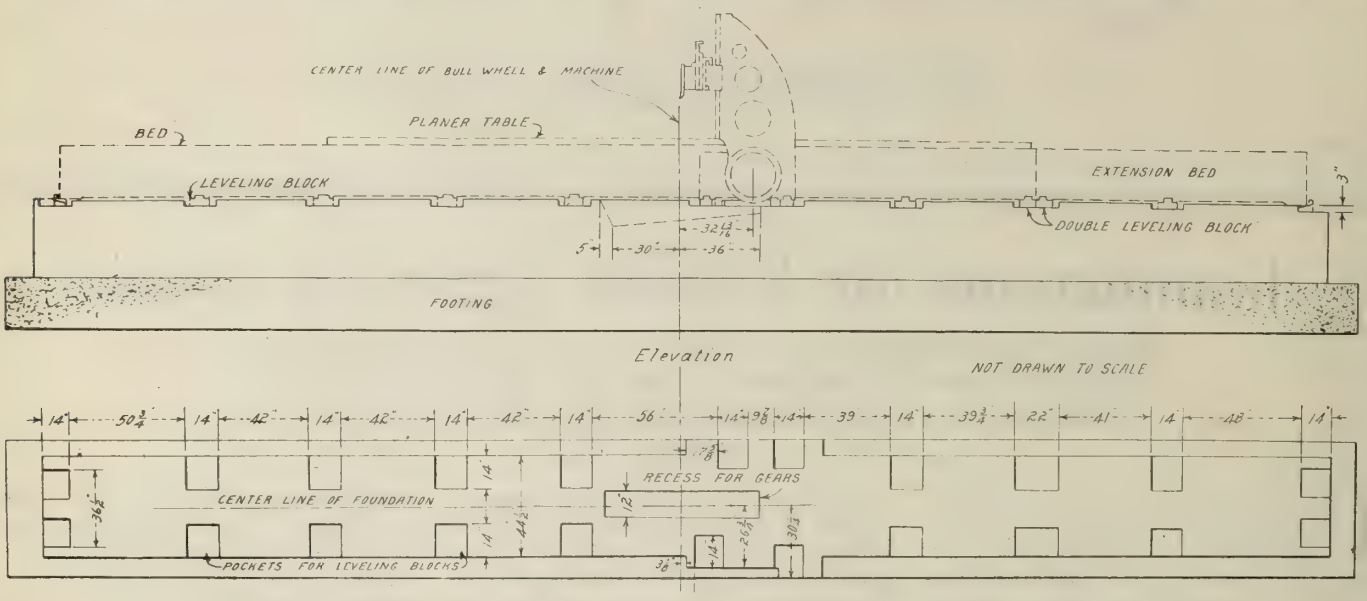


FIG. 2—FOUNDATION FOR A 42 IN. x 36 IN. x 26 FT. CINCINNATI PLANER.

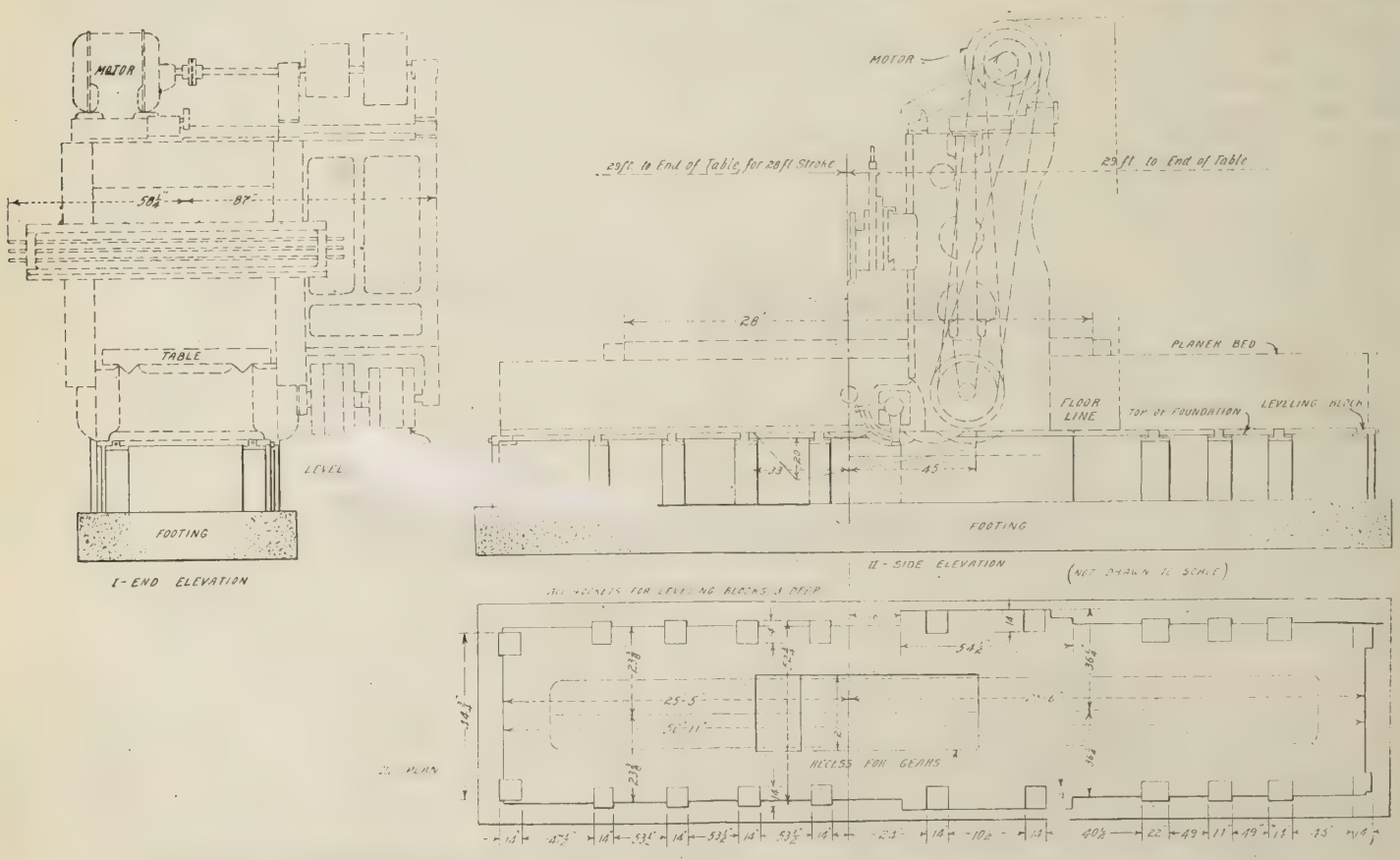


FIG. 3—FOUNDATION FOR A 60 x 48 IN. x 72 FT. DOUBLE MOTOR DRIVEN CINCINNATI PLANER

portion of the foundation will result in a corresponding distortion of the bed of the tool. At one time it was the practice to place pins, possibly ½ inch in

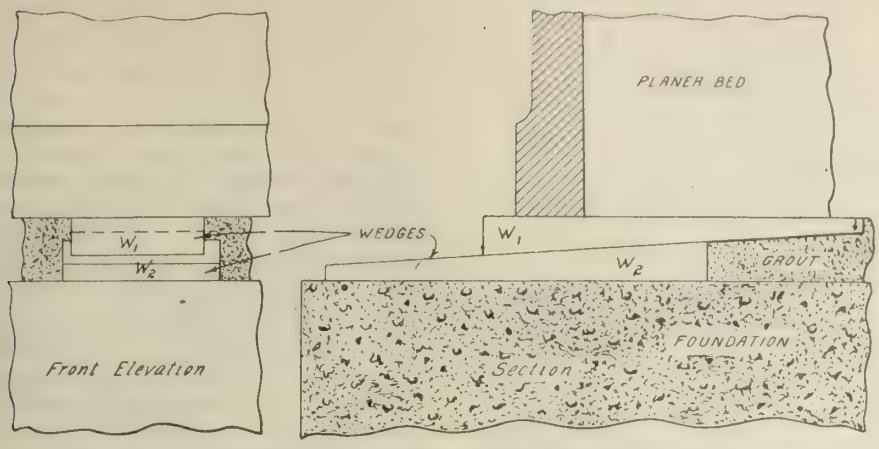


FIG. 4—HOW WEDGES ARE USED FOR LINING UP A PLANER BED PLATE.

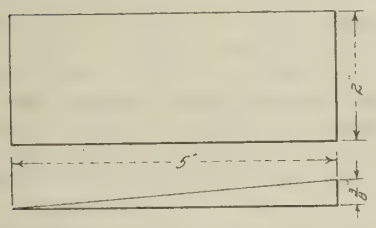


FIG. 5—WEDGE FOR LEVELLING MACHINES

diameter, and extending above the surface of the foundation 1 inch around the planer bed to prevent its being shifted during reversal or by belt pull. Such provision is now seldom, if ever made, because it is unnecessary.

Most Planer Manufacturers Furnish Foundation Plans for the Machines Which They Build. These plans, as a rule, indicate only the general proportions of a suitable foundation and the locations of the planer feet or leveling

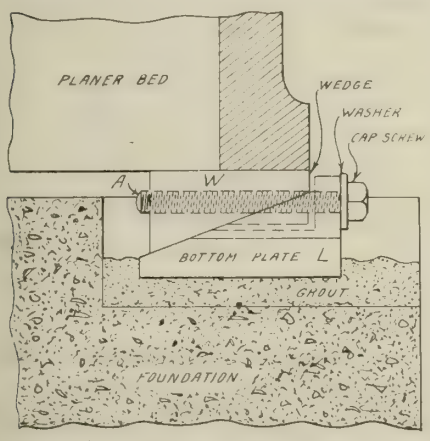


FIG. 7—SHOWING APPLICATION OF PLANER LEVELING BLOCK.

blocks. They do not, as a rule, indicate the detailed construction which should be followed. Some of the foundation plans which have been furnished by manufacturers for planers appear to be unnecessarily complicated.

In Leveling the Planer Bed the procedure to be followed will depend on whether or not the surfaces on the top of the bed are machined parallel to the ways, inasmuch as the table does not bear on any surface except those in the grooves. In any case, no attempt should be made to level the bed until either leveling wedges or leveling blocks (which will be described later) have been inserted under the bed at the proper locations. The leveling is effected by adjusting these wedges or blocks. It is not essential for concrete work that the surfaces on the top of the bed be accurately parallel with the ways. If the top surfaces are not parallel with the ways the transverse leveling may be effected by placing two cylinders, each of exactly the same diameter, in each of the V-grooves and laying the level across them. To level such a bed longitudinally the level may be placed at different locations along the length of the bed in the V-grooves. However, it is the practice of some of the planer builders to machine the surfaces on the top of the bed accurately parallel with the ways. If this procedure has been followed the transverse leveling can be done by laying the level across these surfaces and the longitudinal leveling by placing the level along at different locations on the surfaces. For a medium or large-sized planer, it is necessary, in leveling it longitudinally, to place the level at a number of different locations along its length on the top surface of the bed. Any adjustments that are necessary may be made by manipulating the wedges or the leveling blocks if such are used. Accurate longitudinal leveling is not so essential for a small planer, particularly one which rests on only two legs, one at either end, because, even if the bed is not exactly level longitudinally, the accuracy of the work will not be affected appreciably provided the bed is level transversely.

The Bed of a Medium or Large-Sized Planer is usually first left a trifle high at a location under the point where the tool will cut. The reason for this is that the pressure of the tool and the mass of the housings tend to make the bed low at this location. After the housings have been bolted on, the final adjustments may be made.

The Spacing of the Leveling Wedges or Leveling Blocks under a planer bed is determined by the size of the planer. Figs. 2 and 3 indicate the recommendations as to leveling-block spacings made by the Cincinnati Planer Company for two of its planers. In general the blocks or wedges should be located approximately 4 ft. apart along each side of the bed.

In Setting Leveling Blocks or Wedges they should be placed at the points where the wedges were set by the machine tool manufacturer when the planer bed was finally lined up and scraped in the factory. Some manufacturers make a practice of marking each bed with an X at each point where a leveling block or wedge was located when the bed was scraped in the shop. If a foundation drawing is furnished for the planer it will, as suggested above, indicate the

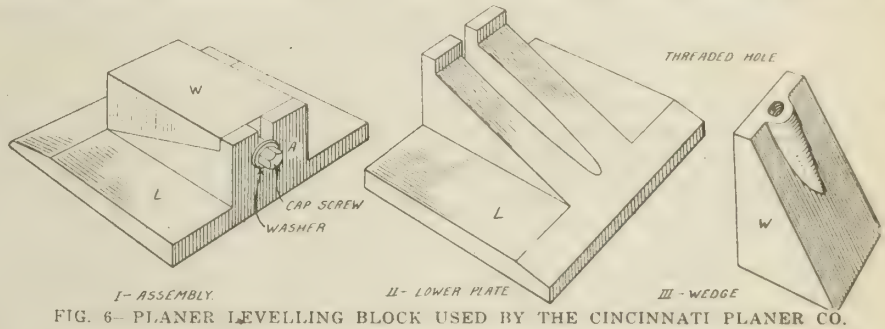


FIG. 6—PLANER LEVELLING BLOCK USED BY THE CINCINNATI PLANER CO.

proper locations for the leveling blocks. If the leveling blocks are not placed at the points where blocks were located when the bed was scraped in the factory it is obvious that, due to deflection, the ways will not be exactly level.

Wedges Grouted in a Foundation Top Are Found Satisfactory for Leveling Small and Medium-Sized Planers for Ordinary Commercial Manufacturing. On the other hand, for accurate machine tool work it appears that leveling blocks are always desirable under the planer bed. Figs. 1 and 4 illustrate the method of grouting metal wedges under a bed. While iron wedges are preferable, wooden ones—pieces of shingles—may be used in an emergency. Wedges are first placed at the proper locations on the foundation and then the bed is mounted on them and leveled by adjusting the wedges. There should be a space of ⅝ to 1 inch between the top of the foundation and the bottom of the planer bed. Then into this space the grout is poured so that it rises within the bed and supports the planer along its entire edge. A dam, arranged by

assembling boards and sticks around the outside of the planer bed is provided to confine the grout. After the grout has partially set, the surplus extending outside the lower edge of the bed can be cut away with a trowel. While this method of using wedges and grouting may, as suggested above, be satisfactory for the conditions specified above, it is not recommended for important work, because it is, all things considered, uneconomical.

A Grout in Which Leveling Wedges or Blocks May be Set consists of one part sharp sand and one part cement by volume, first sifted and thoroughly mixed and then made to the consistency of thick cream by adding water.

Proportions for Iron Wedges may be those specified in Fig. 5 which have proven satisfactory in practice. The pitch of such a wedge should not be too great—that is, the wedge should not be too "steep," because if it is the jar and vibration around an ordinary machine shop will often cause the wedges to slip on one another after the bed has been leveled. This shaking down may occur before the bed has been grouted, in which case difficulties due to inaccurate work will ultimately result.

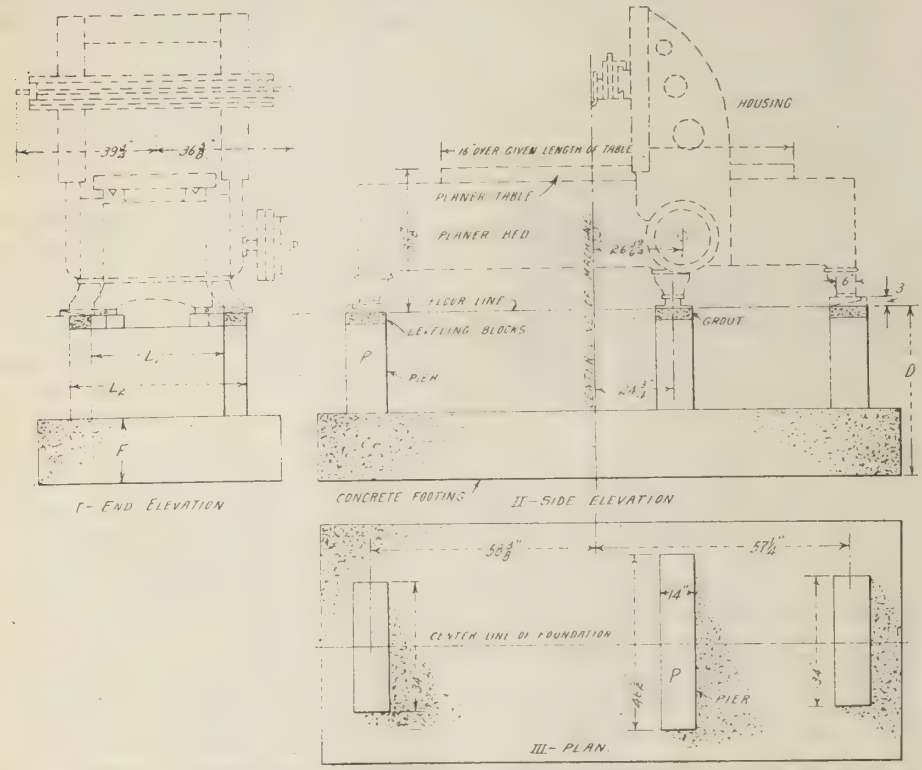


FIG. 8—TYPICAL FOUNDATION PLAN FOR A SMALL PLANER (THIS SHOWS THE PLAN FOR A 28 IN. x 28 IN. x 6 FT. PLANER.

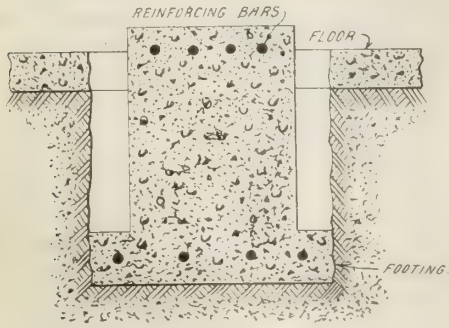


FIG. 9—TRANSVERSE SECTION OF A PLANER FOUNDATION SHOWING STEEL REINFORCING RODS

Leveling Blocks for leveling planer beds are of the general construction suggested in Fig. 6, which shows a block manufactured and recommended by a planer company. The bottom plate of the lower plate, L, has a relatively great area so that it will provide an ample bearing surface and set solidly on the grout on the top of the foundation. The upper plate or wedge, W, provides an ample bearing under the planer leg or bed. The cap screw, A, permits of rapid or fine adjustment. Fig. 7 indicates the method of its application. It will be noted that where these blocks are used the planer bed does not touch the foundation but rests entirely on the leveling blocks. There are two decided advantages which the leveling blocks have over the primitive method of leveling with wedges: (1) When the blocks are used the planer bed may be easily re-leveled at any time, if such procedure becomes necessary, due to the settling of part of the foundation or to any other cause, and (2) A planer bed may be leveled much more rapidly and accurately where the leveling blocks are used. As indicated in Figs. 2, 3, and 7, leveling blocks are, where the bed has no feet, located under it at suitable points. Where the bed has feet, as in Fig. 8, one block is arranged under each foot. It is evident that by operating the adjusting screw (A. Figs. 6 and 7) very fine graduations of level can be obtained.

In Setting Leveling Blocks (Fig. 7) the block is arranged in a grout bedding in a recess (Figs. 2 and 3) provided for it in the top of the foundation. Blocks are set in the grout so that the top faces of all the wedges are approximately in the same plane. Then, after the planer bed has been set on the wedges, the final adjustments are made by turning the screws in the leveling blocks until the planer bed is, as suggested above, level in all directions. Graphite is used for lubricating the faces of the wedge and bottom plate, which slide in contact.

Leveling Blocks are Almost Essential Where a Very Accurate Product is to be Manufactured, that is, for the building of machine tools and similar work where the accuracy must be within 0.001 per ft. length. Foundations may settle individually, as outlined above, so that leveling blocks are essential to maintain the planer beds permanently in accurate adjustment. Leveling blocks are almost imperative for very long planer beds, some of which extend for 80 feet, because a foundation of this length, if constructed with a reasonable regard for cost, can hardly be built so that it will not deflect or settle to some extent.

The Economy of an Adequate Foundation Provided With Leveling Blocks is unquestioned where accurate output is imperative. It is, of course, somewhat cheaper in first cost to install a foundation of small volume and to use iron wedges instead of leveling blocks, but if the lost time that will be involved, due to inability to work close to dimensions, is considered, the investment for suitable foundation equipment will be found more than justified.

Note.—The results of a test made on a planer by the Norton Grinding Company of Worcester, Mass., after the tool had been used for a year, give an indication of the effectiveness of adequate foundations. The planer was an 18 in. x 36 in. x 18 ft. machine. It was tested with its table in place on the bed with a 15 ft. straight-edge. Under this straight-edge, tissue paper could be held at any three points on the table, which indicated that the table had maintained its level both longitudinally and transversely.

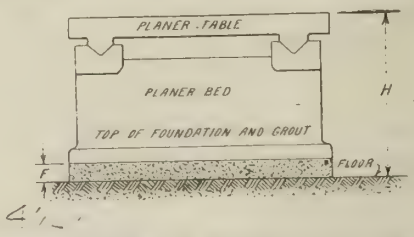


FIG. 10—HEIGHT OF PLANER TABLE ABOVE

Concrete is the Standard Material for Planer Foundations because usually, all things considered, it is the most economical. Masonry, that is, brick and stone, are seldom, if ever, used now. Another advantage of concrete is that it can be, as described below, reinforced with steel. Masonry cannot be so reinforced effectively.

Simplicity of Design is Desirable for the Foundations because a simple foundation can, in most cases, be made to sustain its load just as well as will a

complicated one. Straight sides should always be used in preference to inclined ones so that the cost of forms may be made a minimum. Bevels and mitres in forms are expensive, and; in many cases, wholly unnecessary. It does not appear to be generally recognized that it is often cheaper to use a little more

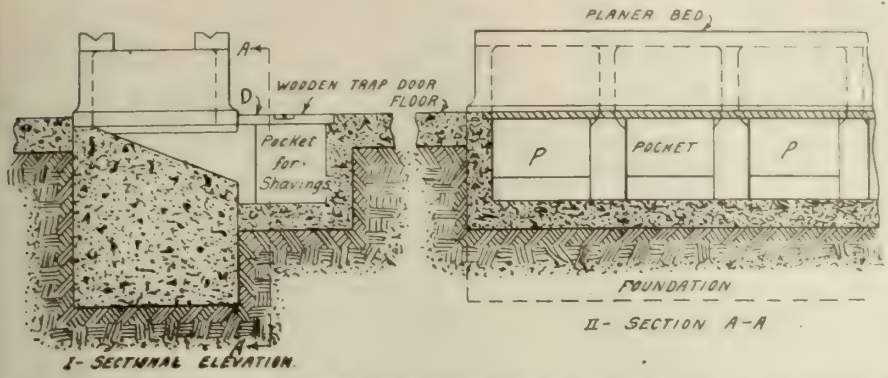


FIG. 11 SHOWING DETAILS OF A PLANER FOUNDATION WITH POCKETS FOR SHAVINGS.

concrete in a foundation than to construct a complicated form. Regular outlines, without offsets or recesses, should, therefore, be used wherever possible. Figs. 1, 2, and 8 show examples of simple, sensible planer foundations.

A Foundation for a Small Planer is shown in Fig. 1. This foundation is simply a rectangular prism of concrete reinforced with steel. Wedges instead of leveling blocks are shown on the top to support the planer bed, although, as outlined above, leveling blocks are usually preferable. Where the earth is self-sustaining, a foundation like that of Fig. 1 can (as is described below) be built without any forms by merely filling with concrete a rectangular excavation in the earth. Where the earth is not self-sustaining and forms are necessary, it is

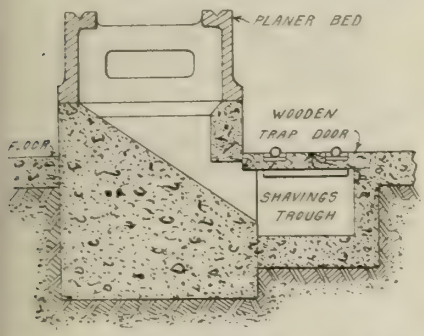


FIG. 13—ARRANGEMENT OF POCKET WHEN BASE OF BED IS RAISED ABOVE THE FLOOR

ordinarily desirable to provide a footing (Fig. 3) upon which the forms can be erected under every foundation.

A Foundation for a Planer With Legs is detailed in Fig. 8. In constructing this the hole was excavated and the bottom filled with a slab of concrete which provides the footing and which distributes the weight over a wide area so that settling will be a minimum. Then on this footing the forms were erected for the piers which extended almost to the floor level. On the top of each pier the leveling blocks were set in grout, as indicated in the diagram.

A Foundation for a Medium Length Planer With Pilasters for the Leveling Blocks is diagrammed in Fig. 3. Foundations of this type have been constructed in certain shops. The provision of the pilasters, however, requires expensive form work, the excess cost of which does not appear to be justified. Apparently the reason why the foundations have been constructed in this manner is so that the foundation will at no point extend beyond the outline of the planer bed except at the location where the leveling blocks are to be placed. The appearance of the resulting foundation is very satisfactory, but it hardly seems that it would earn greater dividends than one built in accordance with the simpler scheme shown in Fig. 2.

A Straight-Sided Foundation for a Long Planer is delineated in Fig. 2. In this design simplicity is the keynote. The cost of the forms and of the foundation itself will be a minimum and at the same time the structure has an attractive and business-like appearance. Note that offsets, pockets, angles and inclined surfaces have been avoided in so far as possible.

Steel Reinforcing may often be used effectively as suggested in Fig. 9. There may always be some tendency for long narrow foundations such as those that are necessary for long planer beds, to deflect in about the same way that a beam deflects. This is particularly true if the soil at the middle or the ends of the foundation yields. Just as a concrete beam may be reinforced with steel rods so can one of these foundations be reinforced as indicated in the diagram. With a beam, however, the load is always imposed from the top, while the ends of the beam are supported. Hence, the top of a beam is always in compression while the bottom is in tension, but with a planer foundation either the top or the bottom may be in tension. If the earth under the centre of the foundation settles the bottom of the beam will be in tension, whereas if the earth at the ends of the foundation settles the top will be in tension. For these reasons it is well to locate reinforcing steel rods both near the top and near the bottom of the foundation. For reinforcing steel pieces of light rails, pipe or rods—scrap material is entirely satisfactory—can be utilized.

The Height of the Planer Table Above the Floor is a thing which must be determined on the basis of the work which the planer is to do and the size of the planer. The table of a large planer should not be as far from the floor as that of a small one because the machinist has little difficulty in seeing the top of any piece of work on a small planer but, on a large planer, where the castings being machined may be a number of feet high, it is desirable to arrange the foundation so that the planer table will not be too far from the floor. By following this procedure the use of a step-ladder by the machinist so that he may see the top of his work may, in many cases, be avoided. No rules which apply generally can be given. It is, however, usually considered good practice to locate the planer tables about the distance from the floor shown in Fig. 10.

The Proper Depth for Planer Foundations is always a thing which must be determined by local conditions. As a general rule, however, it is not necessary or desirable to make any planer foundation deeper than about 5 feet if good solid "bottom" is found at this depth. On the other hand any foundation should, unless its footing is extended over a relatively large area, extend down

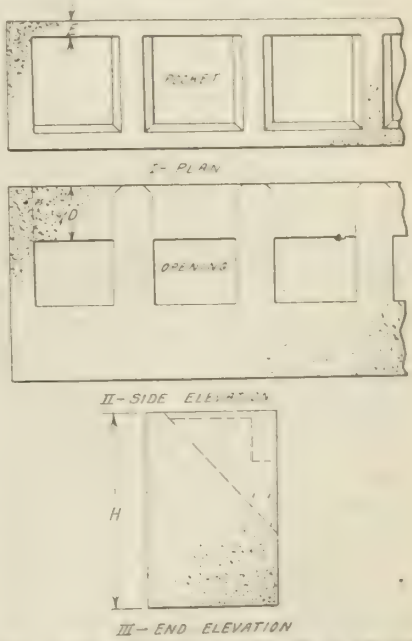


FIG. 12—SIMPLIFIED VIEWS OF A POCKETED FOUNDATION WHEN THE BASE OF BED LIES BELOW THE FLOOR LINE.

to "good bottom." The foundation for a small planer need not, in good soil, be be deeper than a couple of feet. In filled ground trouble is liable to be encountered unless the above precautions are rigidly observed.

The Area of Base Necessary for a Planer Foundation depends upon the character of the soil. In good solid earth it appears that it is seldom, if ever, necessary to have the area of base of the foundation greater than the area of the base of the planer bed. However, spread footings are often used merely because of the convenience in form construction which they afford. That is, under such conditions a foundation like that of Fig. 1 with perfectly straight sides will suffice. Where it is deemed

desirable because of poor soil to increase the area of base, this can usually be best accomplished by putting a spread footing under the foundation, as suggested in Fig. 2.

Shaving or Chip Pockets* May be Provided in Planer Foundations as suggested in Figs. 11, 12, 13 and 14. Such pockets provide a recess into which the chips brushed from the planer table may fall and from which they can be shoveled without sprinkling them over the V ways in the planer bed. Where the planer foundation does not extend above the surface of the floor the construction detailed in Figs. 11 and 12 may be

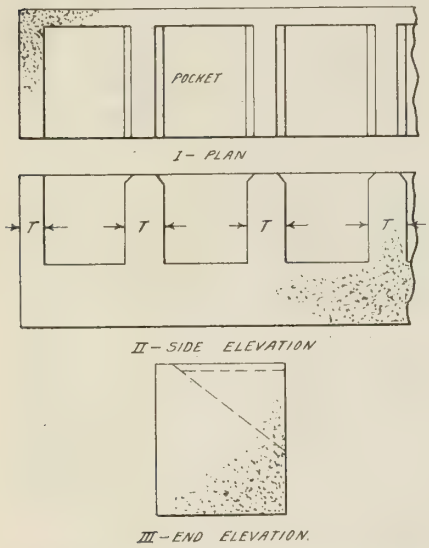


FIG. 14—SIMPLIFIED VIEW OF A POCKETED FOUNDATION FOR A PLANER WHEN THE BASE LIES ABOVE THE FLOOR LINE.

adopted. There is a pocket P, with an inclined face under each opening in the planer bed. Along the side of the bed a trough W extends. The chips drop from the pocket into the trough. A wooden trap door D is provided over the trough. At the end of each day's work the door, D, is taken up and the chips which have been accumulated are shoveled out. Such provision will more than pay for itself for two reasons. The first is that the ways of the planer are protected from the sprinkling of chips which might occur if it was necessary to remove the chips from the recesses in the bed with a shovel. Second, the chips can be removed from the trough W, at almost any time, even when the planer is running, so that overtime need not necessarily be involved. Where the planer foundation extends above the surface of the floor the construction outlined in Figs. 13 and 14 may be used. With this construction there is no possibility of tools or small parts which might be lying on the floor being kicked into the shavings trough.

*This method of providing chip pockets in planer foundations applies particularly where the table has the stop-pin holes and the bolt holes passing entirely through it so as to permit the chips to fall through the table into the bed. The tables of some planers are so designed the chips may pass through the upper part and be taken out of the side of the bed, in which case the bottom of the bed may have no holes through it. With such construction, chip pockets are, obviously, unnecessary.

A Foundation May be Built Without Forms in soil which is self-supporting. In such a soil it is merely necessary to excavate the hole of the size desired and fill it with concrete as suggested in Fig. 15. If a spread footing is necessary this can be made by under-cutting with a shovel around the bottom corner of the excavation as shown at A, B, C.. Where the soil is not stiff enough to support itself, forms for the foundation are necessary.

Methods of Saving Concrete in Planer Foundations are shown in Figs. 15 and 16, in both of which illustrations the foundation is made hollow so that the total volume of concrete required is very much less than would otherwise be necessary. In Fig. 15 old barrels, laid end to end, are placed in the foundation providing the form for a sort of double arch. The barrels are, of course, buried and left in the concrete. In Fig. 16 a form, which may remain in the concrete, is erected to provide the hollow space or tunnel within the structure. Another scehme for saving conrcete which may often be utilized effectively is to fill the interior of a foundation with large boulders or rocks. If such boulders are carefully placed so that there is concrete between them the resulting construction will be about as effective as if the foundation were of solid concrete.

Forms for Planer Foundations may be constructed in accordance with the general plan outlined in Fig. 16. The hole was first excavated and then the concrete for the footing, M, N, O, P, is poured. On this footing the forms are erected. The vertical pieces, P and P may be held by stakes driven into the earth and by blocks, B, wedged in between them and the vertical surfaces of the excavation. The form boards are then nailed to the verticals as shown. The form for the hollow centre Q, R, T, U, is, if such is to be used, now erected. Finally the concrete is dumped into the remaining space.

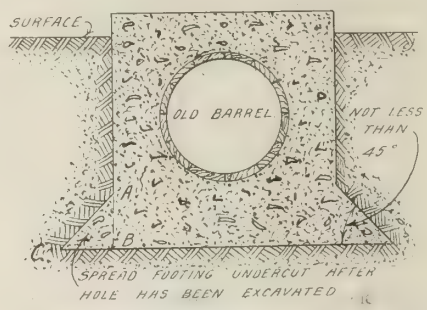


FIG. 15 SHOWING HOW TO SAVE CONCRETE WITH OLD BARRELS AND HOW TO UNDERCUT FOR A SPREAD FOOTING.

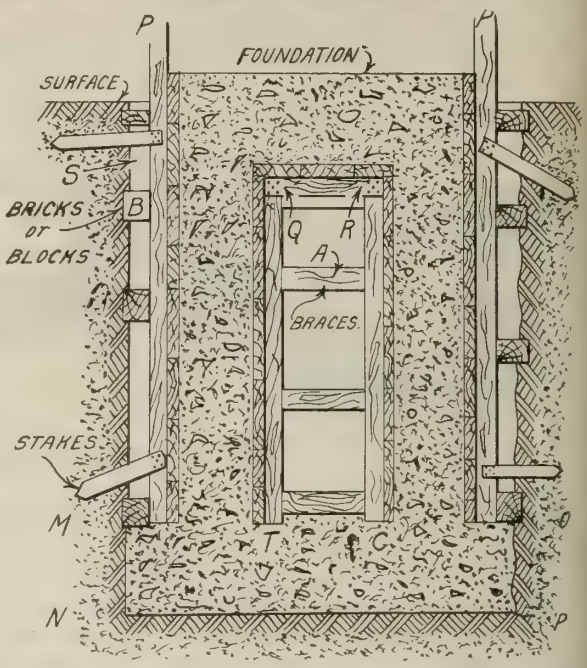


FIG. 16—FORM CONSTRUCTION FOR A PLANER FOUNDATION OF CONSIDERABLE DEPTH SHOWING METHOD OF SAVING CONCRETE BY MAKING FOUNDATION HOLLOW

EXPERT KNOWLEDGE

By A. L. Haas

Knowledge is commonly supposed to be power and for this reason should carry payment.

A story which enforces the point at issue was related to the writer by a friend whose fund of mechanical experience is extensive and peculiar.

A colliery of an out-of-date type had as a part of its equipment an antique beam engine. One day this pulled up and in spite of all coaxing refused duty. The former engineer living retired in the vicinity was sent for in the emergency; he disappeared into the cloud of steam and inside half an hour the accustomed beat of the engine again became audible. "Send in your bill, Jack," was the relieved manager's parting salutation.

When tendered the bill read:—

To starting up engine...£5 5 0

The manager objected to the amount when he ran across the old man the next day. "Ten bob would have been ample for the time you put in," was the manner of his protest. "Send in another bill."

The second claim read thus:—

To time starting up engine..£0 5 0
Knowing how £5 0 0

Total £5 5 0

The bill was paid.

Washington, D.C.—It is now definitely stated by the U. S. Government, through Bainbridge Colby of the Shipping Board, that the proposed transfer to a British Syndicate, of ships under British registry, will not be allowed. The Government have offered to take these vessels over on the same terms as offered by the British Syndicate. The vessels involved aggregate 730,000 gross tons, including some of the finest transatlantic liners.

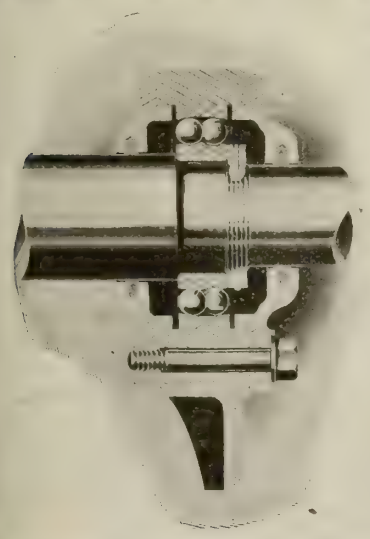
The Use of Ball Bearings for Electrical Machinery

Advantages of Ball Bearings—Enable the Builder to Use a Smaller Air Gap—Better Commutation Due to Greater Precision —Enhanced Efficiency Over Plain Bearing—Dimensions Smaller

By H. M. TRUMBULL

INDUSTRIAL operations are carried on for profit, and profit depends upon the difference between selling price and cost. This difference, due to the events of the past few years, has been steadily decreasing—especially in the manufacture of electrical machinery. For, on the one hand, the cost of all raw material has been advancing, as has also the cost of labor and the expense of marketing the product; on the other hand the manufacturers of electrical machinery, because of keen competition in this line have not deemed it expedient to advance their selling prices in proportion to the increasing costs. The service rendered by electrical machinery produced by the various manufacturers is so nearly identical that no one company has considered it wise to take the initiative in marked advance of selling price. Such conditions might soon prove disastrous and so each manufacturer has been endeavoring to incorporate in his design some material improvement which will net the customer a present and ultimate economy and induce him to pay an increased first cost.

Almost simultaneously many of the manufacturers have answered this question by incorporating ball bearings in the design of their standard equipment. No other single improvement has been made in the last five years which has increased the ruggedness and economy of motors as much as ball bearings. This improvement has proven to be a sales advantage and ball-bearing equipment, because of its strong sales appeal, puts motor selling on a more profitable plane.



MOUNTING ARRANGEMENT WITH BALL BEARING ON MOTOR SHAFT.

For a number of years the desirability of using ball bearings on electrical machinery has been the subject of discussion by engineering societies both in this country and in Europe, but now this question has been taken out of the realm of discussion and made a cold dollars-and-cents proposition.

Not only has the incorporation of ball bearings in motors and generators lessened the selling expense for the manufacturer and allowed him to charge a higher price, but it has also offered such economies to the user of these machines that the higher initial cost has been much over-balanced and additional profits made possible. In fact, progressive mill owners, mine superintendents and shop managers all over the country, who are facing the same problems of advanced costs of materials and labor, are forced to introduce better machinery and to grasp every opportunity for completing a manufacturing operation in less time and at a decreased expense, and so they are specifying ball-bearing equipment.

In order to obtain an ideal of the advantages of the application of ball bearings to electrical machinery, a series of questions was recently submitted to motor-manufacturing engineers and users of ball bearings throughout the country. A careful analysis of the replies, giving the tests and experience of motor designers and users shows the following advantages in favor of ball bearings.

Maintained Air Gap

Among the principal advantages of ball bearings on motors are their precision and freedom from wear. The bearing adjustment remaining constant keeps the rotor in the center of the magnetic field. This permits the motor manufacturer to employ air gaps with clearances so slight that they could not be considered on motors having any other type of bearing. On induction motors a close air gap is of vital importance in the improvement of the machine efficiency and the power-factor.

Chief among the difficulties with plain bearings is the fact that after a period of service the bearings wear down to an amount varying with the load and service conditions. If this wear continues it will finally permit the armature to touch the pole pieces with resulting trouble—perhaps a stripped armature.

In a ball bearing, hardened steel balls roll on hardened steel bearing races, thus rubbing friction is practically eliminated and accuracy is maintained.

On axle-driven generators used for railway car lighting, the bearings must maintain the air gap or a stripped armature results. Ball bearings have replaced plain bearings for this service almost entirely because of the greater dependability attained. Records of 200,000 car-miles, where ball-bearings are used, have become common in spite of the frequently excessive tension of the belt. The shock and distorting action on the shaft due to crossovers, switch frogs and uneven track, the snap of the generator belt when flying ballast is picked up and passes between the belt and pulley, all deflect the armature shaft. It is found that self-aligning ball bearings accept these shaft deflections without binding or wear.

DIEHL TYPE K ADJUSTABLE SPEED INTERPOLE MOTOR FOR OPERATING STEERING GEAR ON SUBMARINES.

Improved Commutation

On direct-current machines, the fact that ball-bearing heads are sealed so as to prevent the escape of lubricant keeps the commutator clean. Commutators are thus protected against a conducting "slop" of dust and oil, and good commutation is maintained.

Precision and durability of bearing setting also insure better accommodation.

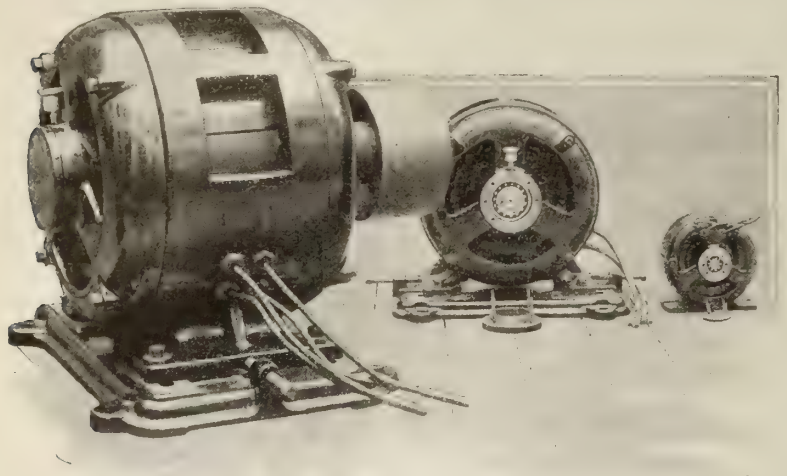
Freedom from sparks from the commutator in flour mills, in coal mines, in textile mills, in woodworking plants, or wherever there is combustible dust, reduces the possible danger of ignition or explosion, thereby materially decreasing the fire and accident hazard.

Comparative Frequency

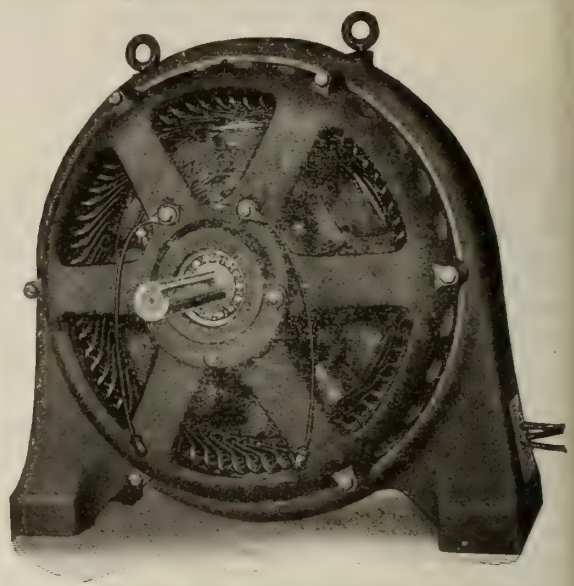
On motors in which the shaft is subject principally to rotating action (torque), bearing friction is a very small percentage of the motor losses. This is the case in direct-coupled units, centrifugal pumps, motor-generator sets, etc. The bearings carry but little, if anything, in excess of the weight of the rotor; therefore pressure between shaft and

bearing lining is inconsiderable and bearing friction is a minimum.

Where the motor shaft is subject to bending action, however, bearing friction becomes an important consideration. This is the case with belt and gear-drive motors. The bearings are subject to severe bending, pounding or shock strains, especially at the driving end. Ball bearings in these cases show a decided saving over plain bearings. This is due to the fact that in ball bearings the friction is practically constant over a wide range of pressures, and because rolling is substituted for the rubbing action of plain bearings.



ROBBINS & MEYERS CO. THE END CAPS OF THE TWO RIGHT HAND MOTORS ARE REMOVED TO SHOW BEARINGS



FAIRBANKS-MORSE MOTOR EQUIPPED WITH BALL BEARINGS.

Compactness

Compactness is required in conditions usually found in general industrial applications for induction and direct-current motors. To get this feature of compactness, motor manufacturers develop the greatest possible horsepower from a given size of motor frame. This reduced size per horsepower capacity gives the greatest driving power in limited space conditions.

The length of the motor bearings affects the question of compactness to an important degree.

Babbitt bearings are usually designed with the box length two and one-half to three times the diameter of the shaft which they support. Contrasted with this, the length of ball bearings along the shaft usually is not over one-third of the shaft diameter. Surrounding the ball bearing is the lubricating chamber, which at its outside limits is one-half to one-third shorter along the shaft than the plain bearing for the same motor, with the result that the over-all length of motors can be reduced 10 to 27 per cent. by the employment of ball bearings.

Where a consideration of aisle room, floor space, machine arrangement, etc., is necessary, a ball-bearing motor goes a long way towards solving the problem, as shown in the following table:

PLAIN DIRECT-CURRENT MOTORS.

Size of Motor.	—Motor Length Over All— Sleeve-Bearing Motor. Inches.	Ball-bearing Motor. Inches.	Reduction in Length. Per Cent.
5	26 1/8	23	12
6	26 7/8	24 1/4	9.8
7	31 11/16	26	18
8	35 1/2	29 3/4	16.2
9	38 7/8	32 1/8	17.4
10	41 9/16	34 1/4	17.6
11	45 7/8	37 7/16	18.4
12	49 7/8	38 3/4	22.4

INTERPOLE MOTORS.

Frame Size.	—Motor Length Over All— Ring-oiler Bearing Motor. Inches.	Ball-bearing Motor. Inches.	Reduction in Length. Per Cent.
1/2	18 7/8	16 1/4	13.9
1	20 15/16	18	14
2	23 7/16	19 7/16	17
3	25 1/8	19 5/8	21.8
5	28 1/8	22 1/8	21.2
7 1/2	33	25 9/16	22.6
10	37	28 3/4	22.3
15	43 1/8	33 1/4	22.9
20	45 1/2	33 3/16	27.1
25	45 5/8	37 3/4	17.3
30	51 3/8	38 1/16	26
40	53 3/16	41 3/8	22.2
50	57 1/8	42 13/16	25

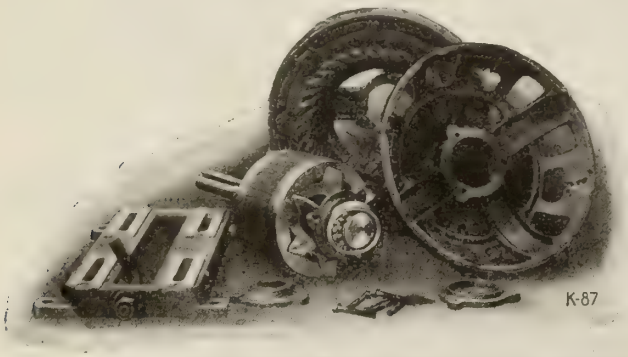
Simplicity and Cleanliness

The use of ball bearings reduces the head construction to its simplest terms. Instead of oil rings, chains, wicks, waste packing or other devices which are required for plain-bearing motors, ball bearings require no oiling devices other than the ball bearing itself. Ball bearings are in themselves positive self-lubricators. Instead of necessitating frequent inspection of the bearings, renewal of the lubricant and possibly occasional rebabbitting, ball-bearing motors require no attention other than periodic lubrication—the length of time between inspections being from one week to six months, depending upon the service.

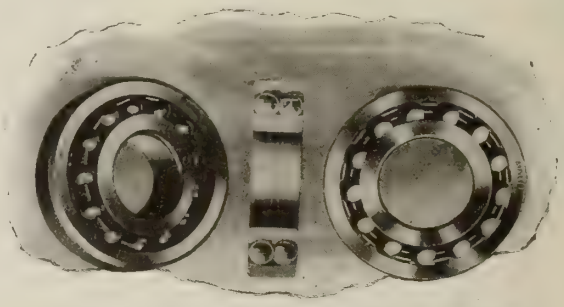
Ball-bearing motors are clean. The ball bearings are encased within bearing heads with sealing grooves on each side of the bearing, preventing the leakage of lubricant. With this protection, dripping or leaking of oil is eliminated and there is no danger of goods becoming soiled or contaminated with oil from this source.

Gear-Drive Motors

Where gear drive is used, ball bearings on electric motors are of particular advantage. In order that gears shall run smoothly and quietly, the proper distance between pinion and gear centers must be maintained. It is a fact that noisy, chattering gears may be caused by wear having taken place in the bearings supporting the gears. After long service



DISASSEMBLED VIEW OF MOTOR, SHOWING BALL BEARINGS.



SKF RADIAL BALL BEARING SHOWN IN NORMAL POSITION AND IN DEFLECTED POSITION.

with this type of drive, ball bearings show no appreciable wear and consequently the gears mesh properly, giving longer and better service.

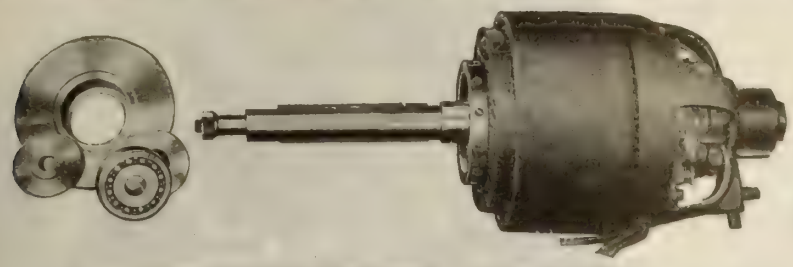
Plain bearings must be designed so that the pressures are well under the limit for the corresponding speed of the bearing. To reduce unit pressure in the bearing surfaces, it is necessary to increase the rubbing area. This may be done in either of two ways:

First, by increasing the journal length. This of course offers the disadvantage of increased floor space required by the motor, and where compactness is a desirable feature this is a serious handicap.

Second, by increasing the shaft diameter. Increasing the diameter increases in direct ratio the speed of the rubbing surfaces which should be kept as low as possible, because each increase of rubbing speed directly increases the likelihood of hot bearings. Larger shafts also mean heavier and more costly motors.

Whether, therefore, the bearing length or the shaft diameter be increased, the plain bearing is confronted with positive limitations.

Ball bearings are designed for high speed and heavy loads. The housings are short and the motor on which they are used may be made very compact. Because of the compact construction the distance between the bearing and pinion is reduced, hence the overhung load on the bearing is proportionately reduced.



BALL BEARING USED WITH VACUUM CLEANER.

Ball Bearings on Axle Generators

Ball bearings are now used almost exclusively on axle-driven generators for railways. A few years ago these machines were equipped with plain bearings. The service is so severe, however, and the attention which can be given is so small, that ball bearings have proved to be the only equipment that will "stand up."

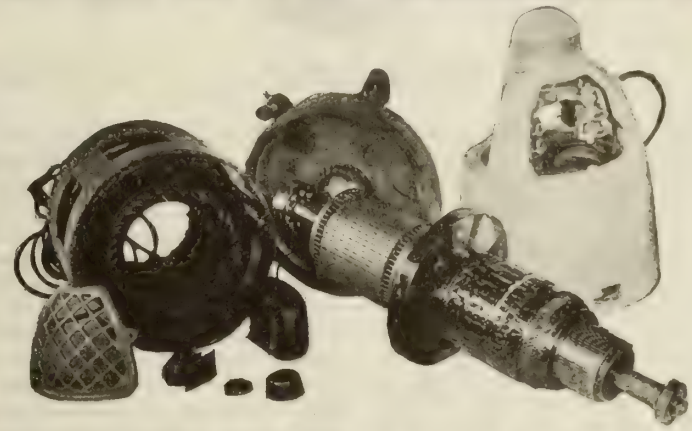
The generators are exposed to snow and ice, heat, dirt and water, the jolts and shocks of passing crossovers and switches, and the continual jar of heavy truck suspension. These conditions all play havoc with plain generator bearings.

The testimony of a superintendent of inspection of one of the largest railroads in the country is eloquent with the advantages of ball bearings on these generators. He says, "The cost of generator maintenance has been reduced—on coaches, 66 per cent.; on diners, 46 per cent. We have never had a hot bearing, have not lost any fields or armatures, the inside of the generator is dry, and we have no trouble due to grounds or short circuits." This is typical service where self-aligning ball bearings are used.

The Lubrication Problem

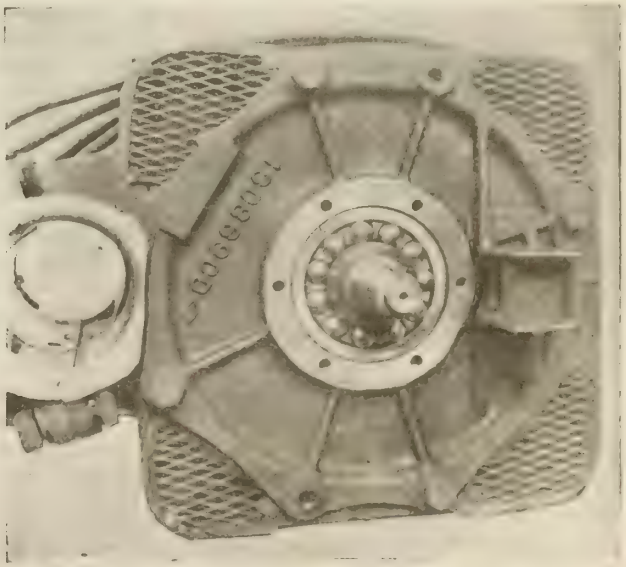
Ball bearings offer the motor user one solution of his lubrication problem. The ball bearings are contained within simply constructed bearing-head brackets with liberal lubricant chambers which are sealed on both sides and by end caps. These end caps are fitted close to the motor shaft and are practically proof against leakage of lubricant, as well as the intrusion of moisture, dust, lint, grit or other foreign substances from without.

Ball bearings are positive self-lubricators. The ball spacer or retainer is of such construction that the bearings are open at the sides, thereby giving free circulation of the lubricant in the ball



CHARGING MOTOR GENERATOR FOR STORAGE BATTERY WORK. EQUIPPED WITH BALL BEARINGS.

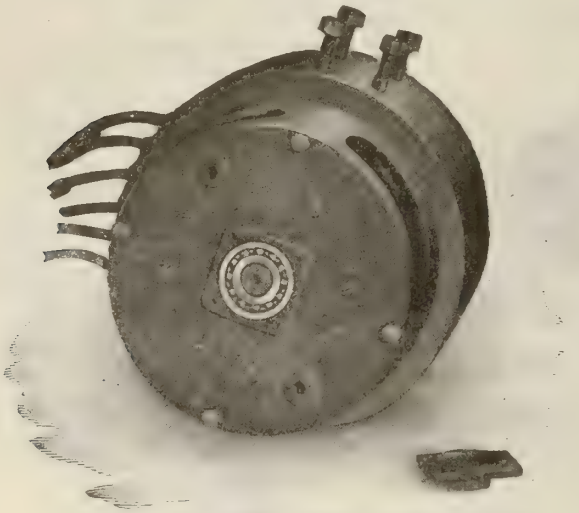
FAIRBANKS-MORSE VERTICAL BALL BEARING INDUCTION MOTOR.



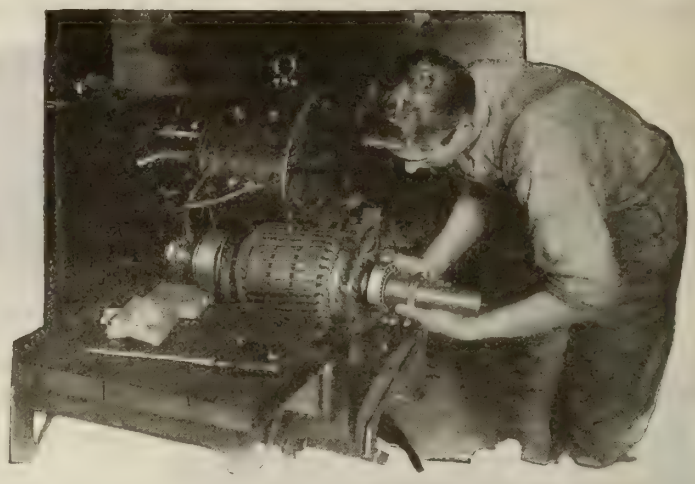
GENERAL ELECTRIC TRACTION MOTOR

paths: Oil rings, chains, or similar rotating oiling devices are done away with entirely and positive, thorough and uniform lubrication is assured.

It will be readily appreciated from the use of ball bearings on motors that:



A 24-VOLT, 40-AMPERE VEHICLE-TYPE MOTOR. MANUFACTURED BY THE DIEHL MFG. CO.



INSTALLING BALL BEARINGS ON ARMATURE SHAFT OF MOTOR. MANUFACTURED BY THE ECK DYNAMO & MOTOR CO.

1. They eliminate the frequent troublesome inspection of plain bearings—the user need not concern himself as heretofore about the possibility of oil rings sticking.

2. Motors equipped with ball bearings are free from the nuisance and dirty conditions caused by creeping oil and dust around the bearing heads. Frozen bearings due to oil or lint or draining of the oil reservoirs are practically eliminated. Security against such conditions in many instances is worth the cost of the motor and is particularly valuable in textile mills, flour mills, woodworking plants, or other paces where dripping oil adds to the fire hazard or, is ruinous to stock in process.

Briefly summarizing the economies offered by ball bearings:

(a) Smaller air gaps permissible, because ball bearings will not wear down as plain bearings do. This gives an improved power-factor for induction motors

(b) Danger of armature touching the pole pieces is eliminated.

(c) Leakage of oil is prevented. Thus oil cannot drip on to the commutator or oily dirt collect, causing flashovers.

(d) Over-all length decreased from 10 to 20 per cent, resulting in a more compact motor.

(e) Longer period between motor inspection and lubrication required—once in six months against once in two weeks with plain bearings.

(f) Fewer repairs and decreased maintenance cost.

(g) Improved motor commutation.

(h) Improved efficiency, because of reduction in bearing losses.

PRECISION TOOLS

The British Ministry of Reconstruction is hard at work on the great task of making Great Britain self-suplying in a number of important commodites which have been procured either wholly or nearly so from abroad. To deal with this duty effectively the Department has been subdivided into numerous sections, each dealing with only particular articles or groups of allied articles, and placed under the direction of an expert. One subject which is engaging attention at present is that of engineer's fine tools, which is taken to mean the various Precision tools used in engineering work. These in the past have come mainly from the United States, and to a lesser extent from Germany, and France, and they include instruments and guages measuring accurately up to ten-thousandths of an inch. The value of the imports of these goods has reached several hundred thousand pounds per annum, and as regards the majority of them, no serious attempt has yet been made to produce them in Great Britain.

It is the object of the Department to promote the home manufacture of as many of these tools as is possible by those who are already making gauges of various kinds. Some people are dubious as to the ability of this country to supply the goods at any rate, on a competitive basis. They say that among other things England lacks a supply of young mechanics thoroughy trained in carefulness and accuracy in their work, and also that to produce at competitve prices the large plant necessary could not be kept going unless a world-wide trade was done. Nevertheless the attempt is being made, and if it succeeds only partially it will have been justified. Splendid work in the making of screw gauges is being done in the engineering department of the Sheffield University, and on quite a large scale.—By M. M.

INDUSTRY IN THE UNITED STATES AND CANADA

Speaking of conditions following war contracts, a gentleman who is very closely in touch with the situation in Canada and the United States, gave his opinion as follows:

"I believe the U. S. government is in somewhat of a quandary over the situation in that country industrially. In the first place the high cost of raw material which prevails at present, and the uncertainty of many things, make the manufacturers hesitate about going ahead and putting up large stocks of anything, and even if they decided to stock up, the merchant would naturally hesitate about laying up stocks at the high figures that the manufacturers would have to sell at. The solution of the high cost problem would seem to be in reduced cost of labor, but in that connection our friend, Samuel Gompers, sounded the warning note the other day when he told the 'Bourbons of Capital' that the workmen would not be content with decreased wages and lengthened hours. I believe the hesitation of the United States in cancelling munitions contracts is caused by a reluctance to throw labor on the market in large quantities with insufficient capacity for absorbing it. The solution for the moment at least would seem to be coming from the reconstruction work that is expected in the United States and Canada from devastated European countries, and efforts are undoubtedly being made to secure some of this before the munitions contracts are entirely cancelled. A conflict between capital and labor, to say the least, would be unfortunate at present. Throwing a large amount of labor on an unprepared market could only result in lowered wages and consequent reduced costs, and while that would eventually work itself out, the result would be obtained only through intense suffering and privation on the part of many of our people. On the other hand, the demands of labor for war-time wages in a period of peace might result in the withdrawal of capital and consequent stagnation. Undoubtedly many powerful brains are at work on the problem to-day, and it is intensely interesting from all points of view."

A new high-pressure central steam supply plant is being built in New York. The steam is delivered for power purposes to office buildings and factories at 125 lb. pressure per square inch.

WELDING AND CUTTING

Notes on Regulations for Arc Welding

In a Paper Read Before the I.E.E. the Author Points Out a Number of the Precautions to be Observed in Arc Welding For the Safety of the Operator and the Effects of a Welding Load on the Supply Mains of the Power Station

By H. M. SAYERS.

ELECTRIC arc welding has recently come into use for a variety of purposes and shows promise of extensive developments. The practice at present is mainly empirical. In view of the possibilities of its application to shipbuilding, one of the Admiralty Departments has set up an Electric Welding Research Committee, including a number of unofficial members representing important interests who offered to render voluntary assistance in the development of electric welding.

One of the points which has come before the Committee is the question of establishing rules in respect of (a) safety of operators, (b) conditions of supply; and it has been thought essential to have a discussion in order to get the views of members of the Institution on these matters.

A very large and influential Research Committee has been formed in the United States. It is communicating all its proceedings and reports to the Admiralty Committee, and among them the discussions and reports on regulations.

The Admiralty Committee has already drawn up a skeleton form of regulations based on experience in Great Britain and the communications from the United States, which are set out below.

This paper is therefore brought forward to introduce a discussion, and to set out the points as they at present appear to arise in practice in Great Britain.

Welding Regulations

It may be said that arc welding has been in use for over 20 years, but its extension to heavy work and the use of metallic electrodes are of more recent date.

Necessary regulations are conveniently divided into two heads:—

(1) Regulations affecting the safety of operators and workers in their vicinity.

(2) Regulations affecting the reliability and regulations of general supply systems.

Taking the first heading, there are two main points:—

(a) Protection of operators and neighboring workers from the effect of the radiations from the arc.

(b) Protection from shock.

(a) Protection from radiation.—Under the first heading it is well known that the light from a naked arc has a serious effect upon the eyes and the skin. This is more serious with the iron arc than with the carbon, as the iron-arc radiation is richer in rays of short wavelength, including ultra-violet rays, which are specially detrimental. Welding arcs require large currents, e.g. a No. 10 welding rod requires up to 120 amperes, and as the extension of the arc to heavier work is clearly foreshadowed, arcs carrying several hundred amperes have to be reckoned with in considering protective appliances.

Where welding is carried out in a factory under stationary conditions the provision of screens, masks, etc., for the welders can be readily arranged, and each operator's position can be isolated from neighboring workers by suitable screens.

More difficulty arises in such work as welding the hulls of ships, where the welders must work on stages; and most, perhaps, in repair work, such as is carried on in marine and other boilers, ship spaces, etc.

The object to be attained in every case is, however, that arc radiations shall not reach the eyes or skin of either the operators or persons in the vicinity, except through screens which obstruct the injurious rays.

The welder himself and any assistant must be able to see his work, and it is therefore necessary that such screens as they use shall be reasonably transparent to ordinary light. It has to be remembered that the skin of the hands, arms, face, and neck needs protection. This can be given by any opaque material. Glass can be obtained which is practically opaque to the most injurious rays, and yet fairly transparent to ordinary light. Combinations of colored glasses are also in use, which are fairly satisfactory. The U.S. Research Committee has recommended certain combinations of this kind.

It is clearly important that the screen or mask used shall be such as not to restrict the operator's movements or to cause a discomfort. Goggles protect the eyes only. Masks are in use which protect the face as well, but masks are open to objection on the point of comfort. A screen held in the left hand carrying a sufficient area of suitable glass, and on apron to shield the left arm, are satisfactory for stationary work. It may not prove so good for ship-building and repair work where the left hand may be required for other uses.

There is no doubt a danger radius from an arc of given power, beyond which no screening is necessary in respect of eye and skin protection. But intense lights within the usual field of vision are objectionable in any working space, quite apart from directly injurious effects, so that the screening-off of welders in factories seems desirable in any case. In shipbuilding it is probable that whilst welding is in progress on any section all the near-by workers will be welders and their mates who will have their individual protection.

In repair work, especially in ship spaces, exigencies of time may require other workers to be employed close to the welders, and perhaps the only possible regulation would have to be in the general terms that efficient shielding from the arc must be employed in such cases.

It may be said that whilst the short-length waves are responsible for the

damage to the eyes, and some of that to the skin, the long-wave or heat radiations from powerful arcs also produce sunburn effects on the skin, which must be guarded against. This effect is, however, essentially of short range and mainly affects the welders themselves.

(b) Protection from shock.—The pressure across a welding arc is quite low. Both for direct and alternating-current arcs it is of the order of 25 to 30 volts. But there is always a steadying resistance or choker in series, and when the arc is broken there is the full supply of pressure on the electrode. It is at this time that there is more danger of shock both because of the higher pressure and because the electrode is not visibly dangerous. It may be laid on the bench or any other handy place and inadvertently touched.

It has to be remembered that in working from a stage, etc., the danger of shock is from indirect effects such as those causing a start or stumble, loss of balance. With d.c. arcs there need be no danger if the supply conditions are properly adjusted; 100 volts is the maximum supply pressure necessary either for carbon or for metallic electrodes, including steadying resistances, and 100 volts d.c. will not make a man start or stumble. Therefore, as regards direct-current welding, the maximum voltage needed is below the danger point, and it is only necessary to limit the supply pressure to some such figure as 100 volts. Even 200 volts (which it may be convenient to employ where welding is only done occasionally) can hardly be called dangerous.

In the case of alternating-current welding the conditions are rather different; whilst the actual arc voltage as shown by a voltmeter is quite low, 30-35 volts, practice shows that a considerably greater circuit voltage must be available. One manufacturer puts this at 110 volts. The minimum stated by another is 65 volts. This matter is under special investigation, and it need only be said here by way of explanation that an iron arc distorts the E.M.F. wave, giving a sharp rise at the beginning of each alteration. Presumably the supply wave must be able to give this peak much in advance of its own peak. It must meantime be accepted that at least 65 volts is needed for a.c. welding. This pressure is capable under certain conditions of giving a severe shock. A welder is certain to have his skin damp with perspiration, which is one condition favorable to a shock. Therefore, to touch a live electrode may have serious consequences, especially for a man working on a staging.

A welder will normally wear a protecting gauntlet of leather, so that there is little risk of shock through the hands unless working in conditions leading to wetting of the gloves. It may perhaps be necessary to lay down the rule that for a.c. welding the gloves must be waterproof. The most likely chance of getting shocks seems to be when the electrode is laid aside and the welder has his hands bare. It is suggested that this danger can be averted by a "no current circuit breaker in the circuit, which could be cut out by a pedal switch for the purpose of re-starting the arc. This "no current" breaker would serve another useful purpose in preventing the use of too long an arc, which makes bad work.

It is submitted that both for a.c. and d.c. welding the work should always be earthed, or connected to the earthed pole of the supply circuit.

It should be a rule that a proper hook or receptacle should be always provided for an electrode not in actual use, and should always be used. This guards against shock, burning, and unintentional short-circuits by contact with the work, and is as essential for work under temporary conditions, repairs, etc., as in a factory. Possibly this rule might dispense with the "no current" breaker in a.c. work. The flexible lead to the electrode needs a little consideration. It must necessarily be somewhat heavy in copper section. The insulating covering must be strong and flexible. Armouring is scarcely admissible on account of weight and stiffness. It should be readily detached from the connecting socket, for ease of exchange, and there should be a switch or breaker between the supply and socket.

The insulation of the flexible near the electrode holder is exposed to considerable heat, conducted and radiated. It must not be damaged by this heating.

The steadying resistances require just the same precautions as resistances for arc lamps, starting and regulating resistances, but as the currents are heavy and pass during the whole of the welding operation ventilation must be good. These resistances, chokers, etc., must be capable of carrying the short-circuit current without rising to a dangerous or destructive temperature. The design presents more difficulty in portable equipments for repair work, etc., than for stationary equipments. The matter only concerns safety regulations in respect to fire risk and accidental contact, and the same regulations as for other similar operations should suffice.

Supply Regulations

The conditions of welding are not favorable for direct supply from the mains of a supply undertaking. The maximum voltage needed, say, 100 volts a.c., down to 60 volts d.c., is considerably below most supplies. The condition that the work must be earthed is also objectionable from the point of view of a supply authority. Of course a higher supply voltage may be used by the simple expedient of using a larger resistance in the welding circuit, but this is wasteful and increases shock dangers. On the grounds of economy it is not likely to be used where welding is in constant or frequent use. The temptation to use it is strongest in works where welding is only done occasionally.

The cases of a.c. and d.c. supply differ materially. Where the general supply from the mains is direct-current it must be expected that the pressure will be 200 volts or over from each outer main to earth. This is much higher than needed, and it brings in a distinct danger of shock, besides being wasteful of energy. It can therefore be excluded from consideration for equipment in steady use. It will pay the user to put in a converting set yielding the desired voltage.

The case of occasional welding may need consideration. From the economical point of view it may pay the user to throw away 75 per cent. of the energy in resistance rather than incur the cost of a converting set. In such cases the safety arrangements must be similar to those provided for a.c. sets. The supply interests, it may be suggested, will be sufficiently protected by proving that the current taken shall be limited in the same way as to any other power circuit. It seems obvious that welding supply-circuits must be run separately from any others from the consumer's main fuses. It should be arranged that the work connection can only be made to the earthed lead of the supply. But it must be expected that the work will be earthed in many cases, and it is suggested that supply engineers should tolerate this with such reservations as to power to disconnect for testing purposes, etc., as they think necessary to protect their systems. The Board of Trade regulations will need an exception to be made in the same sense.

Where, as in most cases, motor-generators are used for supplying d.c. welding sets, the supply mains have better protection, the generators can have characteristics desirable for welding circuits, and the polarity of the electrode can be reversed for special work when desired.

Alternating-Current Welding

Owing to the cheapness and efficiency of transformers, it may be assumed that these will always be used between the mains and the welding circuit. From safety considerations alone these should be of the two-circuit type and have earth shields.

Where single-phase is given, the supply undertaking hardy needs special protection, excepting those common to other power uses. It may perhaps be thought advisable to require that part of the resistance in the electrode circuit shall be in the form of choking coils to limit the current on striking the arc, and on making accidental contacts between electrode and work which are virtually short-circuits.

Where the supply is given from a multiphase system, questions of balancing arise. Obviously the simplest connection is to put the welding transformer across one phase. If a number of welders are in use and they are equally divided between the phases, they will approximately balance each other.

A single-phase supply can be ob-

tained from either two-phase or three-phase systems, loading each phasing. With two-phase three-wire distribution a single-phase supply can be obtained from the two outers, giving 1.414 times the voltage of either phase. This can be transformed in a single-phase transformer to the welding pressure. Whilst this connection loads each phase equally as regards current, the resultant current is out of phase, lagging on one side and leading on the other, reducing the power factor and tending to unbalance the voltage on the two phases.

Alternatively single-phase current can be taken from each phase directly, and where a number of welders are in use this is the simplest and most satisfactory connection, the welders being equally divided between the phases. There is, of course, the probability that unequal numbers will be in simultaneous use on the two phases, producing some unbalanced load.

With three-phase distribution single-phase current can be taken from a three-phase transformer with its secondaries connected in a particular way. This connection gives currents largely out of phase in opposite senses in two of the windings, tending to unbalance the voltage and reducing the power factor.

Welders can obviously be fed from the separate phases, and if a fair number are distributed between the phases the resulting out-of-balance loads will be only those due to differences in the numbers in simultaneous use.

The whole question from the supply point of view is one of magnitude of the effect, having regard to the relative proportions of the welding load and the general load supplied by the power or sub-station affected. The provision of condensers or other corrective devices on the lagging-current phase may be worth while in large lay-outs.

At the present stage it seems premature to make definite regulations. Supply undertakers would be sufficiently protected by the provision that for welding plants above a certain capacity, varying with local conditions, the method of converting the supply shall be subject to their approval, which shall not be unreasonably withheld.

In both d.c. and a.c. welding the striking of the arc is potentially the short-circuiting of the leads. It is on a par with the starting up of a motor, but somewhat more favorable, inasmuch as when welding there must be a resistance in circuit and the current can be limited by providing some minimum resistance or choker which the operator's regulating switch does not cut out. Similar regulations to those limiting starting currents on motors will therefore suffice, with the simplification that where a number of welders are in use a single limiting device in the mains is all that is necessary to protect the supply.

About one hundred years ago American ships carried 90 per cent. of the commerce of the country, and to-day are carrying less than 10 per cent.

EFFECT OF IMPURITIES IN ACETYLENE ON THE COST AND QUALITY OF WELDS

By CHARLES BINGHAM.

THE chief impurities found in or accompanying acetylene are sulphur, phosphorus, silicon, and finely subdivided lime, which affect the quality of the weld, and hydrogen, nitrogen, and their compounds, and water vapor, which affect the cost of the weld by lowering the temperature of the flame, thereby slowing down the welding process and thus increasing the charge for labor, carbide, oxygen, and overhead charges. Occasionally other impurities are also found, but their occurrence is so rare that they need not be considered, states the author in a paper before the "British Acetylene and Welding Association."

Sulphur is found mainly in the form of sulphuretted hydrogen. Most of it is held in the sludge and in the water, but a part always finds its way into the gas and, unless removed, passes into the weld. Sulphur makes the steel or iron "short" or brittle. It is also one of the chief agents in the corrosion of metal pipes, faucets, etc. The quantity of sulphur compounds may vary from 0.1 to 2.4 per cent. by volume; the quantity always increases with an increase of temperature in the generator. Nearly all the sulphuretted hydrogen can be removed by a good water-scrubber; the remainder is easily removed by a chemical purifier.

Phosphorus attacks the metal work of the apparatus and when burnt in the form of phosphoretted hydrogen it is the chief cause of the unpleasant atmosphere often found in welding shops. It makes the weld porous and any that is present in the gas passes almost entirely into the weld. The quantity of phosphorus compounds in acetylene can be as large as 1.2 per cent. by volume. Phosphorus can be removed only by a good chemical purifier.

Silicon is usually found in the form of siliciuretted hydrogen. The gas may contain as much as 0.63 per cent. by volume. Nearly all purifiers that remove phosphorus and sulphur fail to remove silicon compound, but as yet no experiments have shown that the presence of silicon has a bad effect on the weld.

The temperature of generation influences considerably the quantity of finely subdivided lime carried by the gas. This lime dust passes freely through the water, but the quantity present is usually small and can easily be removed by any good chemical purifier. The effects of the lime dust on welds has not been carefully studied, but the dust frequently chokes the narrow passages of the blow-pipe and some authorities claim that this causes spitting of the blow-pipe.

A yellow, brown, or black patch in the sludge is a sure sign that the temperature of the welding part of the flame, that is, the inner cone, is being lowered by hydrogen, water vapor, etc. Water vapor is a most pernicious diluent. It is decomposed at the high temperature of the oxy-acetylene blow-pipe, its decomposition requiring 2300 calories per cubic meter. At a temperature of 150 degrees F., the mere passing of the acetylene through the water will cause it to be saturated with about 5 per cent. of water vapor. Where there is no water scrubber and the generator is overtaxed, it is possible fo a considerable percentage of the vapor to reach the blow-pipe nozzle before it has been able to cool sufficiently for any condensation to take place. Even where a water-scrubber is used the acetylene will be saturated with water, and the higher the temperature of the water the higher will be the percentage of the water vapor.

Essential Factors in Oxy-acetylene Welding

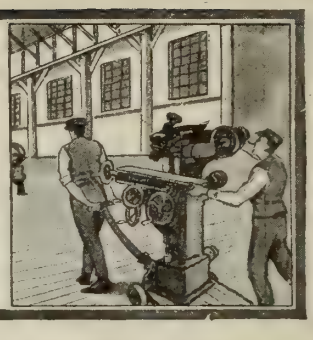
Carbide expands to about twice its volume when decomposed; if there is not sufficient space for it to swell freely, overheating and partial decomposition of the acetylene follow. This is also accompanied by over-production of water vapor. To produce the best results, the generator should produce acetylene at as low a temperature as possible; the temperature of the gas and water in the holder should not exceed, by 30 degrees F., the temperature of the air. The acetylene should pass through an efficient water-scrubber, but the water in the scrubber should not become too warm and should be frequently changed so that it will not become saturated with ammonia or sulphur compounds. The chemical purifier provided for removing phosphorus and sulphur compounds must, also, be regularly renewed or regenerated. The gas must be dried. An efficient method of doing this is to pass the gas after it has gone through the water-scrubber, through a vessel containing live carbide. The moisture in this case will produce additional acetylene which will be practically dry.

WELDING CAR AXLES

The price of car axles has increased about 250 per cent. during the past three years, and deliveries are now very uncertain; hence broken axles should be welded whenever possible. By the electric arc method a good man can prepare and weld two 4-inch axles per day; the cost of a finished reclaimed axle is only about one-third that of a new one

The axle is burned off by the arc to V shape, 5 or 6 inches inside the wheel fit so that only good "live" metal is used in the reclaimed axle. Two prepared pieces are laid in an angle iron with their V-ends together. They are then welded together, using a carbon electrode and cold rolled steel as filler. After the weld is partly completed the axle is rested on a simple trestle and filling-in is completed. The axle is then cut to length and machined. The weld comes nearly in the centre of the completed axle.—R. H. Parsons, "Electric Railway Journal."

DEVELOPMENTS IN SHOP EQUIPMENT

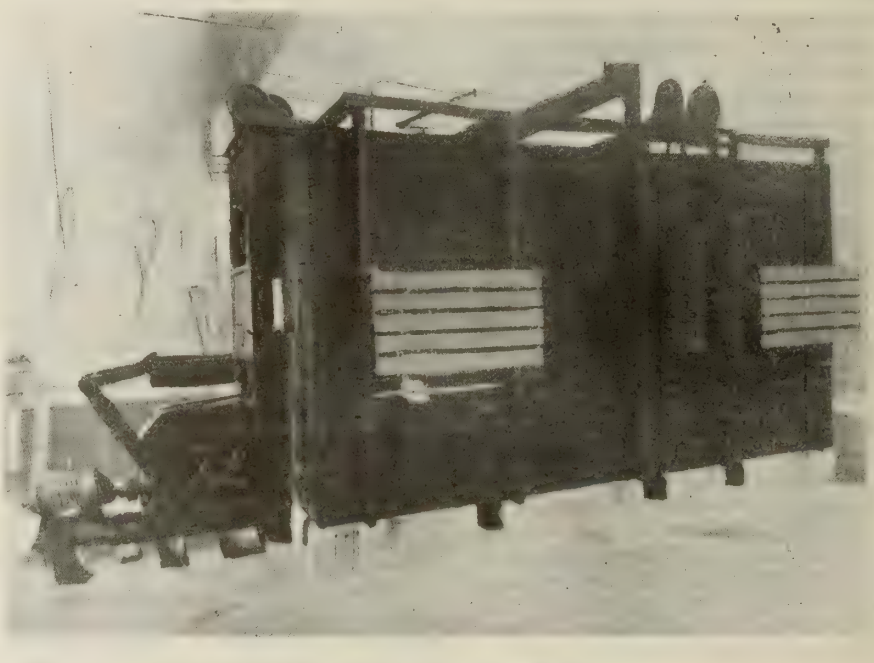


Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

ELECTRIC FURNACES FOR HEAT TREATING

AMONG the many developments directly traceable to the war is the use of the electric furnace in the heat treating of shells, automobile and aeroplane parts. This development is readily adaptable to peace time industries and will prove an admirable method of securing heat for this purpose owing to the uniform temperatures obtained and the ease with which they may be controlled. The accompanying illustrations show one type of the Baily automatic furnace, designed for heat treating manufactured by the Electric Furnace Co., Alliance, Ohio.

In principle this furnace makes use of the resistance principle. The resistance elements, two in number, are contained in troughs of highly refractory material. In this refractory trough the resistance material, composed of broken carbon, is placed, forming contact with the electrodes at each end. The heat radiated from the resistors is transmitted to the articles to be heat treated by reflection from the roof and by direct radiation from the troughs.

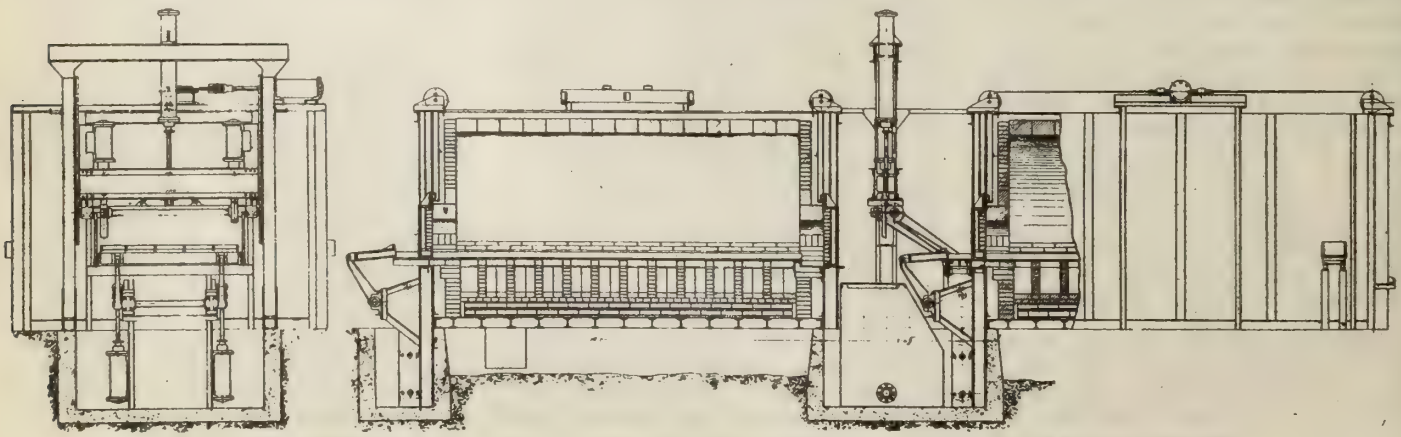


PUSHER TYPE FURNACE

The operation of the furnaces is entirely automatic, the parts to be heat treated being introduced into the furnace by means of an automatic pusher arrangement, and being removed from the other end at the same time. In the line drawing is shown a continuous automatic two-furnace equipment hydraulically operated. In the left hand furnace the parts are heated to the desired temperature and are then quenched and hardened in the quenching tank shown between the two units. From this tank they are automatically picked up and introduced into the drawing furnace where they are raised to the proper temperature for the heat treatment desired.

The temperature of the part to be hardened controls the automatic operation of the furnace as a pyrometer at the discharge end of the first furnace actuates the operating mechanism when the part nearest the discharge end reaches the proper temperature. This is done through a relay which operates a solenoid controlling the operating medium, hydraulic or otherwise.

Variations have been developed for the heat treating of cast steel anchor chain, the chain being fed in at one end of the two-unit installation and coming



CONTINUOUS FURNACE OF 500 K.W. CAPACITY FOR HEAT TREATING AEROPLANE CRANK SHAFTS, ETC.

out at the other heat treated in a very uniform manner. For castings and shapes too large to be cared for by the pusher type mechanism continuous recuperative furnaces are designed of the car type.

In size it is possible to build furnaces of such size as to take in, in a vertical direction, gun tubes and jackets, the quenching tank being made part of the furnace installation. Soaking furnaces for ingots are also made.

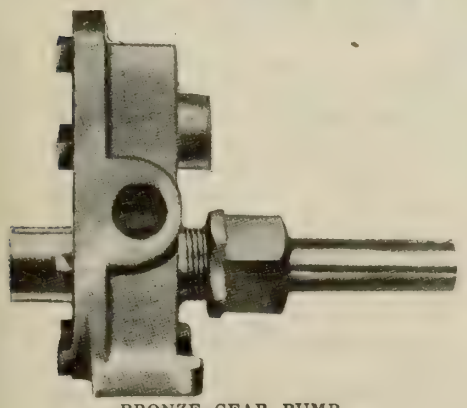
For the melting of brass a resistance type furnace has been built of the non-crucible type. A cylindrical shell is supported by the usual trunnions and brackets for tilting and has suitable walls and a roof of refractory material. The bottom of this chamber is so shaped as to make a bowl-shaped hearth for containing the metal when melted. The resistance element is contained in a circular trough of refractory material connected to the electrodes which are placed opposite each other.

The control of the current and hence of the furnace temperature and melting capacity is done by means of suitable voltage taps brought out from the secondary of a special transformer supplied with each furnace.

For the melting of aluminum a hearth type stationary furnace is used, and the accuracy of control achieved makes it an especially desirable medium for this work. Furnaces of this type are made up to 500 k.w. capacity and are capable of holding three or four tons of metal which are discharged by tapping. The enclosure is of sheet metal with high grade fire bricks as a refractory; heat insulating material is interposed for the reduction of radiation losses. There are doors at either end of the furnace and three rabbling doors on the side opposite the tap hole. These doors are heat insulated in the same manner as the body of the furnace. Those at the ends are opened and closed by sliding up and down vertically, being actuated by compressed air. The rabbling doors swing open on hinges. When running continuously a furnace of this size can melt one ton per hour and has a daily capacity of twenty tons.

BRONZE GEARED PUMPS

The Bronze Geared Pumps, manufactured by the Oberdorfer Brass Co., Syracuse, N.Y., are admirably adapted to the handling of small quantities of liquids, which have to be moved in a steady and reliable manner. They find considerable use in connection with the water and oil circulation on gas engines, and are found in homes for supplying water, in factories for pumping water, lubricating and fuel oils; in various industries for pumping vinegar, wines, spirits, etc.



BRONZE GEAR PUMP

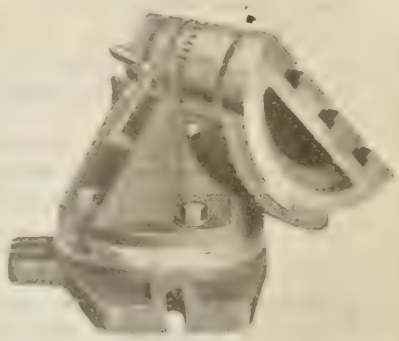
These pumps are simple and durable in construction and consist of the smallest possible number of moving parts. The housing and gears are cast of bronze perfectly adapted to the purpose. Tobin bronze is used in all shafts in place of steel. Brass screws are used for securing the cover plate through the body so that there will be no rusting or corrosion. All parts are carefully machined and are perfectly interchangeable. The impeller shafts are provided with a packing gland secured by a lock nut. Every pump is tested before being placed in stock. None pass inspection unless they show the proper pressure on discharge, and must raise water three feet without priming. Various types and sizes of these pumps are made so that any possible condition which will likely be met with may be supplied out of stock.

In many installations in which is required a varying quantity of liquid under a constant pressure as the pumping fuel oil to several burners or a constant quantity of liquid under a variable pressure as forced lubrication to several bearings, an unloader or other means of relieving an excess pressure is necessary. In pumps for this work this is accomplished by the placing of an unloader in the cover plate of the pump. The inlet pipe is connected from the supply to the pump in the usual manner, and the discharge is connected from the pump to one or more points, as desired. When the pump is started and its outlets are entirely or partially closed so that the pump cannot deliver liquid equal to its capacity, a pressure is built up in the line from the pump to the point of discharge. The pump, however, is provided with a relief valve or unloader, which can be set for any pressure desired in this line, and when the pressure exceeds the amount the surplus liquid is then bypassed and circulates within the pump itself. The pressure on the discharge line is, therefore, constant for any discharge from nothing up to the capacity of the pump. No return pipe is required to take the surplus back to the supply tank.

UNIVERSAL ANGLE PLATE

The inaccurate and make-shift rigs so commonly seen in machine shops are fast giving way to more modern methods of holding work while being machined. The universal angle plate shown herewith is made by the Boston Scale and Machine Co., 100 Ruggles St., Boston, Mass. By its aid any plain milling or grinding machine may be converted into a universal tool and the drill press may be made much more flexible. With a proper set-up it is possible to drill all the holes in the majority of pieces of work without removing the work from the angle plate no matter what relation the angles of the holes bear to one another.

This device is particularly adapted to the tool room and used in connection with a grinder, formed cutters can be ground on it by the addition of centres to the platen. It has a motion through 360 degrees horizontally and 90 vertically. It can be quickly adjusted to any angle without disturbing the work bolted



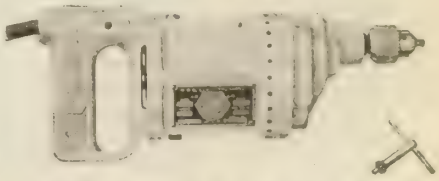
UNIVERSAL ANGLE PLATE

to it and the motion of the working surface is through the axis of the arc of oscillation. Accurate gradations with Vernier attachment reading to 5 minutes permit of its use especially for fine work. The tool is rigid and well built, and has unlimited possibilities of application for work in connection with lathes, planers, milling machines, shapers, drill presses and grinders as well as in connection with die-sinking machines.

A number of different sizes are made and two types, one with handle and worm for actuating the platen and one without.

PORTABLE ELECTRIC DRILL

Ths drill shown is perhaps the lighest weight drill of this capacity made, weighing only 6¾ pounds and having a no-load speed of 1600 R.P.M., full-load energy consumption of 175 watts, at which the speed is 1,000 R.P.M.; it is 4" in diameter and 12" over all. It will take any size drill up to 3-16" in diameter and is equipped with a Series Compensated Motor; can be used from any electric light socket on either alternating or direct current, and is especially designed for drilling small holes in steel, iron or wood. It is made by the Black & Decker Mfg. Co., Baltimore, Md.



NEW PORTABLE ELECTRIC DRILL

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Need Help From Ottawa

STRANGE as it may seem, the average Canadian manufacturer is looking on with more interest and expectation at the trip made by Lloyd Harris and those associated with him than on any activity, or near activity, displayed by the Department of Trade and Commerce at Ottawa.

The Canadian manufacturing interests just now stand in need of some real assistance in determining what markets are good and what markets are good to keep out of.

The war has made great changes in this regard and it is too much to expect that individual firms should be put to the expense of going abroad and finding out just exactly what has taken place.

Markets that were formerly good are no good now. The credit has been impaired and it would be bad business to risk much in trying for the business that is showing in that country.

If manufacturers want to take on poor or risky business they do not have to go very far away from home to get all they want of it.

CANADIAN MACHINERY is not interested in the politics of the country, except as those politics have to deal with the success or failure of the interests of the Canadian manufacturers. It is a fact that the Canadian manufacturer does not receive the assistance from Ottawa that he should, and it is a fact that right now is the time when he wants all the help he can get.

This paper has made some inquiries, and there is undoubtedly a feeling that the Department of Trade and Commerce at Ottawa should be reorganized along lines that will do something more than issue bulletins and deliver addresses.

The problem of the small shop is one that figures in this case very considerably. During the war many of these smaller places carried out very important subcontracts. They neglected what business they had formerly developed, and now they find themselves with their war business gone and only a vague notion of what to turn to. They have no organized selling force. They know little or nothing of local markets.

They have, though, a plant that is in much better physical condition than before the war. They have a better labor market by reason of the fact that a large number of people in the community have worked for years in munitions plants to very fine dimensions.

CANADIAN MACHINERY believes that it states a real condition when it says that the manufacturing interests of the Dominion are waiting for Ottawa to give them the service, through its Trade and Commerce department, that they are entitled to, and which they must have if they are to develop.

Sales Force is Very Large

DON'T make the mistake of thinking that the man who goes out on the road for your firm is the only salesman around the premises.

If you are connected with the business at all you are part of the selling force, and you can spoil sales as well as make them.

You can write a man's name wrong, you can give him wrong initials, you can get him in such an irritated state of mind that the other company will have a splendid chance to make the sale.

The man operating the turret lathe, the planer or the miller is a bit careless about the measurements. He takes a chance. He is selling goods—but for some other company.

Here's something that a former shipping clerk wrote of his experience in this matter:

As a shipping clerk, the writer once sent some one hundred and fifty upper valves for working barrels to the Carter Oil Company. The shipment went to Lincoln County, West Virginia, which happens to have no roads except cow trails and dried-up creek beds. The shipment of valves was hauled horseback up one of these dry creeks. There had been an error in making up the shipment—the cups on the valves were 1⅞" instead of 1¾". It took three weeks to get the right valves from our Pennsylvania factory to Lincoln County, and during that time a score of oil wells had to be shut down. The loss ran into thousands of dollars.

I thought I was just a shipping clerk, and had a boyish longing to be a salesman on the road; but all along I was a salesman—for that mistake of mine sold future goods for a competitor.

Making New Year's Resolutions

IT'S a grand old habit that people have of making good resolutions at the first of the year. Nearly every person does a bit of this every year. In fact the person that can pass the first of a brand new year without making a few resolushes must be a hardened old sinner.

It's an easy matter to hop one's self on the mental scales, and then toss on all the good points on one side, and the shady and positively bad stuff on the other. The trouble is that when a person is considering his own good and bad points he's apt to give the advantage to that side of the beam that carries the stuff that he's bold enough to label "not half bad."

Of course people bust the resolutions that they make at New Year's time. But the very fact that they think it is necessary and advisable to make a few new ones is pretty good proof that the chap is not entirely hopeless. He can see where he needs a few alterations in his habits, and where it is desirable that he should have a few patches on his code of habits and manners.

The fact that your resolutions are apt to fall by the way is no good reason why you shouldn't make any more. If none were made none could be busted, and if none were busted there would be no need of making any more. So in the long run you see that the busting of resolutions is really the thing that keeps up the need for making more of them.

It's a good idea around the start of a new year to get up alongside a good sized measuring stick and see how you size up by it. Don't make the mistake of standing alongside a foot rule and imagine that you're pretty big and pretty straight. Much better to stride up to a ten foot pole and find out what a little chap you really are. If you ever get it into your head that you're big and straight and all right generally, the day of your growth and development has passed. On the other hand, if you're honest enough to have a fair stock-taking of your own real self, and own up to the fact that you're a pretty small squirt, then you have a chance to go ahead and amount to something.

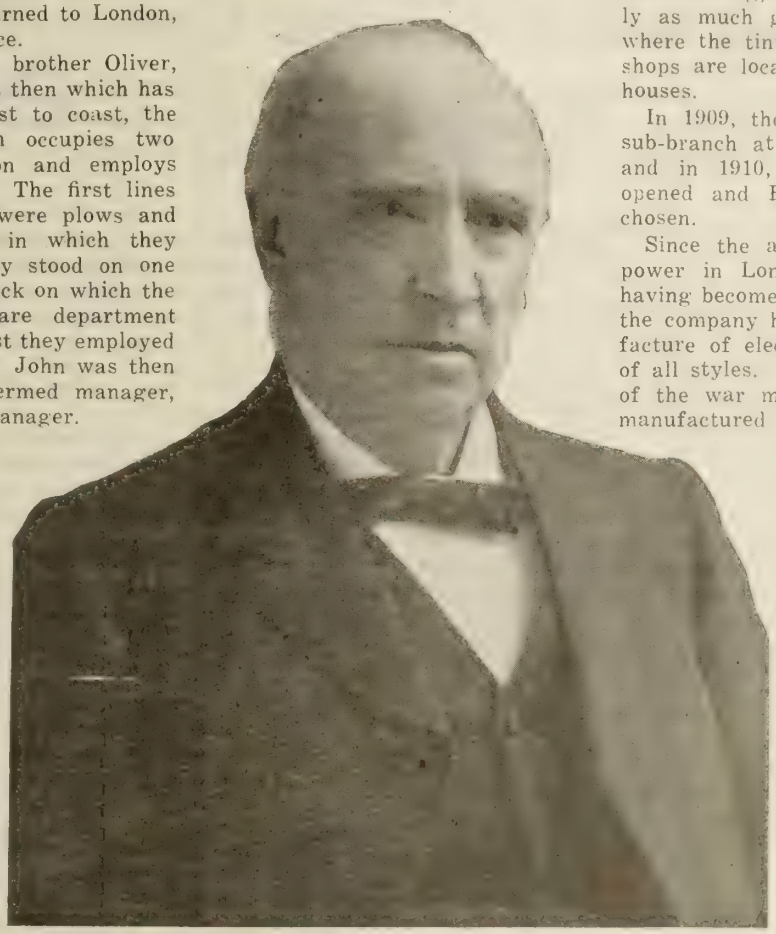
But above all else, don't choose a small rule when you go to take your mental and moral dimensions.

Ninety Years of Age and Still at Business

John McClary, Although He Nears the Century Mark, is Still Hale and Hearty—The Remarkable Growth of One of Canada's Big Industries

LONDON, Jan. 8—Although he celebrated his 90th birthday on Thursday, January 2nd, John McClary, the founder of the McClary Manufacturing Company, is still hale and hearty and spends a great deal of his time at work. Born on a farm near London, in 1829, he came to London in 1847, and started in at the trade of tinsmithing. Seized with the gold fever of 1849, at the age of twenty, he left for California. His was not to be the life of the gold miner, for two years later he returned to London, where he has lived since.

In company with his brother Oliver, he opened up a business then which has since spread from coast to coast, the headquarters of which occupies two large blocks in London and employs more than 1,500 men. The first lines of their manufacture were plows and tinware. The house in which they opened up their factory stood on one small portion of the block on which the tinware and enamelware department is now situated. At first they employed half a dozen workmen. John was then what would now be termed manager, and Oliver was sales manager.



JOHN McCLARY

Their customers were the hardy pioneers that were settled between Windsor, Woodstock and Brantford, and Stratford and Lake Erie. Their manufactured goods were delivered by salesmen in wagons driven over the trails that served for roads at that time. All of their raw material had to be teamed from Port Stanley or from Hamilton over roads that for many months in the year were practically impossible.

With the opening of the Great Western Railroad in 1853-4, began the expansion of the business which has grown so rapidly and which is still dropping its branches to take root in other places in the Dominion. Shortly after the entrance of the railroad, the firm decided that the rush of settlers to this part of the Province would provide a good market for stoves and accordingly made the change. It dropped the manufacture of plows for the manufacture of stoves. The name of the firm was changed from that of J. and O. McClary to the Ontario Stove Works, but the management continued as before. Later the partners decided to add to their products and started in the manufacture of furnaces and enameled wares and also commenced a jobbing trade in sheet metals.

The business continued to grow and in 1871 it was incorporated in Ontario under the name of The McClary Manufacturing Company. In 1882, a Dominion charter was taken out, thus enabling the firm to do business in any part of Canada.

Toronto was the first place chosen for a branch office. In 1879, one was opened there with David McKillop in charge. A second branch was soon opened in Montreal under the management of Andrew A. Brown. In 1880, the first Western branch was opened in charge of J. W. Driscoll. Vancouver was entered in 1894, and in 1901 and 1902, branches were opened up in St. John, N.B., and Hamilton respectively.

It was about this time that the second large building was erected in London. The foundry was moved to the new building, which now occupies nearly as much ground as the old plant where the tinware and enameled ware shops are located together with storehouses.

In 1909, the Calgary branch and a sub-branch at Saskatoon were opened and in 1910, the ninth branch was opened and Edmonton was the spot chosen.

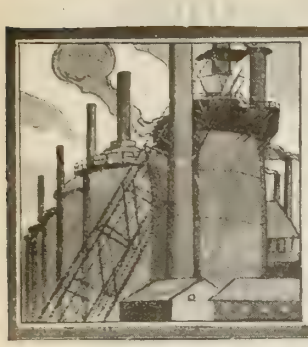
Since the advent of Hydro-Electric power in London and the use of it having become more general for cooking, the company has started in the manufacture of electric heaters and ranges of all styles. During the early years of the war many field kitchens were manufactured for the Canadian army.

Business, the favorable trade conditions of the country in general and of his own organization in particular, is Mr. McClary's constant consideration. In this connection there is no problem too large for him to tackle, nor any detail too small to interest him. To him the news of the day, whether it be the proposal of some new foreign ship canal, political unrest in some distant kingdom, or the price of garden stuff at home, are not simply unrelated facts to be allowed to pass unheeded, but the cause for some corresponding effect upon transportation, immigration or living conditions within our home country, which will have its effects on the trade and welfare of the country. It is this habit of figuring out results that has established his reputation for an almost uncanny foresight, which is all the more remarkable in that it does not allow itself to be warped or obscured by the common defect of a personal bias. It it due to his industry and foresight that the McClary Manufacturing Company has reached its present position and it is still going strong.

Canada has 138 daily, and 921 weekly newspapers.

It takes the product of 20,000 acres of pulp-wood forests every year to supply Canadian newspapers with white paper.

The principal pulp and paper mills of Canada are located in the provinces of Quebec, Ontario, New Brunswick, Nova Scotia and British Columbia.



MARKET DEVELOPMENTS

Buyers and Sellers Getting Closer Together

Every Price Concession Made Now Has a Tendency to Reduce the List of Those Waiting For Lower Levels Before Making a Purchase—Deep Cuts Made in Scrap Prices

ONE class is coming quite noticeably to the front in all departments of trade in machinery, steel, iron or metals, and that class may be lumped and called "waiters," and the principal reason assigned for their attitude is one of expectation in regard to declining prices. There is at present a fairly wide margin between what purchasers think they should pay and what sellers think they should get, and any concessions that are made tend to bring the sellers and buyers nearer to that point where they can be, and do business, to mutual advantage,

It is not expected there can be, for instance, any big reduction announced by the steel mills in Canada to meet every cut that is made by the big producers on the other side of the line. Warehouses, in many cases, are full of material that has cost more than the present U.S. price, and if the Canadian price were put down to a competitive basis at once it would mean a serious situation for these interests. As it is they show a marked tendency to sell at very close prices just now. They want all the business they can secure, and one way to secure it in the face of competition is to introduce a certain amount of flexibility in their selling prices.

There are some enquiries for equipment for railroad shops and other lines but otherwise the machine tool trade is quiet. Dealers are not showing any particular desire to stock up on shell shop equipment, although there is a big opening to do so now. Some sales have been made, but mostly from places where operations had not been going on long before the word came to cancel.

A new list is out this week for scrap metal prices, and the cuts that have been made bring prices down to a poor looking remnant of their former war-time greatness. A few sales are put through at better prices, but in such cases there is always more or less urgency in the sale. For instance, one shell shop sold a car of copper turnings for 17c pound only a few days ago. To-day they could hardly expect to get over 15c. The 17c was paid because the dealer making the purchase had a contract that he had to fill or face cancellation. His need made 17c the price, but the price lasted for that one car only.

SLIGHT REVIVAL NOTICED IN MACHINE TOOLS IN MONTREAL

MONTREAL, January 9.—Present hopes are built on the ultimate plans of any reconstruction policies that may be adopted by the Government or the manufacturers, but as yet these plans have not been advanced far beyond the suggestion stage. In some cases the large industrial establishments that have been interested in munitions are retaining their organization intact so as to be in a position to immediately undertake any enterprise that may develop from the activities of the Trade Commission. While some of the smaller mushroom plants have ceased to exist, the majority are resting on their oars in the anticipation that the early future will bring a proportionate return of war activity. Railroad shops and shipbuilding plants are quite active, but few are marked with the night operations of a few months ago.

Waiting Attitude in Steel

The usual quiet spell that follows the New Year holidays is additionally emphasized this year owing to the recent cessation of war activities and the uncertainty that invariably accompanies such conditions. The country has not yet settled down seriously to a definite policy of reconstruction, and as a consequence the readjustment to a more normal basis of ruling quotations is correspondingly delayed. Marine development is the principal factor in present business, and together with the railroad activity is responsible for the bulk of current steel demand. Dealers here report a comparatively quiet situation, due partly to seasonable conditions and to the waiting attitude generally assumed by consumers, anticipating as they do a still further decline in price quotations. Since the market has been freed from control the domestic buying has shown a slight increase, but little is being purchased for future activity. In the opinion of some dealers here this condition will likely obtain for several weeks yet, but a gradual resumption of normal activity is looked for in the course of a couple of months.

Metals are Quiet

To all intents and purposes the metal markets are open for all business, as practically all control has been removed; despite this condition, however, the situation is not marked by any sharp declines of any importance. Copper is receiving the attention of dealers and producers, and the formation of the American Copper Export Association marks one of the reconstruction moves of this body. The situation here is quiet but domestic business is of fair volume. The situation in tin is one in which the trading is more or less uncertain. It appears that much more tin has come to light than was thought possible, and now that the market is on the downward glide the metal is being produced. This may be responsible for the attitude of the British authorities in holding up shipping permits from England. As a consequence of the holidays and the general inactivity of the industrial situation all metals are exceedingly quiet. The local market is featureless with quotations going to lower levels. Copper shows a decline of

2 cents on lake and electrolytic, the price asked being 27 cents per pound. Castings is now quoted at 26 cents per pound. Tin is quoted at 75 cents, a drop on the week of 5 cents per pound. Spelter is unchanged at 9½ cents. Lead at 9 cents is ½ cent lower than last week. Antimony is weaker, having declined from 11 cents to 10 cents per pound. Aluminum is in light demand with 43 cents as the nominal quotation.

Railroad Demand Increases

Some revival in the machine tool inquiry has been noted of late in respect to the railroad requirements. This is not very pronounced but sufficient to maintain the interest among the dealers and the manufacturers. In general, however, the demand is light respecting new equipment, but considerable trading has taken place in connection with used tools. It may be of interest to note that single tools such as lathes, planers, and drill presses, are being bought by those who have acquired a little experience in connection with their work on munitions and will be utilized by these men in setting up small repair shops in some of the smaller towns throughout the province. The supply business is not exceedingly active but volume is by no means discouraging.

Scrap at a Standstill

With the industrial world relatively teeming with all classes of material that is generally recognized by many as fit for nothing but scrap, it is a remarkable fact that the market in old materials is practically devoid of any pronounced activity. It is true that light trading continues to be a factor of present business, but this is invariably for current operations as no actual interest is displayed where future activity is, or might be, concerned. It is, however, assumed by different dealers that considerable buying will develop as soon as more stabilized conditions are effected. As a matter of fact some dealers here announce good inquiries from large consumers for early deliveries. Scrap prices quoted are of little assistance at the present moment as dealers state they have virtually nothing on which to base their buying or selling prices and each transaction must be carried out on its own individual merits. Current prices are therefore only nominal, but readjustments may be anticipated in the near future.

FORD RAISES MINIMUM

A new minimum wage scale of $6 a day, a flat increase of $1 a day for approximately 28,000 employees throughout the country, was announced recently by the Ford Motor Company. Employees of the Ford tractor interests also are included in the increase.

Twenty-three thousand other employees of the Ford interests already receive $6 or more a day.

Coincident with the announcement of the wage increase, it was made known that Henry Ford has formally resigned as President of the Ford Motor Company, and his son, Edsel, elected to succeed him at a salary of $150,000 a year.

Mr. Ford, in tendering his resignation, gave as his reason his intention to devote more time to the tractor industry. He retains his seat on the Board of Directors of the company in an advisory capacity.

POINTS IN WEEK'S MARKETING NOTES

Montreal reports indicate that there is a slight revival in the demand for machine tools, particularly from the railroad shops.

It is understood that Canadian steel mills are about to figure on rather large tonnages for the Government railroads. Such orders would be acceptable to the mills just now, as there is not a great volume of new business offering yet.

A new list of prices for scrap material was handed out this week. There is an all-round reduction that amounts to an average of about thirty per cent.

One munition firm secured 17c per pound for a car of copper turnings, but on a sale that was urgent. The dealers would not pay over 15c for the same material to-day.

Pittsburgh reports indicate that a decline in steel production is looked for there, experts figuring out that it may run as high as 40 per cent. of the high mark recently attained. It is hardly likely that steel prices in Canada will be at once reduced to meet the cuts announced in United States. Many of the warehouses in Canada have stocks on hand that cost them much more than present base prices. Holders of this stock are running it off at prices very close to their actual cost figures.

SCRAP PRICES ARE PUT ON LOW LEVEL

Reasons Why Prices of Steel Are Not Lowered In The Canadian Trade At Present

TORONTO.—There seems to be a feeling of lack of confidence in the market situation. It makes little difference in which direction enquiry is made, the same thing will be found true. Hayden, Stone & Co., of Boston, mention something this week that applies to the situation regarding machine tools, supplies, steel, iron, scrap, or almost any commodity that comes within the circle of operations covered by this group. The statement referred to is as follows:

"Until the producers and consumers of the great staple articles, particularly iron and steel, get together on a basis where they can do business freely, the business world will have such an air of uncertainty that its effect cannot but be communicated to the stock market. Reaching a basis on which business can be freely carried on cannot be effected in a moment after such a prolonged period of artificial price stimulation as we have been passing through, but we believe—before this month is ended—we shall see good progress. The first step taken was in the price reduction announced. This was a wise movement as tending to bring producers and consumers together. . . . As a matter of fact the cycle of advancing wages has reached such an acute stage that there is really no benefit to be gained by any further advance in wages. While we all like to get as much as possible in dollars and cents, there is no gain whatever when any advance in the money wage paid is immediately followed up by a corresponding advance in everything that goes to make up the cost of living. The process has reached this point. After all it is not so much a question of how many dollars a man receives as it is how much these dollars will buy, and we may be very sure that it is not until the number of dollars received by the average laborer is decreased, that the purchasing power of the individual dollar is increased."

The result of the facts—for they are facts—contained in the above is found in the machine tool, steel, scrap, or any other line of business. The general attitude of the purchasing public is "waiting." When that attitude becomes chronic it creates a serious situation.

The Steel Trade

Warehouses report that the month of December was a good one. In some lines a very active business was done. For instance, in the matter of tubes one house informs CANADIAN MACHINERY that in December they did three times as much business as they have done in any month for a long time. The question of Canadian mills coming out openly and meeting the prices of Pittsburgh is talked of, but there are many points involved before such a move could be considered. It would tend to demoralize the whole trade in some ways. For instance, there is hardly a warehouse that has not in it stocks of steel bars that have been placed there at a cost of 4c or better. Were the Canadian mills to cut deep down in the price it would mean that these warehouses would have to sell out for what they could get, and the loss, where fairly large stocks are carried, would be serious. Although no actual cuts have been made in the last few weeks in the price of steel shapes and tubes, there is considerable flexibility in some of the price lists that is helping to meet the situation, and bringing buyers into the market whereas they would otherwise join the list of waiters.

Machine Tool Trade Slow

Machine tool dealers report business as very quiet in the metal working industries, but several inquiries are in for

machinery for wood working and other lines. Plants that have been making shells are not only busy getting rid of their stocks, but are doing their best to get their adjustments made as quickly as possible. Machinery that is not good for any other operations is being sacrificed in many cases, as those having it for sale probably reckon that it does not owe them anything. Some dealers have taken in a quantity of shell shop equipment, while other houses refuse to touch it at all. There do not appear to be any hard and fast lines along which the various firms are working. Some of the tools taken in are general purpose, and have been used very little. They have been bought "at a price," and the dealers in question are content to put them away and forget about it for a while.

A Scattered Market

It has frequently been explained in these columns that the quotations for second hand materials appearing on another page in this paper do not at present represent an actual basis of operation, for the simple reason that dealers are not in the market to buy unless they have contracts that have to be filled or cancelled. One case of this came to light a few days ago when a car of copper turnings from a munitions shop was sold for 17c. The reason for the price was that a dealer had a contract to fill by a certain date, and had he not secured the material at once his contract for the entire amount might have been cancelled.

The trouble with the explanation in these columns of the prices on another page is that readers sometimes look only at the quoted figures, and are thereby led astray. With this in mind, CANADIAN MACHINERY to-day asked one of the leading dealers in Toronto for quotations at which he would buy, and these are made the basis for the quotations given in that column to-day. The reductions are more than liberal. Those having much to sell will be inclined to hold on for a while in the hope that there may be a revival in the market that will help matters. All coppers are down to 15c; heavy melting steel from $22 down to $15; boiler plate from $20 to $15, car wheels from $30 to $18, and so on. "Those prices are the ones at which we will buy," remarked the dealer, "and you will see that they represent a very substantial reduction from the figures that have formed the basis of dealing for some time back." Aluminum is given in his list at $18 per hundred, but we know of one dealer in Toronto who has a quantity on hand for which he cannot secure 14c. The scrap market is in poor shape and it does not show signs of improving very rapidly.

Moving to Toronto.—The Elgin Mfg. Co., which was organized last June in St. Thomas for the manufacture of 18-pounder British shrapnel, has been sold to the manager, J. D. Cumming, who proposes dismantling the plant and disposing of the machinery. Later, Mr. Cumming proposes to start the manufacture of coal pulverizing machinery in Toronto.

STEEL PRODUCTION IS LIKELY TO SHOW A FALLING OFF VERY SOON

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., January 9.—The whole pig iron market has now come down the $3 a ton originally suggested in the price reduction programme the American Iron and Steel Institute committee had prepared for submission to the War Industries Board at the meeting of December 11, but which the Board refused to hear read, as it had decided to discontinue price fixing after December 31. The steel producers adopted the suggested reductions in steel prices very promptly, but the merchant blast furnaces held off. There have been very few sales simply because there has been very little demand, but enough sales have occurred to show that any furnace expecting to sell must accept at least $3 a ton less than the Government prices formerly ruling.

The reduced prices are as follows: Bessemer, $32.20; basic, $30; No. 2 foundry (1.75 to 2.25 per cent silicon), $31; malleable, $31.50; forge, $30. Under Government control all prices were f.o.b. furnace except that during the fourth quarter of 1918 Tennessee and Virginia furnaces were allowed to charge delivered prices equal to base price plus freight from Birmingham to point of delivery, while eastern Pennsylvania furnaces were allowed, similarly, to use Pittsburgh as a basis. This gave the furnaces involved somewhat higher than base prices f.o.b. their furnaces. Now, however, various questions will arise. In open market conditions pig iron prices are not uniform at furnace as some districts develop lower or higher prices than others. Eastern Pennsylvania furnaces cannot stay on a Pittsburgh basis as that would make prices too high, while again, their prices normally rule somewhat higher at furnace than is valley iron at furnace. Southern iron, of course, must be at less than northern at furnace or it will not sell in sufficient volume since to engage the capacity of southern furnaces much iron must be sold in the north with heavier freights than must be paid on northern iron to delivered points. Birmingham prices prices used to rule about $3.25 below valley prices. Now Birmingham and valley are both quoting $31 at furnace on foundry iron, and Birmingham iron must come down still more, while besides that, the Birmingham furnaces are not nearly as well sold up as the northern furnaces. Eventually all these things will have to be straightened out, and this will make it difficult to maintain pig iron prices. Competition will more readily develop in pig iron than in steel since steel prices are easier to maintain because practically all steel prices are based on Pittsburgh, plus freight.

As to adjusting prices under pig iron contracts, each case will probably be considered individually. Nearly all buyers of pig iron who have contracts at Government prices are requesting that the $3 concession be made, and while furnaces have said a good bit about contracts being contracts and enforceable at law, the probability is that in most cases the furnaces will eventually recede and make the concession. They suggest that an important consideration will be whether the customer would be put at a disadvantage by reason of competition in his finished products if required to pay the contract price.

Steel Demand Light

Demand for steel products generally is very light. As to new buying and enquiry there is practically none, while specifications on contracts are light. There is, of course a large tonnage of contract tonnage on books, but it does not mean actual business unless the buyers specify or give actual shipping orders. The mills are of course ready, as a rule, to accept orders under the contracts at the recently reduced prices instead of at full contract prices, but that does not bring much business. For a time the mills made claims that they would hold buyers to contract prices despite the open market reductions, but no one took that talk very seriously. What was expected, perhaps, was that shipments through December would be invoiced at the old prices, but in some cases at least the concession was made to apply even to shipments between December 12, the date when some steel mills announced the reduced prices, and December 31.

The New Steel Contract

There is much more discussion than adoption of the new form of contract for the sale of finished steel products approved by the board of directors of the American Iron and Steel Institute and recommended for adoption by the trade. The feature of the new form is the provision for "liquidated damages," to be paid by the mill if it fails to ship on time and by the buyer if he fails to specify on time, the "liquidated damages" to be the difference between contract price and market price at time of failure, but in no case to be less than five per cent. of the contract price. The statement has been printed in two trade papers that the new contract is "already in use by leading steel producers," but that is not correct unless the phrase "in use" be interpreted quite liberally. It is certain that regular contracting is not being done with the new form, and it is very doubtful whether a single steel producing company has yet had contracts printed with its name thereon. The form that is used for discussion is a form printed by the institute, with no particular steel company name printed.

Generally speaking the steel producers favor adoption of the new contract form, but they are looking for leadership. Usually leadership is furnished by the United States Steel Corporation, but it seems there still needs

to be discussion between the corporation officials in New York and the heads of the subsidiary companies, which make the actual sales, before a unanimous opinion is developed.

If this new contract form were adopted the result of course would be to limit very greatly the amount of forward buying and forward selling, as neither party would be willing to commit himself so far ahead when the contract had to be lived up to. Hitherto at one time buyers would fail to specify, while at another time mills would fall behind in deliveries. Buyers overbought and mills oversold.

Trade Prospects

The entire trade, buyers and sellers alike, are in accord that it is unlikely there will be much market activity for some time to come, say for three months at least. While it is sometimes contended that prices will not decline further, there is practically no doubt that in time they will. Doubtless, as has been the case in the past when buying practically ceased at a time when there was much contract business on books, prices will be maintained as far as possible to encourage buyers to take out contract material. When there is not much more business in actual shipping orders to be squeezed out of contracts, and when there is a disposition on the part of consumers to make fresh sales, prices will come down to whatever point is necessary to get buyers to take hold. The steel mills always endeavor to avoid reducing prices to the last point until the buyer is known really to be ready to take hold.

There is practically no doubt that steel mill operations will drop to less than 75 per cent. of capacity within a very few weeks, and a rate of 60 per cent. or less may be reached. Capacity may now be estimated at about 49,000,000 gross tons of steel ingots a year, while in 1913, the best year before the war, production was about 30,300,000 tons, and capacity at the end of the year, or just before the war was about 34,000,000 tons. Thus even a 60 per cent. operation of the steel mills at this time, when there is scarcely any new construction work going on, and hardly any railroad buying, would really represent quite a lot of steel in the circumstances.

THE WEEK IN INDUSTRIAL HAMILTON

THE RETURNED MEN GET THE PREFERENCE

Canadian Westinghouse Expect to Have Larger Force at Work Soon

HAMILTON, Ont.—The Canadian Westinghouse, which was a big manufacturer of munitions for the Allied Governments, is returning with renewed energy to the manufacture of its numerous products, and is confident of greatly increased business during the present and the next few years. During the war the plant employed about 2,600 hands, working on munitions.

With the cancellation of war orders the company found it necessary to dismiss only a very few of their men during the period which it will require them to return to staple lines again. Just now the company is arranging for new orders, and they expect to increase their staff over their war strength. More than 700 men voluntarily enlisted from their plant, and positions will be given each of them on their return. Already over 200 returned men are employed there, and preference is being given the veteran and Britisher.

TRADE WITH SIBERIA IS BEING CONSIDERED

Hamilton Men Are Organizing To See What Can Be Done in the Matter

HAMILTON.—M. J. Finlay, representative of the Canadian Trade and Commerce Department, is touring Canada under the direction of Sir George Foster, in an effort to try and secure interest among manufacturers in the shipping of their products to Siberia. Mr. Finlay, who is a young man, has lived in Siberia for a number of years, having been connected with various agencies, including that of the Lloyd Company. He also became a Red Cross worker when conditions required that the Russians needed assistance.

In Hamilton he spoke before a large gathering of local manufacturers, including representatives of almost every industry in the city. He went over the advantages and the difficulties of handling goods in Siberia in a very efficient manner, explaining that at the present time Siberia boasted one railway which ran several hundreds of miles. He also referred to the rivers of the country which have been put to use for transportation purposes, and stated that the railways were equipped to handle heavy weights up to about two tons, but that other than those weights should be packed in boxes of about three by two by one feet.

A scheme was suggested by George Martin, general traffic manager of the Toronto, Hamilton and Buffalo Railway Company, whereby the Dominion as a whole, in going after the new trade in Siberia, should co-operate; the banks to establish branches in Siberia, and the various manufacturing interests, with the assistance of the Government, to build a huge warehouse at the port of entry, and for all companies to ship their products to that house, where an efficient sales expert representing every line shipped, would handle the sales.

Manley Morden, manager of the head office of the Bank of Hamilton, drew attention to the fact that a local banker had been appointed to the commission which was to investigate conditions in Siberia, and that he could not comment on the subject until such time as the report of the commission was available. However, he expressed his belief that the Government, in appointing a banker to the commission, had the same idea in view as proposed by Mr. Martin, so far as the financial end of it was concerned.

The board of trade are going to meet again and consider the matter, and advise the Trade and Commercial Department that, if they can arrange guarantees of payment for the goods, that local concerns will ship goods to the country.

M. J. Finlay stated it was only a matter of a very short time before the representatives of the Allied Governments would, at the peace conference, decide upon some definite policy for the country, and that the period of revolution would be passed.

"The trouble there now is that they have never before had freedom of speech, and now that they can talk they all want to do it at once and the country is not big enough to hold them, although it is very large," said Mr. Finlay during his address.

HARD TO SECURE SUFFICIENT GAS

And in Consequence a Number of Departments are Being Closed Off

Hamilton.—That a number of local manufacturing concerns will be forced to close certain portions of their business because of the putting into effect of the order shutting off the use of natural gas at the end of the present month, was the statement made by P. V. Byrnes, manager of the United Gas and Fuel Company to CANADIAN MACHINERY.

Under the original order of the Government Gas Commission, issued last July, all natural gas to manufacturing concerns in the city was cut off. Many of the manufacturers got busy and were granted special permits to use the gas to the end of the present month. In some cases this will mean the partial closing of certain manufacturing concerns, and in a few cases, unless a further extension to use gas can be secured, it will mean complete closing. The Westinghouse is one of the concerns cut off entirely, and it will mean the closing of some departments. The International Harvesters have been cut off but have secured a permit for the use of gas for their restaurant, which is maintained for the exclusive use of employees.

Many Shops Have No After-War Problems

Feel That More Assistance Should be Given by the Trade and Commerce Department—Australian Trade Has Been Difficult to Hold During the Years of the War

Special to CANADIAN MACHINERY

BRANTFORD, January 8.—Several of the manufacturers in this city have no after-war problems to deal with. In fact they are in a much better shape than those in several nearby places that have been working exclusively on war contracts. There have been big war orders placed and completed here in the last few years, but many of them have been finished and regular lines substituted well in advance of the signing of the armistice.

As a matter of fact, Brantford is also about the only place in the country that still has war contracts that may live. Dominion Steel Products, Ltd., who intend to go into the building of engines and marine work, have orders that stand for gun mounts, while Motor Trucks, Limited, have a contract for 9.5 shells that hovers between life and death. Officials of this latter company, when asked by CANADIAN MACHINERY in regard to the present standing of the contract, said that they were not in a position to state definitely just how their contract stood. Neither were officials of Motor Trucks ready to state what they were going to do with their immense plant once the war orders are out of the way. It is generally understood that they have a pretty good idea of the lines they will follow, but Mr. Detwiler, president of the company, stated that for the present they preferred not to discuss their plans for publication.

Canadian Manufacturers' Position

"The Canadian manufacturers right now are not facing any worse position than they were at the outbreak of the war. Then they did not know that the war was coming. We passed from a peace footing to war conditions over night. Recently it has been known for some time that the war was going to end, and end right, and the manufacturing interests are in better condition to pass back to peace lines than they were to undertake the new and untried lines of war material." Such is the belief of Logan Waterous, of the Waterous Engine Co. At present orders for the U.S. Government for 12 large marine boilers are in course of completion in the well-known Waterous shops, and there has been no slackening of effort in other lines of work. "Provided there is a good season in the lumber business we should also feel the effect of this," continued Mr. Waterous. "We had British contracts in our shops for the 4.5 shell, but these were finished some time ago, and our policy since then has been to develop our old lines. In fact we never dropped them." Mr. Waterous, in discussing the possibility for Canadian manufacturers entering the foreign market, stated that there was no doubt a great need for a more aggressive policy on the part of the Department of Trade and Commerce at Ottawa. Manufacturers needed assistance at present in entering markets that had been unsettled following the war. It was not fair to ask individual manufacturers to go ahead and do this work entirely on their own initiative. Mr. Waterous was satisfied that this same feeling was quite common among the manufacturers of Canada who were producing lines suitable for export business.

The Cockshutt Plow Co.

This is one concern that is looking after trade abroad as well as at home; in fact the bulk of the output goes to foreign markets. The Cockshutt Company are preparing now to send abroad for business. Col. Harry Cockshutt, chief of the experimental department, and G. K. Wedlake, are leaving in a few days for Europe, and expect to spend some time on the continent, while James A. Latimer, who has spent some years in Australia in the interests of the Cockshutt Company, started the first of the week for that country.

"Prospects for business are very satisfactory," stated Mr. George Scott, of the Cockshutt Co., when discussing the matter with CANADIAN MACHINERY. "There are sales being made now that were not possible before. For instance, during the last year we shipped 6,200 tractor plows to England to help in the campaign for the increased production of food there. We have inquiries in for large orders of 12 in., 14 in. and 16 in. plows from West Siberia. The trouble with business there now is who is going to pay the bill. The trade with South Africa has remained remarkably stable during the entire period of the war. In fact it has been a much better place for business than Australia."

Mr. Latimer, the Australian representative of the Cockshutt Plow Co., stated that several things had militated against the development of business with Australia, especially in the last few years. "The most notable of all," he remarked, "has been the increase in freight and shipping charges and the impossibility of securing transportation at any price. Charges that before the war were $3 for shipping have been as high as $65. Then again, owing to the shortage of shipping bottoms, the wheat has not been moved out of the country. The Government took over the entire stores of wheat there, and paid the growers three shillings a bushel, with the understanding that when sales were made there would be a dividend on this. The dividend amounted to about three pence a bushel, which brought the price up to 85c per bushel, which is quite a difference to the price the Canadian farmer has been getting, which is practically three times as much. There is a tremendous store of wheat in that country now, parts of the crops of 1915-16-17 and 18 being still stored there. This has had the effect," stated Mr. Latimer, "of making a good many of the growers leave the land. In fact it is estimated that 40 per cent. of the growers quit the business. Such a state brought a lot of used farm machinery on the market and hurt trade considerably. There are easily 165,000,000 bushels of grain in Australia now.

"It is almost impossible for Canadians to get in there to sell buggies and wagons, as there is a high tariff of 55 per cent. maintained against foreign importations in these lines. In fact that is true of many of the lines that it has been found possible to make in Australia. There is a 20 per cent. tariff against plows. On binders there had been none until the war, and now there is 5 per cent. for revenue." Mr. Latimer will make an extended tour of the country and will be away for some time.

Mr. Scott, when on the question of export business, stated that the manufacturers could be greatly assisted by a more vigorous campaign on the part of the officials of the Trade and Commerce Department. "There are many doubtful markets, and the individual manufacturer should not be expected to go ahead and find out all the facts himself. If it's bad or doubtful business he's after, he doesn't have to send so far away from home for it."

The labor situation has been such as to hinder production at the Cockshutt plant for some time, although there has been an improvement lately. Several of those who have been working in munitions plants for some time at high wages do not care to go back to work at anything approaching the old scale. They have saved some money and aren't particularly anxious to come down to the smaller wage connected with the peace line.

The Question of Material

Goold, Shapley & Muir turned out a large quantity of munitions. They were early in this business, and secured good results from their 4.5 contracts. Speaking to CANADIAN MACHINERY, W. H. Whitaker, secretary-treasurer of the company, stated that the manufacture of tractors here was a difficult matter because of the competition of the American firms, who were able to buy the raw material to better advantage than the

Continued on page 69

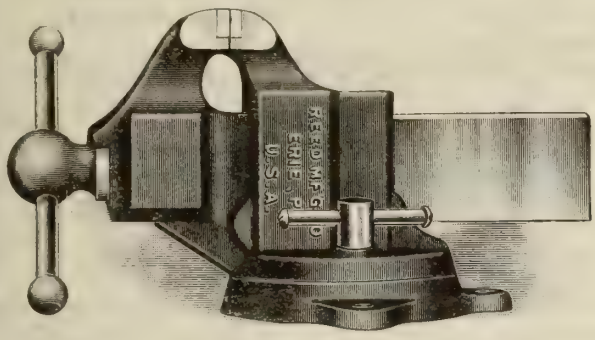
THE A. R. WILLIAMS MACHINERY CO. LTD

64 FRONT ST., W. TORONTO, ONT.

SALES — SUPPLY DEPARTMENT — SERVICE

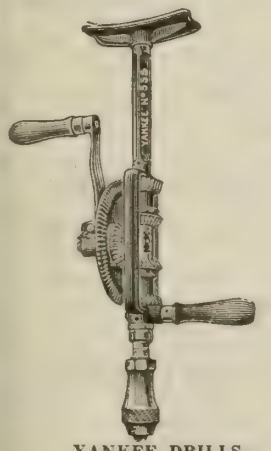
MAKING THE GARAGE PAY

Nineteen-Nineteen will undoubtedly be a banner year for garages. This is, to the garage equipped to MAKE IT PAY. Therefore, why drift along without the many inexpensive lines that reduce your overhead by facilitating rapidity of work. With prices right, and an excellent stock, the following lines meet your expectations.



Reed Vises

Have established a reputation of high quality. Backed by a guarantee to be right in every respect. A guarantee that says if there is anything anywhere wrong with a REED Tool it will be repaired or replaced free of charge.



YANKEE DRILLS

Yankee Tools

In these days, when, to come out on top, the newest, cleverest and quickest operating tools are in demand, no tools meet the situation like YANKEE. An efficient, strong, durable and smooth working tool, covered by inducive prices, make it the tool for garage use.

Wright High Speed Hoists

These four words have spelled success to the manufacturer of a particular line. For fourteen years they have been advancing to meet every condition. The service a WRIGHT Hoist gives you indicates its quality, for the material in every part of this hoist is the best that can be obtained. For overhead space and where short distance between hook is essential, WRIGHT Hoists will meet your requirements. When you buy a WRIGHT Hoist you get maximum efficiency at minimum cost. Make your next hoist a WRIGHT Hoist.

Mossberg Socket Wrenches

These Ratchet Sets are leaders in their line, a line that will reduce your overhead by facilitating rapidity of work. For present day methods they are a necessity. Pressed out as they are from high quality steel, they assure you of long life and big returns for small outlay.

The A. R. WILLIAMS MACHINERY CO., Ltd.

TORONTO, ONTARIO

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$32 75
Lake Superior, charcoal, Chicago	37 50
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	37 25
Basic, Valley furnace	33 40

Government prices.

	Montreal	Toronto
Hamilton	....	.....
Victoria	....	50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Steel bars, base, Toronto	4 90
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	*2 90
Tank plates, Pittsburgh	*3 25
Structural shapes, Pittsburgh	*3 00
Steel hoops, Pittsburgh	*3 50

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

*Government prices.

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$ 27 00	$ 28 00
Electro copper	27 00	28 00
Castings, copper	26 00	26 00
Tin	75 00	78 00
Spelter	9 50	10 00
Lead	9 00	10 00
Antimony	10 00	11 50
Aluminum	43 00	50 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 8 00	$ 7 00
Plates, 3-16 in.	8 50	8 40

WROUGHT PIPE

Price List No. 37

	Black	Galvanized
Standard Buttweld	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	5 22	7 35
⅜ in.	5 22	7 35
½ in.	6 63	8 20
¾ in.	8 40	10 52
1 in.	12 41	15 56
1¼ in.	16 79	21 05
1½ in.	20 08	25 16
2 in.	27 01	33 86
2½ in.	43 29	54 11
3 in.	56 61	70 76
3½ in.	71 76	88 78
4 in.	85 02	105 19
Standard Lapweld		
2 in.	31 82	38 30
2½ in.	47 97	58 21
3 in.	52 73	76 12
3½ in.	78 20	96 14
4 in.	92 65	114 00
4½ in.	1 12	1 37
5 in.	1 30	1 59
6 in.	1 69	2 06
7 in.	2 19	2 68
8L in.	2 30	2 81
8 in.	2 65	3 24
9 in.	3 17	3 88
10L in.	2 94	3 60
10 in.	3 79	4 64

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	18 00	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	19 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Heavy melting steel	20 00	15 00
Shell turnings	9 00	8 00
Boiler plate	21 00	15 00
Axles(wrought iron	30 00	15 00
Rails	26 00	15 00
No. 1 machine cast iron	30 00	18 00
Malleable scrap	25 00	15 00
Pipe wrought	18 00	8 00
Car wheels	38 00	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove Plate	22 00	14 00
Cast boring	11 00	8 00
Scrap zinc	6 50	5 00
Heavy lead	6 00	8 00
Tea lead	5 50	3 50
Aluminum	16 00	18 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅝" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅝ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd. brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent.
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$47 50
Open-hearth billets	47 50
O.H. sheet bars	51 00
Forging billets	60 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅝ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

Steel Castings

Quick Deliveries

We Specialize in

High-Grade Electric Furnace Steel Castings

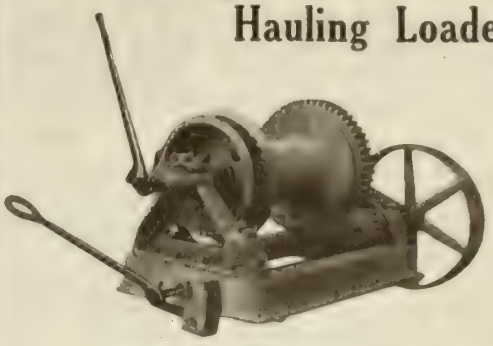
Let us quote for your requirements

The Thos. Davidson Mfg. Co.
Limited

Steel Foundry Division:
Lachine Canal, Que.

Head Office:
187 Delisle St., Montreal

For Hoisting Heavy Materials or Hauling Loaded Cars



Made in 7 Sizes

10 H.P.
15 "
20 "
25 "
32 "
40 "
" 50

Made with two drums also if desired.

We can also supply this Hoist geared for direct connection with an Electric Motor. Let us send you photograph or catalogue.

May we submit a tender on your Castings and Steel Plate Work?

Marsh Engineering Works, Limited
Established 1846
Belleville, Ontario

Sales Agents: Mussens Limited, Montreal
Winnipeg and Vancouver

Free Tool Grinding Chart

Grind your cutting tools in exactly the right way to get best results—and you save time. That's obvious. It is precisely that that this Tool Grinding Chart enables you to do.

It has been adopted as standard by many firms that found it a long way better than guess work.

CANADIAN MACHINERY would like to see this Chart in every shop in the Dominion. Mail the coupon below for your copy to-day.

Shows at a glance Correct Clearance and Rake Angles for Cutting Tools

CANADIAN MACHINERY,
153 University Avenue, Toronto.

Please send me/us free, one of your tool grinding charts.

Signed.....

Firm Name.....

St. Address.....

City.....

Prov. .....

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 16
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 50
Sheets, black, No. 10	10 00	8 50
Canada plates, dull, 52 sheets	9 00	9 15
Can. plates, all bright	9 50	10 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	10 70
Premier, 10¾ oz.	.....	11 00
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$36 00	$.....
1¼ in.	40 00	.....
1½ in.	43 00	36 00
1¾ in.	43 00	36 00
2 in.	50 00	36 00
2¼ in.	53 00	38 00
2½ in.	55 00	42 00
3 in.	64 00	50 00
3¼ in.	.....	58 00
3½ in.	77 00	60 00
4 in.	90 00	75 00

Prices per 100 ft., Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.		Cts. per lb.	
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

45,000 SHOWERS

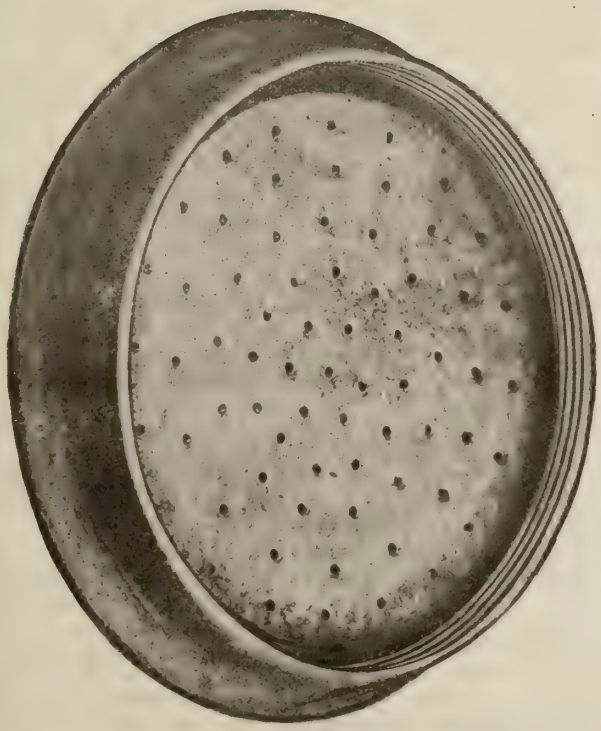
A Manufacturer Gives the Details of Filling a U.S. Government Order for 45,000 Shower Heads, Using Geometric Die Head and Collapsing Taps.

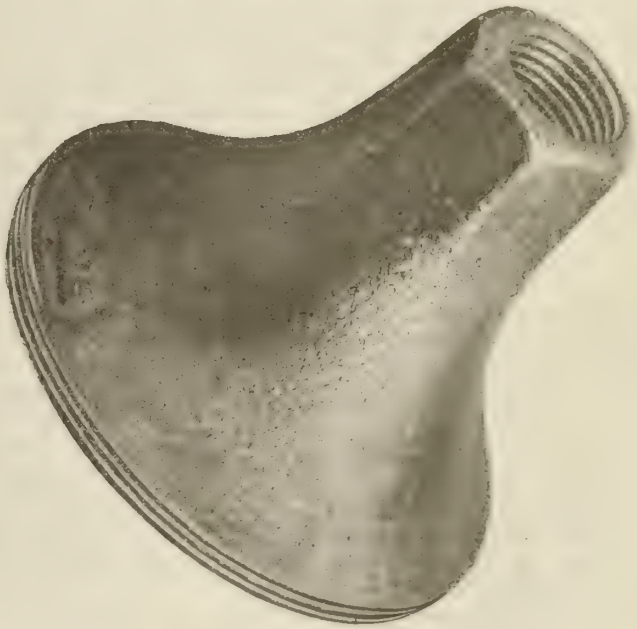
"On the main thread of the shank 3⅜"-16, we average 230 per hour, with a surface speed of about 400 feet per minute. On the pig iron end we averaged 220 per hour, with a surface speed of about 200 feet per minute. This speed may seem a little low, but we cut this down in order to get a quicker handling of the work. We handled these in air chuck, and in releasing air chuck the work automatically dropped to a box below.

"On the face, tapped 3⅜"-16, we averaged 210 per hour, with a surface speed of about 400 feet per minute.

"We were very much pleased with the Geometric tools on this work, especially with the chasers, as we completed 30,000 showers, male thread, with one set of these chasers."

Try a Geometric Thread-Cutting Die Head or Collapsing Tap on your work, and be equally pleased.



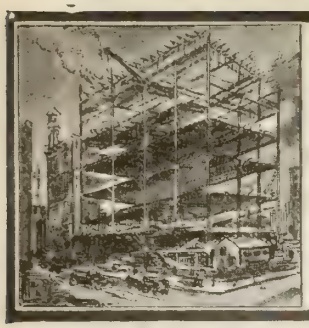


The Geometric Tool Company

New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal; The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Bridge Collapses at Teeswater, Ont.—The new cement arch bridge on Con. 15 and 16, in Normanby that was built last summer by contractors Clarke and Cole, of Owen Sound, collapsed on the 7th inst. The span was seventy feet. The plan was prepared by O. L. Surveyor McDowell, of Owen Sound. The foundation was bad and unsuited to a concrete bridge.

St. Andrew's Hospital. — Although military and public works officials state they have received no official word that the Dominion Government has abandoned the $2,000,000 St. Andrew's Hospital scheme which called for the erection of thirty buildings, it is rumored among contractors in the city that the proposition has been dropped. Tenders were called on December 12, but Mr. Hastings, Clerk of Public Works for Toronto, states that he has received no notice that the tenders have been accepted. The St. Andrew's College property cost the Dominion Government $500,000.

WANT TO INVESTIGATE THE FORD CONTRACT FOR THE EAGLE BOATS

CONSIDERABLE interest attaches to the story that Henry Ford's contract for Eagle boats will be investigated. Senator Lodge calls for the investigation, and from the nature of the charges it would seem likely that Lodge's request will be allowed. Of course, there may be motives of purely political character behind the move. The Canadian Ford plant is in no way concerned with the rumpus that seems to be looming at Washington.

A despatch from Washington, referring to the matter, says:—

Senator Lodge introduced into the Record extracts from the series of articles now current in the "Daily Iron Trade," a publication devoted to iron and steel industries of the great lakes region, in which the deliberate charge was made that the Ford contract to build the Eagle boats was wasteful to the last degree, that the need for boats had long passed and that opportunity for profiteering to a hitherto unsuspected limit reposed in the exceedingly favorable contract which Mr. Ford holds with the Government.

Basis for the Demand

The article which Senator Lodge used as the basis for his demand for the investigation was in part as follows:

"The cost of the Eagle boats originally was placed at $275,000, or $500 a ton without guns. The estimate cost now is $400,000, or $800 a ton. The cost of ordnance comes to $112,000 a boat. Under the contract agreement the Ford Motor Company is to be paid $20,000 over the actual cost if the cost of the hull and machinery exceeds $275,000. Twenty-five per cent. of any saving under $275,000 is to be paid the Ford Motor Company in addition to the $20,000.

"The contract reads, 'The contractors shall use every endeavor to deliver the first of said vessels within five months from the date of this contract, March 1, 1918, ten boats within one month thereafter, twenty boats within the next following month and twenty-five boats a month thereafter.' "

The article which Senator Lodge introduced into the Record draws the deadly parallel between this highly advantageous contract and the pacifist utterances of Henry Ford in which he said he would not accept a cent of profit out of his war contracts. The article continued:

"Had the late candidate for the Senate lived up to his contract ninety-three Eagles would have been completed and in commission by December 15. As a matter of fact exactly seven had been completed by that date, three being in New London, Conn., and four somewhere between Detroit and New London, and of these seven six were rushed to the coast leaking and generally incomplete to get them out before the freeze (of Lake Erie)."

Says First Boat Leaked

The article declares that "the first Eagle leaked badly and not until she was electrically welded did she become water tight." The first Eagle was launched July 11, 1918, but could not start for the Atlantic coast until November 4.

"Most of these intervening 116 days were spent remedying the poor riveting and other defects in the hull," the article asserts. "Originally estimated to cost only $275,000 or thereabouts this figure now has been increased to $400,000. On top of this comes $112,000 each for armament and $20,000 for Henry Ford's profit, thus the items of profit, cost of hull and machinery and the outlay for ordnance mount up to $532,000. The changes that will have to be made on the Atlantic coast before the boats are really ready for service will easily bring the total to $550,000, it is estimated."

MARINE

Captain George W. Purdy, of Plymouth, Yarmouth county, reached his home last week after an absence of over six years.

Montreal.—The annual report of the Manchester Liners, Limited, of Manchester, England, has been received here. At the outbreak of the war the fleet consisted of fifteen steamers, and of this number eight were sunk by mine or submarine. Five steamers were purchased and two built to replace the losses, the year's work proving very satisfactory.

Captain Purdy was, previous to the outbreak of the war, master of the Battle Line steamer "Pandosia," of St. John, which ship arrived at Hamburg just a day or so prior to the declaration of war. Within two or three days after the declaration Captain Purdy and his first officer, Captain S. S. Patterson, of Port La Tour, N.S., were with many others taken prisoners, and have ever since been held as such, although several at one time or another have been exchanged.

Montreal.—The owners of the steamer Heathcote, the Dominion Shipping Co., have been awarded $183,354, including interest, for her loss following a collision with the ship Kelbergen in the Bay of Fundy in July, 1917. The owners of the Kelbergen, Messrs. Furness, Withy & Co., have been condemned to pay this amount according to a finding by W. S. Walker, K.C., deputy registrar of the Admiralty Court, confirmed by Mr. Justice McLennan. The assessors were Thomas Robb of the Shipping Federation and Thomas Hall of the Hall Engineering Works, Montreal.

London, Eng.—Sir Joseph MacLay, the Minister for Shipping, pointed out recently that the ending of hostilities had eased the shipping position enormously and had permitted tonnage available for bringing imports to the British Isles to be increased by something equivalent to 10,000,000 tons of goods per annum. Shipping losses having ceased and the output of tonnage continuing to in-

Dominion Friction Surface Belting

Conserves Power and Labor, Increases Production, and Cuts Manufacturing Costs

The lowest possible manufacturing cost is obtained only through highly efficient equipment that will conserve power and labor and "speed up" production.

Dominion Friction Surface Belting is the most economical and efficient transmission equipment obtainable.

Dominion Friction Surface Belting is more than waterproofed fabric—it conserves power by taking a "bull-dog" grip on the pulleys, that practically eliminates slipping and transmits the maximum force that can be transmitted by a belt.

The economy, uniformity and dependability built into each foot of Dominion Friction Surface Belting insure long and continuous service, which saves much time, energy, trouble and worry for employees, and prevents idle machines by removing the cause of transmission troubles.

Dominion Friction Surface Belting "speeds up" production by giving long and continuous service—by conserving power and labor and insuring satisfied operators.

In the largest
Paper Mills
Flour Mills
Steel Plants
Sugar Refineries
Textile Mills
Grain Elevators
Railway Shops
Machine Shops
Saw Mills
Power Houses
Cement Mills
Automobile Plants
Quarries
Mines
and wherever Transmission is required.

CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION RUBBER SYSTEM
AND ASSOCIATED COMPANIES

Our belting engineers can help to cut your manufacturing costs just as they have helped other manufacturers.

One of our service branches is within phone call of your plant---your request for advice places you under no obligation.

Service Branches:

Halifax	Toronto	Fort William	Edmonton
St. John	Hamilton	Winnipeg	Calgary
Quebec	London	Brandon	Lethbridge
Montreal	Kitchener	Regina	Vancouver
Ottawa	North Bay	Saskatoon	Victoria

crease," said Sir Joseph, "the position grows easier day by day. The time is not far distant when it will be possible to release tonnage from requisition on a substantial scale and thereby create a free market in tonnage and freight.

Steamer Morden Makes Record.—The big Canadian steamer, W. Grant Morden, of which Capt. Geo. Pearson of Owen Sound is master, has made a record showing for the season, and her freight earnings for the last round trip will be the largest ever made by a lake freighter. The steamer left Buffalo early in the month for Duluth with a cargo of hard coal, and was due back at Buffalo on Monday or Tuesday with a load of grain. The Morden took about 13,000 tons of coal on the upbound trip, at $1.15 a ton, and on the run down she has 450,000 bushels of wheat, for which she will receive 7c a bushel. The freight on the latter cargo is, therefore, about $31,500, and figuring on the coal at $13,000, she will earn about $44,500 on the round trip. The Grant Morden holds the record for the largest tonnage to go through the Soo Canal.

Halifax, Jan. 1.—Capt. E. Craddock of the steamer "War Taurus," lying at Dewolf's wharf, this city, was accidentally shot in the back this morning while attempting to quell a disturbance on board the ship. The Captain was rushed to a hospital, where he is now being operated upon, and all the members of the crew, numbering 20, were taken to the police station for examination. According to the agents of the steamer, a number of the men attempted to raid the ship's stores this morning. The steward in charge communicated with the Captain, who, after ordering the men to disperse, handed his revolver to the first officer, telling him to use it if the men refused to obey orders. A scuffle followed, and in the excitement the Captain was shot in the back, the bullet entering his body near the spine.

The "War Taurus" was built in Toronto, and this was her maiden trip.

MUNICIPAL

Toronto.—On the return of the Harbor Commissioners from Ottawa, it was announced that the Government, through Hon. Frank Carvell, had signified its intention of proceeding directly with the work on the eastern end of the harbor. The park and boulevard at the western end will be carried through, and next year the work will be in full swing from Ashbridge's Bay to the Humber.

Tottenham, Ont., has recently passed a by-law for the establishment of a commission for the administration of all works undertaken by the corporation for the distribution and supply of electrical energy consequent upon the contract entered into with the Hydro-Electric Power Commission of Ontario. A vote will be taken in January for the election of two of the members of the Commission.

PERSONAL

Major F. L. C. Bond has been appointed chief engineer of the Grand Trunk Railway system with headquarters at Montreal.

One of the Greatest Men of the War—although but little has been said of him—is Captain E. P. Jesop, of the United States Navy. Capt. Jesop put 500,000 men in France, saved the United States same $20,000,000, and put the German interned ships into operation a year ahead of the time anybody had a right to calculate that they could be put into commission. Captain Jesop did it all with an idea. The idea was that the broken parts of the engines of the German ships could be repaired by electric welding.

Major Bond, who succeeds Mr. H. R. Safford, recently appointed engineering assistant to the regional director of the central western district, United States railroad administration, has just returned from overseas after two years' service with the 10th Battalion Canadian Railway Troops. He was born in Montreal in 1877. He was educated at Montreal High School, the Collegiate Institute and McGill University. Upon graduating from McGill in 1898, he entered the service of the Grand Thun as assistant resident engineer of th eastern division, and in 1901 was ap pointed engineer in charge of doubl track construction. In 1902 he wa night superintendent on the construc tion of the Park Avenue tunnel of th New York subway, but returned to th Grand Trunk as resident engineer, east ern division, a position which he hel until 1913. From 1913 to 1916, whe he went overseas, Major Bond was divi sion engineer, eastern lines. He holds high reputation in railway and engineer ing circles and his work with the Cana dian expeditionary force won the highes commendation.

TRADE GOSSIP

Vancouver, B.C.—Mr. G. D. Swan consulting engineer for the Dominio Government, has investigated the harbo facilities of Victoria and Vancouver i connection with the placing of orders fo steel ships.

Coal Production in B.C.—A decreas in production of coal in British Columbi during November amounted to approxi mately 49,476 tons, as compared wit the October total. The falling off i

Lieut. Lloyd M. Archibald of the Royal Flying Corps, well-known representative of the Dart Union Company of Toronto, as he appeared as a prisoner of war in Germany (on the right). Word has just been received by his brother, Charles Archibald, of Charles P. Archibald Co., machinery dealers, Montreal, an nouncing his safe arrival in Englan after being a prisoner in Germany fo over a year.

ALGOMA

MARK OF ALGOMA O.H. QUALITY

Structural Steel—Merchant Bars

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Iron, Brass and Bronze Castings

Steel Rails—Open Hearth Quality

All Sections from 12 lbs. to 100 lbs. per yard

Splice Bars

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Sulphate of Ammonia

Sulphuric Acid *Nitre Cake*

PIG IRON

Basic *Foundry* *Bessemer*

ALGOMA STEEL CORPORATION, LIMITED

SAULT STE. MARIE, ONTARIO

attributed chiefly to the lower output of the Island collieries, caused principally by the Spanish influenza epidemic. November production is estimated at 168,006 tons, as against 217,482 tons for October. For the eleven months ending November production in British Columbia amounts to 2,372,161 tons, which is 222,186 above the 1917 record.

Promoting Empire Trade.—Measures are being taken by the "Bulletin" of the Imperial Institute to familiarize tanners in the British Empire with the good qualities of the Indian hides. Before the war these hides were collected by German agents and were exported principally to German tanneries. Investigation has been made regarding the possibility of finding British markets for the Indian raw materials, and information is given out to the representatives of the leather industry so that this trade can be kept within the Empire when normal conditions are restored.

New Premises.—The Vanadium-Alloys Steel Company of Pittsburgh, and Latrobe, Penn., manufacturers of high speed and alloy tool steels, have leased the offices and warerooms at 566-568 West Randolph street. This company will carry in Chicago a large stock of "Red Cut Superior" high speed steel in all the standard sizes and shapes of bar stock, also treated bits for tool holders. Owing to the size of their new warerooms, the Vanadium-Alloys Steel Company will now carry a much larger stock than formerly with which to serve their many customers in Chicago and contiguous territory.

Hamilton's Output.—Hamilton munition plants turned out 3,471,425 shells during the war for the allied forces. The largest output of individual shells was that of the Dominion Steel Foundries, which turned out 1,316,430 18-pounder shrapnel shells. The heaviest shells manufactured here were the 60-pounder high-explosive shells, manufactured by the Canadian Westinghouse, Limited, and the Sawyer-Massey Company. Nine local plants turned out 18-pounders, the production of which far exceeded that of any other kinds. Manufacture of munitions in Hamilton began in 1915 and ceased in December, 1918.

Shell Boxes for Municipalities.—Sir Joseph Flavelle, chairman of the Imperial Munitions Board, when spoken to in connection with his gift of 134,000 shell boxes to the city of Ottawa, stated that a similar course was being adopted in regard to other cities and towns throughout the Dominion. At the present time there were surplus supplies of boxes at forty different points, ranging in number from 200 to 150,000. All these would be presented to the municipalities in which they were located. Sir Joseph said there would be no demand for these boxes now that all munitions manufacturing in Canada had ceased, and that to store them was out of the question.

London, Eng.—Lloyd Harris is visiting the Continent to look over the situation in Belgium and France and to confer with the Governments of those countries. Large supplies of all kinds are needed for rebuilding in the ruined areas and for equipping national industries, and there is sound ground for expecting that a considerable proportion of these goods will be bought in Canada, the Government in each case being the purchaser and assuming responsibility for all payments. There would appear to be openings for Canadian trade in the Balkans and Roumania. As for trade generally between Canada and Great Britain there is every indication that it will develop rapidly on normal business lines once restrictions upon imports are removed.

British Enterprise in Reconstruction.—In order to minimize waste, the vast bulk of war machinery in Britain is being adapted to the requirements of commerce. The Ministry of Munitions is buying, selling, and transporting machinery from useless districts to productive areas. The new productive scope of the machinery is enormous. The big pre-war firms are not only already engaged in fulfilling pre-war orders for such things as motor lorries, but are also carrying into effect schemes for the production of agricultural machinery, sewing machines, watches, clocks, and cheap motors. The shortage of prism glasses also has led, he says, to the installation of a plant for the manufacture of huge quantities of finer glasses even than the pre-war Zeiss.

Object to New Rate.—The Transportation Department of the Canadian Manufacturers' Association has issued a circular inviting discussion on the proposed increase in express rates which will come up before an official government body in March.

The changes in express charges are dealt with in the circular as follows:

"The Express Traffic Association for Canada, on behalf of the express companies, have applied to the Board of Railway Commissioners for authority to increase their rates an average of 25 per cent. west of Sudbury and 37 per cent. east of Sudbury over the present rates per 100 pounds.

"Shipments weighing 100 pounds or more now move under rates per 100 pounds generally based on the distance the shipment travels. The application proposes three schedules (instead of six as at present) of rates per 100 pounds.

"As is well known, in the past three years the railways have been allowed to increase their rates approximately 50 per cent. in Eastern Canada, and over 25 per cent. in Western Canada, during which time there have been no increase in express rates. This has had the effect of throwing traffic, formerly carried by freight, on the express companies, taxing their facilities and materially decreasing the efficiency of the service. The return to normal conditions, however, should assist to a great extent in re-establishing an adequate service."

Payment for War Contracts.—A meeting was recently held at Cleveland in which a number of Canadian manufacturers are interested. The gathering included representatives of 200 or more firms from both sides of the line that had been engaged in turning out war material for the American Government order. The object of the meeting was to urge prompt payment of all outstanding bills in this regard. Unless a speedy liquidation of these accounts, which in all amount to hundreds of thousands, is brought about, some embarrassing positions are anticipated. The manufacturers adopted a resolution recommending the immedidate passage of the Dent bill, with necessary amendments to meet the situation; asking Secretary Baker to take immediate steps to check the claims of sub-contractors, and urging the payment of such amounts as may appear to be clearly due. Several present and former members of the Government's War Department, who had participated in placing contracts by phone and verbally at times, attended, and stated their conviction that the Government was under a moral obligation to come forward and make the adjustments as soon as possible. As far as Canadian concerns are interested, the number is not very large in regard to the payment for actual material. Bills for the purchase of plants and equipment will, of course, be more numerous from this side of the line, and a number of large firms are working on their claims for compensation now. It is claimed though, that some firms that have shipped war material to United States, or forged it for treatment here on U. S. order, are experiencing some delay in securing payment for the same. It is claimed that payment for material turned out after the signing of the armistice is illegal, in the strict interpretation of the law, and a special act of Congress will be necessary to provide for liquidating the claims of these manufacturers.

CATALOGUES

The Norton Grinding Company, Worcester, Mass., have issued a Universal Tool and Cutter Grinder book — fourth edition—in which they describe their Universal Tools and Cutter Grinder. The various sizes of this machine are shown and attachments are also illustrated for the handling of almost any class of work which may be desired. Types of work, and set-up for the machine, are given considerable prominence. The various shapes of wheels which may be used with these machines are very clearly shown by a number of line drawings.

The Link Belt Co., Toronto, have issued a catalogue on the equipment for the handling and separation of coal at the mine. Their long connection with this business has enabled them to specialize in the equipment for the handling, separation and loading of coal at the mines. The catalogue shows the various types of coal-handling equipment made by the company and shows many complete installations that they have installed in the past. Eighteen pages are devoted to illustrations showing various coal tipples and loading chutes of various coal companies. The illustrations of complete equipment are followed by detail pictures, which show to good advantage the various types of conveying, sorting and cleaning appar-

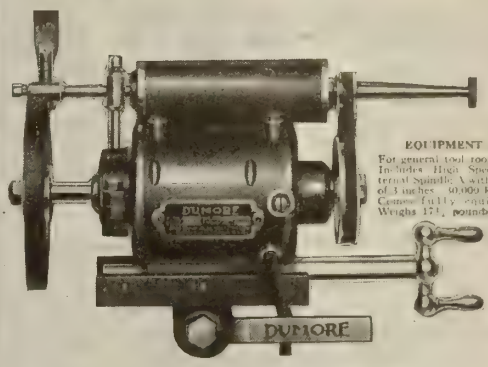
The Specifications Call For .0001±

SUPPOSE you were studying the specifications for a big job—one that called for making new and expensive tools—would your present tool-room equipment let you handle it? There are only two kinds of tools—the good and the poor—there's no half-way mark. And the quality of your output is fixed by the degree of accuracy you can obtain in your tool-room.

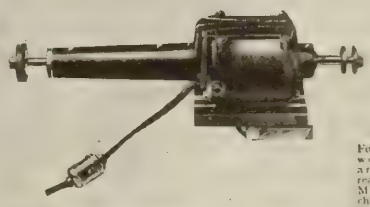
Accuracy in grinding depends upon correct cutting speed and perfect running balance. That is why the **DUMORE** grinder has been given speeds ranging from 10,000 to 50,000 R. P. M., along with a dynamically balanced armature. With this tool in your shops you can eliminate chatter, taper or bell-mouthed grinding. Then, too, the **DUMORE** is portable, easily carried to all parts of the shop and quickly set up in any machine ready for use.

If you are interested in obtaining only the best tools, ask your dealer about the **DUMORE** grinder. If he doesn't carry it, write us for literature and prices.

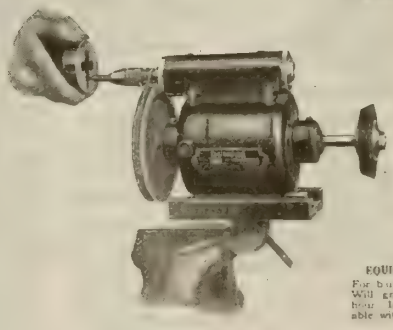
WISCONSIN ELECTRIC CO.
2907 16th St. RACINE, WIS.



EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 4 inches. 40,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.



EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 40 an hour. Interchangeable with A and B

DUMORE HIGH SPEED GRINDERS

atus. Box car loaders are shown, coal feeders and continuous centrifugal driers are illustrated.

The Hanson Clutch and Machinery Co., Tiffin, Ohio, have recently issued two catalogues descriptive of friction clutches and friction clutch pulleys. It is a well known fact that the majority of present day clutches are so large and heavy that they have a tendency to bind the shafts they are mounted on and cause trouble and expense to the users. The patented construction featured by this firm eliminates the cumbersome features of former clutches and permits the installing of an extremely powerful clutch in very restricted locations. Its light weight, small size and neat appearance make it particularly adaptable to as incorporation into machine tools. The booklet on friction clutches describes the principles involved, gives complete dimensions of the various types and makes recommendations as to their various uses. The catalogue dealing with friction clutch pulleys gives complete data regarding the various sizes of standard pulleys in which the clutch is incorporated.

Kelly Reamers and Production Tools is the title of a new catalogue issued by the Kelly Reamer Co., of Cleveland, Ohio. This catalogue is descriptive of the Kelly Floating Reamers and Production Tools with adjustable and replaceable high speed steel blades for machining of steel, iron, bronze and aluminum. They are used extensively in the machining of engine cylinders, crank cases, transmission cases, auto parts, pumps, connecting roads and tools, etc. The many combinations that may be obtained in tools of this type make it impossible for the manufacturer to illustrate and list more than a small portion of them in the pages of the catalogue, but representative types of reamers are described in extensive detail. The principle of operation is very clearly shown and the incorporation of the various units into multiple tools is treated of in a very interesting manner. Various arrangements are shown in which the tools are set up for various operations upon standard makes of machines, and also their use is shown in the operation of single purpose machines for various classes of work.

The Greenfield Machine Company, Greenfield, Mass., has issued catalogue No. 6 dealing with their Universal Tool and Cutter Grinder. The catalogue deals almost exclusively with the various operations which may be performed on this machine. Each operation is illustrated with an engraving and directions are given as to the proper set-up required. The bevel and face mill holder attachment is shown by means of four operations which are done by its use, grinding an angular cutter, grinding the face of inserted tooth cutters, grinding the end of inserted tooth cutters, sharpening counterbores, and sharpening small end cutters. Another attachment which is shown enables butt mills having taper shanks to be readily sharpened. Other illustrations show the sharpening of spiral cutters, grinding formed cutters, grinding the flutes of taps, grinding the clearance on a reamer, and sharpening the end of a chucking reamer. Cylindrical grinding may readily be performed on the machine, and taper grinding with the same facility. The Universal Vise is one of the most valuable and important attachments furnished with this machine, and considerable information is given as to its use.

The Gisholt Machine Co., Madison, Wis., have issued a new catalogue on the Gisholt Standard Turret Lathe. In this catalogue a departure is made from the usual line of trade literature in that considerable number of pages have been devoted to the illustrating of actual operations performed by the lathe. Close-up views of lathes at work are shown on the first thirteen pages of the catalogue, and it is stated that these photographs selected from a large number of different parts which have been finished on Gisholt machines show just what could be seen if a person stood beside the lathe doing the work. A number of operations shown are, machining gear blanks, machining cast steel wheels for trucks, machining steel gear blanks, and machining malleable iron wagon hubs. The machining of a cast iron truck wheel is taken through its various stages from the first operation to the production of the finished part. The use of the lathe in the machining of motor parts is shown in an illustration which gives a good view of the set-up used in the boring of steel cylinders for aeroplane engines. The mechanical advantages obtained by using the Gisholt Turret Lathe and the economical advantages obtained are gone into thoroughly and this information is followed by general specifications and dimensions together with pictures of the various sizes of the machines. The last part of the book is devoted to standard tools for the lathes, boring bars, reamers, tool holders, and chucks. The turret on the lathes, as well as the motor driven lathes, are illustrated and described.

The Link-Belt Company, Toronto, has issued a new booklet entitled "The Economical Handling of Coal and Ashes and Reserve Coal Storage." This book from the wealth of details and the illustrations it contains is a valuable reference work on the subject. The modern power plant contains much equipment which is the result of real engineering genius, but it is only recently that the boiler-room has begun to receive the attention which it deserves. The development of the electric generator, the steam turbine and its various accessories has proved a greater attraction to inventive genius than the more prosaic problems of fuel saving and labor saving in the boiler-room. As a matter of fact, however, boiler-room savings probably offer greater possibilities than further savings in the generator room. Many of the large power plants are built by corporations employing competent engineers, who are familiar with the best modern practice, and who obtain the co-operation of specialists in selecting and arranging the various parts of the equipment. In many of the smaller plants, however, the owner is apt to rely largely on his own judgment or on the judgment of an architect or engineer whose experience is not broad enough to ensure the best results. To both of these classes of power plant owners the subject matter of this book should prove of unusual interest, as it brings together in a compact form the various systems and devices used for the handling of fuel and ashes. The various types of equipment manufactured by the company are shown and power plant layouts are in all cases given, so that various arrangements of the conveying equipment may be readily seen and understood. The Peck carrier, belt, conveyers, scraper conveyers, and other forms of conveying apparatus are described in detail and weighing devices, measuring apparatus and other apparatus which goes to make up a complete coal and ash handling plant are described and illustrated.

WANTS A CHANCE FOR MANUFACTURER

Guelph Manufacturer Claims There is Opposition to All Development

Special to CANADIAN MACHINERY

GUELPH, January 9.—"There is no use denying the fact that there is in Canada a feeling of opposition to the manufacturer." Such was the opinion of Mr. E. Barelman, president and general manager of the Gilson Engine Co. at Guelph. "We have had a good chance to try this out in connection with tractors. It looks now as though it would be better for us to manufacture at our American plant for distribution in Canada, much as we would prefer to do it here. We have been waiting for a number of years now for matters to take a turn in the other direction, but we cannot see any favorable signs. The Canadian manufacturer does not want to put his protection on the back of the farmers who are going to purchase his goods, but he does want to have a chance to work in conditions that are favorable to his development, and he does not like to feel that his every movement is regarded with a certain amount of suspicion."

The Gilson Co. are going ahead, though, turning out tractors of a new type. Their silo department, which was started about three years ago, is feeling the high cost of material as there is a large amount of wood used in the Gilson silo. There is no after-war problem at this shop, and all departments are busy and well employed.

The most successful acid-resisting alloys are those of iron and silicon containing 14 to 15 per cent. of silicon. According to a paper read by Mr. W. C. Carnell before the American Institute of Chemical Engineering, such alloys resist the action of nitric and sulphuric acids of all strengths, and also are proof against atmospheric corrosion. In the acid industry this alloy is much more efficient than stoneware.

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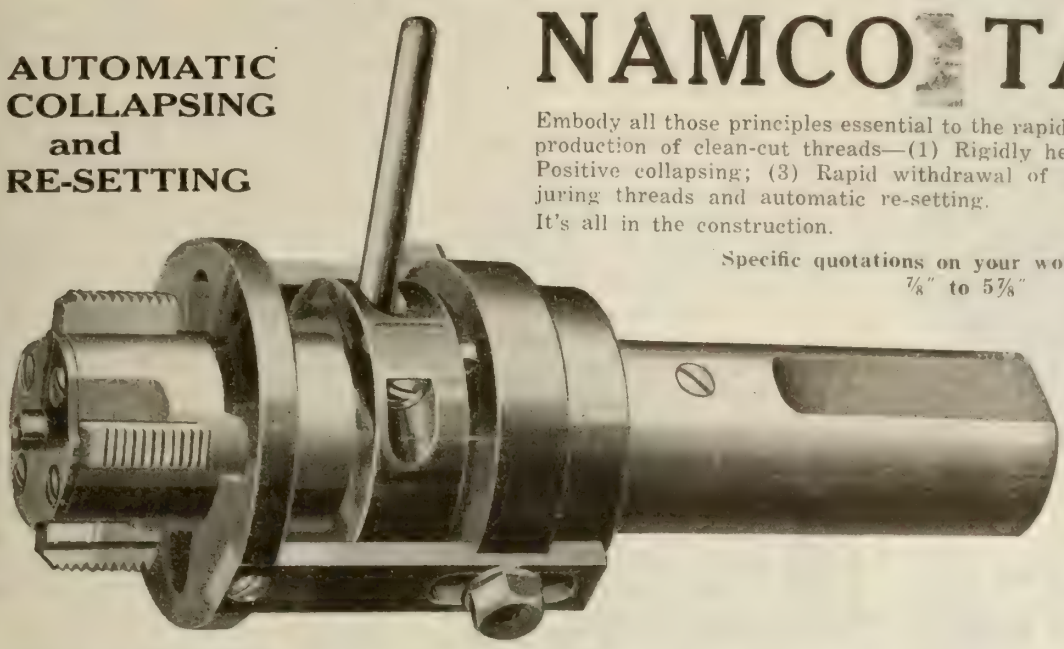

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DEAL GENEROUSLY WITH EMPLOYEES

Canadian Cartridge Co. at Hamilton Have Closed as Munitions Plant

HAMILTON.—Last Monday the Canadian Cartridge Company, as a shell plant, virtually closed its doors, and ceased to manufacture munitions. This is only one of the many plants here which has discontinued shell operations, but it is the only one to date that has been compelled to close down. Many other concerns which have been working on war material have reverted back to their pre-war lines and are building up large stocks in anticipation of large export business. Indications show that very large quantities of machinery, stoves, kitchen ware, wire, wire nails, roofing, tacks of all descriptions, and other commodities in daily use will be shipped to Siberia, while negotiations are under way to increase the export trade to South America.

The Canadian Cartridge Company, since the beginning of hostilities, have been manufacturing cartridge cases of various classes and on Monday last finished the last case of the anti-aircraft class for the United States Government. During the many months of war the company has been more than good to their men, and directly of great value to the Dominion. The profits on their orders were in a way divided with the men, this on the bonus plan, which was a very high rate. In order to stimulate production and keep their staff at the highest possible speed during the shortage of shells, the company offered inducements by way of special bonuses for every hundred cases produced over a given amount, and placed that amount within reason. Thus it was that the Cartridge Company won an enviable reputation.

Mr. Alex. Petrie, connected with the company, stated that the closing of the plant was for only a very short period, during which the company would carry on experimental work along the line of steel barrel manufacturing, and with the completion of that work would open their plant and commence operations.

When the company found it necessary to dismiss their shop staff they donated to each one a month's wages, and paid the wages and bonus due. This was in addition to a Christmas gift of $25 to each of the staff, and ten and fifteen dollars to each employee, according to his length of service.

The officials would not predict as to the possible length of time they would be closed, but indications would point to it being some months before they would again be operating.

Trade With Argentina.—Jorge Mitre, editor and publisher of "La Nacion," Buenos Ayres, who spent a few days in Toronto, said in reference to trade with Argentina: "Argentina should be a good market for both Canada and the United States. Our country is not a manufacturing country, but it is a good spending country. It is not a manufacturing country because we have no minerals, and while we have some large cities—Buenos Ayres is a cosmopolitan city of three millions—the chief production is in agriculture. Naturally, there is a good market for agricultural implements. We obtain all our pulp and paper from Canada now. There are many things which I should suppose Canada

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could export to Argentina." Asked as to the question of credits, Mr. Mitre said that the long-time credits formerly given by the Germans would not prevent business on American plans. For one thing, there is now a greater amount of liquid capital ready for investment, so that long credits are not necessary. As to the tariff, this is for revenue purposes only. While agricultural implements are imported free of duty, and other necessities, luxuries are taxed. For instance, pianos pay a reasonable customs tax, though it does not prevent large importations. Mr. Mitre said he had seen Canadian pianos in Buenos Ayres, but more American instruments.

Patents Issued.—The following is a list of Canadian patents recently issued through the agency of Messrs. Ridout & Maybee, 59 Yonge Street, Toronto, from whom further particulars may be obtained: Frederick L. H. Sims, internal combustion engine; Asa Mutchenbacker, sawing machine; Walter R. Morson and E. Beaumont Jarvis, necktie form; John T. Dennis, fuel composition; Harvey J. Miles, intermittent feeding mechanisms for tapes or bands; Edouard Van Brabant, machines for removing flax seed from flax; Appleford Counter Check Book Co., Limited, paper cabinet; James W. Moffat, electric furnace; Alfred T. Snodgrass, the manufactuer of artificial abrasives; James T. King, mouthpieces for brass wind instruments; John E. Pointon, bread-making machinery.

BRITISH GOVERNMENT RELAXES MANY TRADE RESTRICTIONS

IMPORTANT cable dispatches have been received by Mr. G. T. Milne and Mr. F. W. Field, the British Trade Commissioners at Montreal and Toronto respectively, from the Imperial Department of Overseas Trade in London, pointing out that since the armistice was signed many restrictions on commerce have been withdrawn, while in the case of those which remain licenses are being granted much more freely than previously. Particulars regarding these relaxations will be published weekly in the "Board of Trade Journal," the official organ of the Imperial Government for notices regarding trade.

Orders placed during the war period now have good prospects of being executed, and arrangements for new business should be made without delay.

The following relaxations in particular should be noticed:

1. Permits to manufacture and priority certificates in connection therewith are no longer necessary.
2. Firms are at liberty to accept civil or commercial orders for immediate execution, thus freeing the engineering industry, among others, for commercial work.
3. All the principal kinds of raw materials may now be used for the commercial manufacture of goods for export, but these raw materials themselves may not be exported in certain cases without licenses. Among those to which this condition applies are the following:—

Aluminum, brass, iron, nickel, steel, antimony, copper, lead, spelter or zinc, tin.

In general, restrictions on the export of manufactured goods have been removed, while they have been retained in the case of raw materials.

The following list indicates the most important items, the export of which was formerly prohibited to all countries, but are now permitted to be exported to any part of the British Empire:—

Articles of aluminum.
Articles—manufactures of asbestos.
Belting, cotton—including belting impregnated with balata or rubber.
Bicycles—complete.
Bicycle tyres and parts.
Boots and shoes (except children's with soles or uppers of leather).
Brooms.
Brushes (except tooth brushes).
Copper—and manufactures of—except wire bars, plates, rods, sheets, stripe tubes.
Galvanized sheets—corrugated or flat.
Grindstones.
Glass for optical instruments.
Hand tools for agriculture.
Hollowware, domestic—or iron or steel plate.
Iron and steel rivets, nuts and screws.
Iron and steel wire cloth.
Incandescent mantles and rings.
Jute cordage and twine, padding and webbing, twist and piece goods.
Linoleums.
Magnesite and magnesite bricks.
Nails (wire).
Magnetos and parts.
Photographic materials.
Rubber manufactures—except surgical gloves.
Surgical bandages and dressings.
Steel sheets (black).
Tools (small).
Wagons and carts—and parts.
Wool and hair—manufactures of, not to include raw wool or yarns.

Certain factors will continue to hamper the export trade, notably (1) shortage or labor till the army is demobilized; (2) shortage of tonnage; (3) the need for reorganization of plant in certain industries before resuming normal work, but it is considered that the effect of these factors will diminish greatly in a few months.

Cleveland.—Four large carriers, to take about 1,500,000 bushels, are chartered to load at Fort William and hold at Georgian Bay ports, and a steamer of 240,000 bushels capacity was placed to load at Chicago for Buffalo. Some owners are figuring in making two more trips in the grain trade. A large quantity of grain will be floated by November 30, when the regular insurance expires, but considerable tonnage will be required for December loading.

Search for graphite deposits in the United States since the war started has brought to light the largest known deposits of high grade mineral on the continent, says the New York State Department of Labor. It is between Lake George and Lake Champlain in the vicinity of Black Mountain. The veins crop out for nearly a mile with a thickness of 50 ft. The graphite content indicates a variation of 6 to 10 per cent. of the large flake variety desired by crucible makers, while a 6 ft. layer assays over 15 per cent. of high grade graphite.

Pyridine is not the only substance which has a high solvent action on coal constituents. Thus, Vignon states that aniline dissolved 23.4 per cent., and quinoline 47.3 per cent.—at boiling point—of a bituminous gas coal from the Loire district, whilst Parr and Hadley record the extraction of 35 to 40 per cent. from "high-volatile" coal, and 20 to 30 per cent. from "low-volatile" coal by treatment with phenol at 110 deg. Cent. in an atmosphere of carbon dioxide.

MANY SHOPS HAVE NO AFTER-WAR PROBLEMS

Continued from page 50

Canadian firms. "The American has been buying raw material at a price fixed by the War Industries Board, but none of that was for export to the Canadian business. The Canadians had to pay a higher price on this side for their material, and compete in the open market for business. Of course, there is a big demand for tractors and we are selling them as fast as they can be turned out, particularly in Ontario, but the handicap is there just the same and it should be adjusted as quickly as possible."

A decrease in prices of material used in galvanizing was an acceptable thing to this firm, as their windmill business is at all times a big item in the sum total of their trade.

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FOR SALE—1—36" x 36" x 12' Bertram Planer, single head in first-class condition. 1—64" x 6' Horizontal Boring Miller, single back geared, in good condition. Globe Engineering Co., Ltd., Hamilton, Ont. ctfm

FOR SALE—300 PIECES COLD ROLLED shafting, 2" rd. x 81¼", in fair condition. Price on application. Also several items Rivets, Bolts and Steel. Complete list on application. John Deere Mfg. Co., Ltd., Welland, Ont. (c26m)

TWO LOWDOWN TRUCKS FOR SALE. A. B. Ormsby Company, Limited, 48 Abell Street, Toronto. (c27m)

FOR SALE—HOOP STEEL. 8 TONS OF ⅝" x 22 gauge hoops, in coils, first-class condition. Price on application. Dominion Foundries & Steel, Limited, Hamilton, Ont. (c25m)

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WANTED BY A COMPANY PRODUCING crucible cast steel in the United States, a representative in Canada who is thoroughly familiar with the tool steel business, especially High Speed Steel business in Canada. Answering advertisement state previous experience, age and salary wanted. Box 540, Canadian Machinery. (c2m)

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1—16" Fox Crank Shaper. Used.
1—16" Hendy Geared Shaper. Used.
2—14" Hendy Friction Metal Shapers. Used.
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3—No. 2 Clizbe Casting Grinders, on stand. New.
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3—No. 0 Champion Bench Casting Grinders. New.
1—No. 3 Detroit Floor Casting Grinder. Used.
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1—No. 14 Double End Pedestal Casting Grinder. Used.
1—Iron Foundry Builders' Pedestal Casting Grinder. Used.
1—8 x ¾ Casting Grinder on stand. Used.
1—American Drill Grinder. Used.
1—W & M Tool Drill Grinder. Used.
1—Washburn Drill Grinder. Used.
1—Yankee Drill Grinder. Used.
2—W & M Yankee Drill Grinders. New.
1—No. 30 Landis Plain External Grinder. Used.
1—No. 60 Heald Cylinder Grinder. Used.
1—No. 2½ Woods Universal Tool and Cutter Grinder. Used.
1—No. 1 Thomson Universal Tool and Cutter Grinder. New.
1—Cutter and Reamer Grinder. Used.
1—6-A Gorton Universal Disc Grinder. Used.
1—24" Disc Grinder Press. Used.
1—No. 34 Horizontal Disc Grinder. Used.
1—Temco Electric Grinder on Pedestal. New.
1—Temco D Electric Motor Grinder. New.
1—Temco G Bench Electric Grinder. New.
1—Van Dorn Portable Electric Grinder. Used.
1—Hand Electric Grinder. New.
1—P-Tool Electric Grinder. Used.
5—Dumore A.T.P. Grinders. New.
1—Dumore B.T.P. Grinder. New.
2—Dumore G.A.C. Electric Type Grinders. New.
3—Dumore, Jr., Electric Grinders. Used.
1—No. 1 Landis Internal Grinder. Used.
1—Morse Face Grinder. Used.
1—28 x 7 Planer Type Surface Grinder. Used.
1—No. 6 Bryant Chucking Grinder. Used.
1—52 x 45 x 13' 3" Patch 2 Head Open Side Planer. Used.
1—46 x 40 x 13' 2" Patch 2 Head Open Side Planer. Used.
1—44 x 34 x 11' 4" Lincoln 2 Head Open Side Planer. Used.
1—24 x 24 x 6 Wilson Metal Planer. New.

RIVERSIDE MACHINERY DEPOT
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The Financial Post

Review and Outlook Number This Week

The special articles in this Review and Outlook Number are prepared by members of the staff of THE FINANCIAL POST and of associate publications in the MacLean group of Specialized Business Newspapers.

Peace Brightens Prospects for Loan Companies
Imperial Oil's Plan Based on Dollars and Cents
Decline in Net Earnings of C.P.R.
Bank Clearings Again Ahead of Last Year
Meeting Client on His Individual Business Ground
Bankers Looking to the Far East
Should Banks Buy Victory Bonds?
Using the Trade Acceptance in Retail Business
Bond Market Has Been Quiet But Very Strong
N. F. U. Organizes Loss Information Service Bureau

(SPECIAL SECTION)

The Government is Organizing a Comprehensive Machine for the Repatriation of Canada's Army
Let Us Have Confidence in Ourselves — Editorial
Banks are Blazing the Trail for Development of Export Trade in Markets of the World
Opportunity for United States to Play Part of "Big Sister" to Canada in a Financial Way
Not so Much a Problem of Who Will Emigrate, But Who Will Prove Desirable to Canada
The Business of Bringing the Boys Back Home
Canada's Borrowings During 1918 Reach a Total That Establishes a New Record
Bond Market Has Experienced Peculiar Year
Beating Swords of War to Plow Shares of Peace
British Can Build Cheaper Vessels Than Canadians
War and the "Flu" Cause Abnormal Death Claims
Canada's Banks and Question of Larger Capital
Now the Stock Exchanges are Taking the Rough Jolts Out of Financial Reconstruction
Canada Made a Remarkable Record in the Production of Shells and Other Munitions
The Menace of the Bolsheviki! Insidious Influences Threaten Relations
Price of Wheat and Production of Livestock
Comparative Price Records of Canadian Securities for Past Eight Years
Activity in Renting Workingmen's Houses and in Dealings in Farm Lands Distinguishes Realty Market
Steel is King When Nation Goes to War
Canada's Exports and Their part in Beating the Hun
January Dividend Payments
Canada's Part in Beating the Submarine Peril

Above mentioned are a few of the more important contents of this issue of THE FINANCIAL POST. Send a subscription to THE POST and note its business value to you. Use this form in sending subscription which is $3.00 per year.

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Nearly New

1 6 x 8 Perrin Accumulator with Unloader.
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2 300-ton Perrin Hydraulic Presses.
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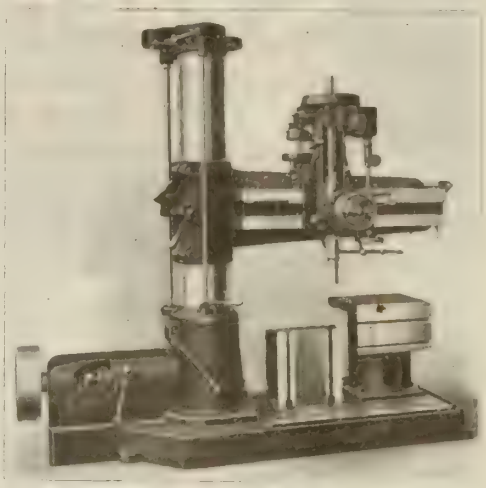
Ryerson 4' Plain Radial Drilling Machine with gear box drive.



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1—16 x 7" South Bend Screw Cutting Engine Lathe.

1—18 x 8 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.

1—24 x 10 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.

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1—Ryerson-Owen No. 3 Universal, belt drive.
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3—20" Ryerson Rockwell Sensitive.
1—28" Ryerson Sibley Sliding Head.
1—4' Ryerson Radial Drill, Gear Box.
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1—8' Lennox, Double Housing Type, Splitting Shear, capacity ¾" belt drive.

1—Ryerson Steel Frame No. 2 Hand Lever Shear, 6" blades, ¼" capacity.

1—Ryerson Steel Frame No. A-6 Hand Lever Punch, 6' throat, capacity ¼ x ¼.

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1—Ryerson Steel Frame No. 5-A Hand Lever Punch, 3' throat, capacity ¼ x ¼.

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36" Bausch Vertical Boring Mill, two heads.
48" x 48" x 12' D. & H. Open-side Planer, one head on rail, one on side.
36" x 36" x 10' Gray Planer, two heads.
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36" x 36" x 8' Hamilton Planers, two heads.
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2—3" x 36" Jones & Lamson, geared head.
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15" x 6' New Sidney D.B.G. Quick-change Lathe, swing 17".
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3—17" x 8' New Sidney D.B.G. Quick-change Lathe, swing 19".
18" x 24" New Rahn Larmon Lathe, D.B.G., quick change.
9—19" x 8' New Sidney D.B.G. Quick-change Lathes, swings 21".
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5' Bickford Single Pulley Drive Radial.
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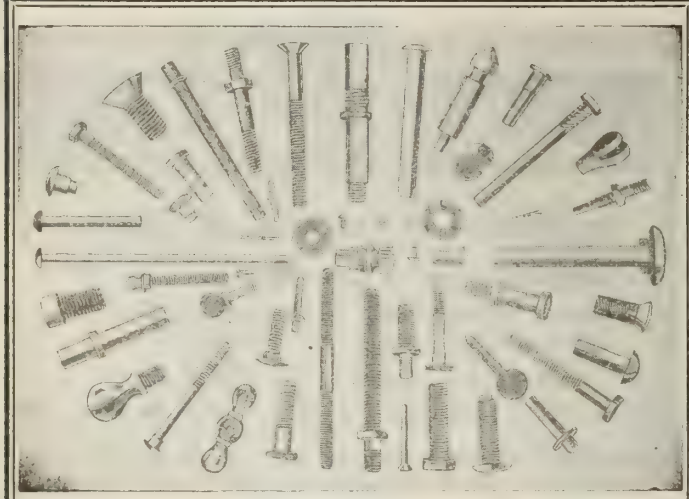

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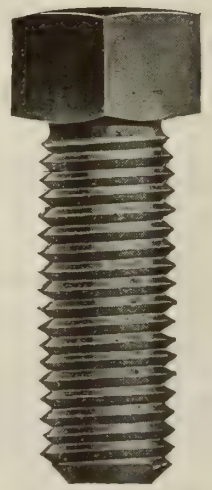

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One 25″ x 50″ Left-Hand Wheelock Engine.
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These engines are in excellent condition.

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Pay You to Adopt Them

Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball Bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.

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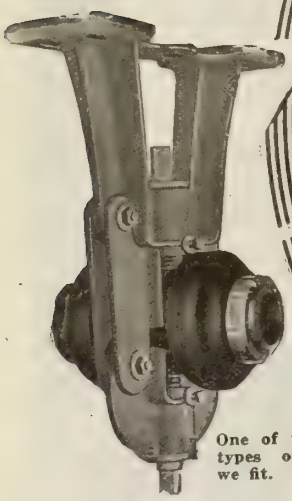

One of the many types of frames we fit.

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Have you received a copy of Catalog 3-G? Pay to send for one if you haven't.

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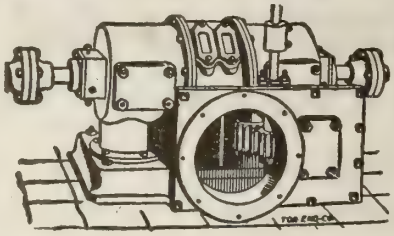

Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

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Thor Portable Electric Drills

(Licensed under Burke Universal Motor Patent)

The various sizes in which these practical and durable tools are made, adapt them to all classes of mechanical assembling and repair work.

A feature of these tools is the famous four point.

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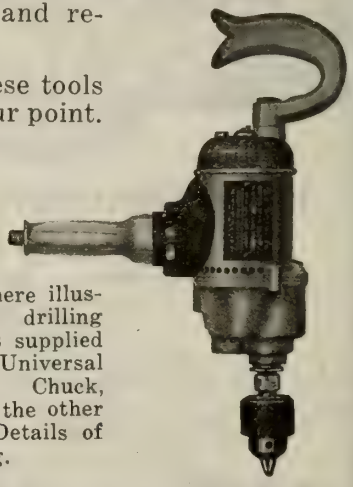

Our No. 00 Drill (here illustrated) has 5/16" drilling capacity in steel, is supplied with D. C. or Universal Motor, a Jacobs Chuck, aluminum case and the other "Thor" features. Details of full line in catalog.

Independent Pneumatic Tool Co.

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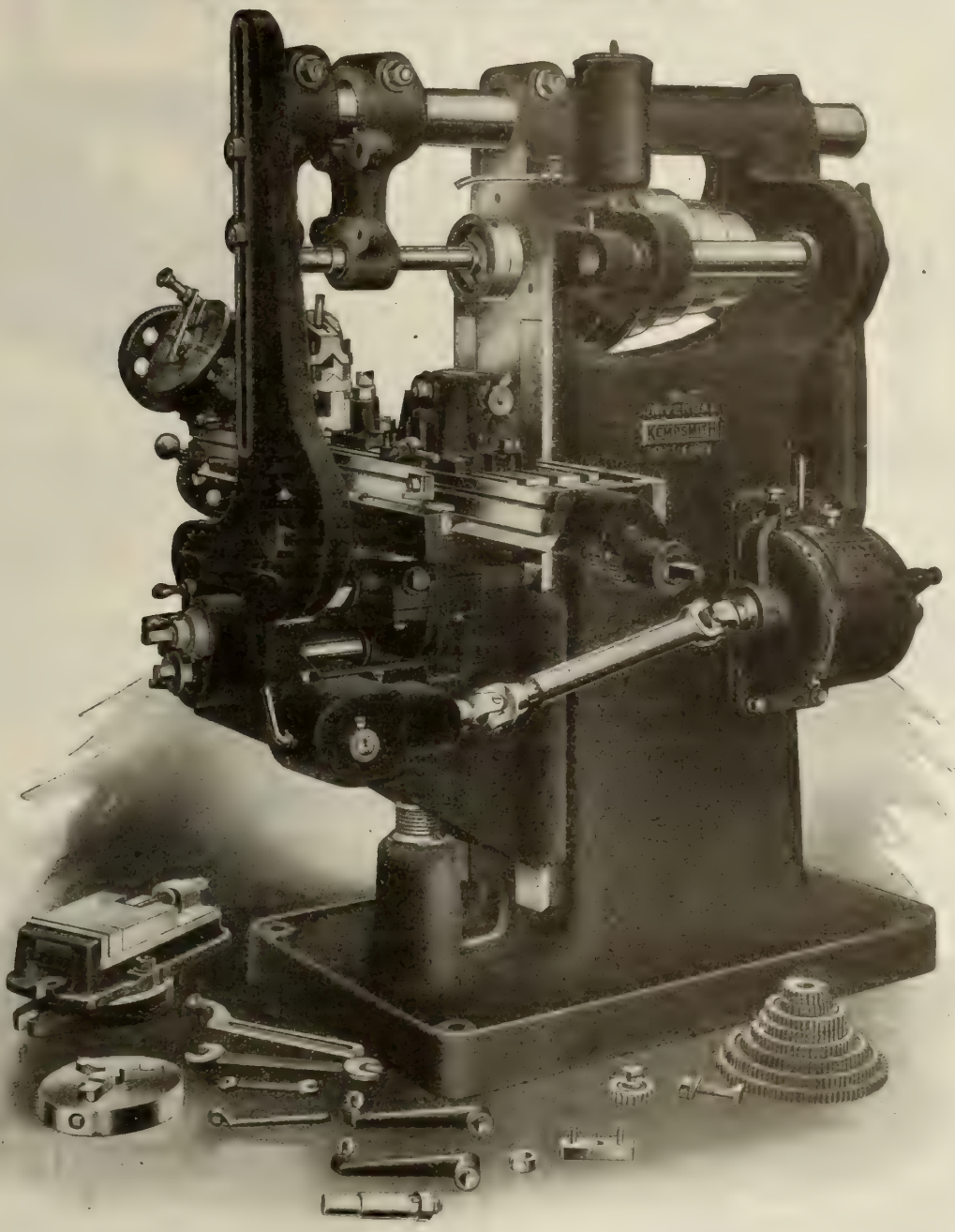

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It is sold with an iron-clad guarantee.

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H & G

Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

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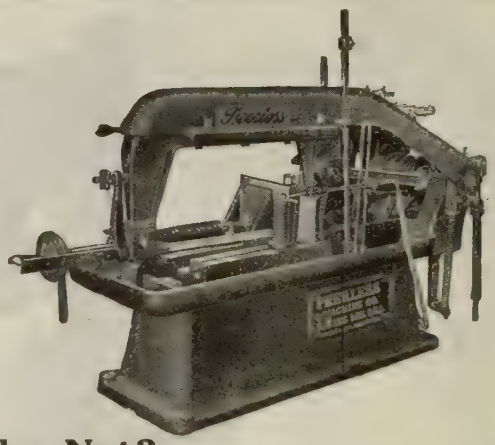
Peerless HIGH SPEED
THE NEW STANDARD
Increases Production 50 to 100%



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WHEN big plants of national reputation, who are using three, six, eight, twelve and up to thirty or more Peerless Machines say that they increase production from 50 to 100 per cent., saving in time, labor, blades and expensive material;

AND WHEN we are willing to have you try out the Peerless for 30 days' at our own risk and expense, we paying freight both ways if it fails to make good;

THEN WHY NOT try it out for yourselves, when the gain is more yours than ours if it makes good, and if it fails the loss is ours alone?

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EFFICIENCY SERVICE

Graphic Production Control

is a modern departure from obsolete manufacturing principles. It is the **one and only** system which insures maximum output

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It actually controls by putting everybody in the plant on **schedule.**

We are **practical men** and **experts** in this field.

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It's easy to instal.

Let us write you about it.

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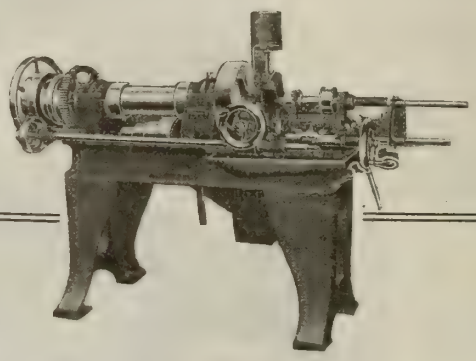

Cutting-Off Costs Cut in Half

With a V-shaped cutter leading and a square-shaped cutter finishing off, one taking an up cut and the other a down cut, both at the same time, you can do double the amount of work with the HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE.

You get a square cut and save any sideway strain on machine or bearings. Investigate further.

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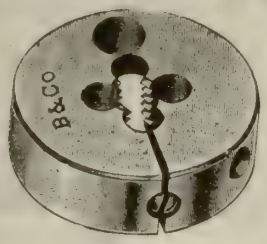
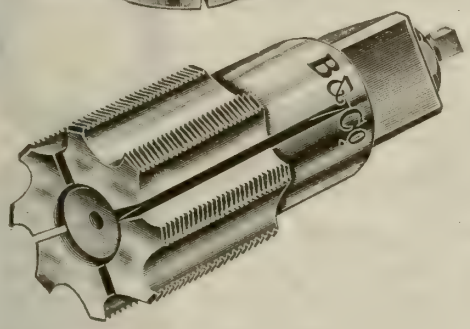
Butterfield

Taps, Dies and Reamers





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Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.

Send for Catalog No. 17. It's just out

Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office : 220 King St. W.

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If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

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Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY

Classified Advertising Section

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Hyde Engineering Works

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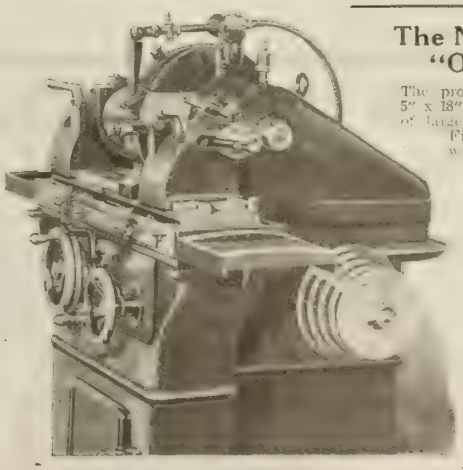
Enquiries Solicited for

General Machine Contract Work

P. O. Box 1185 Telephones 1863-1864



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The production capacity of our 5" x 18" Plain Grinder is worthy of larger and costlier machines. Fifty-seven varieties of work, more or less, from cast iron bushings to high speed steel cutters, take their accurate finish from Ott Grinders; and the initial machine in any plant—no matter what it makes — invariably recommends others.

Write for full particulars.

OTT Grinder Co.

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Sheet Metal Working Machinery

THE D. H. STOLL CO., INC.
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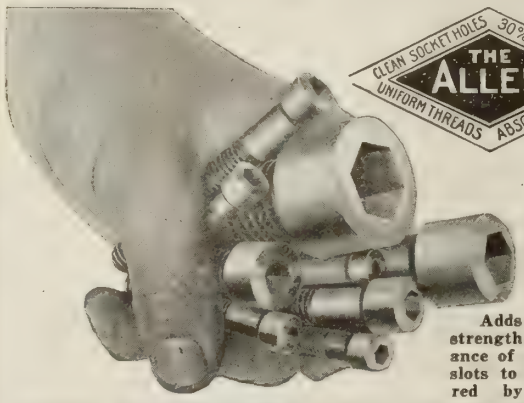

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THE ALLEN
UNIFORM THREADS ABSOLUTE SAFETY

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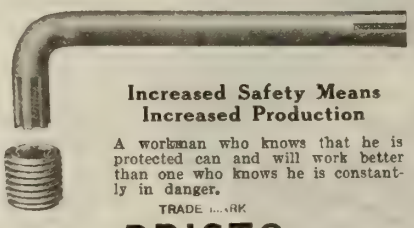
Adds to value, strength and appearance of machines. No slots to become marred by use. Try

THE ALLEN MFG. CO., Hartford, Conn. U.S.A. Manchester, England.



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A workman who knows that he is protected can and will work better than one who knows he is constantly in danger.

TRADE MARK

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REG. U.S. PAT. OFF.

SAFETY SET SCREWS

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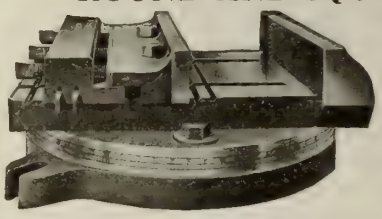
FOREIGN AGENTS: Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinava; G. W. Burton Griffiths & Co., London, Manchester and Glasgow; Barandiaran, Metivier, Gazeau & Cia, San Sebastian, Spain.

Skinner Planer Chucks

ROUND AND SQUARE BASE



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Sixteen (16) different sizes.

Always in stock for immediate shipment.

Catalog of Lathe and Drill Chucks sent upon request. Copy?

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OXY-ACETYLENE ELECTRIC

AMERICAN ARMCO INGOT IRON

make *Safe* welding easy

ARMCO IRON Rods are practically pure iron and are peculiarly free from the sulphur, phosphorus, slag, oxides and other impurities that ordinarily destroy the homogeneity of the weld.

You will find it decidedly to your advantage to give ARMCO IRON Rods a careful test.

PAGE STEEL & WIRE CO.

STEEL AND WIRE PAGE QUALITY PRODUCTS

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Plants: Monessen, Pa., and Adrian, Mich.

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11

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In stock and to order, any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

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G. B. GRANT

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ITS EASILY DONE WITH
ELM CUTTING OIL
WE ALSO SPECIALIZE IN DRAWING, FLOOR AND MOTOR OILS
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Our line comprises Diamond Pointed Tools for every industrial purpose. We are also equipped to furnish promptly special Diamond Pointed Tools of every variety. Quality products.

ORDER FROM ST. CATHARINES if more convenient. Complete stock — quick service. Goods submitted on memorandum to responsible firms.

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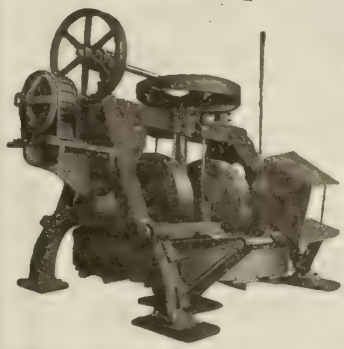
John W. Gordon, Manager, 5 James St., St. Catharines.

Canadian Steel Foundries Need Frost Improved Sand Mills



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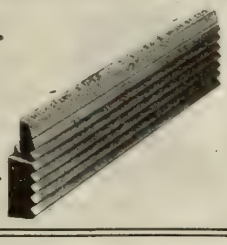

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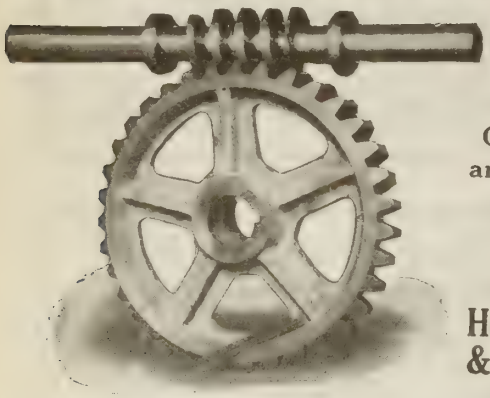

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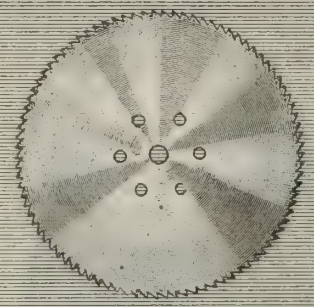

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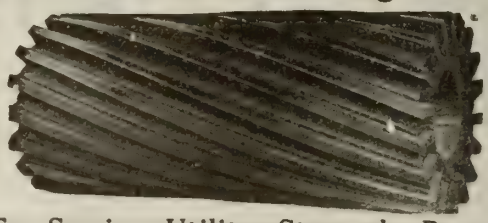

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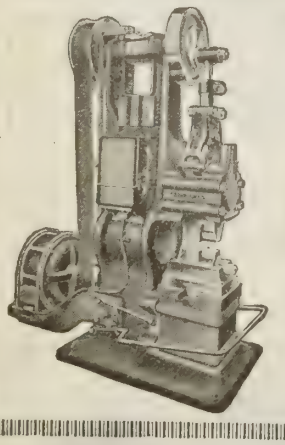

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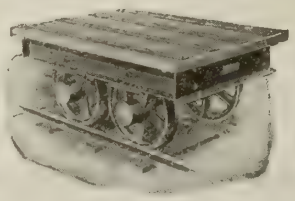

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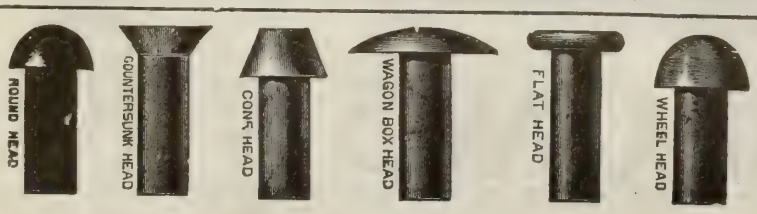

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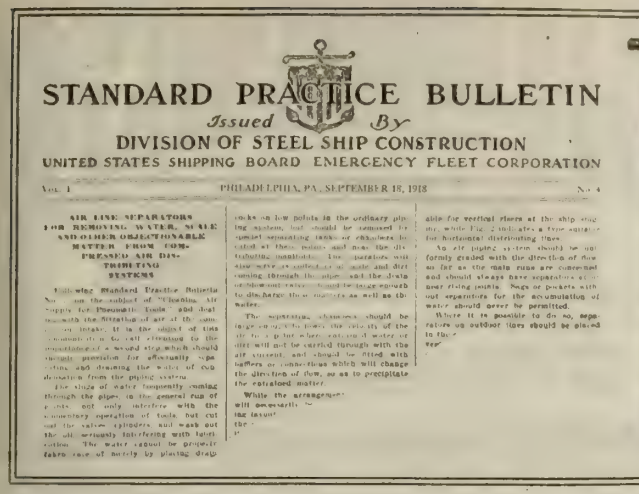
STANDARD PRACTICE BULLETIN
Issued By
DIVISION OF STEEL SHIP CONSTRUCTION
UNITED STATES SHIPPING BOARD EMERGENCY FLEET CORPORATION

Vol. 1 PHILADELPHIA, PA., SEPTEMBER 18, 1918 No. 4

AIR LINE SEPARATORS FOR REMOVING WATER, SCALE AND OTHER OBJECTIONABLE MATTER FROM COMPRESSED AIR DISTRIBUTING SYSTEMS

This issue Standard Practice Bulletin No. [illegible] on the subject of "Cleaning Air Supply for Pneumatic Tools" and deal [illegible] the filtration of air at the compressor intake. It is the object of this [illegible] to call attention to the importance of a second step which should include provision for effectually separating and draining the water of condensation from the piping system.

The slugs of water frequently coming through the pipes in the general run of [illegible] not only interfere with the satisfactory operation of tools, but cut out the valve cylinders and wash out the oil seriously interfering with lubrication. The water cannot be properly taken care of merely by placing drain cocks on low points in the ordinary piping system, but should be removed by special separating tanks or chambers located at their points and near the distributing manifolds. These separators will also serve as collectors of scale and dirt coming through the pipe, and the drain or blow-out valves should be large enough to discharge these elements as well as the water.

The separating chambers should be large enough to lower the velocity of the air to a point where entrained water or dirt will not be carried through with the air current, and should be fitted with baffles or other devices which will change the direction of flow, so as to precipitate the entrained matter.

While the arrangement will necessarily vary [illegible] tage taken [illegible] the [illegible] ver

able for vertical risers at the ship engine, while Fig. 2 indicates a type suitable for horizontal distributing lines.

An air piping system should be uniformly graded with the direction of flow so far as the main runs are concerned and should always have separators at lower rising points. Bags or pockets without separators for the accumulating of water should never be permitted.

Where it is possible to do so, separators on outboard lines should be placed in the [illegible]

Avoid Moisture in Air Lines
BY USING A
PANGBORN
Moisture and Oil Separator

Its efficiency lies in its simplicity and common sense principles.
Made in eight sizes for lines from 1" to 3" in diameter.

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CANADIAN PACIFIC RAILWAY COMPANY, Montreal, Canada
Our NEW AIR-TIGHT BLAST GATE will save the air (money) you are now losing through leaky blast gates.
Circular 123-T explains its many other advantages, outlining clearly its all-around superiority over the ordinary light, flimsy, cheap, leaky and unreliable blast gates, and the heavy, cumbersome, expensive and slow-acting gate valves and stop cocks. Ask for circular and list of users.

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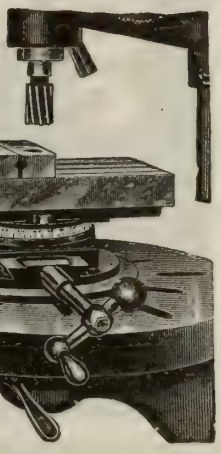

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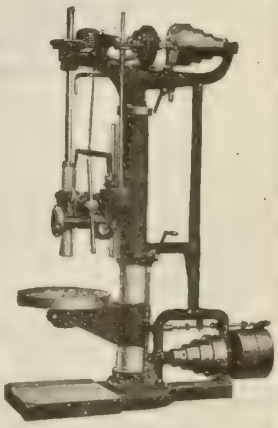

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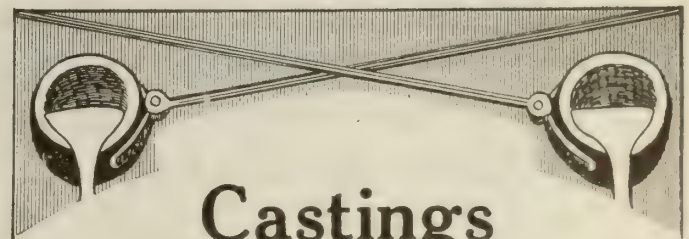

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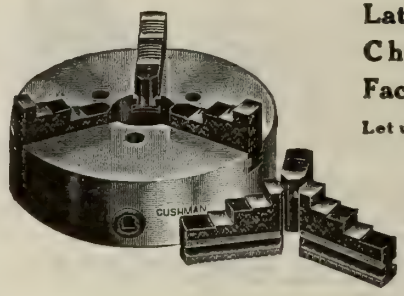

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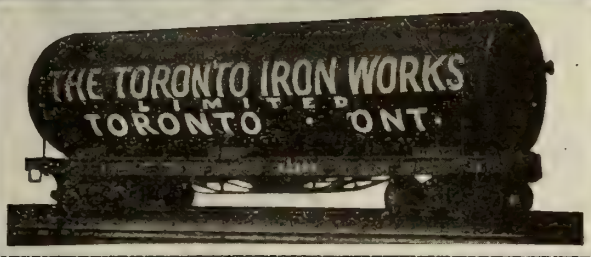

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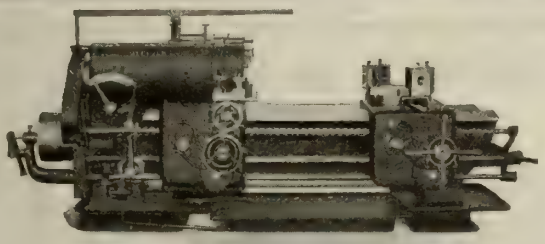

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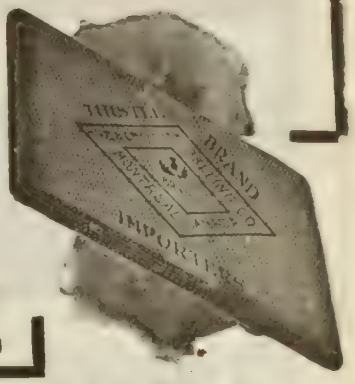

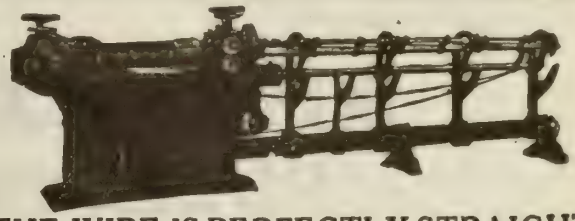

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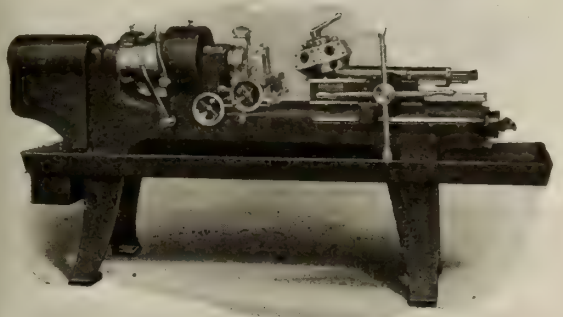

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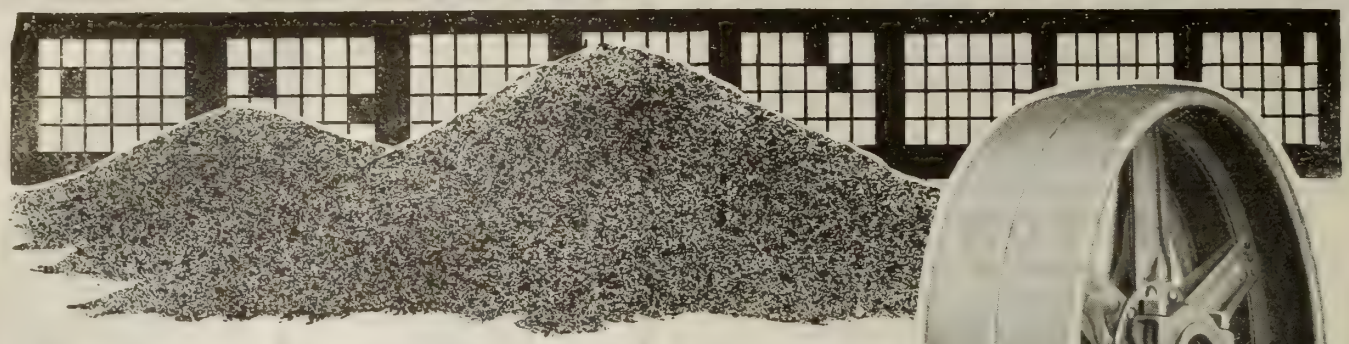

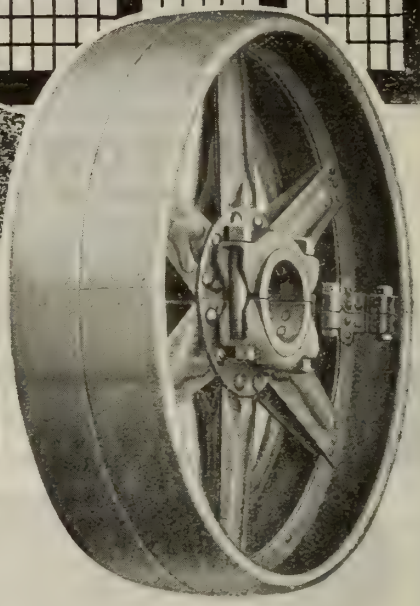

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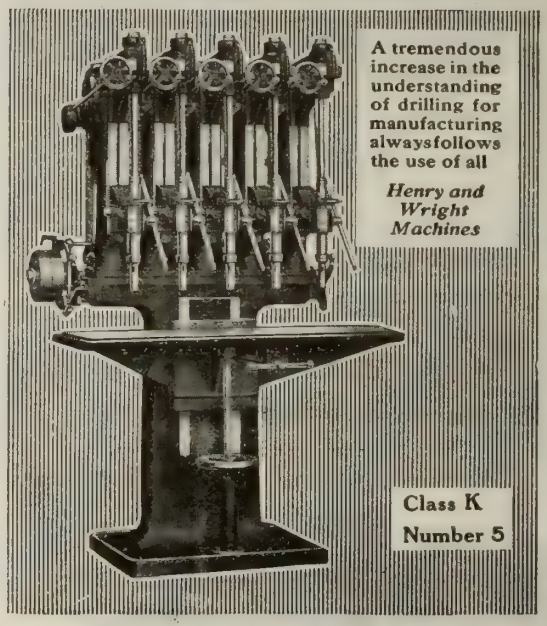

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Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
Tolland Mfg. Co., Montreal, Que.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto

BALLS, STEEL
Boker & Co., Inc., Montreal, Que.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie, Ont.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal.
Graton & Knight Mfg. Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Welding Works, Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Canadian Welding Works, Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.

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Can. Graton & Knight Mfg. Co., Montreal, Que.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, STITCHED COTTON DUCK
Canadian Welding Works, Montreal, Que.
Dominion Belting Co., Hamilton, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, WOVEN
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENCH LEGS, STEEL
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New Britain Mach. Co., New Britain, Conn.

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Kennedy & Sons, Ltd., Wm., Owen Sound.
Marsh Engineering Works, Belleville, Ont.
Plessisville Foundry Co., Plessisville, Que.
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Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

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Can. Driver-Harris Co., Harrison, N.J.

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Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

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International Malleable Iron Co. Guelph, Ont.

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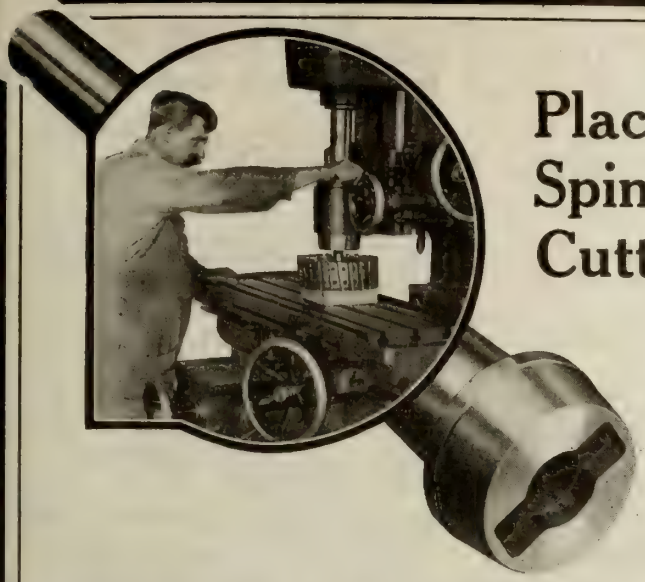

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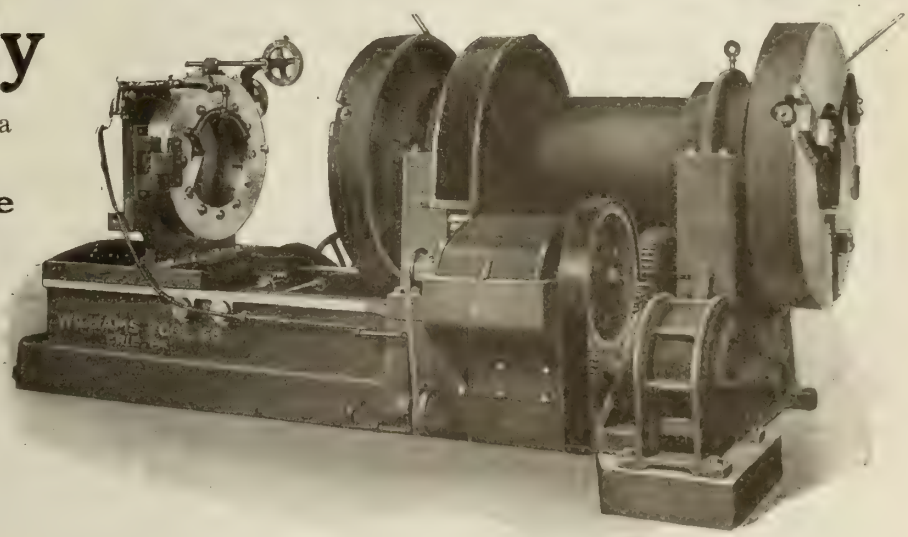

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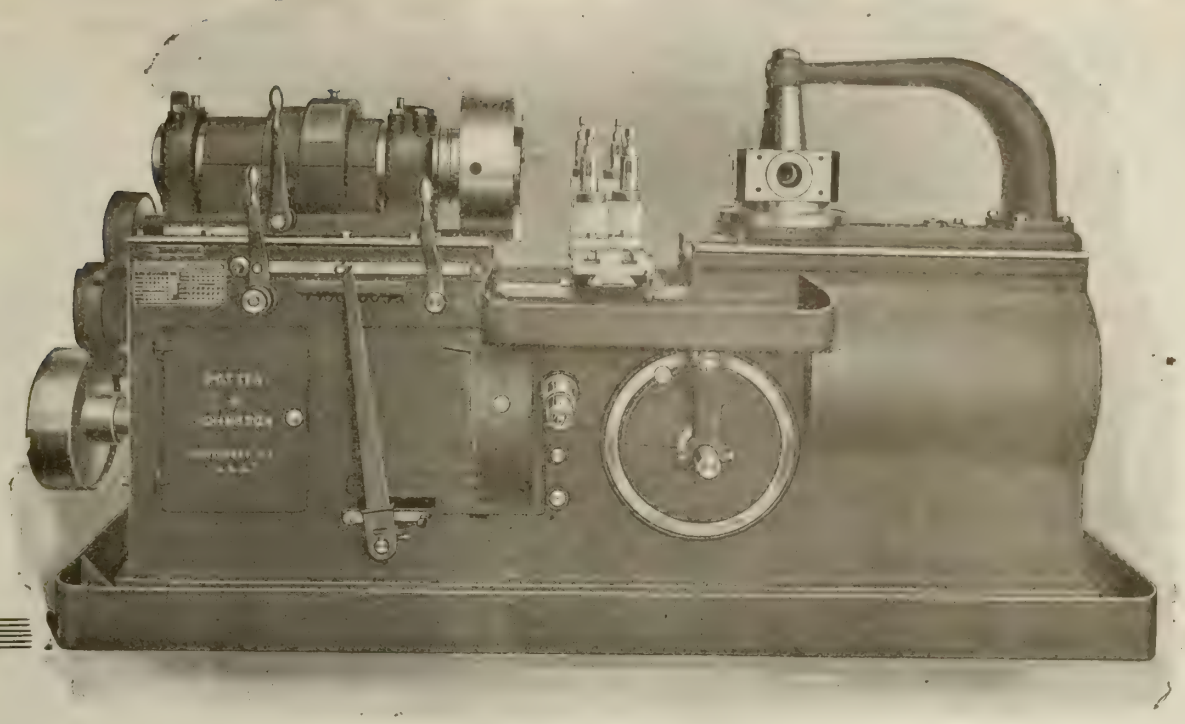

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Riverside Machinery Depot, Detroit, Mich.
Smalley-General Co., Inc., Bay City, Mich.
Sidney Tool Co., Sidney, Ohio.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blasdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.

LATHES, HORIZONTAL
Wood Turret Machine Co., Brazil, Ind.

LATHES, METAL TURNING
Fittings, Ltd., Oshawa, Ont.

LATHES, JOURNAL TRUEING
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, PATTERNMAKERS'
J. G. Blount Co., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Wood Turret Machine Co., Brazil, Ind.
Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.

LATHES, SINGLE PURPOSE
Baxter & Co., Ltd., J. R., Montreal, Que.
Bertram, John, & Sons Co., Dundas Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Plessisville Foundry, Plessisville, Que.
Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.

LATHES, SCREW CUTTING
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Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.

LATHES, SPINNING
Bliss, E. W., Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.

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Acme Machine Tool Co., Cincinnati, Ohio.
Bertram, John, & Sons Co. Dundas Ont.
Rivett Lathe & Grinder Co., Boston, Mass.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co. Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.

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St. Lawrence Welding Co., Montreal, Que.
Canadian Welding Works, Montreal, Que.

LEATHER STRAPPING
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Standard Optical Co., Geneva, N.Y.

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Whiting Foundry Equipment Co., Harvey, Ill.
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Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LIQUID AIR
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Dennis Wire & Iron Works, London, Ontario.

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Elm Cutting Oil Co., Toronto, Ont.
Ontario Lubricating Co., Hamilton, Ont.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
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Garlock-Walker Machinery Co., Toronto, Ont.

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Prest-O-Lite Co., Inc., Toronto, Ont.
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J. H Williams & Co., Brooklyn, N.Y.

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Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Hinckley Machine Works, Hinckley, Wis.
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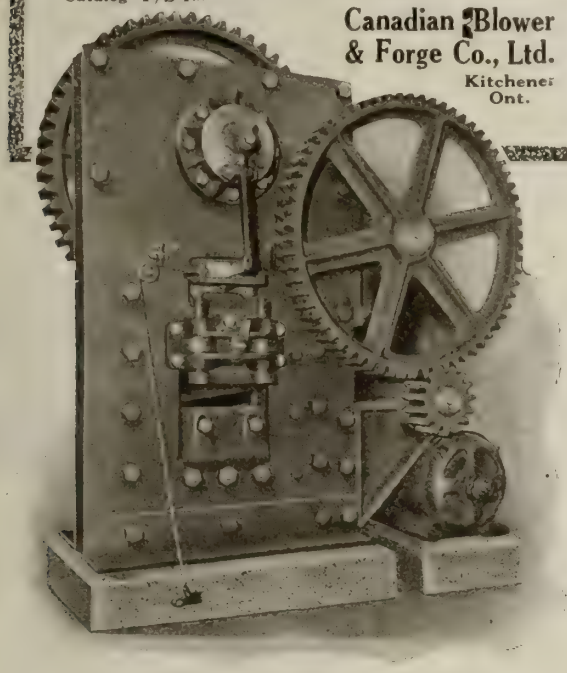

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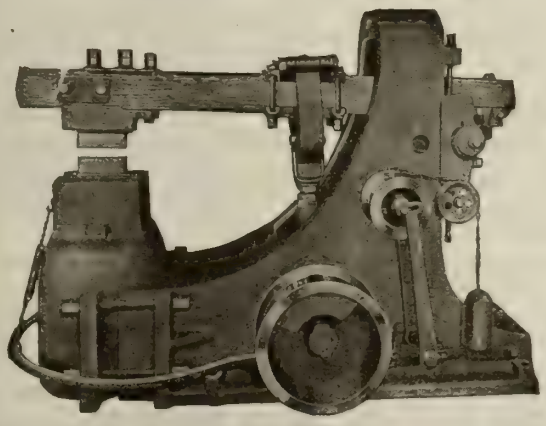

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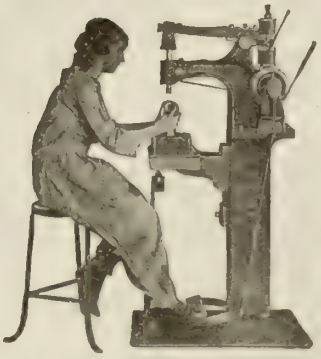

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National Acme Co., Cleveland, Ohio.
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Wilkinson & Kompass, Hamilton, Ont.

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Can. Drawn Steel Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.

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Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
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National Machy Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
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Bliss, E. W., Co., Brooklyn, N.Y.
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Peck, Stow & Wilcox, Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.

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SHELL PAINTING MACHINES
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Sheldons, Ltd., Galt, Ont.

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Jones & Glassco, Montreal.

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Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilkinson & Kompass, Hamilton, Ont.

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Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.

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MacKinnon Steel Co., Sherbrooke, Quebec.
Marsh Engineering Works, Belleville, Ont.

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Modern Tool Co., Erie, Pa.
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Ferracute Mach. Co., Bridgeton, N.J.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
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Mulliner & Edlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
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Vanadium-Alloys Steel Co., Pittsburgh, Pa.
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Can. Brakeshoe Co., Sherbrooke, Que.
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Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
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Plewes, Ltd., Winnipeg, Man.
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Joliette Steel Co., Montreal, Que.

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Illingworth Steel Co., John, New York, N.Y.

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Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

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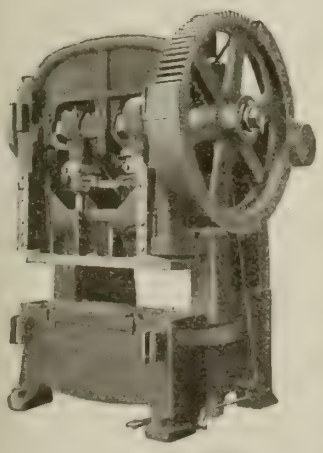
Double Crank Presses



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United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Steptoe Co., The, John, Cincinnati, Ohio.
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Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.
Steptoe, The John Co., Cincinnati, Ohio.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.

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Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.

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Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.

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Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Marsh Engineering Works, Belleville, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
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Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

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Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

MUNTZ METAL
Brown Copper & Brass Roller Mills, New Toronto, Ont.

NAILS
Page Steel & Wire Co., Adrian, Mich.

NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

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Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.

NICKEL
Boker & Co., Inc., H., Montreal, Que.

NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.

NUTS
Williams & Co., J. H., Brooklyn, N.Y.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, Ohio.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.

NUT TAPPERS
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.

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Elm Cutting Oil Co., Toronto, Ont.

OILS, DRAWING
Elm Cutting Oil Co., Toronto, Ont.

OIL SEPARATORS
Can. Fairbanks-Morse, Co., Montreal.
Sheldon's, Ltd., Galt, Ont.
Smart-Turner Machine Co., The, Hamilton.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto.

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
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Whiting Foundry Equipment Co., Harvey, Ill.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Whiting Foundry Equipment Co., Harvey, Ill.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
Brantford Oven & Rack Co., Brantford, Ont.

OXY-ACETYLENE WELDING AND CUTTING
Can. Welding Works, Montreal, Que.
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

OXY-ACETYLENE WELDING AND CUTTING PLANT
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Oxyweld Co., Ltd., Toronto, Ont.

OXYGEN (SEE ACETYLENE)
Canadian Welding Works, Montreal, Que.

PACKINGS, ASBESTOS
Canadian Welding Works, Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PACKINGS, LEATHER, HYDRAULICS, ETC.
Baxter & Co., Ltd., J. R., Montreal, Que.
Graton & Knight Mfg. Co., Worcester, Mass.
Gutta Percha & Rubber, Ltd., Toronto, Can.
William R. Perrin, Ltd., Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

PAPER MILL CONVEYORS AND DRIVES
Can. Link-Belt Co., Toronto, Ont.

PAPER MILL MACHINERY
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Hydraulic Machy. Co., Ltd., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.

PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

PECK CARRIERS FOR POWER PLANTS
Can. Link-Belt Co., Toronto, Ont.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.

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Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph, Ont.

PIPE CUTTING AND THREADING MACHINES
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Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PHOTOSTATS
Commercial Camera Co., Providence, R.I.

PIPE RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.

PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport, Conn.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

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Betts Machine Co., Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.

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Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Lynd-Farquhar Co., Boston.

PLANING MILL EXHAUSTERS
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Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

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Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.

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MacKinnon Steel Co., Sherbrooke, Quebec.

POLISHING MACHINES
Ford-Smith Machine Co., Hamilton, Ont.

POWER HOUSE CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

PRESSERS, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.

PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
William R. Perrin, Ltd., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
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Hydraulic Machy. Co., Ltd., Montreal, Que.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
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Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
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PRESSES, POWER
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E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Riverside Machinery Depot, Detroit, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, SCREW
Barnes, W. F., & John Co., Rockford, Ill.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.
William R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Erie Foundry Co., Erie, Pa.
Ferracute Mach. Co., Bridgeton, N.J.
Stoll Co., D. H., Buffalo, N.Y.

PRODUCTION WORK
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Kennedy & Sons, Wm., Owen Sound, Ont.

PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
Algoma Steel Corp., Sault Ste. Marie, Ont.
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dodge Sales & Eng. Co., Mishamsha, Ind.
Ford-Smith Machine Co., Hamilton, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Positive Clutch & Pulley Works., Ltd., Toronto.
J. C. Wilson & Co., Belleville, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, FRICTION CLUTCH
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn.

PULP MILL MACHINERY
Hydraulic Machy. Co., Ltd., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, CENTRIFUGAL
Goldie & McCulloch Co., Galt, Ont.
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

PUMPS, FUEL OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, HIGH PRESSURE
Hydraulic Machy. Co., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.

PUMPS, ALL KINDS
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
William R. Perrin, Ltd., Toronto.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, HYDRAULIC
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.

PUMPS, ROTARY, POWER DRIVEN
Bowser & Co., Inc., S. F., Toronto, Ont.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Trahern Pump Co., Rockford, Ill.

PUMPS, LUBRICANT, OIL, WATER
Bowser & Co., Inc., S. F., Toronto, Ont.
Fry's (London), Ltd., London, England.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Trahern Pump Co., Rockford, Ill.

PUMPS, MOTOR AND BELT DRIVEN
MacGovern & Co., Montreal, Que.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, SUD
Fry's (London), Ltd., London, England.

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Graton & Knight Mfg. Co., Worcester, Mass.

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E. W. Bliss Co., Brooklyn, N.Y.
Boker & Co., Inc., H., Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Can Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Mulliner-Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Stoll Co., D. H., Buffalo, N.Y.
Wickes & Co., Saginaw, Mich.

PUNCHES, CHROME, VANADIUM SHELL
Hammond Steel Co., Inc., Syracuse, N.Y.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

PYROMETERS
Bristol Co., Waterbury, Conn., U.S.A.
Shore Instrument & Mfg. Co., New York City.
Taylor Instrument Co., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS
Can. Welding Works, Montreal, Que.
United Brass & Lead, Ltd., Toronto, Ont.

RAIL BENDERS
Algoma Steel Corp., Sault Ste. Marie, Ont.
Niles-Bement-Pond Co., New York.

RADIAL DRILLING MACHINE, WALL
Lynd-Farquhar Co., Boston.
Wickes & Co., Saginaw, Mich.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

RAIL OVERHEAD
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

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Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
The McCrosky Reamer Co., Meadville, Pa.
The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER AND SELF-FEEDING
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REGULATORS, AUTOMATIC
Electric Steels & Metals, Ltd., Welland, Ont.

REGULATORS, PRESSURE TEMPERATURE
Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

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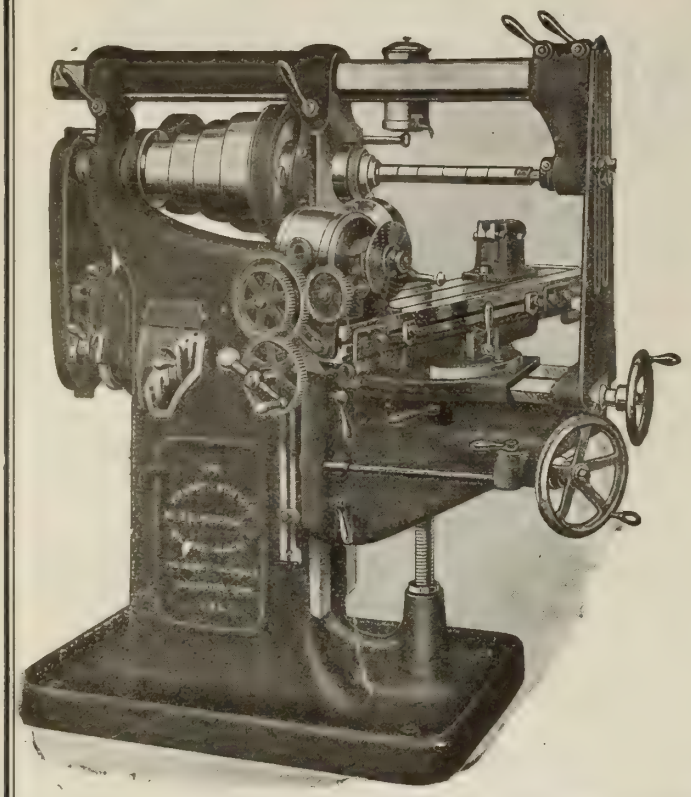

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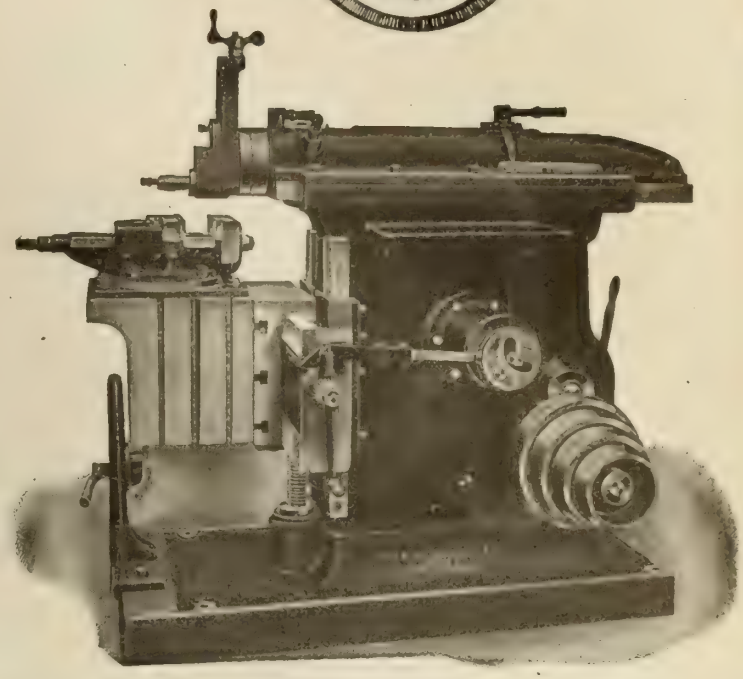

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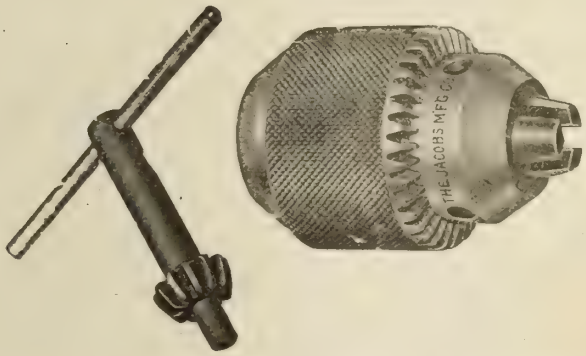

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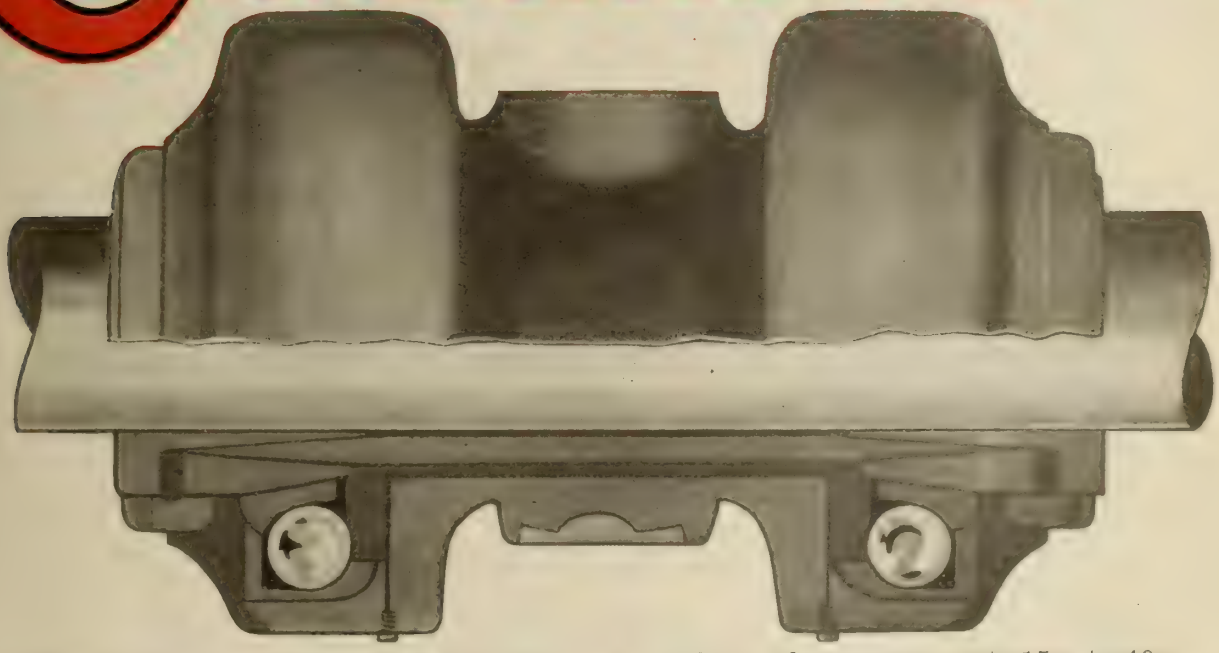

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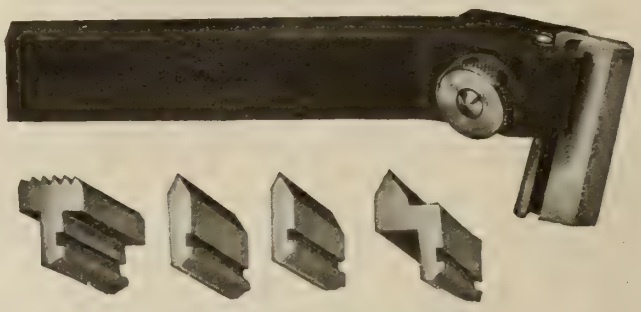

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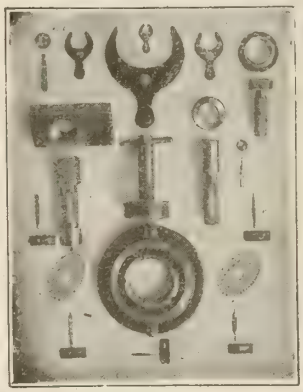

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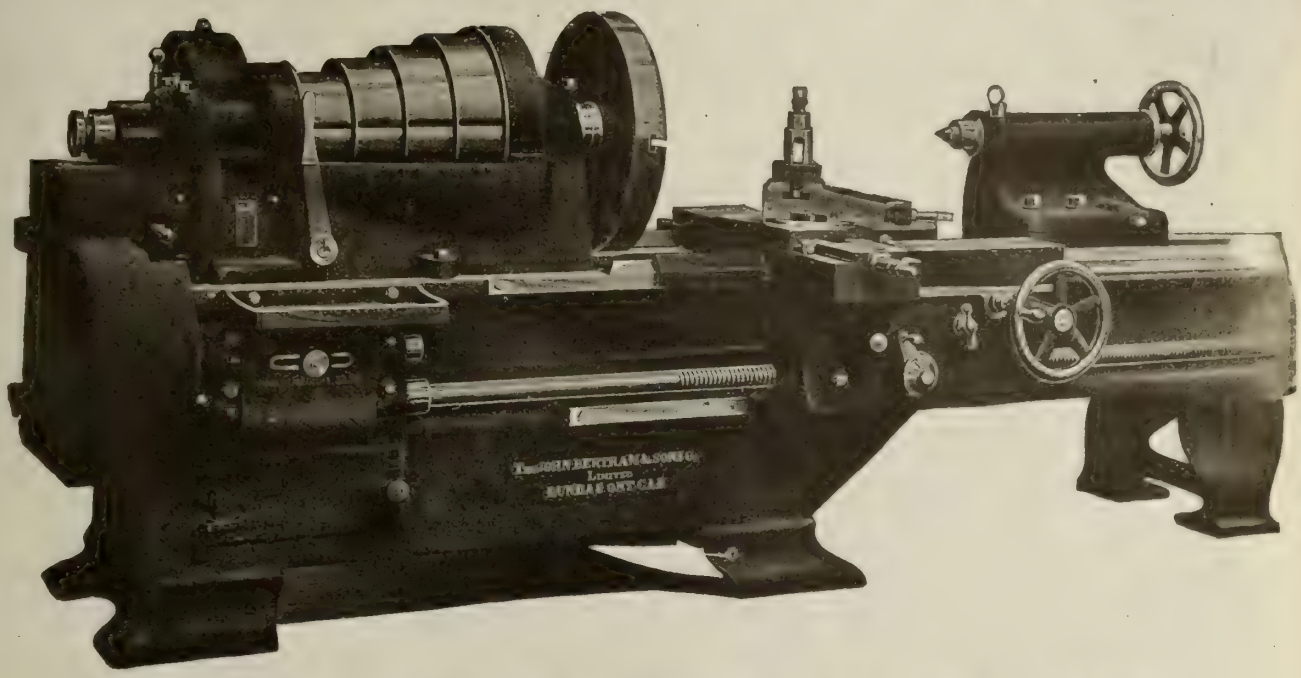

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In addition to the above we maintain a service department, where five artists and advertisement writers are employed. Then there is our make-up department, composing, press and mailing, business and subscription departments, where many printers and others are employed. We have, too, our regular correspondents and contributors in various industrial centers in Canada and the United States.

Recently one of our readers called at our office and was shown through the different departments. He was surprised and went away saying he had a wholesome respect for such an organization.

We have tried to picture to you just how thoroughly we are equipped to give you service. CANADIAN MACHINERY'S chief object in life is to serve—to multiply good ideas and pass them on to you and to hundreds of others. CANADIAN MACHINERY or any high-grade journal can be wonderfully helpful or it can be of no use at all. It depends on the individual. Some profit by reading. Some do not.

Canada will need men **who know** and need them in large numbers, and need them perhaps long before we imagine. We are putting the best into CANADIAN MACHINERY. It is up to you to get yours out of it.

HAMILTON PIG IRON
OPEN HEARTH STEEL BILLETS
STEEL AND IRON BARS
RAILWAY FASTENINGS-FORGINGS.
BOLTS NUTS AND WASHERS.
POLE LINE HARDWARE.
SCREWS-WROUGHT PIPE-
WIRE-AND WIRE PRODUCTS of
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Service
Quality
THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON - - MONTREAL

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

Are your Tools made of Red Cut?

VANADIUM-ALLOYS STEEL CO.

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Swedish Steel & Importing Co., Limited

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Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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PROMPT SHIPMENTS from large stock

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO.
ESTABLISHED 1900
Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company
MONTREAL QUE.

Strong in the Neck

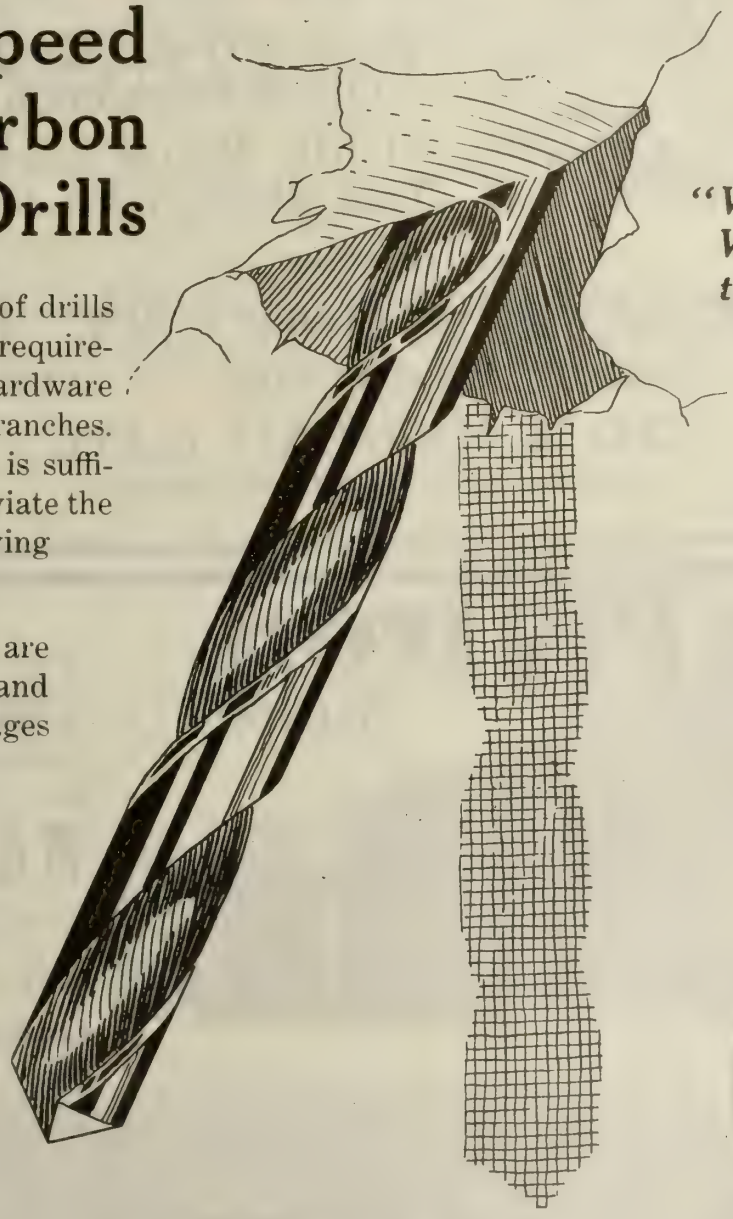
WILT

High Speed and Carbon Twist Drills

"Where There's a Wilt---There's the Way."

The **"WILT"** line of drills provides for the requirements of the hardware trade in all its branches. The **"WILT"** line is sufficiently large to obviate the necessity of carrying a mixed stock.

"WILT" drills are put up in neat and convenient packages for the trade, and will reach you in good condition. Wholesalers and retailers can sell **"WILT"** drills with the assurance that the final purchaser will receive absolute satisfaction.



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OF CANADA, LIMITED

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London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C.2, Eng.

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TRADE MARK
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High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

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RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

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The Ideal Steel for Machining Shells

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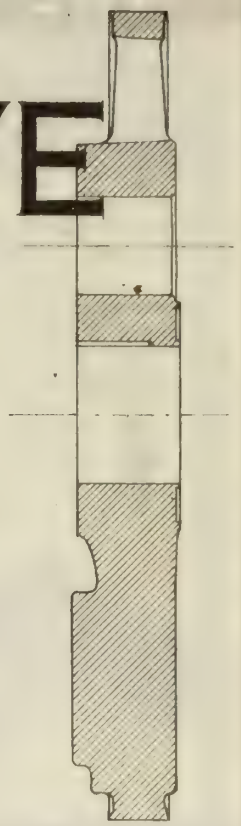

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High Grade STEEL Castings
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Send us your drawings
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Guaranteed Accuracy .00001"

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GAGE BLOCKS

These Gages are the standard with such organizations as Imperial Munitions Board, Canada Cement Company, Willys-Overland Company, Dominion Arsenal, Dominion Cartridge Company, The Turnbull Elevator Mfg. Co., Holden-Morgan Co., and Brown Engineering Corp.

Any one of thousands and thousands of measurements to .0001" can be made up by any shop man in a few moments.

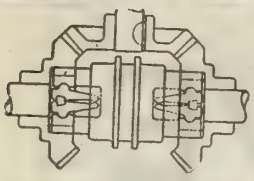
They take the place of less accurate tools both for producing work and checking its accuracy. One use nowadays is to set and check Johansson Adjustable Snap Gages in those shops that have taken advantage of the Limit System.

Write us for further information. Better still, let us demonstrate in your own shop.

H. E. STREETER
523 New Birks Bldg. - Montreal

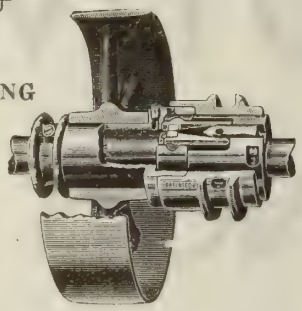
Johansson Gage Blocks, Special Taps, Hobs, Reamers and Cutters; Bench Lathes, Surface Grinders, Magnetic Chucks, Prestowich Gages, Micrometers, etc.

THE JOHNSON FRICTION CLUTCH

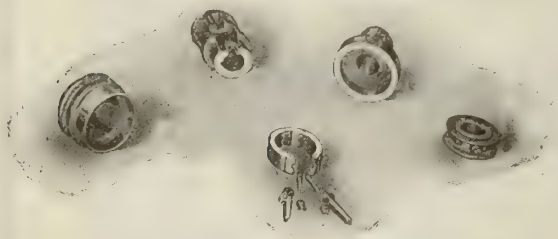


DOUBLE CLUTCH
IN NEST OF GEARING

Note the parts of this Clutch



STANDARD CLUTCH with Pulley Clutch Engaged



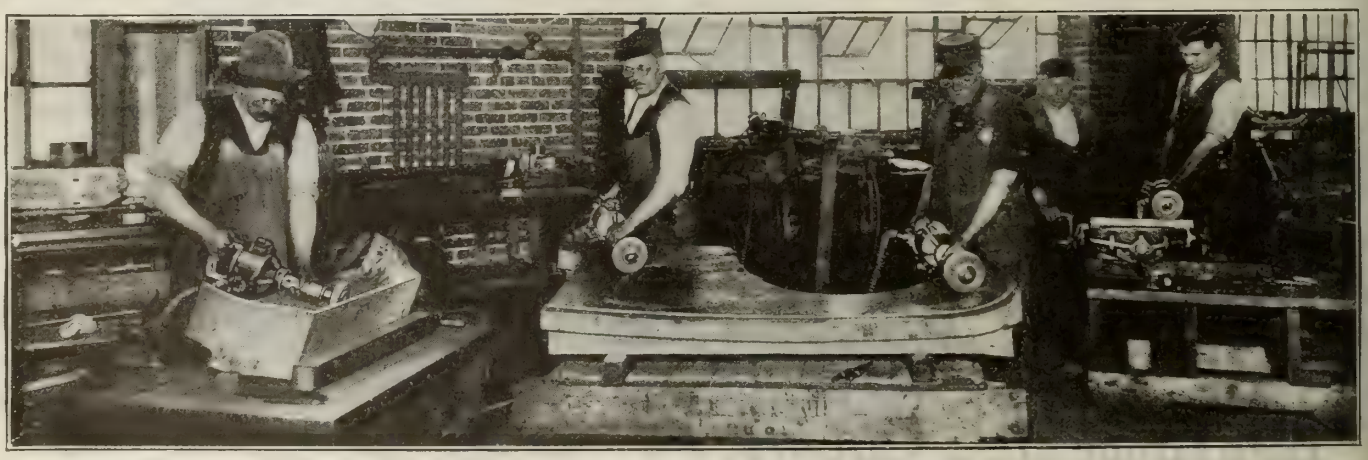
FOR SERVICE

The leading engineers are specifying *Johnson Friction Clutches.* Our years of experience in manufacturing friction clutches places us in an excellent position to take care of your requirements. The *Johnson Friction Clutch* has but few parts and is easily modified to meet any conditions. Have *you* noticed the concerns who are using *Johnson Friction Clutches?* There's a reason. Service is in back of it all. What are your requirements?

You Should Have Our Yellow Data Sheets and Booklet "Clutches As Applied In Machine Building"

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Toronto and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



How One Plant Uses The "LITTLE DAVID" GRINDER

CANADIAN INGERSOLL-RAND CO., LTD.

With Offices at

SYDNEY, SHERBROOKE, MONTREAL, TORONTO, COBALT, WINNIPEG, NELSON, VANCOUVER

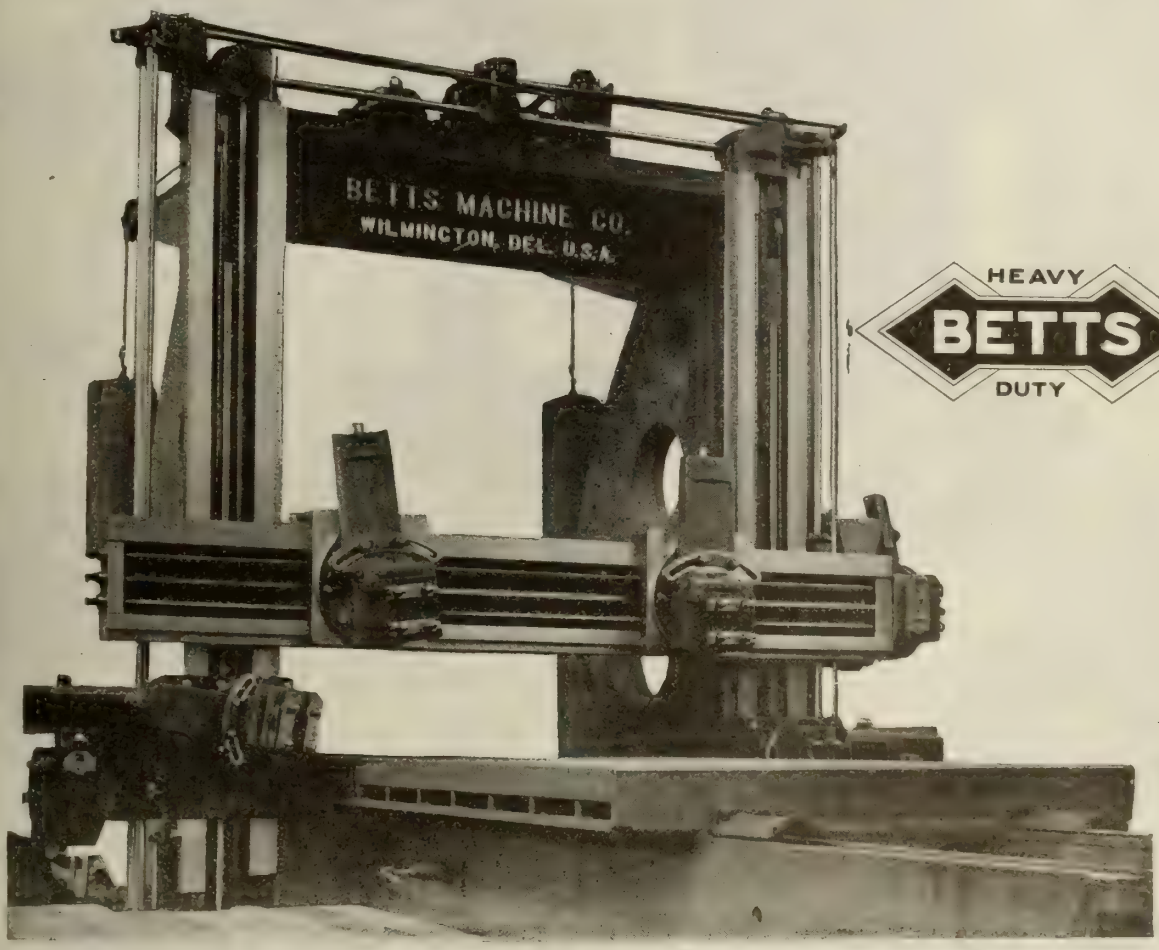
BETTS

"The Highest Type of Heavy Duty Machine Tools"

WHEN a thing is so well done that it stands out head and shoulders above everything else in its field, you can always be sure that the men back of it have concentrated every energy and focused every force on that one thing, for years or possibly a lifetime. You can be sure that they haven't scattered their attention or divided their energies.

Betts Heavy Duty Machine Tools are the result of concentration and combined effort, and their popularity is due to superiority of design, the accuracy and durability built into the tools and the backbone to stand up under the severe service required.

Complete information regarding any Betts Tool and specifications will be forwarded on request.



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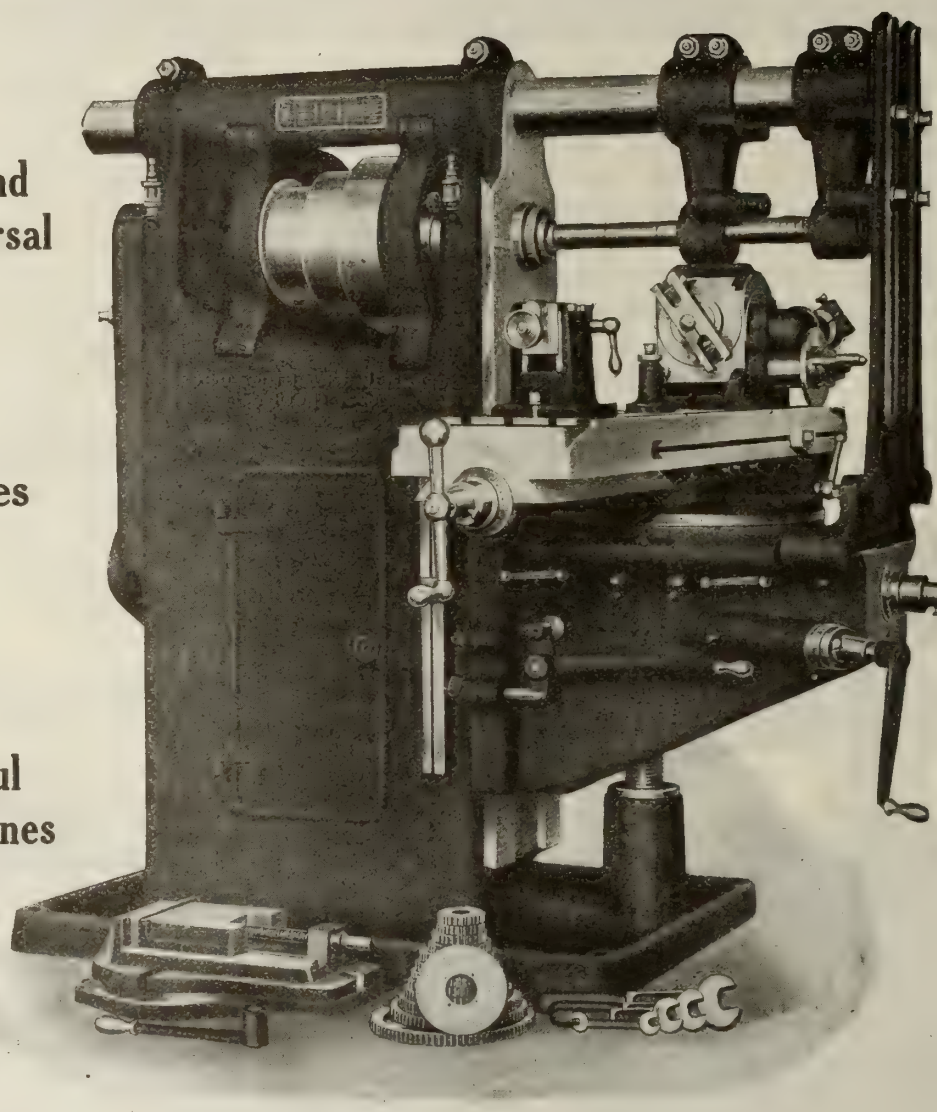
Milling Machines

Plain and Universal

4 Sizes

Powerful Machines



Rigid

Accurate

Our New Catalogue Is Ready

Extract from letter just received from one of the largest concerns of its kind in the British Empire—The Birmingham Small Arms Company, Limited, Birmingham, England; a user in a large way of Ford-Smith Millers:—

> *"We have your letter of the 4th instant, regarding the Ford-Smith Milling Machines which you supplied to us some time ago. In reply, we may say that so far these machines have proved very satisfactory."*

MANUFACTURED IN CANADA BY

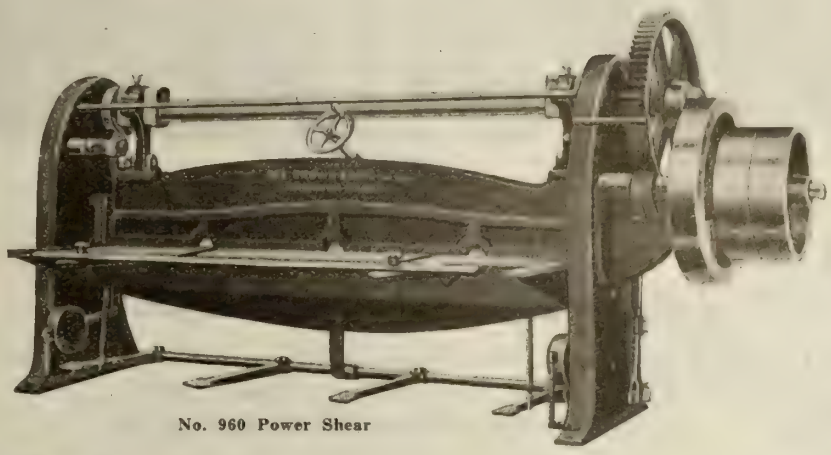
The Ford-Smith Machine Co., Limited

Hamilton, Ontario, Canada

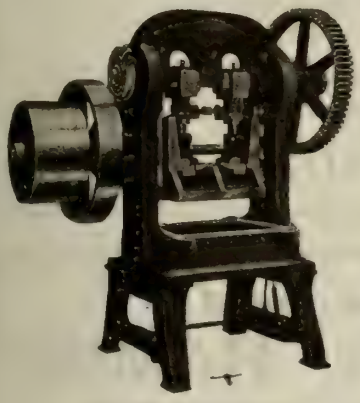
Makers of Milling Machines, Grinders and Special Machinery

Agent for Great Britain; W. E. Storey, 3 Arundel St., London, Eng.
Agent for United States and Foreign Countries: Alf. Herbert, Limited 54 Dey St., New York

Stood The Test



No. 960 Power Shear



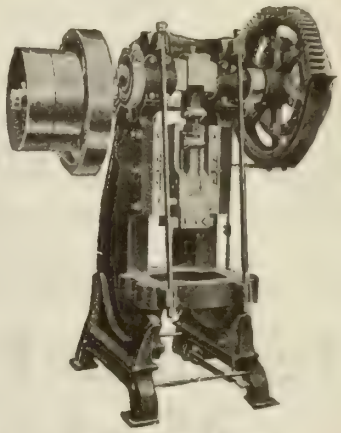
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

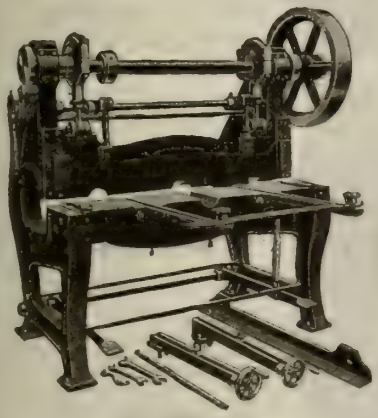
Inexperienced help and 24 hours daily service will test the best machines.

Quality that is "*built in*" on a machine is bound to assert itself under such circumstances.

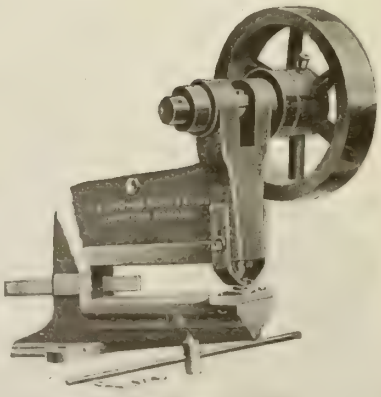
Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press



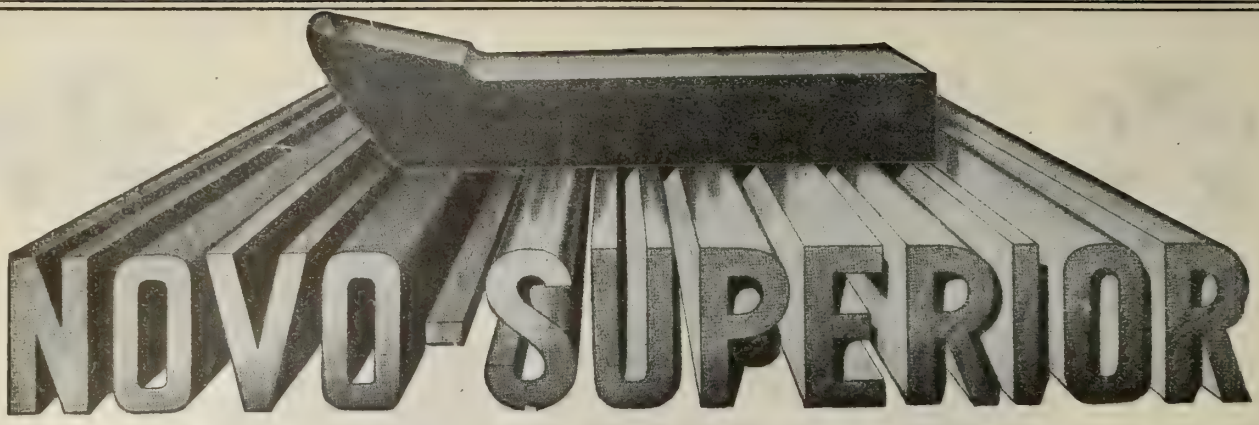
No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc., Music Wire for Springs, Steel Balls. Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

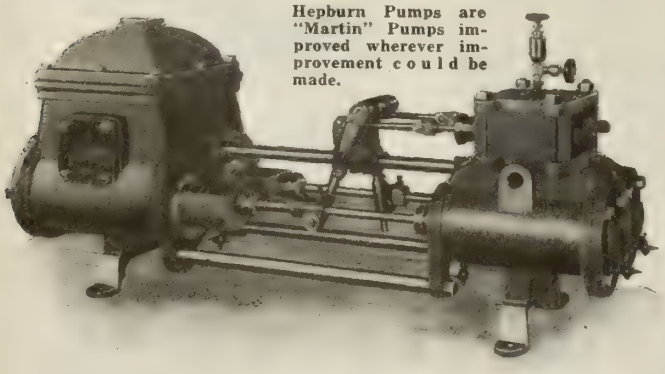
Circular Saws—for wood and for hot or cold metal cutting

Machine Knives—for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James Street, Montreal

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street **Toronto, Ontario**

If You Need a

POWER HAMMER

of uncommon strength throughout — a hammer constructed to deliver work of surpassing quality in great quantity, and to keep everlastingly at it—

You Need Jardine's

Note a few particulars:

Hammer slide is a steel casting; so is the ram, and connecting bolts for the ram are machined from solid steel bar.

Hammer and anvil dies of properly tempered, highest grade tool steel are held in machine seats by tapered keys in the ram and anvil block, so there's no need to put taper on the dies.

Jardine's Canadian Giant Power Hammer has never failed.

Write for Catalog

A. B. JARDINE & CO.
Limited
Hespeler, Ont., Canada

RICH

Rich for Rush Work

All work is produced under high pressure these days but often something turns up that requires pushing through with a rush. In cases like these you need RICH DRILLS. They have a capacity for speed possessed by no other drills and they do clean, accurate work—no feed too heavy, no speed too high.

RICH DRILLS AND REAMERS are **Forged** (not milled) from best high speed steel.

Machinery,
Machine Tools,
Factory and Mill Supplies

Our line of machinery and general equipment is strictly modern in design. If you have any problems to solve let us help you. Quick Service.

Standard Machinery & Supplies, Limited
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RICH

Electrite

Electric furnaces, automatically regulated, the most modern methods, and **the introduction of Uranium** — make this a steel of truly remarkably cutting properties.
We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

Uranium

CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.
That means a lighter and stronger machine—a machine built to take a lot of punishment. **Write for Catalog P/S-16.**

Canadian Blower & Forge Co., Ltd.
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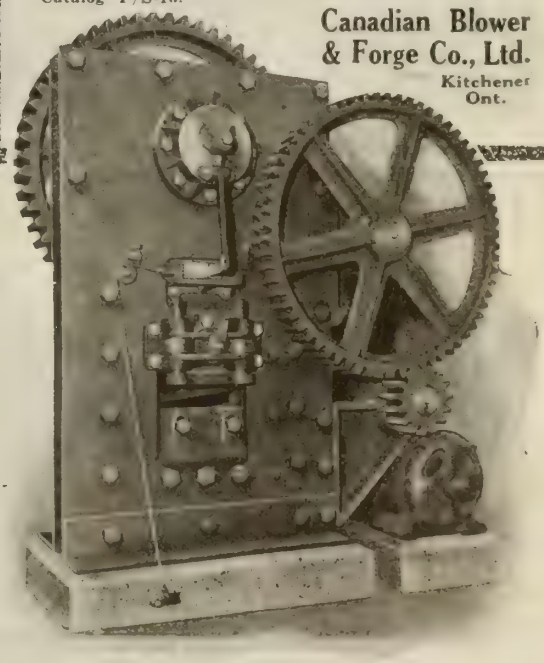


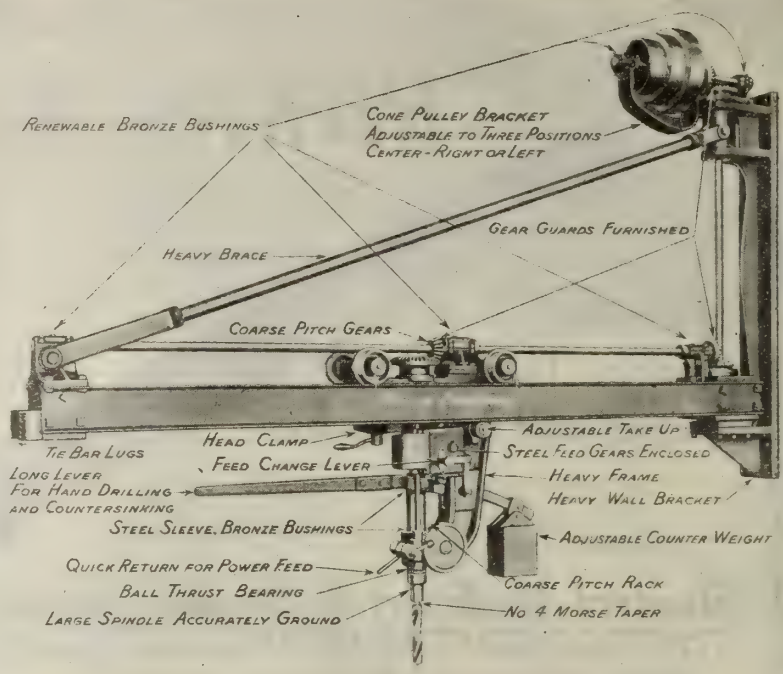
Here's a Drill You Want

The Lynd-Farquhar Wall Radial Drilling Machine is a real machine tool, carefully designed and made from the best material. The entire control of the drill is within easy reach of the operator. The arm is constructed of extra heavy channels and is supported from the outer end to the top of the wall bracket by heavy steel brace bars. The head is exceedingly rigid. It is mounted on four flanged wheels, fitted with roller bearings, and moves with extreme ease from end to end of the arm.

MADE IN FOUR STANDARD SIZES

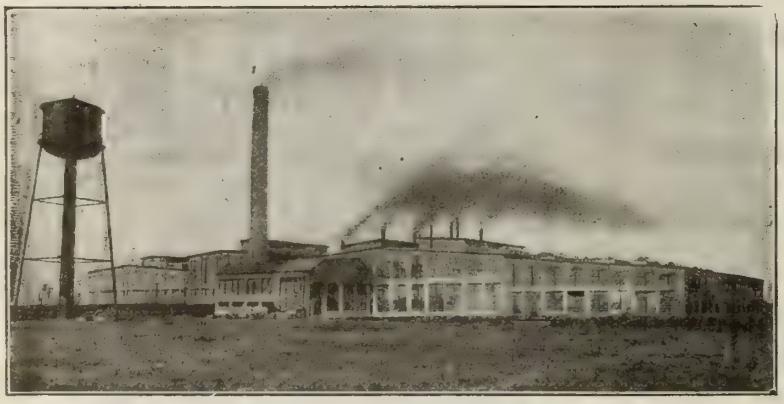
Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**



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FOR CUTLERY PURPOSES

Prices On Application

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IMPERIAL GENUINE BABBITT METAL *The Highest Grade Manufactured*

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg Vancouver

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

Don't Let Your Men Work with Dull Files

Tell them to turn them in when they have passed their "efficient point."

By doing so you will get more and better work from the men. You will save money because labor is more costly than material and your men will be better satisfied because no man likes to work with poor tools.

The files that give the longest efficiency are the "Famous Five."

Specify Them When Ordering.
They Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by

Immediate Service In Williams' Superior Drop-Forged Wrenches

For Every Purpose

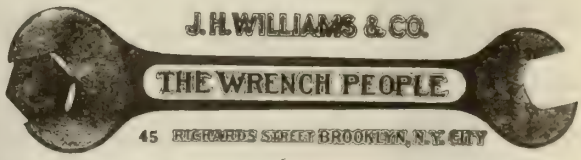
PURSUANT to our policy, inaugurated nearly half a century ago, of standardizing lines of Drop-Forged Wrenches, we have now developed some 40 patterns in about 1,000 sizes with openings running from 3/16 to 7⅝ inches, for every purpose.

All are reliable, efficient tools made of the best materials obtainable and manufactured by methods developed and perfected through many years' experience.

We carry them Big and Little, Bent and Straight, Thick and Thin; something *Standard* for every recognized trade need.

Specify "Williams' Wrenches" or Tools when you order and get *Superior* quality.

Ask for Wrench Booklet



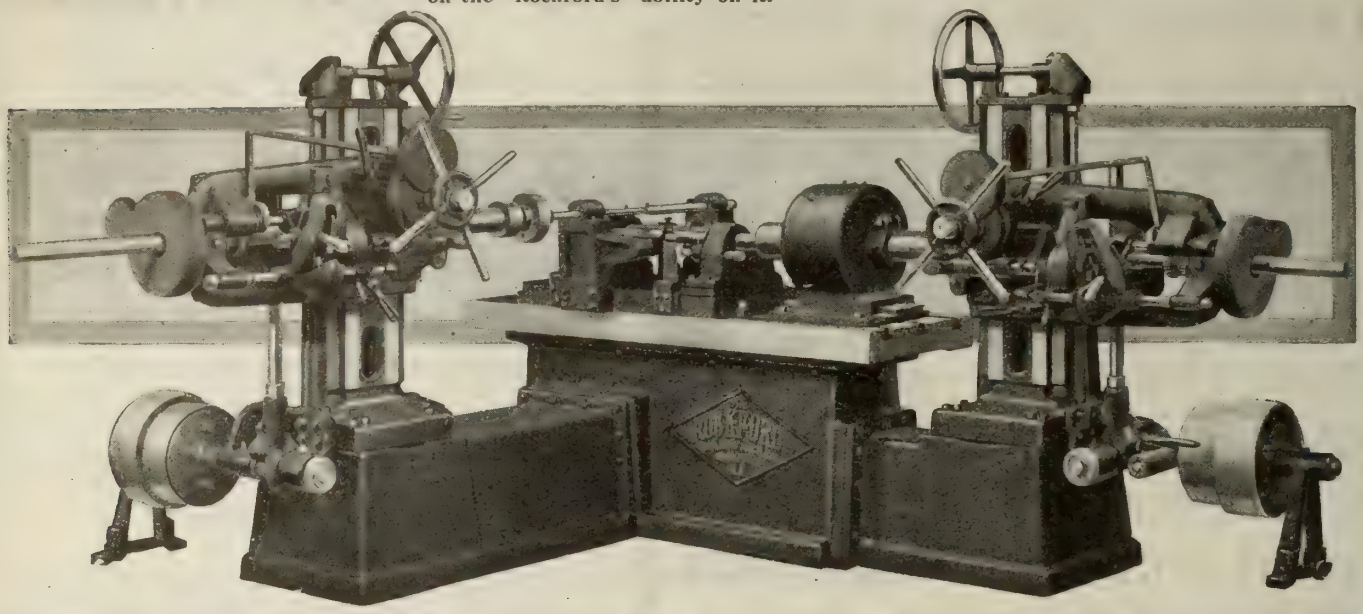
The A. G. Low Co. Ltd.
45 Pacific Ave. Saskatoon, Sask.
Agents for Manitoba, Saskatchewan, Alberta, and British Columbia

Rockford Horizontal Boring Machine

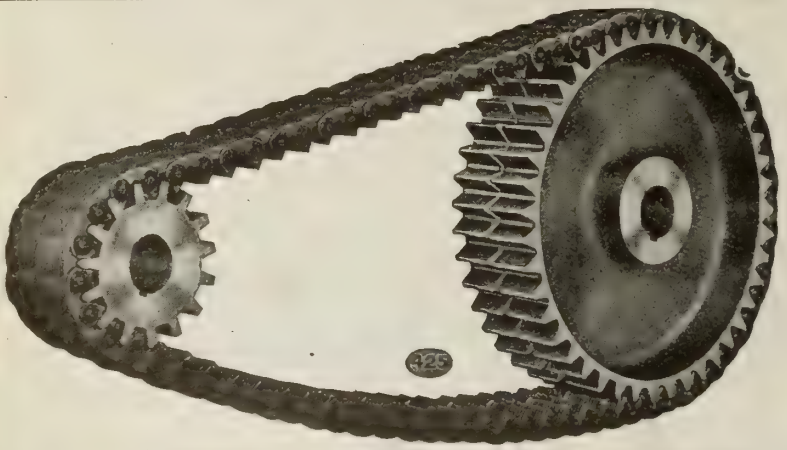
For Automobile Manufacture

This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



The Rockford Drilling Machine Co., Rockford, Ill.



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MONTREAL AND TORONTO

Specialists in

POWER TRANSMISSION CHAINS

CANADIAN AGENTS FOR

"RENOLD"

Patent Silent and Bush Roller Chains

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Chain Drives from ¼ H.P. to 5000 H.P. in successful operation

Write for particulars to

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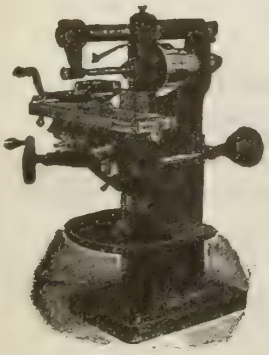
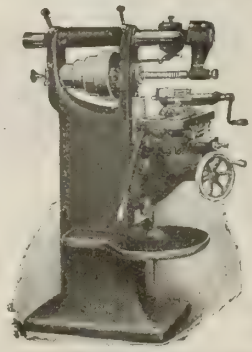
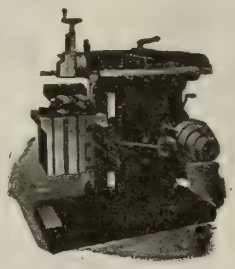
Increased Production Means Increased Profits



Large Millers for large work —STEPTOE MILLERS for small work



Large Planers for large work —STEPTOE SHAPERS for small work.

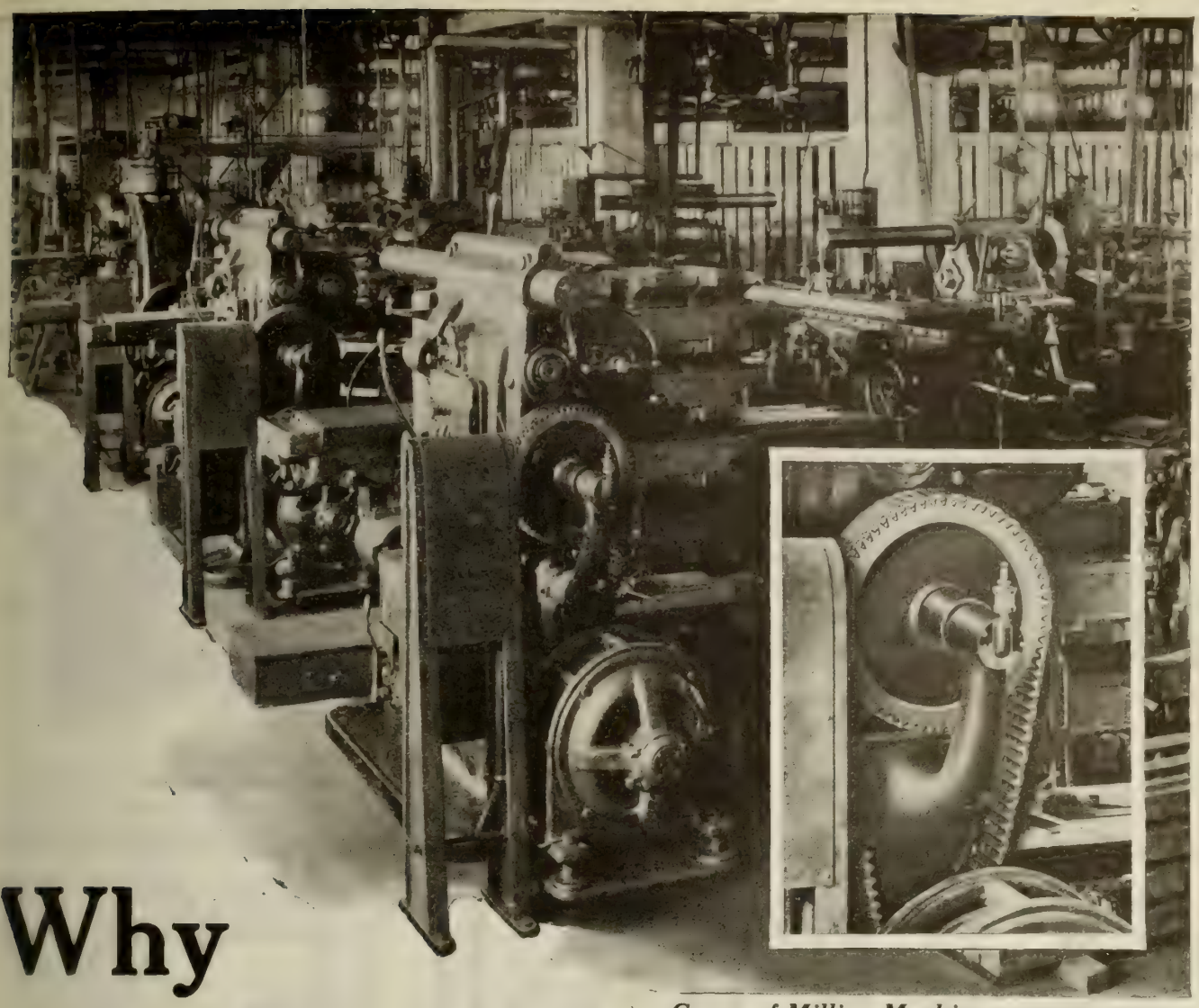


Will result in increased production; less money invested in machinery, and increased profits.

THE JOHN STEPTOE COMPANY

CUMMINSVILLE, CINCINNATI, OHIO, U.S.A

Canadian Representatives: Garlock-Walker Machinery Co., Toronto, Ont.



Why

Group of Milling Machines

Do Modern Shops Use "Morse"?

Machine Tools driven through "Morse" Silent Chains are positively connected to motor—instantaneous motion, no slip, no backlash. 99 per cent. efficient, compact, flexible, positive.

"MORSE" Drives have every quality of

Efficient Power Transmission

STRENGTH SIMPLICITY ENDURANCE SILENCE

Conserve Power *Before Buying Pulleys and Belting investigate, know the facts.* **Increase Production**

Are you under your conditions producing maximum output with minimum cost?

MORSE CHAIN CO. Largest Manufacturers of Silent Chains in the World **ITHACA, N.Y.**

MORSE ENGINEERING SERVICE ASSISTANCE WITHOUT OBLIGATION

Address Nearest Office

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GREENSBORO, N.C. ..... 805 Ashboro Street
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CANADA ..... Jones & Glassco, Reg'd Montreal, St. Nicholas Bldg. Toronto, Traders' Bank Building.
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ST. LOUIS, Mo. ..... Morse Engineering Co., Chemical Bldg
Licensees for Europe and Eastern Hemisphere, The Westinghouse Brake Co., Ltd., 82 York Road, King's Cross, London, N.

Smalley General Thread Milling Machines

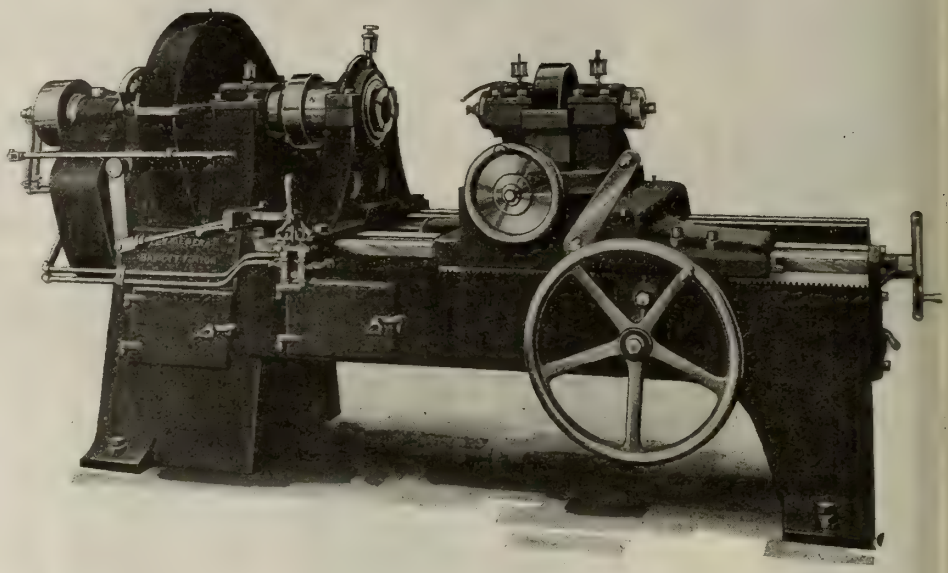
Two speeds—in on minute milling 2 to 1 inches or turning 1 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

Write for Bulletin.



Smalley General Co., Inc.

BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

SIDNEY

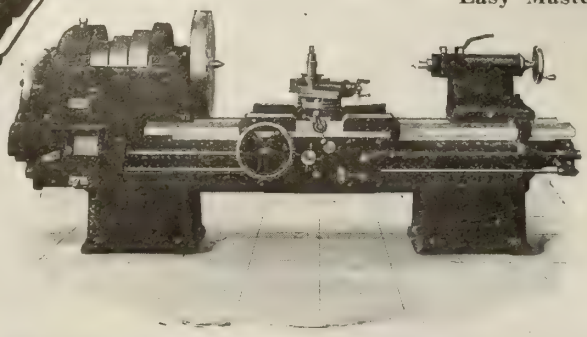
for SERVICE

Heavy Duty Lathes

The 25-inch Heavy Duty Quick Change Sidney shown below is the last word in lathe construction. Every possible improvement will be found in this late model. Bed lengths available are 10, 12, 14, 16, 18 and 20 feet. Also built with a 27-inch swing.

Easy Masters of Big Jobs

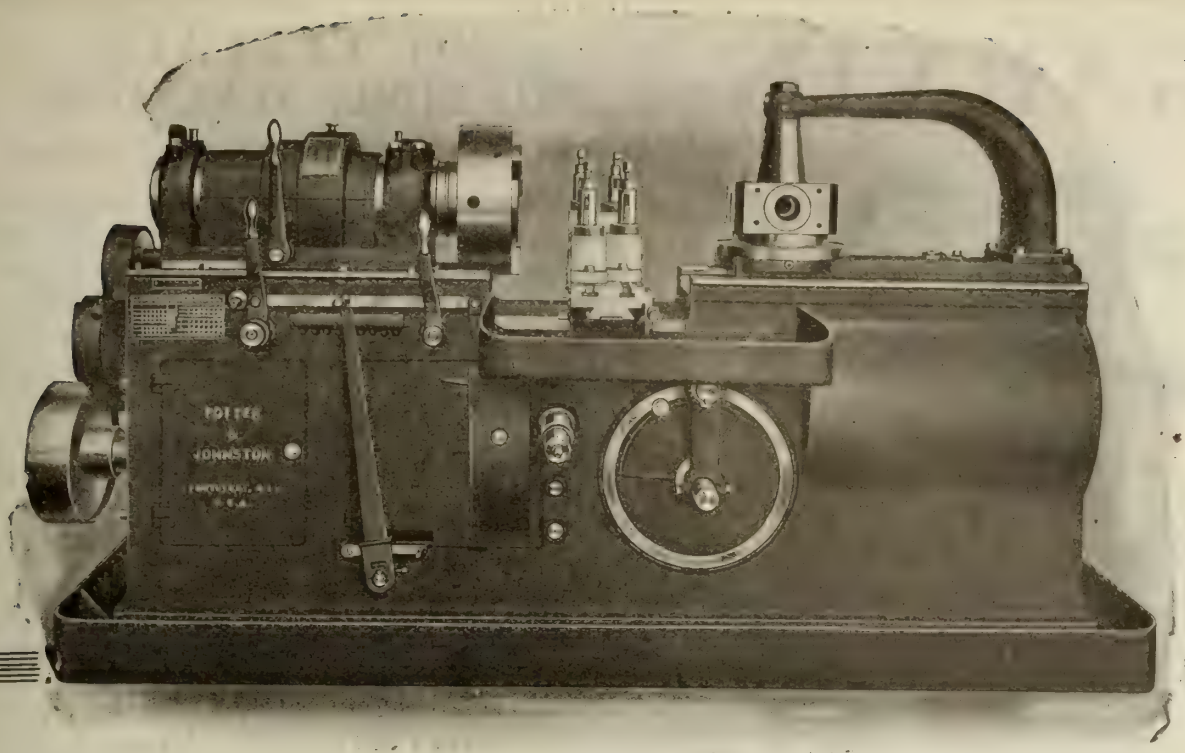
Regardless of the severity of work, dependence put on Sidney Lathes has never been misplaced. The Sidney line has made good—with a vengeance. New Bulletins just issued on 25-inch machine. Write to-day!



The Sidney Tool Company

SIDNEY, OHIO

CANADIAN AGENTS:
The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cost, *both* are readily obtained on

Potter & Johnston Manufacturing Automatics

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

Catalog gives full particulars. Drop a card for it.

Canadian Offices : POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office : 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse : Galt, Ont., Canada

GARVIN

No. 12 Plain Milling Machine - Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....18 x 6 x 15 in.

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

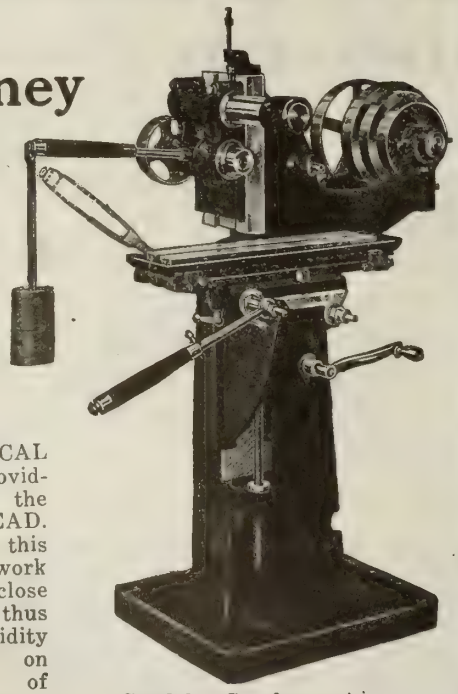
THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

THOUSANDS IN USE

The Whitney

Hand Milling Machine



The VERTICAL FEED is provided for by the SLIDING HEAD. On account of this feature the work can be held close to the table, thus giving a rigidity not possible on other types of Hand Millers.

Send for Catalogue A.

The Whitney Mfg. Co.

Hartford Conn. U.S.A.

Chains—Keys—Hand Milling Machines

Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company

HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

STELLITE

"Not Steel but its Master"

Reconstruction Period

The part played by STELLITE in the winning of the war has been no small one. It was due to the use of STELLITE and the determination of our manufacturers that Canada was able to make such an enviable record in shell production.

What Canada has done in war she can do in peace, but she must continue along the lines of rapid production and efficiency.

By the use of Arc-Welded Tools of STELLITE your production can be increased and your tooling costs reduced.

Write Our Service Department For Particulars

Deloro Smelting & Refining Company, Limited

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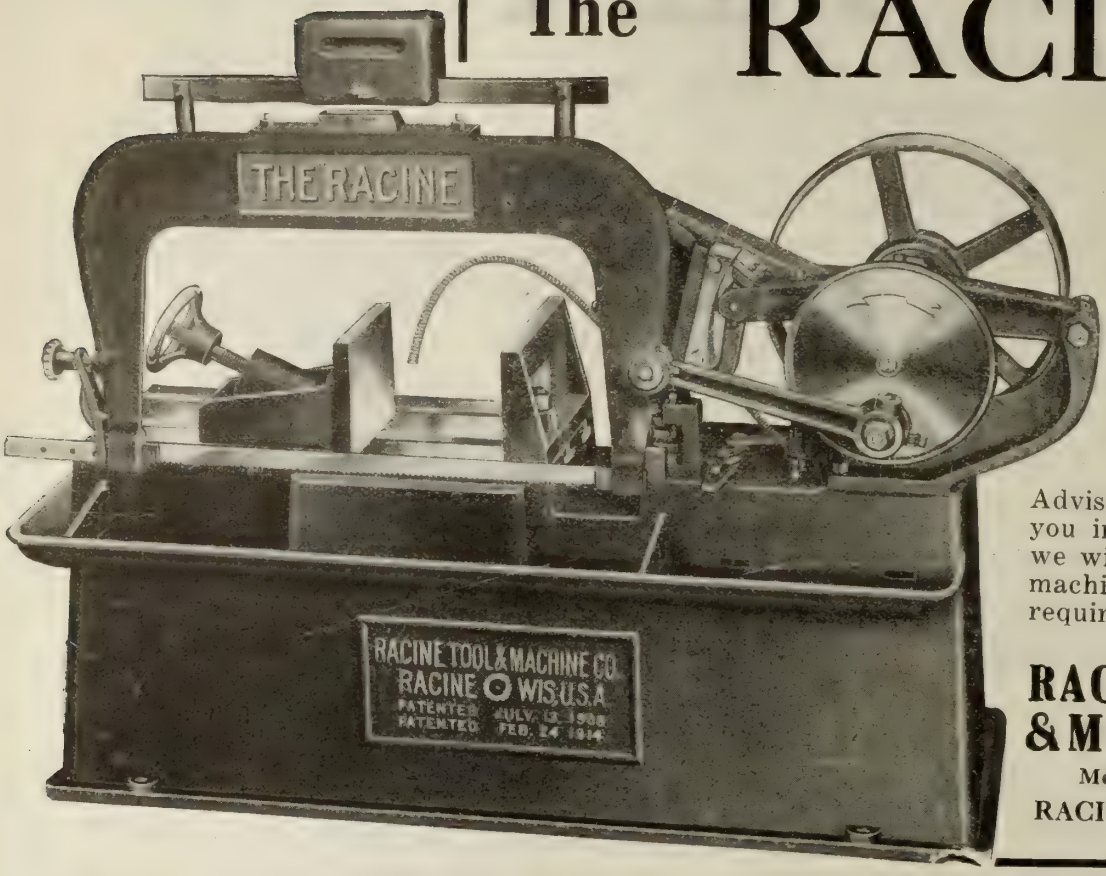
200 King Street West

DELORO, ONT.

MONTREAL
315 Craig Street West

The "RACINE"



For Speed

For Accuracy

For Quantity Production

For Saving in Blade Costs

For Saving in Material

Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

RACINE TOOL & MACHINE CO.

Melbourne Avenue

RACINE, WIS., U.S.A.

SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

ST. JOHN MONTREAL VANCOUVER

HEAVY MACHINE SAW BLADE

ENOX 18 G. 17 G & 16 G THICK

10 TEETH TO INCH

½ TO 2 WIDE ACCORDING TO TYPE & SPEED OF MACHINE

ENOX

Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

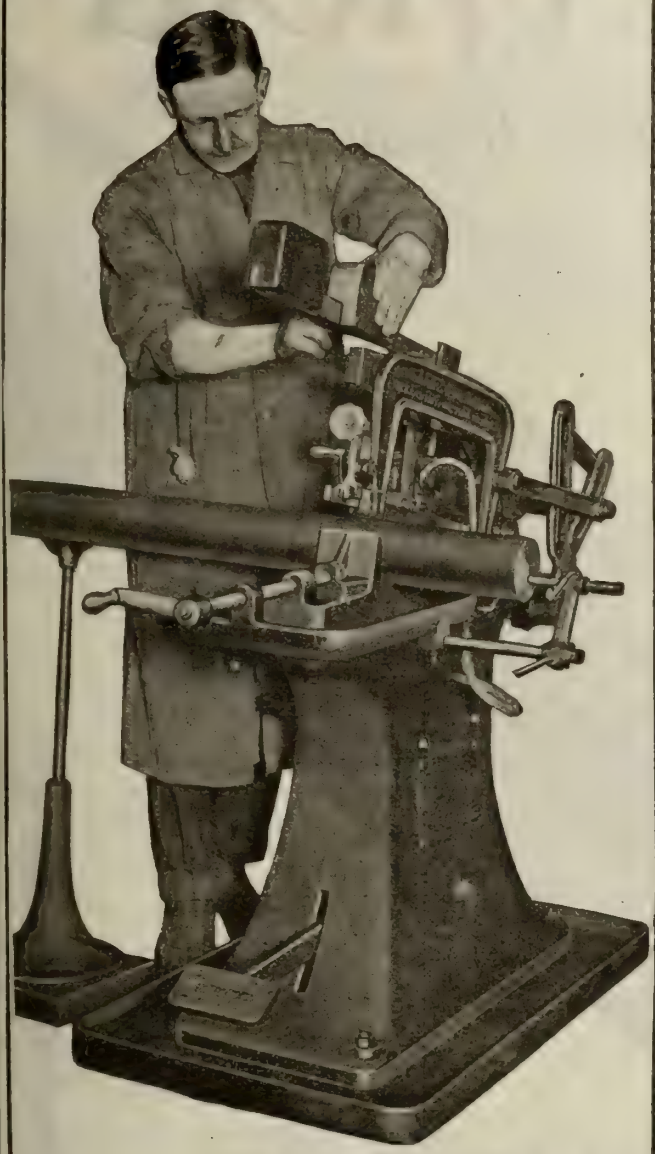
46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10

ENOX LIGHT 21 G THICK 14 TEETH

MACHINE BLADE ⅝ & ¾ WIDE TO INCH

ENOX HAND FINE TEETH

SAW BLADES 20 TEETH TO INCH



You Save Raw Materials—

like coal, iron, cotton, steel, etc. Why not hack saws and TIME, which is so vital in industries to-day? For the utmost in hack saw value—the maximum of cost, use

STARRETT Hack Saws

They help "speed up" production, because they cut faster and are economical, because they last longer.
Write for Catalog No. 213. It shows hack saws and frames, also in any styles and sizes of Starrett Precision Tools.

The L. S. Starrett Co.

The World's Greatest Toolmakers.
Mfrs. of Hack Saws Unexcelled.
ATHOL, MASS.

STARRETT HACK SAWS CUT QUICKER LAST LONGER

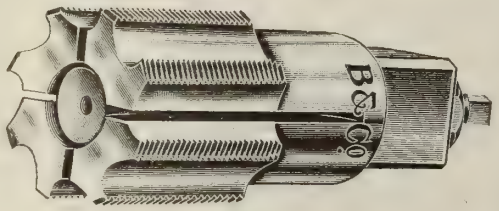
42-866

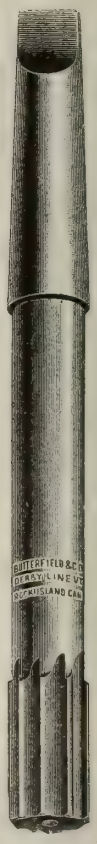
Starrett Hack Saws

If any advertisement interests you, tear it out now and place with letters to be answered.

Butterfield

Taps, Dies and Reamers



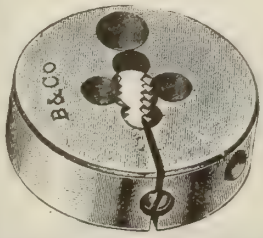


The Deciding Factor in Tool Economy is Quality

Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.

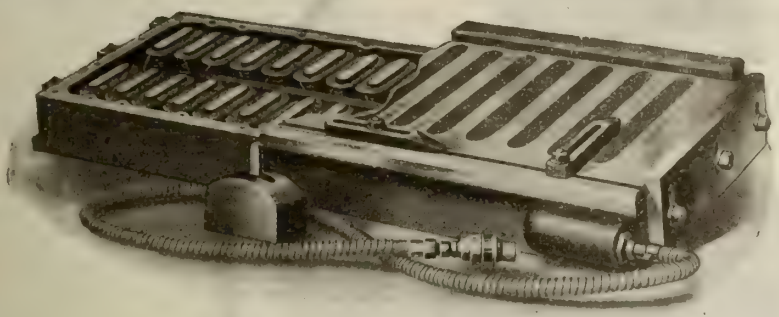


Send for Catalog No. 17. It's just out

Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office : 220 King St. W.

14 FACTS ABOUT HEALD MAGNETIC CHUCKS



Holding Power is 110 to 210 lbs. per sq. in., depending on size of chuck.

Pole Pieces do not loosen up. Top Plate Frame is solid.

Plenty of air space between coils.

Unit Coil System means uniform holding power over entire magnetic surface.

Great Range of Work due to pole arrangement.

Very Thick Top Plate allows surface to be trued up frequently.

Chuck is Water-proof, Moisture-proof and Heat-proof.

Small Current consumed.

Water-tight Volt Box. Voltage easily changed on rectangular chucks.

Heald Chucks will not magnetize machine they are used on.

Armor Tube protects connecting wires.

Detached and Protected Demagnetizing Switch, can be located at operator's convenience.

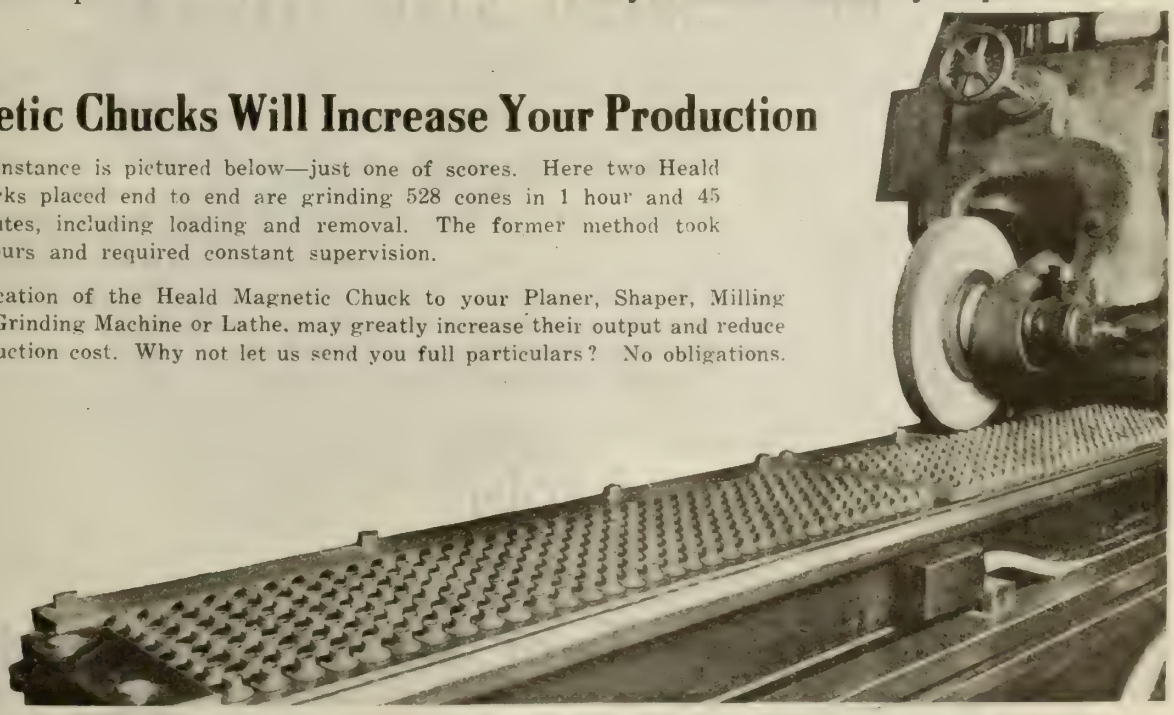
Chuck Demagnetizes completely.

Every Feature Tested by Experience.

Magnetic Chucks Will Increase Your Production

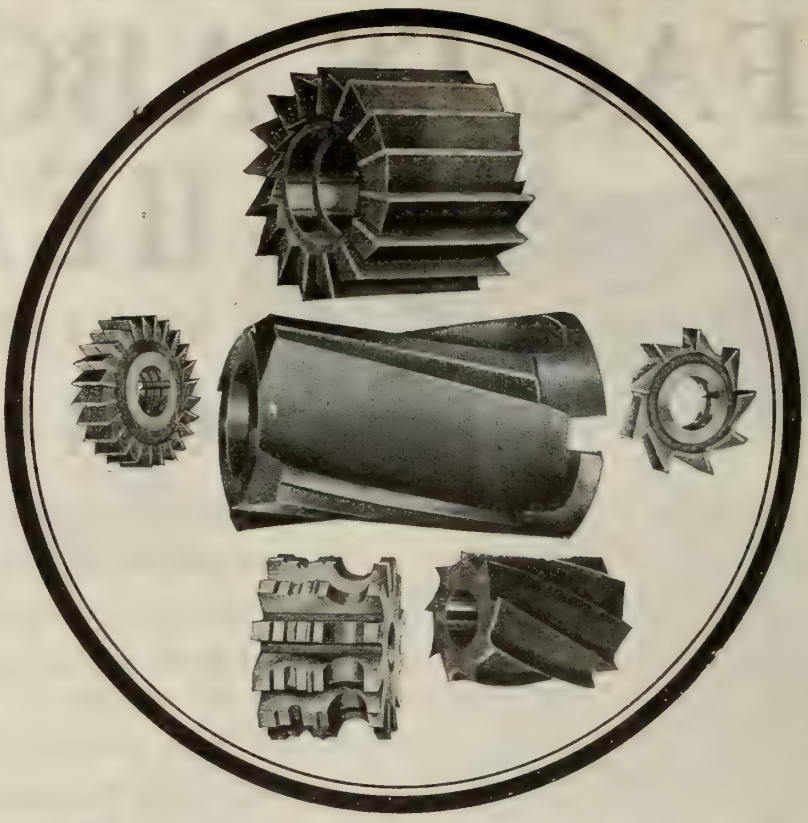
An instance is pictured below—just one of scores. Here two Heald Chucks placed end to end are grinding 528 cones in 1 hour and 45 minutes, including loading and removal. The former method took 5 hours and required constant supervision.

The application of the Heald Magnetic Chuck to your Planer, Shaper, Milling Machine, Grinding Machine or Lathe, may greatly increase their output and reduce your production cost. Why not let us send you full particulars? No obligations.



The Heald Machine Co., Worcester, Massachusetts

CANADIAN AGENTS:—Aikenhead Hardware, Ltd., Toronto; Canadian Fairbanks-Morse Co., Montreal; George F. Foss Machinery & Supplies Co., Montreal; Garlock-Walker Machinery Co., Toronto; H. W. Petrie, Ltd., Montreal, Quebec; Standard Machinery & Supplies, Ltd., Montreal; The Swedish Gauge Company, Montreal; A. R. Williams Machinery Co., Ltd., Toronto; Williams & Wilson, Montreal, Quebec.



DAVIDSONIZED
HIGH SPEED STEEL TOOLS

such as pictured above, are establishing new standards in high speed tool efficiency. Made by the Davidson process, these tools possess a degree of toughness, cutting efficiency and resistance to abrasion such as was never before believed possible. Actual working tests have always proven 50% or greater increase in production.

SPECIAL SERVICE

To plants having their own tool making force we supply these tools in rough ground annealed form within approximately 1-32 of finish. Thus a tool that takes 20 hours to make from the solid bar can easily be finished from our blanks in 2 hours. This standard of comparison holds good as regards various styles and sizes of tools. The use of our tools in this form will establish new standards in tool room production. We guarantee against breakage in the hardening operation.

Send Drawings, Blueprints or Patterns and we will quote prices and quick deliveries.

DAVIDSONIZED DTM CORP. STEEL

The Davidson Tool Mfg. Corporation

Main Offices:
118-120-122-124 Maiden Lane
New York City

Works:
56-58-60-62 North Sixth Street
Brooklyn, N.Y.

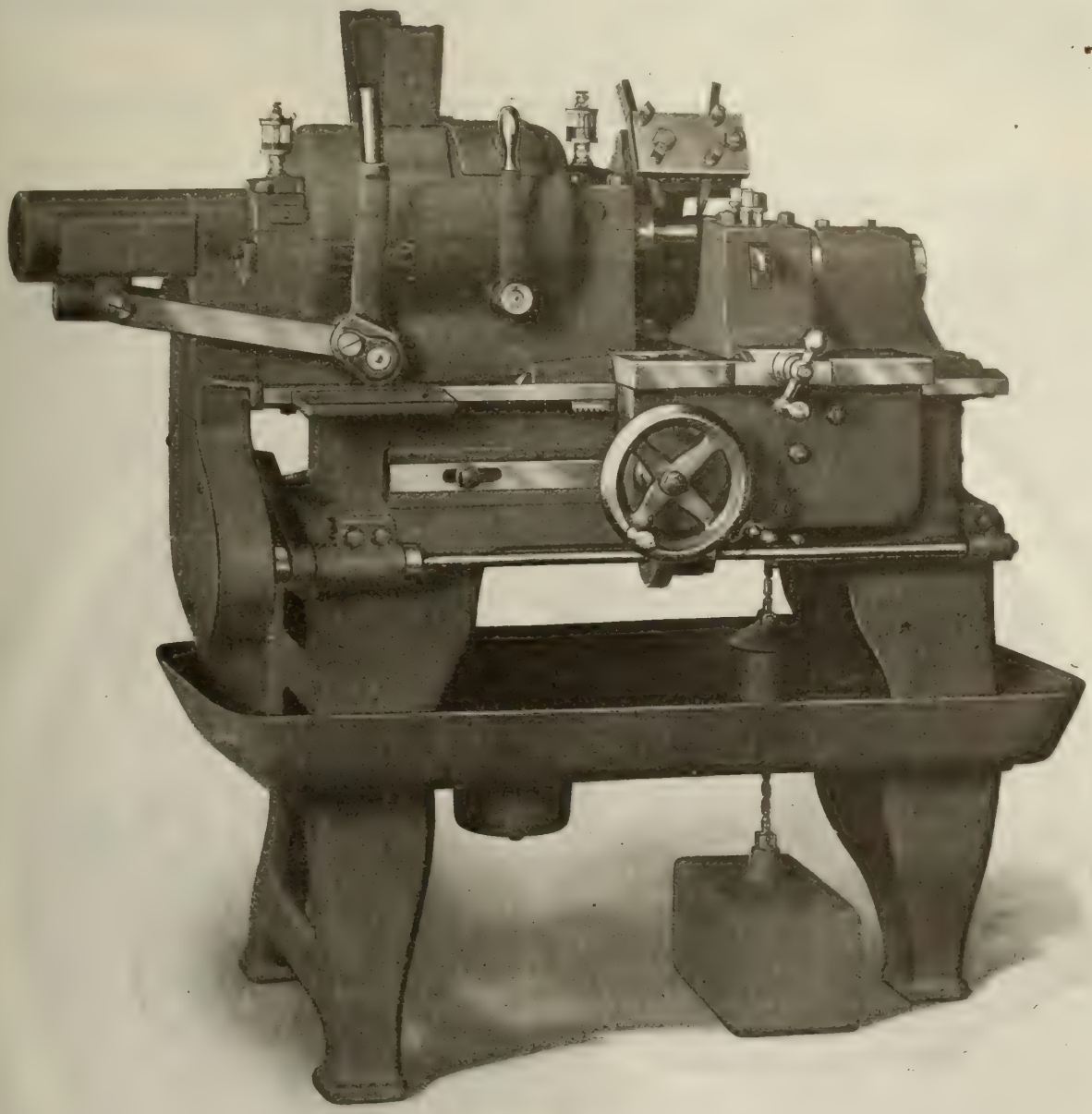
SOLE SELLING AGENTS FOR CANADA:

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

Ottawa Toronto Hamilton St. John Quebec Montreal Windsor
Winnipeg Saskatoon Calgary Vancouver Victoria

REED-PRENTICE COMPANY

WORCESTER MASS. U.S.A.



DO YOU KNOW?

A REED-PRENTICE AUTOMATIC WILL MACHINE BUSHINGS AND SIMILAR PIECES WHICH CALL FOR TURNING, FACING, GROOVING OR BEVELING, IN COMBINATION, WITH A RAPIDITY THAT WILL MAKE YOUR PRESENT PRODUCTION TIME UNWORTHY OF FURTHER CONSIDERATION.

IF YOU HAVE QUANTITY MANUFACTURE OF SUCH A CHARACTER, SEND US A BLUE PRINT OF THE PIECES AND WE WILL GLADLY SEND YOU GUARANTEED TIME FIGURES WHEN THE MACHINING IS DONE ON A REED-PRENTICE AUTOMATIC LATHE.

CANADIAN FAIRBANKS-MORSE CO., LTD.
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES.

Through SKF Ball Bearings

60 to 80% of your friction load is wiped out. 80% of your lubricant is saved. Hot boxes, burnouts, binding, seizing are eliminated. All this through S K F Ball Bearings. Whether in your line shafting, your machine tools, or in fact any mechanism that consumes power, S K F Ball Bearings will reduce friction and upkeep cost to a minimum.

Special literature on many subjects will interest and convince you.

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THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

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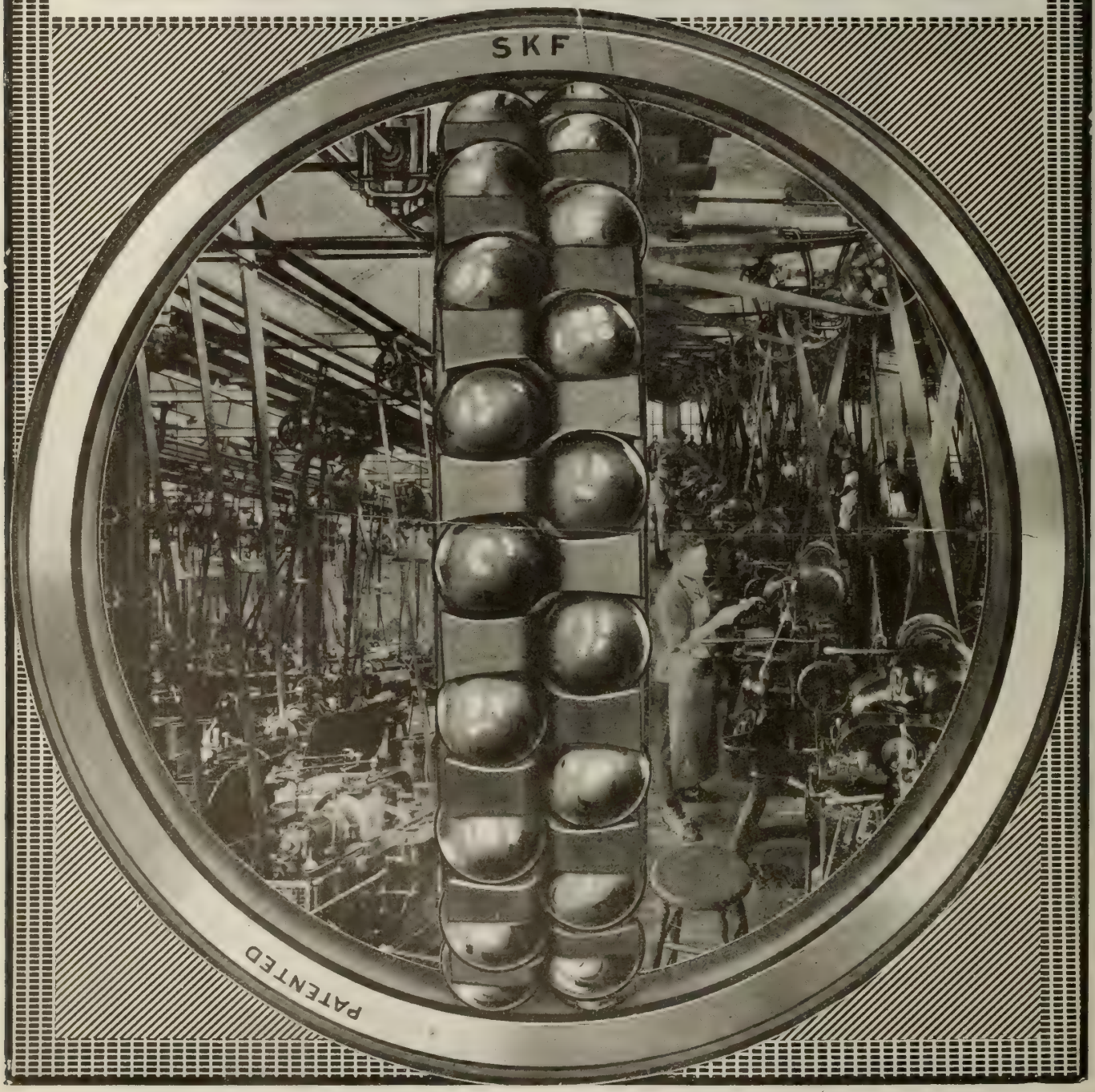
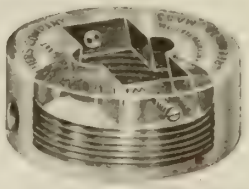
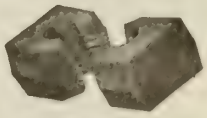




Cap for Little Giant Collet, showing Adjusting Screws.



Little Giant Die

A Pointer

Poor tools or lack of tools is the greatest hindrance the repair man has. The novice with an assortment of good tools can accomplish more.

No shop equipment is complete without a GTD Screw Plate. Not only will it recut jammed threads, but new threaded parts can be made—and it's mighty hard to get spare parts nowadays.

GTD Screw Plates are made in over a hundred assortments. Yours is among them.

Write for New Small Tools Catalog No. 40 describing Screw Plates, Taps, Dies, Reamers, etc.

WELLS BROTHERS COMPANY of Canada, Ltd.
GALT - ONTARIO
Cauadian Factory of the
GREENFIELD TAP AND DIE CORPORATION

Buy a

G T D Screw Plate

with Little Giant Adjustable Reversible Dies

Forgings and Steel Stampings

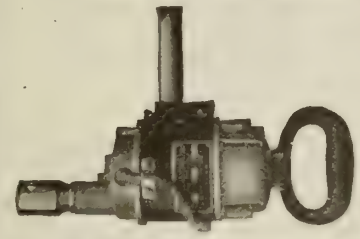
OUR Forge Plant compares very favorably in size with any on the Continent. Its efficiency is equal to that of any, and exceeds most. We can handle effectively practically any drop forging.

OUR Stamping Plants contain over 100 presses, including equipment to handle heaviest drawn work.

Dominion Forge & Stamping Co., Ltd.
WALKERVILLE, ONTARIO
Toronto Office: 510 Lumsden Building

U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

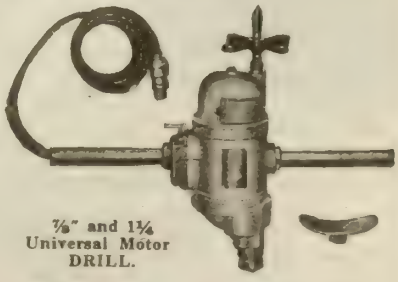
For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES
3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅞" and 1¼ Universal Motor DRILL.

For Sale By
The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 21A

The Use of Hard Wheels

Log conditions vary with the seasons. In the winter the logs are frozen or ice-covered; in the spring the bark is full of dirt, mud and grit, which cannot be entirely removed by flushing with a hose or rolling around in the pond. All the year trouble is usually experienced from iron in the form of nails, spikes and bolts which have been driven into the logs at various times. Stones are frequently picked up in the bark and completely covered over in a few years.

When a saw runs into iron or stones, anything is likely to happen, from the mere dulling of the points of the teeth to completely stripping away the teeth and perhaps tearing the whole saw to pieces. The amount of grinding is necessarily proportional to the condition in which the saws came back to the file room. With knocked-off points and stripped teeth, several hours of exceedingly hard grinding may be necessary. This is hard on the wheel, which may wear down in a few hours of this strenuous work as much as several weeks of ordinary grinding. For an occasion like this the careful grinder uses the wheels which he has found are too hard for the general run of work. These harder wheels will stand up and hold their shape much better than can be expected of the regular wheels.

As you were reading the above, perhaps some grinding problem in connection with your saw sharpening occurred to you. The Norton Sales Engineering Department stands ready to help you solve this problem. Why not put it up to them?

NORTON COMPANY

NEW YORK STORE — 151 CHAMBERS ST.
CHICAGO STORE — 11 NO. JEFFERSON ST.

ELECTRIC FURNACE PLANTS
NIAGARA FALLS, N.Y. — CHIPPAWA, ONT.

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS — NIAGARA FALLS, N. Y. CHIPPAWA, ONT.
NEW YORK STORE 151 CHAMBERS ST. — CHICAGO STORE 11 NO JEFFERSON ST.

TRADE NORTON MARK

Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assures accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

Canadian Fairbanks-Morse Co., Ltd.

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.

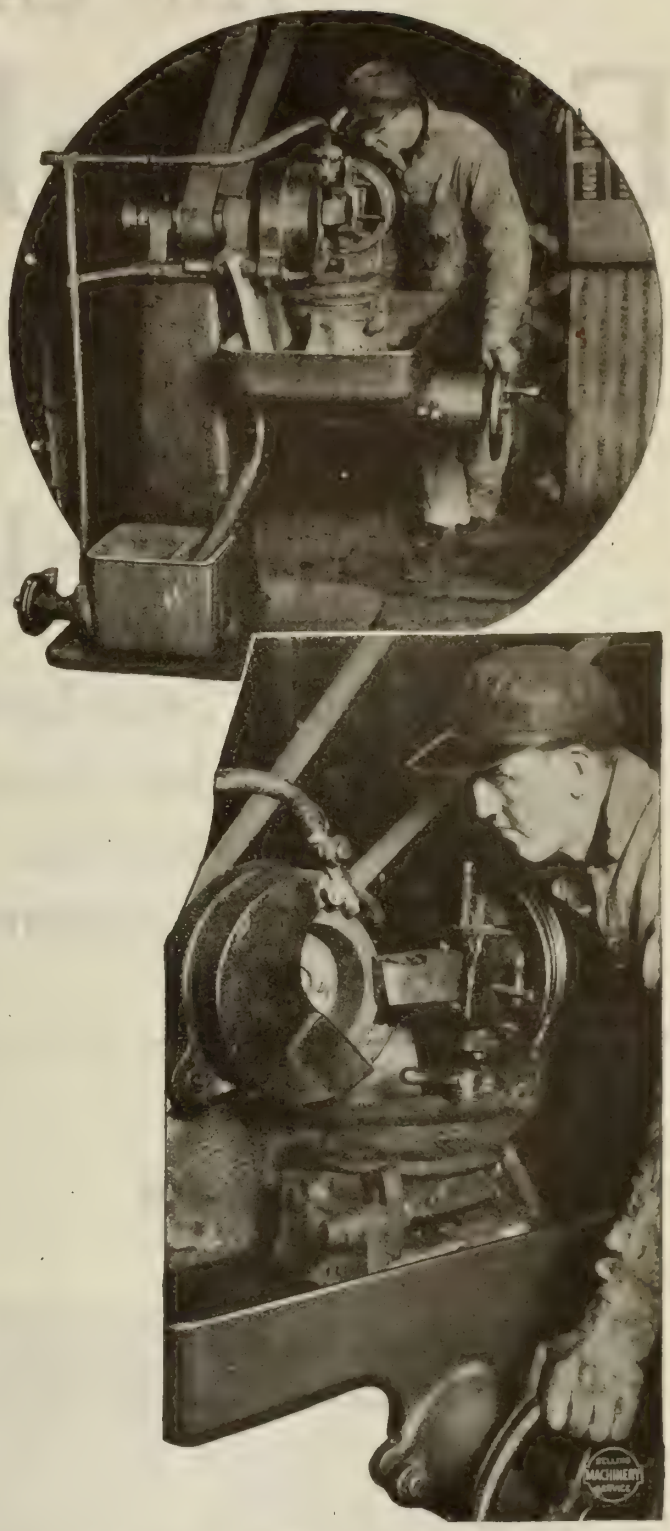
Detroit, Michigan

Sales Representatives

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

SAVED!

—$7.50 Annually on Every Machine Hand in the Shop



that is operating an engine lathe, turret lathe, shaper, planer, slotter, vertical boring-mill or screw machine.

Let's say that every one of these machinists consumes five minutes a day grinding tools. As a matter of fact they all probably consume more. But five minutes is a fair, conservative estimate to use as a basis for some rapid calculating.

Now let's say you are paying 30 cents an hour and working 300 days a year.

If your men could be relieved of tool grinding you would get **25 hours more** production time from each one annually, with no additional hardship to him—and you'd save $7.50 per man. Worth considering, isn't it?

And your men *can* be relieved of tool grinding! That's the point. You can easily make this saving.

A boy or a handy man can do all of the tool grinding for your entire plant—and do it right—better even than your best machinists can do it by hand—if you install in your tool room a

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Making Milling and Gear Cutting Attachment—I

In This Article is Described the Making of an Attachment For Lathes Which Performs Milling and Gear Cutting Operations— Various Tools and Operations Used in Machining Are Shown

By ROBERT MAWSON

IN this article is described an attachment for lathes which performs milling and gear-cutting operations.

The attachment is compact, easily applied and positive in its action.

The various tools used in machining the various elements are described in detail also by means of illustrations.

It will be seen that they are of a high character as regards modern tool design and manufacture enabling accurate and intensive production to be obtained.

In most cases the first machine tool bought by a shop is a lathe.

A visit to the small country jobbing shop will show in many cases as the only machine tool—a lathe, or as the shop enlarges, two or more to meet the demand.

However, there are many problems which come to both the small and larger shops that cannot be well done on a lathe. Such problems are milling and gear-cutting, and as these are so few that they do not warrant the purchasing of a special machine, an attachment for the lathe which will perform these operations is useful and valuable.

The Presto Machine Co., Inc., Brooklyn, N.Y., are manufacturing what is known as the "Star" milling and gear-cutting attachment, which is designed and can be used to advantage for the work noted.

In Fig. 1 is shown a front view of the attachment fitted onto a lathe, and a rear view is illustrated in Fig. 2.

The attachment can be conveniently secured to the lathe and is suitable for a wide range of work, which includes various milling operations with the exception of spiral cuts.

The cutter block A is mounted on the carriage of the lathe and fed in either direction, longitudinal or cross, by hand or automatic power feed of the lathe.

The cutter spindle B may be rotated in either direction, receiving power from the driving collar C, which is clamped on the spindle of the lathe.

Motion is transmitted through the sliding shaft, universal joints shown and bevel gears in the cutter block.

The universal head D is clamped to the inside ways of the lathe bed. The vertical column E carries a slide, on which may be mounted the dividing head as shown, or a vee; a graduated collar on feed screws reads in thousandths of an inch.

The vertical column swivels on base and the dividing head swivels on the vertical slide, graduations of 180 deg., facilitate quick and accurate adjustment to any desired angle.

The index arm swings on end of bearing for indexing spindle, is graduated and may be adjusted for side cuts on bevel gears. When the vise is used on the vertical column work such as surface milling, cutting keyways, milling ends of shafts may be performed.

Machining the Cutter Block

One of the most complicated castings on the attachment is the cutter block, and is shown in detail in Fig. 3.

The problem of tooling this part so that accurate and intensive manufacture could be obtained was also quite a study. One of the rough castings as received at the shop is shown in Fig. 4.

The first operation is rough planing the vees, which is performed in a fixture which holds 14 at once in two rows of seven. The next operation is finish machining the vees and is performed with the fixture shown in Fig. 5.

The casting is located on three pins as A and held down with two straps B.

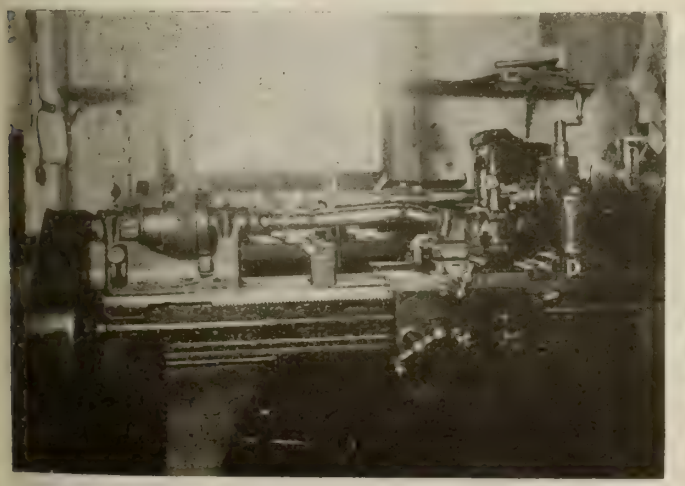


FIG. 1.—FRONT VIEW OF ATTACHMENT IN USE.

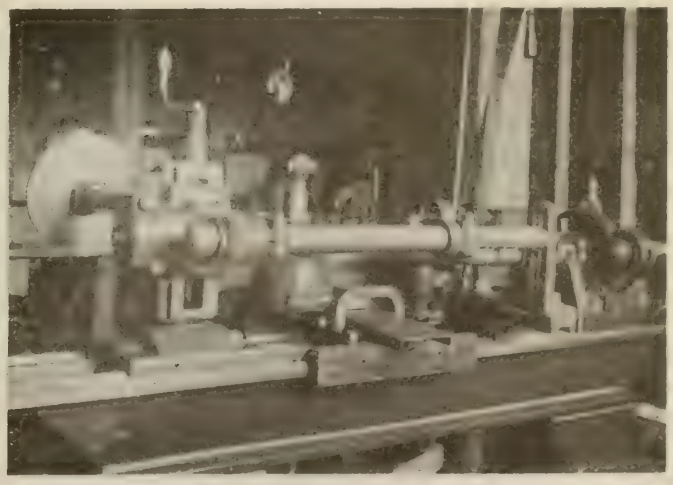


FIG. 2.—REAR VIEW OF ATTACHMENT ON LATHE.

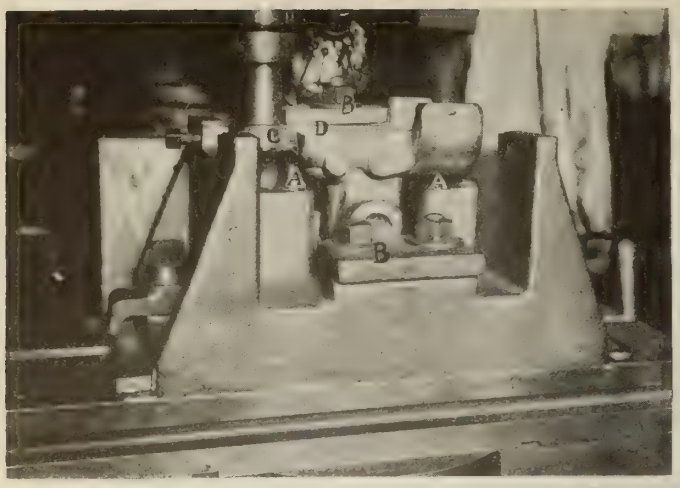


FIG. 5.—FINISH MACHINING THE VEES.

FIG 4.—UNFINISHED CUTTER BLOCK.

The correct location is obtained with a stop pin. It will be noticed that the strap in front fits into the cored hole of the piece which affords a handy and sure means of holding.

The milling fixture is located by tongues on the machine table so that the milled slot will be square.

The vees are then machined with the angle cutter C.

The machine table is then lowered, the correct amount reading with the index of the miller in the usual manner, and the upper surfaces D machined with the end of the same angle cutter. The vees are then scraped accurately to a gauge after the casting has been removed from the fixture.

The casting is then placed in the jig shown in Fig. 6 and the angular hole drilled and reamed to 1.250 inches.

In the jig the casting is located by the steel vee block A, the piece being slid in from the end. This block accurately fits the scraped surfaces and the casting is then pushed back against a stop pin.

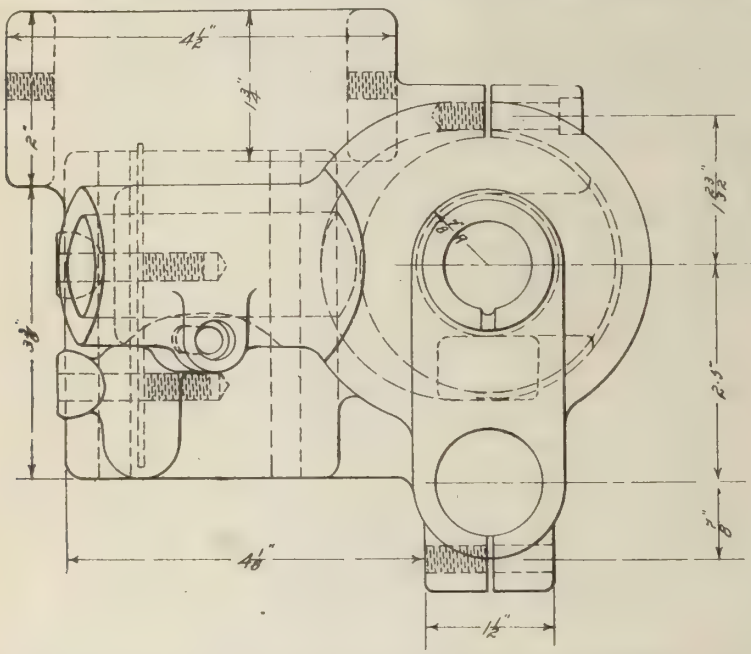
The screw B, when tightened, holds the piece securely in the jig.

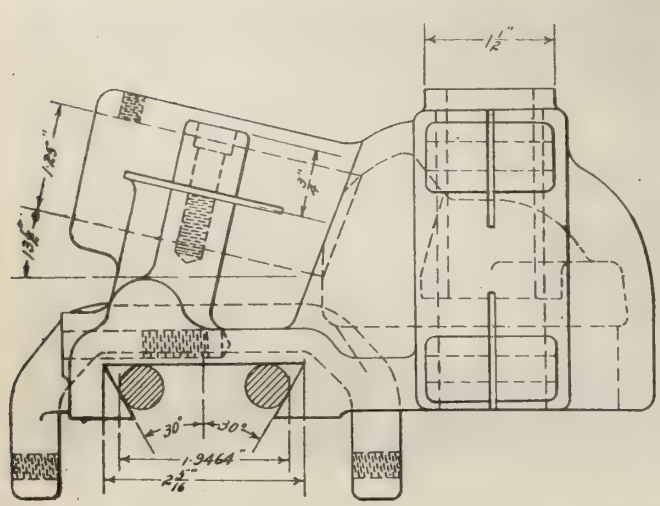
Some idea of the number and sizes of holes machined in this and the subsequent operation using this jig may be gathered by referring to the tool board shown at the right of the jig.

An interesting method is the way these are arranged in the tray or board, which is the sequence in which the man uses them, and being kept in order as shown, facilitates the machining operation.

The jig is then turned over on the other three sides and all the other holes, with the exception of the bolt holes, are then machined.

These operations comprise drilling, reaming, counterboring and facing bosses. These may be followed by referring to the detail of the cutter block. The bolt holes are next drilled and tapped, no jig being used, the holes being spotted in the centre of their respective bosses.





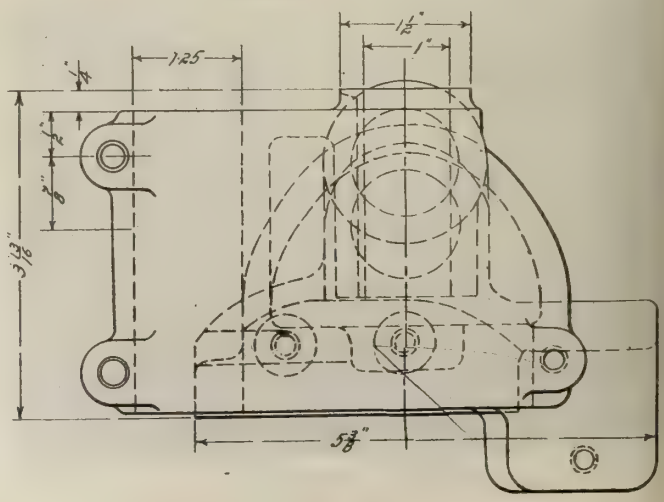


FIG. 3

The casting is next placed on the fixture, Fig. 7, being located by 1-in. and 1.250-in. pins which fit into holes A and B respectively.

Two slots are then cut at C and D, using a 1-16-in. slitting cutter in the milling machine in the usual manner. The casting is then removed from the fixture and an oil groove cut in each bearing.

One of the finish machined cutter blocks is shown in Fig. 8 and an idea of the amount and variety of machining operations necessary is apparent.

Machining Cutter Block

The cutter block is made from bar steel, and the first operation is cutting to length.

One of the sections is then placed in the fixture, Fig. 9, being located against the two setscrews A.

The open-ended strap B is then tightened onto it by means of the setscrew, as shown with the fixture in position on the milling machine table. A pair of gang cutters with a cutting edge of 60 deg. to obtain 30 deg. on the block, accurately spaced, is used to machine the piece.

The block is then placed in the jig, Fig. 10, being pushed into a locating vee surface at the rear with the screw A and at the forward end with the setscrew B.

The two setscrews C are then tightened down to hold it securely in the jig.

(Continued on page 63)

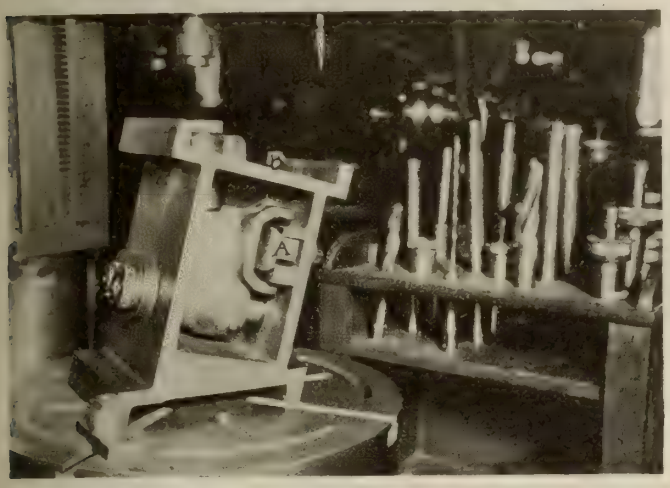


FIG. 6.—MACHINING ANGULAR HOLE.

FIG. 7.—SLOTTING THE CASTING.

FIG. 8.—A FINISHED CUTTER BLOCK.

FIG. 9.—MILLING CUTTING BLOCK.

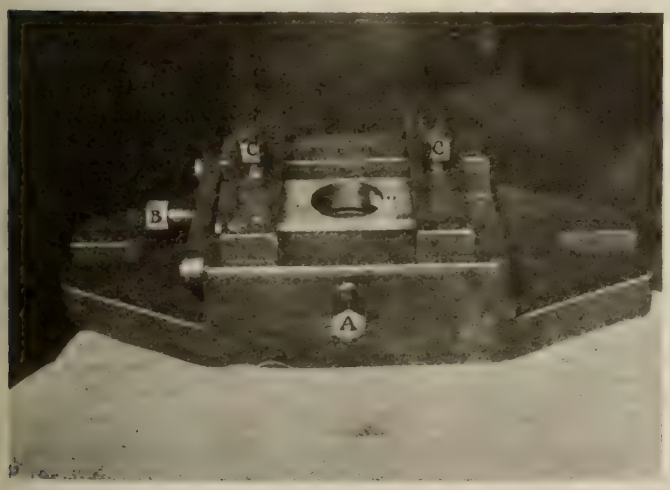


FIG. 10.—MACHINING FOR BASE BINDER.

FIG. 11.—MILLING BASE BINDER KEY.

AEROPLANE MOTORS

Types in Use To-day —Method of Operation and Principles Underlying Their Design — Ignition and Carburetion Very Important

By LIEUT. H. POLLARD

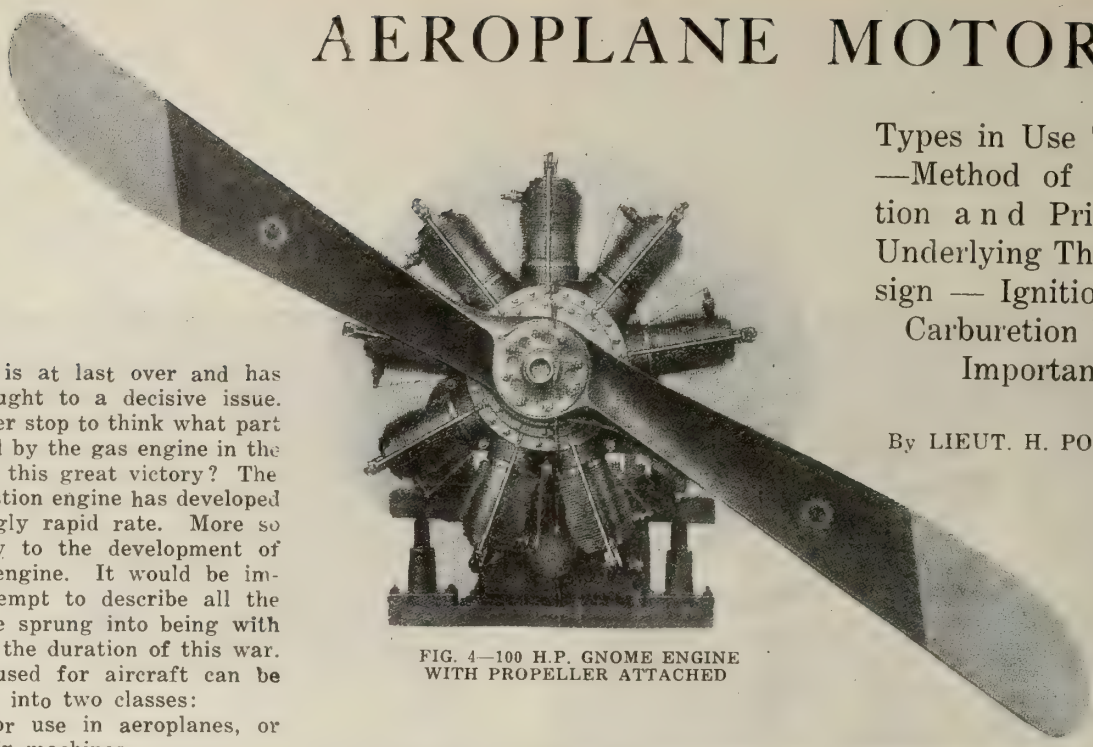


FIG. 4—100 H.P. GNOME ENGINE WITH PROPELLER ATTACHED

THE war is at last over and has been brought to a decisive issue. Do we ever stop to think what part has been played by the gas engine in the achievement of this great victory? The internal combustion engine has developed at an exceedingly rapid rate. More so does this apply to the development of the aeroplane engine. It would be impossible to attempt to describe all the types that have sprung into being with the advent and the duration of this war.

Engines as used for aircraft can be divided roughly into two classes:

(a) Those for use in aeroplanes, or heavier than air machines.

(b) Those for use on dirigibles, or lighter than air machines.

The engines classified under the former heading will be more largely dealt with. It must be understood that it is of the utmost importance that the weight per horse power be at an absolute minimum. The reasons in substantiation of this are:—

(a) To allow of rapid climbing.

(b) To increase the radius of action.

(c) To reduce the weight and increase the efficiency of the gliding angle.

(d) To increase the safety of the machine in a gale.

The need of maximum power with the minimum of weight and bulk has made the aerial type of engine the highest expression of the designer's art. Nor yet has the limit been reached, greater power in relation to weight is constantly being obtained by the employment of new discoveries. The aeroplane year by year becomes more stable, more speedy, and more adaptable to the requirements of peace and war. The future of mechanical birds of German creation has been the subject of many works of fiction, and it may be that the counterpart of that "Clipper of the Clouds," of which Jules Verne dreamed and wrote, will some day sail the skies in reality. This will only be achieved through the aid of the internal combustion engine, which, although it has reached a high stage of perfection, is still capable of further development, if we are to forge ahead in our aerial endeavors.

Internal combustion engines to-day are used in such a large degree that I think it would be wasting the reader's time to occupy more than a brief space in explanation of the fundamental principles. It is well known that the essential parts are a piston which moves up and down inside a closed body known as the cylinder. This piston is connected to the crankshaft by a connecting rod, and the valves (exhaust and inlet) are fitted to allow of the gases entering and leaving the cylinder. A sparking plug is also fitted to enable ignition of the gases.

The Cycle of Operations or what is known sometimes as the Otto cycle is the name given to the four strokes of the piston, which occur in the following sequence: Induction, compression, power, and exhaust, each stroke being of equal duration. This is only a theoretical cycle and in practice is never adhered to. Induction occurs from approximately top dead centre to a little past bottom dead centre; the reason for this is because the piston descends with a higher velocity than that of the incoming gases and were the valve to close at bottom dead centre, which is its true theoretical closing point, we should have weak compression and ultimate loss of power due to inadequate supply of gas being drawn in. From inlet closing to top dead centre is compression stroke ignition occurring a little distance before top dead centre. This is spoken of as advanced ignition. From top dead centre to exhaust opening, which is invariably before bottom dead centre, is power stroke, and from exhaust opening to top dead centre again is exhaust stroke, thus completing the cycle of operations. This is a very brief description of the four-stroke principle on which most of our practical aero engines of to-day are working.

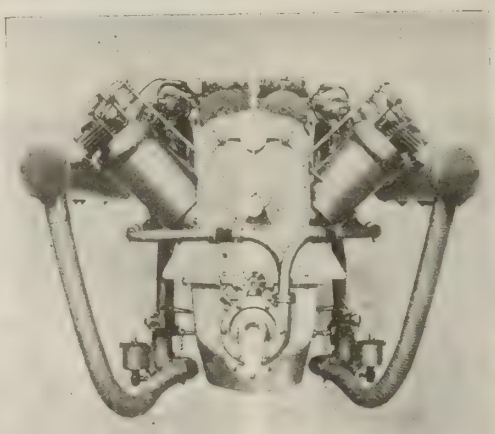


FIG. 1—200 H.P. CURTIS ENGINE.

Engine Types

Engines in general use to-day can be classified under three headings: Stationary or Reciprocating, Rotary, and Radial. Stationary engines, such as the Hispano-Sueza, Rolls-Royce, Sunbeam, Curtiss, and Beardmore, have their cylinders set at an angle and situated above the crankcase, or are vertically above the crankcase, as in the case of the Beardmore or Sunbeam. In all cases, the crankcase and cylinders are stationary, the crankshaft revolving.

In the rotary type, the cylinders are set radially around a fixed crankshaft, the cylinders and crankcase revolving. Examples of this type are the B.R., Le Rhone, Clerget, and Monosonpape.

The radial engine is in appearance very similar to the rotary, having its cylinders set in like fashion around the crankcase, but they are stationary and are usually water-cooled, the crankshaft itself revolving. An example of this type is the Salmson Canton-Mane. The radial type will be but little referred to, as it is only used in small numbers.

The Rotary Engine

The rotary engine, being the most important from an aviation standpoint, requires further description. What is the principle governing its operation, or in other words, why does it revolve? On

examination of the diagram it is found that in any rotary engine there are two centres of rotation, "A" being the centre of rotation for the pistons, around which

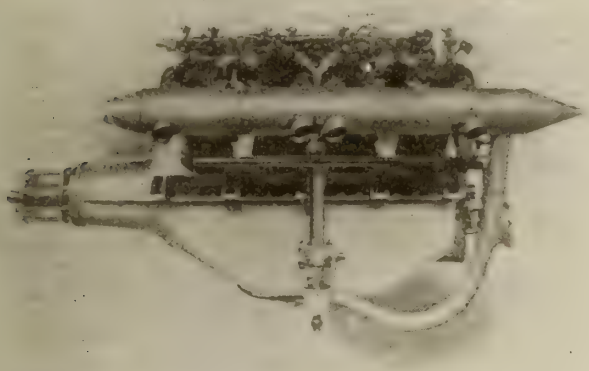


FIG. 2 200 H.P. CURTIS ENGINE.

the pistons revolve at a fixed radius; "B" the centre point around which the cylinders and crankcase revolve. The distance between these two centres is approximately half the stroke of the piston.

The diagram shows a piston in a slightly exaggerated position of explosion. The point "C" represents the gudgeon pin and the arrow "P" represents the thrust on the piston head due to the explosion of the gases in the cylinder. When an explosion occurs the force "P" is exerted in the direction of "C" to "A." This, of course, is due to the fact that the pistons are connected to the point A through the medium of the connecting rod. There is also another force in the direction of "C" to

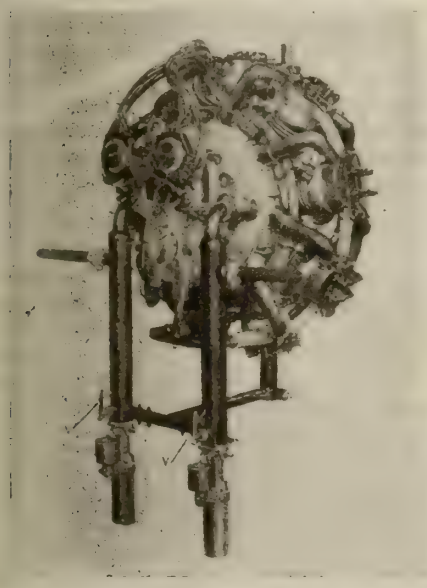


FIG. 3—SALMSON CANTON MANE RADIAL TYPE ENGINE.

"B" set up, due to the fact that the piston is trying to reach the point "B," because it is guided in the cylinder, which is set radially to the centre "B." Now, it is well known to students of mechanics that wherever there is action, there is reaction equal and opposite, consequently there will be the reactions of the two forces C.A. and C.B., and the resultant, shown by the line XY, is resolved into the force R on the leading edge of the cylinder, causing it to revolve. This principle only applies to a rotary engine and not to the radial engine, which is very similar in outward appearance.

Compression

Leaving the general principles of engines, some of the more important details will be dealt with. Of very great importance is the maintenance of compression. In an engine compression is maintained through the medium of well-fitting valves, piston rings and accurately made joints, such as the joint between the cylinder and body, sparking plug and its mounting.

The maintenance of compression must not be confused with the keeping of a piston gas-tight in its cylinder. It has been found from experience that many people have a doubt as to what answer to make to the question: "How is a piston kept gas-tight, and how is compression maintained?" Pistons are made gas-tight by the fitting of piston rings or their equivalent, and compression is maintained as stated above. Oil does not maintain compression as so many are apt to think; it certainly does assist, to a slight degree, and the addition of more oil or a thicker oil may appear to raise the compression of the engine, but it will ultimately lose power from the overheating which will follow from over-lubrication.

Valve Operation

Practically all the valves on aero engines are mechanically operated. In some cases they are operated through the medium of an overhead camshaft; in others, by means of a tappet lifting up a tappet rod, which in turn depresses the valve. In between this tappet and tappet rod there is a small space of a few thousandths of an inch which is spoken of as "tappet clearance." This clearance is to allow of the expansion which occurs after the engine has become heated; if it were not there, after a little while the tappet and the tappet rod would have expanded to such an extent as to cause the valve to remain permanently open. It can easily be seen that this clearance, if altered to any large extent, will materially affect the lift and the length of time the valve is open, and consequently, in a very large degree the efficiency of the engine. It will require no very large amount of perception on the reader's part to grasp this fact, that tappet clearance is not for the purpose of retarding or advancing ignition, as its functions have been mis-described more than once by would-be aviators.

The Crankshaft

The next point to claim attention is the function of the crankshaft and the camshaft on rotary and stationary engines. On a stationary engine the chief duty that the crankshaft has to perform is to transmit the power given to it by the pistons to the propeller which it is driving. In the case of a rotary engine the crankshaft has many more functions to perform. The following list gives a rough idea of the many and varied functions of a rotary engine crankshaft.

1. A point of attachment for the engine to the plane.
2. A point for the pistons and the cylinders to revolve around.
3. A point of attachment for the carburettor.
4. The whole of the thrust from the propeller is absorbed by it.
5. It conveys oil to the working parts.
6. The crank pin provides a fixed point against which the force of the explosion can exert itself in revolving the engine.

It will be noticed that the crankshaft functions partly as a camshaft, inas-

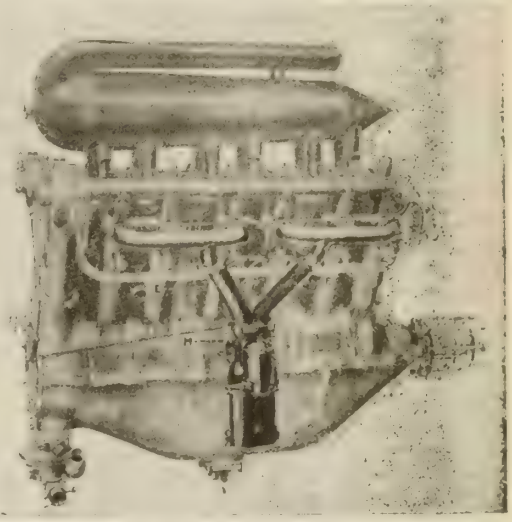


FIG. 5—220 H.P. RENAULT STATIONERY ENGINE.

much as the small end forms a pivot around which the campack rotates.

In studying rotary engines it is as well to bear in mind that the following sequence of build is general throughout all the different types. Starting from the front or propeller end of the engine, and passing to the rear, the build is as follows: The propeller boss is mounted on the nose piece which is attached to the front of the cam box, this in turn being held to the front of the crankcase on which the cylinders are mounted. Bolted to the rear of the crankcase is the thrust box, containing the thrust races, which absorb the thrust of the propeller or air-screw, as the case may be. Bearing this particular form of build

in mind will enable the reader to locate quickly the position of any part of the engine.

Centrifugal Force Effect

Centrifugal force plays an important part in a rotary engine. Any body which is influenced by this force tends to fly outwards in a radial direction. A very well-known illustration is the swinging around of a bucket half full of water, centrifugal force in this case throwing the water firmly against the base of the bucket and thus preventing the water spilling.

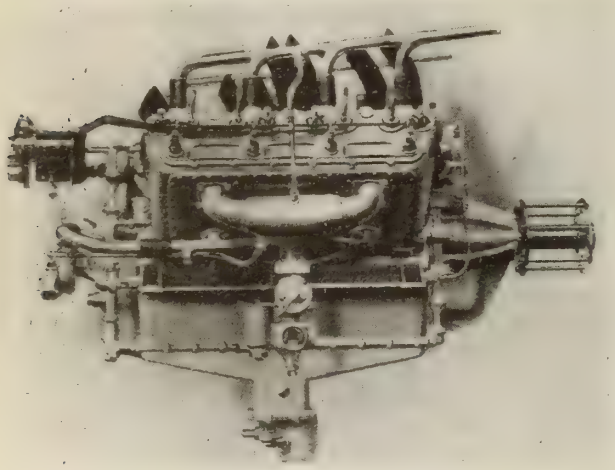


FIG. 6—150 H.P. SUNBEAM STATIONARY ENGINE.

When a truly formed and well-balanced flywheel rotates at a moderate speed no vibration is apparent. Should, however, any portion or section of the rim of this flywheel be heavier than the remaining portions of the wheel, the centrifugal force affecting it will produce an internal stress on this portion, and will ultimately cause that part of the wheel to break away if the wheel is only revolving at a moderate speed; also an acute vibration will be present, due to the unbalanced flywheel. This effect is very easily demonstrated by a simple little experiment with a disc which has three bolts attached in a symmetrical manner around the circumference; when this disc is rotating no vibration is present, but upon removing one of the bolts and throwing the disc out of balance, an acute vibration is shown. This is, of course, only a general illustration.

Take a particular case—the exhaust valve on the Le Rhone engine. When this engine is revolving at moderately slow speeds, the exhaust valve closes at forty degrees before top dead centre, while at the normal rate of revolution for this engine the exhaust closes at five degrees past top dead centre. The reason for this is that mechanically the valve closes at forty degrees before top dead centre, but owing to the influence of centrifugal force at high speeds the tappet rod is hurled outwards, thus depressing the exhaust valve and keeping it open until five degrees past top dead centre. Similarly in the case of the Monosonpape engine, the exhaust valve is made much heavier than mechanical strength demands of it, purely to counteract the influence of centrifugal force on the tappet rods. Thus by making the valve heavier, the necessity of having to fit balance weights to the tappet rod, as is done in the Gnome, is obviated.

From the particular examples given it is apparent that it is absolutely essential in replacing any part of an engine which is affected by centrifugal force, that the weight of the new part should be equal weight with the one it is replacing.

Order of Firing

The different orders of firing which prevail have a marked effect from a balance point of view on the various types of engines. The order of firing on an 8-cylinder vee type engine, say, is 15374826. On examination it will be seen that the cylinders are firing with an interval of time equivalent to a quarter of a revolution, therefore taking two successive cylinders, the impulses on crankcases from explosions occur almost simultaneously. A similar condition exists over the remaining six cylinders, giving a common point of intersection over the complete order of firing. This common point of intersection of the different impulses is approximately over the centre of gravity of the engine. By having the force of explosion localized at the centre of gravity, a minimum vibration is produced. This order of firing gives a maximum balance with a minimum of vibration. In contrast with the preceding example take an engine of exactly similar type, but with a wholly different order of firing, say 12347856, and with the cylinders numbered as shown on the sketch. When this engine is running, there is a tendency to rock longitudinally in the plane, that is, there is a very great chance of an acute vibration being present.

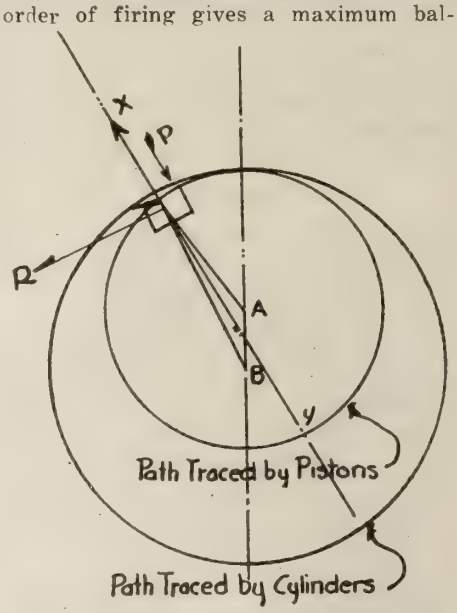


FIG. 7—DIAGRAM ILLUSTRATING THE WORKING PRINCIPLES OF A ROTARY ENGINE.

All rotary engines fire in one specific order, the cylinders being caused to fire alternately, a seven cylinder engine firing in the order 1, 3, 5, 7, 2, 4, 6. Plainly, it would be impossible to fire these cylinders consecutively, or to have an even number, instead of always an odd number of cylinders. If the question were asked, "What is the order of firing of a rotary engine, and why?" the answer would be that the order of firing is 1, 3, 5, 7, 2, 4, 6 to conform to the four-stroke principle, giving a maximum balance and an evenly distributed turning moment. If each cylinder had to be fired in turn, since it requires two revolutions of the engine to give four strokes—one revolution would be all power, and the next revolution would be all exhaust; speed would have to be maintained purely by the excess of energy which the machine had received on the power stroke. Thus there would be a very erratic turning moment with this order of firing.

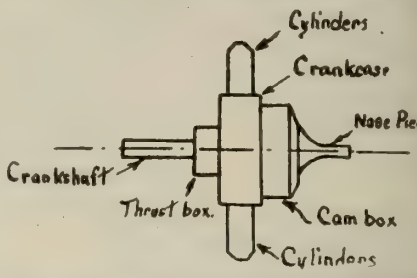


FIG. 8—DIAGRAM ILLUSTRATING SEQUENCE OF BUILD OF ROTARY ENGINES.

Lubrication

The lubrication of engines is accomplished by force and splash. By splash lubrication is meant that the oil is thrown up in the form of a spray from the connecting rod big ends. These ends are sometimes fitted with a scoop which dips into a trough of oil at each stroke, thus supplying the necessary splash. In other cases, it is the excess of oil oozing from the crank pin bearings which is picked up by the whirling crankshaft and thrown up into the interior of the cylinder, oiling cylinder, piston and piston rings.

Forced lubrication is effected by means of oil circulating pumps, divided into two classes, rotary or gear type, and plunger and piston type. The general principle of each of these types of pumps is the same, but they are modified to a certain extent to meet the varying designs of engines. The most elementary form, and one which is very largely used, is shown in the illustration: it consists of two small gears which engage with one another and run in a close fitting casing. Oil enters midway at one side of the casing and leaves similarly at the other side of the pump. The oil is transmitted by the spaces in between the teeth, which form, as it were, small pockets for the oil. Oil is carried around both sides of the casing as shown by arrows, the teeth at the

point of engagement at the other side of the casing forming an oil lock.

It would be well while dealing with lubricating systems, to say a word or two regarding the different lubricants

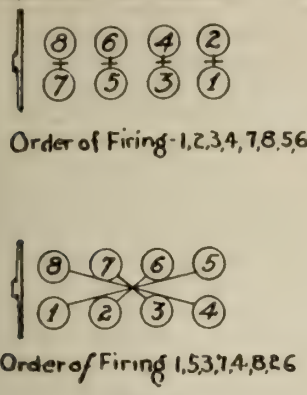


FIG. 8A.

used. On a rotary engine, in every case, a vegetable oil, such as castor oil, or castrol, is used. The reasons for this are that a vegetable oil does not easily mix with petrol; also, it has a higher flash point and a higher viscosity, or in simpler language it is more sluggish in action. There is one point to be guarded against in the use of a vegetable oil, especially in the cold months of the year, Castor oil when allowed to stand for any length of time on a cold day will deposit a sediment at the bottom of the vessel in which it is held, and the oil will become very much thicker. To thin castor oil so that it would again become serviceable, it would be necessary to heat the oil and at the same time stir it well to get the sediment back again into solution. If the sediment were allowed to go into the engine, it would have a very detrimental effect on the bearings. Another way of rectifying this trouble is to mix 15 per cent. methylated spirits with the castor oil. Mineral oil is used on stationary engines only.

Cooling Systems

The cylinder is kept at a practicable working temperature, i.e., about 185 degrees F. by continually circulating water around it, the cylinders being water jacketed. It will be easy to follow that, with the continual exploding of the charges in the cylinder, heat would be accumulating, and unless some means were adopted for keeping down this accumulation of heat, the cylinder would quickly become red hot, lubrication of the piston would be impossible and the motor would soon stop work. Water is the best medium for extracting this surplus heat from the cylinder walls. Circulation is set up in the water system by means of a rotary pump driven from the crankshaft. This pump draws water from a radiator, usually built up of a large number of copper tubes, so as to offer the maximum cooling surface to the air. From there it is forced into the water jackets around the cylinders, combustion head and valve ports, and thence to the radiator again to be cooled.

It is then of great importance that particular attention should be paid to this water cooling system as it is here that most trouble is experienced in the running of petrol engines in very cold weather, especially so in the case of an aeroplane motor.

The reason for so great an amount of trouble being caused by the freezing up of a petrol engine is very simple. It is a well known fact that water in a frozen state occupies more space than it does in its liquid form. Now, as we are unable to dispense with quite a considerable length of exposed water piping in an engine of this nature, it will clearly be seen that the pipes which admit and receive the water to and from the cylinders will freeze up solid first. The water remaining in the cylinder will then be pent up with no means of escape, and as it freezes and of necessity requires more space, the only outlet for it is to burst the weakest spot in its prison, and this is usually the water jacket. This mostly happens when the engine is stopped and stands in a low temperature for any length of time. As soon as the engine is re-started, the heat generated by the cylinders soon melts the ice in the water jackets and water will soon begin to pour from the bursts in the sides of the water jackets. To run an engine in this condition, of course, would be highly dangerous.

The symptoms of an engine freezing up whilst in the air appear at first sight almost contradictory. Volumes of steam and hot water will be seen spouting from the vent hole in the radiator cap, as though the engine were overheating, as, in reality, it is. The reason for this is as follows: The water usually occupying the lower tank of the radiator and water pipe connecting same to the water pump is, or should be, cold, after passing through the cooling tubes of the radiator. This water therefore stands in danger of freezing up, even while the engine is running, and as it does so, it effectually blocks up all circulation in the water system. The water then remaining in the cylinder water jackets must remain

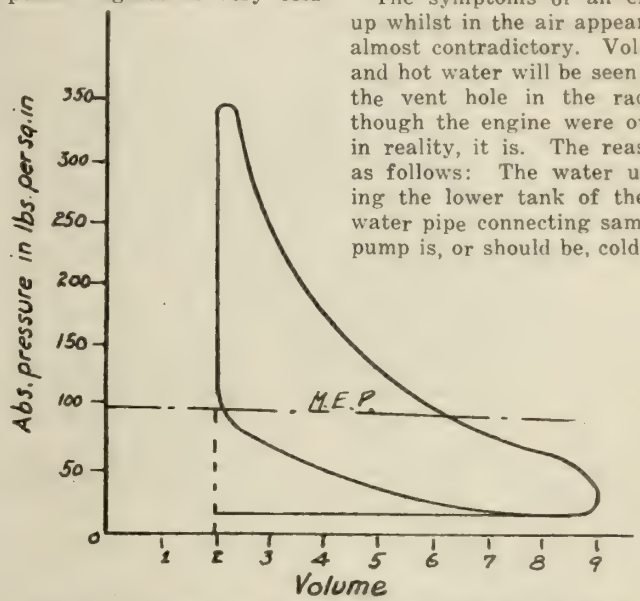


FIG. 11—TYPICAL DIAGRAM FROM A FOUR-STROKE ENGINE.

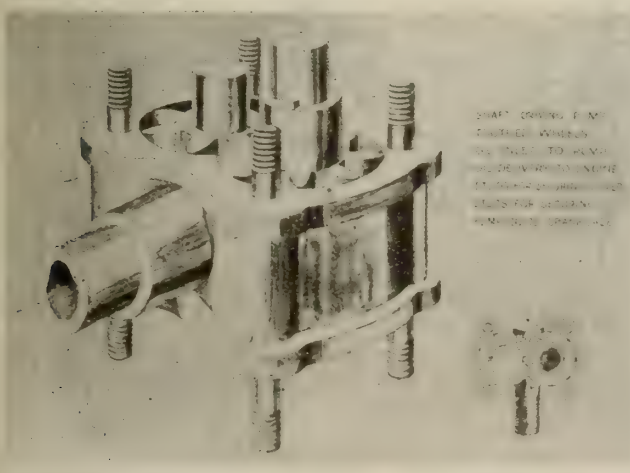


FIG. 9—ROTARY OR GEAR TYPE PUMPS.

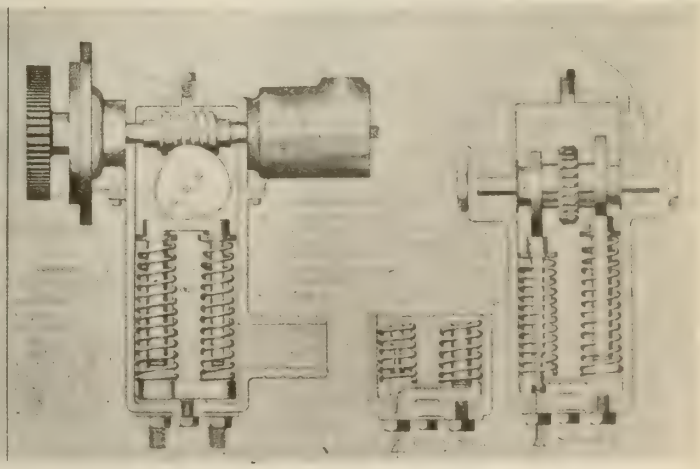
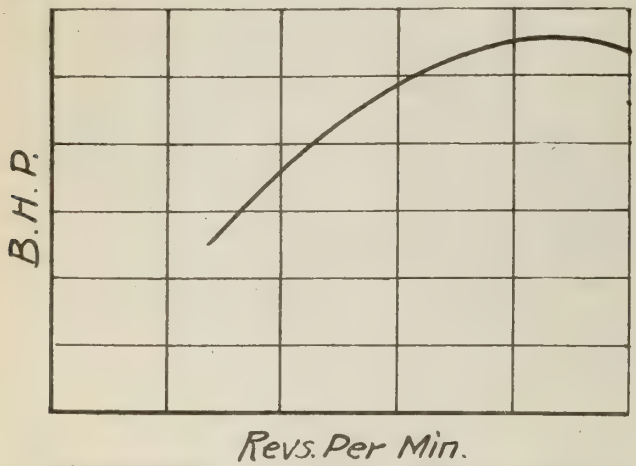


FIG. 10 PLUNGER TYPE PUMP.

there, and as it has no means of being cooled, quickly boils over, giving off the steam first noticed. The engine in this condition will soon freeze up if allowed to run.

To overcome these difficulties then, the cooling fins of the radiator should be covered with a sheet of asbestos or other material so as to minimize as much as possible the efficiency of the radiator as a cooling medium. All the exposed pipes leading from the radiator to water pump, pump to cylinders, and cylinders to radiator again should be bound with asbestos cord and wrapped over this with some cold resisting material such as felting, the whole being bound securely with wire to prevent same from working loose whilst in use. When engines are fitted with a water heated induction pipe, as in the case of the "Curtiss," this should also be wrapped, as the rush of the mixture through the pipe has a cooling effect and the water jacket stands in danger of freezing up.



12 POWER SPEED GRAPH FROM A NORMAL GAS ENGINE.

Experience has shown, however, that in spite of these precautions being taken, cases of frozen water systems are still numerous, and it is advisable to substitute some non-freezing solution as a cooling medium in place of water. For this purpose mixtures of glycerine and water and alcohol and water are used, and sometimes a combination of the two, as for example, sixty per cent. water, thirty per cent. alcohol, and ten per cent. glycerine, which freezes at 10 degrees below zero.

The advantage of the non-evaporating qualities of glycerine is greatly nullified by its being sticky in use, and its setting up a corrosive action in brass and copper. Wood or denatured alcohol and water, therefore, is the most suitable mixture for general purposes, its only disadvantage being that it evaporates quickly. The mixture must therefore be made up to the proper density regularly by adding a certain amount of fresh spirit. The following figures show the freezing point of solutions containing different percentages of alcohol, 20 per cent. solution freezes at 15 degrees above zero, 30 per cent. solution freezes at 8 degrees below zero, 50 per cent. solution freezes at 15 degrees below zero.

A comparison of air and water cooled engines shows that the advantage of a water-cooled engine is longer life and a higher thermal efficiency, due to a smaller loss of work through overheating. The disadvantages attached to a water-cooled engine from an aeronautical point of view are that it is much heavier and also liable to freezing troubles as already mentioned.

As regards the advantages of rotary over stationary engines, the chief advantage of the former is that its weight per horsepower is much less. It is easier to dismantle a rotary engine and it is more accessible. The disadvantages of the rotary engine are that it is a very heavy consumer of fuel and not as reliable as the stationary engine.

"Timing"

Assuming that all engines work on a common basis, that is, the four-stroke or Otto cycle principle, one method of timing may be applied to every engine:

1. Set any piston in exhaust closing position.
2. Set exhaust tappet clearance for that cylinder.
3. Turn the camshaft in the direction of its rotation until the particular exhaust valve for the cylinder being timed is in the closed position.
4. Mesh the timing gears.
5. Adjust the remaining tappet clearances.

Similarly the ignition timing of any engine:

1. Set any piston in ignition position.
2. Mesh the magneto driving gear with the platinum points of the contact breaker just breaking.
3. Wire the distributor terminals to the sparking plugs in the correct order of firing.

Engine Testing

In testing aero engines only the brake horse power (B.H.P.) is considered. It is possible with the aid of very delicate instruments to obtain an indicator diagram which enables us to obtain the indicated horse power (I.H.P.) of the engine. Special optical diaphragm indicators are occasionally employed, however, and with reasonable care fairly accurate diagrams can be obtained. It is, however, an instrument more suitable for the laboratory than for an engineering workshop test room. It is necessary when taking these diagrams to obtain records of several successive cycles as they vary in shape and size so that an average may be taken in determining the mean effective pressure. Once having obtained an indicator diagram it is an easy matter to work out the indicated horse power of an engine. From an inspection of the accompanying diagram it will be seen that it is a simple matter to obtain the mean height of the diagram, which, of course, will be our mean effective pressure. Knowing this we can proceed with the following formula and work out the I.H.P.

The work done per stroke is equal to the area of the diagram, i.e.:

Stroke x M.E.P. x area of piston = work done per stroke.

S x M.E.P. x A = W.

S will be measured in feet.

M.E.P. will be measured in lbs. per square inch.

A will be measured in square inches.

$$W \times \frac{R.P.M.}{2} \times \text{No. of cylinders} =$$

total work done per min.

One horse power unit is equal to 33,000 ft. lbs. per min.

$$\therefore \text{H.P.} = \frac{W \times R.P.M. \times N}{2 \times 33000}$$

Brake horse power (B.H.P.) or power at the flywheel, or shaft horse power as it is variously termed, is found by means of a brake dynamometer, of which there are many types. B.H.P. is, of course, less than I.H.P., the difference between these two being the horse power absorbed by the engine internally. The ratio of the B.H.P. to the I.H.P. is known as the mechanical efficiency of the engine.

$$\text{Mechanical efficiency} = \frac{\text{B.H.P.}}{\text{I.H.P.}}$$

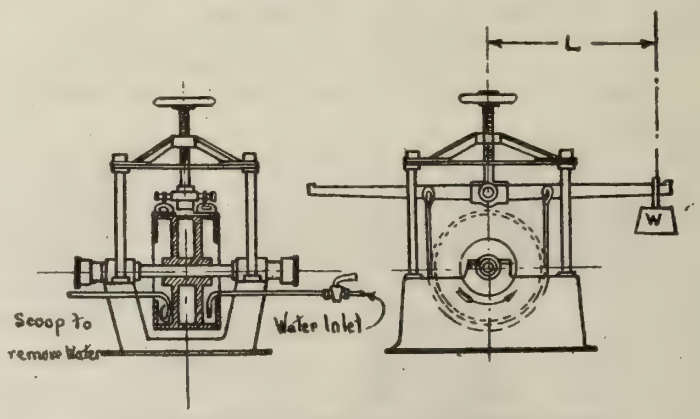


FIG. 13—BRAKE PULLEY FOR GAS ENGINE TESTS.

(Continued on page 52)

Rolling Concrete Reinforcement from Old Rails

Old Rails Make the Best Steel For Concrete Reinforcing When Re-rolled Into the Proper Shapes—Rails Are Slit Into Three Pieces and the Head Used For Reinforcing Steel

By W. S. STANDIFORD

THE use of concrete as a building material has created an extensive demand for steel reinforcing bars, quite a number of mills being engaged in their manufacture as it is very lucrative, there being a constant demand for the bars. In these days of strenuous competition the use of waste materials are being largely used in different lines of manufactures, old rails playing a most important part in the building of skyscrapers, etc. Some mills make their reinforcing bars out of bessemer steel, low carbon metals being made and marketed. It has been found out by experience that the best steel to make them out of is a metal having a high elastic limit and tensile strength; in fact, the most important factor in concrete reinforcement is the tensile strength and elastic limit of the reinforcing bar. Other things being equal the steel having the highest elastic limit or yield point will be the most satisfactory for reinforcement.

When under strain as soon as the elastic limit of any reinforcing bar is reached the metal stretches, rapidly decreasing in section, drawing loose from the concrete and destroying the monolithic bond existing before this point is reached. Therefore the safety of the entire construction is in direct proportion to the elastic limit of the steel used. Compared to the average run of concrete reinforcing metal on the market the bars made from old steel rails are far superior; the elastic limit of the old rail steel is 50,000 to 60,000 pounds per square inch in either twisted or plain bars as compared to an elastic limit of

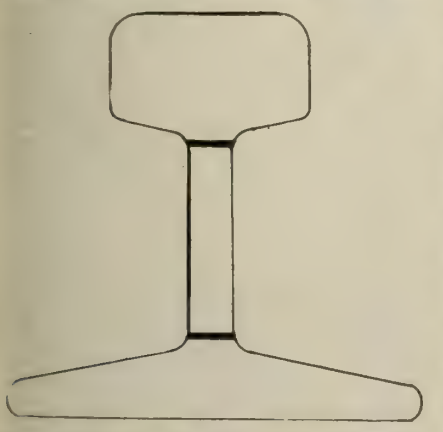


FIG. 1—SECTION OF OLD RAIL SHOWING WHERE THE HEAD AND FLANGE ARE CUT.

25,000 to 30,000 pounds for the ordinary bars. From the foregoing it will readily be seen that reinforcing bars made from old steel rails with its 80,000 pounds minimum tensile strength is far superior for all kinds of concrete work.

In these days of industrial activity, railroad embargoes and slow deliveries of raw materials, the use of old steel rails to make concrete reinforcing bars will often enable mills to fill orders quickly for material for concrete construction that otherwise would have to be delayed until steel billets could be obtained. The size of the rails used to make these bars weighs 100 pounds per yard, and the head only is rolled, the flange and the web generally being used to make small, flat steel bars, and also angles for bedsteads, etc. The rails after 25 years' use on the railroad ties and discarded as useless are sold as scrap by the railroads and can be bought cheaply. On the surface of the head of the rail will be found an occasional sliver, which must be cut off with a cold chisel, as it will not weld in the rerolling process which the metal receives.

The head is then ready to be separated from the web; this may be done by cutting the metal lengthwise in shears, or cutting the steel while it is hot, in slitting rolls, the head being cut at the fillet, see Fig. I; the latter also shows where the web and flange are separated, it being customary in mills manufacturing bars from this product to cut the flange off at the same time so as to save rehandling as much as possible and give three sets of bars for making different sections; the rail heads are then cut up into billets of the desired lengths to make the required lengths of bars as desired by the customer, put into a heating furnace and evenly heated. They are then ready for rolling in the guide roughing rolls, shown in Fig. 2. As these rolls are used for breaking down billets of various sizes to make different shaped steel sections as may be demanded by the consumer, box and edging passes are put in so as to take a 4 x 4 billet and reduce it rapidly, which box and edging grooves usually do. On account of the heavy draft allowed by this type of passes, the use of a 4 x 4 inch billet also allows of longer finished bars delivered by the rolls. That is the reason why passes of this size are put into guide roughing rolls, even if they are only used occasionally for orders where there is a departure from the concrete bars orders.

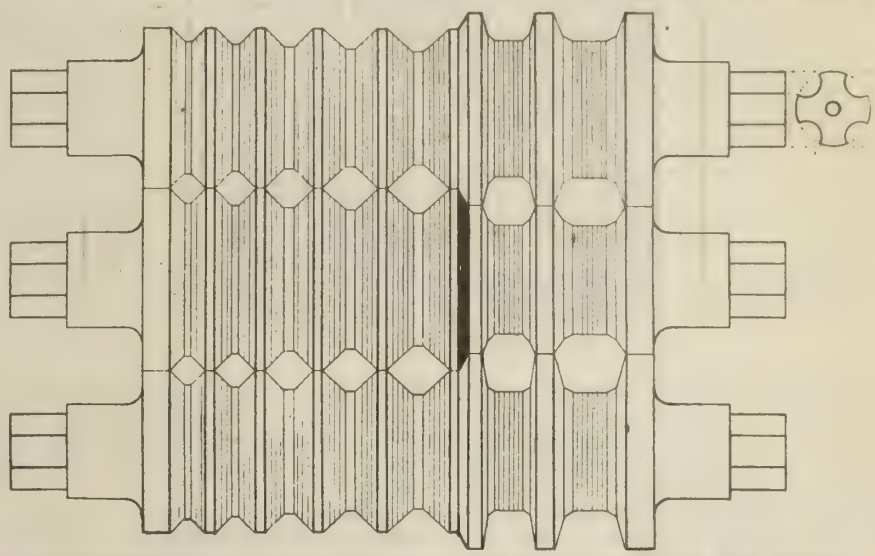


FIG. 2 PASSES IN ROUGHING ROLLS AND GENERAL LAYOUT OF THE ROLLS

The box and edging passes are not used in reducing the rail head billet, the latter being put by the rougher into one of the angle passes in the rolls. The 100 pounds per yard rail head billet measures about 2½ inches wide across the top; the thickness at the widest part in the centre of the head at the cut fillet averages 1⅝ inches; the roughing roll angle passes have angles of 97 deg. with fillets in the bottoms, ranging from ⅜ of an inch wide down to ⅛ of an inch. In the photograph the full number of angle grooves are not shown as the pictures would lose in clearness. The rail head billet is inserted into a suitable angle pass in an upright position, guides being used to prevent it from turning over in the pass.

The object of placing the bar in an upright position being to force the bar to assume the shape of the pass so as to make it enter the other grooves easier as the bar has a rectangular shape (which is an awkward section to enter into angle grooves, as there is a great liability of it turning over unless the guides are kept sufficiently tight) it is necessary to repeat the upright inser-

tions in three different sized grooves before it can be made to assume the shape of the angle passes in the rolls.

This is due to the extreme hardness of the metal in the old rails, thus making light drafts necessary at the start of the rolling. Most old rails steel, after 25 years in the services of the railroads, have changed their structure from a fibrous to a crystalline nature; the rerolling it receives restores the fibrous characteristic, putting it in normal condition again. After the bars go through three passes in an upright position they then have the shape of the angle passes and this allows the rougher to turn the bars over on all sides and thus work the parts that lie near the joints of the rolls. All angle grooves mostly work the bars on the bottom of the fillets, and the object of having fillets in these passes is to work the metal on the corners of the bars as much as possible, there being no work done on these parts of the bars that lie near the joints between the rolls. In both the roughing and strand sets of rolls the use of fillets in the bottoms of the grooves compresses the metal on the corners of the bars.

When the bars assume the shape of the angle passes in the roughing rolls they are then turned over on their sides and put through each succeeding smaller pass and are then ready for the strand rolls illustrated in Fig. 3. These rolls, made out of chilled iron, have their passes more closed in, their angles being 92 degrees; the fillets also are smaller. The small fillets are put in so as to make sharper corners on the finished square, as if the fillets are too large in the strand roll grooves the bar will not form sharp corners on the diamond to make a square having sharp corners. Diamond grooves are only capable of sustaining a limited amount of draft, and when the fillet is too large on the strand bar it will not fill the pass area out but makes rounded corners on the top and bottom of the diamond pass bars.

The steel bar is now transferred from the roughing rolls to the strand ones and pushed through them until a size of 1¼ inches is obtained. The bar is run through the first pass twice, it being turned over at a right angle to its previous position before it is run through the last time. The object of this is to have the four corners of the strand bar possess the same thickness in order to make a perfect finished square. If the strand bar had two of its corners larger in diameter than the other two, thus making a lopsided bar, the extra metal would squeeze out in the diamond pass at the joints of the rolls, thus making a heavy fin which would double over and show a lapping mark on the finished square.

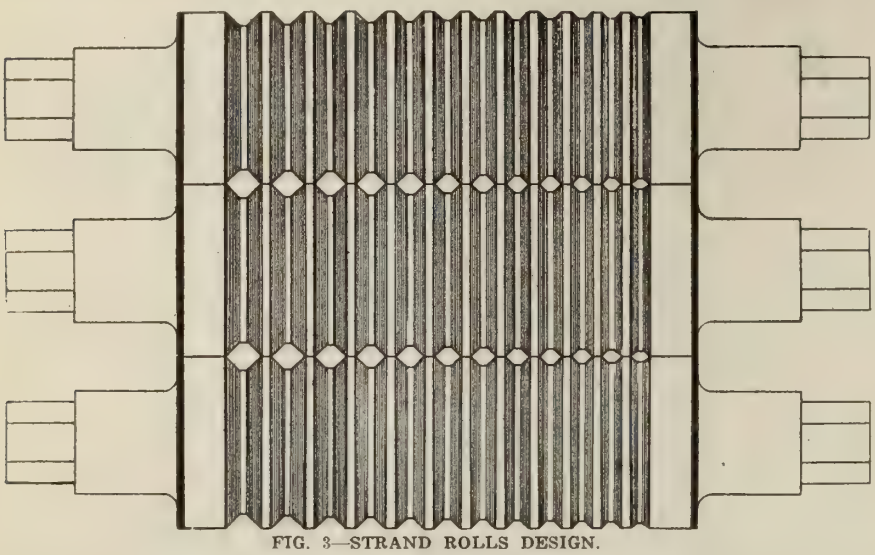


FIG. 3—STRAND ROLLS DESIGN.

There is also danger of the collars between the diamond passes breaking out when any pass is overfilled and the metal extends between the collars of the revolving rolls. The writer has seen many roll passes rendered useless by incompetent roller's careless setting and handling of the rolls. The steel strand bar being rolled to size is now ready for the diamond rolls; these rolls, unlike the roughing and strand rolls, are a two-high, as it is only necessary to run the strand bars once through the diamond pass. Diamond groove angles vary from 97 degrees to 110 degrees; the variations of different degrees of arcs between the above mentioned angles are used to suit the individual requirements of the mill, such as engine power, methods of heating, the temperature at which the diamond bars are run through the finishing squares and other local factors, all of which have a most important bearing on the tonnage output of the mill.

The grooves most generally used and put into the diamond rolls by the roll turner are as follows: ¼, ⅜, ½, 9-16, ⅝, 11-16, ¾, ⅞, 1 and 1⅛ inches. In some mills, due to the rolls not having a long body length, it is customary to have the smaller sized grooves put into a separate set of rolls, but it is best in all cases where possible to have as many different sizes of passes as can be gotten into one set of rolls. This reduces the changing of rolls to a minimum and conduces to a greater output. The greatest losses of time in the average rolling mill are due to the changing of rolls frequently by having longer rolls with numerous housings containing rolls to make different sections; any set of rolls can be coupled up and gotten into action quickly by the roller. The angles of the diamond passes to make the square for manufacturing the reinforced concrete bars is 104 degrees. The total width of the diamond bar to make a one inch square is 1⅝ inches, the thickness being 1¼ inches measured over the top and bottom corners of the bar. The strand bar goes once through the diamond pass; the size of the diamond bar as given above is subject to slight variations in size by the roller, who raises or lowers the rolls to suit the working of the metal in the rolls, as each lot of old rails made by different makers varies in its working in the rolls. What the roller mostly pays attention to, is to see that the passes are filled out to their utmost area without overfilling; by doing this the bars have as sharp edges in the pass at the centre of the bars as it is possible to get them.

The action of the diamond roll groove on the strand bar is very uniform, the strand bar being inserted with two of its square sides facing the top and bottom of the diamond pass instead of the fillet ends of the strand bar facing downwards towards the sharp edges of the centres of the pass. Of course the strand bar could be inserted in the above-mentioned position and would make a good appearing diamond bar, but it is better to place the strand bar with its side facing upwards instead of a fillet facing towards the bottom of the pass for the following reason: as the bar has been rolled in the strand passes mostly on the angle, it is better, in order to make the metal more fibrous in nature, to change the angle at which the steel is reduced, hence the advisability of having the strand bar enter the diamond groove in an upright position. It is an axiom of good roll designing that frequent changing of the rolling position of iron and steel bars in passes makes the metal more fibrous in nature, and the fibrous condition of these metals is what enables them to withstand strains and rough usage.

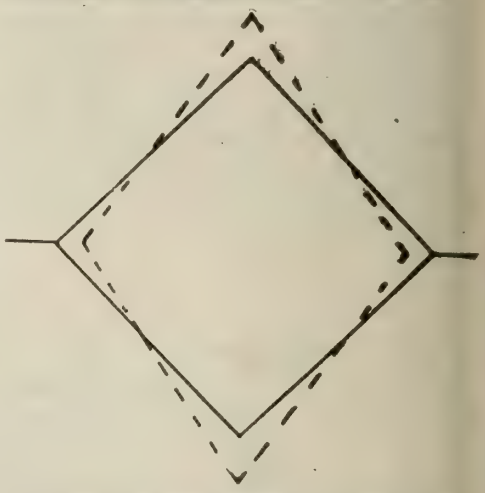


FIG. 4—An enlarged square pass showing the position of a bar from the diamond rolls going into the square pass of rolls illustrated in Fig. 5. The diamond rolls being practically the same design as the squares, the only difference being in the number of degrees contained in the angles of passes. The violent change in section from a diamond to a square makes the metal fibrous in texture.

This is what every manufacturer of iron and steel products strives for as it is realized by them that a high-grade product generally brings repeat orders, it being the latter that counts in these days of strenuous competition. In the diamond groove the metal of the strand bar, as it is inserted in an upright position, meets the slanting sides of the pass and the flow of the metal is forced toward the centre of the pass. This causes an entirely different structural change of the molecules of the metal, they being rearranged in an entirely different manner to suit the shape of the pass.

As the bar is now near the finishing pass in the square rolls, its elastic limit and tensile strength are very nearly up to the maximum limits of the metal, and the finishing touches are given it in the square rolls illustrated in Fig. 5; these rolls have the grooves cut into them on an angle of 90 degrees. This is done so that the finished bars will leave the rolls easily without any shearing of the metal, which otherwise would be the case if the grooves were put into these rolls with the flat side of the bar parallel to the rolls axis; the groove being absolutely straight on sides in a case of this kind, the straight sides of the pass would rub against the sides of the bar, thus causing the metal to cling to it and shear off portions of the bar, with a strong possibility of the metal jamming in the rolls, it depending upon the condition of the bar's temperature.

By putting the square grooves in on an angle all chances of shearing are avoided, the rolls working very nicely and making an accurate sized bar if the roll turning and roll setting have been carefully done. It is a fact that no matter how accurately the passes have been put out into the rolls by the roll turner, if the roller is incompetent or careless, he can, by his handling of the rolls, make a faulty sized and bad looking bar; the blame for which he naturally puts on the roll turner. The latter, if he understands his business, then goes out into the mill and set the rolls so that they will make good bars; this wastes the roll turner's time which should be spent in turning rolls and not in the mill doing other people's work. Faulty bars are made by not having the strand pass filled out properly, unequal sized corners on the strand bar, and the diamond pass bar not containing enough metal to make a good square.

The square passes in the rolls being crossed; that is, the edges of the passes are not in line with one another, and the temperature at which the diamond and square bars are rolled also has a most important influence in the making of a good finished product; for instance, if the diamond bar is inserted into the finishing square pass at too high a temperature, the metal, being in a very soft condition, will be reduced too rapidly and overfill the pass, spreading out on the collars; if, on the other hand, the diamond bar is too cold it will resist the rolling pressure so strongly that it will not fill out the pass to its fullest area. Should the bar be unevenly heated by the heater and contain some cold spots on it the bars will be uneven in size, some parts being larger in diameter than others.

This is due to the fact that when the cold spots go through the rolls the latter springs more than it would when rolling metal that has been evenly heated; if there are a number of cold spots on the bar the finished product will be wavy in appearance and size, thus it will be seen the most important part that even heating plays in the manufacture of steel and iron. In the square rolls illustrated in Fig. 5, the collars of the rolls are shown as touching one another in actual practice; theh turning of the collars of the rolls are so arranged that the two end collars are 1-64 of an inch larger in diameter than the others.

This allows a small amount of light to be seen between the middle collars when the end ones are touching one another. The object of this is to prevent the narrow collars between the passes from breaking out (as chilled iron is a very brittle material) as they slam down on each other after the bar has passed through the rolls, the broad end collars taking the shock of the spring.

When a bar first enters the rolls the latter springs upwards; this is due, not to any bending of the rolls, as the latter is a negligible factor in short guide rolls, but it is due to the wear on the threads of the housing screws, the latter taking to a large extent the shock of each bar as it enters a pass. The spring between a pair of rolls is 1-32 of an inch, which is allowed for in the turning of the rolls; as the end collars are made 1-64 of an inch larger in diameter than the others it may be thought that the end passes next to the collars would be lop-sided, thus having one side of the square longer than the other.

In order to show that this view is erroneous, the methods of turning will be described. The roll is first faced off level, then the passes are cut in with a tool having a 90-degree angle to the correct depth, a divider being used to make sure that each side of the square is equal in length; after all of the passes are finished a facing-off tool is put in the lathe, it being of such a length and placed so that the ends of the tool projects ¼ of an inch over and on to the end colars. A small shaving of metal is then taken off the collars, thus leaving them all of the same diameter with the exception that the portions of the end collars that extend nearest the necks are larger in diameter.

The 1-64 of an inch of light between the middle collars of the rolls, added to the 1-32 of an inch of light caused by the springing of the rolls, makes 3-64 of an inch open space, when a bar is passing through. Added to this amount of light is also the shrinkage size, which makes the light space between the collars nearly 1-16 of an inch, this amount being the distance between the collars of the rolls for a 1 inch bar. It being necessary in all cases to have the hot size of a finished square larger in diameter than when it is cold, as it cools to the required dimensions, now it is evident that as the finishing rolls are apart, when a bar is passing through that the two corners of the square at the joints of the rolls would be blunt and rounded in shape, if an ordinary strand bar was inserted directly into the square pass. Hence it is found advisable, in practice, to use a diamond-shaped bar, and put the latter into the square groove in a vertical position. This places the sharp corners of the diamond bar in the square groove, opposite the joints of the rolls. In Fig. 4 the position that the diamond bar occupies in the square pass is represented in dotted outline. It will be observed that the diamond bar does not quite extend to the corners of the square pass, and that it also is actually longer than the distance between the centre corners of the square in the top and bottom rolls.

The reason for this is the necessity for having a sufficient amount of draft on the diamond bar to just fill out the sectional area of the square pass so as to make a good bar. As the corners on the diamond bar that faces the joints of the square rolls are already made, the change of angle from a diamond to a square keeps its corners sharp, the result being a perfect square is made if the roller has used judgment in handling

Continued on page 65

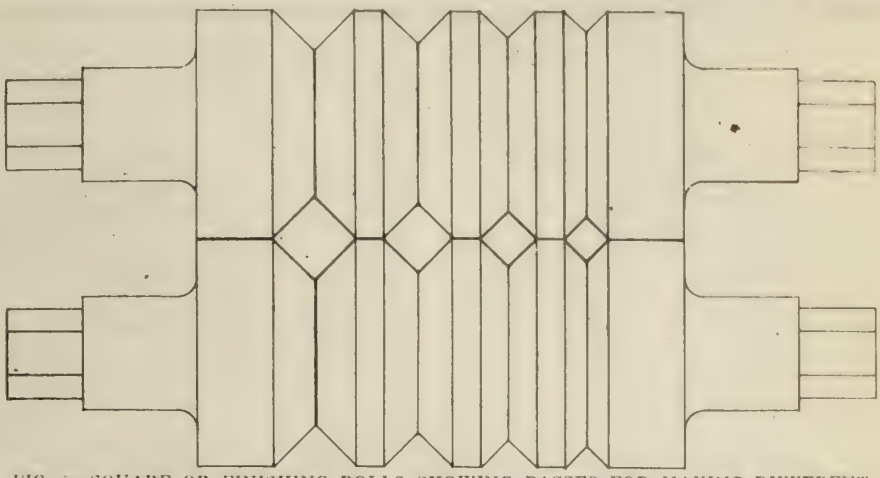


FIG. 5 SQUARE OR FINISHING ROLLS SHOWING PASSES FOR MAKING DIFFERENT SIZES OF CONCRETE REINFORCING BARS.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

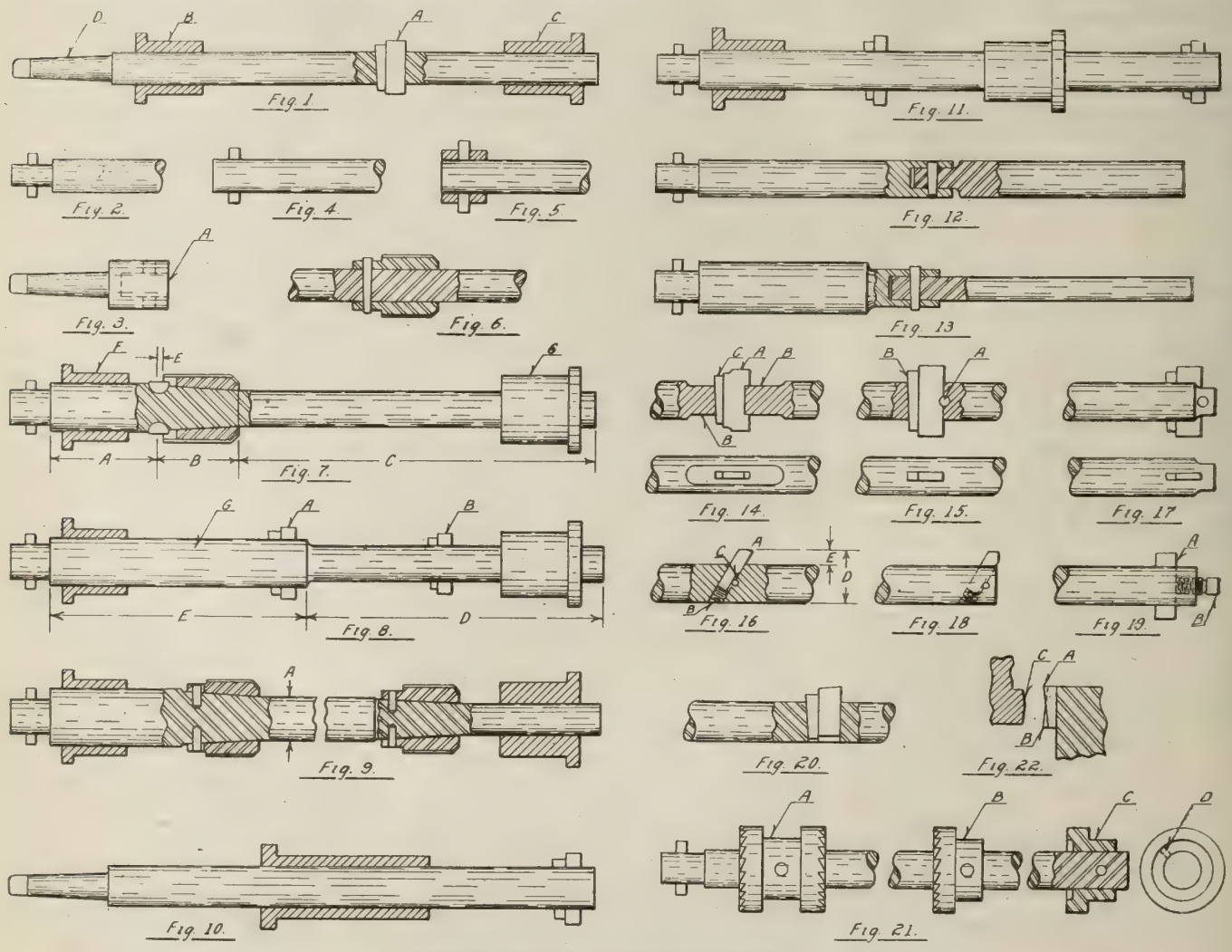
BORING BARS AND BORING CUTTERS

By P. WASHINGTON

A BORING bar must have a good running fit in the bushings, it must be as rigid and heavy as possible, straight and ground concentric. When the bar has been turned and once ground to the correct size it should never be put in a lathe and filed, or emery cloth used on it. Boring bars are made from machine steel and are not hardened. Small bars are sometimes made from tool steel and hardened, in order to give them additional stiffness. Shanks for reamers, and facing bars, should be made in the same way as boring bars, but, if possible, should even be stiffer.

The most common type of boring bar is shown in Fig. 1, the cutter A being located at about the middle of the bar, and the bar being guided at both ends by bushings B and C. The bar is provided with a taper shank at D, fitting the spindle of machine or a collet connected with a knuckle joint. It is common practice to turn down the end of the bar, as shown in Fig. 2, to fit a knuckle joint or a collet shown in Fig. 3. Sometimes the bar can be left full size, as shown in Fig. 4, and sometimes the end is even made larger than the bar, by forcing on a collar, as shown in Fig. 5, in order that the end may fit the driving collet. A key is passed through the end of the bar for driving it; this key fits in the slot A in the collet shown in Fig. 3.

The bar shown in Fig. 1 can also be used for facing purposes, the cutter A being taken out, and a facing cutter inserted. The same bar can also be used for a special shell reamer, when this has a straight hole, the reamer being held to the bar by a taper pin, as shown in Fig. 6. Standard shell reamers have a taper hole, and for these the bar must be turned with a taper part, as shown in Fig. 7, where the part A is turned up to the largest size possible (generally 1-32 or 1-16 inch under the diameter of the reamer); part B being turned to fit the taper hole in the shell reamer, is left long enough to permit the reamer



DIFFERENT KINDS OF BORING BARS.

being pressed up tightly without touching the shoulder D. As a rule, the taper part is so dimensioned that 1-8 inch will be left at E, between the shoulder of the bar and the back of the shell reamer, when this is forced up as far as possible. The reamer is driven by keys or pins entering in a slot cut across the end of the reamer. The part C of the bar is turned down to some standard size, just below the size of the small end of the taper hole in the reamer. The bushings F and G may be made with the same outside diameter, fitting the same size lining bushings in the jig, their inside bearings beng made to fit the large and small diameter of the bar.

A boring bar used for boring out two holes of different size may be made as shown in Fig. 8; A and B are the cutters for the two holes, and part of the bar C is turned down for a length, D, to suit the small hole. The part E can then be made of as large diameter as permissible for boring out the hole for which tool A is used. By making the bar in this way, a more rigid construction is possible than if the part E were turned down to the smaller diameter required by the hole bored by cutter B There may be more than two holes of different sizes in succession, and then the bars may have a greater number of steps; if there is but a slight difference in the sizes of the holes to be bored out, it hardly pays to turn down steps on the bar. The stepped bar may also be used for facing bars. While these small matters may be unimportant and elementary, they must be taken into consideration when designing a set of expensive tools for boring jigs, which are to be in constant use where accuracy is to be maintained.

Reamer bars for reaming out two or more holes simultaneously may be made as shown in Fig. 9, providing the diameter A is large enough for turning the taper portion for another shell reamer of smaller size. Should the diameter be too small to permit this, an extension can be provided, or a separate bar used for the smaller reamer. The principle of stepped bars can be applied also where the cutters are placed, as illustrated in Fig. 10. The principal features of this bar are that the cutting tool is always located at the end of the bar, opposite to where it is driven, and that there is but one bushing or guiding. This bushing should be as long as possible to give a good bearing and prevent the bar from wabbling. Sometimes, as illustrated in Fig. 11, the jig is made with two bearings, which, however, are on the same side of the cutter, and a comparatively short distance apart.

Sometimes a bar must be made in two parts. The reason may be that one solid bar would be too long to permit of its being pushed into the jig from one side. Another reason may be that the cutting tools are too large to pass through some intermediate hole. The two parts of the bar may be connected with a taper pin, as shown in Fig. 12, the end of bar A being a sliding or driving fit in the hole in section B. This bar should be ground after the two parts are assembled, so that they will run exactly true with each other. A stepped bar made up of two sections is shown in Fig. 13

Cutters for Boring Bars

The cutters used in boring bars vary widely. The cutter A, Fig. 14, is commonly used. It cuts with both ends, and is centred by the two flats B, milled or filed on the bar; a slot is provided in the cutter which fits these flats of the bar. After the cutter has been put in place, it is tightened by the Key C, and is turned to the correct diameter required and then hardened. A more modern arrangement is shown in Fig. 15. The cutter here is a plain rectangular piece of steel, cutting with both ends. It is centred by the pin A, which is driven into a hole drilled so that one-half of it passes through the slot in the centre. As in the former case, the cutter is turned down to the right diameter when in place. It is tightened down by the key B. This way of locating the cutter centrally has proven very satisfactory.

Facing cutters may be located and held in place in the same way. They are longer than boring cutters, being intended to finish a boss or seat around a hole, but otherwise they are made to about the same dimensions.

Single-ended boring cutters, as shown in Fig. 16, are used to a great extent, and it is claimed that they give a more perfect hole. The illustration shows a common way of securing the tool; the cutter A, which is made of drill rod or other round tool steel stock, fits a hole bored at an angle of sixty degrees with the axis of the bar, and is adjusted by a headless setscrew B. When adjusted, the cutter is held rigidly in place by the pin C provided on one side with a flat tapering portion, which fits against the flatted side of the cutter, as shown in Fig. 16. This cutter is very easily set by taking a measurement D with a micrometer. Subtract from the dimension D the diameter of the bar, thereby obtaining dimension E. Add E to D, thereby obtaining the diameter of the hole which will be cut. The screw may have to be adjusted a few times to obtain the desired result. The two kinds of cutters referred to may also be used on the ends of the bars, as shown in Figs. 17 and 18. The cutter of the type shown in Fig. 15 may be held in either of the two ways shown in Fig. 17 and 19. In the latter case the cutter is spotted at A, and held by a pointed screw B. This method does not always insure accurate results. The simplest kind of single-ended cutter and the manner in which it is held, is shown in Fig. 20. It may be used in any kind of bar, and, with ordinary care, good results may be obtained even with this simple tool. The variations possible are many; and the examples shown simply indicate the most common practice.

Facing cutters may be made similar to boring tools, or they may be made with teeth, similar to end milling cutters, as shown in Fig. 21. One of the cutters A cuts with both sides, while the cutter B cuts with one side only. The bar is provided with a slot and with notches for locating and holding in place the various cutters, as shown at C. A pin D is driven into the cutter, and enters the notch, thus driving the tool The cutters can also be held on the bar by taper pins, but the putting in place and the removal of the cutters would then be much slower.

Different cutters are commonly used for roughing and finishing. To make it easier to remove the metal with the roughing cutter, it may be made with every other tooth beveled in opposite directions, as shown in Fig. 22, where A is one tooth beveled toward the centre, and B the next tooth beveled outward. Using a cutter of this kind will produce a surface as indicated at C, which must be faced squared by a finishing cutter.

In order to face the work to correct dimensions, stops are sometimes provided which strike against some finished surface, which stands in a given relation to some other surface.

MANUFACTURING A MILLING AND GEAR-CUTTING ATTACHMENT—I.

Continued from page 53

The centre hole is then drilled and bored to 1.375 inches.

A Woodruff keyway is next machined, which may be seen at the right hand side of the large centre hole.

The dovetail is then scraped until it is a good sliding fit in the cutter block.

The next operation is drilling the small binding screw hole 5-16 x 18 threads, using a simple jig located from the vee and bored hole.

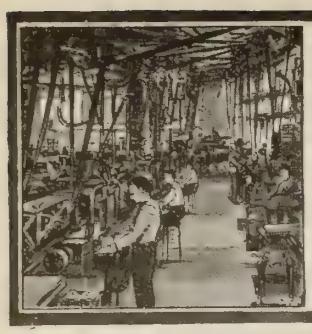
The base binder key is made from a bar of semi-circular steel, the first operation being cutting to length.

Three of the sections are then placed in the fixture, Fig. 11, being held in place with the pin-headed setscrew as shown.

The interesting feature of this tool is the concave surface, against which the keys rest. This is made with an angle of 10 deg. so that after the key (the fixture shows two of these already machined) has been milled the concave surface will possess this angle.

The key is then placed in a simple drill jig, being located by its outside contour and a small pinhole drilled.

Dismantling Plant.—The Willys-Overland Limited, West Toronto, is completing its work on aeroplane engines for the British Government, and to make a way for its motor car programme, plans to dispose of machinery, equipment and tools procured especially for its aero-engine contract. This machinery consists of the finest type of machine tools, and the Company will shortly be in a position to supply intending purchasers with lists of machinery and tools, from which tenders can be sent in to the company. These lists will be sent out upon request.



DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

THE BLOMQUIST-ECK HORIZONTAL BORING MILL

IN designing the Blomquist-Eck horizontal boring, drilling and milling machine, the Blomquist-Eck Machine Co., Cleveland, Ohio, constantly bore in mind the working efficiency demanded of a tool of this type in practically all lines of manufacture. Realizing that it was impossible to do heavy accurate boring and milling on a low, shallow bed or base with large openings both front and rear and directly under the column where the greatest stresses and strains exist, they originated a deep bed or base of a box pattern and eliminated an inherent fault.

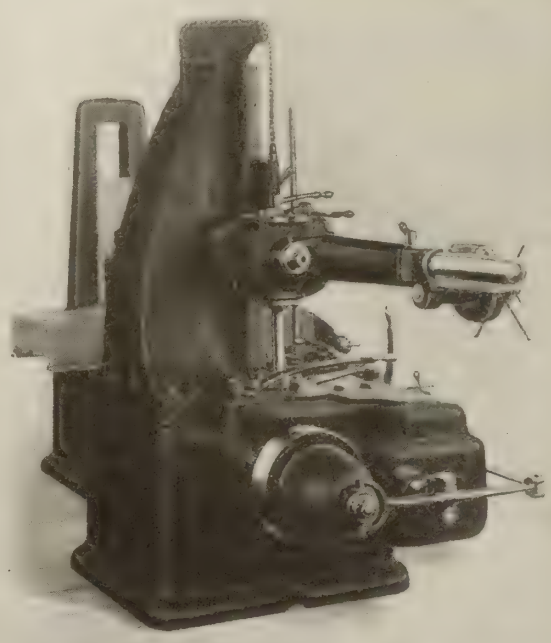
The working efficiency of any horizontal mill and drill depends entirely upon its ability to operate upon all classes of work at the highest speeds and coarsest feeds practicable and at all times to produce a finished product of dependable accuracy. These points have been developed to the highest degree by combining rigidity, accuracy, a suitable range of selective speeds and feeds with the highest standard of material and workmanship.

A complete system of jigs, fixtures and gauges are used, insuring a uniform standard construction throughout as well as the interchangeability of parts. The various groups of mechanism form complete individual units, and any unit can be inspected, removed or replaced without disturbing the alignment or any adjoining unit.

The bed or base is an unusually wide and deep box section cast entirely in one piece. The outer walls directly under the column are left intact without cored openings which adds greatly in resisting the lines of stress. Chip chutes are provided and so aranged that their walls give added strength. The bed (directly under the column) is reinforced by sections tied together and cast integral with the base. The bed is further reinforced by heavy deep ribs running lengthwise, and at right angles the three point support or bearing is also incorporated in the construction, forming the best known foundation principle.

The column is very rigid box section in design, strongly braced internally by ribs in both horizontal and vertical positions. The tapered sides and base of the column give the machine a neat, substantial, rugged appearance, also providing a liberal bearing upon the bed, eliminating deflections and spring.

The spindle saddle is designed with a liberal bearing surface on the face of the column, a long, narrow guiding edge with single screw adjustable taper gib for adjustments on one side and square lock form with gib on the other side. This construction will always maintain and insure a perfect alignment for the spindle saddle. The centre of the spindle in the spindle saddle is placed close to the column face (reducing overhang to a minimum) without sacrificing strength at a point most desired. The elevating screw, which is between the column faces and the spindle, is placed in such a predetermined position in relation to the narrow guide that the vertical movement of the saddle is direct and accurate. The units comprising the spindle and saddle are counterbalanced by a weight within the column, thus relieving the elevating screw of wear and tension.

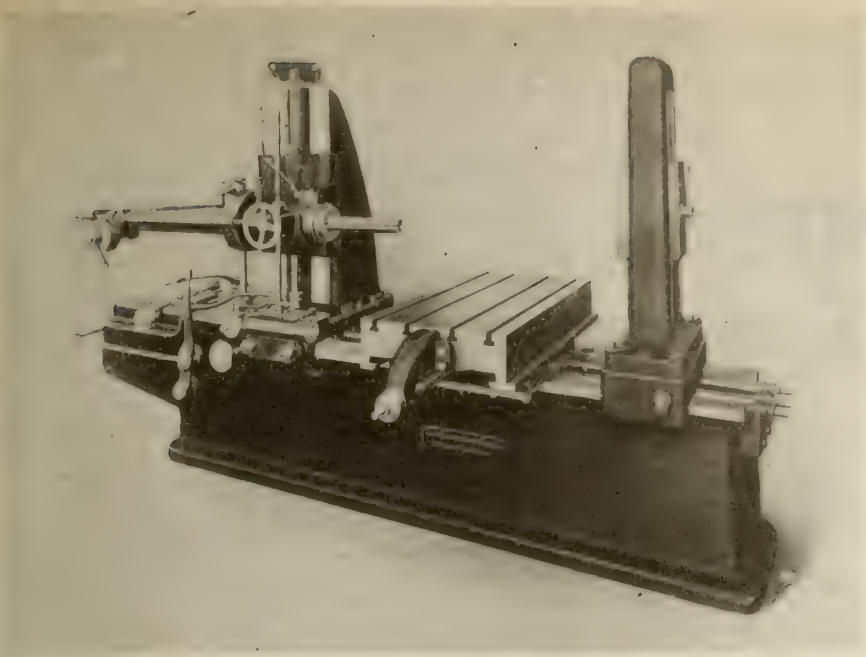


END VIEW OF BORING MILL

Spindle is made from carefully selected high carbon steel, heat treated, ground its entire length, bored Morse taper and provided with end thrust for operating in either direction. Spindle sleeve consists of a hammered high carbon steel forging accurately ground inside and out, thereby insuring a perfect uniform spindle bearing. The front and rear spindle sleeve bearings are adjustable and tapered, made of genuine Government bronze. Either bearing can be adjusted to compensate for wear. Sight feed oil cups provide an adequate lubrication.

The boring bar support is raised or lowered in unison with the spindle saddle by a shaft and a set of planed steel bevel gears. The bar support or bearing proper is securely clamped by a lever binding bolt at any position.

The spindle is powerfully designed and well adapted to the heaviest and finest class of work. The close coupled drive gear shafts, mounted on S K F double row self-aligning ball bearings, transmit the power to the spipndle in a most direct and practical manner. All shafts are made of high carbon steel. Hardened steel ring spur gears, heat treated, are used wherever possible and these are shrunk on to cast iron hubs. The smaller spur gears in the drive are made of solid steel and heat treated. The bevel gears are made of hammered steel forgings planed from the solid. The speed changes are made by two levers at the front of the machine which operate the selective sliding gears. The base is proportioned in such a manner to properly locate the entire driving mechanism and each individual shaft and bearing can be removed or replaced without disturbing any adjoining unit. Access to the entire unit may be had through an oil-tight top plate cover, the removal of which permits an easy inspection when required. All gears run in a bath of oil and in addition a positive



BLOOMQUIST-ECK BORING MILL, FRONT VIEW

cascade oiling system is provided for both gears and bearings.

The feed to the spindle in either direction to the spindle saddle in raising or lowering upon the column, to the table saddle paralleling the bed, or to the table longitudinally upon its saddle, is introduced in the same direct positive geared manner as applied to the spindle drive. Shafts are made of high carbon steel mounted on S K F ball bearings. Gears are of steel and heat treated. The feed mechanism in the base is arranged so any unit may be removed or replaced without disturbing any adjoining unit. All gears run in a bath of oil and in addition a positive cascade oiling system is provided for bearings and shafts. The feed changes are made by two levers which are placed directly in front and at the top of the gear box. In addition there are three selective interlocking levers provided that engage either the spindle, vertical or table feeds. If the spindle feed is being operated, the table and vertical feeds are automatically locked or vice versa. No two conflicting feeds can be engaged at the same time. In operating star feed facing heads or work of similar nature all feed levers can be positively locked in a neutral position.

Convenience and safety is provided for the operator by placing all controlling levers to the front and high enough so he has no occasion to stoop or reach beyond that of his normal working position.

The bed surfaces were designed and so proportioned that enable the use of a long, deep, rugged saddle to compensate for any overhang of the table at the extreme front or rear positions. When the table is in either extreme position it is supported in the saddle practically three-fourths of its entire length. The saddle is gibbed to the bed by the square lock method having a long narrow guiding edge with a taper gib for adjustment. Perfect alignment is always assured. The table is of an improved extra heavy pattern, long, wide and deep. It is reinforced by heavy ribs, and the metal being of a special analysis is so disposed to resist the greatest strain that might be imposed. The T slots are planed from the solid. The table is securely gibbed by the square lock method which in this instance reinforces and resists any strains when the table is in an overhanging position.

Power rapid traverse of a friction type is provided for all members operated by the feed. Regardless of whatever feed may be engaged the rapid traverse always operates at one rate of speed in either direction. It is instantly engaged or disengaged without disturbing the original feed setting. An adjustable safety friction leather washer in the clutch mechanism prohibits damaging any portion of the mechanism engaged. The clutch control is sensitive and practically any amount of travel can be had.

Adjustments by hand to the spindle saddle, spindle travel or movement, table saddle or table are provided in addition to the automatic feeds. All screws being fitted with graduated dials reading in thousandths of an inch, interchangeable work is assured and accuracy throughout obtained.

Single friction clutch pulley drive operating at constant speed is regularly furnished. Constant speed or adjustable speed motor drive is furnished when required at extra prices. The manufacturers are prepared to equip their machines with any type of electrical control, manual or automatic push button.

STARRETT BOOK IN ITS FOURTH EDITION

The fourth edition of the Starrett Book for Machinists' Apprentices, published by the L. S. Starrett Co., of Athol, Mass., has just been issued. The book, now in its thirty-fifth thousand, is a well illustrated volume of 176 pages, bound in red Athol leather and designed to answer in an authoritative manner questions as to how to do the every-day work of the average machine shop. The different classes of work are taken up separately, the most common errors pointed out and the correct practice indicated. Much attention is given to the proper use and care of tools, the reading of micrometers and verniers, bench work, lathes and lathe tools, grinding, belts, gears, etc. The book is essentially for the apprentice rather than the expert machinist, though the latter will find much of interest and value, and is intended to provide the answers to the many questions usually asked of the foreman or superintendent. Distribution is being made exclusively through the hardware dealers handling the Starrett line of tools, the price being 50 cents per copy. The briefest examination of the volume will convince the ambitious apprentice or machinist of its value in his every-day work.

ROLLING CONCRETE REINFORCEMENT FROM OLD RAILS

Continued from page 61

his rolls. The size of the concrete bar made is 1 inch, that being the average size of metal that is mostly used for reinforcing concrete work, although there are other sizes made to suit the requirements for different classes of concrete construction. Some bars are twisted while the metal is hot, and others have protruding knobs of metal on their sides. The latter are made by a machine which cuts out hollow places in the square roll passes; this is done after the roll grooves are turned.

When the metal is rolled in the finishing square grooves, it flows into the hollow spots, thus forming knobs on the surface of the bars. Reinforcing metal with either twisted or knob surfaces are used to hold tighter to the concrete than the plain bars will do, some contractors preferring one or the other styles according to which they consider the best.

When bars are embedded in concrete for any length of time and the structure is torn down, it has been found out by experience that the reinforcing bars were in good condition; the only difference noted was, that the outside surfaces of the bars were perfectly bright as if the metal had been put into a buffing and polishing lathe; this de-rusting of the bars is probably due to the action of the chemicals in the concrete in dissolving the outer coating of oxide of iron and rust at the moment that the concrete hardens, and then stops, as the interior of the metal is not affected.

Old rail steel, when made into square, flat bars and angles, is also suitable for quite a variety of uses, as owing to its high elastic limit and high tensile strength, it will give good satisfaction to the users.

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Soldier Training and Civilian Life

HAS military experience made a man more or less fit for the civil life to which he must now turn? Col. Lorne Mulloy, the blinded veteran of the Boer War, sized this situation up well at a meeting in Brantford a few days ago.

Ordinarily, a man judges, decides, and acts in regard to when he shall go to bed, when he shall rise, when or whether he shall shave, shine his shoes, eat his breakfast, wear his overcoat, and all the multiplicity of acts that constitute a day. Self-interest drives him to work in the morning and keeps him there till quitting time; self-interest and responsibility make him provide for food, clothes and shelter, and whatever comforts his state in society expects for himself and those dependent on him.

In the army, on the other hand, all is already decided for him. He does not get up when he elects—the bugle wakes him; he has to shave and shine up; he eats when the rest of the parade eats; he is told "'A' company will parade with greatcoats"; even his pay is unnecessary to his comfort—he could waste it all and he would still be clothed, fed, sheltered, and given medical care.

From the moment the soldier dons his uniform he is relieved of all the responsibility, the "urge" that makes for success in civil life. If he worried about his keep in the army he would be as foolish as the reader would be if he worried about the supply of air.

Now, take the uniform off, and the individual feels much like a heavy draught horse with a heavy load, tugging it up a hill would, should the bridle suddenly be snatched off. He is nonplussed. He is used to being directed. He cannot feel his responsibility for his keep; his three years of training have almost erased that from his thoughts. He cannot at once exercise his initiative; he has been taught for three years to act just so and not otherwise. He is not actuated by the self-interest that impels the citizen to work. If his self-interest had been exercised for the last three years, how long would he have drilled in the snow, tramped in the heat, or stood, with freezing fingers gripping his rifle, as he stood to his waist in the frozen slime of Flanders? He is released from the extraneous spur of military life, and the inner spur of ambition and self-interest has not yet begun to function.

Against this, it can be held that the men who went to the front are those possessed of a high degree of courage and determination. They are men who won every decoration known from the V.C. down. They saw the great need and they realized the great danger, and they were big enough to rise to the occasion.

For the time they may need a little more latitude than formerly. Surely it is not asking too much to suggest that this should be extended to them?

It is not fair that a returned man should be expected to be 100 per cent. efficient the first day he starts work after two or three years in the army.

Returned Soldiers Are No Menace

SO much is heard of the returned soldier that it might be imagined he was not a welcome comer to this country.

Some of our pessimists, when they look at the numbers that are being let out by the munitions works, are fond of throwing up their hands and saying, "And just think of all the returned soldiers that will be around looking for something to do."

One might almost imagine, to hear these croakers, that they wished the war might have continued indefinitely in order that there might be no such thing as the returning soldier to deal with.

Or else another guess might be that matters were becoming so serious that for every soldier returning home a civilian from the same community should go down and jump in the lake, in order to keep the balance of people and jobs unruffled.

Canada was mightily interested in these soldiers when they enlisted. She was mightily interested in them when they were holding that Western line that looked for all the world time and again as though it were going to break, and Canada is mightily interested in these men right now, and wants to put them back into civil life just as quickly and comfortably as possible.

The army that went from this country was not an army of professional soldiers. The army will not remain in the uniform. The men in it will cease to be soldiers just now as soon as they can be brought back and returned to civil life.

This returned soldier talk is being carried in some stages to a point where it might appear to be proper to refer to it as the "returned soldier menace."

For the great majority these are our own men. They are coming back to their own land. They are returning to a country that is well able to look after them—to a place that urged them to enlist and cheered them when they did so. There are some of them that war has used badly. These men are not on the charity of the country. They have paid the price almost to the limit, and every cent they get in the way of pension is a wage dearly purchased.

This army that is coming back is not an army of invasion. They are our own men. Fathers, brothers, sons, husbands of families that have always lived here. It would be well for some of the folks that speak with long faces of the returning soldier problem, to get this drift well imbedded in their mental vision.

AN expert is one who tells others how to do things that he'd make an awful mess out of if he'd tackle it himself.

* * *

THE Ontario Government is going to open up more territory for fishing. All of which points to the need of making sure of a good crop of fishworms and corkscrews.

* * *

THERE was a drop in the pork market this week. Pigs with their boots on went down $3 per hundred. All of which means that there will be a squeal from the farm, but not necessarily from the barnyard end of it.

* * *

THE German Junkers sowed the seeds of anarchy in Russia. The stuff sprouted, grew and went to seed, and the seed blew and found root in Germany. It's just the old story of sowing the wind and reaping the whirlwind, but in this case they sowed the Bolshevik and are gathering the Spartacans.

CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 3. January 16, 1919.

Making Milling and Gear Cutting Attachment—I

In This Article is Described the Making of an Attachment For Lathes Which Performs Milling and Gear Cutting Operations—Various Tools and Operations Used in Machining Are Shown

By ROBERT MAWSON

IN this article is described an attachment for lathes which performs milling and gear-cutting operations.

The attachment is compact, easily applied and positive in its action.

The various tools used in machining the various elements are described in detail also by means of illustrations.

It will be seen that they are of a high character as regards modern tool design and manufacture enabling accurate and intensive production to be obtained.

In most cases the first machine tool bought by a shop is a lathe.

A visit to the small country jobbing shop will show in many cases as the only machine tool—a lathe, or as the shop enlarges, two or more to meet the demand.

However, there are many problems which come to both the small and larger shops that cannot be well done on a lathe. Such problems are milling and gear-cutting, and as these are so few that they do not warrant the purchasing of a special machine, an attachment for the lathe which will perform these operations is useful and valuable.

The Presto Machine Co., Inc., Brooklyn, N.Y., are manufacturing what is known as the "Star" milling and gear-cutting attachment, which is designed and can be used to advantage for the work noted.

In Fig. 1 is shown a front view of the attachment fitted onto a lathe, and a rear view is illustrated in Fig. 2.

The attachment can be conveniently secured to the lathe and is suitable for a wide range of work, which includes various milling operations with the exception of spiral cuts.

The cutter block A is mounted on the carriage of the lathe and fed in either direction, longitudinal or cross, by hand or automatic power feed of the lathe.

The cutter spindle B may be rotated in either direction, receiving power from the driving collar C, which is clamped on the spindle of the lathe.

Motion is transmitted through the sliding shaft, universal joints shown and bevel gears in the cutter block.

The universal head D is clamped to the inside ways of the lathe bed. The vertical column E carries a slide, on which may be mounted the dividing head as shown, or a vee; a graduated collar on feed screws reads in thousandths of an inch.

The vertical column swivels on base and the dividing head swivels on the vertical slide, graduations of 180 deg., facilitate quick and accurate adjustment to any desired angle.

The index arm swings on end of bearing for indexing spindle, is graduated and may be adjusted for side cuts on bevel gears. When the vise is used on the vertical column work such as surface milling, cutting keyways, milling ends of shafts may be performed.

Machining the Cutter Block

One of the most complicated castings on the attachment is the cutter block, and is shown in detail in Fig. 3.

The problem of tooling this part so that accurate and intensive manufacture could be obtained was also quite a study. One of the rough castings as received at the shop is shown in Fig. 4.

The first operation is rough planing the vees, which is performed in a fixture which holds 14 at once in two rows of seven. The next operation is finish machining the vees and is performed with the fixture shown in Fig. 5.

The casting is located on three pins as A and held down with two straps B.

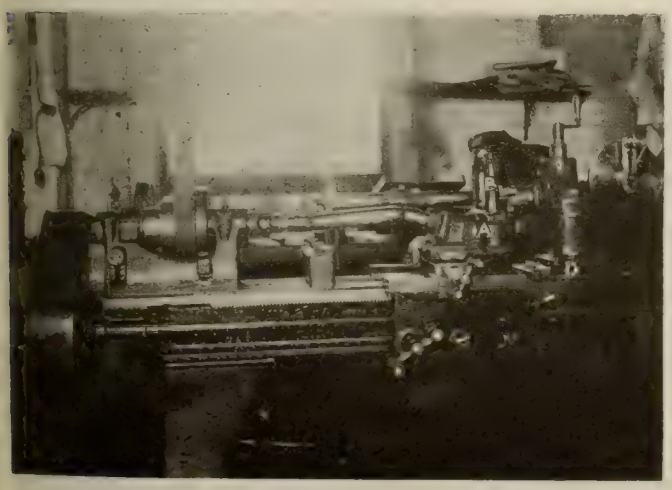


FIG. 1.—FRONT VIEW OF ATTACHMENT IN USE.

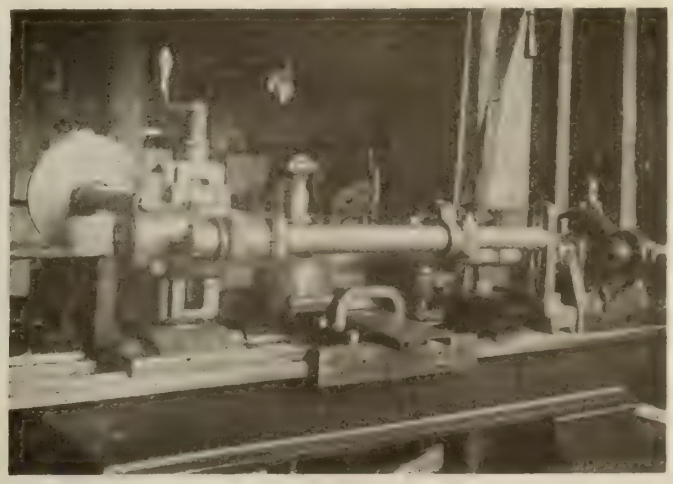


FIG. 2.—REAR VIEW OF ATTACHMENT ON LATHE.

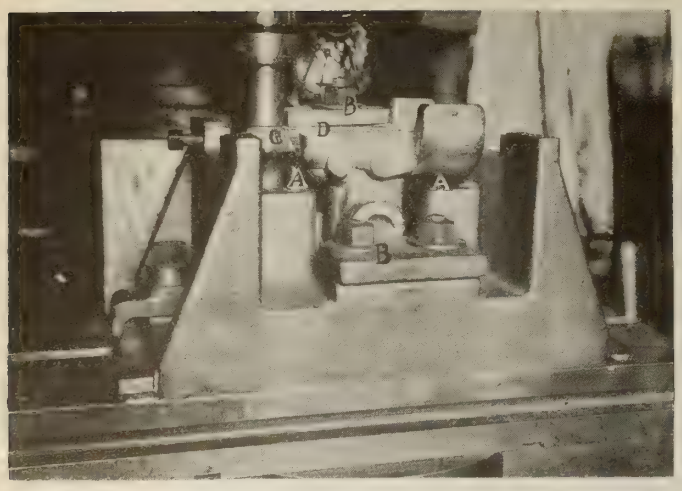


FIG. 5.—FINISH MACHINING THE VEES.

FIG 4.—UNFINISHED CUTTER BLOCK.

The correct location is obtained with a stop pin. It will be noticed that the strap in front fits into the cored hole of the piece which affords a handy and sure means of holding.

The milling fixture is located by tongues on the machine table so that the milled slot will be square.

The vees are then machined with the angle cutter C.

The machine table is then lowered, the correct amount reading with the index of the miller in the usual manner, and the upper surfaces D machined with the end of the same angle cutter. The vees are then scraped accurately to a gauge after the casting has been removed from the fixture.

The casting is then placed in the jig shown in Fig. 6 and the angular hole drilled and reamed to 1.250 inches.

In the jig the casting is located by the steel vee block A, the piece being slid in from the end. This block accurately fits the scraped surfaces and the casting is then pushed back against a stop pin.

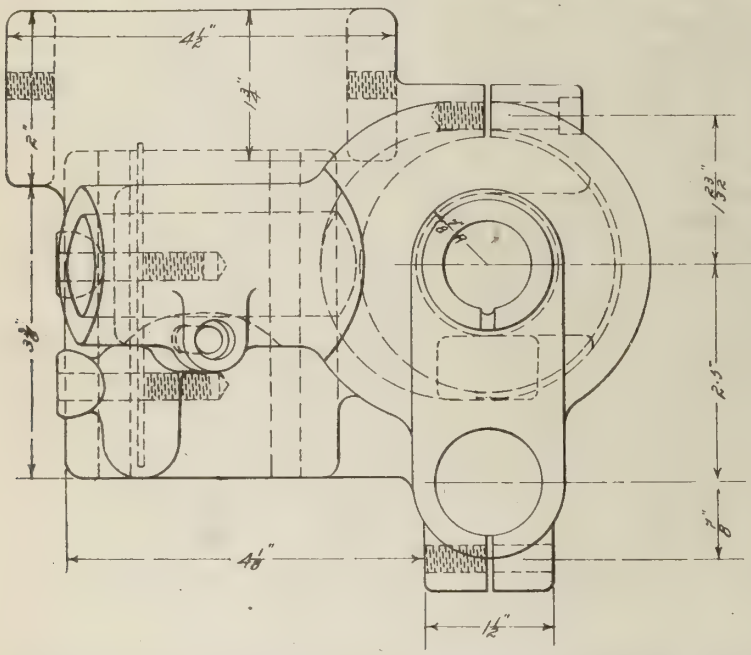
The screw B, when tightened, holds the piece securely in the jig.

Some idea of the number and sizes of holes machined in this and the subsequent operation using this jig may be gathered by referring to the tool board shown at the right of the jig.

An interesting method is the way these are arranged in the tray or board, which is the sequence in which the man uses them, and being kept in order as shown, facilitates the machining operation.

The jig is then turned over on the other three sides and all the other holes, with the exception of the bolt holes, are then machined.

These operations comprise drilling, reaming, counterboring and facing bosses. These may be followed by referring to the detail of the cutter block. The bolt holes are next drilled and tapped, no jig being used, the holes being spotted in the centre of their respective bosses.



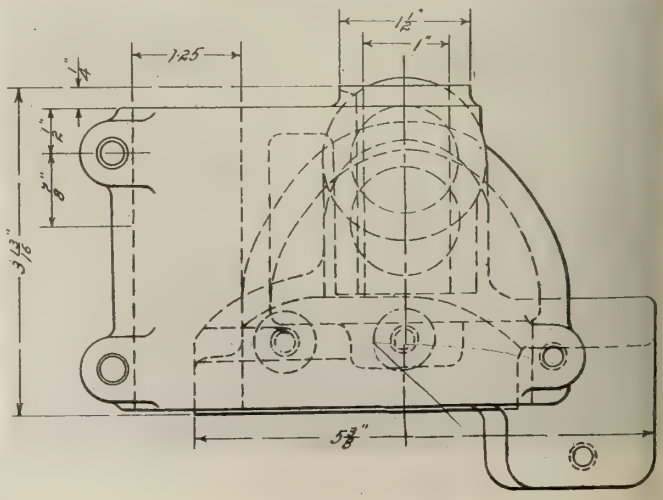


FIG. 3

The casting is next placed on the fixture, Fig. 7, being located by 1-in. and 1.250-in. pins which fit into holes A and B respectively.

Two slots are then cut at C and D, using a 1-16-in. slitting cutter in the milling machine in the usual manner. The casting is then removed from the fixture and an oil groove cut in each bearing.

One of the finish machined cutter blocks is shown in Fig. 8 and an idea of the amount and variety of machining operations necessary is apparent.

Machining Cutter Block

The cutter block is made from bar steel, and the first operation is cutting to length.

One of the sections is then placed in the fixture, Fig. 9, being located against the two setscrews A.

The open-ended strap B is then tightened onto it by means of the setscrew, as shown with the fixture in position on the milling machine table. A pair of gang cutters with a cutting edge of 60 deg. to obtain 30 deg. on the block, accurately spaced, is used to machine the piece.

The block is then placed in the jig, Fig. 10, being pushed into a locating vee surface at the rear with the screw A and at the forward end with the setscrew B.

The two setscrews C are then tightened down to hold it securely in the jig.

(Continued on page 63)

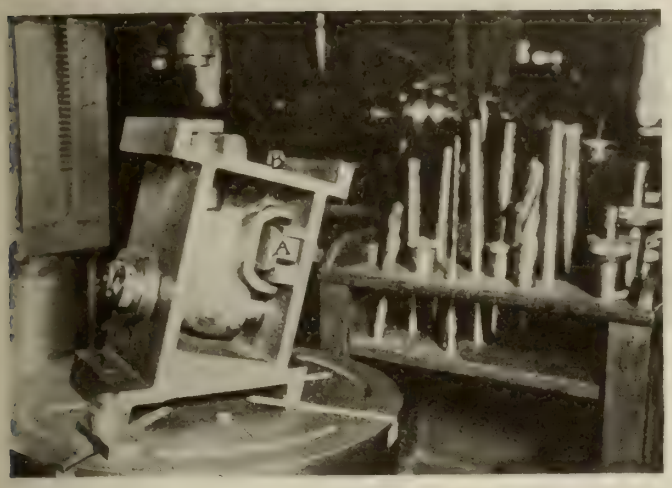


FIG. 6.—MACHINING ANGULAR HOLE.

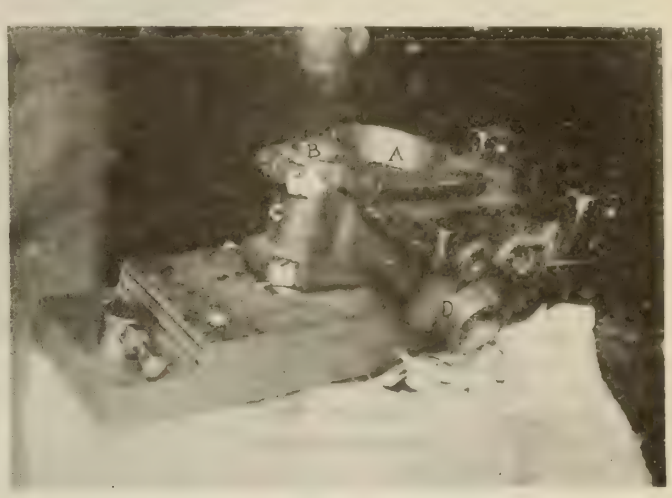


FIG. 7.—SLOTTING THE CASTING.

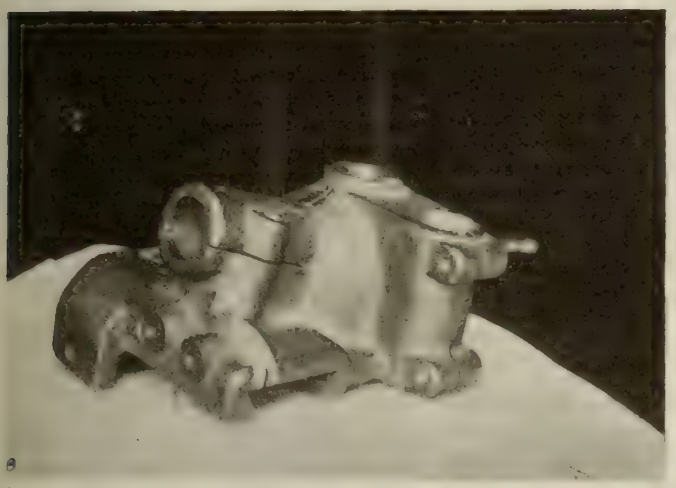


FIG. 8.—A FINISHED CUTTER BLOCK.

FIG. 9.—MILLING CUTTING BLOCK.

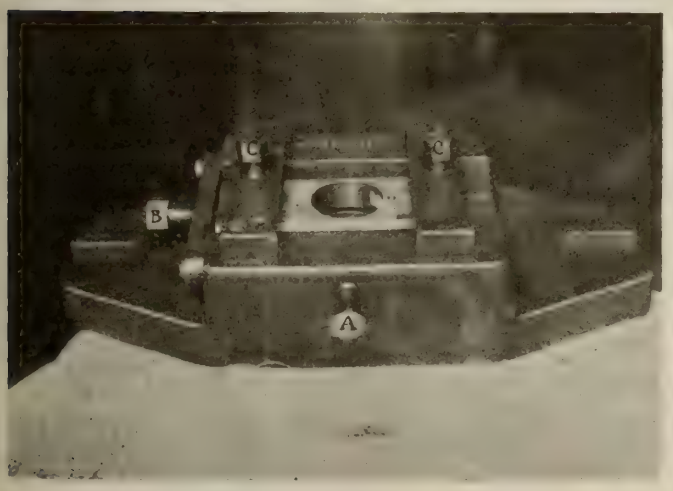


FIG. 10.—MACHINING FOR BASE BINDER.

FIG. 11.—MILLING BASE BINDER KEY.

AEROPLANE MOTORS

Types in Use To-day —Method of Operation and Principles Underlying Their Design — Ignition and Carburetion Very Important

By LIEUT. H. POLLARD

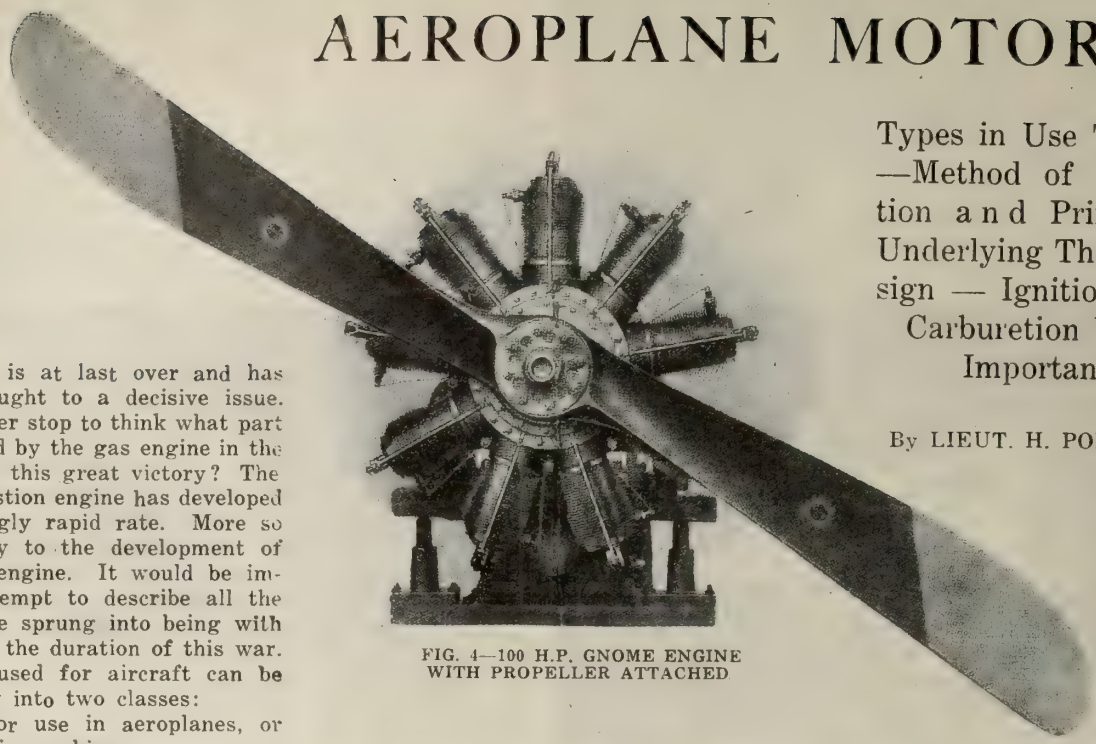


FIG. 4—100 H.P. GNOME ENGINE WITH PROPELLER ATTACHED

THE war is at last over and has been brought to a decisive issue. Do we ever stop to think what part has been played by the gas engine in the achievement of this great victory? The internal combustion engine has developed at an exceedingly rapid rate. More so does this apply to the development of the aeroplane engine. It would be impossible to attempt to describe all the types that have sprung into being with the advent and the duration of this war.

Engines as used for aircraft can be divided roughly into two classes:

(a) Those for use in aeroplanes, or heavier than air machines.

(b) Those for use on dirigibles, or lighter than air machines.

The engines classified under the former heading will be more largely dealt with. It must be understood that it is of the utmost importance that the weight per horse power be at an absolute minimum. The reasons in substantiation of this are:—

(a) To allow of rapid climbing.

(b) To increase the radius of action.

(c) To reduce the weight and increase the efficiency of the gliding angle.

(d) To increase the safety of the machine in a gale.

The need of maximum power with the minimum of weight and bulk has made the aerial type of engine the highest expression of the designer's art. Nor yet has the limit been reached, greater power in relation to weight is constantly being obtained by the employment of new discoveries. The aeroplane year by year becomes more stable, more speedy, and more adaptable to the requirements of peace and war. The future of mechanical birds of German creation has been the subject of many works of fiction, and it may be that the counterpart of that "Clipper of the Clouds," of which Jules Verne dreamed and wrote, will some day sail the skies in reality. This will only be achieved through the aid of the internal combustion engine, which, although it has reached a high stage of perfection, is still capable of further development, if we are to forge ahead in our aerial endeavors.

Internal combustion engines to-day are used in such a large degree that I think it would be wasting the reader's time to occupy more than a brief space in explanation of the fundamental principles. It is well known that the essential parts are a piston which moves up and down inside a closed body known as the cylinder. This piston is connected to the crankshaft by a connecting rod, and the valves (exhaust and inlet) are fitted to allow of the gases entering and leaving the cylinder. A sparking plug is also fitted to enable ignition of the gases.

The Cycle of Operations or what is known sometimes as the Otto cycle is the name given to the four strokes of the piston, which occur in the following sequence: Induction, compression, power, and exhaust, each stroke being of equal duration. This is only a theoretical cycle and in practice is never adhered to. Induction occurs from approximately top dead centre to a little past bottom dead centre; the reason for this is because the piston descends with a higher velocity than that of the incoming gases and were the valve to close at bottom dead centre, which is its true theoretical closing point, we should have weak compression and ultimate loss of power due to inadequate supply of gas being drawn in. From inlet closing to top dead centre is compression stroke ignition occurring a little distance before top dead centre. This is spoken of as advanced ignition. From top dead centre to exhaust opening, which is invariably before bottom dead centre, is power stroke, and from exhaust opening to top dead centre again is exhaust stroke, thus completing the cycle of operations. This is a very brief description of the four-stroke principle on which most of our practical aero engines of to-day are working.

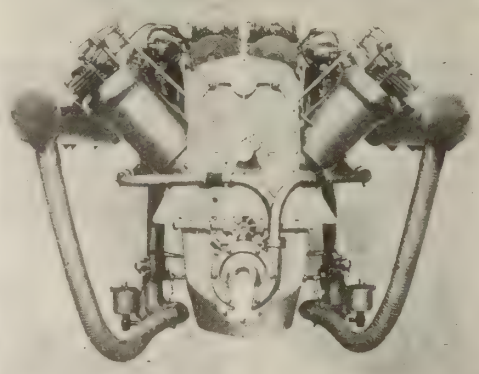


FIG. 1—200 H.P. CURTIS ENGINE.

Engine Types

Engines in general use to-day can be classified under three headings: Stationary or Reciprocating, Rotary, and Radial. Stationary engines, such as the Hispano-Sueza, Rolls-Royce, Sunbeam, Curtiss, and Beardmore, have their cylinders set at an angle and situated above the crankcase, or are vertically above the crankcase, as in the case of the Beardmore or Sunbeam. In all cases, the crankcase and cylinders are stationary, the crankshaft revolving.

In the rotary type, the cylinders are set radially around a fixed crankshaft, the cylinders and crankcase revolving. Examples of this type are the B.R., Le Rhone, Clerget, and Monosonpape.

The radial engine is in appearance very similar to the rotary, having its cylinders set in like fashion around the crankcase, but they are stationary and are usually water-cooled, the crankshaft itself revolving. An example of this type is the Salmson Canton-Mane. The radial type will be but little referred to, as it is only used in small numbers.

The Rotary Engine

The rotary engine, being the most important from an aviation standpoint, requires further description. What is the principle governing its operation, or in other words, why does it revolve? On

examination of the diagram it is found that in any rotary engine there are two centres of rotation, "A" being the centre of rotation for the pistons, around which

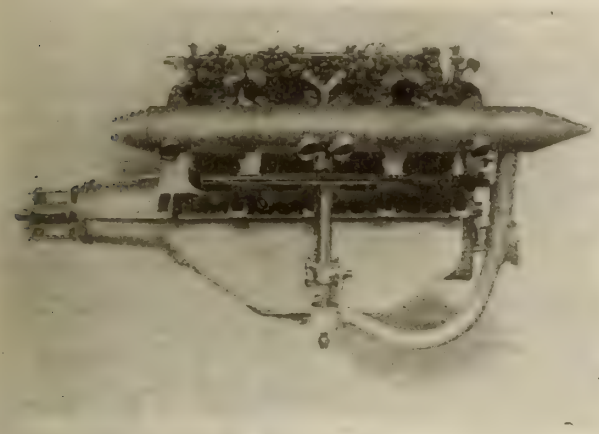


FIG. 2 200 H.P. CURTIS ENGINE.

the pistons revolve at a fixed radius; "B" the centre point around which the cylinders and crankcase revolve. The distance between these two centres is approximately half the stroke of the piston.

The diagram shows a piston in a slightly exaggerated position of explosion. The point "C" represents the gudgeon pin and the arrow "P" represents the thrust on the piston head due to the explosion of the gases in the cylinder. When an explosion occurs the force "P" is exerted in the direction of "C" to "A." This, of course, is due to the fact that the pistons are connected to the point A through the medium of the connecting rod. There is also another force in the direction of "C" to

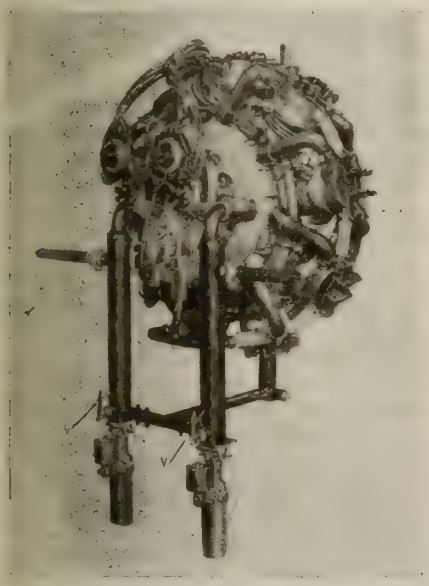


FIG. 3 SALMSON CANTON MANE RADIAL TYPE ENGINE.

"B" set up, due to the fact that the piston is trying to reach the point "B," because it is guided in the cylinder, which is set radially to the centre "B." Now, it is well known to students of mechanics that wherever there is action, there is reaction equal and opposite, consequently there will be the reactions of the two forces C.A. and C.B., and the resultant, shown by the line XY, is resolved into the force R on the leading edge of the cylinder, causing it to revolve. This principle only applies to a rotary engine and not to the radial engine, which is very similar in outward appearance.

Compression

Leaving the general principles of engines, some of the more important details will be dealt with. Of very great importance is the maintenance of compression. In an engine compression is maintained through the medium of well-fitting valves, piston rings and accurately made joints, such as the joint between the cylinder and body, sparking plug and its mounting.

The maintenance of compression must not be confused with the keeping of a piston gas-tight in its cylinder. It has been found from experience that many people have a doubt as to what answer to make to the question: "How is a piston kept gas-tight, and how is compression maintained?" Pistons are made gas-tight by the fitting of piston rings or their equivalent, and compression is maintained as stated above. Oil does not maintain compression as so many are apt to think; it certainly does assist, to a slight degree, and the addition of more oil or a thicker oil may appear to raise the compression of the engine, but it will ultimately lose power from the overheating which will follow from over-lubrication.

Valve Operation

Practically all the valves on aero engines are mechanically operated. In some cases they are operated through the medium of an overhead camshaft; in others, by means of a tappet lifting up a tappet rod, which in turn depresses the valve. In between this tappet and tappet rod there is a small space of a few thousandths of an inch which is spoken of as "tappet clearance." This clearance is to allow of the expansion which occurs after the engine has become heated; if it were not there, after a little while the tappet and the tappet rod would have expanded to such an extent as to cause the valve to remain permanently open. It can easily be seen that this clearance, if altered to any large extent, will materially affect the lift and the length of time the valve is open, and consequently, in a very large degree the efficiency of the engine. It will require no very large amount of perception on the reader's part to grasp this fact, that tappet clearance is not for the purpose of retarding or advancing ignition, as its functions have been mis-described more than once by would-be aviators.

The Crankshaft

The next point to claim attention is the function of the crankshaft and the camshaft on rotary and stationary engines. On a stationary engine the chief duty that the crankshaft has to perform is to transmit the power given to it by the pistons to the propeller which it is driving. In the case of a rotary engine the crankshaft has many more functions to perform. The following list gives a rough idea of the many and varied functions of a rotary engine crankshaft.

1. A point of attachment for the engine to the 'plane.
2. A point for the pistons and the cylinders to revolve around.
3. A point of attachment for the carburettor.
4. The whole of the thrust from the propeller is absorbed by it.
5. It conveys oil to the working parts.
6. The crank pin provides a fixed point against which the force of the explosion can exert itself in revolving the engine.

It will be noticed that the crankshaft functions partly as a camshaft, inas-

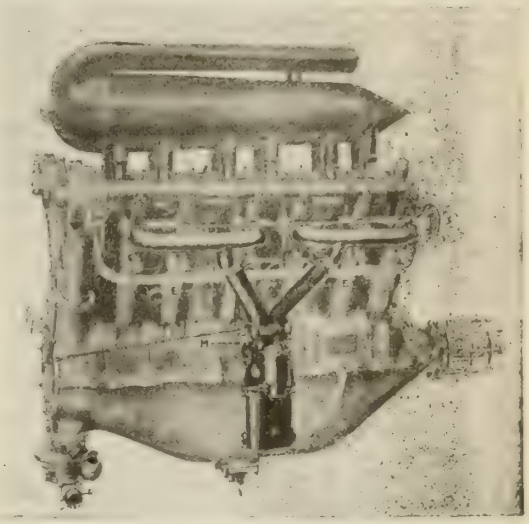


FIG. 5 220 H.P. RENAULT STATIONERY ENGINE.

much as the small end forms a pivot around which the campack rotates.

In studying rotary engines it is as well to bear in mind that the following sequence of build is general throughout all the different types. Starting from the front or propeller end of the engine, and passing to the rear, the build is as follows: The propeller boss is mounted on the nose piece which is attached to the front of the cam box, this in turn being held to the front of the crankcase on which the cylinders are mounted. Bolted to the rear of the crankcase is the thrust box, containing the thrust races, which absorb the thrust of the propeller or air-screw, as the case may be. Bearing this particular form of build

in mind will enable the reader to locate quickly the position of any part of the engine.

Centrifugal Force Effect

Centrifugal force plays an important part in a rotary engine. Any body which is influenced by this force tends to fly outwards in a radial direction. A very well-known illustration is the swinging around of a bucket half full of water, centrifugal force in this case throwing the water firmly against the base of the bucket and thus preventing the water spilling.

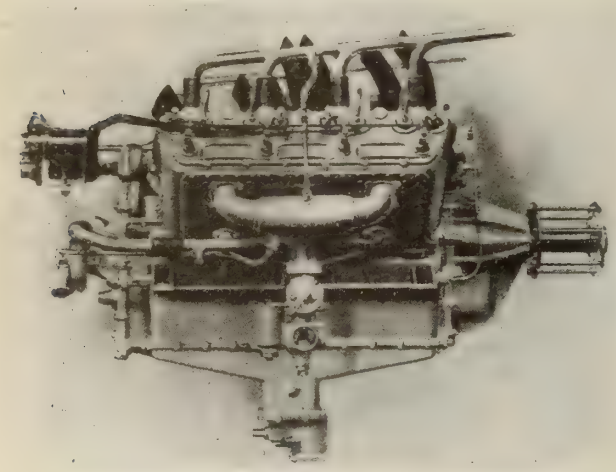


FIG. 6—150 H.P. SUNBEAM STATIONARY ENGINE.

When a truly formed and well-balanced flywheel rotates at a moderate speed no vibration is apparent. Should, however, any portion or section of the rim of this flywheel be heavier than the remaining portions of the wheel, the centrifugal force affecting it will produce an internal stress on this portion, and will ultimately cause that part of the wheel to break away if the wheel is only revolving at a moderate speed; also an acute vibration will be present, due to the unbalanced flywheel. This effect is very easily demonstrated by a simple little experiment with a disc which has three bolts attached in a symmetrical manner around the circumference; when this disc is rotating no vibration is present, but upon removing one of the bolts and throwing the disc out of balance, an acute vibration is shown. This is, of course, only a general illustration.

Take a particular case—the exhaust valve on the Le Rhone engine. When this engine is revolving at moderately slow speeds, the exhaust valve closes at forty degrees before top dead centre, while at the normal rate of revolution for this engine the exhaust closes at five degrees past top dead centre. The reason for this is that mechanically the valve closes at forty degrees before top dead centre, but owing to the influence of centrifugal force at high speeds the tappet rod is hurled outwards, thus depressing the exhaust valve and keeping it open until five degrees past top dead centre. Similarly in the case of the Monosonpape engine, the exhaust valve is made much heavier than mechanical strength demands of it, purely to counteract the influence of centrifugal force on the tappet rods. Thus by making the valve heavier, the necessity of having to fit balance weights to the tappet rod, as is done in the Gnome, is obviated.

From the particular examples given it is apparent that it is absolutely essential in replacing any part of an engine which is affected by centrifugal force, that the weight of the new part should be equal weight with the one it is replacing.

Order of Firing

The different orders of firing which prevail have a marked effect from a balance point of view on the various types of engines. The order of firing on an 8-cylinder vee type engine, say, is 15374826. On examination it will be seen that the cylinders are firing with an interval of time equivalent to a quarter of a revolution, therefore taking two successive cylinders, the impulses on crankcases from explosions occur almost simultaneously. A similar condition exists over the remaining six cylinders, giving a common point of intersection over the complete order of firing. This common point of intersection of the different impulses is approximately over the centre of gravity of the engine. By having the force of explosion localized at the centre of gravity, a minimum vibration is produced. This order of firing gives a maximum balance with a minimum of vibration. In contrast with the preceding example take an engine of exactly similar type, but with a wholly different order of firing, say 12347856, and with the cylinders numbered as shown on the sketch. When this engine is running, there is a tendency to rock longitudinally in the plane, that is, there is a very great chance of an acute vibration being present.

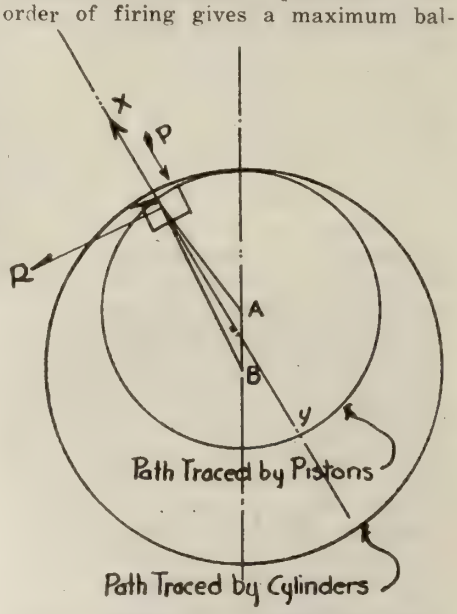


FIG. 7—DIAGRAM ILLUSTRATING THE WORKING PRINCIPLES OF A ROTARY ENGINE.

All rotary engines fire in one specific order, the cylinders being caused to fire alternately, a seven cylinder engine firing in the order 1, 3, 5, 7, 2, 4, 6. Plainly, it would be impossible to fire these cylinders consecutively, or to have an even number, instead of always an odd number of cylinders. If the question were asked, "What is the order of firing of a rotary engine, and why?" the answer would be that the order of firing is 1, 3, 5, 7, 2, 4, 6 to conform to the four-stroke principle, giving a maximum balance and an evenly distributed turning moment. If each cylinder had to be fired in turn, since it requires two revolutions of the engine to give four strokes—one revolution would be all power, and the next revolution would be all exhaust; speed would have to be maintained purely by the excess of energy which the machine had received on the power stroke. Thus there would be a very erratic turning moment with this order of firing.

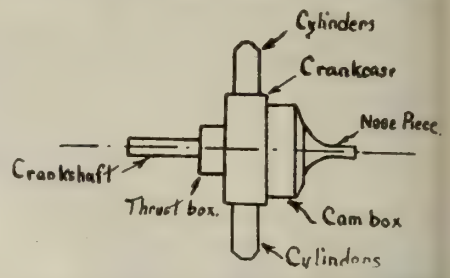


FIG. 8—DIAGRAM ILLUSTRATING SEQUENCE OF BUILD OF ROTARY ENGINES.

Lubrication

The lubrication of engines is accomplished by force and splash. By splash lubrication is meant that the oil is thrown up in the form of a spray from the connecting rod big ends. These ends are sometimes fitted with a scoop which dips into a trough of oil at each stroke, thus supplying the necessary splash. In other cases, it is the excess of oil oozing from the crank pin bearings which is picked up by the whirling crankshaft and thrown up into the interior of the cylinder, oiling cylinder, piston and piston rings.

Forced lubrication is effected by means of oil circulating pumps, divided into two classes, rotary or gear type, and plunger and piston type. The general principle of each of these types of pumps is the same, but they are modified to a certain extent to meet the varying designs of engines. The most elementary form, and one which is very largely used, is shown in the illustration: it consists of two small gears which engage with one another and run in a close fitting casing. Oil enters midway at one side of the casing and leaves similarly at the other side of the pump. The oil is transmitted by the spaces in between the teeth, which form, as it were, small pockets for the oil. Oil is carried around both sides of the casing as shown by arrows, the teeth at the

point of engagement at the other side of the casing forming an oil lock.

It would be well while dealing with lubricating systems, to say a word or two regarding the different lubricants

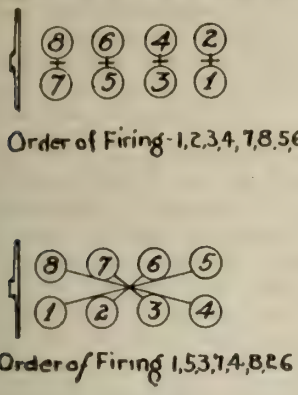


FIG. 8A.

used. On a rotary engine, in every case, a vegetable oil, such as castor oil, or castrol, is used. The reasons for this are that a vegetable oil does not easily mix with petrol; also, it has a higher flash point and a higher viscosity, or in simpler language it is more sluggish in action. There is one point to be guarded against in the use of a vegetable oil, especially in the cold months of the year, Castor oil when allowed to stand for any length of time on a cold day will deposit a sediment at the bottom of the vessel in which it is held, and the oil will become very much thicker. To thin castor oil so that it would again become serviceable, it would be necessary to heat the oil and at the same time stir it well to get the sediment back again into solution. If the sediment were allowed to go into the engine, it would have a very detrimental effect on the bearings. Another way of rectifying this trouble is to mix 15 per cent. methylated spirits with the castor oil. Mineral oil is used on stationary engines only.

Cooling Systems

The cylinder is kept at a practicable working temperature, i.e., about 185 degrees F. by continually circulating water around it, the cylinders being water jacketed. It will be easy to follow that, with the continual exploding of the charges in the cylinder, heat would be accumulating, and unless some means were adopted for keeping down this accumulation of heat, the cylinder would quickly become red hot, lubrication of the piston would be impossible and the motor would soon stop work. Water is the best medium for extracting this surplus heat from the cylinder walls. Circulation is set up in the water system by means of a rotary pump driven from the crankshaft. This pump draws water from a radiator, usually built up of a large number of copper tubes, so as to offer the maximum cooling surface to the air. From there it is forced into the water jackets around the cylinders, combustion head and valve ports, and thence to the radiator again to be cooled.

It is then of great importance that particular attention should be paid to this water cooling system as it is here that most trouble is experienced in the running of petrol engines in very cold weather, especially so in the case of an aeroplane motor.

The reason for so great an amount of trouble being caused by the freezing up of a petrol engine is very simple. It is a well known fact that water in a frozen state occupies more space than it does in its liquid form. Now, as we are unable to dispense with quite a considerable length of exposed water piping in an engine of this nature, it will clearly be seen that the pipes which admit and receive the water to and from the cylinders will freeze up solid first. The water remaining in the cylinder will then be pent up with no means of escape, and as it freezes and of necessity requires more space, the only outlet for it is to burst the weakest spot in its prison, and this is usually the water jacket. This mostly happens when the engine is stopped and stands in a low temperature for any length of time. As soon as the engine is re-started, the heat generated by the cylinders soon melts the ice in the water jackets and water will soon begin to pour from the bursts in the sides of the water jackets. To run an engine in this condition, of course, would be highly dangerous.

The symptoms of an engine freezing up whilst in the air appear at first sight almost contradictory. Volumes of steam and hot water will be seen spouting from the vent hole in the radiator cap, as though the engine were overheating, as, in reality, it is. The reason for this is as follows: The water usually occupying the lower tank of the radiator and water pipe connecting same to the water pump is, or should be, cold, after passing through the cooling tubes of the radiator. This water therefore stands in danger of freezing up, even while the engine is running, and as it does so, it effectually blocks up all circulation in the water system. The water then remaining in the cylinder water jackets must remain

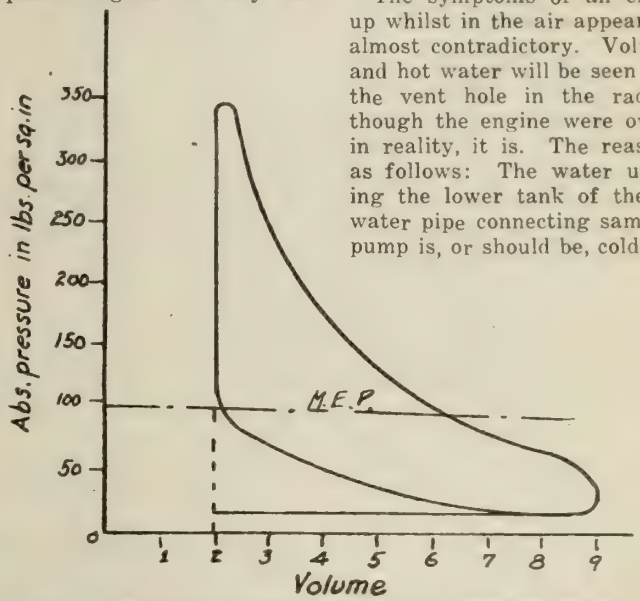


FIG. 11—TYPICAL DIAGRAM FROM A FOUR-STROKE ENGINE.

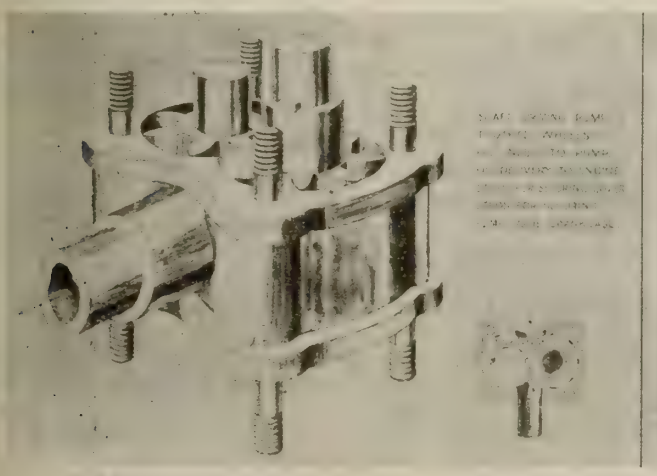


FIG. 9—ROTARY OR GEAR TYPE PUMPS.

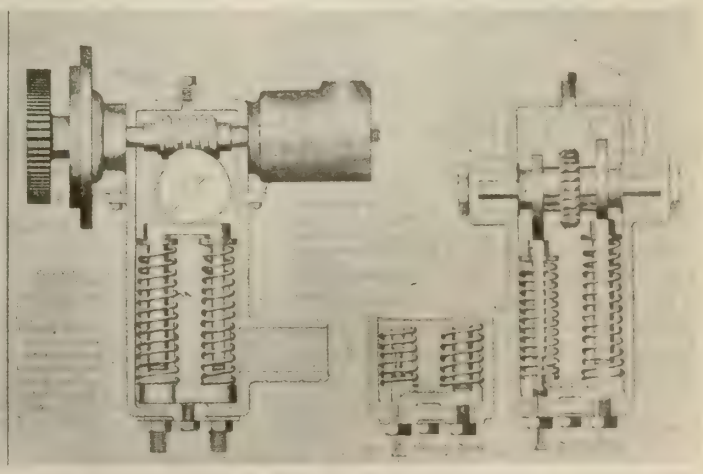
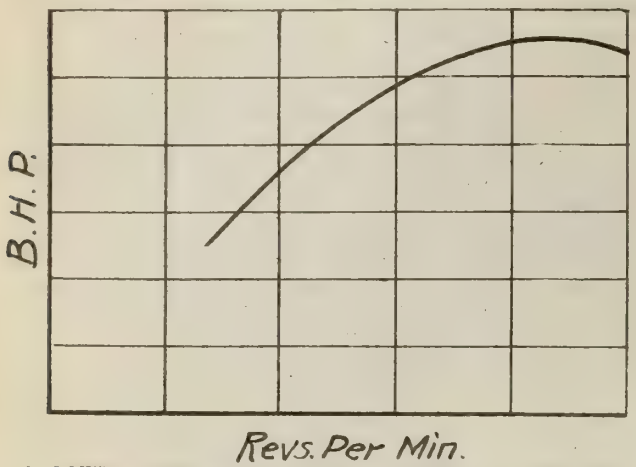


FIG. 10 PLUNGER TYPE PUMP.

there, and as it has no means of being cooled, quickly boils over, giving off the steam first noticed. The engine in this condition will soon freeze up if allowed to run.

To overcome these difficulties then, the cooling fins of the radiator should be covered with a sheet of asbestos or other material so as to minimize as much as possible the efficiency of the radiator as a cooling medium. All the exposed pipes leading from the radiator to water pump, pump to cylinders, and cylinders to radiator again should be bound with asbestos cord and wrapped over this with some cold resisting material such as felting, the whole being bound securely with wire to prevent same from working loose whilst in use. When engines are fitted with a water heated induction pipe, as in the case of the "Curtiss," this should also be wrapped, as the rush of the mixture through the pipe has a cooling effect and the water jacket stands in danger of freezing up.



12- POWER SPEED GRAPH FROM A NORMAL GAS ENGINE.

Experience has shown, however, that in spite of these precautions being taken, cases of frozen water systems are still numerous, and it is advisable to substitute some non-freezing solution as a cooling medium in place of water. For this purpose mixtures of glycerine and water and alcohol and water are used, and sometimes a combination of the two, as for example, sixty per cent. water, thirty per cent. alcohol, and ten per cent. glycerine, which freezes at 10 degrees below zero.

The advantage of the non-evaporating qualities of glycerine is greatly nullified by its being sticky in use, and its setting up a corrosive action in brass and copper. Wood or denatured alcohol and water, therefore, is the most suitable mixture for general purposes, its only disadvantage being that it evaporates quickly. The mixture must therefore be made up to the proper density regularly by adding a certain amount of fresh spirit. The following figures show the freezing point of solutions containing different percentages of alcohol, 20 per cent. solution freezes at 15 degrees above zero, 30 per cent. solution freezes at 8 degrees below zero, 50 per cent. solution freezes at 15 degrees below zero.

A comparison of air and water cooled engines shows that the advantage of a water-cooled engine is longer life and a higher thermal efficiency, due to a smaller loss of work through overheating. The disadvantages attached to a water-cooled engine from an aeronautical point of view are that it is much heavier and also liable to freezing troubles as already mentioned.

As regards the advantages of rotary over stationary engines, the chief advantage of the former is that its weight per horsepower is much less. It is easier to dismantle a rotary engine and it is more accessible. The disadvantages of the rotary engine are that it is a very heavy consumer of fuel and not as reliable as the stationary engine.

"Timing"

Assuming that all engines work on a common basis, that is, the four-stroke or Otto cycle principle, one method of timing may be applied to every engine:

1. Set any piston in exhaust closing position.
2. Set exhaust tappet clearance for that cylinder.
3. Turn the camshaft in the direction of its rotation until the particular exhaust valve for the cylinder being timed is in the closed position.
4. Mesh the timing gears.
5. Adjust the remaining tappet clearances.

Similarly the ignition timing of any engine:

1. Set any piston in ignition position.
2. Mesh the magneto driving gear with the platinum points of the contact breaker just breaking.
3. Wire the distributor terminals to the sparking plugs in the correct order of firing.

Engine Testing

In testing aero engines only the brake horse power (B.H.P.) is considered. It is possible with the aid of very delicate instruments to obtain an indicator diagram which enables us to obtain the indicated horse power (I.H.P.) of the engine. Special optical diaphragm indicators are occasionally employed, however, and with reasonable care fairly accurate diagrams can be obtained. It is, however, an instrument more suitable for the laboratory than for an engineering workshop test room. It is necessary when taking these diagrams to obtain records of several successive cycles as they vary in shape and size so that an average may be taken in determining the mean effective pressure. Once having obtained an indicator diagram it is an easy matter to work out the indicated horse power of an engine. From an inspection of the accompanying diagram it will be seen that it is a simple matter to obtain the mean height of the diagram, which, of course, will be our mean effective pressure. Knowing this we can proceed with the following formula and work out the I.H.P.

The work done per stroke is equal to the area of the diagram, i.e.:

Stroke x M.E.P. x area of piston = work done per stroke.

S x M.E.P. x A = W.

S will be measured in feet.

M.E.P. will be measured in lbs. per square inch.

A will be measured in square inches.

$$W \times \frac{R.P.M.}{2} \times \text{No. of cylinders} =$$

total work done per min.

One horse power unit is equal to 33,000 ft. lbs. per min.

$$\therefore H.P. = \frac{W \times R.P.M. \times N}{2 \times 33000}$$

Brake horse power (B.H.P.) or power at the flywheel, or shaft horse power as it is variously termed, is found by means of a brake dynamometer, of which there are many types. B.H.P. is, of course, less than I.H.P., the difference between these two being the horse power absorbed by the engine internally. The ratio of the B.H.P. to the I.H.P. is known as the mechanical efficiency of the engine.

$$\text{Mechanical efficiency} = \frac{B.H.P.}{I.H.P.}$$

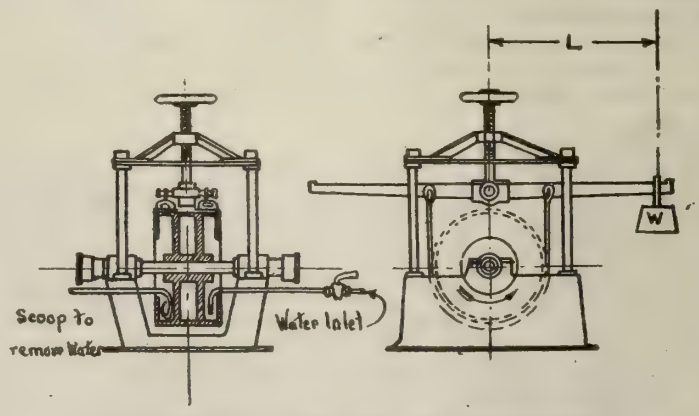


FIG. 13—BRAKE PULLEY FOR GAS ENGINE TESTS.

(Continued on page 52)

Rolling Concrete Reinforcement from Old Rails

Old Rails Make the Best Steel For Concrete Reinforcing When Re-rolled Into the Proper Shapes—Rails Are Slit Into Three Pieces and the Head Used For Reinforcing Steel

By W. S. STANDIFORD

THE use of concrete as a building material has created an extensive demand for steel reinforcing bars, quite a number of mills being engaged in their manufacture as it is very lucrative, there being a constant demand for the bars. In these days of strenuous competition the use of waste materials are being largely used in different lines of manufactures, old rails playing a most important part in the building of skyscrapers, etc. Some mills make their reinforcing bars out of bessemer steel, low carbon metals being made and marketed. It has been found out by experience that the best steel to make them out of is a metal having a high elastic limit and tensile strength; in fact, the most important factor in concrete reinforcement is the tensile strength and elastic limit of the reinforcing bar. Other things being equal the steel having the highest elastic limit or yield point will be the most satisfactory for reinforcement.

When under strain as soon as the elastic limit of any reinforcing bar is reached the metal stretches, rapidly decreasing in section, drawing loose from the concrete and destroying the monolithic bond existing before this point is reached. Therefore the safety of the entire construction is in direct proportion to the elastic limit of the steel used. Compared to the average run of concrete reinforcing metal on the market the bars made from old steel rails are far superior; the elastic limit of the old rail steel is 50,000 to 60,000 pounds per square inch in either twisted or plain bars as compared to an elastic limit of

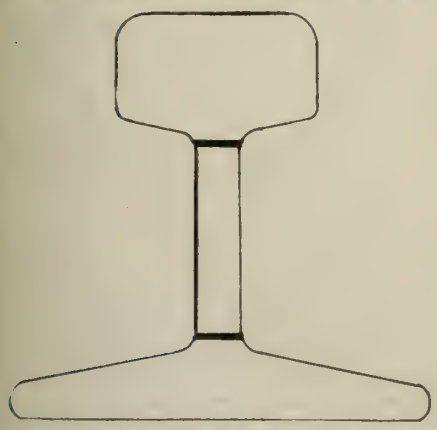


FIG. 1—SECTION OF OLD RAIL SHOWING WHERE THE HEAD AND FLANGE ARE CUT.

25,000 to 30,000 pounds for the ordinary bars. From the foregoing it will readily be seen that reinforcing bars made from old steel rails with its 80,000 pounds minimum tensile strength is far superior for all kinds of concrete work.

In these days of industrial activity, railroad embargoes and slow deliveries of raw materials, the use of old steel rails to make concrete reinforcing bars will often enable mills to fill orders quickly for material for concrete construction that otherwise would have to be delayed until steel billets could be obtained. The size of the rails used to make these bars weighs 100 pounds per yard, and the head only is rolled, the flange and the web generally being used to make small, flat steel bars, and also angles for bedsteads, etc. The rails after 25 years' use on the railroad ties and discarded as useless are sold as scrap by the railroads and can be bought cheaply. On the surface of the head of the rail will be found an occasional sliver, which must be cut off with a cold chisel, as it will not weld in the rerolling process which the metal receives.

The head is then ready to be separated from the web; this may be done by cutting the metal lengthwise in shears, or cutting the steel while it is hot, in slitting rolls. the head being cut at the fillet. see Fig. I; the latter also shows where the web and flange are separated, it being customary in mills manufacturing bars from this product to cut the flange off at the same time so as to save rehandling as much as possible and give three sets of bars for making different sections; the rail heads are then cut up into billets of the desired lengths to make the required lengths of bars as desired by the customer, put into a heating furnace and evenly heated. They are then ready for rolling in the guide roughing rolls, shown in Fig. 2. As these rolls are used for breaking down billets of various sizes to make different shaped steel sections as may be demanded by the consumer, box and edging passes are put in so as to take a 4 x 4 billet and reduce it rapidly, which box and edging grooves usually do. On account of the heavy draft allowed by this type of passes, the use of a 4 x 4 inch billet also allows of longer finished bars delivered by the rolls. That is the reason why passes of this size are put into guide roughing rolls, even if they are only used occasionally for orders where there is a departure from the concrete bars orders.

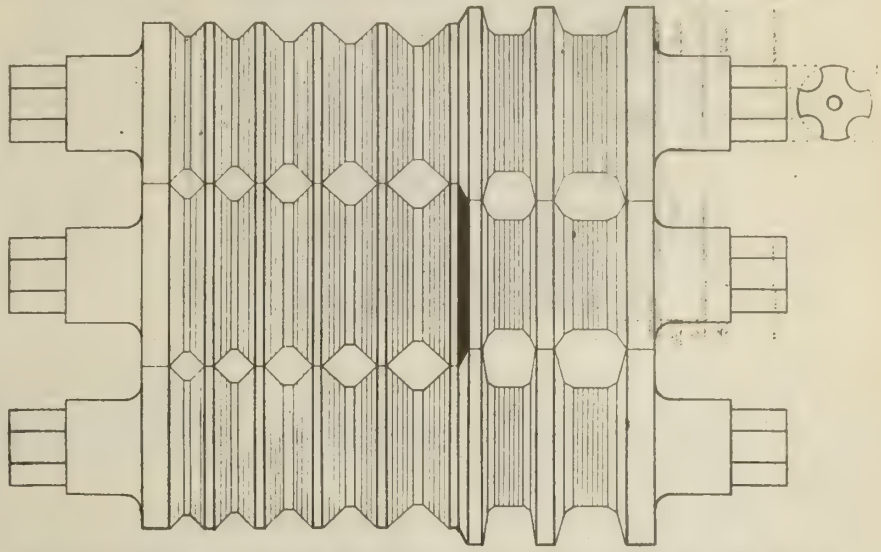


FIG. 2 PASSES IN ROUGHING ROLLS AND GENERAL LAYOUT OF THE ROLLS

The box and edging passes are not used in reducing the rail head billet, the latter being put by the rougher into one of the angle passes in the rolls. The 100 pounds per yard rail head billet measures about 2½ inches wide across the top; the thickness at the widest part in the centre of the head at the cut fillet averages 1⅝ inches; the roughing roll angle passes have angles of 97 deg. with fillets in the bottoms, ranging from ⅜ of an inch wide down to ⅛ of an inch. In the photograph the full number of angle grooves are not shown as the pictures would lose in clearness. The rail head billet is inserted into a suitable angle pass in an upright position, guides being used to prevent it from turning over in the pass.

The object of placing the bar in an upright position being to force the bar to assume the shape of the pass so as to make it enter the other grooves easier as the bar has a rectangular shape (which is an awkward section to enter into angle grooves, as there is a great liability of it turning over unless the guides are kept sufficiently tight) it is necessary to repeat the upright inser-

tions in three different sized grooves before it can be made to assume the shape of the angle passes in the rolls.

This is due to the extreme hardness of the metal in the old rails, thus making light drafts necessary at the start of the rolling. Most old rails steel, after 25 years in the services of the railroads, have changed their structure from a fibrous to a crystalline nature; the rerolling it receives restores the fibrous characteristic, putting it in normal condition again. After the bars go through three passes in an upright position they then have the shape of the angle passes and this allows the rougher to turn the bars over on all sides and thus work the parts that lie near the joints of the rolls. All angle grooves mostly work the bars on the bottom of the fillets, and the object of having fillets in these passes is to work the metal on the corners of the bars as much as possible, there being no work done on these parts of the bars that lie near the joints between the rolls. In both the roughing and strand sets of rolls the use of fillets in the bottoms of the grooves compresses the metal on the corners of the bars.

When the bars assume the shape of the angle passes in the roughing rolls they are then turned over on their sides and put through each succeeding smaller pass and are then ready for the strand rolls illustrated in Fig. 3. These rolls, made out of chilled iron, have their passes more closed in, their angles being 92 degrees; the fillets also are smaller. The small fillets are put in so as to make sharper corners on the finished square, as if the fillets are too large in the strand roll grooves the bar will not form sharp corners on the diamond to make a square having sharp corners. Diamond grooves are only capable of sustaining a limited amount of draft, and when the fillet is too large on the strand bar it will not fill the pass area out but makes rounded corners on the top and bottom of the diamond pass bars.

The steel bar is now transferred from the roughing rolls to the strand ones and pushed through them until a size of 1¼ inches is obtained. The bar is run through the first pass twice, it being turned over at a right angle to its previous position before it is run through the last time. The object of this is to have the four corners of the strand bar possess the same thickness in order to make a perfect finished square. If the strand bar had two of its corners larger in diameter than the other two, thus making a lopsided bar, the extra metal would squeeze out in the diamond pass at the joints of the rolls, thus making a heavy fin which would double over and show a lapping mark on the finished square.

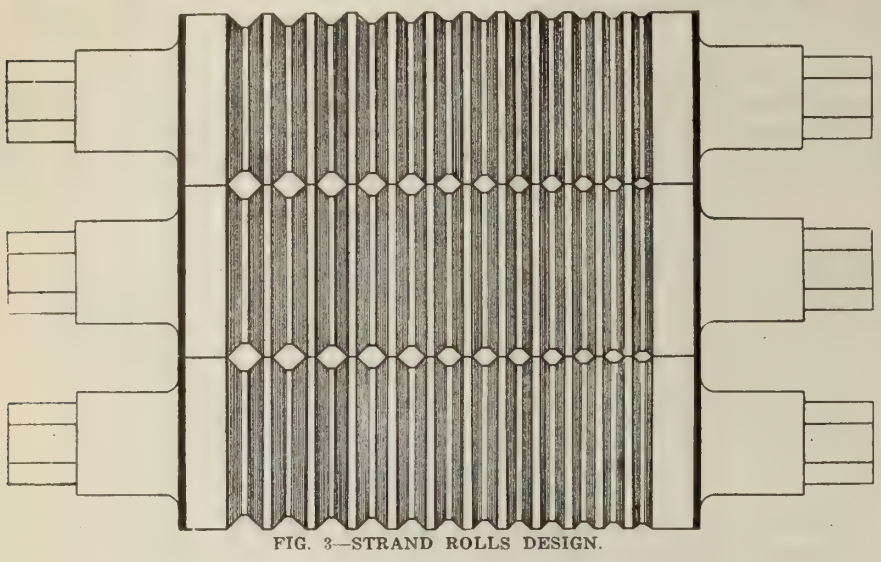


FIG. 3—STRAND ROLLS DESIGN.

There is also danger of the collars between the diamond passes breaking out when any pass is overfilled and the metal extends between the collars of the revolving rolls. The writer has seen many roll passes rendered useless by incompetent roller's careless setting and handling of the rolls. The steel strand bar being rolled to size is now ready for the diamond rolls; these rolls, unlike the roughing and strand rolls, are a two-high, as it is only necessary to run the strand bars once through the diamond pass. Diamond groove angles vary from 97 degrees to 110 degrees; the variations of different degrees of arcs between the above mentioned angles are used to suit the individual requirements of the mill, such as engine power, methods of heating, the temperature at which the diamond bars are run through the finishing squares and other local factors, all of which have a most important bearing on the tonnage output of the mill.

The grooves most generally used and put into the diamond rolls by the roll turner are as follows: ¼, ⅜, ½, 9-16, ⅝, 11-16, ¾, ⅞, 1 and 1⅛ inches. In some mills, due to the rolls not having a long body length, it is customary to have the smaller sized grooves put into a separate set of rolls, but it is best in all cases where possible to have as many different sizes of passes as can be gotten into one set of rolls. This reduces the changing of rolls to a minimum and conduces to a greater output. The greatest losses of time in the average rolling mill are due to the changing of rolls frequently by having longer rolls with numerous housings containing rolls to make different sections; any set of rolls can be coupled up and gotten into action quickly by the roller. The angles of the diamond passes to make the square for manufacturing the reinforced concrete bars is 104 degrees. The total width of the diamond bar to make a one inch square is 1⅝ inches, the thickness being 1¼ inches measured over the top and bottom corners of the bar. The strand bar goes once through the diamond pass; the size of the diamond bar as given above is subject to slight variations in size by the roller, who raises or lowers the rolls to suit the working of the metal in the rolls, as each lot of old rails made by different makers varies in its working in the rolls. What the roller mostly pays attention to, is to see that the passes are filled out to their utmost area without overfilling; by doing this the bars have as sharp edges in the pass at the centre of the bars as it is possible to get them.

The action of the diamond roll groove on the strand bar is very uniform, the strand bar being inserted with two of its square sides facing the top and bottom of the diamond pass instead of the fillet ends of the strand bar facing downwards towards the sharp edges of the centres of the pass. Of course the strand bar could be inserted in the above-mentioned position and would make a good appearing diamond bar, but it is better to place the strand bar with its side facing upwards instead of a fillet facing towards the bottom of the pass for the following reason: as the bar has been rolled in the strand passes mostly on the angle, it is better, in order to make the metal more fibrous in nature, to change the angle at which the steel is reduced, hence the advisability of having the strand bar enter the diamond groove in an upright position. It is an axiom of good roll designing that frequent changing of the rolling position of iron and steel bars in passes makes the metal more fibrous in nature, and the fibrous condition of these metals is what enables them to withstand strains and rough usage.

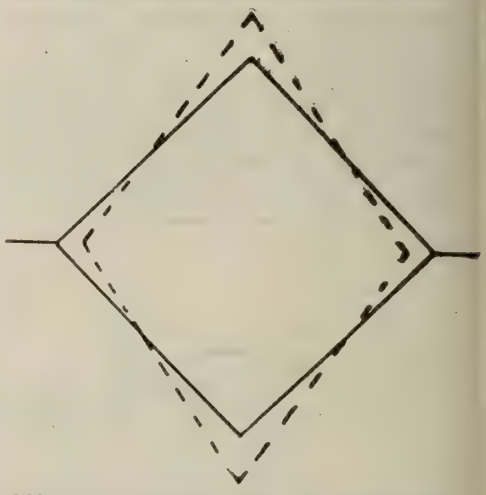


FIG. 4—An enlarged square pass showing the position of a bar from the diamond rolls going into the square pass of rolls illustrated in Fig. 5. The diamond rolls being practically the same design as the squares, the only difference being in the number of degrees contained in the angles of passes. The violent change in section from a diamond to a square makes the metal fibrous in texture.

This is what every manufacturer of iron and steel products strives for as it is realized by them that a high-grade product generally brings repeat orders, it being the latter that counts in these days of strenuous competition. In the diamond groove the metal of the strand bar, as it is inserted in an upright position, meets the slanting sides of the pass and the flow of the metal is forced toward the centre of the pass. This causes an entirely different structural change of the molecules of the metal, they being rearranged in an entirely different manner to suit the shape of the pass.

As the bar is now near the finishing pass in the square rolls, its elastic limit and tensile strength are very nearly up to the maximum limits of the metal, and the finishing touches are given it in the square rolls illustrated in Fig. 5; these rolls have the grooves cut into them on an angle of 90 degrees. This is done so that the finished bars will leave the rolls easily without any shearing of the metal, which otherwise would be the case if the grooves were put into these rolls with the flat side of the bar parallel to the rolls axis; the groove being absolutely straight on sides in a case of this kind. the straight sides of the pass would rub against the sides of the bar, thus causing the metal to cling to it and shear off portions of the bar, with a strong possibility of the metal jamming in the rolls, it depending upon the condition of the bar's temperature.

By putting the square grooves in on an angle all chances of shearing are avoided, the rolls working very nicely and making an accurate sized bar if the roll turning and roll setting have been carefully done. It is a fact that no matter how accurately the passes have been put out into the rolls by the roll turner, if the roller is incompetent or careless, he can, by his handling of the rolls, make a faulty sized and bad looking bar; the blame for which he naturally puts on the roll turner. The latter, if he understands his business, then goes out into the mill and set the rolls so that they will make good bars; this wastes the roll turner's time which should be spent in turning rolls and not in the mill doing other people's work. Faulty bars are made by not having the strand pass filled out properly, unequal sized corners on the strand bar, and the diamond pass bar not containing enough metal to make a good square.

The square passes in the rolls being crossed; that is, the edges of the passes are not in line with one another, and the temperature at which the diamond and square bars are rolled also has a most important influence in the making of a good finished product; for instance, if the diamond bar is inserted into the finishing square pass at too high a temperature, the metal, being in a very soft condition, will be reduced too rapidly and overfill the pass, spreading out on the collars; if, on the other hand, the diamond bar is too cold it will resist the rolling pressure so strongly that it will not fill out the pass to its fullest area. Should the bar be unevenly heated by the heater and contain some cold spots on it the bars will be uneven in size, some parts being larger in diameter than others.

This is due to the fact that when the cold spots go through the rolls the latter springs more than it would when rolling metal that has been evenly heated; if there are a number of cold spots on the bar the finished product will be wavy in appearance and size, thus it will be seen the most important part that even heating plays in the manufacture of steel and iron. In the square rolls illustrated in Fig. 5, the collars of the rolls are shown as touching one another in actual practice; theh turning of the collars of the rolls are so arranged that the two end collars are 1-64 of an inch larger in diameter than the others.

This allows a small amount of light to be seen between the middle collars when the end ones are touching one another. The object of this is to prevent the narrow collars between the passes from breaking out (as chilled iron is a very brittle material) as they slam down on each other after the bar has passed through the rolls, the broad end collars taking the shock of the spring.

When a bar first enters the rolls the latter springs upwards; this is due, not to any bending of the rolls, as the latter is a negligible factor in short guide rolls, but it is due to the wear on the threads of the housing screws, the latter taking to a large extent the shock of each bar as it enters a pass. The spring between a pair of rolls is 1-32 of an inch, which is allowed for in the turning of the rolls; as the end collars are made 1-64 of an inch larger in diameter than the others it may be thought that the end passes next to the collars would be lop-sided, thus having one side of the square longer than the other.

In order to show that this view is erroneous, the methods of turning will be described. The roll is first faced off level, then the passes are cut in with a tool having a 90-degree angle to the correct depth, a divider being used to make sure that each side of the square is equal in length; after all of the passes are finished a facing-off tool is put in the lathe, it being of such a length and placed so that the ends of the tool projects ¼ of an inch over and on to the end colars. A small shaving of metal is then taken off the collars, thus leaving them all of the same diameter with the exception that the portions of the end collars that extend nearest the necks are larger in diameter.

The 1-64 of an inch of light between the middle collars of the rolls, added to the 1-32 of an inch of light caused by the springing of the rolls, makes 3-64 of an inch open space, when a bar is passing through. Added to this amount of light is also the shrinkage size, which makes the light space between the collars nearly 1-16 of an inch, this amount being the distance between the collars of the rolls for a 1 inch bar. It being necessary in all cases to have the hot size of a finished square larger in diameter than when it is cold, as it cools to the required dimensions, now it is evident that as the finishing rolls are apart, when a bar is passing through that the two corners of the square at the joints of the rolls would be blunt and rounded in shape, if an ordinary strand bar was inserted directly into the square pass. Hence it is found advisable, in practice, to use a diamond-shaped bar, and put the latter into the square groove in a vertical position. This places the sharp corners of the diamond bar in the square groove, opposite the joints of the rolls. In Fig. 4 the position that the diamond bar occupies in the square pass is represented in dotted outline. It will be observed that the diamond bar does not quite extend to the corners of the square pass, and that it also is actually longer than the distance between the centre corners of the square in the top and bottom rolls.

The reason for this is the necessity for having a sufficient amount of draft on the diamond bar to just fill out the sectional area of the square pass so as to make a good bar. As the corners on the diamond bar that faces the joints of the square rolls are already made, the change of angle from a diamond to a square keeps its corners sharp, the result being a perfect square is made if the roller has used judgment in handling

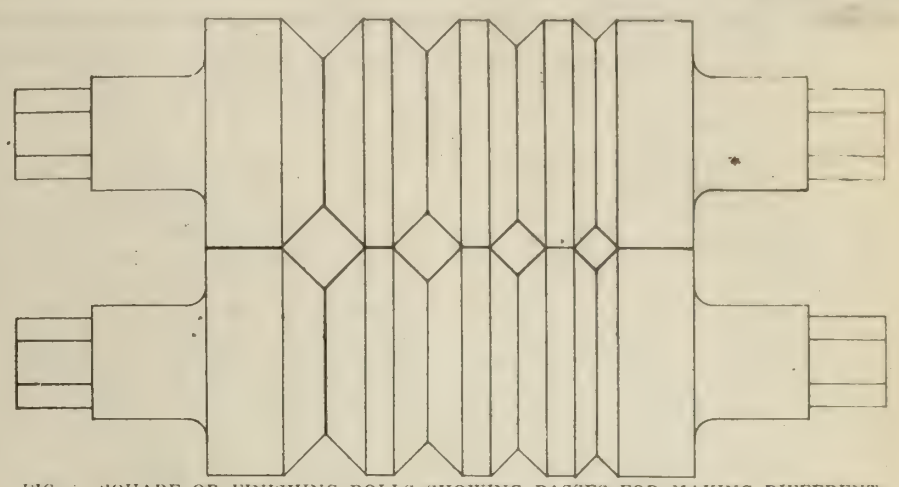


FIG. 5 SQUARE OR FINISHING ROLLS SHOWING PASSES FOR MAKING DIFFERENT SIZES OF CONCRETE REINFORCING BARS.

Continued on page 65

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

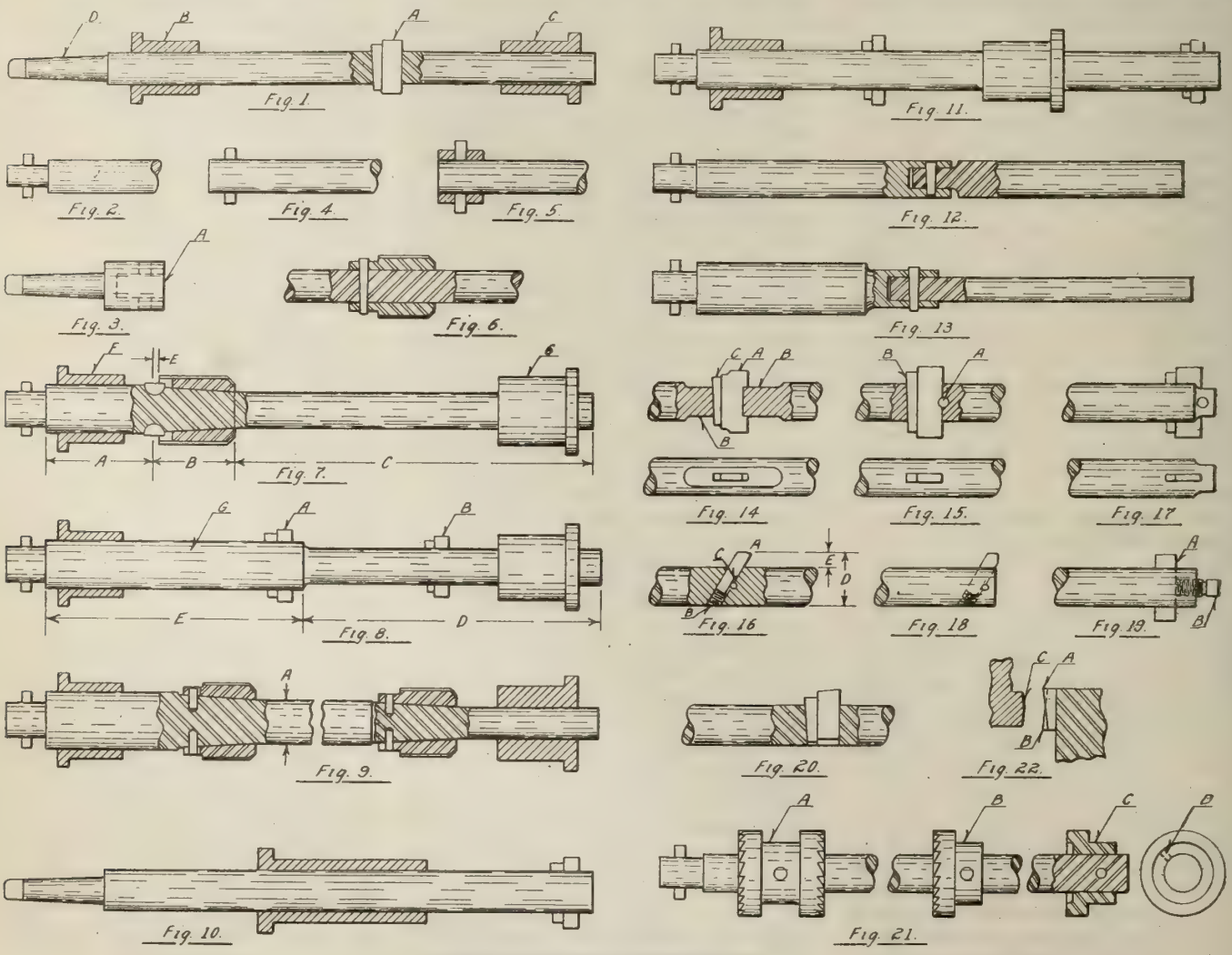
BORING BARS AND BORING CUTTERS

By P. WASHINGTON

A BORING bar must have a good running fit in the bushings, it must be as rigid and heavy as possible, straight and ground concentric. When the bar has been turned and once ground to the correct size it should never be put in a lathe and filed, or emery cloth used on it. Boring bars are made from machine steel and are not hardened. Small bars are sometimes made from tool steel and hardened, in order to give them additional stiffness. Shanks for reamers, and facing bars, should be made in the same way as boring bars, but, if possible, should even be stiffer.

The most common type of boring bar is shown in Fig. 1, the cutter A being located at about the middle of the bar, and the bar being guided at both ends by bushings B and C. The bar is provided with a taper shank at D, fitting the spindle of machine or a collet connected with a knuckle joint. It is common practice to turn down the end of the bar, as shown in Fig. 2, to fit a knuckle joint or a collet shown in Fig. 3. Sometimes the bar can be left full size, as shown in Fig. 4, and sometimes the end is even made larger than the bar, by forcing on a collar, as shown in Fig. 5, in order that the end may fit the driving collet. A key is passed through the end of the bar for driving it; this key fits in the slot A in the collet shown in Fig. 3.

The bar shown in Fig. 1 can also be used for facing purposes, the cutter A being taken out, and a facing cutter inserted. The same bar can also be used for a special shell reamer, when this has a straight hole, the reamer being held to the bar by a taper pin, as shown in Fig. 6. Standard shell reamers have a taper hole, and for these the bar must be turned with a taper part, as shown in Fig. 7, where the part A is turned up to the largest size possible (generally 1-32 or 1-16 inch under the diameter of the reamer); part B being turned to fit the taper hole in the shell reamer, is left long enough to permit the reamer



DIFFERENT KINDS OF BORING BARS.

being pressed up tightly without touching the shoulder D. As a rule, the taper part is so dimensioned that 1-8 inch will be left at E, between the shoulder of the bar and the back of the shell reamer, when this is forced up as far as possible. The reamer is driven by keys or pins entering in a slot cut across the end of the reamer. The part C of the bar is turned down to some standard size, just below the size of the small end of the taper hole in the reamer. The bushings F and G may be made with the same outside diameter, fitting the same size lining bushings in the jig, their inside bearings beng made to fit the large and small diameter of the bar.

A boring bar used for boring out two holes of different size may be made as shown in Fig. 8; A and B are the cutters for the two holes, and part of the bar C is turned down for a length, D, to suit the small hole. The part E can then be made of as large diameter as permissible for boring out the hole for which tool A is used. By making the bar in this way, a more rigid construction is possible than if the part E were turned down to the smaller diameter required by the hole bored by cutter B There may be more than two holes of different sizes in succession, and then the bars may have a greater number of steps; if there is but a slight difference in the sizes of the holes to be bored out, it hardly pays to turn down steps on the bar. The stepped bar may also be used for facing bars. While these small matters may be unimportant and elementary, they must be taken into consideration when designing a set of expensive tools for boring jigs, which are to be in constant use where accuracy is to be maintained.

Reamer bars for reaming out two or more holes simultaneously may be made as shown in Fig. 9, providing the diameter A is large enough for turning the taper portion for another shell reamer of smaller size. Should the diameter be too small to permit this, an extension can be provided, or a separate bar used for the smaller reamer. The principle of stepped bars can be applied also where the cutters are placed, as illustrated in Fig. 10. The principal features of this bar are that the cutting tool is always located at the end of the bar, opposite to where it is driven, and that there is but one bushing or guiding. This bushing should be as long as possible to give a good bearing and prevent the bar from wabbling. Sometimes, as illustrated in Fig. 11, the jig is made with two bearings, which, however, are on the same side of the cutter, and a comparatively short distance apart.

Sometimes a bar must be made in two parts. The reason may be that one solid bar would be too long to permit of its being pushed into the jig from one side. Another reason may be that the cutting tools are too large to pass through some intermediate hole. The two parts of the bar may be connected with a taper pin, as shown in Fig. 12, the end of bar A being a sliding or driving fit in the hole in section B. This bar should be ground after the two parts are assembled, so that they will run exactly true with each other. A stepped bar made up of two sections is shown in Fig. 13

Cutters for Boring Bars

The cutters used in boring bars vary widely. The cutter A, Fig. 14, is commonly used. It cuts with both ends, and is centred by the two flats B, milled or filed on the bar; a slot is provided in the cutter which fits these flats of the bar. After the cutter has been put in place, it is tightened by the Key C, and is turned to the correct diameter required and then hardened. A more modern arrangement is shown in Fig. 15. The cutter here is a plain rectangular piece of steel, cutting with both ends. It is centred by the pin A, which is driven into a hole drilled so that one-half of it passes through the slot in the centre. As in the former case, the cutter is turned down to the right diameter when in place. It is tightened down by the key B. This way of locating the cutter centrally has proven very satisfactory.

Facing cutters may be located and held in place in the same way. They are longer than boring cutters, being intended to finish a boss or seat around a hole, but otherwise they are made to about the same dimensions.

Single-ended boring cutters, as shown in Fig. 16, are used to a great extent, and it is claimed that they give a more perfect hole. The illustration shows a common way of securing the tool; the cutter A, which is made of drill rod or other round tool steel stock, fits a hole bored at an angle of sixty degrees with the axis of the bar, and is adjusted by a headless setscrew B. When adjusted, the cutter is held rigidly in place by the pin C provided on one side with a flat tapering portion, which fits against the flatted side of the cutter, as shown in Fig. 16. This cutter is very easily set by taking a measurement D with a micrometer. Subtract from the dimension D the diameter of the bar, thereby obtaining dimension E. Add E to D, thereby obtaining the diameter of the hole which will be cut. The screw may have to be adjusted a few times to obtain the desired result. The two kinds of cutters referred to may also be used on the ends of the bars, as shown in Figs. 17 and 18. The cutter of the type shown in Fig. 15 may be held in either of the two ways shown in Fig. 17 and 19. In the latter case the cutter is spotted at A, and held by a pointed screw B. This method does not always insure accurate results. The simplest kind of single-ended cutter and the manner in which it is held, is shown in Fig. 20. It may be used in any kind of bar, and, with ordinary care, good results may be obtained even with this simple tool. The variations possible are many; and the examples shown simply indicate the most common practice.

Facing cutters may be made similar to boring tools, or they may be made with teeth, similar to end milling cutters, as shown in Fig. 21. One of the cutters A cuts with both sides, while the cutter B cuts with one side only. The bar is provided with a slot and with notches for locating and holding in place the various cutters, as shown at C. A pin D is driven into the cutter, and enters the notch, thus driving the tool. The cutters can also be held on the bar by taper pins, but the putting in place and the removal of the cutters would then be much slower.

Different cutters are commonly used for roughing and finishing. To make it easier to remove the metal with the roughing cutter, it may be made with every other tooth beveled in opposite directions, as shown in Fig. 22, where A is one tooth beveled toward the centre, and B the next tooth beveled outward. Using a cutter of this kind will produce a surface as indicated at C, which must be faced squared by a finishing cutter.

In order to face the work to correct dimensions, stops are sometimes provided which strike against some finished surface, which stands in a given relation to some other surface.

MANUFACTURING A MILLING AND GEAR-CUTTING ATTACHMENT—I.

Continued from page 53

The centre hole is then drilled and bored to 1.375 inches.

A Woodruff keyway is next machined, which may be seen at the right hand side of the large centre hole.

The dovetail is then scraped until it is a good sliding fit in the cutter block.

The next operation is drilling the small binding screw hole 5-16 x 18 threads, using a simple jig located from the vee and bored hole.

The base binder key is made from a bar of semi-circular steel, the first operation being cutting to length.

Three of the sections are then placed in the fixture, Fig. 11, being held in place with the pin-headed setscrew as shown.

The interesting feature of this tool is the concave surface, against which the keys rest. This is made with an angle of 10 deg. so that after the key (the fixture shows two of these already machined) has been milled the concave surface will possess this angle.

The key is then placed in a simple drill jig, being located by its outside contour and a small pinhole drilled.

Dismantling Plant.—The Willys-Overland Limited, West Toronto, is completing its work on aeroplane engines for the British Government, and to make a way for its motor car programme, plans to dispose of machinery, equipment and tools procured especially for its aero-engine contract. This machinery consists of the finest type of machine tools, and the Company will shortly be in a position to supply intending purchasers with lists of machinery and tools, from which tenders can be sent in to the company. These lists will be sent out upon request.

DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

THE BLOMQUIST-ECK HORIZONTAL BORING MILL

IN designing the Blomquist-Eck horizontal boring, drilling and milling machine, the Blomquist-Eck Machine Co., Cleveland, Ohio, constantly bore in mind the working efficiency demanded of a tool of this type in practically all lines of manufacture. Realizing that it was impossible to do heavy accurate boring and milling on a low, shallow bed or base with large openings both front and rear and directly under the column where the greatest stresses and strains exist, they originated a deep bed or base of a box pattern and eliminated an inherent fault.

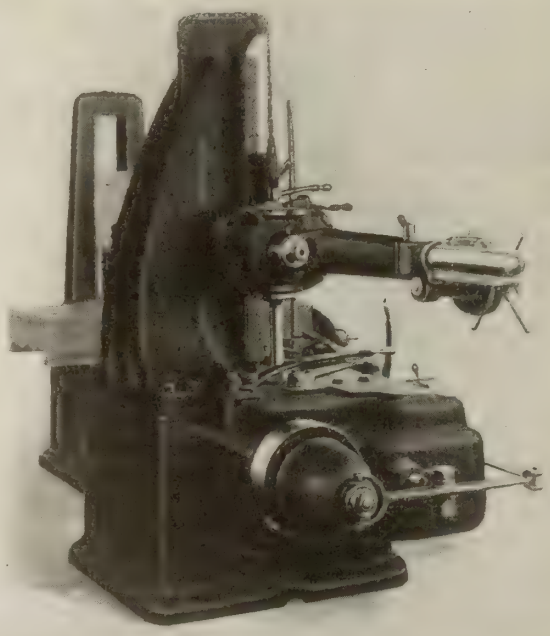
The working efficiency of any horizontal mill and drill depends entirely upon its ability to operate upon all classes of work at the highest speeds and coarsest feeds practicable and at all times to produce a finished product of dependable accuracy. These points have been developed to the highest degree by combining rigidity, accuracy, a suitable range of selective speeds and feeds with the highest standard of material and workmanship.

A complete system of jigs, fixtures and gauges are used, insuring a uniform standard construction throughout as well as the interchangeability of parts. The various groups of mechanism form complete individual units, and any unit can be inspected, removed or replaced without disturbing the alignment or any adjoining unit.

The bed or base is an unusually wide and deep box section cast entirely in one piece. The outer walls directly under the column are left intact without cored openings which adds greatly in resisting the lines of stress. Chip chutes are provided and so aranged that their walls give added strength. The bed (directly under the column) is reinforced by sections tied together and cast integral with the base. The bed is further reinforced by heavy deep ribs running lengthwise, and at right angles the three point support or bearing is also incorporated in the construction, forming the best known foundation principle.

The column is very rigid box section in design, strongly braced internally by ribs in both horizontal and vertical positions. The tapered sides and base of the column give the machine a neat, substantial, rugged appearance, also providing a liberal bearing upon the bed, eliminating deflections and spring.

The spindle saddle is designed with a liberal bearing surface on the face of the column, a long, narrow guiding edge with single screw adjustable taper gib for adjustments on one side and square lock form with gib on the other side. This construction will always maintain and insure a perfect alignment for the spindle saddle. The centre of the spindle in the spindle saddle is placed close to the column face (reducing overhang to a minimum) without sacrificing strength at a point most desired. The elevating screw, which is between the column faces and the spindle, is placed in such a predetermined position in relation to the narrow guide that the vertical movement of the saddle is direct and accurate. The units comprising the spindle and saddle are counterbalanced by a weight within the column, thus relieving the elevating screw of wear and tension.

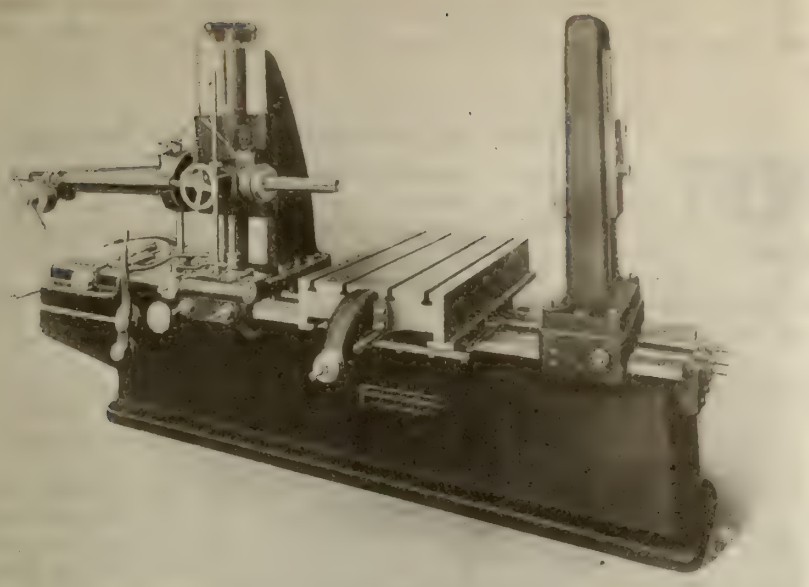


END VIEW OF BORING MILL

Spindle is made from carefully selected high carbon steel, heat treated, ground its entire length, bored Morse taper and provided with end thrust for operating in either direction. Spindle sleeve consists of a hammered high carbon steel forging accurately ground inside and out, thereby insuring a perfect uniform spindle bearing. The front and rear spindle sleeve bearings are adjustable and tapered, made of genuine Government bronze. Either bearing can be adjusted to compensate for wear. Sight feed oil cups provide an adequate lubrication.

The boring bar support is raised or lowered in unison with the spindle saddle by a shaft and a set of planed steel bevel gears. The bar support or bearing proper is securely clamped by a lever binding bolt at any position.

The spindle is powerfully designed and well adapted to the heaviest and finest class of work. The close coupled drive gear shafts, mounted on S K F double row self-aligning ball bearings, transmit the power to the spipndle in a most direct and practical manner. All shafts are made of high carbon steel. Hardened steel ring spur gears, heat treated, are used wherever possible and these are shrunk on to cast iron hubs. The smaller spur gears in the drive are made of solid steel and heat treated. The bevel gears are made of hammered steel forgings planed from the solid. The speed changes are made by two levers at the front of the machine which operate the selective sliding gears. The base is proportioned in such a manner to properly locate the entire driving mechanism and each individual shaft and bearing can be removed or replaced without disturbing any adjoining unit. Access to the entire unit may be had through an oil-tight top plate cover, the removal of which permits an easy inspection when required. All gears run in a bath of oil and in addition a positive



BLOOMQUIST-ECK BORING MILL, FRONT VIEW

cascade oiling system is provided for both gears and bearings.

The feed to the spindle in either direction to the spindle saddle in raising or lowering upon the column, to the table saddle paralleling the bed, or to the table longitudinally upon its saddle, is introduced in the same direct positive geared manner as applied to the spindle drive. Shafts are made of high carbon steel mounted on S K F ball bearings. Gears are of steel and heat treated. The feed mechanism in the base is arranged so any unit may be removed or replaced without disturbing any adjoining unit. All gears run in a bath of oil and in addition a positive cascade oiling system is provided for bearings and shafts. The feed changes are made by two levers which are placed directly in front and at the top of the gear box. In addition there are three selective interlocking levers provided that engage either the spindle, vertical or table feeds. If the spindle feed is being operated, the table and vertical feeds are automatically locked or vice versa. No two conflicting feeds can be engaged at the same time. In operating star feed facing heads or work of similar nature all feed levers can be positively locked in a neutral position.

Convenience and safety is provided for the operator by placing all controlling levers to the front and high enough so he has no occasion to stoop or reach beyond that of his normal working position.

The bed surfaces were designed and so proportioned that enable the use of a long, deep, rugged saddle to compensate for any overhang of the table at the extreme front or rear positions. When the table is in either extreme position it is supported in the saddle practically three-fourths of its entire length. The saddle is gibbed to the bed by the square lock method having a long narrow guiding edge with a taper gib for adjustment. Perfect alignment is always assured. The table is of an improved extra heavy pattern, long, wide and deep. It is reinforced by heavy ribs, and the metal being of a special analysis is so disposed to resist the greatest strain that might be imposed. The T slots are planed from the solid. The table is securely gibbed by the square lock method which in this instance reinforces and resists any strains when the table is in an overhanging position.

Power rapid traverse of a friction type is provided for all members operated by the feed. Regardless of whatever feed may be engaged the rapid traverse always operates at one rate of speed in either direction. It is instantly engaged or disengaged without disturbing the original feed setting. An adjustable safety friction leather washer in the clutch mechanism prohibits damaging any portion of the mechanism engaged. The clutch control is sensitive and practically any amount of travel can be had.

Adjustments by hand to the spindle saddle, spindle travel or movement. table saddle or table are provided in addition to the automatic feeds. All screws being fitted with graduated dials reading in thousandths of an inch, interchangeable work is assured and accuracy throughout obtained.

Single friction clutch pulley drive operating at constant speed is regularly furnished. Constant speed or adjustable speed motor drive is furnished when required at extra prices. The manufacturers are prepared to equip their machines with any type of electrical control, manual or automatic push button.

STARRETT BOOK IN ITS FOURTH EDITION

The fourth edition of the Starrett Book for Machinists' Apprentices, published by the L. S. Starrett Co., of Athol, Mass., has just been issued. The book, now in its thirty-fifth thousand, is a well illustrated volume of 176 pages, bound in red Athol leather and designed to answer in an authoritative manner questions as to how to do the every-day work of the average machine shop. The different classes of work are taken up separately, the most common errors pointed out and the correct practice indicated. Much attention is given to the proper use and care of tools, the reading of micrometers and verniers, bench work, lathes and lathe tools, grinding, belts, gears, etc. The book is essentially for the apprentice rather than the expert machinist, though the latter will find much of interest and value, and is intended to provide the answers to the many questions usually asked of the foreman or superintendent. Distribution is being made exclusively through the hardware dealers handling the Starrett line of tools, the price being 50 cents per copy. The briefest examination of the volume will convince the ambitious apprentice or machinist of its value in his every-day work.

ROLLING CONCRETE REINFORCEMENT FROM OLD RAILS

Continued from page 61

his rolls. The size of the concrete bar made is 1 inch, that being the average size of metal that is mostly used for reinforcing concrete work, although there are other sizes made to suit the requirements for different classes of concrete construction. Some bars are twisted while the metal is hot, and others have protruding knobs of metal on their sides. The latter are made by a machine which cuts out hollow places in the square roll passes; this is done after the roll grooves are turned.

When the metal is rolled in the finishing square grooves, it flows into the hollow spots, thus forming knobs on the surface of the bars. Reinforcing metal with either twisted or knob surfaces are used to hold tighter to the concrete than the plain bars will do, some contractors preferring one or the other styles according to which they consider the best.

When bars are embedded in concrete for any length of time and the structure is torn down, it has been found out by experience that the reinforcing bars were in good condition; the only difference noted was, that the outside surfaces of the bars were perfectly bright as if the metal had been put into a buffing and polishing lathe; this de-rusting of the bars is probably due to the action of the chemicals in the concrete in dissolving the outer coating of oxide of iron and rust at the moment that the concrete hardens, and then stops, as the interior of the metal is not affected.

Old rail steel, when made into square, flat bars and angles, is also suitable for quite a variety of uses, as owing to its high elastic limit and high tensile strength, it will give good satisfaction to the users.

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Soldier Training and Civilian Life

HAS military experience made a man more or less fit for the civil life to which he must now turn? Col. Lorne Mulloy, the blinded veteran of the Boer War, sized this situation up well at a meeting in Brantford a few days ago.

Ordinarily, a man judges, decides, and acts in regard to when he shall go to bed, when he shall rise, when or whether he shall shave, shine his shoes, eat his breakfast, wear his overcoat, and all the multiplicity of acts that constitute a day. Self-interest drives him to work in the morning and keeps him there till quitting time; self-interest and responsibility make him provide for food, clothes and shelter, and whatever comforts his state in society expects for himself and those dependent on him.

In the army, on the other hand, all is already decided for him. He does not get up when he elects—the bugle wakes him; he has to shave and shine up; he eats when the rest of the parade eats; he is told "'A' company will parade with greatcoats"; even his pay is unnecessary to his comfort—he could waste it all and he would still be clothed, fed, sheltered, and given medical care.

From the moment the soldier dons his uniform he is relieved of all the responsibility, the "urge" that makes for success in civil life. If he worried about his keep in the army he would be as foolish as the reader would be if he worried about the supply of air.

Now, take the uniform off, and the individual feels much like a heavy draught horse with a heavy load, tugging it up a hill would, should the bridle suddenly be snatched off. He is nonplussed. He is used to being directed. He cannot feel his responsibility for his keep; his three years of training have almost erased that from his thoughts. He cannot at once exercise his initiative; he has been taught for three years to act just so and not otherwise. He is not actuated by the self-interest that impels the citizen to work. If his self-interest had been exercised for the last three years, how long would he have drilled in the snow, tramped in the heat, or stood, with freezing fingers gripping his rifle, as he stood to his waist in the frozen slime of Flanders? He is released from the extraneous spur of military life, and the inner spur of ambition and self-interest has not yet begun to function.

Against this, it can be held that the men who went to the front are those possessed of a high degree of courage and determination. They are men who won every decoration known from the V.C. down. They saw the great need and they realized the great danger, and they were big enough to rise to the occasion.

For the time they may need a little more latitude than formerly. Surely it is not asking too much to suggest that this should be extended to them?

It is not fair that a returned man should be expected to be 100 per cent. efficient the first day he starts work after two or three years in the army.

Returned Soldiers Are No Menace

SO much is heard of the returned soldier that it might be imagined he was not a welcome comer to this country.

Some of our pessimists, when they look at the numbers that are being let out by the munitions works, are fond of throwing up their hands and saying, "And just think of all the returned soldiers that will be around looking for something to do."

One might almost imagine, to hear these croakers, that they wished the war might have continued indefinitely in order that there might be no such thing as the returning soldier to deal with.

Or else another guess might be that matters were becoming so serious that for every soldier returning home a civilian from the same community should go down and jump in the lake, in order to keep the balance of people and jobs unruffled.

Canada was mightily interested in these soldiers when they enlisted. She was mightily interested in them when they were holding that Western line that looked for all the world time and again as though it were going to break, and Canada is mightily interested in these men right now, and wants to put them back into civil life just as quickly and comfortably as possible.

The army that went from this country was not an army of professional soldiers. The army will not remain in the uniform. The men in it will cease to be soldiers just now as soon as they can be brought back and returned to civil life.

This returned soldier talk is being carried in some stages to a point where it might appear to be proper to refer to it as the "returned soldier menace."

For the great majority these are our own men. They are coming back to their own land. They are returning to a country that is well able to look after them—to a place that urged them to enlist and cheered them when they did so. There are some of them that war has used badly. These men are not on the charity of the country. They have paid the price almost to the limit, and every cent they get in the way of pension is a wage dearly purchased.

This army that is coming back is not an army of invasion. They are our own men. Fathers, brothers, sons, husbands of families that have always lived here. It would be well for some of the folks that speak with long faces of the returning soldier problem, to get this drift well imbedded in their mental vision.

AN expert is one who tells others how to do things that he'd make an awful mess out of if he'd tackle it himself.

* * *

THE Ontario Government is going to open up more territory for fishing. All of which points to the need of making sure of a good crop of fishworms and corkscrews.

* * *

THERE was a drop in the pork market this week. Pigs with their boots on went down $3 per hundred. All of which means that there will be a squeal from the farm, but not necessarily from the barnyard end of it.

* * *

THE German Junkers sowed the seeds of anarchy in Russia. The stuff sprouted, grew and went to seed, and the seed blew and found root in Germany. It's just the old story of sowing the wind and reaping the whirlwind, but in this case they sowed the Bolshevik and are gathering the Spartacans.

FORTY-THREE YEARS A MACHINIST FOR C.G.R.

Long Record of Faithful Service—Mr. Sand's Connection With Moncton Shops.

IN point of service, W. T. Sands is the "oldest" man in the Canadian National Railway (C.G.R.) machine shops, at Moncton, N.B. He has been continuously employed as a machinist in the C.G.R. shops since June 1, 1876—a period of nearly 43 years.

W. T. SANDS

The accompanying picture of Mr. Sands, which is a good likeness of him, as he is to-day, suggests that he must have jumped directly from swaddling clothes into machinist's overalls. As a matter of fact, Mr. Sands celebrated his sixty-fourth birthday last Christmas. He was born at St. Martin's, N.B., Dec. 25, 1854. Whether it be due to this auspicious circumstance, or to the choice of a nuptial day exactly twenty-four years later, Mr. Sands seems to have got more than a glimpse of the secret of youth. The discrepancy between his appearance and Father Time's records, Mr. Sands says, is due to the temperate habits he has practised, and the steady work he has done since boyhood.

Besides having been a faithful servant of the nation for more than forty years, Mr. Sands has played the part of a good and useful citizen of the city of his adoption, and to-day commands the highest respect not only of his fellow-employees, but of Monctonians generally.

Where You Can Make Money

THERE was a good mechanic in a shop not far from Toronto. He was a tool maker, and took a keen interest in his work. In fact, he was rather proud of the fact that he was a good tool maker.

He read in the columns of CANADIAN MACHINERY that the paper would pay for some of his experiences and ideas, and he tried it out.

He went over his records, looked into the charts and formulas that he had used at various times—for he kept careful record of them all. It was not a very hard matter to pick on several items that he thought other mechanics would like to read about, and he kept in view those things that had been of some real assistance to him in his work.

And so he started at it. He sent in his stuff and he sent along with it a sketch, well drawn—for he is a good draftsman—and waited to hear from the paper.

In a few days he got a letter. It stated that his stuff was what the paper wanted, and it would be used as soon as the sketch could be made into a cut for printing purposes.

He had done the writing and the sketching in an evening at home. Doing it had brought back to his mind very clearly all the details in connection with the work, and in this way he was a better man himself when he went back to work the following day.

It was the middle of the next month before he got his payment. It amounted to $4.50. Not much, perhaps, but it was a start. It more than paid for his paper for a year, and it gave him the certain knowledge that where he had made $4.50 for an idea in print he could make another $4.50 and so on.

It wasn't long before he spent another evening at home at this work. He had gained the "drift" of what the paper wanted to print. He began to see that there was more in it than the money he could get out of it. He was gaining greater confidence in himself, and he was finding that the commonplace was being removed from his work.

Can you duplicate the performance of this tool maker? Can you put in writing some experience, some production method, some shop kink that has helped you? Can you send along with it a little sketch so that the idea will get all the way across to those who read it? If you can, and will, you can open up to yourself a nice little field for making money.

CANADIAN MACHINERY will give every consideration to matter you may care to contribute. Have in mind the new work that will have to be performed in the machine shops of the Dominion when it may be necessary to resort to quantity production. If your sketching is not done in style to make it fit for reproduction, we have men on the staff whose business it is to draw perfectly before the matter goes in the paper, so do not hesitate on that account.

CANADIAN MACHINERY wants your contributions, and you will be a bigger and a better man for the effort.

Speakin' of Winter

THERE'S heaps of folks what versify about the summer time, and set their thoughts to prosy word or else to jinglin' rhyme. They tear off yards about the birds, about the skies and flowers, and throw themselves clear out of joint about the sunny hours.

And then there's others what will take and dip the quill in ink, to show that summer season puts people on the blink.

They spread 'emselves to show, by heck, the beauties of the spring, of bustin' buds and slush and mud, of them there things they sing—about the birds a-comin' home and fixin' up their house, and sittin' on the straw-stack and shoutin' for a spouse.

Of course some others much prefer the days when autumn comes, and fall fairs beckon to the spuds, the punkins and the plums.

There aint no rule, it seems to me, to make folks think alike, nor nothin' much to tell a chap which way they're goin' to strike.

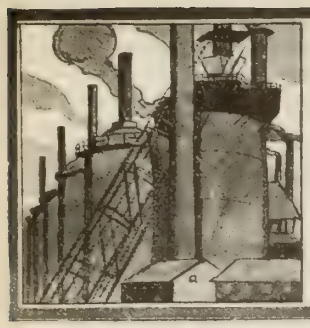
But here's a word for winter time, the days for you and me, let's hatch a toast unto the thing and drink it in cold tea. We've heard from poets heaps of times about the ice and snow, of the robins pullin' on his socks whene'er the north winds blow—and heaps of stuff's been writ in verse 'bout ridin' in a sleigh, with yer feet upon a heated brick beneath a wisp of hay.

Of course them things is right and good and pleasin' to the eye, and it's right to speak and notice them as they go flittin' by. But there's one thing that brings the tears a-spoutin' to my lashes—when father hits the cellar stairs and starts to sift the ashes.—ARK.

A U.S. SENATOR is out with the suggestion that the Kaiser be hanged. If he'd only came out and had his idea put across about five years ago he'd have saved this world getting mixed up in an awful mess.

* * *

IT IS being suggested that the Prince of Wales should get a wife in the States, as the stock of princesses is running short in Europe. Well, why not let the chap get out and hustle and find a wife for himself?



MARKET DEVELOPMENTS

New Price Did Not Govern First Big Order

Plate For Boiler Construction Placed at Figure Above the U.S. Fixed Figure For Last Quarter—Dealers Satisfied That Good Business is Ahead After Adjustment

THERE seems to be a tendency in some very well informed quarters to think that the U.S. Steel Corporation was rather premature in announcing a reduction in prices which included a three-cent base price for plate. To show that it does not control the situation it is worth noting that he biggest plate order sent from Canada since the war ceased was placed inside the last week or so at a base price of 3.75, which is well in advance not only of the Corporation cut price, but of the fixed price of 3.25 that ruled during the life of the U.S. War Industries Board. Certain it is that the three-cent price has not stimulated business.

Other lines continue to make concessions in prices. Sheets, for instance, are at a seven-cent mark from the warehouses. Sheet mills, both in U.S. and Canada, are out looking for business. Many mills were taken off sheets during the war, and are now returning from the rolling of plate or other war material. Their books are empty and any business offering is keenly pursued. The tube situation also shows a tendency to weaken, although form of voluntary action on the part of the dealers, be- it must be said that these reductions are more in the cause the stocks all over Canada and the States are still very low and it will take a considerable time to replenish them.

Dealers in machine tools report some enquiries that will mean immediate business, and they are all satisfied that there is a good turnover not far ahead. The making of adjustments with the U.S. Government following the cancellation of war contracts is going to take up considerable time, and this work has hardly been brought under way yet. It seems likely that the office for attending to this work will be located in Toronto, as that place is the logical centre for the majority of the shell shops that have been handling these orders.

The scrap metal market remains disorganized and stagnant. There are no sales being made. Sellers who have any material feel inclined to hold out for better terms, but dealers at present are well stocked and are not inclined to raise the rather low levels to which they have recently marked the price list.

THERE IS NOT A LARGE VOLUME OF BUSINESS MOVING IN MONTREAL

Special to CANADIAN MACHINERY

MONTREAL, Jan. 13.—Inquiry at different sources fails to develop any concentrated action regarding plans for reconstruction, but a certain undertone of early activity seems to pervade the general situation. A recently returned officer from France stated to CANADIAN MACHINERY that big business would soon materialize in European countries and that Canada would share in no small measure in this reborn activity. Many of the metal-working plants in this district are closed, or operating with reduced forces, but no feeling of unrest appears evident.

Even labor seems to recognize the future possibilities of extensive development and are apparently resigned to a brief period of unemployment. Business in this district has shown a slightly better tone during the week and prospects are generally encouraging.

Slight Improvement in Steel

Gradual readjustment to more normal price conditions has created a cautious attitude on the part of the buyers and purchases are seldom made on a large scale, the tendency apparently being to cover their immediate requirements only, with the feeling that the near future will see still further moderation in general price conditions. While the past few weeks have not been marked with any pronounced activity, due to many obvious reasons, present indications point to a slight renewal of optimism, as dealers here report better inquiry and demand for some domestic steels. Plates and structural shapes are moving a little more freely. Considerable uncertainty is still shown throughout the trade, and this is clearly illustrated in the effort to find out what the other fellow is doing, or going to do. Everything appears to hinge on the possibility of good business developing as a result of the efforts of those now active in Europe. That such trade will materialize is generally conceded, but the volume is still more or less a question of doubt, and until some tangible development takes place, the reluctant spirit will still feature the resumption of activity. The local steel mills are still busy, but operating below capacity. Cancellations are not heavy, but in some instances concessions are being made. Dealers here are now asking 7 cents for ¼-inch plates and 7½ cents for 3-16-inch up.

No. 10 black sheets are now quoted at 8 cents, instead of the 10 cent price ruling for the latter part of 1918.

It is expected that boiler tubes will be adjusted to a lower price level very soon, even though the demand is still heavy.

With the cessation of shell-making activity it was quite natural to expect a falling off in the demand for high speed steel, and the market in this connection is a quiet one at present. Some dealers here are reported to be sacrificing their stocks, but the nominal quotation is still high, the reason being the relative cost of labor and raw materials. The average quotation at the present time ranges from $1.75 to $2.00 per lb.

No Activity in Metals

Apart from the quiet tone that has emphasized the metal markets for the

past few weeks there is little to report. Some little business is being done, but features are entirely absent. The general demand for copper is poor, and, according to reports, the smelters and refineries are operating at low pressure. Quotations here are unsteady at 26 and 27 cents per lb. Tin is comparatively quiet and sales are invariably on small lots; prices are nominal at 75 cents per lb. Lead is in fair demand and quotations are firm at 9 cents per lb. Spelter is inactive and quotations range from 9¼ to 9½ cents per lb. Aluminum is quiet, but demand is fairly steady and price is maintained at 43 cents per lb

Quiet in Machine Tools

There is little to report in connection with the machine tool business. There is no pronounced activity in any direction and trading is generally quiet. Some business has been done in second-hand shell machinery, but this is on equipment that can readily be adapted to general purpose work. In this field, like that of most others, there is the feeling that early developments will result in a revival of machine tool demand, but without definite assurance, a waiting attitude appears to feature what little business is being done. Another factor that is apparently delaying a more general buying of tools is the possibility of a return to more normal prices in the matter of the cost of finished machines. At present the quotations are governed largely by the prevailing high cost of labor and raw materials; this, however, is steadily being adjusted to meet the rising conditions. Dealers report a fairly steady demand for tools for railroad use and of late the demand for rock drills has shown an increase. Road work and canal extensions on the part of the Government is probably responsible for this activity.

Lower Prices No Inducement

Lower levels in scrap have had no material affect upon the market and the situation remains one of virtual stagnation, with little activity reported anywhere. Many large consumers were well stocked when operations were suddenly suspended, and until this material is absorbed heavy buying is not expected. Dealers here report that a great deal of the shell scrap is being bought up by the American mills, but the volume of this class of scrap, in this district, is still considerable. Small quantities of foundry scrap is the only active business at the present. Both dealers and consumers are waiting for further developments and little buying is expected on the declining market. In general the quotations this week are lower than last, but crucible copper is 1½ cents higher than previously quoted. Scrap aluminum has advanced from 16 to 18 cents, this week's price. Heavy melting steel and old boiler plate have both declined $5 per ton, the quotations being $15 and $16 respectively. Rails at $20 shows a drop of $6 per ton. Car wheels are now quoted at $25 to $30 per ton, against the previous price of $38. Stove plate has declined from $22 to $16 per ton. Scrap zinc at 5½ cents, heavy lead at 5½ cents, and tea lead at 4½ cents, represent a drop of from ½ to 1 cent per lb.

POINTS IN WEEK'S MARKETING NOTES

Orders have been placed in Canada for seventy-six boilers for Fabricated Ship Corporation. Plate for over fifty of these has been ordered, the base price being not the new 3 cent. price, but 3.75, which is even higher than the fixed price which has ruled during the war.

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Prices of boiler tubes show signs of coming down a little. Just how far this tendency will develop is hard to say, as there is not a very large stock in either Canada or United States.

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The Canadian Government railways are sending out specifications for considerable business in the way of supplies for the railway shops.

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The making of adjustments between the U.S. Government and Canadian shell shops whose contracts were cancelled, will begin shortly. It is expected that a considerable time will be necessary to get these matters adjusted satisfactorily as very large sums are involved, and work at all stages will have to be considered.

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There are practically no sales being made in the scrap metal trade. Sellers have not reconciled themselves to the lower levels that dealers are insisting upon, and dealers are stocked now without buying material for which they have no disposition in sight.

ONLY CORPORATION HAS 3c PLATE PRICE

Big Business Placed From Canada Recently Has Been On a 3.75 Base Price

TORONTO. — There is nothing now approaching the volume of business that was passing through the machine tool and supply houses a few months ago. For a long time it was war work, and still more war work, and when this is cut off it is only natural to suppose that there should be a big drop. Recovery can be said to have started. Several dealers report that they have made sales during the week, and in each case it has been a nice new machine that has figured in the deal. Developments are being held up to some extent by reason of the delays that seem to be necessary in connection with the presentation and consideration of claims from manufacturers whose munitions contracts were cancelled at the signing of the armistice.

It becomes evident that it cannot be regarded that 3c is the base price for steel plate at U.S. points, as mills outside the Corporation are not down to that figure.

Some Business Offering

Machine tool dealers are satisfied that there is going to be some good business in store for them. They hold that the first four months of 1919 will be required for the manufacturers who have been working on munitions to get straightened away and arrange regarding the making of adjustments. Only a little work is being carried on yet in the manufacture of U.S. orders. Fuses will be through by the end of the month, and it will mean that another thousand or so munitions workers, mostly women, will be dismissed in Toronto. When fuse making is ended there will not be much left in the way of war material to provide employment. The Adjustment Board has been named, but very little work has been done. There is a lot of detail in connection with the cases with which they will have to deal, and it will be some time before it is all cleared up.

The Canadian Government railways is asking for specification and prices on a nice list of supplies this week, and there is some business offering in connection with the marine department.

Corporation Stands Alone

Apparently it is a mistake to take it for granted that three cents is the base price for steel plate at all American points. The Steel Corporation stand alone with this price. A representative of a large United States mill, who was in Toronto this week, when speaking of this matter to CANADIAN MACHINERY contended that the action of the Steel Corporation in rushing in with a price lower than the level fixed during the war had served no good purpose. "It has not brought in any extra business, and these independent rollers are not following. They are not originating any more business at the three-cent rate than they might have done had they stated that their base price was one cent per pound. Steel cannot be produced at their figure at present charges in U.S. mills."

There seems to be evidence coming up that contracts placed for plate for Canadian users are not going at the 3c rate. For instance, the contracts for the ships being ordered through the Fabricated Ship Co., for French delivery, will have to provide for 76 boilers. Orders for the material for at least 50 of these has already been placed and not at the three-cent rate. In fact, CANADIAN MACHINERY learns that the base price for the plate in these boilers was at a figure of 3.75 f.o.b. U.S. mills. It is also stated that the Corporation that has the three-cent base charge now has no definite shipping date. That was one of the things insisted upon in the contract referred to above, and the firms handling the business were able to agree to that part of the contract. There were

only three mills in the U.S. that could make delivery on the quality and size of plate required and together with that give a promise of actual delivery at a specified time.

The price of sheets is much easier. If one were to look for the reason it would not take long to come to the conclusion that it is because mills are out looking for business. The dropping market can hardly be laid to the warehouse men, as there is not a large stock of sheets in the country. At the same time the production is coming back very rapidly. There had been many mills that had been ordered by Washington to roll plate and other material and now that the Government control is removed and they are returning to old lines the production of plate is coming back to large amounts very quickly.

It is supposed that the books of most of the bills an either side of the line are pretty well cleared up on the plate proposition now.

Tubes Are Weaker

The reductions that have taken place in the price of tubes appear to be voluntary on the part of some of the sellers. There are no large stocks on hand either here or across the line. In fact there are some sizes that are not represented yet. There has been for some weeks past an unusually heavy demand for tubes, and this tends to keep the stock on hand at a low mark. Instead of the old tube list standing with ten per cent. off a new list was handed out to-day, making 4-inch tubes $67 against a former $75. It may be that still lower prices will come in tubes, for they are still a long way ahead of the pre-war prices. In Canada when the war broke out four-inch tubes were quoted at 18c against the 67c, or the 75c, which has been standing for some time. It is doubtful if even after the lapse of time and much readjusting prices will ever come down to the 18c. In November of 1915 the price had risen to 22c. After that the rise in price amounted to a real procession, and it was an unbroken succession of increases covering the period between them and the end of the war.

Market Still Stagnant

Last week a new list of scrap metals was announced, and in it some very severe cuts were made in the prices that dealers would pay. The list was not put out with the idea of stimulating trade, for an announcement that prices dealers will pay have been cut to pieces is hardly calculated to help matters this way. A leading Toronto dealer when asked if anything was coming in at the new low levels said, "There is practically no business going on at present. Many of the yards are going over their business for the year. As a matter of fact we do not want to buy and sellers do not seem anxious to dispose of their holdings at present rates. I can't see where there is anything in the immediate future that is going to improve matters much either. For all practical purposes we are simply sitting on the fence at the present time."

U. S. STEEL MILLS DO NOT FIND ANY TENDENCY OF BUYERS TO STOCK UP

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Jan. 16. — Pig iron production in the United States in December was at the rate of about 40,800,000 gross tons a year, showing a decrease of a trifle less than one per cent. from the November rate and a decline of slightly less than three per cent. from the maximum rate on record, which was attained in September. The year's production was about 38,900,000 tons, against 38,647,397 tons in 1917 and 39,434,797 tons in 1916, the record year.

Production in 1918 was at about 12 per cent. under the average capacity for the year, the losses in production being due to the railroad breakdown last winter, occasional shortages of coke later, poor quality of coke furnished, a little labor shortage, and a considerable shortage of the classes of scrap usually used in blast furnaces to swell output.

The present blast furnace capacity is about 45,000,000 tons. There has been a sharp increase in capacity since the war started. No new furnaces were completed in 1914, and only three in 1915 and four in 1916, but in 1917 no less than 14 new stacks were completed and blown in and for 1918 the count was eight stacks. There are seven stacks now in course of erection or definitely projected, which would add considerably more than a million tons to the capacity.

Production of steel ingots in December was at the rate of 43,750,000 gross tons a year, against a rate shown for November of 43,000,000 tons a year. The maximum rate attained was in September last, at the rate of 46,800,000 tons per year.

Steel ingot production in 1918 amounted to about 42,200,000 tons, against 43,700,000 tons in 1917 and 41,400,000 tons in 1916. As was the case in pig iron, the steel ingot output in 1918 was considerably below the capacity, which averaged during the year about 48,000,000 tons. Capacity at present is about 49,000,000 tons, and there is about 1,000,000 tons capacity involved in new construction now in progress.

Some blast furnacemen, also some scrap dealers, are attempting to argue just now that building of new steel capacity has outrun blast furnace construction, so that if there were such demand for steel as to call for all steel making capacity to be operated there would not be enough pig iron to go around. This is not correct. A careful analysis of the whole situation indicates that the balance between pig iron capacity and steel capacity is the same as was shown by the actual production in 1916, and in that year no steel works suffered from lack of pig iron. That is, if the production of steel making pig iron bore to the 49,000,000 ton steel ingot capacity the same proportion as obtained in 1916 there would be left, out of a 45,000,000 ton production of pig iron, about 7,000,000 tons of foundry and other grades not used by steel works. Furthermore, the United States in 1916 exported about 600,000 tons of pig iron and about 200,000 tons of scrap. Assuming that the steel works undertook to operate at capacity, they would be able to get a supply of pig iron and scrap, but there would be in addition a margin of safety in the cutting off of exports of pig iron and scrap.

Mill Operations Light

The rate of steel production in December was surprisingly heavy, in view of the lightness of demand. Apparently the mills made every effort to ship promptly against orders on books, for fear customers would ask for postponements. The average steel consumer probably did not realize, immediately upon the signing of the armistice, how plentiful steel was going to become. The matter is well understood now, and by as much as steel was shipped freely in December, the requirements of buyers are now diminished. Some estimates place steel mill operations last week at as low as 65 per cent. of capacity, and while this seems like a tremendous change for an industry that only two months ago was straining every nerve to get out the last ton possible of output, it is really suggestive of a high rate of production, for 65 per cent. production out of the present capacity would mean 40 per cent more tonnage than was produced in 1906, and it is well recalled that the demand that year was regarded as almost unprecedentedly heavy. There was enormous demand for rails, with a heavier output than attained in any other year, before or since, and large quantities of steel were used for building freight cars and locomotives. Now there are hardly any rails being rolled and only a very few tens of thousands of freight cars are still to be built, on old orders, while there is no move to place additional orders. Also, there is scarcely any new construction outside the railroads, and manufacturing consumers generally are operating at rather light rates, except the automobile industry, which is making every effort to turn out a maximum number of cars every week, wtih promise of a very full demand for an indefinite time to come. The automobile industry, however, is physically unable to consume steel equal to more than two or three per cent. of the total steel making capacity. Jobbers are buying very sparingly. Their orders are urgent, in that when they do buy they want the quickest possible delivery, as they are afraid as to prices. There is no disposition on the part of either jobbers or manufacturing consumers to buy ahead.

In the circumstances the likelihood is that steel mill operations will continue to decrease for some time to come, perhaps to a rate below 50 per cent. of capacity. Some additional demand will

doubtless develop with spring, but the heavy demand, the demand that is universally expected to keep the steel industry busy and prosperous for a period of years, perhaps five, is still in the uncertain future. Steel producers are as diffident about making predictions as to when this demand will start as they are bold in asserting that some time it will come.

Prices

Pig iron and steel prices are under no pressure. The market all along the line is well defined and producers will not budge from the recognized prices. There are no offers to buy any considerable tonnages at slight cuts from existing quotations and thus there is no incentive to cut. Producers have large quantities of material sold under contract and with a steady market they expect buyers to take more material than could possibly be sold by cutting prices. Hence it is easy for the market to stay steady.

Steel Corporation Figures

The Steel Corporation reports its unfilled tonnage at the close of business December 31 at 7,379,152 tons, or 745,511 tons less than at the beginning of December. This statement is altogether a puzzle. Shipments during December were probably about 1,100,000 tons, and if there were bookings on new business equal to 350,000 tons that is all that could be expected, recalling how very dull the market was during the month. That would strike a balance in one respect, but it would leave nothing for the cancellations of war steel contracts that had to follow the sudden ending of the war. How these cancellations could avoid getting into the records before the end of December is not understood. One may speculate, of course, that the war steel business had not been entered as unfilled tonnage originally, but it would be equally difficult to explain why such an omission occurred.

SOME DOUBT ABOUT U.S. IRON PRICE NOW

Makers Don't Want Business Based On Any Loan Price Conditions.

SALES of pig iron that are passing this week are not large. There apparently is some doubt as to whether $31 or $34 is the base price at U.S. points.

Chicago.—A number of contracts were made for first half delivery at $34, and one of the most difficult questions now is what to make of these contracts.

Cleveland. — Invoices are being sent along by producers with shipments that were booked for first quarter delivery at $34 per ton, and cancellations are not entertained.

Pittsburg. — Small lots of iron are being sold, but mostly for some specific purpose. The new price is being recognized and immediate shipment is asked for in every case. Sales are not going over 500 or 700 tons.

New York.—Enquiries are being made more freely than for some weeks. The actual tonnage is not large. The market looks as though it were going to become steady on a basis of $3 under the fourth quarter schedule.

Buffalo.—There is a decided tone of betterment noted in market conditions here. One furnace says it is sold up to a point where it can only care for regular customers by giving them their wants piecemeal.

Cincinnati.—Furnaces seem to be well filled with orders and will not consider taking on business at a low-price contract.

THE SCRAP MARKET IS ABOUT AS DEAD AS COULD BE IMAGINED

STAGNATION describes the condition in the scrap trade at present. Neither buyers nor sellers are in the market. Sellers do not want to make the sacrifice necessary to get buyers to consider their stocks, and buyers will not pay the price that will induce a none too insistent seller to part with his material. Reports from some of the U.S. points are as follows:—

Chicago. — There is comparatively little new buying going on here. Here and there a consumer comes out to buy at present quotations, but the total tonnage passing in these sales does not amount to very much. Dealers in some cases find that they are coming out at the small end of the deal through cancellations. They filled orders and lost money in 1917 by so doing, and the same thing is taking place now by reason of consumers refusing to pay prices it has cost them to secure material under contract.

New York.—It looks as though consumers and dealers were united on one point, and that is to stand back and wait for prices to settle somewhere. Figures quoted are simply nominal, but the trend is undoubtedly downward. Canadian munitions makers are offering about 20,000 tons of shell steel, but up to the present there have been no takers for the lot.

Pittsburgh.—The prices of scrap are on the toboggan in this district. There is a very limited demand and no stabilizing influence has made itself felt. Heavy melting is as low as $20. There is a large amount of shell scrap offering, although the amounts from Canada are decreasing owing to Government regulations.

Cleveland.—Present needs is the limit for any buying that is being done here. As low as $15 has been paid and accepted for heavy melting, although the average runs above that.

Buffalo.—It begins to look as though the bottom has been reached in the scrap market. Scrap from Canadian shell shops that were working on U.S. orders is being stored at three plants here.

Cincinnati. — Top ends of shrapnel rounds are coming back on the market in fairly large quantities. A number of cancellations that are being insisted upon help to keep the market in an unsettled condition.

St. Louis.—Inactive describes the conditions in the market here. The actual business that is passing does not amount to much. Even at the new prices that have been announced no business is being done, as buyers do not seem to consider coming into the market at any price. Railroads are holding their lists until higher prices are obtainable.

SEVERAL CHANGES DURING THE YEAR

Promotions to Many at Plant of Dominion Steel Corporation

During the war several important changes occurred in the staffs of the Coal and Steel Companies, says the Sydney, N.S., "Daily Post."

D. H. McDougall, who had been general manager of the Dominion Coal Company since 1912 and of the Dominion Iron and Steel Company since 1916, resigned both offices to become president of the Nova Scotia Steel and Coal Company. No successor has been appointed.

R. F. Randolph, who had been general superintendent of the Dominion Iron and Steel Company since 1916, retired from that office in October and was succeeded by H. E. Rice, previously assistant general superintendent. About the same time G. D. McDougall, chief engineer, resigned that office to become general superintendent of the Nova Scotia Steel & Coal Company. No successor has been appointed. On 1st of December Wm. H. Graham was appointed superintendent of construction at the Dominion Steel Works, and J. H. Fraser was transferred from assistant master mechanic to assistant superintendent of construction. Early in November, H. D. Townsend was appointed superintendent of Electrical Department in succession to F. L. Collins, who resigned some months earlier and returned to the United States.

W. G. Wilson, who has been appointed superintendent of plate mill, has taken up his duties and will overlook the erection of the mill and the installation of the machinery connected with it.

John S. Whyte, chief mechanical engineer of the Dominion Coal Company, resigned that office to join the staff of the Acadia Coal Company, and his duties were taken over by Vincent McFadden, chief electrician. Following upon movements in the principal works' offices there have been several transfers and promotions which have brought a number of men a step forward.

WHAT TO MAKE

By D. A. H.

That is the question asked in many a shop at the present time. One answer is, a good oil can. Go into any shop or factory and what do we find as the oil can situation? The cans all leaky and worn out.

At present prices for oil, a slight leak will waste the cost of a new can in a couple of days. The only exceptions to the sloppy oil can situation are the oil cans of the stationary engineer, which are but seldom used and might be said to be as ornamental as they are useful.

One shop tried all the cans on the market from the most expensive down to the ten cent variety, and after a two years' test, unhesitatingly adopted the latter. Their report says that either the spout or the joint or the bottom is defective in all classes of cans, and after a few weeks of service at the hands of men who are, to say the least, the best trained to handle "machinery" of any occupation in the world, it is cheaper to throw the cans away than to keep them. As this makes the renewal cost the item of expense, the tin cans are, of course, the cheapest.

The union between the spring bottom and the can body must be so perfect that the natural falls to the floor will not disrupt it. A can spun from one piece would be ideal. The spout should be seamless and integral with the flanged connection to the can proper; the joint between spout and can (if there were any at all) should be a half turn lock of substantial design with a metal-to-metal seat that does away with the slippery stretching gasket. An ideal arrangement would be an entire one-piece construction obtainable by welding or brazing and the use of tubing or formed metal; then if a self-filling device, as with fountain pens, could be incorporated and the can filled through the spout, there would be no threads to wear out in a dozen fillings and consequently no leaking at the base of spouts.

Workmen instinctively neglect and dread to use a can that gets their fingers oily, even though their work is of the kind known as "dirty." If necessary, the oil can could be heavier; no man would object to lifting two pounds instead of one if he could get the advantages named along with the weight. The can which looked most serviceable of all to the writer was a cast can, but the spout joint was defective. If one was made so the spout was cast integral, then drilled out, and a filling boss put on the side that permitted coarse threads half an inch long for a cap with a ground seat—that would be one of the first real cans and the writer is ready to order some at once.

Court Awards $10,000.—The Superior Court, presided over by Justice Maclennan, recently awarded the widow of Emil Primus Hagg, killed last year while at work in the plant of the Canadian Steel Foundries, the sum of $10,000.

NAME AND ADDRESS OF H.R.H. WANTED

In CANADIAN MACHINERY, January 2, there were two short articles published, "Making Twin Screws for Two Jaw Chucks," and "Hints on Cutting Square Threads." These were by H.R.H. Through an error in our records we have lost the proper name and address of H.R.H. We are anxious to secure this information in order that a cheque for the amount due for these may be forwarded.

AEROPLANE MOTORS

Continued from page 58

Thus an engine with a brake horse power of 180 and an indicated horse power of 200 would have a mechanical efficiency of .9. Brake horse power tests of engines are usually made over a range of speeds and by plotting the B.H.P. against the corresponding revolutions per min., a curve is obtained, which shows how the B.H.P. varies with the speed. The type of curve is shown and it will be noted that at first the power rapidly increases with the speed, but that the rate of increase diminishes until the maximum B.H.P. is reached. At higher speeds the power rapidly falls off. The reduction in the rate of growth of the power with speed arises from the rapid increase in the resistance offered by the piping and valves to the inlet and outlet of gases, and also to reduced mechanical efficiency at high speeds. A sketch of a type of brake which has successfully been employed in more than one workshop, and which is worthy of note for its simplicity is shown in Fig. 17. The brake pulley is supported on a shaft running in ball bearings. The ends of the shaft are fitted with a coupling by means of which a short flexible drive can be obtained from the motor to be tested. Two wide brake straps are applied round the very wide pulley and attached to a lever carried by a vertical screw passing through a nut fixed in the cross head at the top of the frame. The loading of the brake is effected by means of weights W., which can be varied as regards position on the lever. When the final adjustment has been made the lever is horizontal the moment $W \times L =$ the force of friction around the circumference of the pulley $\times$ R and

$$\text{B.H.P.} = \frac{2\,\Pi\,L\,N\,W}{33000}$$

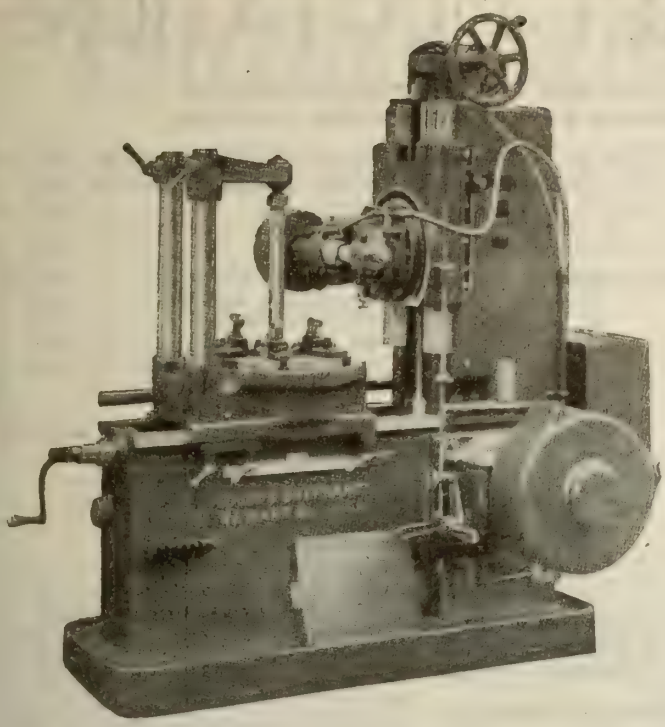
This is, of course, neglecting the horse power, which is also consumed by the brake, which should really be added to the B.H.P. obtained by the above formula.

Water is circulated to keep the pulley cool, centrifugal force ensuring a fairly uniform depth of water around the entire rim.

Before closing, a few brief words on troubles which may arise during the testing of an engine. The easiest method of locating a trouble is by a process of elimination. To an experienced man, the rhythm or hum of an engine, when working, is as the tune of the strings of the violinist, satisfactory when in harmony but the slightest discord telling him the cause of the trouble behind. Generally speaking, engine troubles may be classified under one of three headings: Carburation, valve timing and ignition lubrication. Troubles under the first heading will be found to affect the engine in a general manner; that is, the engine suffering from faulty carburation would stop gradually. Ignition troubles have the effect of stopping an engine suddenly. Troubles under the last heading, lubrication, cause overheating, loss of revolutions per minute and the possibility of ultimate cessation.

1. Engine stops suddenly: This is due to failure of the ignition circuit.
2. Engine stops gradually and misfires;
   (a) Petrol used up.
   (b) Carburetor choked.
   (c) Petrol tank air-bound.
   (d) Sparking plugs fouled.
3. Loss of power, engine continuing to fire regularly;
   (a) Loss of compression.
   (b) Faulty mixture.
   (c) Inefficient lubrication.
   (d) Incorrect tappet clearance, affecting the lift of the valve.
4. Loss of power, engine continuing to fire irregularly;
   (a) Magneto trouble.
   (b) Sparking plug or high tension wires damaged.
5. Hissing sounds from the engine;
   (a) Broken sparking plugs.
   (b) Leaky joints.
   (c) Pitted valve seatings.
6. Engine continues to fire after being switched off;
   (a) Excessive carbon deposit.
   (b) Switch wired wrongly, keeping engine on permanent contact.
7. Vibration—unbalanced engine;
   (a) This may be due to a bent crankshaft.
   (b) Loss of engine fittings.
   (c) Unbalanced propeller.

Making Adjustments. — The Claims Board is getting organized, but as yet not much work has been done. It seems likely that the offices will be moved to Toronto, which seems to be the logical centre for the works. The members of it are Messrs. Col. O. W. Albee, Maj. Underwood, and one other U.S. officer, Holt Gurney, and H. M. Perry. There is a large amount of work ahead of this body, as they will have to deal with factories in all stages of development, as well as with shops that were producing and have claims for cancelled contracts. It is likely that the work of making settlements and adjustments will keep them busy for at least six months.



Gould & Eberhardt Gear Hobbers

For cutting Spur, Helical and Worm Gears up to 120" dia. Also

Multiple Spindle, Continuous Operation Automatic Roughing Machines for large production.

Put your gear-cutting problems up to us. Catalog on request.

Write for prices and deliveries.

A. R. Williams Machinery Company, Limited

ST. JOHN, MONTREAL
WINNIPEG, VANCOUVER

If It's Machinery, Write Williams"

64 W. FRONT STREET
TORONTO

Steel Castings

Quick Deliveries

We Specialize in

High-Grade Electric Furnace Steel Castings

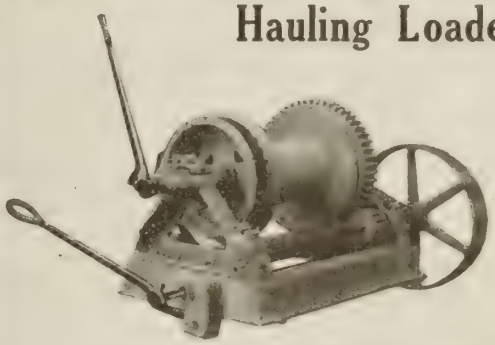
Let us quote for your requirements

The Thos. Davidson Mfg. Co.
Limited

Steel Foundry Division:
Lachine Canal, Que.

Head Office:
187 Delisle St., Montreal

For Hoisting Heavy Materials or Hauling Loaded Cars



Made in 7 Sizes

10 H.P.
15 "
20 "
25 "
32 "
40 "
" 50

Made with two drums also if desired.

We can also supply this Hoist geared for direct connection with an Electric Motor. Let us send you photograph or catalogue.

May we submit a tender on your Castings and Steel Plate Work?

Marsh Engineering Works, Limited

Established 1846

Belleville, Ontario

Sales Agents: Mussens Limited, Montreal
Winnipeg and Vancouver

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$32 75
Lake Superior, charcoal, Chicago	37 50
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	37 25
Basic, Valley furnace	33 40

Government prices.

	Montreal	Toronto
Hamilton	.....	.....
Victoria	.....	50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Steel bars, base, Toronto	4 90
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	*2 90
Tank plates, Pittsburgh	*3 25
Structural shapes, Pittsburgh	*3 00
Steel hoops, Pittsburgh	*3 50

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

*Government prices.

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$ 27 00	$ 28 00
Electro copper	27 00	28 00
Castings, copper	26 00	26 00
Tin	75 00	78 00
Spelter	9 50	10 00
Lead	9 00	10 00
Antimony	10 00	11 50
Aluminum	43 00	50 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 7 00	$ 7 00
Plates, 3-16 in.	8 50	8 40

WROUGHT PIPE

Price List No. 37

Standard Buttweld	Per 100 feet Black	Galvanized
⅛ in.	$ 6 00	$ 8 00
¼ in.	5 22	7 35
⅜ in.	5 22	7 35
½ in.	6 63	8 20
¾ in.	8 40	10 52
1 in.	12 41	15 56
1¼ in.	16 79	21 05
1½ in.	20 08	25 16
2 in.	27 01	33 86
2½ in.	43 29	54 11
3 in.	56 61	70 76
3½ in.	71 76	88 78
4 in.	85 02	105 19
Standard Lapweld		
2 in.	31 82	38 30
2½ in.	47 97	58 21
3 in.	52 73	76 12
3½ in.	78 20	96 14
4 in.	92 65	114 00
4½ in.	1 12	1 37
5 in.	1 30	1 59
6 in.	1 69	2 06
7 in.	2 19	2 68
8L in.	2 30	2 81
8 in.	2 65	3 24
9 in.	3 17	3 88
10L in.	2 94	3 60
10 in.	3 79	4 64

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	19 50	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	18 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Heavy melting steel	15 00	15 00
Shell turnings	9 00	8 00
Boiler plate	16 00	15 00
Axles(wrought iron	30 00	15 00
Rails	20 00	15 00
No. 1 machine cast iron	30 00	18 00
Malleable scrap	25 00	15 00
Pipe wrought	18 00	8 00
Car wheels	25-30	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove plate	16 00	14 00
Cast boring	11 00	8 00
Scrap zinc	5½-6	5 00
Heavy lead	5½	8 00
Tea lead	4½	3 50
Aluminum	18 00	18 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent.
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$47 50
Open-hearth billets	47 50
O.H. sheet bars	51 00
Forging billets	60 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

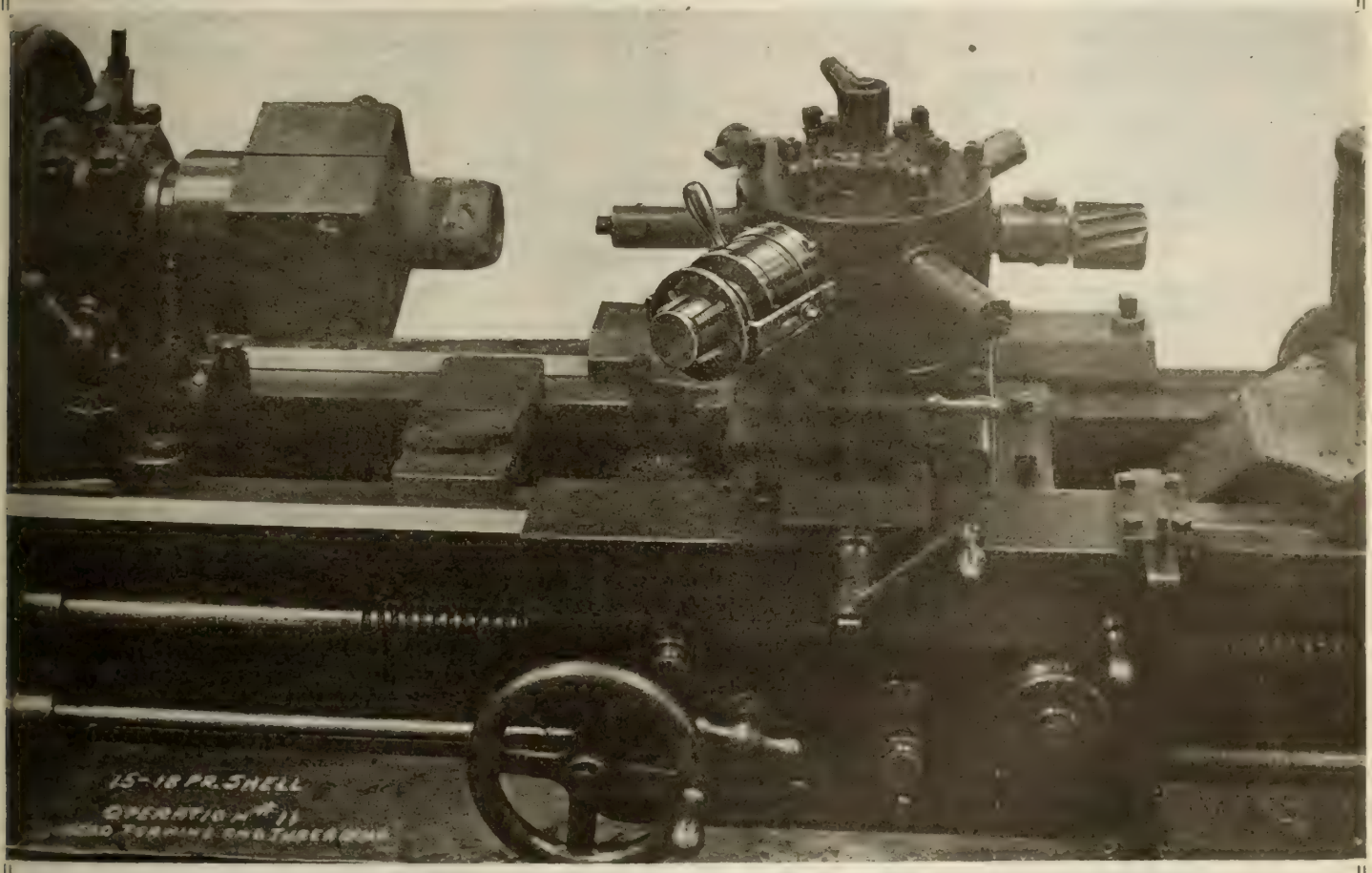
ANOTHER GEOMETRIC FEAT

DESCRIBED IN A LETTER FROM CANADA

Messrs. Geometric Tool Company,
New Haven, Conn., U.S.A.

Gentlemen:—

"The engine lathe shown in the photograph which we are sending you commenced work on shells within four months of the start of the war, when methods were in course of development, and special machines were unknown. Material and labor were both frequently unsatisfactory. Rejections due to poor threads were



frequent troubles with shell makers. Despite many adverse conditions the contract was successfully completed, and the Geometric Tap used on this lathe (fitted to cross-slide on carriage) was an important contributing factor in the good work done in the early strenuous times."

Very truly yours,

Whether yours is a tapping or threading job, or both, you would be satisfied with the Geometric way of doing it.

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 16
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 00
Sheets, black, No. 10	8 00	8 50
Canada plates, dull, 52 sheets	9 00	8 65
Can. plates, all bright.	9 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	9 00
Premier, 10¾ oz.	.....	9 30
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.			Cts. per lb.
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

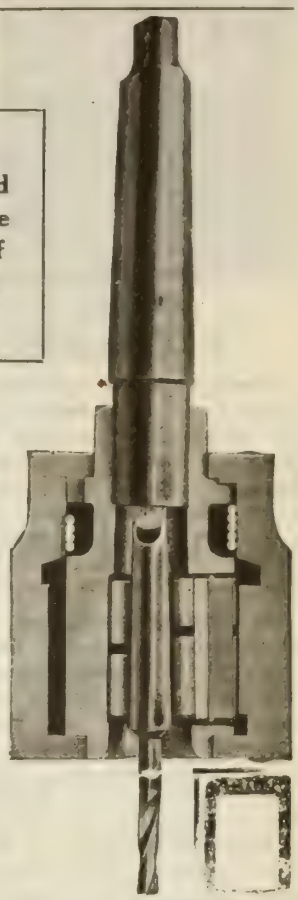
PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

USE Aikenhead's Wahlstrom Chuck

Output Increased 50%—the Result of Minutes Saved



Because this Automatic Chuck will double the output of your drill press while actually lessening the labor of the operator.

This Chuck will save minutes every time a tool is changed, because it self-centers the tool, enabling the operator to remove one drill and insert another in two seconds, without stopping spindle.

This Chuck grips the entire shank of the tool, and the cam action is such that the jaws grip more firmly as resistance on the tool increases. Consequently it holds broken tang tools as well as perfect tools securely. No strain can weaken the grip or cause slippage.

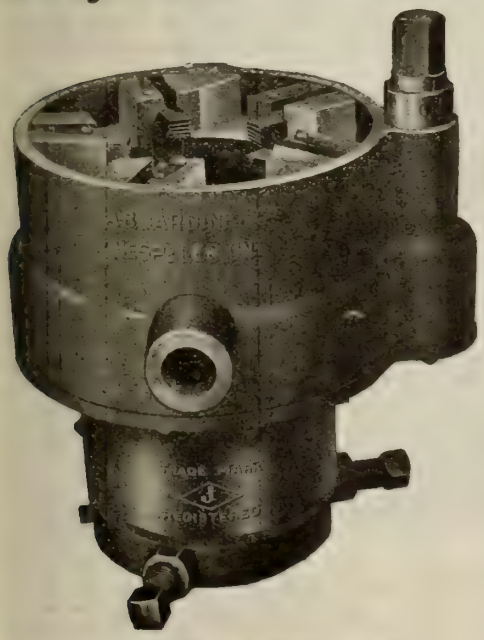
Count the advantages of a Chuck that drills, reams, counterbores and taps without stopping spindle.

Absolutely nothing to get out of order—no collets, no sockets, no keys, no labor.

May we send you Booklet?

Aikenhead Hardware Limited
17 Temperance St. TORONTO

Here's what they'll do—



GEARED ADJUSTABLE THREADING TOOL No. 22

Enable One Man to do the Work of Two.

Aikenhead's Jardine Pipe Threading Tools

In one minute **one man** cuts 2" pipe; in 8 minutes, 4" pipe; in 16 minutes, 6" pipe; in 30 minutes, 8" pipe.

You'll look a long time before you'll find another pipe threading tool equal this everyday record of Jardine tools.

The cutters in Jardine tools cut clean; they don't squeeze. Moreover, they have cutters for each size of pipe. As the tool advances on the pipe, these cutters open out so as to make a proper taper on the thread. The actual cutting is done by the mouth threads of the cutter, the back threads merely steady the tool.

There are more very important facts. Write for them.

GEARED ADJUSTABLE THREADING TOOL NO. 22

Leading screw and gears protected from dirt and chips. Ratchet enables one man to thread 2½" to 4" pipe in ditches or positions close to walls or ceilings. Driving cross supplied.

Aikenhead Hardware, Limited
17, 19, 21 Temperance Street, Toronto

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Perth, Ont.—A deputation of Lanark citizens met J. A. Stewart, M.P., to ask his assistance in getting the Canadian National Railway constructed through Perth to Lanark and then on to Arnprior. Messrs. Mackenzie & Mann gave a written promise to construct this line in 1914 previous to the outbreak of war; since then it has been in abeyance.

St. Catharines.—Baldry, Yerburgh and Hutchinson, contractors for section No. 2 Welland ship canal, reopened their office here and will at at once begin the organization of a new staff for a resumption of their section of the work which the Government has authorized after a shutdown of two years. Alex. Grant, formerly of the Trent Valley canal, who succeeds J. L. Weller as chief engineer of the ship canal, was here to-day.

New York.—There was a decrease in the domestic mine output of lead and zinc during the last year. The lead and the recoverable zinc of ores mined were approximately 563,000 tons and 627,000 tons, respectively, as compared with 651,156 tons and 711,192 tons in 1917. The refined lead output of smelters and refineries was 645,000 tons, against 612,-214 tons in 1917, and the antimonial lead output was 22,000 tons as against 18,647 tons. The lead available in the United States is 540,000 tons, against 515,258 tons in 1917.

TRADE GOSSIP

Open S K F Office.—The Montreal office of the S K F recently opened at 412 St. James Street under the management of Geo. F. Sheppard is rapidly being remodelled and fitted out with a complete stock of ball bearings, and the various models for demonstrative purposes.

A New Product.—The Tolland Manufacturing Company of Montreal has recently placed on the market a new type of bearing metal, known as "Tomco" special heavy bearing metal. It is especially adapted for rolling mill and paper making machinery and all bearings where heavy pressure is a feature.

Studying Big Problem.—A series of weekly lectures on "Industry, and the Problems of Reconstruction" are being given at the McGill University by Francis Hankin, who has made a special study of the relations of labor and capital from a business standpoint.

In the survey of the present conditions Mr. Hankin emphasized two points: first, the consequence that would likely follow any attempt to adopt a system of repression of any discontent or industrial unrest that might manifest itself in this new era; second, the necessity of treating the workman as more than a cog in the wheel, and that labor shall in future be recognized as the first charge on production. This series of lectures will continue throughout the winter, the first two being free and open to the public, the rest of the course being restricted to those who register.

Damaged by Fire.—The block of motor sales offices on Park Avenue, Montreal, was seriously damaged by fire last week to the extent of about $250,000. The stores affected were the Cadillac Motors, Limited, Just Motors, Dominion Motor Car Co., and Cutten and Foster, and water damage to White Motor Car Co.

Open Labor Offices.—By the establishment of three provincial labor bureaus in Montreal, it is expected that civilian labor will be handled and returned soldiers will be taken care of and helped back to civil occupation. Similar bureaus will be opened in other cities and towns throughout the province. These bureaus will operate in co-operation with postmasters and manufacturers.

Getting the Latest.—As an indication of the extent to which modern equipment is being adopted in New Zealand it is interesting to note that the Volta Mfg. Co., of Welland, are shipping a six-ton electric steel furnace to a firm in Christchurch, New Zealand. Representatives of this firm have made occasional trips to America, with practically the sole purpose of keeping in touch with advanced methods in the steel and iron business.

Big Lumber Purchase.—As the outcome of negotiations carried on by the Canadian Trade Commission for the past month, the timber controller of Great Britain will purchase in Canada half a million standards of lumber, equivalent in the Dominion to one billion square feet. The lumber, which is to be of all grades, will be bought under the direction of the timber controller through British brokerage house and Canadian timber agents in London, who will deal direct with the Canadian lumber producers. The total amount involved is $40,000,000.

Fire Prevention.—At the last regular meeting of the Montreal branch of the Engineering Institute, an illustrated address was given by Geo. H. Greenfield, of the Canadian Car Co., on "Fire Prevention," and the necessity of rigid inspection as an essential factor in the protection of property. The subject was ably dealt with by Mr. Greenfield, and every phase of fire protection and fire fighting was covered, so that little was left for the discussion that followed. From now until the first of May the Montreal branch of the Institute will meet every Thursday evening instead of the fortnightly meeting as formerly.

Where Real Value Is.—At a meeting held in the Central Y.M.C.A. last week, E. W. Beatty, president of the C.P.R., addressed about 250 boys. He impressed on his young hearers the necessity of hard work without which no man got to the top. Education, he said, was essential in the present age, and stated that a man from his shoulders down was worth about $2.50 per day, but from his neck upwards the value was unlimited. Where it is impossible for boys to go to day school, he emphasized the advantage of night study, and although some degree of sacrifice was needed, the education acquired would be fully realized in later years.

Nova Scotia's Output.—Figures on the estimated output of Nova Scotia during the year give the following returns:

Coal	$26,250,000
Coke and by-products	6,150,000
Gold and other minerals	220,000
Gypsum, limestone, etc	825,000
Building materials and clay products	550.000
Iron and steel products	22,400,000
Fisheries	11,650,000
Manufactures, ships and freights	58.340,000
Products of the farm	42.680,314
Products of the forest	5,400,000
Game and furs	500,000
Grand total	$174.965.314

Appoint Committee.—The Council for Scientific and Industrial Research has appointed a sub-committee consisting of Dr. R. F. Ruttan, of McGill University, and Arthur Surveyor, C.E., of Montreal, to confer with the Montreal Board of Trade and Chambre de Commerce in regard to the establishment at Montreal of a bureau of technical and commercial information. While no definite action has yet been taken, the scheme provides for a reference library of scientific, trade

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New Incorporations. — Incorporation has been granted to the following: The C. H. Doerr Co., Limited, Kitchener, capital $250,000; R. Stewart, Son & Cunningham, Limited, Ottawa, capital $50,000; The Bannockburn Clothing Co., Limited, Montreal, capital $50,000; Canadian Government Merchant Marine, Limited, Toronto, capital $1,000,000; Canadian Voyageur, Limited, Toronto, capital $100.000; Canadian Pioneer, Limited, Toronto, capital $100,000; Forhans, Limited, Montreal, capital $100,000; Modern Creamery Company, Limited, Montreal, capital $2,000; Bock & Tetreau, Limited, Montreal, capital $40,000; Canadian Braid & Trimming Co., Limited, Montreal, capital $50,000; The Smart Turner Machine Co., Limited, Hamilton, capital $200 000; Vandeweghe, Limited, Montreal, capital $49,000.

Plants Not Sold.—None of the Munitions Board war plants have as yet been disposed of by Home Smith, in whose care they were entrusted. Mr. Smith says that perhaps in about a fortnight there may be some definite move. Asked if he would dispose of the various plants by auction Mr. Smith said he had not yet decided.

Labor in Montreal.—That the cessation of war munitions activities is resulting in a considerable amount of unemployment and that there are now many skilled and unskilled workers who are unable to procure employment, was the statement made by Mr. Joseph Ainey, director of the Quebec Provincial Labor Bureau. "As far as domestic labor is concerned,' he said, " we have always a call for it, and can place anyone who wants a job, but the industrial market shows a surplus of labor in comparison with the demands."

Seeking Employment.—Increasing difficulty is being experienced in placing men in positions in Toronto and vicinity. There are still large numbers of inquiries for men for manufacturing plants and for lumbering, and many who do not require help at present have indicated that positions will be open in a few weeks or months. The stream of men seeking employment is much larger than at any time since the end of hostilities, and the probability is that even more will be in search of work during the next two months. During December the Government Employment Bureau was not unusually busy, but at the turn of the year a noticeable increase was experienced. The best avenue for disposing of labor at present is for farm work. The demand for agricultural workers is very good for this time of year. Quite a number of men have signified their willingness to go to the land, and farmers have been coming in to the city to secure help. Quite a percentage of the men taking up farm work are married.

Montreal Fire.—Fire completely destroyed the auto and wagon plant of Jennings Co., 15 Wellington Street, Montreal, on the afternoon of January 12. About 150 automobiles were stored or being repaired at the time, and all of these will be a total loss. Among the cars destroyed were nine ambulances for the Canadian Government, just about ready for shipment. Considerable damage was also done to adjoining property. The total loss is estimated at a million and a quarter, Jennings & Co. suffering to the extent of over a million dollars. Other firms' losses are: M. B. Steine Co., wholesale boots and shoes, $20,000; McClary Mfg. Co., $20,000; S. J. Carter, wholesale grocers, $20,000, and Hudson Bay Co., slight damage. The origin of the fire, according to officials of the Jennings Co., is thought suspicious; information in their possession led them to believe that an attempt of an incendiary character might be made against the plant, and a few weeks ago military protection was asked, as the firm was engaged on Government contracts.

On Eastern Trip.—Mr. Cribbs, representing the E. Pullan Co., of Toronto, has recently returned from an extended trip through Eastern Canada, covering particularly the Maritime Povinces. He reports that a large number of the shops that had shell contracts have not other lines ready to turn to and at present are simply marking time, and clearing up the last traces of shell work around the premises. In a couple of cases that came to his notice there were communities to which shell work had attracted larger numbers than could be absorbed in normal times, and there was naturally quite an exodus of people from these communities at present. Even some shops that had well established lines were finding some difficulty in returning to them immediately. They had been devoting a great deal of attention and shop room to the turning out of munitions, and it will take some little time for them to get things in shape for the production of their old lines again. The feeling seems to be that after the first four months of the present year things will begin to show a very decided improvement in a good many lines.

Looking for Business.—Ernest Crabtree, president of the Dominion Machinery Co., 110 Church Street, Toronto, leaves for England on January 20th via S.S. Olympic, with a view to securing contracts for Canadian manufacturers, and will open a place of business in London, England. Further announcements will be made regarding the address when Canadian manufacturers, who anticipate catering to export trade may communicate. Business will be carried on as usual at 110 Church Street, Toronto, where additional English lines will be represented. Mr. Crabtree, speaking to CANADIAN MACHINERY, stated that he was taking over an agency for the Knight Metal Products chuck, goods of the Superior Machine Co., and the Westman Machine Co., of London, Ont., as well as the grinders sold by the Dominion Machinery Co. He also represents the Positive Clutch & Pulley Co., of Aurora, and the Elliott Wood Worker, made in Toronto. Mr. Elliott, of this company, is going overseas with Mr. Crabtree, to demonstrate this machine, a portable one largely used by contractors. A warehouse will be opened in London as well as Toronto, and Mr. Crabtree is satisfied that there is sufficient business in sight to warrant his undertaking.

Making Emery Wheels.—In the manufacture of emery wheels one might imagine that the various degrees of hardness were achieved by varying the amount of "firing" to which the wheels were exposed. The baking process, as a matter of fact, has nothing to do with it. All degrees of grinding emeries, from very soft to very hard ones, can be baked in the same furnace at the same time—the different qualities being determined before "firing" by varying the proportion of bonding material and the abrasive element: the harder wheels, of course, having the higher percentage of abrasive. The fineness or coarseness of the stone is, of course, determined by screening the abrasive material, and ranges from coarse sand to the fineness of flour. Emery is mined largely in the Island of Crete, and in Turkey. The war, in stopping shipment from the Mediterranean, stimulated the invention of substitutes, and the Canadian and American laboratories have produced abrasives which many consider better than the emery they are meant to replace. We in Canada never had to wear paper clothes, or drink turnip coffee, but we surely have learned new uses for many odd materials, and many odd uses for new materials.

Exhibit of I.M.B.—Before the Imperial Munitions Board passes out of existence it is having made an exhibit of the work that was carried on in this country under its direction. The space occupied will be about 70 feet long and will be in the form of three steps. One of these exhibits will go in the Dominion Archives at Ottawa, another goes to Montretal and the third to Toronto. Material for these displays have been collected at Ottawa, and the work of putting them together is well under way. There will be, in shells, a display of the British types from the 15 pr. to the 9.2, and in the American from the 75 mm. to the 9.2. From the Dominion Arsenal will be shown cartridge cases, fixed ammunition and small arms ammunition, as well as American and British fuses. Certain styles of inspection gauges will be on exhibition, but it would be impossible to show all the various types of gauges that were used in inspection at different times. Four models of wooden ships will also be shown, the models being about six feet in length. There will be only a small display in airplane work, as there are so few models available. One, which is the property of Brig. Gen. C. E. Edwards, director of inspection in Canada, has been turned over to the exhibit that is to be placed in the Dominion Archives at Ottawa. Included will also be exhibits of T.N.T.,

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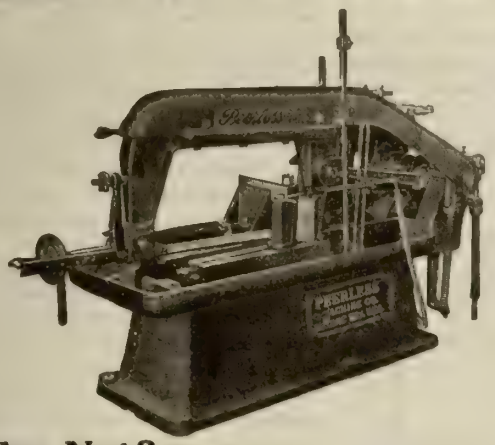

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gun cotton, cordite, etc., but these dangerous things will not be exhibited in reality. Rather will they be imitated, and this work has been very successfully carried on, and is practically completed now. The I.M.B. exhibit will also show the minerals that have been used largely in the war work, including lead, copper, tungsten, etc. Each shell and other piece of work will be labelled showing the value of that product turned out. The latest figures will be used, and it is believed that the total production of munitions, etc., in Canada will be shown to have been in the neighborhood of $1,116,000,000.

MARINE

Victoria, B.C.—The boilers for the twenty ships being built for the French Government by the Foundation Company will be made by the Vulcan Iron Works. The order amounts to about $1,000,000.

Vancouver. B.C.—J. J. Coughlan says British shipyard interests are already under-bidding British Columbia builders, and that there will be keen competition between shipyards here and the Old Land as soon as the present tonnage shortage is overcome.

New York.—United States shipping men are beginning to feel some anxiety with regard to the future. They are convinced that very keen competition will have to be met with the other maritime nations, especially Great Britain. After expending $3,000,000,000 in the construction of shipyards, in building and equipping ships, it is far from a certainty that the United States can compete successfully with the merchant marines of other nations.

Toronto.—On December 11th, 1917, the waters of Toronto bay were frozen over and remained so until April 5, 1918, when the ice broke up and moved out through the eastern and western channels to the lake. There was some indication that it might again freeze over Saturday, but the rise in the temperature kept it clear.

In 1913 the waters of the bay did not freeze until January the 13th, and remained so until March 20th. The following are the records for the past ten years:—

Frozen	Cleared
1908—On Dec. 14	March 29, 1918
1909—On Dec. 27	March 27, 1909
1910—On Dec. 10	March 20, 1910
1911—On Jan. 6	March 31, 1911
1912—On Jan. 9	April 16, 1912
1913—On Jan. 13	March 20, 1913
1914—On Dec. 15	April 2, 1914
1915—On Dec. 26	April 2, 1915
1916—On Dec. 27	April 3, 1916
1917—On Dec. 11	March 28, 1917
1918—	April 5, 1918

Yarmouth, N.S. — The new schr. George Melville Cochrane was launched at Port Greville on Tuesday, Dec. 31. She is 820 tons register, has two decks, is fitted with stockless anchors, gasoline hoisting power and is classed in Bureau Veritas for 13 years. She is one of the largest and finest vessels ever built at that place. She has been sold to Adam B. MacKay, of Hamilton, Ont., and will be towed to St. John where she will load for a southern port.

Ottawa.—The Canadian Government Merchant Marine, Limited, has been incorporated with a capitalization of $1,000,000. The head offices of the company will be in Toronto. Those mentioned in the letters patent as being incorporated are Gerard Ruel, barrister-at-law; Lorne William Mitchell, Treasurer; Wilfred Bankart Langmore, Solicitor; Charles Durno Cowie, Secretary, and Frederick Joseph Buller, Paymaster, all of Toronto. The new company is authorized to own and operate steamships and water craft of every description; to acquire all structures, buildings, hotels, shops and equipment necessary to operate, docks, wharves and harbor facilities, and generally is given full authority to take any steps necessary for the carrying on of its work. Announcement was made by the Minister of Marine, early in November, that it was the intention of the Government to place the operation of Government shipping under corporate control, in co-operation with the Canadian National Railway System.

Owen Sound.—The tug Harrison returned to Owen Sound Dec. 27th, after one of the most eventful trips that she ever had. She was engaged in towing half of the steamer Atikokan to Kingston and when near Port Colborne she burst a steam pipe and the chef, Landon Taylor, was scalded to death by escaping steam, and the engineer, Mr. Robertson, was badly scalded. She delivered her tow at Kingston and started for Owen Sound, expecting to reach that port before Christmas, but on account of heavy weather, snow, and the fact that all the aids to navigation were withdrawn, it was found necessary to put into Harbor Beach, Mich., and wait there for favorable weather. The Harrison is under command of Capt. Waugh and is one of the strongest and staunchest tugs on the lakes. She will winter at Owen Sound.

London.—Mines and mine fields were rendered obsolete by the developments of the "Paravene," the invention of Lieut. Burnley, and consistently urged upon the British navy by Admiral Sir Hedworth Meux. This instrument was officially adopted by the navy early in 1916, and was so successful that special factories were built for its construction. It is now learned that the British Grand Fleet on several occasions pushed right into the Bight of Heligoland, which, if mines meant anything, would have been a death-trap for ships. German experts never solved the mystery. From the time of its adoption to the close of the war, only two warships were reported having been sunk by mines. The most recent use of the "Paravenes" was on the occasion of British war-ships entering the Baltic through a closely mine-strewn area. The steel wire mooring ropes of the mines are said to have been cut by the "Paravenes" as easily as string is cut by scissors.

PERSONAL

Thomas P. Orchard, formerly production manager on the Browning machine gun tripods, with the New Britain Machine Co., New Britain, Conn., has joined the Service Engineering Co., planning and quantity production specialists, 25 Church St., New York City, as sales engineer.

Walter V. Turner, manager of the engineering department of the Westinghouse Air Brake Company, of Pittsburgh, and an inventor of note, died following a brief illness. Mr. Turner had more than 400 patents granted for various inventions. One of these, the "K" triple valve, is said to be valued at $28,000,000.

G. H. Duggan has been appointed to the presidency of the Dominion Bridge Co., to fill the vacancy created by the retirement of Phelps Johnson, the former president. Mr. Duggan has had a long service with the company, and for the past several years has acted in the capacity of vice-president and managing director, and has been closely associated with most of the important developments and extension of the Dominion Bridge Co. Mr. Johnson will remain on the board of directors of the Bridge Co., and will also serve on the executive committee.

In the death of Julius E. Waterous, which took place at his home, Bonnythorpe, Brantford, on January 11, the city lost one of its industrial leaders. He was one of the founders of what is now the Waterous Engine Works, one of that city's largest industrial plants, with which he was connected as mechanical manager and vice-president until he organized the Waterous Works, which he successfully conducted until he retired from active business in 1910. He was seventy-five years of age at his death. He is survived by his wife, formerly Miss Annie Van Someren, and two sons, Reginald and Bertram, who have just returned from overseas, where they were connected with the Canadian Artillery. Among the works with which Mr. Waterous was connected were the waterworks plants at Windsor, Orangeville and Lindsay, constructed under his supervision, following the installation of waterworks in his home city, the first in Canada.

MUNICIPAL

Hamilton.—Industrial Commissioner C. W. Kirkpatrick announced that he was moving in regard to having a deputation wait on the Government at Ottawa soliciting the establishment in Hamilton of a terminal elevator with a minimum capacity of a million bushels of grain. The agitation for such an elevator in the province has been going on for some time and is fostered by Hon. G. S. Henry, Minister of Agriculture in the Ontario house. Mr. Kirkpatrick believes that Hamilton will have stiff opposition, principally by Toronto. It is believed that representatives from other sections of the province will oppose both Toronto and Hamilton and urge the location of the elevator in a grain growing section.

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The Financial Post on "Bolshevism"

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Besides the terse, incisive article of which the above sentences are a part,

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President Peacock Tells of Barcelona Company's Position on Radial Issue
Manufacturers and Problems of Demobilization
Case for Bell Company is Concluded
Prosperity From U.S. Banks From War Financing
Meeting the Foreigner on Good Terms
The Development of Industry by Science
Big Drop in Municipal Bond Sales Last Year
National City Co.'s Plans for Canada
Speculation as to Trend of Prices in Bond Market
Real Estate at Medicine Hat
Desire for Show Causes High Rents
Surtax Levied by Montreal on Public Utilities
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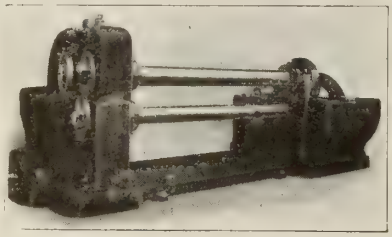

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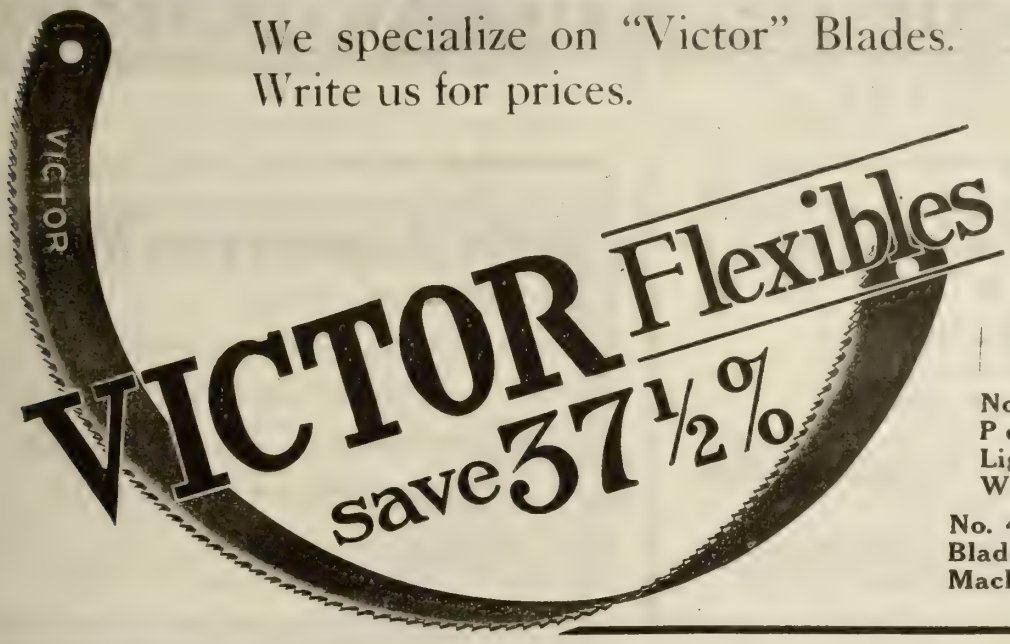

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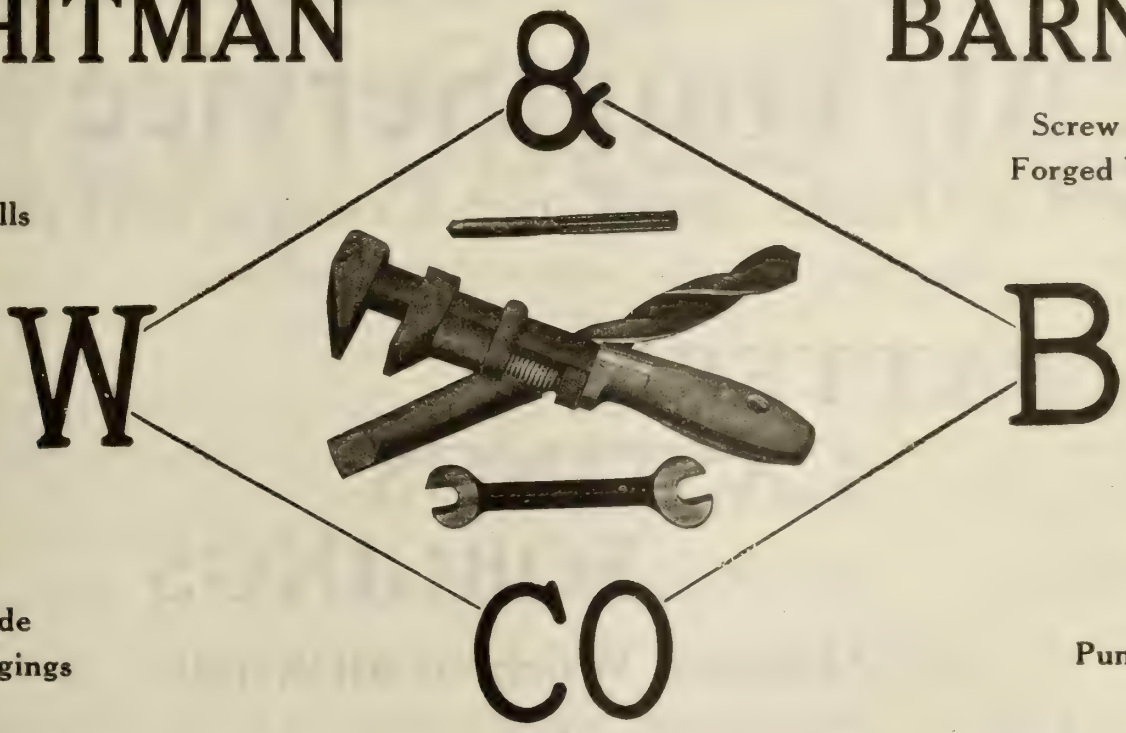

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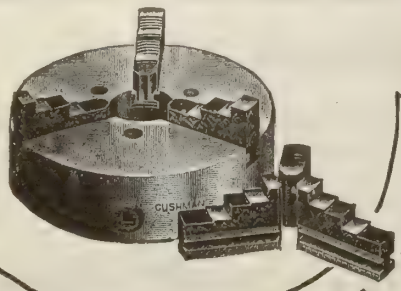

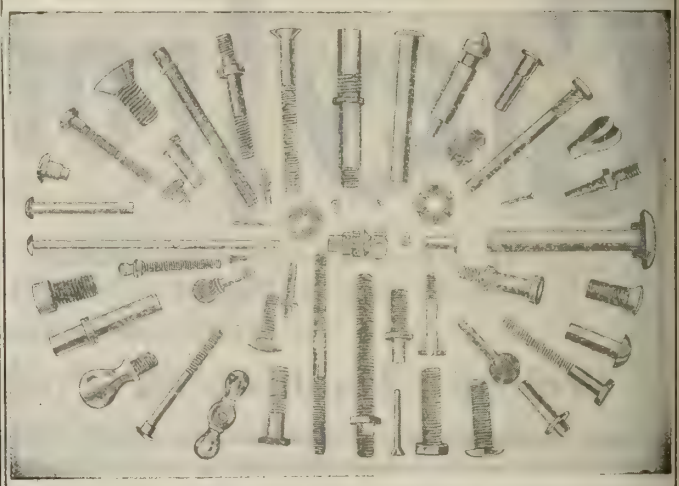

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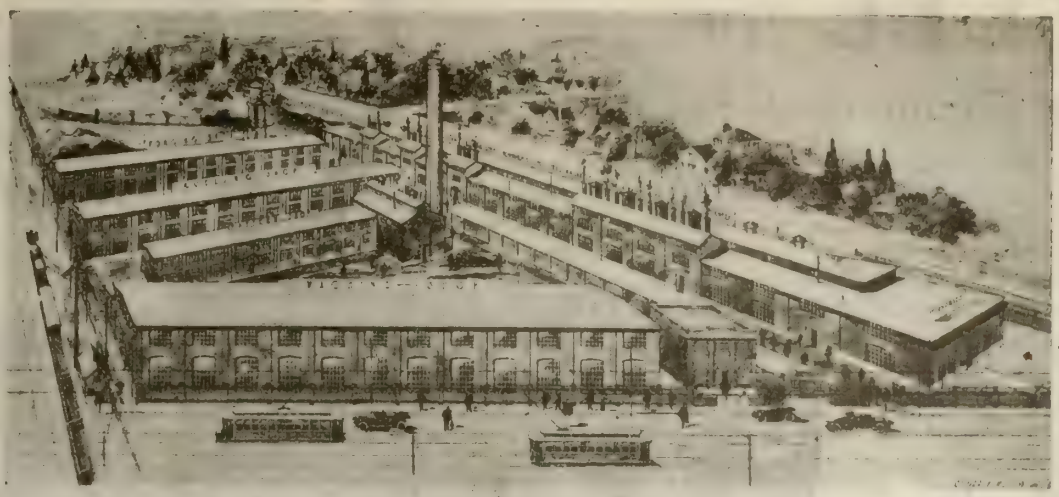

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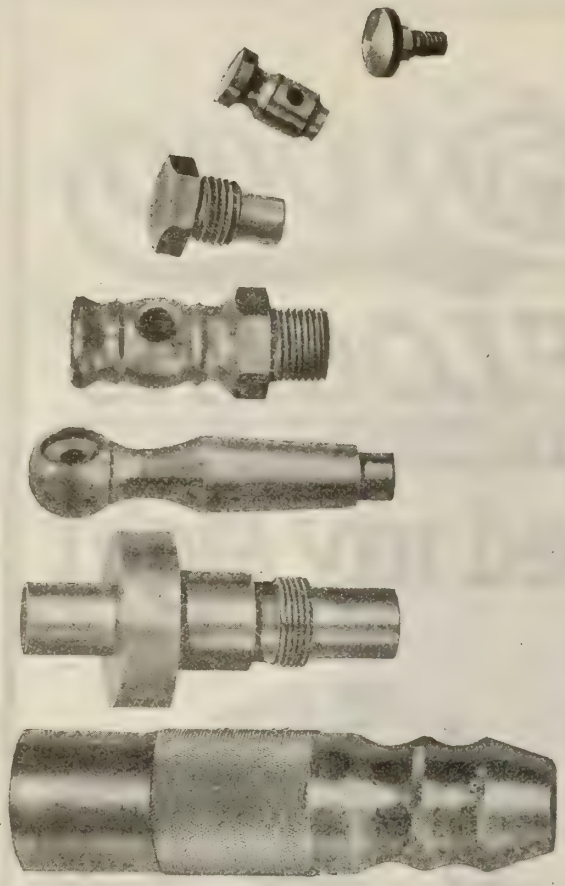

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To these Pieces on

ACME AUTOMATICS

IN THE TIME OF ONE OPERATION. IN SIZES UP TO 3¾" dia.—11" long.

Production that is continuous, economical, automatic and consistently accurate.

Complete data concerning the ACME MULTIPLE SPINDLE AUTOMATIC SCREW MACHINE will be sent on receipt of Samples or Blue-prints. Send for Acme Bulletin.

The National Acme Company

New England Plant WINDSOR, VT. **Cleveland, O.** Canadian Screw Plant MONTREAL, P.Q.

Branch Offices:

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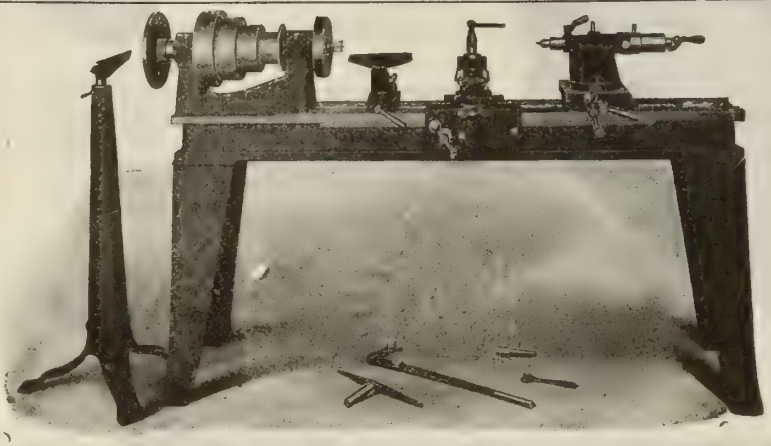
Makers of Gridley Single and Multiple Spindle Automatics at Windsor, Vt., and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, O.



A Favorite—

Blount Pattern-makers' Lathe

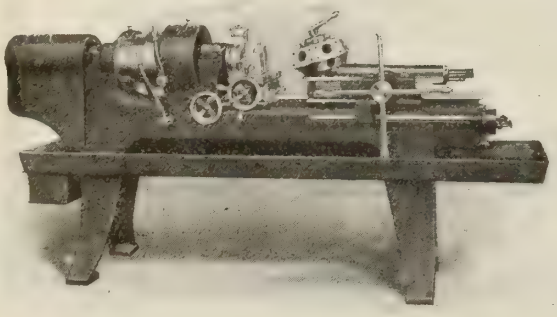
FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catalog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY
EVERETT, MASS., U.S.A.

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



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OR

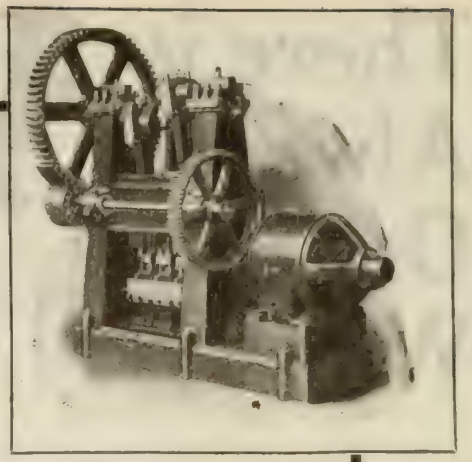
ASK THE USER

FIFTEEN YEARS OF SATISFIED USERS

WOOD TURRET MACHINE CO.
BRAZIL INDIANA U.S.A.

Heavy Duty Triplex Pumps

BELT DRIVEN OR DIRECT CONNECTED



DIRECT CONNECTED OR BELT DRIVEN. ANY PRESSURE UP TO 5,000 POUNDS, SIZES AND CAPACITIES UP TO 4½ IN. x 14 IN.—125 GALLONS PER MINUTE.

ALSO FULL LINE OF

HYDRAULIC PRESSES, ACCUMULATORS, VALVES AND FITTINGS FOR MUNITION PLANTS AND ALL OTHER PRESSING USES.

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OUR SKILLED ENGINEERS ARE AT YOUR SERVICE TO HELP WORK OUT YOUR PRESSING PROBLEMS

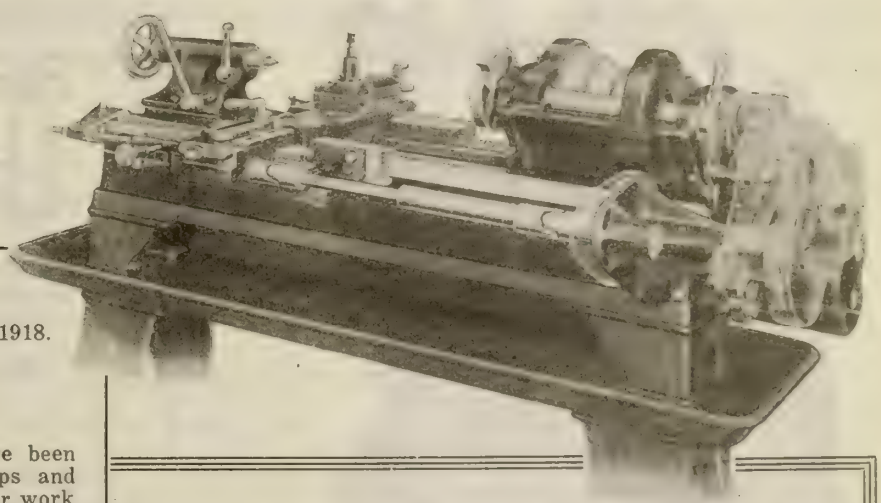
The Hydraulic Machinery Co., Limited

MONTREAL CANADA

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th, 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

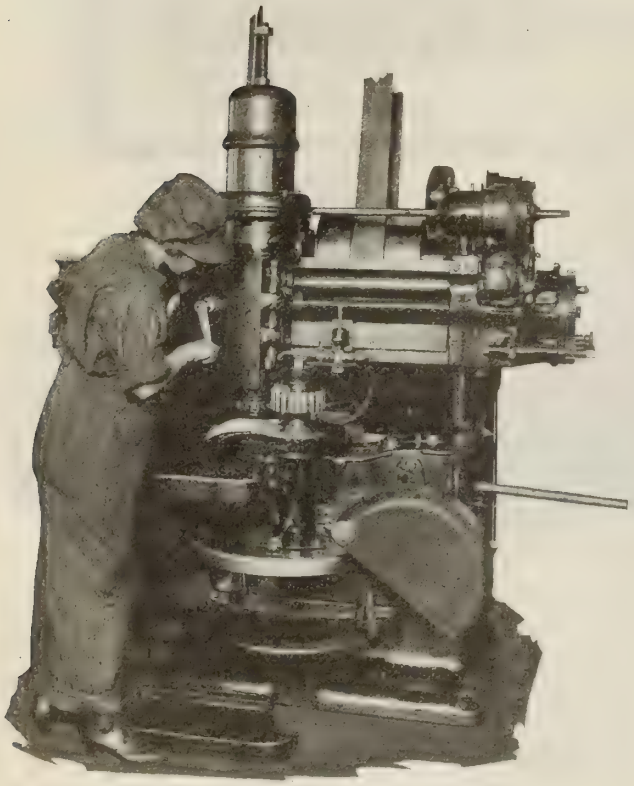
MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

There is Always One Best Way

And with our large and varied equipment we can place YOUR JOB on the BEST machine for its particular requirements.



Cutting Tractor Transmission Gears on Fellows Gear Shaper

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GREY IRON AND BRASS CASTINGS

We have the facilities, the men and the equipment to do your work and do it right. Quick service—right prices.

Send us your specifications when in need of SPECIAL MACHINERY.

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TOMCO Bearings

These bearings give matchless satisfaction and last a lifetime. Used for heavy or light service. Give them a trial.

We do all our work, and can guarantee everything that leaves our shops. Enquiries promptly answered.

Tolland Mfg. Co., Limited

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2

"Strictly Up to You"

is the duty of so guarding dangerous machinery that even a careless workman can't get hurt or killed.

Heavy damage suits and useless regrets are avoided by installing inexpensive DENNIS Machine Guards. Make your plant safe!

Dictate us a letter to-day.

THE DENNIS WIRE AND IRON WORKS CO. LIMITED

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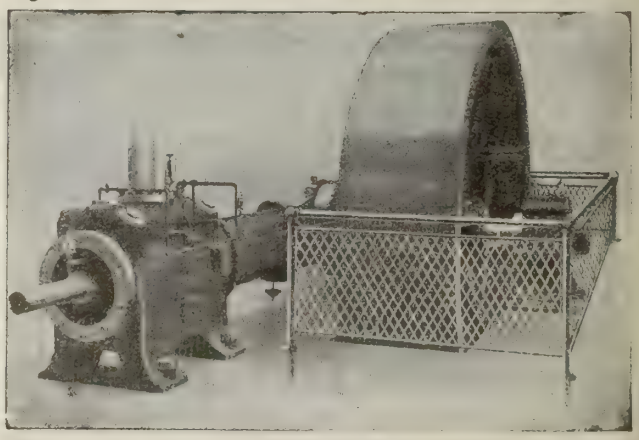

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guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
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Tool and Gauge Work

Our present equipment, which is unexcelled in Canada, enables us to produce Thread Gauges, Tools, Dies, Jigs, Fixtures and other gauge work upon short notice.

Our usual guarantee of quality supports our claims.

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ESTABLISHED IN 1910
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Automatic Machinery
for all purposes
Punch Press Work
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Consult us on your machine problems

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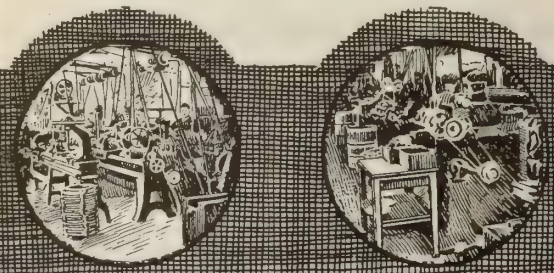

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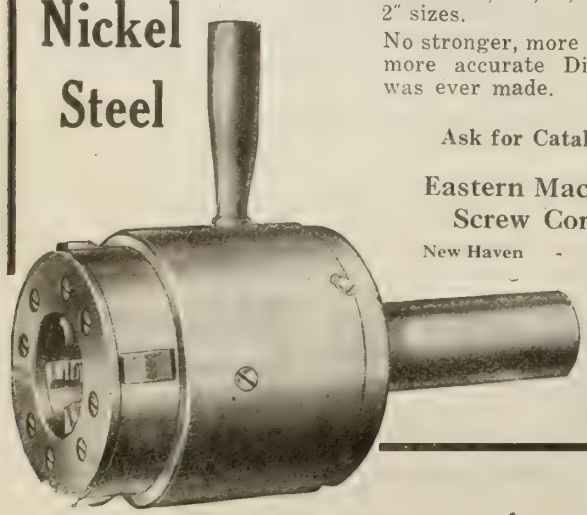
Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel



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Eastern Machine Screw Corp.
New Haven - Conn.

USED STEAM ENGINES
FOR SALE

One Left-Hand Improved Horizontal Simple Automatic Laurie Corliss Engine.

Diameter of Cylinder	28"
Length of Stroke of Piston	48"
No. of Revolutions per minute	75
Fly Wheel	18' x 12½" Face
Weight	40,000 lbs.
Rated Horse Power	625
I. H. P.	700
Max.	950

One 25" x 50" Left-Hand Wheelock Engine.
One 20½" x 46" Left-Hand Wheelock Engine.

These engines are in excellent condition.

Photograph and full particulars will be sent on application to

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LIMITED
Toronto, Canada

WHITCOMB-BLAISDELL

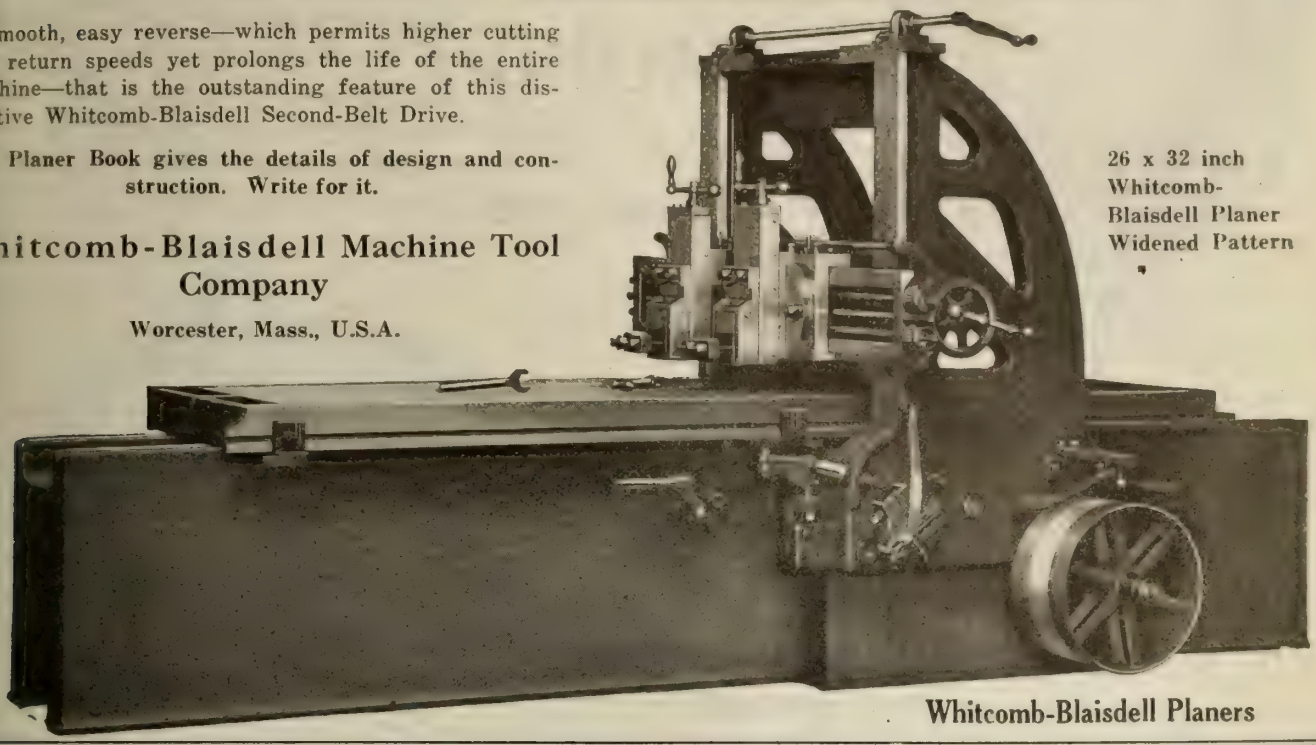
The Planer With the Second-Belt Drive

A smooth, easy reverse—which permits higher cutting and return speeds yet prolongs the life of the entire machine—that is the outstanding feature of this distinctive Whitcomb-Blaisdell Second-Belt Drive.

Our Planer Book gives the details of design and construction. Write for it.

Whitcomb-Blaisdell Machine Tool Company

Worcester, Mass., U.S.A.



26 x 32 inch Whitcomb-Blaisdell Planer Widened Pattern

Whitcomb-Blaisdell Planers

ESTABLISHED 1860

Sole Canadian Rights to Manufacture the

"HYDE"

Anchor-Windlasses

Steering-Engines

Cargo-Winches

Which have stood the test of 50 YEARS

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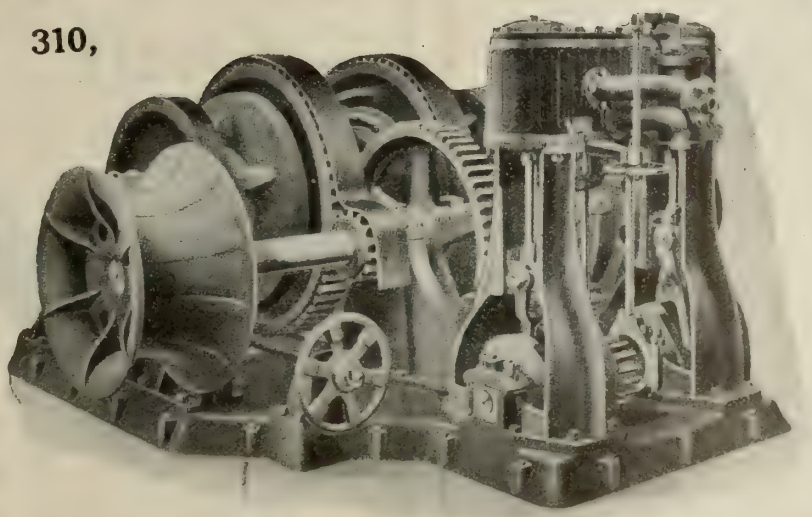

The "HYDE" Spur-Geared Steam Windlass

Propeller Wheels

Largest Stock in Canada.

Heavy Gears, Mill Repairs, Water Power Plant Machinery

Steel Castings

Manufactured by

The Wm. Kennedy & Sons, Limited

Owen Sound, Ontario

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ALMOND Chucks and Micrometers

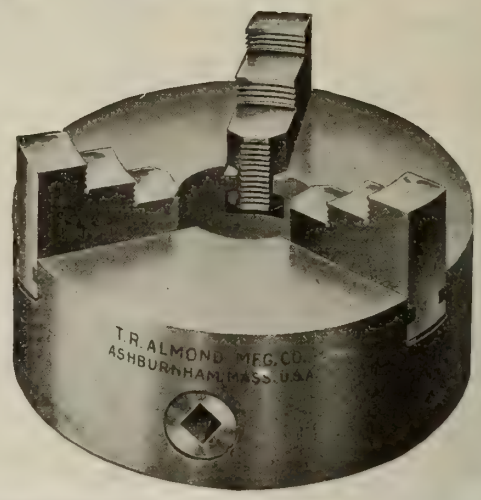
ALMOND CHUCKS ARE TOOL SAVERS

Simple to operate, powerful, accurate and durable, and cost less to operate.

ALMOND MICROMETERS recognize comparison with Johansson Swedish Gauges only.

WE are in a position to fill your wants for Micrometers, Drill Chucks (all sizes), and Lathe Chucks of the smaller sizes, 5", 6", 7½" and 9".

ALMOND MICROMETERS are to be had in English or Metric measurements—1, 2 and 3 inches—25, 50 and 75 thousandths, adjusted to Johansson Swedish Gauges.



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For Immediate Delivery

T. R. ALMOND MFG. CO.

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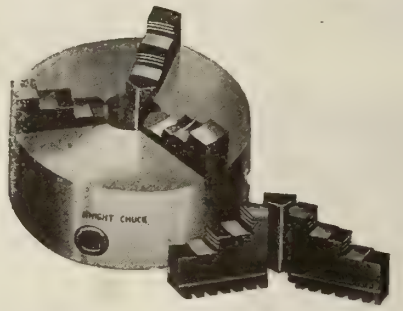


Scroll · Chucks

Three-Jaw Universal Geared

The best material obtainable is used in the manufacture of KNIGHT Chucks. First grade gray iron bodies and backs, steel scrolls, pinions, jaws and wrenches. These chucks are thoroughly tested and inspected as to workmanship, position, synchronization and finish before leaving the factory.

Knight Metal Products

LIMITED

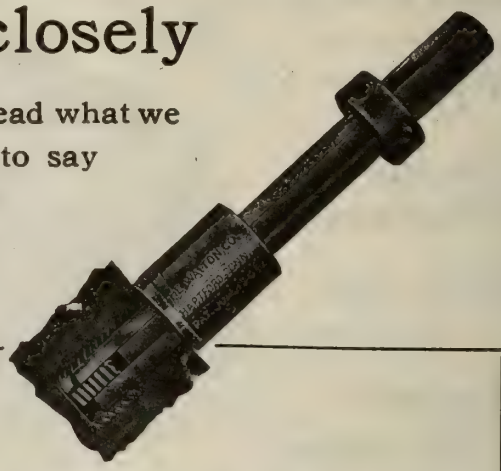
119 West Adelaide Street

Toronto, Ont., Canada

Cable: "Knightmetl"; Code, Western Union

Look at this again —closely

and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.

Don't you think it would pay to have a few lying around on your benches?

The Walton Company

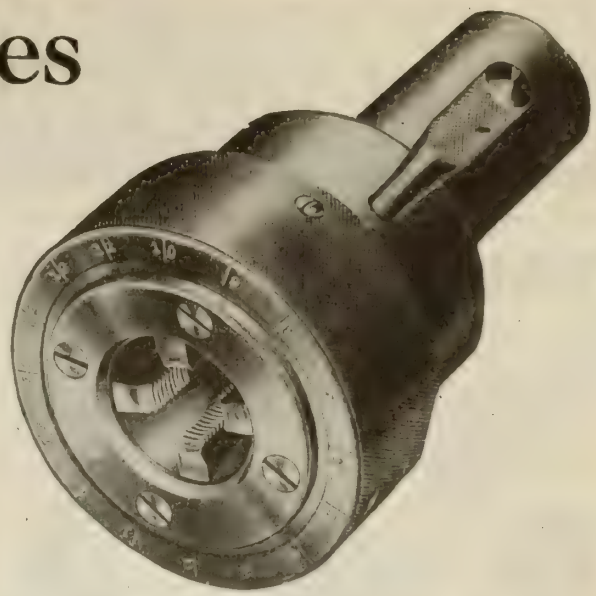
Hartford, Conn.

Quick Deliveries

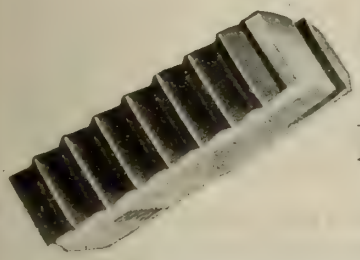
ON

MURCHEY CHASERS

We make a specialty of quick deliveries to the users of our tools, and if you'll become one of our patrons you'll find at the end of a year's time that you have saved many hours' valuable time through the quick deliveries we make on Murchey Chasers.



This saving, coupled with the great economy that always accompanies the use of **Murchey** Automatic Self-opening Dies, Collapsing Taps and Hand Sizing Taps, is a saving worth while in these days of high production costs. Use them.



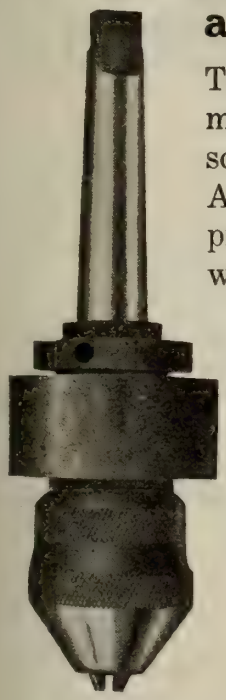
ENQUIRIES GLADLY ANSWERED

MURCHEY MACHINE & TOOL CO.

75 PORTER STREET, DETROIT, MICH.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
Fenwick Freres & Co. - - 16 Rue Fenelon - - Paris, France

Prevent Broken Taps and Spoiled Work



Tap breakage is a serious matter now owing to the scarcity of machine tools. And then there is the probability of spoiling the work as well.

The Bicknell-Thomas Friction Tap Chuck

eliminates all danger of these losses. It is simple, efficient, durable and easily adjusted. Is made in five sizes, capacities ⅛ in. to 1 in.

To prove our statement let us send you one on trial. Anyway, write for Illustrated Circular.

Bicknell-Thomas Company
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If any advertisement interests you, tear it out now and place with letters to be answered.

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MOUNTED or UNMOUNTED—Fine Quality

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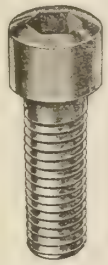
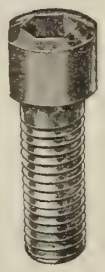
Sheet Metal Working Machinery

THE D. H. STOLL CO., INC.
BUFFALO, N.Y.



CLEAN SOCKET HOLES 30% STRONGER
THE ALLEN
UNIFORM THREADS ABSOLUTE SAFETY



Socket Head Cap Screws

Clean cut socket holes, free from chips. Accurately threaded to standard gauges. Test them where great strength is desirable.

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TRADE MARK
BRISTOL'S
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ELECTRIC PYROMETERS

FOR EVERY SERVICE

Bristol's Recording Pyrometer furnished with patented frictionless smoked chart recording system, especially valuable for processes requiring continuous heat treatment.

Simplicity of construction and ruggedness make them ideal shop pyrometers. The ONLY pyrometer equipped with Weston milli-voltmeter movement.

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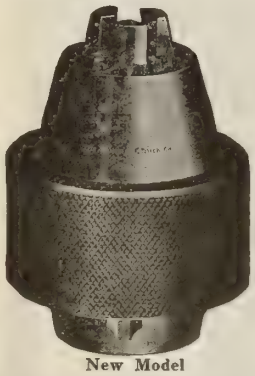
SKINNER DRILL CHUCKS



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THE LARGEST ASSORTMENT
Made By Any Manufacturer

The "New Model" is especially adapted to rapid, sensitive drilling. It is accurate, light, strong and hand operated. The price is surprisingly low. Illustrations of complete line on request.

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Main Office and Factory
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New York Office—94 Reade St.
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NEW AIR-TIGHT BLAST GATE

FOR LOW AND MODERATE PRESSURES

(Patented)

"The Air-Tight Blast Gates in use in our plant have given entire satisfaction."
CANADIAN PACIFIC RAILWAY COMPANY, Montreal, Canada.

Our NEW AIR-TIGHT BLAST GATE will save the air (**money**) you are now losing through leaky blast gates.

Circular 123-T explains its many other advantages, outlining clearly its all-around superiority over the ordinary light, flimsy, cheap, leaky and unreliable blast gates, and the heavy, cumbersome, expensive and slow-acting gate valves and stop cocks. Ask for circular and list of users.

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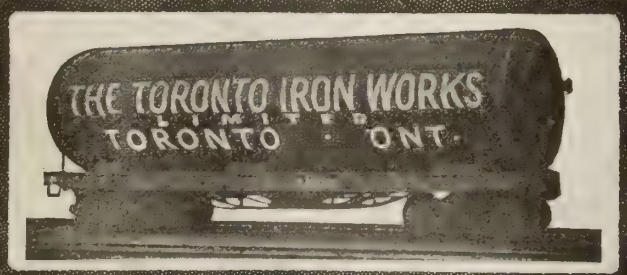

OIL STORAGE - GASOLINE TANKS - AIR RECEIVERS
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The HURLBUT-ROGERS CUTTING-OFF MACHINE

Cuts Off In Half The Time

The Hurlbut-Rogers Cutting-Off and Centering Machine is a big producer because there are TWO TOOLS instead of one, working in the same cut.
VERY POWERFUL, RIGID AND ACCURATE.
Pays its cost in savings effected in very few months.
ASK FOR FULL DETAILS.

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FOREIGN AGENTS: England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne.
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DIAMOND POINTED TOOLS

Our line comprises Diamond Pointed Tools for every industrial purpose. We are also equipped to furnish promptly special Diamond Pointed Tools of every variety. Quality products.

ORDER FROM ST. CATHARINES if more convenient. Complete stock — quick service. Goods submitted on memorandum to responsible firms.

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FOR ALL KINDS OF HEAVY LIFTING

Send for complete catalogue showing 50 styles 10 to 100 tons capacity.

Made only by **A. O. NORTON, Limited**
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LANDIS MACHINE CO., INC.
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Manufacturers of BOLT and PIPE THREADING MACHINERY

Exclusive Canadian Agents:
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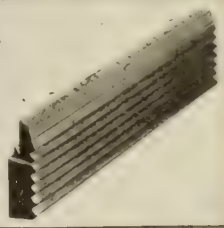

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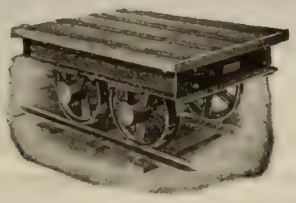
All kinds of Shop and Foundry Trucks



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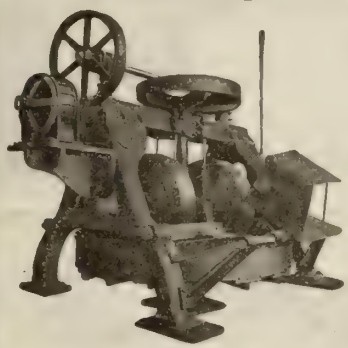
Complete Foundry Equipment

WHITING FOUNDRY EQUIPMENT CO. HARVEY-ILL. U.S.A. CHICAGO DEALER

Cranes of all Types

Canadian Steel Foundries Need Frost Improved Sand Mills



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Unloading Device
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ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.

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Fast Cutting

Powerful

Inserted Helical Blades of High-Speed Steel

For Service—Utility—Strength—Power
4-in. Diameter for General Use.

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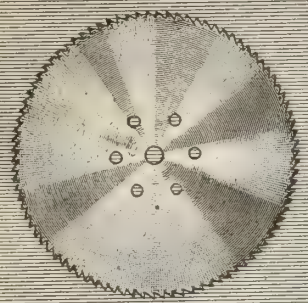

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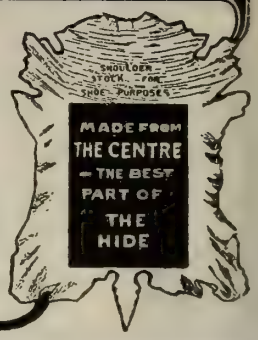

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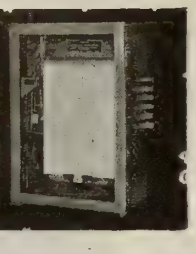

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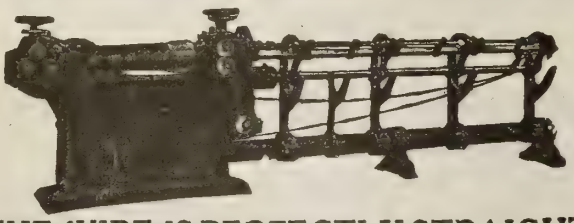

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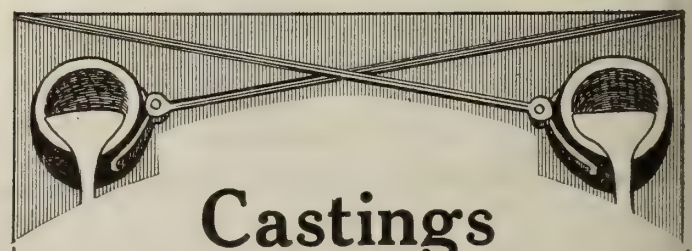

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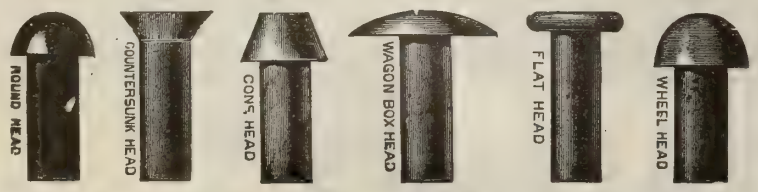

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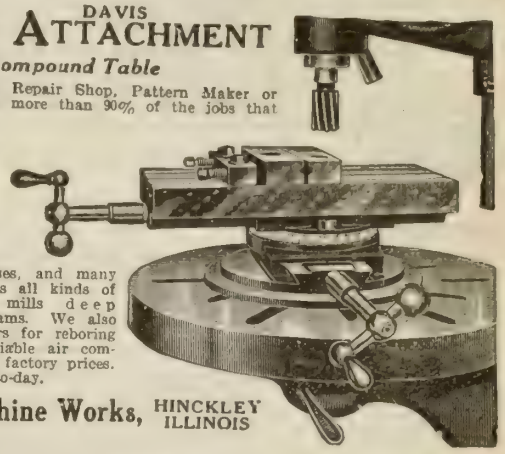
For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.



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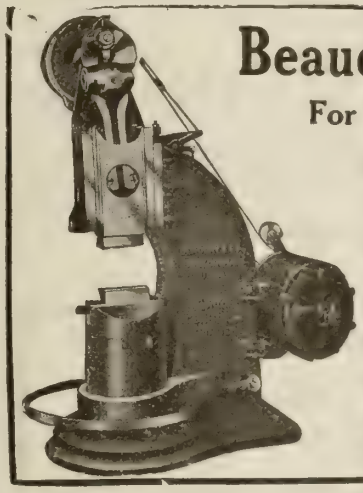

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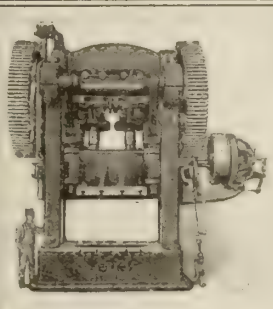

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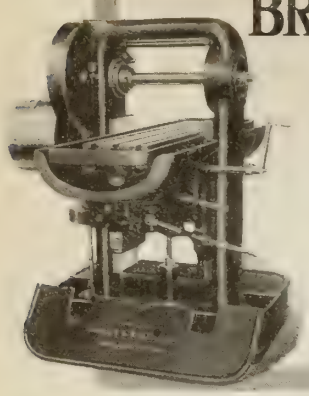

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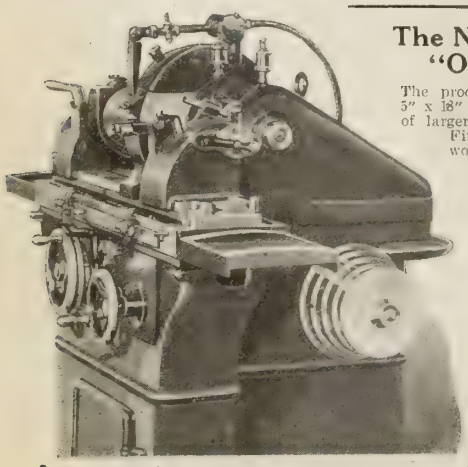

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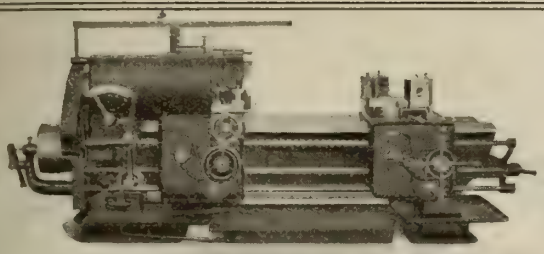

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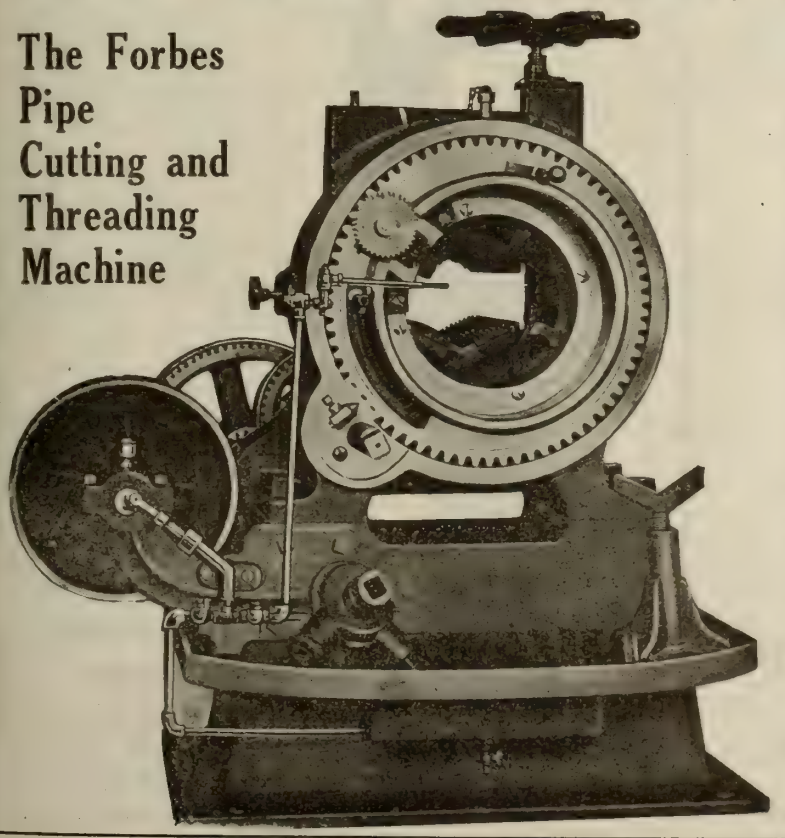

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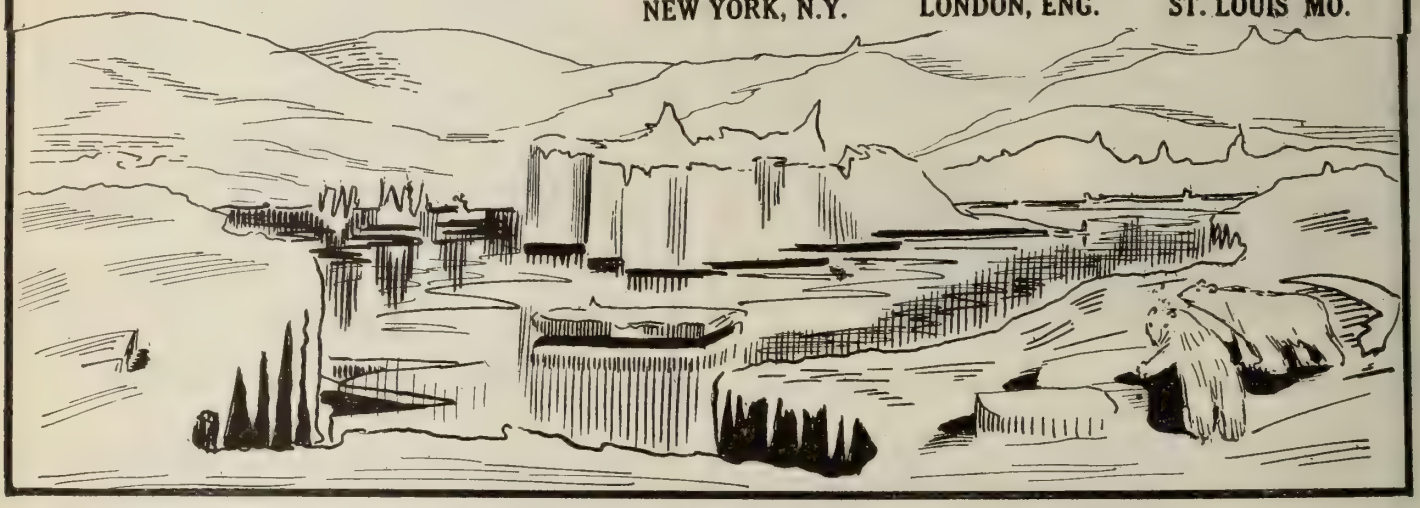

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Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.

BLASTING MACHINES, SAND
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

BILLET MARKERS
Matthews & Co., Jas H., Pittsburgh, Pa.

BILLETS
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste. Marie, Ont.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Riverside Machinery Depot, Detroit, Mich.

BLOW PIPES AND REGULATORS
Canadian Welding Works, Montreal, Que.
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.

BLUE PRINTING MACHINERY
Commercial Camera Co., Province, R.I.
Mulliner-Edlund Tool Co., Syracuse, N.Y.
Wickes Bros., Saginaw, Mich.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que.
Joyce, Koebel & Co., Inc., New York.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
Riverside Machinery Depot, Detroit, Mich.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich.
Williams Machinery Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BOLT THREADING MACHINERY
Jardine & Co., Ltd., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto
Canadian Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Gisholt Machine Co., Madison, Wis.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Niles-Bement-Pond Co., New York.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland, Ohio.
New Britain Mach. Co., New Britain, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland, Ont.

BRASS AND COPPER BARS, RODS AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.
Tallman Brass & Metal Co., Hamilton, Ont.

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.

BRIQUET-INGOTS
Eastern Block Corporation, Chicago, Ill.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co. Inc., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BRIDGES, RAILWAY AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Tolland Mfg. Co., Montreal, Que.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.

BRONZE, COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville, Ont.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananogue, Ont.

BUSHINGS, BRONZE
Oberdorfer Brass Co., M. L., Syracuse, N.Y.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

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Bliss, E. W. Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J
Brown, Boggs & Co, Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBONIZING BOXES
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal.

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Marsh Engineering Works, Belleville, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CARS, STEEL BODY
Marsh Engineering Works, Belleville, Ont.

CASTINGS, MACHINERY
Tolland Mfg. Co., Montreal, Que.
Winnipeg Iron Foundry Co., Winnipeg.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER
Algoma Steel Corp., Sault Ste. Marie, Ont.
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.
Tolland Mfg. Co., Montreal, Que.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Marsh Engineering Works, Belleville, Ont.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Tolland Mfg. Co., Montreal, Que.
Fittings, Ltd., Oshawa, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ROUGH
Tolland Mfg. Co., Montreal, Que.

CASTINGS, NICHROME
Can. Driver-Harris Co., Harrison, N.J.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
Fittings, Ltd., Oshawa, Ont.
International Malleable Iron Co. Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Wright Mfg. Co., Lisbon, Ohio.

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHESTS, TOOL
Mechanics Tool Chest Co., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Smalley-General Co., Inc., Bay City, Mich.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.

CLAMPS
Preston Woodworking Machine Co., Preston, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston, Mass.
Manufacturers' Equipment Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Riverside Machinery Depot, Detroit, Mich.
Smart-Turner Machine Co., Hamilton, Ont.

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found's & Forgings, Ltd., Welland, Ont.

CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Welland Motor & Machine Co., Welland, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS AND STARTERS
Williams Machy. Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
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MacGovern & Co., Montreal, Que.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co, Harvey, Ill.

CONVEYORS, BELT AND CHAIN
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

COPING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.
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WOULD NEVER BE SELECTED FOR A DISTANCE RUN. A TOOL MAKING OCCASIONAL SPECTACULAR PERFORMANCES HAS NO LEGITIMATE PLACE IN YOUR EQUIPMENT. THE STEADY DAY-BY-DAY PRODUCER THAT CAN ALWAYS BE DEPENDED UPON IS THE ONLY TOOL TO OWN AND, BY THE WAY,

"MORSE" TOOLS

HAVE A REPUTATION OF BEING THAT KIND

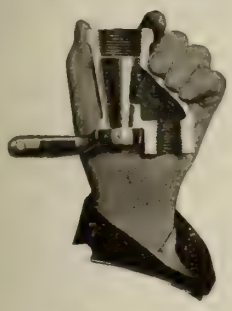
MORSE TWIST DRILL & MACHINE COMPANY

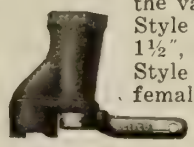
NEW BEDEORD MASS., U.S.A.

Cleco AIR HOSE Fittings

We furnish everything required from the Pipe to the Pneumatic Tool

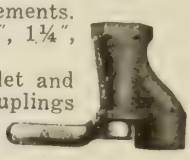
Cleco AIR SEATED VALVES, NEVER SLIP HOSE CLAMPS, MENDER CLAMPS, AIR HOSE COUPLINGS, NIPPLES, ETC.





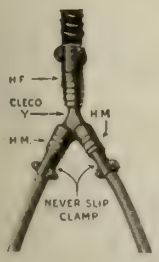
Cleco Air Seated Valves

have one-piece body valve plug and handle. No packing required as the valve plug is air-seated. Made in five sizes to suit all requirements. Style P.O., made in following sizes standard pipe thread—¾", 1", 1¼", 1½", 2", 2½" inlets and ½", ¾", 1", 1¼", 1½", 2" outlets. Style F.O. is made in one size only—1" standard pipe thread inlet and female Bowes coupling outlet and interchanges with Bowes couplings everywhere on the line or in the shop or yard.



CLECO "Y" HOSE FITTINGS

Are made in four styles with male or female outlets or inlets and interchange with Bowes male or female coupling ends; sizes ¼" to ¾" inclusive. The two "Y" fittings illustrated are the plain style. The other two styles are each equipped with a valve having same features as Cleco Air Valves described above.



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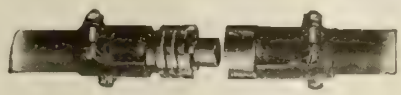
Over 2,500,000 in General Use

Instantly Connected or Disconnected



Absolutely Air Tight under all pressures

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84 Chestnut Street, Toronto, Ont.

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Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.

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Can. Link-Belt Co., Toronto, Ont.

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Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Quebec.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Quebec.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Found's & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
J. C. Wilson & Co., Belleville, Ont.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUCIBLES
Hyde Engineering Co., Montreal, Que.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLA BLOCKS
Hyde Engineering Co., Montreal, Que.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.
Elm Cutting Oil Co., Toronto.
Ontario Lubricating Co., Hamilton, Ont.

CUTTING AND WELDING PLANTS
Canadian Welding Works, Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co. Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co. Montreal.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Anderson & Co. of Can., Geo., Montreal, Que.
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

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Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.

DIES, NOSING
Marsh Engineering Works, Belleville, Ont.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.

DIE SINKERS
Becker Milling Machine Co., Boston, Mass.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

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Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Wells Brothers Co. of Canada, Galt, Ont.

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Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que
Firth & Sons, Thos., Montreal, Que.

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Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

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A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

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Swedish Steel & Importing Co., Ltd., Montreal.

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Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Ford-Smith Mach Co., Hamilton, Ont.
Wheel Trueing Tool Co., Windsor, Ont.

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W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp, Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILL RODS
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.

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John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.

DRILLING MACHINES RADIAL AND TURRETT
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
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John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Wickes Bros., Saginaw, Mich.

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Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
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Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
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Millers Falls Co., Millers Falls, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.

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Aikenhead Hardware Co., Toronto, Ont.
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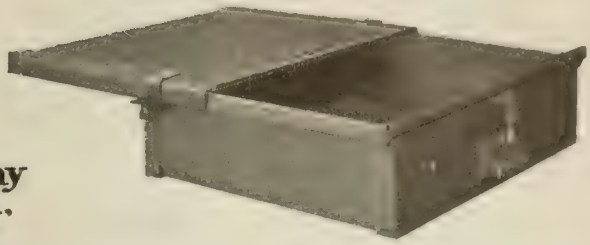

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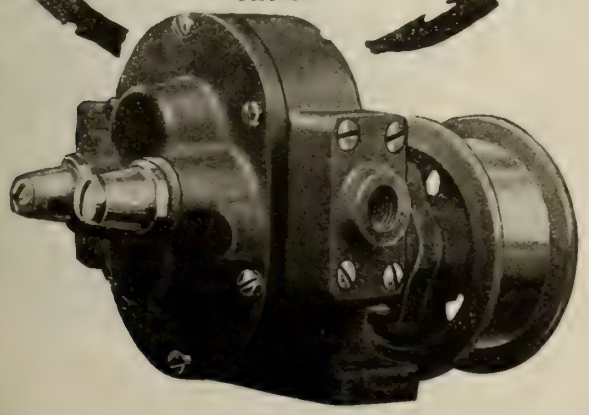

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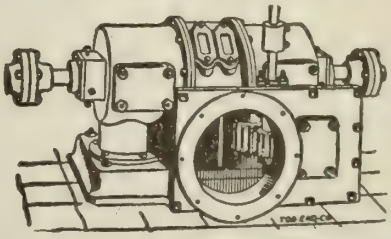

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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

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Butterfield & Co., Rock Island, Que.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Armstrong Bros. Tool Co., Chicago, Ill.
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Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Millers Falls Co., Millers Falls, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.

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Sheldons, Ltd., Galt, Ont.

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Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
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Standard Machy. & Supplies, Ltd., Montreal, Que.
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Williams & Wilson, Ltd., Montreal, Que.

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Ford-Smith Machine Co., Hamilton, Ont.

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Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
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Sheldons, Ltd., Galt, Ont.
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Page Steel & Wire Co., New York, N.Y.

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Vanadium-Alloys Steel Co., Pittsburgh, Pa.

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Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Port Hope File Mfg. Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

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FIRE CLAY
Hyde Engineering Co., Montreal, Que.

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Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

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Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

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Nova Scotia Steel & Coal Co., New Glasgow, N.S.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
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Erie Foundry Co., Erie, Pa.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.

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Hyde Engineering Co., Montreal, Que.

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Standard Fuel Engr. Co., Detroit, Mich.
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FURNACES, BRASS, MALLEABLE
Whiting Foundry Equipment Co., Harvey, Ill.

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Standard Fuel Engineering Co., Detroit, Mich.

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Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.
Strong-Carlyle-Hammond, Cleveland, O.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

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Dom. Forge & Stamping Co., Walkerville, Ont.

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Erie Foundry Co., Erie, Pa.

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Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

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Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Normac Machine Co., St. Catharines, Ont.
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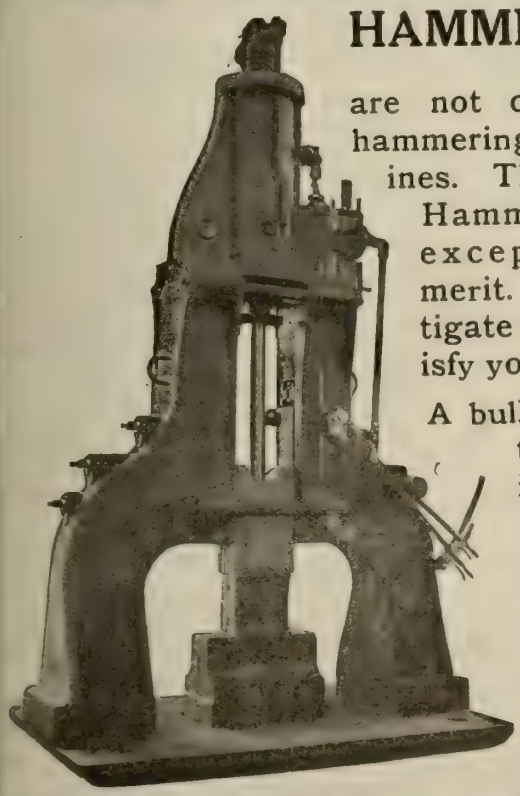

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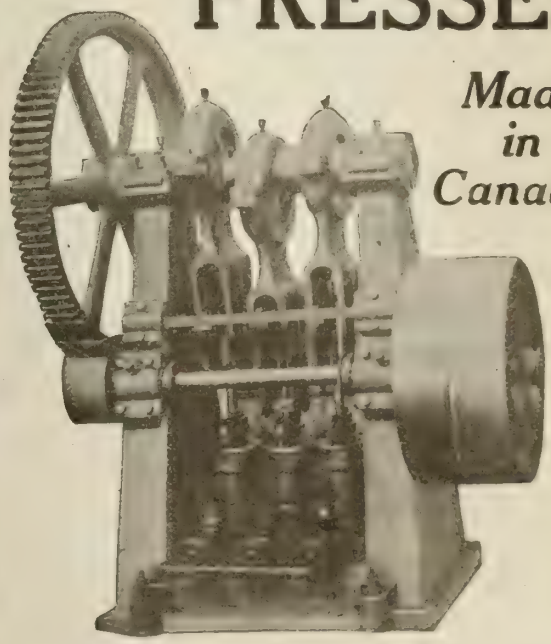

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The Financial Post on Business Government

"LET us demand that the standard of efficiency in the Government be raised to the highest possible point by the calling in of more of the business executives of the country to take the place of the arm-chair politicians who win to position by the ability to win votes rather than to serve the interests of voters. Let these men assist in the negotiations for reconstruction business from Europe, the financing of such orders on a business basis, the establishment of proper trade relations with foreign markets, the readjustment of taxation and the tariff to a more intelligent basis in relation to individual industries, the efficient demobilization of the soldier and other problems of policy, but let every individual meet for himself those other problems which concern those whose welfare depends upon him and solve them to the best of his ability. Reconstruction begins at home. Let us have confidence in ourselves."

Beside the vigorous leading article from which the above is quoted,

The Post Review and Outlook Number This Week Contains:

The following special articles prepared by members of the staff of THE FINANCIAL POST *and of associate publications in the MacLean group of Specialized Business Newspapers.*

Peace Brightens Prospects for Loan Companies.
Hydro Reviewed for Maine People.
Canadian Car Earned Enough to Wipe Out Arrears.
Want Increase Considered on Per Cent. Basis.
Imperial Oil's Plan Based on Dollars and Cents.
Smaller Net Profits by Consolidated Smelters.
Decline in Net Earnings of C. P. R.
Bank Clearings Again Ahead of Last Year.
Meeting Client on His Individual Business Ground.
Bankers Looking to the Far East.
Should Banks Buy Victory Bonds?
Using the Trade Acceptance in Retail Business.
Edmonton Bond Dealer Sentenced.
Bond Market Has Been Quiet But Very Strong.
Liquidation of Life Company May Be Probed.
N. F. U. Organizes Loss Information Service Bureau.

(SPECIAL SECTION)

The Government is Organizing a Comprehensive Machine for the Repatriation of Canada's Army.
Let Us Have Confidence in Ourselves—Editorial.
Banks Are Blazing the Trail for Development of Export Trade in Markets of the World.
Opportunity for United States to Play Part of "Big Sister" to Canada in a Financial Way.
Not So Much a Problem of Who Will Emigrate, But Who Will Prove Desirable to Canada.
The Business of Bringing the Boys Back Home.
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Bond Market Has Experienced Peculiar Year
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The Menace of the Bolsheviki! Insidious Influences Threaten Relations.
Price of Wheat and Production of Livestock.
Comparative Price Records of Canadian Securities for Past Eight Years.
Activity in Renting Workingmen's Houses and in Dealings in Farm Lands Distinguishes Realty Market.
Steel Is King When Nation Goes to War.
Canada's Exports and Their Part in Beating the Hun.
January Dividend Payments.
Canada's Part in Beating the Submarine Peril

above mentioned are a few of the more important contents of this issue of THE FINANCIAL POST. Send a subscription to THE POST and note its business value to you. Use this form in sending subscription, which is $3.00 per year.

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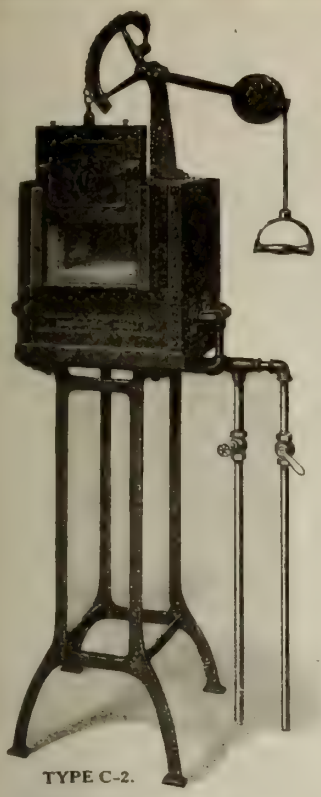

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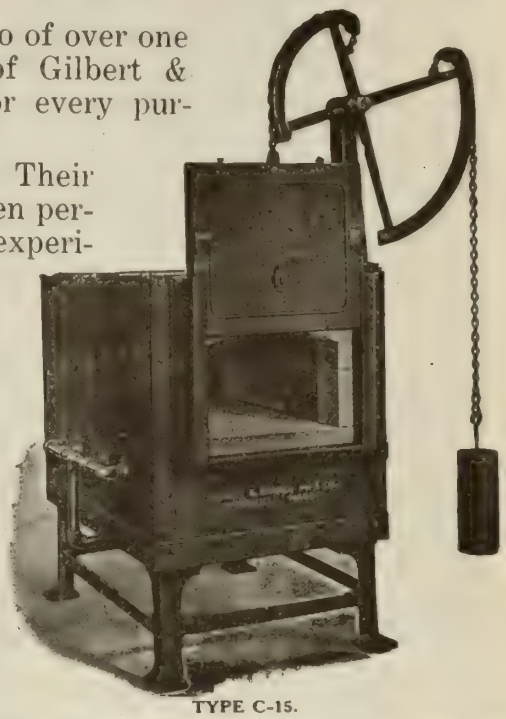
Just now we are making prompt delivery of these two types and many others. Send for Stock List 24.



TYPE C-15.

Gilbert & Barker Mfg. Co. West Springfield Mass.

Canadian Agents: Williams & Wilson, Montreal, Que.

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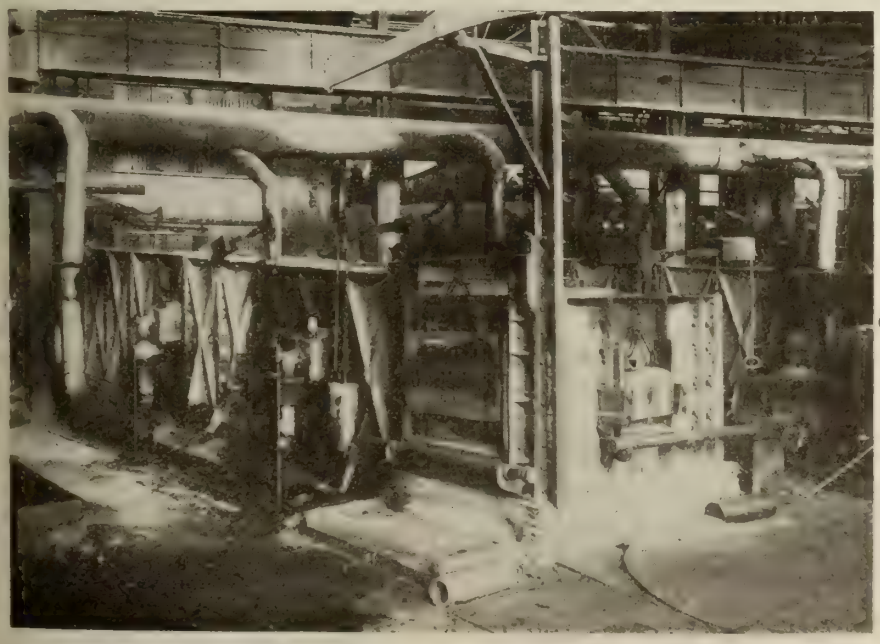
Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

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MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.

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MacGovern & Co., Montreal, Que.
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Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
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St. Lawrence Welding Co., Montreal, Que.
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Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
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Rickert-Shafer Co., Erie, Pa.
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Modern Tool Co., Erie, Pa.
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Victor Tool Co., Waynesboro, Pa.

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Landis Machine Co., Waynesboro, Pa.
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Pratt & Whitney Co., Dundas, Ont.
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TAP EXTRACTORS
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Shore Instrument & Mfg. Co., New York City.

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Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

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Deloro Smelting & Refining Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
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Williams & Co., J. H., Brooklyn, N.Y.

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Can. B. K. Morton, Toronto, Montreal.
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General Steel Co., Milwaukee, Wis.
H. A. Drury Co., Montreal.
Firth & Sons, Thos., Montreal, Que.
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Hawkridge Bros. Co., Boston, Mass.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Pratt & Whitney, Hartford, Conn.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
National Machy. Co., Tiffin, O.
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Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto.
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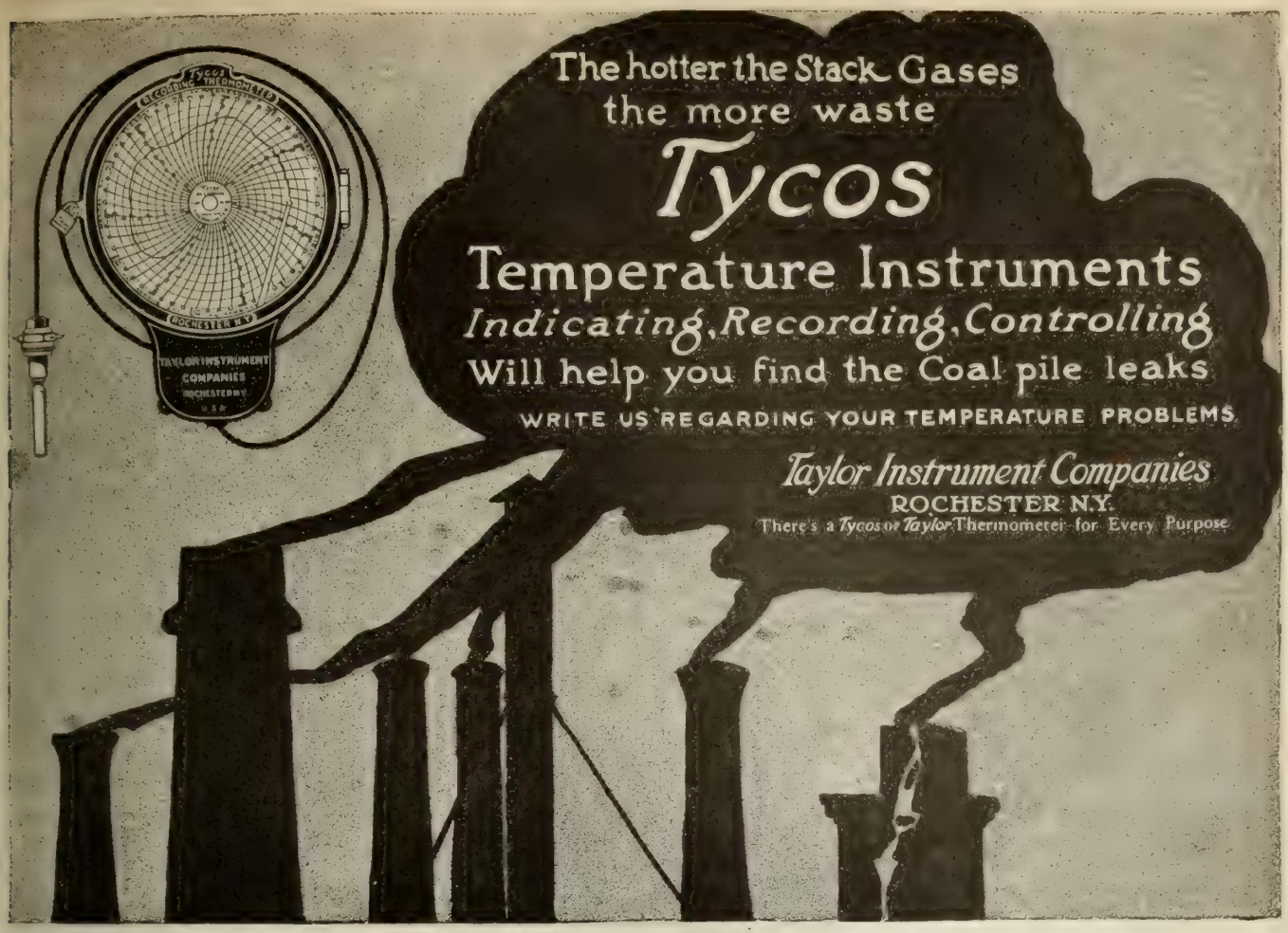

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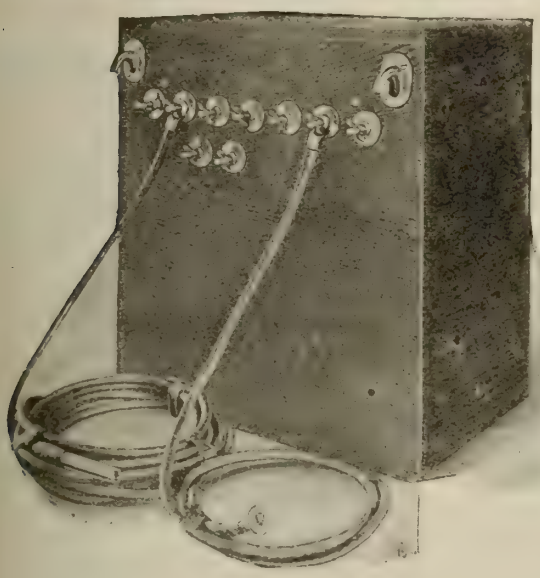

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Fox Machine Co., Jackson, Mich.
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Gooley & Edlund, Cortland, N.Y.
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Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.
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A. R. Williams Machy. Co., Toronto.

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Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
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Garvin Machine Co., New York.
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Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
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R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
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Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.

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Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.

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Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

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Williams & Wilson, Ltd., Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.
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MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.

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Pritchard-Andrews Co., Ottawa, Ont.

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NICKEL SILVER
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NICKEL STEEL
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National-Acme Co., Cleveland, Ohio.
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Wilkinson & Kompass, Hamilton, Ont.

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NUT MACHINES (HOT)
National Macny. Co., Tiffin, Ohio.

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National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.

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Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.

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OILS, DRAWING
Elm Cutting Oil Co., Toronto, Ont.

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Sheldon's, Ltd., Galt, Ont.
Smart-Turner Machine Co., The, Hamilton.

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Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

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Whiting Foundry Equipment Co., Harvey, Ill.

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Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Whiting Foundry Equipment Co., Harvey, Ill.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Oxyweld Co., Ltd., Toronto, Ont.

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Canadian Welding Works, Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
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Graton & Knight Mfg. Co., Worcester, Mass.
Gutta Percha & Rubber, Ltd., Toronto, Can.
William R. Perrin, Ltd., Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

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Hydraulic Machy. Co., Ltd., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.

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Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

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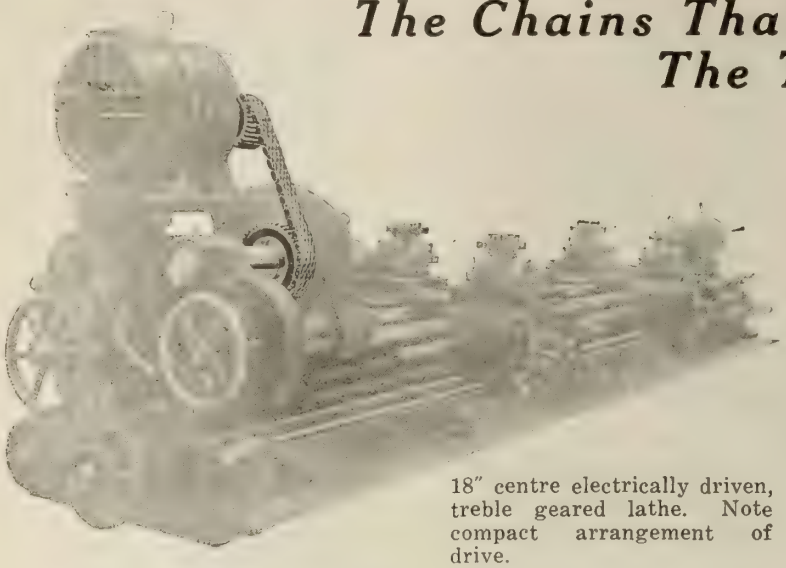

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AND MANUFACTURING NEWS

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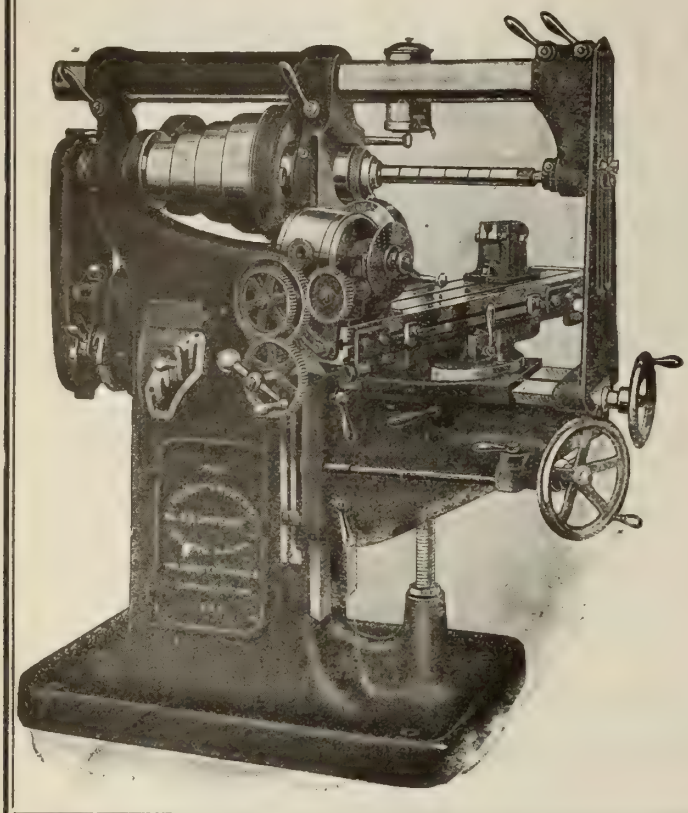

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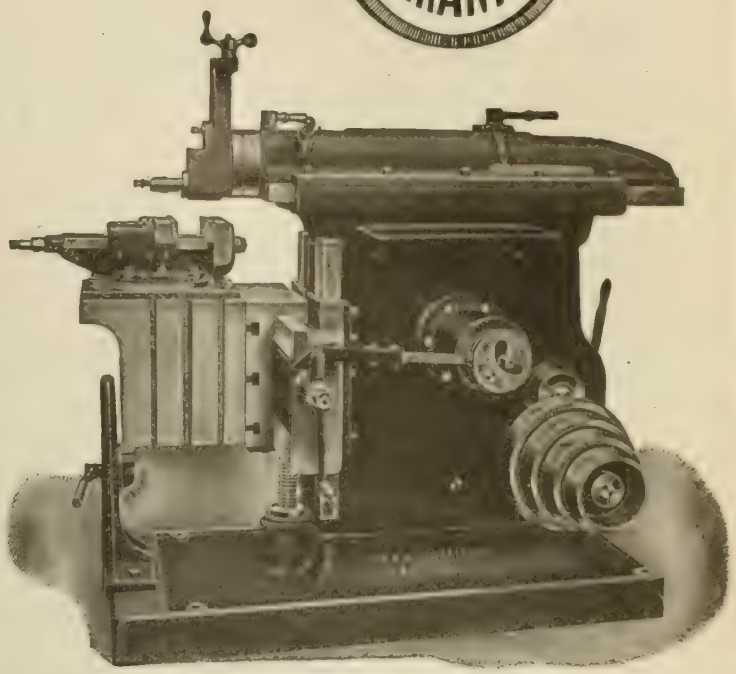

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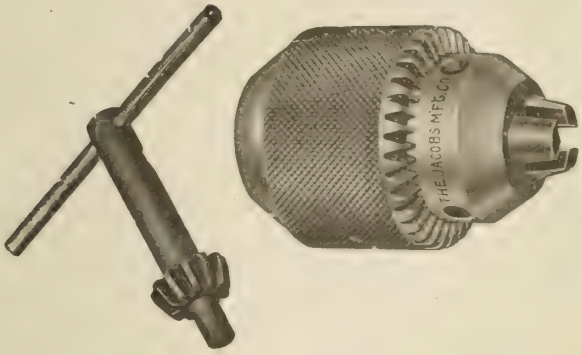

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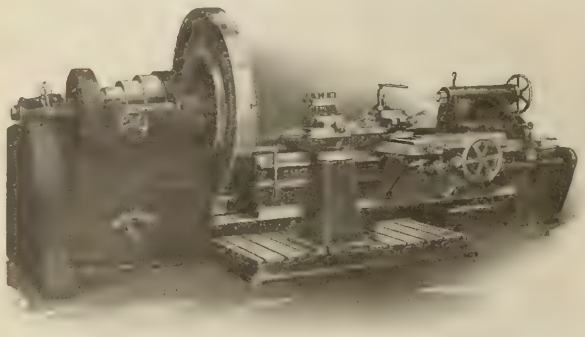

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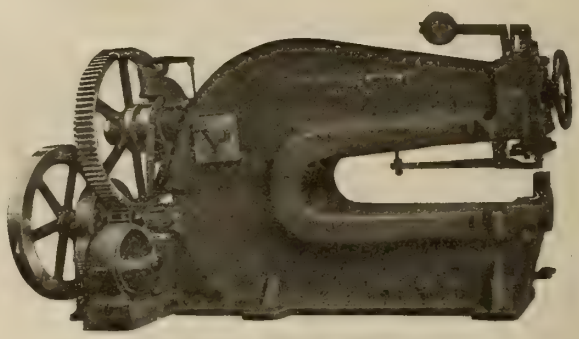

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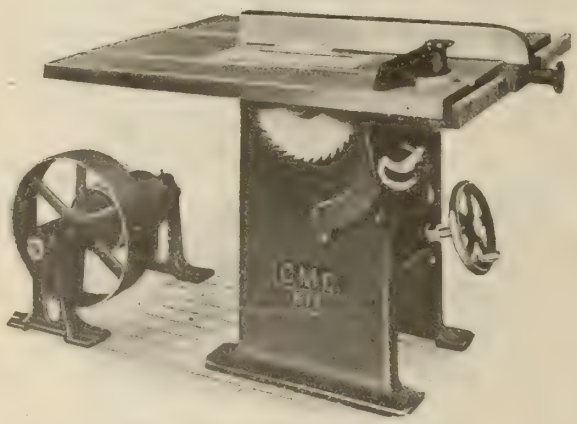

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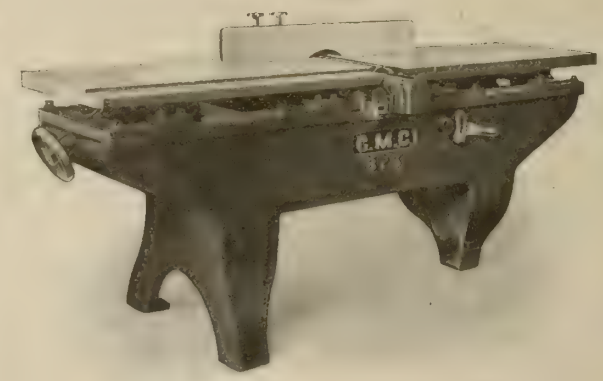

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EDITORIAL INDEX—PAGE 111 BUYERS' DIRECTORY—PAGE 80 ADVERTISING INDEX—PAGE 112

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

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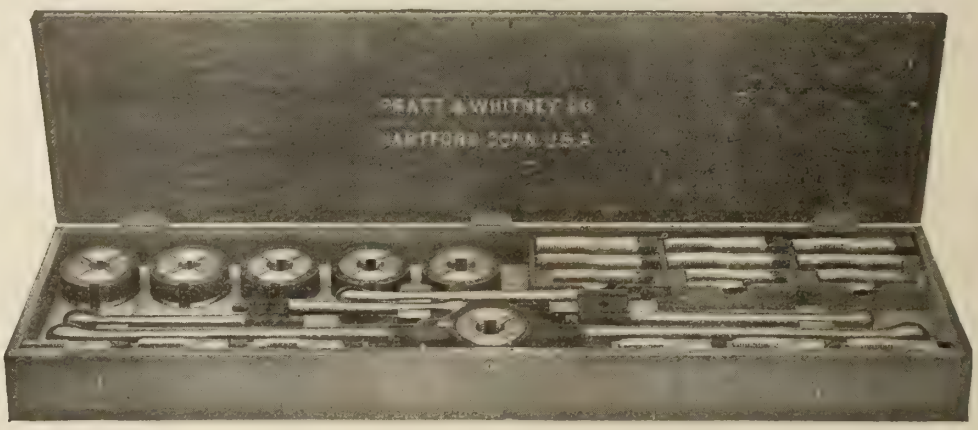

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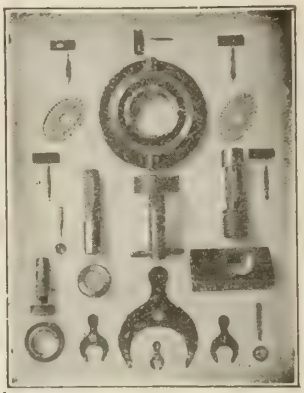

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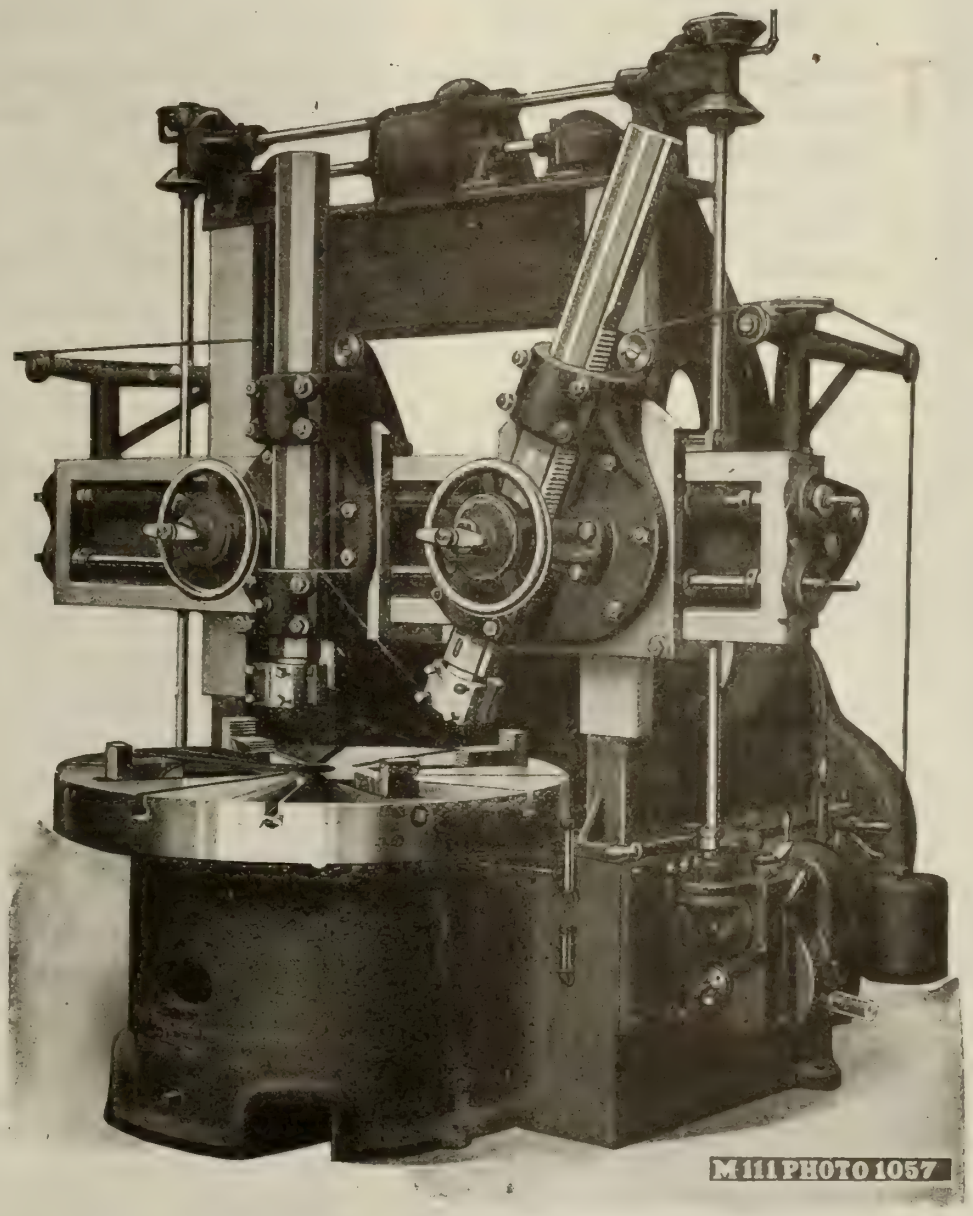

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The Publisher's Page

TORONTO JANUARY 23, 1919

THERE is in the United States a publication serving the Iron and Steel trades. It is a weekly paper, and even its smallest and thinnest issues are stout. Other issues are positively corpulent, and its annual number is huge in its proportions.

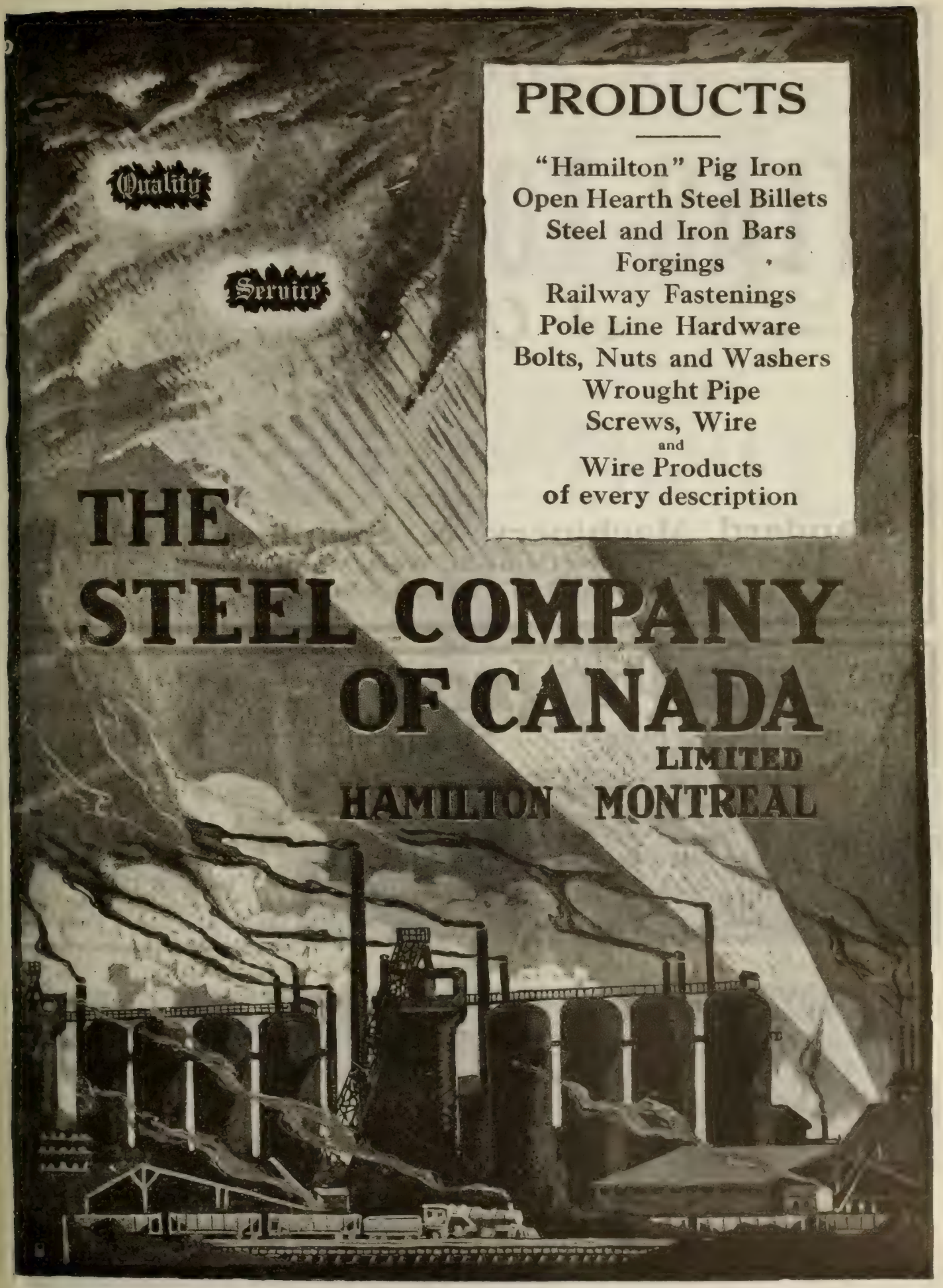
We refer to the Iron Age. It is a wonderful paper. It is respected and is regarded as the authority in the field it serves. The volume of advertising it carries is tremendous. Its Annual Review Number is a valuable advertising reference of over 668 pages.

Now the publishers of the Iron Age are wont to mildly brag about their Annual Number, and we don't blame them, because we're going to do the same about our own Annual Number. And, if we had an Annual Number as big as the Iron Age we'd probably brag harder and longer.

The Annual Review Number of the Iron Age contains 668 pages. The Annual Review Number of CANADIAN MACHINERY contains 442 pages. The population of the United States is approximately fourteen times greater than the population of Canada. Canadian industries are fewer and farther between. One would naturally think, then, that a Canadian publication could not produce a number of 442 pages. And yet we did it. We did it, too, without undue insistence, and what is more, we were compelled to go to press, leaving out a good many advertisements on account of late copy and cuts.

We have received many complimentary letters about our Annual Number, and we take it for granted that many think what few take the time to express. A number of this kind produced in the face of a radical change in conditions is, we flatter ourselves, an achievement to be proud of. To us it is an endorsation of CANADIAN MACHINERY by its advertisers—by firms who have used it regularly for years, and especially during the years of the war. To us it means an expression of confidence that the journal which served so faithfully in time of war would be able to serve with equal faithfulness in the time of peace and reconstruction. Their confidence has not been misplaced.

We take off our hats to the Iron Age, and we congratulate it, because we know its achievement is the result of service—just as ours has been.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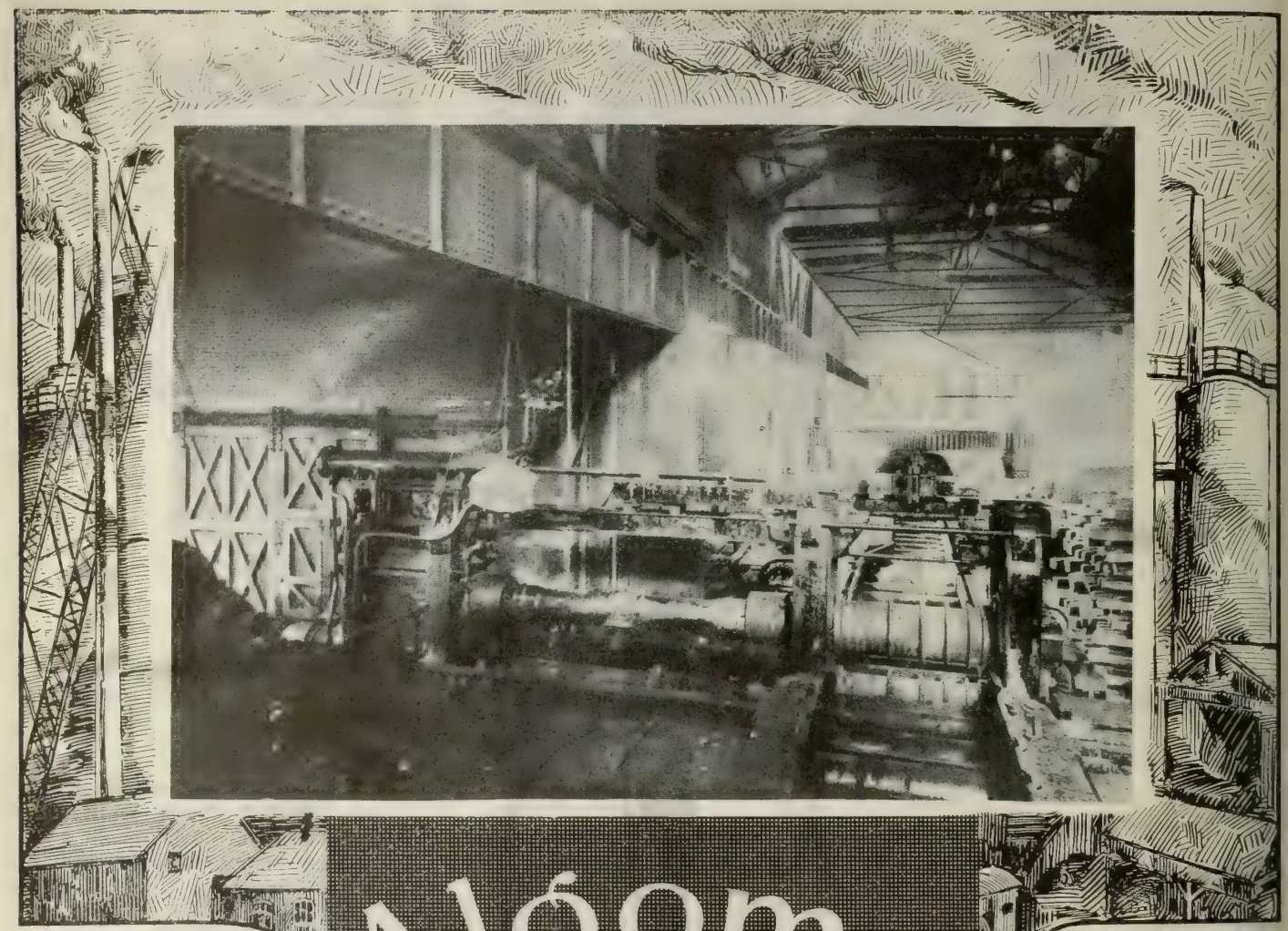

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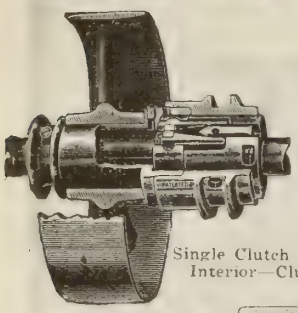
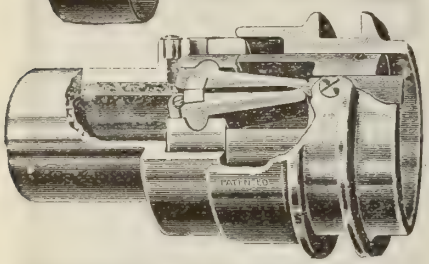
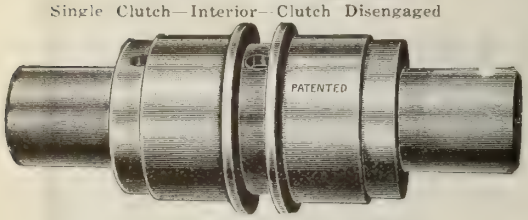
THE JOHNSON FRICTION CLUTCH



Single Clutch Pulley Mounted Interior—Clutch Engaged



Single Clutch—Interior—Clutch Disengaged



Double Clutch—Exterior

THE CLUTCH THAT CLUTCHES

starting your machines without grating noise or jar. It is the Acme of Simplicity and is being adopted by the leading machine tool builders as a part of the machine tools they manufacture, and the Johnson Friction Clutch adds another talking point. Our booklet, "CLUTCHES AS APPLIED IN MACHINE BUILDING," is of interest to you and a copy will be sent on request. For countershaft or line shaft work the JOHNSON FRICTION CLUTCH gives the service you are looking for.

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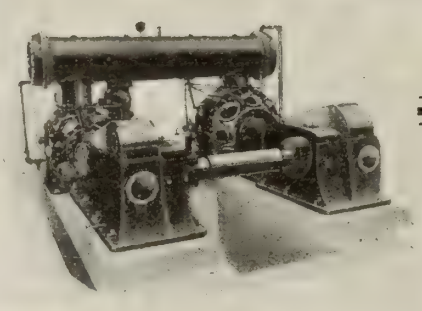

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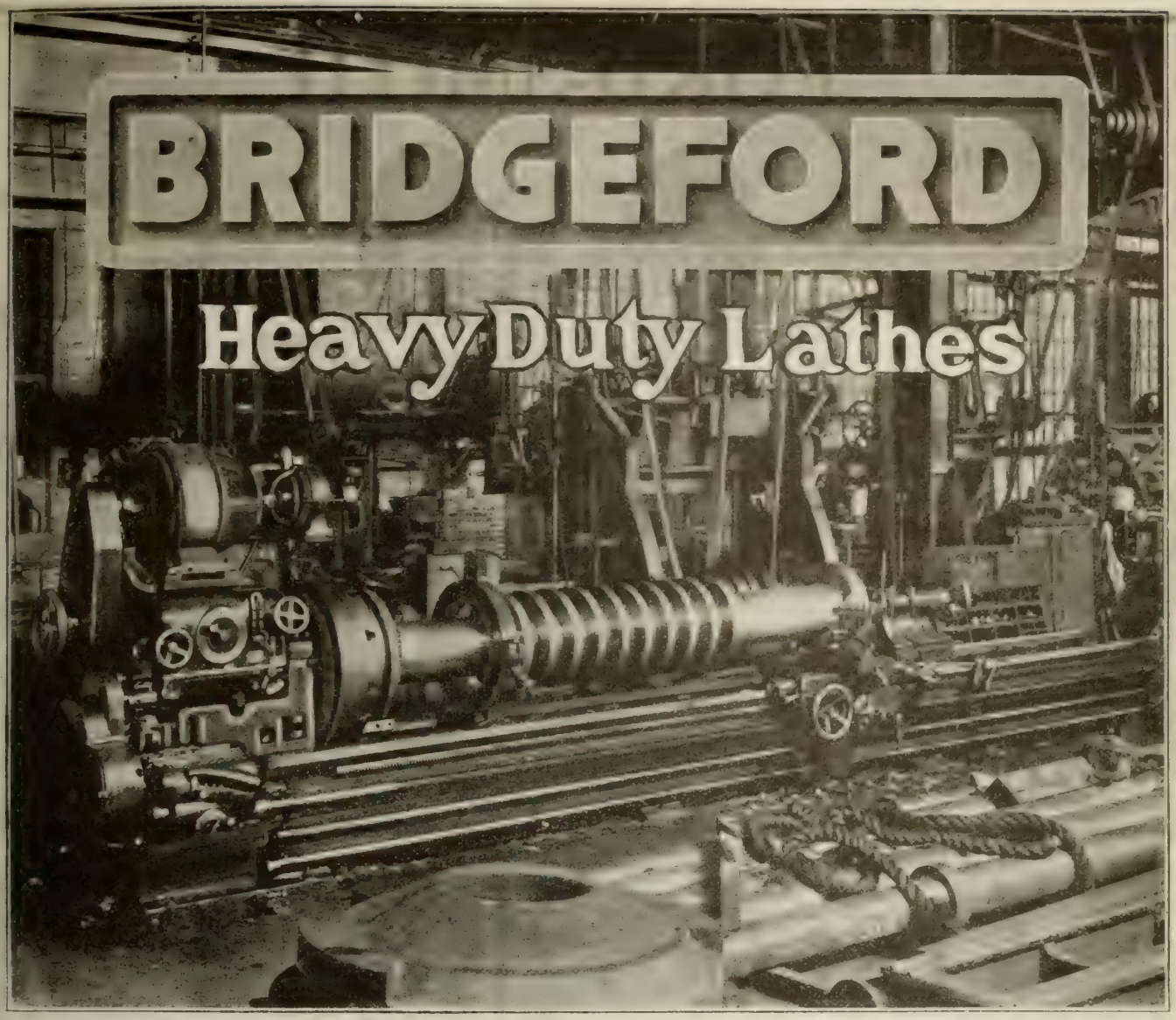

Turning Forged Steel Thrust Shafts

The shaft shown in this lathe is a forged steel thrust shaft for one of the standard 2800 h.p. Marine Engines, being built for the Emergency Fleet Corporation.

The rough size of the shaft is approximately 27¼ in. diameter by 12¾ in. long and the limits of accuracy required are .002 plus and minus.

The lathe is a 36 in. Bridgeford Engine Lathe installed in the shop of the C. & G. Cooper Co., Mount Vernon, Ohio, and is capable of taking the roughing cut as well as finishing the shaft to the close limits of accuracy required.

The Bridgeford line includes Heavy Duty Engine Lathes from 26 in. to 60 in. swing, Heavy Duty Axle Lathes and Journal Truing Lathes and Heavy Manufacturing Lathes of 27 in. and 30 in. swing.

Details and specifications of any machine required will be sent on request.

Bridgeford Machine Tool Works

161 Winton Road, Rochester, N. Y.

Manufacturers of Heavy Duty Lathes for More than Twenty Years

FORD-SMITH

Disc Grinders

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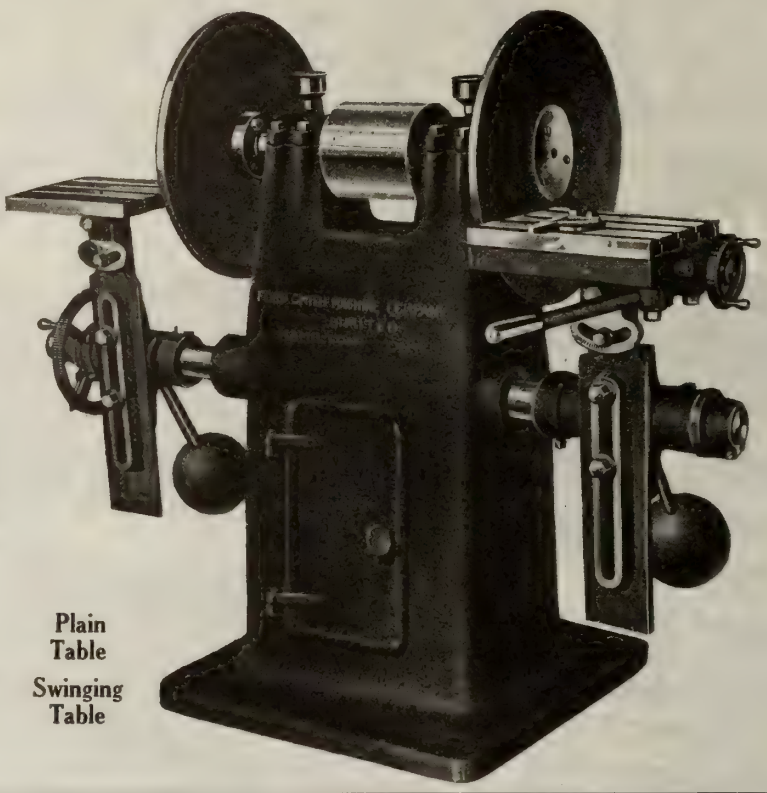
Swing Grinders

Floor Grinders

Plain Table

Swinging Table



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Special Machinery

Manufactured by

FORD-SMITH MACHINE CO.
LIMITED
HAMILTON, CANADA

Our new catalogue is ready

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ELECTRIC
Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
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CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

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Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada

THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times.

Are your Tools made of Red Cut?

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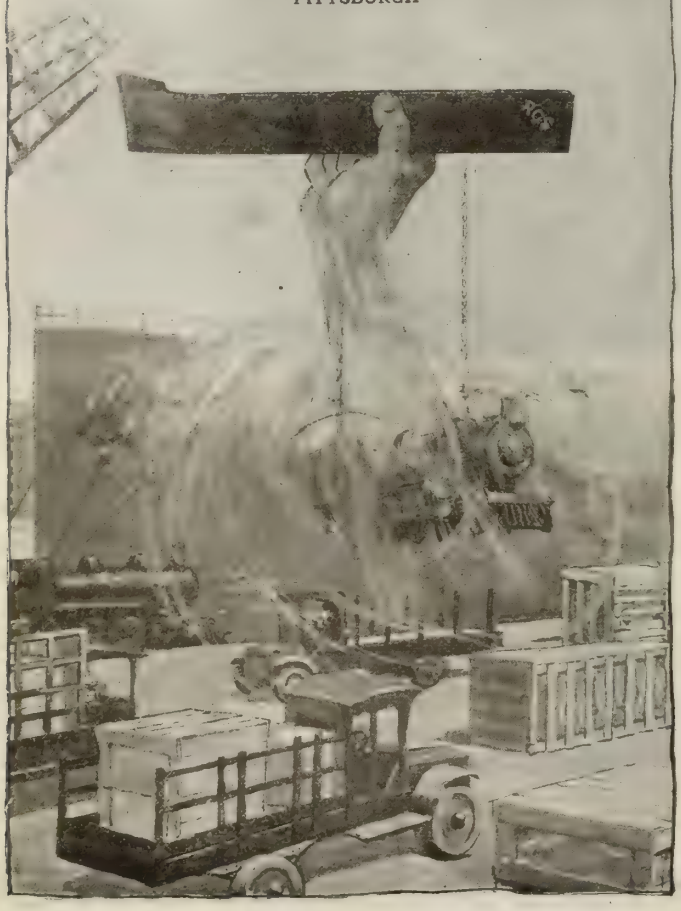

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ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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PROMPT SHIPMENTS from large stock

A Keen Cutter

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Quantity Business Preferred

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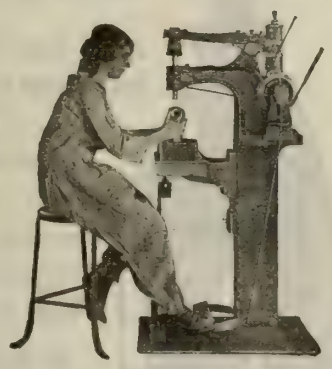
Brockville, Ont.

The Hammer With The Human Stroke



HEADS RIVETS COLD

Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:—

A rivet a second, sizes up to 3/16".
A rivet in two seconds, size ¼" to ⅜".
A rivet in three seconds, size 7/16" to ⅝".

And on special order we build machines to handle rivets up to 1½" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the **High Speed Riveting Hammer** does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

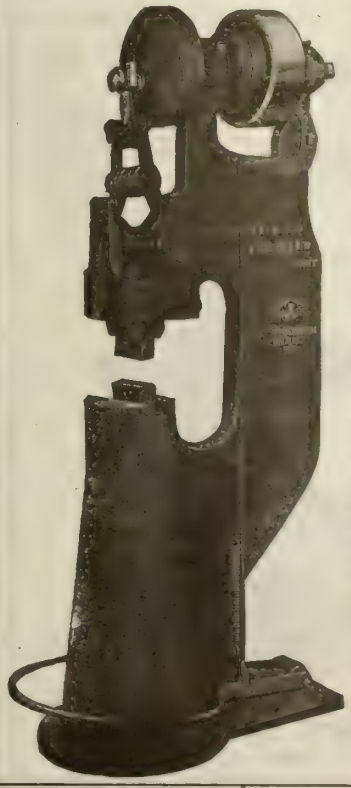
and

Let us shoulder your riveting problems.
Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.
ROCHESTER, N.Y.

If You Need a

POWER HAMMER



of uncommon strength throughout — a hammer constructed to deliver work of surpassing quality in great quantity, and to keep everlastingly at it—

You Need Jardine's

Note a few particulars:

Hammer slide is a steel casting; so is the ram, and connecting bolts for the ram are machined from solid steel bar.

Hammer and anvil dies of properly tempered, highest grade tool steel are held in machine seats by tapered keys in the ram and anvil block, so there's no need to put taper on the dies.

Jardine's Canadian Giant Power Hammer has never failed.

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A. B. JARDINE & CO.
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"WACO"

TRADE MARK
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TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

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1118 Queen Street West, Toronto, Ontario

Phone Park. 250

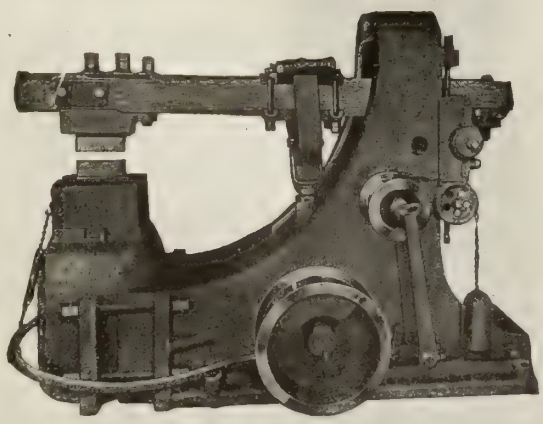
A Rochester Helve Hammer and a Smith are Mighty Good Company for Each Other

ROCHESTER HELVE HAMMERS

Six Sizes
Two Styles of Frames

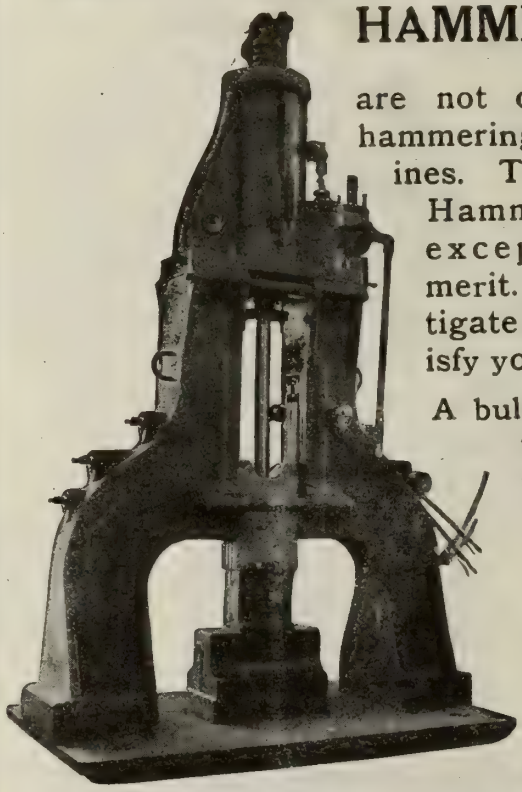
Are adjustable for length of stroke while running.

Long stroke provides for handling larger work than other hammers of the same head sizes and the springy forging blows delivered by the solid hickory helves combine advantages of forging and drop hammers.



THE WEST TIRE SETTER CO.
ROCHESTER, NEW YORK

"ERIE" STEAM FORGING HAMMERS



are not ordinary hammering machines. They are Hammers of exceptional merit. Investigate and satisfy yourself.

A bulletin for the asking.

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ERIE, PENNSYLVANIA, U. S. A.

STELLITE

"Not Steel but its Master"

STELLITE is now recognized as the master Cutting Metal, and has won for itself, during the War, a reputation in the Machine Shop not enjoyed by any steel.

STELLITE is hard, tough, acid-resisting, and is immune to heat up to 2000° F. — it might help you out of some mechanical difficulty. Why not talk it over with our Service Department?

The foremost Engineering Shops in Canada and the United States are now using it in a variety of ways and constantly increasing its use and their own production.

Deloro Smelting & Refining Company, Limited

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"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
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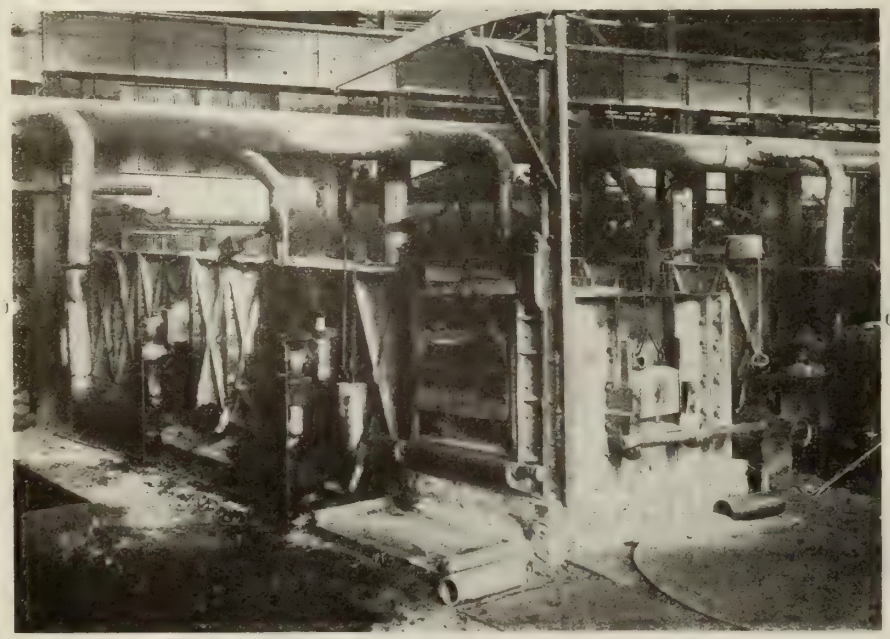
Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write
Mechanical Engineering
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Three Rivers, Quebec, Canada

Uranium High Speed Steel

Keeps Tools in Commission

It is not to be expected that tools of an inferior grade of high-speed steel should withstand the severe service imposed on them in shops working under pressure.

Cutting tools used under such conditions should be made with URANIUM. It keeps tools in commission. It reduces breakage, and provides a tougher, harder cutting edge.

STANDARD ALLOYS COMPANY
FORBES AND MEYRAN AVENUES
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OIL or GAS

Prompt delivery on all tool room types.

For

Annealing
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Furnaces built for special requirement

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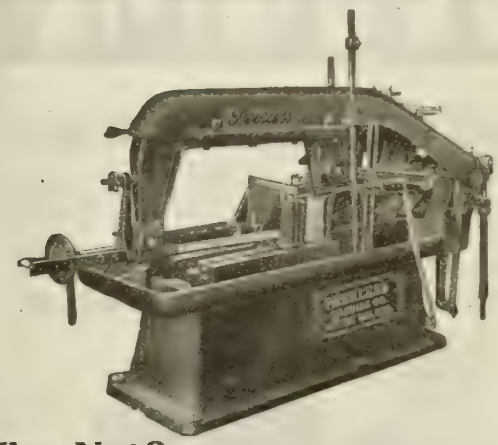
THE NEW STANDARD
Increases Production 50 to 100%



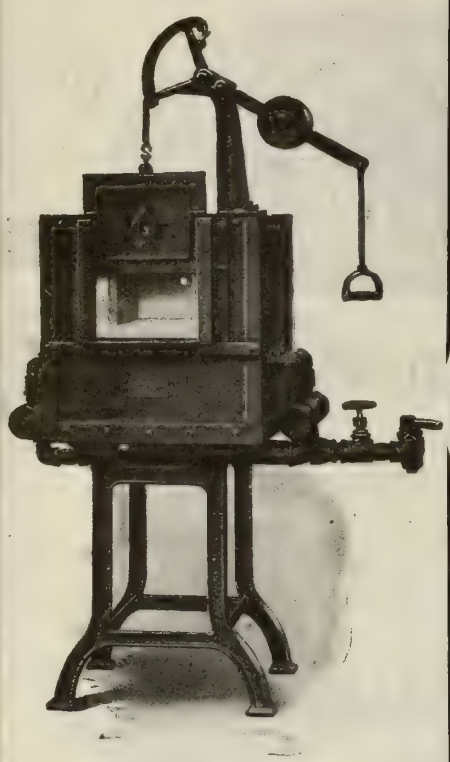
Why Not?

WHEN big plants of national reputation, who are using three, six, eight, twelve and up to thirty or more Peerless Machines say that they increase production from 50 to 100 per cent., saving in time, labor, blades and expensive material;

AND WHEN we are willing to have you try out the Peerless for 30 days' at our own risk and expense, we paying freight both ways if it fails to make good;

THEN WHY NOT try it out for yourselves, when the gain is more yours than ours if it makes good, and if it fails the loss is ours alone?

PEERLESS MACHINE CO.
1607 RACINE STREET RACINE, WISCONSIN



TYPE K HIGH SPEED STEEL FURNACE

The Right Furnace for High Speed Steel

Too much—too little or an uneven heat treatment of High Speed Steel renders it practically worthless for the purpose intended.

This Gilbert & Barker furnace has been designed especially for the correct heat treatment of High Speed Steel. A temperature of 2400°F. is quickly obtained and **easily maintained.** The heat is uniform on all sides of the work and loss by radiation is reduced to the minimum by special insulation.

More than 50 years' experience in designing and building furnaces, especially for the accurate and economical heat treatment of metals is your guarantee of satisfaction.

PROMPT DELIVERY ON G. & B. FURNACES

Recent additions to our plant, already one of the largest in this field, makes it possible to offer immediate shipment of your order.

Tell us your problem and we will tell you the type of furnace you require, but first send for Bulletin 24. To-day is a better day than tomorrow--write.

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ROTARY GEARED PUMPS

Use the Individual Pump Different classes of work require different compounds. By using the individual system, as many different compounds as desired may be used. This is a valuable feature. Trahern Rotary Geared Pumps. Would you like to try one? Write.

Trahern Pump Company, Rockford, Ill.

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A. R. WILLIAMS MACHINERY CO.
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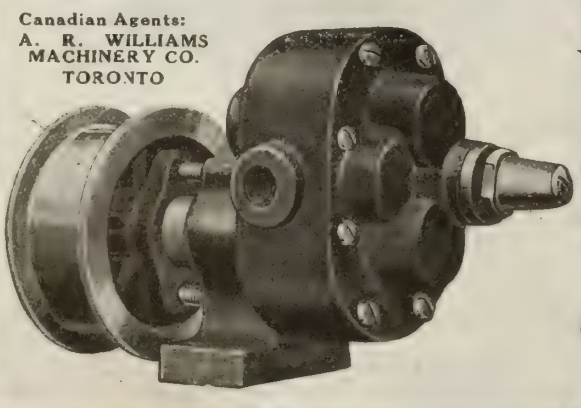

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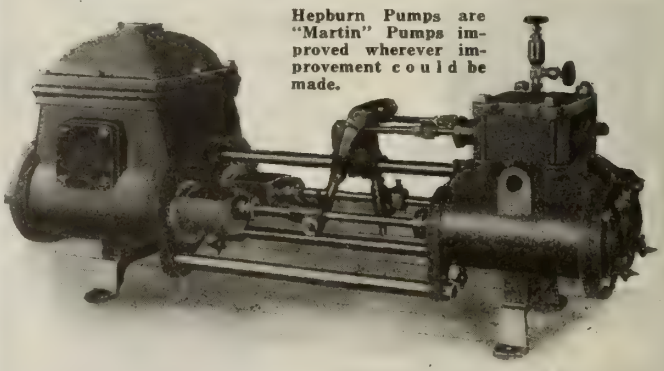
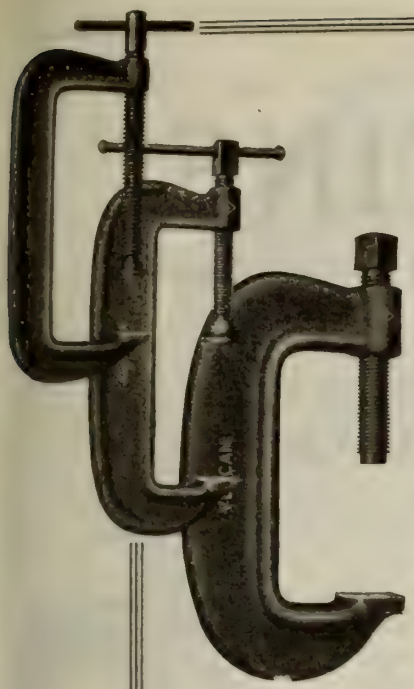
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street **Toronto, Ontario**



Williams' Superior Drop-Forged "C" Clamps

"THEY STAND THE STRAIN"

Both economy and convenience follow the use of tools designed for specific classes of work. Williams' line of Clamps provide something to meet the requirements of the individual job—or any combination of jobs. There's "A Williams' Clamp for every purpose."

If it's general utility—without the need for maximum strength—Williams' "Light Service" line will fit the case. 8 sizes, 2 to 12" capacities.

If it's stability and utility—medium service—Williams' "Agrippa" line offers the solution. 7 sizes, 4 to 18" capacities.

If it's extreme strength and heavy service—Williams' "Vulcan" line provides both. 11 sizes, ¾ to 12½" capacity.

All are made of a special, high grade steel. After forging they are submitted to a refining process or "heat treatment" which increases their stiffness and strength and reduces the liability of springing. Machinists' Tools booklet on request.

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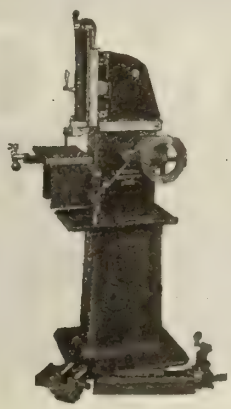
Agents for Manitoba, Saskatchewan, Alberta and British Columbia

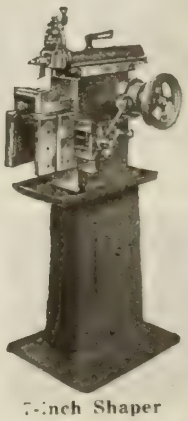
A Trio of Cost Cutters

Rhodes Vertical and Horizontal Shapers



Combination

Fast!
Accurate!
Wide Range!

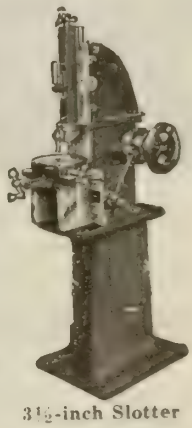


7-inch Shaper

If you are interested in the serious business of increasing production and cutting costs in operations you should investigate the RHODES line of Vertical and Horizontal Shapers.

These light, powerful, quick machines will take care of your shaping and slotting, tool-making, die-making, modeling and all other light work now being done on bigger and more expensive machines. Rhodes Tools cost less to operate, work faster and more efficiently. Their capacity is large and is greatly promoted by many easily-attached adjustments.

Rhodes Vertical and Horizontal Shapers are cutting costs in all parts of the world. The service they are giving to others they will give to you. Let us tell you all about this trio of successful machines. Write now!



3½-inch Slotter

The Rhodes Manufacturing Co.

Owned and Operated by the Jacobs Mfg. Co.

Hartford, Conn., U.S.A.

Use "RACINE" H. S. Tungsten Power Blades

Standard
the World Over

Only on the draw stroke does the blade of this

"RACINE"

High Speed Metal Cutting Machine

come in contact with the metal—then

How It Cuts---
Deep and Quick

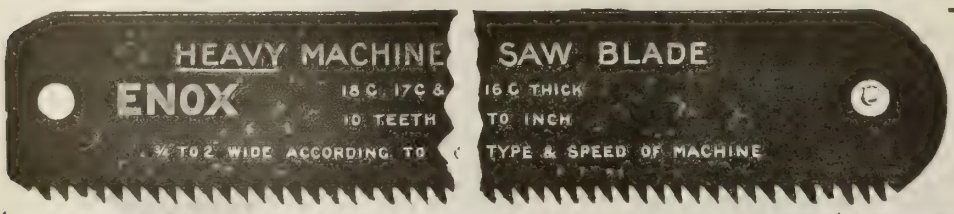
Machine is of substantial construction, designed for accuracy, for speed, for long service of both machine and blade.

The "Racine" is the only machine that duplicates every cut exactly. It has no equal for quantity of accurate work done in a day, in a year, in a lifetime.

Proof for the asking.

Racine Tool & Machine Company

Melbourne Ave., Racine, Wis., U.S.A.



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Hacksaw Blades
ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

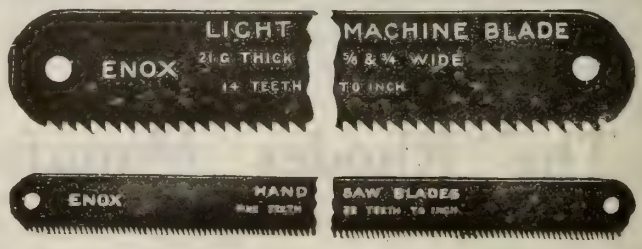
Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10



If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

Starrett Hack Saws

have the Stamina, the "Punch," and the Endurance. They are made of the *right stuff*—the finest tempered Tungsten steel, with milled teeth properly set; flexible or hard backs, so they can take a lot of punishment and abuse without calling "halt" or breaking down.

Mechanics, superintendents, and "bosses" endorse and recommend Starrett Hack Saws as the truly economical saws, because they give the maximum of service for the minimum of cost.

Write for our Catalog No. 213

It describes hack saws, frames and machines, and shows you why you cannot afford to use any other than Starretts; also shows many styles and sizes of Starrett Precision Tools.

The L. S. Starrett Co., Athol, Mass.

The World's Greatest Toolmakers
Mfrs. of Hack Saws Unexcelled.

NEW YORK LONDON CHICAGO

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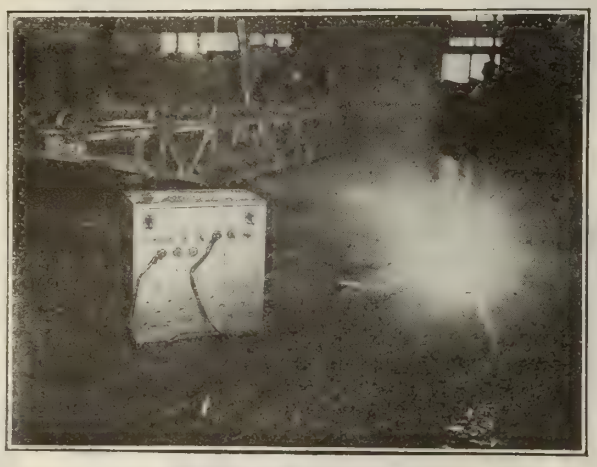
STARRETT HACK-SAWS CUT QUICKER LAST LONGER

Electric Welding by Alternating Current



WELDING STEEL PLATE
HAMILTON BRIDGE WORKS, HAMILTON, ONT.

The

"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

Reduces welding costs to minimum
Does not require expert to operate

The Arcwell Corporation of Canada, Ltd.
710 C.P.R. Building, Toronto
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"STERLING" Hack Saws

Will prove an economical investment and should be used in every machine shop.

If you care to save money, use "Sterling" Blades.

MANUFACTURED BY
DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A.

Wire Cloth

of every description

We make **Machinery Guards** of all kinds.

Metal Lockers for Clothes.

Steel Shelving for all purposes.

Drop a line for full details

Canada Wire & Iron Goods Company
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A Time Saver— Can You Beat It?

HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, when properly tightened, will not break away, or slip.

If you break it we will furnish a new one free of charge.

Consolidated Press Company

HASTINGS *LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.* MICHIGAN

Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver

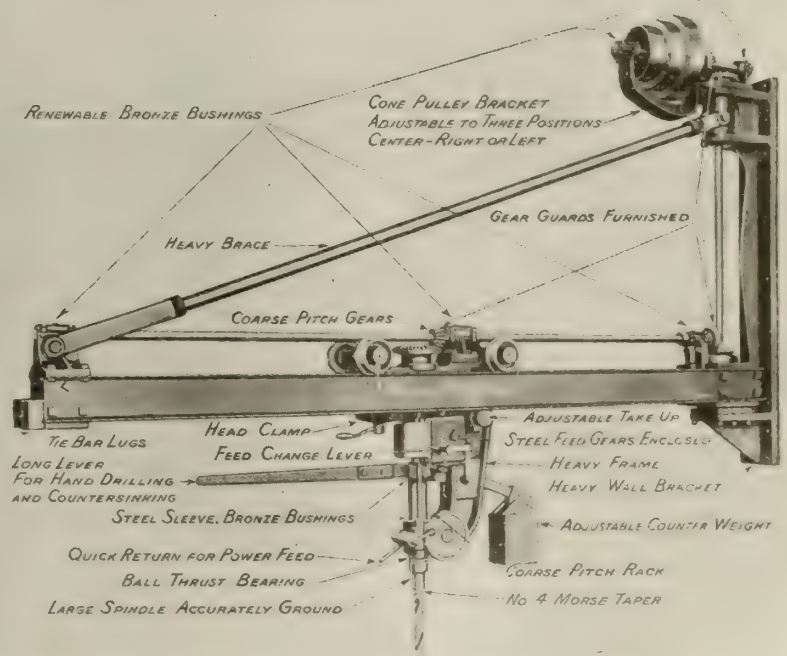
Here's a Drill You Want

The Lynd-Farquhar Wall Radial Drilling Machine is a real machine tool, carefully designed and made from the best material. The entire control of the drill is within easy reach of the operator. The arm is constructed of extra heavy channels and is supported from the outer end to the top of the wall bracket by heavy steel brace bars. The head is exceedingly rigid. It is mounted on four flanged wheels, fitted with roller bearings, and moves with extreme ease from end to end of the arm.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

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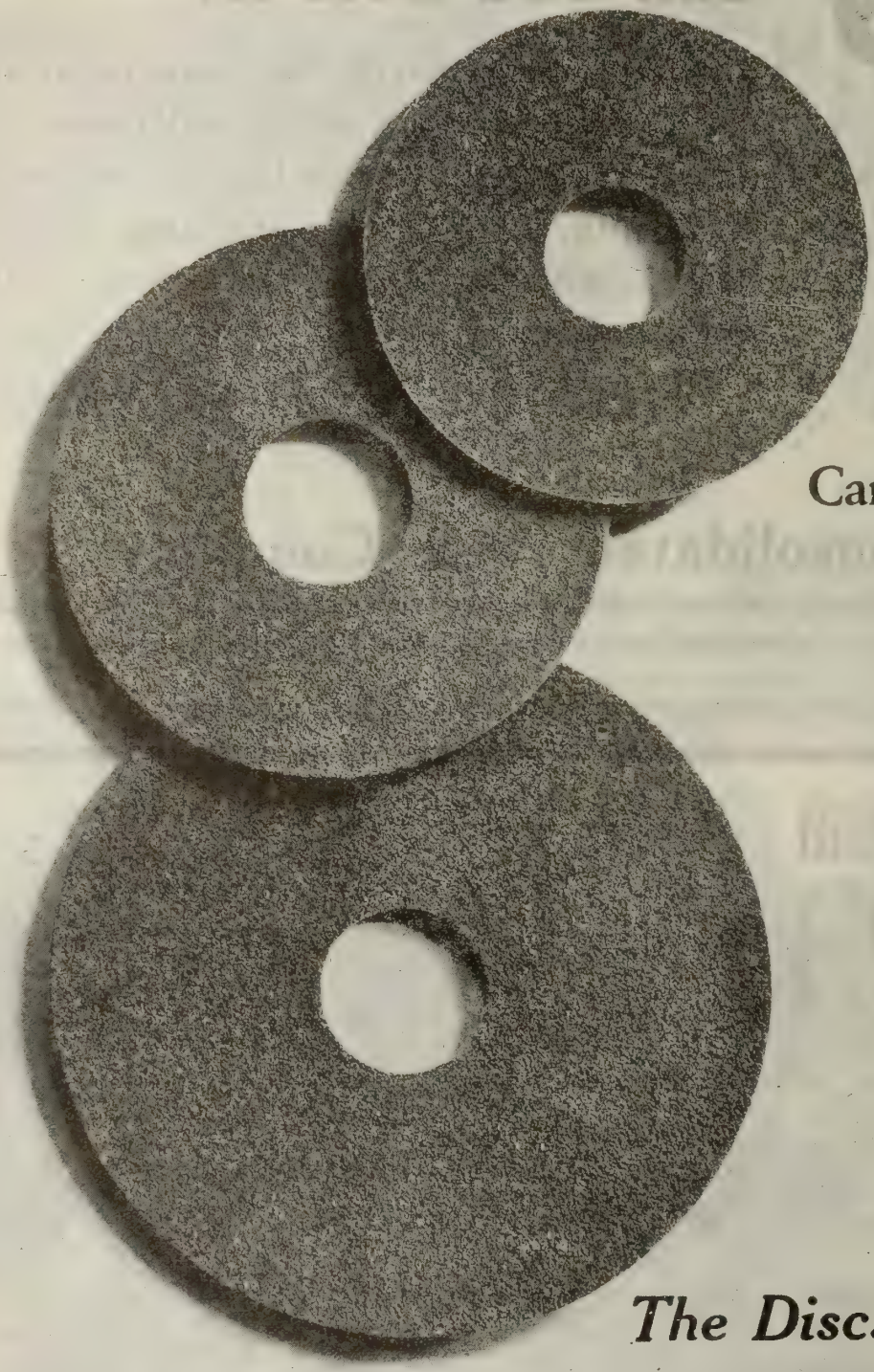
Making Abrasive Discs



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The Discs that Do

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For Your Particular Purpose

To Increase Production — To Save on Disc Costs — To Turn Out Better Work —

YOU tell us what you are grinding and how you are doing it, and you will get a run of discs made to meet *your* grinding conditions—accurately graded to do *your* work. They will be discs that are open and free cutting—that wear right down to the fabric without glazing, standing up under the work with bulldog tenacity.

It's the way we make them—and what we make them of.

It is because of the hard, sharp, fast-cutting Carborundum and Aloxite grains and the high quality of cloth and glue. It is because of the care we use in making every disc fit to do its full duty.

If you are grinding aluminum, brass, bronze or light cast iron—it is a Carborundum Disc you should use. For all kinds of steel, heavy snagging work or malleables—an Aloxite Disc. For heavy cast iron and mild steel—a Carboxite Disc.

Some of the biggest users of discs in the country are Carborundum customers. They are getting the results you can get with

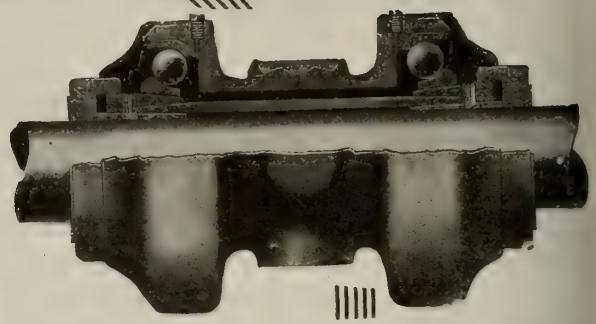
The Discs that Do

Made in all grits, all sizes up to sixty inches, in four weights: light, regular, heavy and double coated.

Quick Deliveries? Certainly!

Niagara Falls, New York

Chapman Double Ball Bearings



Sectional view of Chapman Double row ball bearings.

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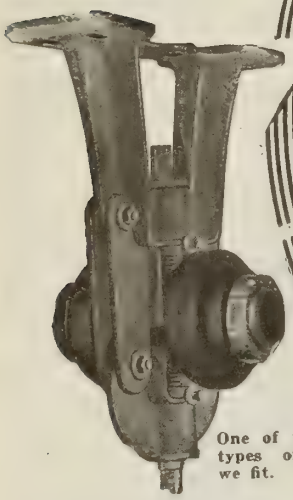
Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball Bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.

Chapman Double Ball Bearings practically eliminate friction, and they require lubrication only once or twice a year—therein lies the secret of their economy.



One of the many types of frames we fit.

Chapman Double Ball Bearing Company of Canada, Ltd.

339-351 SORAUREN AVE., TORONTO
Room 408 Shaughnessy Bldg., Montreal; Transmission Ball Bearing Co., Inc., 1050 Military Rd., Buffalo, N.Y.

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Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

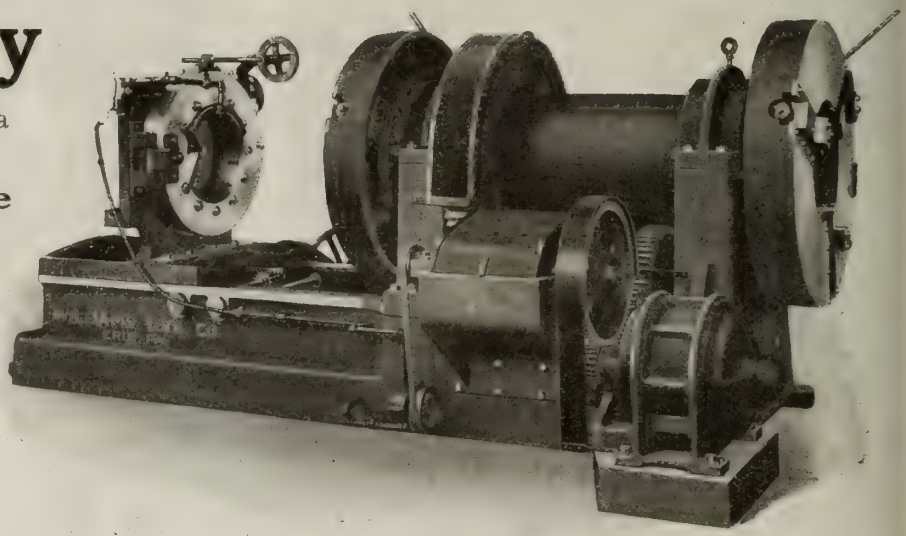
Williams Pipe Machine

that's on the job.

For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.

It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.

The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



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Williams Tool Company

Erie - Penn. - U.S.A.

Canadian Agents:
The A. R. Williams Machinery Co., Ltd. Toronto Canada

European Agents:
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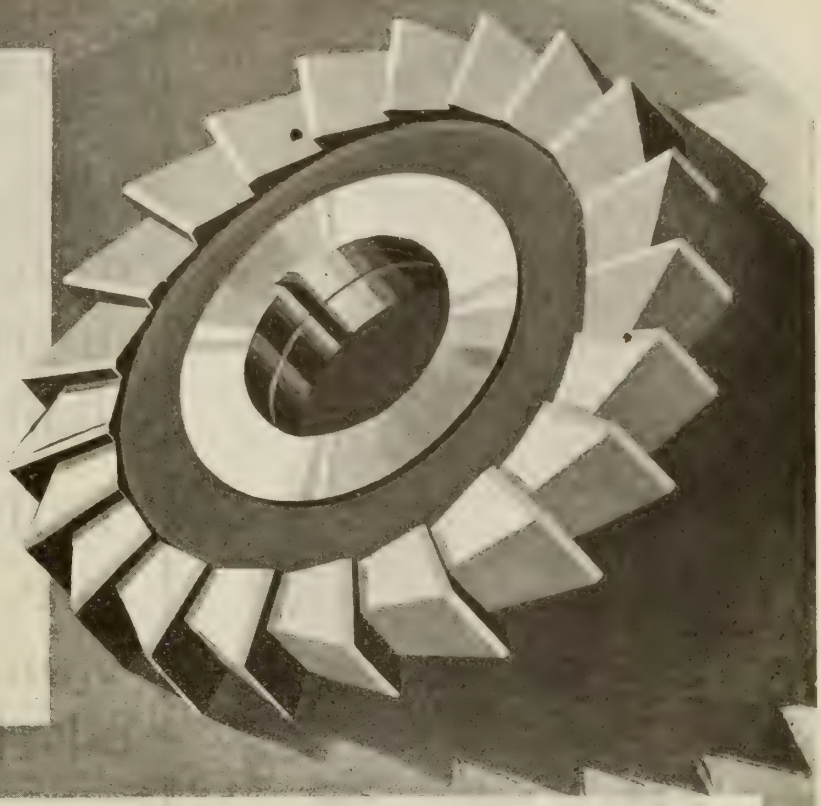
This Tool

was tested in a well-known plant in New York

It is a Davidsonized milling cutter, 4" diameter by ½" face. Run at a speed of 250 R.P.M., and with a feed of 7" per minute, taking a cut ½" wide by ½" deep, it worked without any difficulty for ONE HOUR AND THIRTY-TWO MINUTES.

As against this, a high-speed steel milling cutter of one of the best-known makes, and also a cutter made from one of the best-known high-speed steels, ran under the same conditions for TWENTY-EIGHT MINUTES. At the completion of the test the Davidsonized cutter was in better condition than either of the other two tools.

The material tested was .45% Carbon Open Hearth Steel, containing .70% Manganese.
*Name on request.



You Can't Get Away From Facts Like These

We claim that it is possible in a majority of instances to obtain similar results.

Davidsonized High Speed Steel

offers you great opportunities for increased production, long service and tool-making economy. We guarantee **any** tool of Davidsonized High Speed Steel to give you at least 10% better service than any other tool you have been using on corresponding work. You will be the sole judge. More and more of the leading machine shops are turning to this steel of remarkable service, because—

(1) It increases production 10% or more. Such an increase, figuring factory overhead and labor, multiplies several times over the value of the tool.

(2) The guarantee above gives absolute protection.

(3) Davidson Special Service cuts tool-making time and tool-room costs.

SPECIAL SERVICE

We will supply Davidsonized Tools, semi-finished and easier to machine than any carbon tool steel, within approximately 1/64 of finish on face, 1/64 in bore and 1/32 in diameter, leaving only the final hardening and sharpening to be done in your tool room. A tool that takes 20 hours to make from the solid bar can easily be finished from a Davidsonized blank in about two hours. **And we will guarantee our tools against breakage in hardening.**

This service, though it applies also to standard tools, is especially desirable in the case of **tools made to unusual shapes** and other **specifications**.

Use this special service. It costs you less than to bring your tools from the bar to the stage at which we furnish them. It eliminates the loss of breakage in hardening. And, most important of all, it gives you better tools than you have been using, tools capable of such performances as the one described above, tools that will boost your production and give you longer service. Send us a trial order; our guarantee prevents all risk. Correspondence invited.

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THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

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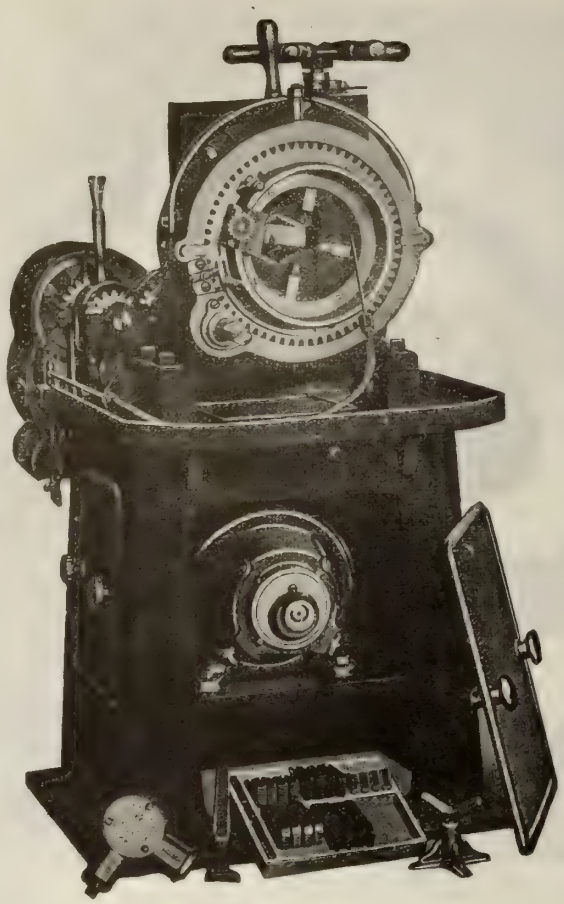

"Forbes Facts"

1. **One man can do the work of six against the old stock and die method of cutting.**
2. **It is the only machine on the market with receding gear.**
3. **It is self-contained and motor-driven.**
4. **It is portable.**

These are convincing arguments for the construction and utility of this machine. Thread cutting can be performed fast, clean and true. Equipped with self-centering vise.

The Curtis & Curtis Co.
115 Garden Street Bridgeport, Conn.

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One hour's work with a dull file will cost you more in wasted labour than a new file.

Tell your men, therefore, to turn in files the moment they have passed their efficient point.

But to get files that give the longest efficiency, specify "Famous Five" when you order.

They Are:

KEARNEY & FOOT
GREAT WESTERN
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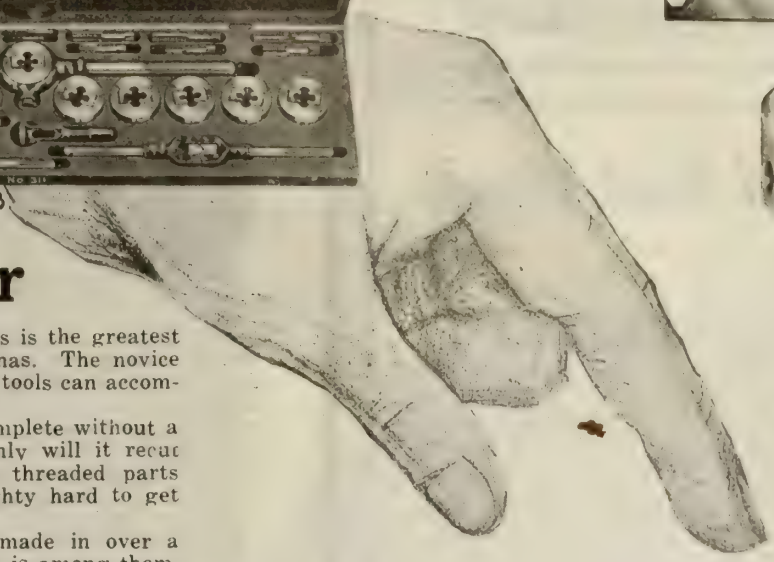
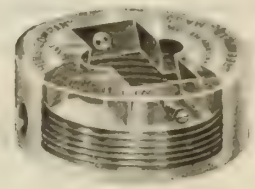
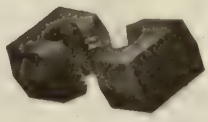
Made in Canada by





Cap for Little Giant Collet, showing Adjusting Screws



Little Giant Die

A Pointer

Poor tools or lack of tools is the greatest hindrance the repair man has. The novice with an assortment of good tools can accomplish more.

No shop equipment is complete without a GTD Screw Plate. Not only will it recut jammed threads, but new threaded parts can be made—and it's mighty hard to get spare parts nowadays.

GTD Screw Plates are made in over a hundred assortments. Yours is among them.

Write for New Small Tools Catalog No. 40 describing Screw Plates, Taps, Dies, Reamers, etc.

WELLS BROTHERS COMPANY of Canada, Ltd.

GALT - ONTARIO

Canadian Factory of the

GREENFIELD TAP AND DIE CORPORATION

Buy a

G T D Screw Plate

with Little Giant Adjustable Reversible Dies

One Thor— More Thors

Thor

New Pistol Grip Chipping, Calking and Flue Beading Hammers. Single Valve. No Vibration.

More Power, Speed, Durability and Economy

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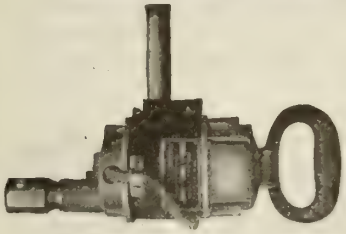
U. S. Electric Drills and Grinders

Save Time. Labor and Money



They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES

3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
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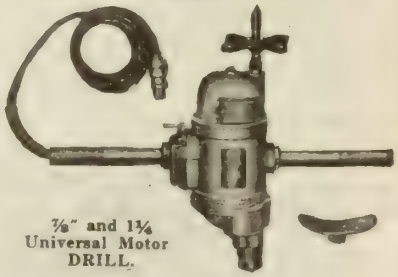
All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅞" and 1¼ Universal Motor DRILL.

For Sale By

The Canadian Fairbanks-Morse Co., Limited

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THE UNITED STATES ELECTRICAL TOOL CO.

CINCINNATI, OHIO

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 21A

The Use of Hard Wheels

Log conditions vary with the seasons. In the winter the logs are frozen or ice-covered; in the spring the bark is full of dirt, mud and grit, which cannot be entirely removed by flushing with a hose or rolling around in the pond. All the year trouble is usually experienced from iron in the form of nails, spikes and bolts which have been driven into the logs at various times. Stones are frequently picked up in the bark and completely covered over in a few years.

When a saw runs into iron or stones, anything is likely to happen, from the mere dulling of the points of the teeth to completely stripping away the teeth and perhaps tearing the whole saw to pieces. The amount of grinding is necessarily proportional to the condition in which the saws came back to the file room. With knocked-off points and stripped teeth, several hours of exceedingly hard grinding may be necessary. This is hard on the wheel, which may wear down in a few hours of this strenuous work as much as several weeks of ordinary grinding. For an occasion like this the careful grinder uses the wheels which he has found are too hard for the general run of work. These harder wheels will stand up and hold their shape much better than can be expected of the regular wheels.

As you were reading the above, perhaps some grinding problem in connection with your saw sharpening occurred to you. The Norton Sales Engineering Department stands ready to help you solve this problem. Why not put it up to them?

NORTON COMPANY

NEW YORK STORE 151 CHAMBERS ST. — CHICAGO STORE 11 NO. JEFFERSON ST.

ELECTRIC FURNACE PLANTS

NIAGARA FALLS, N.Y. — CHIPPAWA, ONT.

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT. — NEW YORK STORE 151 CHAMBERS ST. — CHICAGO STORE 11 NO JEFFERSON ST.

TRADE NORTON MARK

Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assures accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

Canadian Fairbanks-Morse Co., Ltd.

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Steel Lettering Dies and Stamps

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"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.

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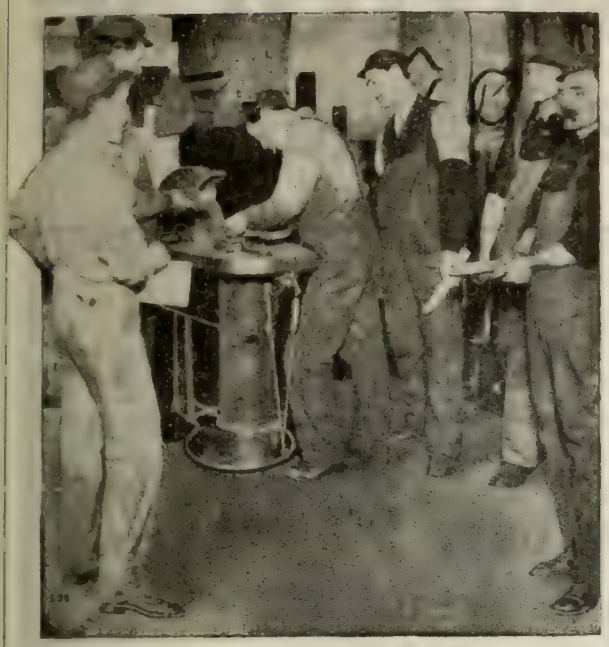
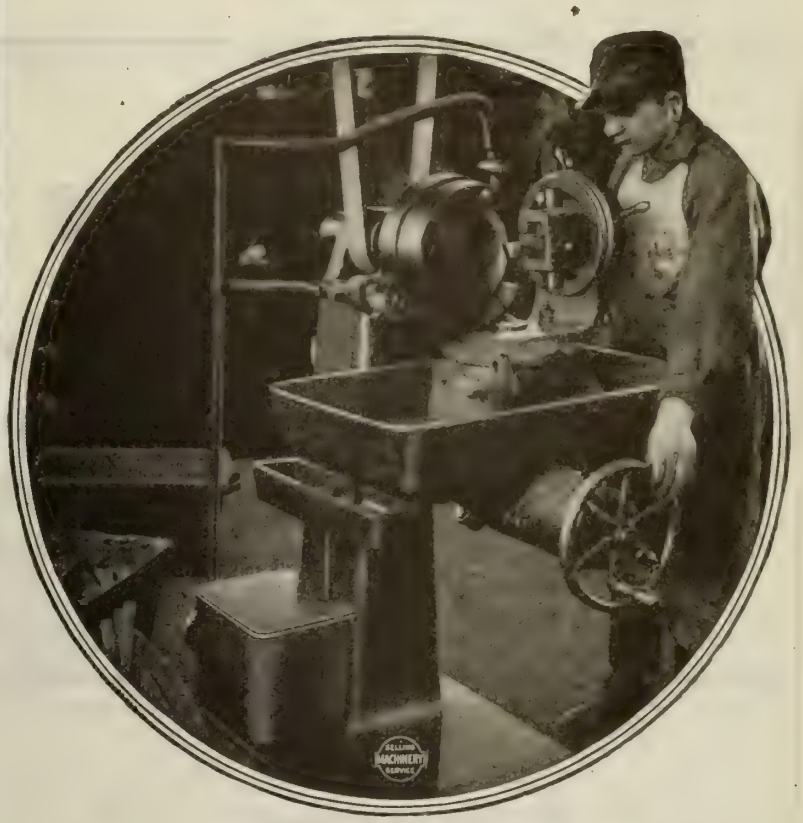
The Old Emery Stand Breeds Industrial Slackers





But—
A Boy and a Gisholt Will Put Them to Work

This is no time for slackers; in army or shop. Then why give space to anything that invites idleness?

Gisholt Tool Grinders are good recruiting agents. With a Gisholt on the job your machine tool operators stay on the job and thus add valuable productive working minutes to their time and the turning time of their machines.

Sharp tools all the time, busy men all the time, busy machines all the time—that's the Gisholt method.

Isn't it worth looking into?

Gisholt Machine Co. - Madison, Wis., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

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EVERYTHING MECHANICAL

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The Scales that made weighing
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Our stocks are the largest in Canada

The Canadian Fairbanks-Morse Co., Limited

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 4. January 23, 1919

Making Machine Knives

The operations connected with the welding and grinding of knives for wood-working tools and paper cutters offer features of more than passing interest.

By W. F. SUTHERLAND

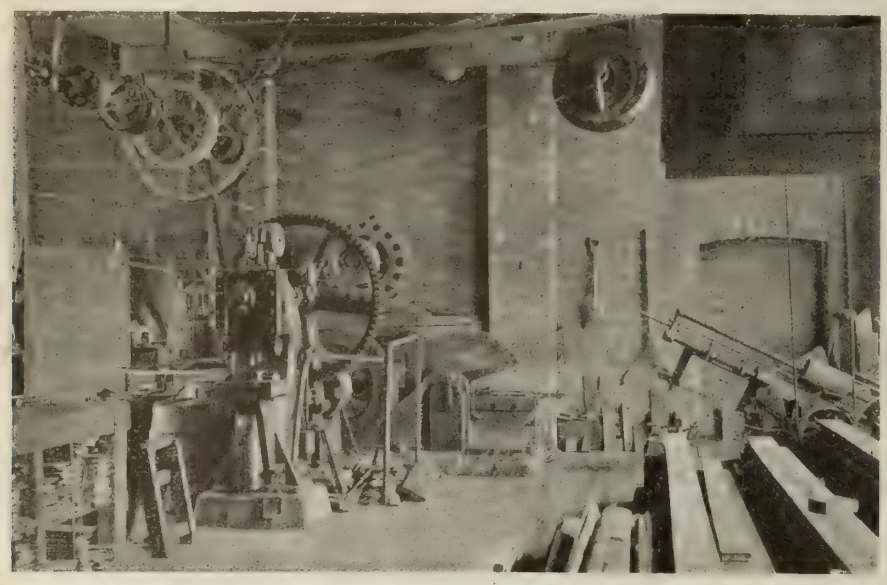
FROM the exquisite weapons and implements of the bronze age to the modern cutting tools of to-day is indeed a far cry, but the skill of the craftsman is as evident now as then. Bronze knives, axes and other weapons, dug up after countless years in the earth, excite to-day the admiration of those who appreciate beauty of form. The day of quantity production and fine limits requires equal skill in those who fashion the tools of modern industry. Careful workmanship and skill are now apparent in the length of life and performance of the knives and other cutting mediums of the present day.

The manufacture of machine knives, cutters and shear blades as carried on by the Galt Knife Co., Ltd., is an excellent example of an industry where acquired skill is of great importance. Machine knives for the woodworking, paper and veneer trades, special cutter heads and shear blades for metal power shears are made from Sheffield crucible, or high speed steel, and throughout the process experienced men have been found essential to the securing of a high quality in the finished product.

Materials Used

For the cutting edge of planer, paper cutting and veneer knives Sheffield crucible steel is used, welded on a body of dead soft open hearth steel. This latter is a very low carbon steel well adapted to welding. For the formed cutters for stickers, shapers and other woodworking tools, crucible steel is used throughout. High speed steel is used when required for the round cylinders of the later makes of wood-working tools, such as planers and jointers.

Stock bars are taken from the stock room and cut to approximately the correct length in a pair of alligator shears made by the Canton Foundry and Machine Co. Bars which are too large to be sheared are sawn in an Acme metal sawing machine of English make. This machine cuts on the return stroke and can be run at three speeds—130, 90, or 60 strokes per min. For cutting the soft steel 130 strokes per minute are used,



STOCK ROOM AND PUNCH, SHEARS AND METAL SAW

while for the crucible steel shapes for the cutting edge 60 strokes per minute have been found to give the best results.

Welding

The crucible steel and mild steel backing are then taken to the forge shop for welding.

It is here that skill has been found essential to success. It may be imagined that to make a perfect weld two or more inches wide and perhaps 8 ft. long between the two steel parts of each knife is no mean task. The welding faces of the cutting edge and back are carefully ground to remove every particle of scale and are then heated in a furnace to the welding temperature. This furnace is in two parts, the rear portion being used for preheating the shorter lengths, while for the long knives it is made part of the main furnace. The furnace has been made by the company and a high grade of coke is used for fuel. A flux is used in the welding operation, gun barrel borings and borax being used with good results.

The bar of soft steel is double the width approximately of the finished knife and the crucible steel cutting edge also double the required width is welded down the centre of the soft steel bar. The weld is first tacked on a power hammer and is then passed through the 9-in. welding rolls shown, which were also made in the plant. It will be noticed that there is a V shaped projection on the upper roll. This serves to separate the bar into two halves, each one having the crucible steel edge welded in. This V also serves to bevel the edge and eliminates much of the grinding which would be otherwise necessary. The finished welded bar is shown beside the rolls as it comes from the machine parted into two pieces.

Machining

After the welding operation the blanks are trimmed to the proper length and the slots then punched out considerably smaller than the finished slot. The next step is the tempering, which is carried out in the forge room—both oil and water baths are used. The oil tank being mounted on a truck is readily moved to any required location.

The water bath is contained in a reinforced concrete tank ,the walls of which are 4 in. thick. Water-tightness is secured by a coating of Keene's cement and no seepage has ever been noticed. Several ovens of various sizes are used and one tempering fire will take in a piece 8 ft. long. Anthracite pea coal is used for fuel. The forge shop equipment includes a 1,000-lb. Canada Machinery drop forge and a forging hammer by Beaudry of Boston.

Rough Grinding

After being tempered the knives are rough ground and bevelled. The frames which do this work are large enough to take in stones 6 ft. by 14 in. face. These stones are used in the rough grinding frames until worn down to 40 in. diameter and are then placed in the face grinder, where they are used until worn down to 6 in. thick. After this they serve yet another useful purpose, for they are then placed in another frame and used until nothing but the hole remains.

The frames used in the grinding room were all made in the factory and contain a number of features of rather more than usual interest. The face grinder shown has a cup chuck in which the wheels are fastened by jaws and wedges. The feed mechanism is an ingenious bit of mechanism. A belted feed shaft carries a spur gear, which engages with an internal and spur gear alternately on the feed mechanism.

Proper clearance is provided between the spur gear and the internal gear so that the driving pinion engages with only one of them at a time. By means of a hand lever the pinion is shifted from the internal gear to the spur gear, as it is desired to reverse the travel of table. This arrangement gives a slow working traverse of the table and a rapid return stroke.

The other frames shown are fitted with a slightly different arrangement. It is here necessary to use a level gear as the direction of traverse is across the face of the wheel. Advantage is taken of this fact and two level gears alternately engage on either side of a level driving pinion. A hand lever here also controls the direction of the table traverse.

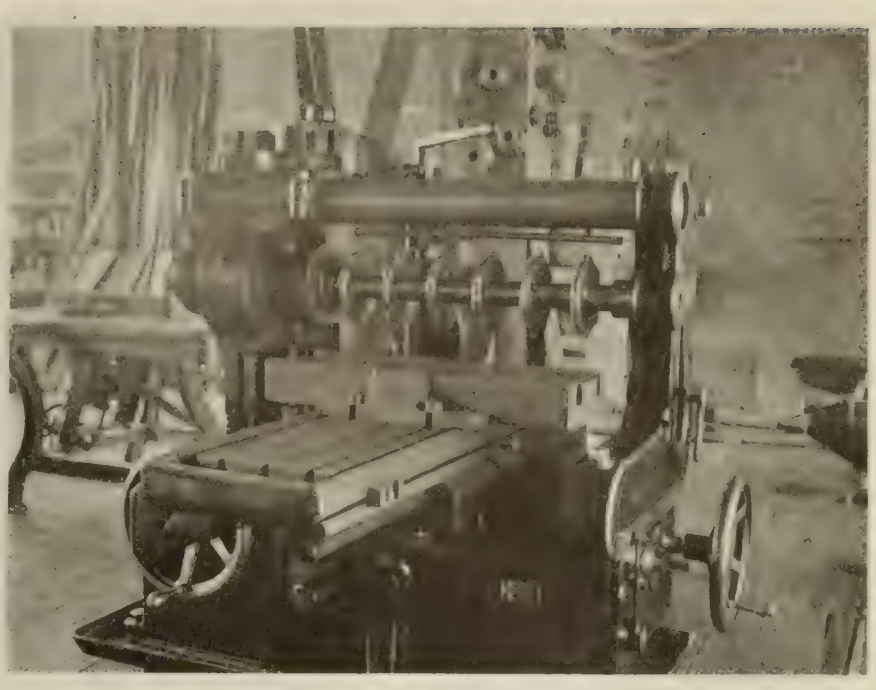
The table runs on two rails and the feed mechanism is attached to it by means of an endless chain working on a feed roller of 3 in. pipe mounted on the feed shaft.

The wheels used are of a high quality natural grit and have to be tempered or left to age until the natural moisture has evaporated.

1,000 DROP HAMMER

Milling the Slot

The next step is the accurate milling out of the slot to the required size and spacing. A 26-in. Kempsmith milling machine, Lincoln type, is used for this operation. This machine is shown in one of the illustrations and a close up view of one of the cutters is also illustrated. This cutter is somewhat novel in design and is made up of a mild steel body with inserted blades of high speed steel. Dovetailed slots are milled in the body and are carried slightly past the centre line of the cutter. The slots are cut alternately on each face of the body and the bits are driven home in the slots to a firm bearing, after which they are ground to the proper cutting contour. Hardened steel bushings are used to space the cutters at the proper centering. The milling of the bolting slots after hardening and tempering eliminates any variation which might be experienced through the change in length produced by the hardening. This sequence is rendered possible by the use of mild steel for the body of the knife.

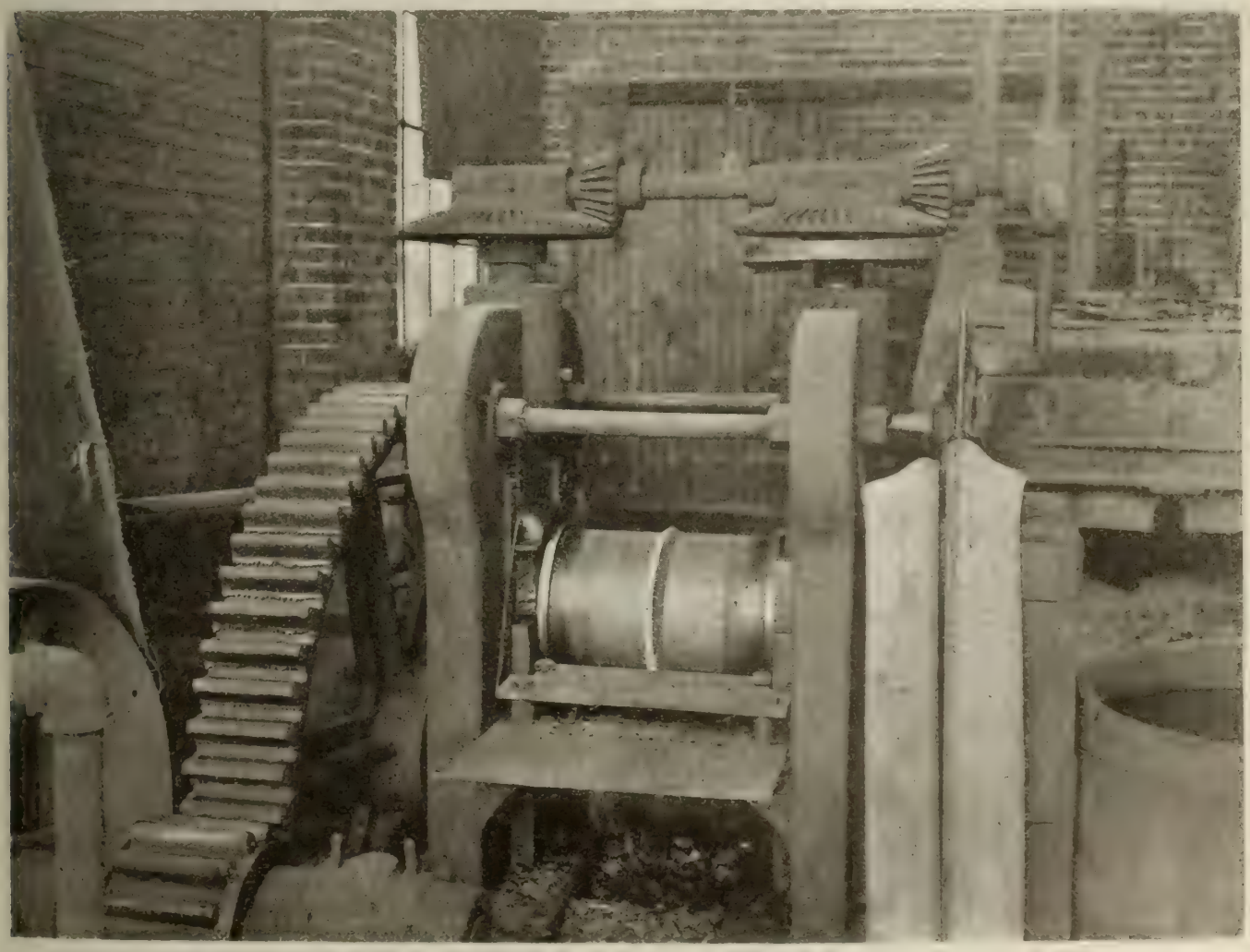


KEMPSMITH MILLER SET UP FOR SLOTTING KNIVES

Edging and Finishing

The final sharpening or edging of the knife is done on a Bridgeport Emery Wheel Co. machine. This grinder will grind a knife 100 in. long and a carborundum cup wheel is used. The knives are finally ground on the back and carefully balanced. The necessity for balancing the knives belonging to a set where two or more are used in a planer head is very apparent, for a small cut of balanced mass would result in a serious vibration at the high speeds employed.

The welded type of knife is also adaptable to other than the flat knives,

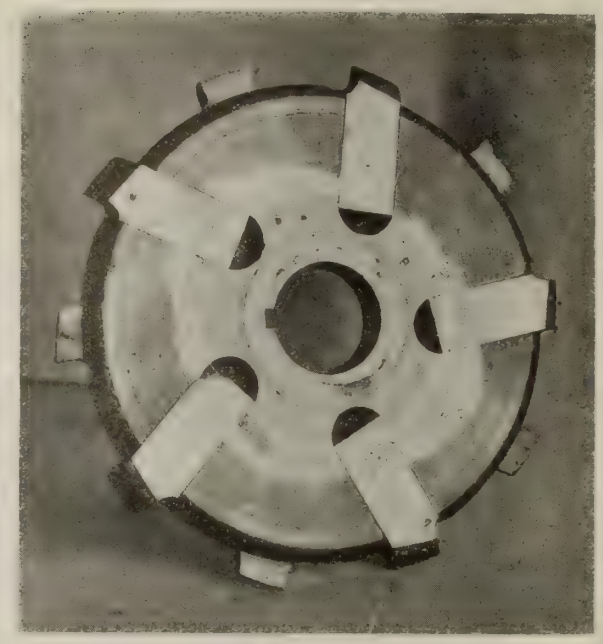


WELDING ROLLS NOTE THE "V" WHICH PARTS THE BAR AT THE CENTRE AND ASSISTS IN WELDING

curved knives can readily be fashioned to template; in this case grinding has to be accomplished by hand. Much of this work has to be done and four stands are provided, three of Ford-Smith make and the other by the Perfect Machinery Co. No one type of wheel is used, several makes being used as occasion requires.

Wood milling cutters for shaper spindles are made of crucible steel, the stock being sawn to length, turned, bored, and milled. A McDonald lathe, 16 in. swing is used for the relieving of all cutters. A special relieving attachment permits the relieving of cutters of from 2 to 30 teeth, if desired. The slots in milling cutters are drilled out and the slots in the Kempsmith miller.

A Mackenzie shaper and a McDougal 24 in. by 8 ft. planer form part of the well-equipped machine shop. A Barnes drill and Racine back-saw are also found.



TYPE OF CUTTER USED IN SLOTTING KNIVES

During the war hacksaw blades were almost impossible to obtain and a saw sharpener was installed. This machine, made by the Wardell Mfg. Co., Cleveland, automatically sharpens the saw when once started. An ebonite wheel, 1-16 in. thick, is used and tilted at such an angle that the cutting rake of the teeth is preserved. A cam provides means for gradually raising the wheel ashes as the tooth is sharpened and dogs provide means whereby the teeth are automatically advanced into position.

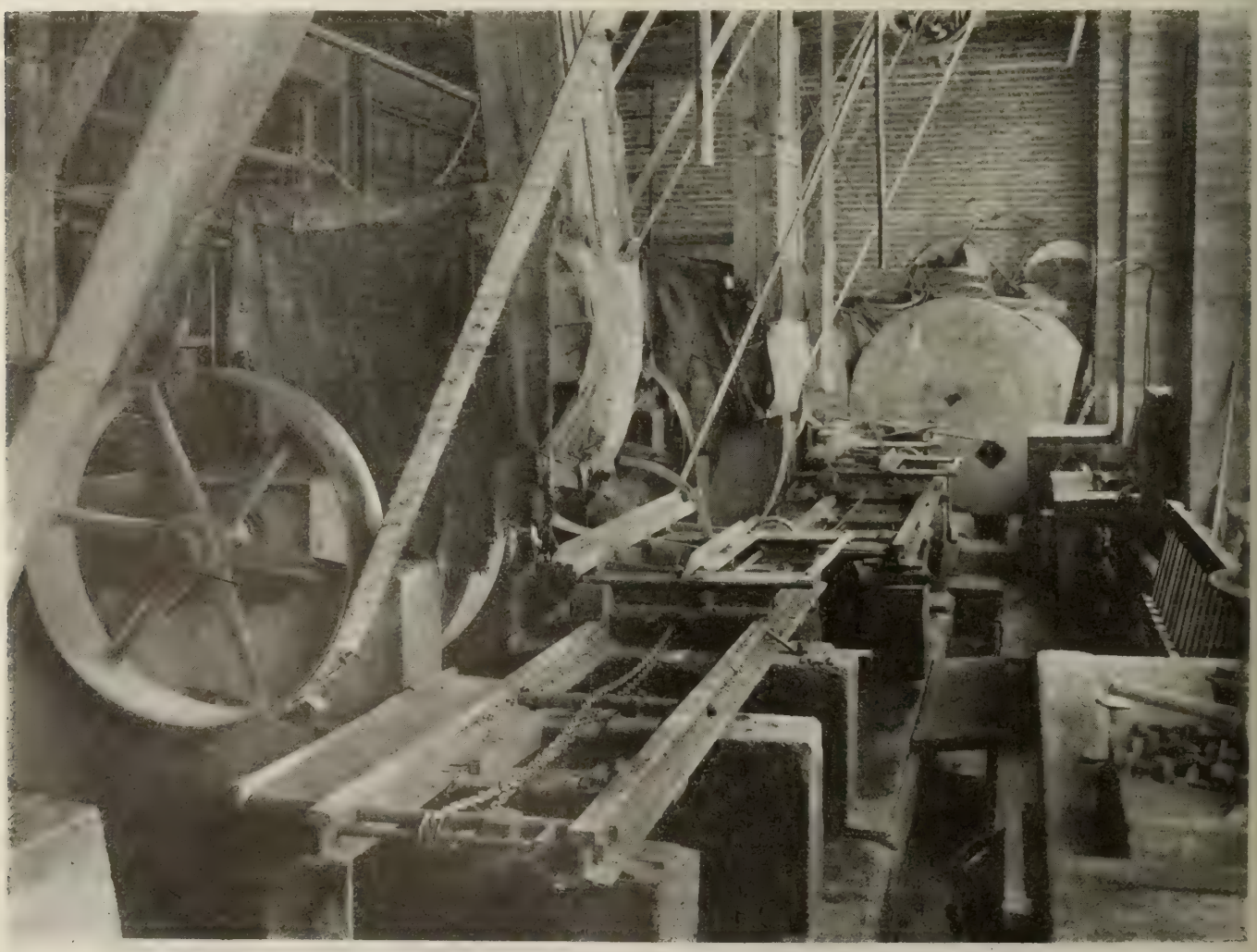
War Developments

The war came at a most inopportune time for the Galt Knife Co., as the firm had only been started, July, 1914, and the advent of war conditions necessarily threw the furniture and wood-working businesses out of joint. These trades are perhaps the greatest users of the various types of knives made, and the loss of their business was of no small consequence. However, the munition business offered an attractive field and work was actively started on forging of shell plugs and sockets, brass being the material then used.

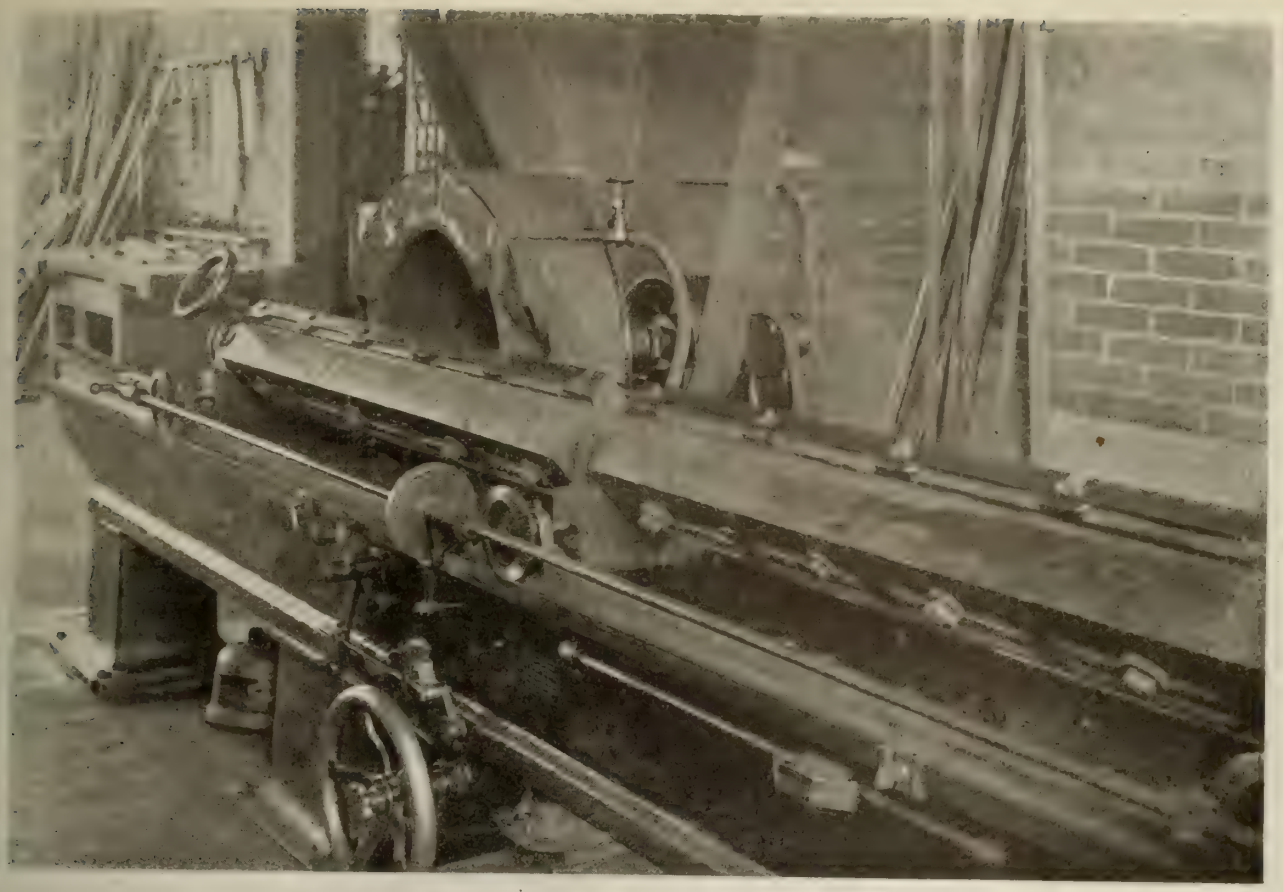
With the enormous expansion of the shell industry, shell boring cutters and formed tools were in great demand. The experience of this firm in the use of the Sheffield steel and high speed steel enabled them, with the plant on hand, to turn out cutters in such quantities as to be a material factor in the tooling up of Canadian munition shops.

Personnel

The Galt Knife Co., as before men-



VIEW IN GRINDING ROOM, SHOWING EDGING GRINDERS.



BRIDGEPORT EMERY WHEEL CO. GRINDER USED IN EDGING KNIVES

tioned, was started in July, 1914, by Thomas Vair and son, Ward Vair. The measure of success which has attended their efforts is due in no small measure to the past experience both the founders gained during many years of active management in industries of like nature.

The Return of Peace

One kind of business makes another, and if people need furniture, if soldiers need clothes, and all of us need food, as it is certain we do—furniture makers, the clothing trade, the agricultural interest, and others of our more or less basic industries are going to call in the machine shop to their assistance. Ward Vair is optimistic as to the probable effects of the return of peace upon our manufacturing interests.

The wood-working industry has been pretty well demoralized during the past few years and many of the planing mills and furniture factories had been closed up tight until peace conditions returned. Stocks have now been depleted and many factories have no stock whatever on hand.

When orders start coming in, equipment will have to be purchased to take care of it. All this you may say is dependent upon the probability of orders being received, but in this connection it must be remembered that our returning army, far from being a liability, will likely prove to be an asset in our business life. Take for instance the one item of civilian clothes. The Government allowance granted the soldier for his purchase of civics is thirty-five dollars and at a conservative estimate of 300,000 men this will result in a business of $10,500,000 for the clothing trade alone.

Other lines of business will profit in like fashion, particularly the agricultural industry of Canada, which, needless to say, is in expectation of extremely profitable returns for its labor during the next few years.

All industry, no matter of whatever kind, is in the last analysis dependent upon the machine shops, foundry and other metal-working trades for its existence.

Modern agriculture is becoming increasingly dependent upon labor-saving devices for its existence, and everything that finds a place in the furnishing of the home, the clothing we wear, or the food we eat is fashioned in some measure with the aid of the products of the machine shop.

SMOKE AN EXPENSIVE NUISANCE

The black, opaque smoke that is often given off by the chimneys of boiler plants consists largely of myriads of little particles of unconsumed carbon, together with volatile and condensible tarry matters that are distilled from the coal by the heat, and which are passing away unburned. Cindery particles of coal or coke of tangible size may also be present in vast numbers. The production of black smoke is a sure sign of imperfect combustion, and the owners of plants that produce it in huge volumes should remember that such smoke is an expensive nuisance, and they should take strenuous measures to abolish it, in the interest of their own pocketbooks. The light, grayish clouds that are often seen about the top of a chimney are of no especial significance as they consist mainly of condensed water-vapor. Screens, ruled with graduated black lines, may be had for estimating the density of smoke, and the use of these screens often leads to a material improvement in the combustion.

Numerous special devices may be had for "burning" the smoke, or lessening its production; but although some of these are doubtless effective, it must nevertheless be admitted that none of them gives an ideal solution of the problem, because the cost of reducing the smoke by blowing air or steam into the furnace is likely to be fully as great as the saving that results from the consequent improvement in the combustion. The prevailing opinion among engineers is to the effect that "the best smoke consumer is a good fireman"—which means that by careful management under the guidance of an intelligent and skilful man, the combustion can be carried out well enough to avoid the production of black smoke in any considerable quantity. This is true only to a certain extent, however, for although the good fireman is without doubt a highly important element, the most essential feature of all is a properly designed furnace.

Making Milling and Gear Cutting Attachment—II

In This Article is Described the Making of an Attachment For Lathes Which Performs Milling and Gear Cutting Operations—Various Tools and Operations Used in Machining Are Shown

By ROBERT MAWSON

IN this article, which is the second of the series, other tools and methods are described as used by the Presto Machine Co., Inc., Brooklyn, N.Y., when manufacturing a milling and gear-cutting attachment. The object of the tools is for intensive and accurate production and the results are proving satisfactory. Particular attention might be called to the marking machine which is used for graduating the dividing head base. This is of special design and is simple in operation, accurate in results and is practically fool proof.

The overhanging arm supports the cutter arbor, which is driven by the gears housed in the cutter block.

The first operator when machining this arm is turning the shank A—Fig. 1.

This operation is performed in a lathe with the tail stock centre setting in the centre B, the boss on the casting being provided for that purpose. The turned surface is afterwards ground .1250 inches.

The arm is then placed on the jig shown, being located by a vee block and held with the strap C.

A hole is then drilled and reamed to 0.562 in., the tools being guided through the bushing D.

Machining the Vertical Column

A view of one of the vertical columns before machining is shown in Fig. 2 and the various operations followed will be described in their sequence.

The first operation is shaping the base, which is performed in the fixture Fig. 3. The casting is located between pins A and rests on pads at the rear and front ends.

The screw B when tightened forces the piece back against a stop and the four straps shown hold it against the cutting stresses exerted by the shaping tool.

With the fixture and casting located and held on the shaper table the base C is then machined.

The next operation is machining the dovetail, and the fixture used is shown in Fig. 4. The casting again rests on locating pads and the various screws shown being tightened hold it securely in the fixture.

The two dovetails are then machined each with an angle of 30 degrees.

The machined surfaces are then scraped to a gauge to ensure both smoothness and accuracy in shape.

The casting is next placed in the fixture Fig. 5, being located by the machined dovetail A, the receiving surface of the tool being an accurate fit for the same. The piece is then pushed back against a locating pad at the rear of the fixture.

The screws B when tightened down hold the casting securely in the fixture. This is located by tongues on the milling machine table so that the surface of the boss will be machined squarely.

The casting being fed across the face of the revolving cutter C the face of the boss for the base binder is machined.

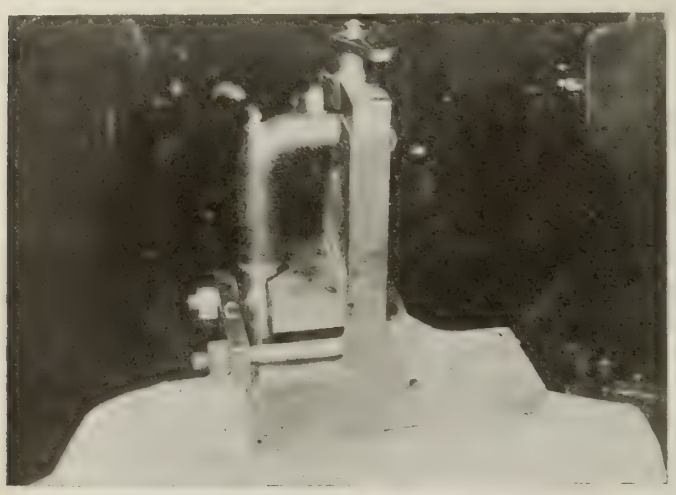


FIG. 1—DRILLING THE OVERHANGING ARM.

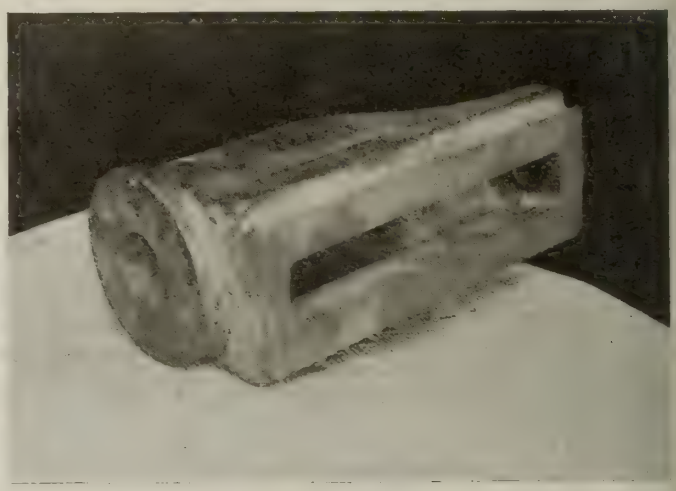


FIG. 2—UNFINISHED CASTING, VERTICAL COLUMN.

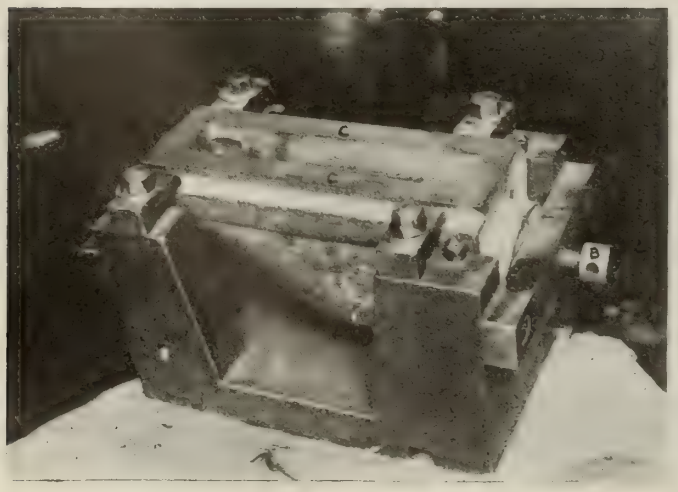


FIG. 3—SHAPING THE BASE.

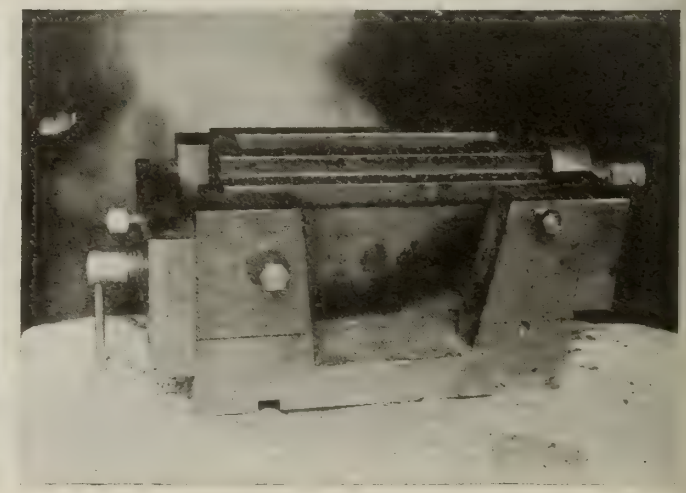


FIG. 4—MACHINING THE DOVETAIL.

FIG. 5 FACING BASE OF COLUMN.

FIG. 6—TURNING THE BOSS.

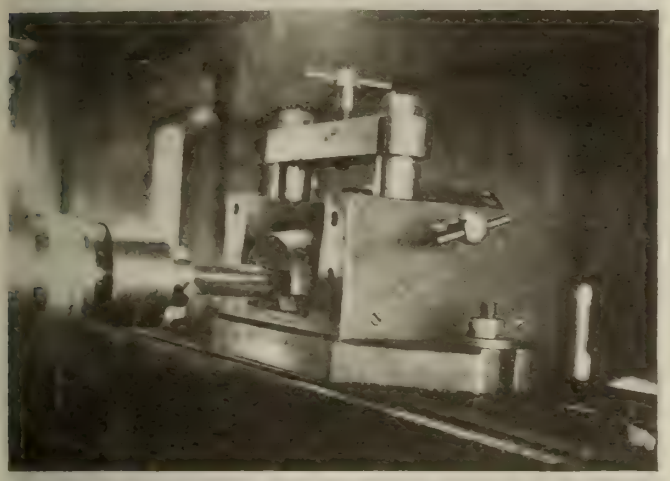


FIG. 7—DRILLING, FACING AND TAPPING.

FIG. 8—MILLING THE KEYWAY

The end mill is then removed and the nserted tooth cutter A, Fig. 6, is at-ached to the milling machine spindle.

This tool, it will be noticed, is a com-ination boring and turning tool and is ised to first bore out the hole. After his is accomplished the boring tool is nade with a straight shank; this acts s a pilot for the turning operation. The ool is used as follows: the table is set o the correct height and then fed in gainst the revolving boring tool. The eed or travel is continued until the out-ide of the boss is turned to the dia-eter between the cutting edges of the wo inserted blades shown, which is 375 in.

It will be noticed that these blades can e adjusted, being held with two set crews.

The fixture is then turned around 180 eg. on the milling machine table to the osition shown in Fig. 7. A hole is then rilled in the boss which is tapped out ith 1 in. x 6 threads as shown in the lustration. It will be thus seen that his fixture is used for facing, boring nd turning the boss at one end, and illing and tapping the boss on the op-osite end. A number of holes with -16-18 threads are then drilled, no jig eing however used, the holes being potted in the centre of the various losses.

The casting is next placed on the fix-ture, Fig. 8, being located by the dove-tail surfaces sliding on from the end of the fixture. A Woodruff keyway is then machined at the upper end of the bored hole.

One of the finished machined castings is shown in Fig. 9, and the various steps observed in manufacture may be fol-lowed.

Machining the Dividing Head Base

The vertical column is mounted on a base known as the dividing head base. One of these, as received from the foun-dry, is shown in Fig. 10.

The first operation is milling the vees in the fixture, Fig. 11.

The casting is placed on height pins and fits under a ledge of the fixture along the surface A.

The two clamps B force the casting into this ledge and also tend to hold it down.

A pair of gang cutters accurately spaced is then used to machine the two vee surfaces shown.

The surfaces machined are at 45 deg. or an included angle of 90 degrees.

In Fig. 12 is shown the casting mount-ed on a lathe face plate for the next operation, which is facing, turning the 1.374 in. boss, boring and countersinking a 0.4375 in. hole and bevelling a 60 deg. surface for the graduations.

The casting is located against three stop plates A and held down with four clamps as shown.

When performing the operations noted on the casting the tool illustrated in Fig. 13 is used. This tool is carried in the lathe tool post at an angle, so that the end of the 1.374 in. boss is first faced, using a stop in the cross slide for the correct diameter.

The diameter is then turned, also using a stop for the correct height of boss. The face is then machined again to a stop and the edge of the tool being ground with the correct angle the bevel is formed by feeding the tool down to another stop.

By this method these machining oper-ations are simply fed, being almost auto-matic.

The 0.4375 in. hole is then bored in the centre of the boss and countersunk, using a combination tool in the turret of the lathe.

After the tools are once set to the cor-rect positions all the dividing head bases may be machined with these various operations without again resetting the tools.

The next operation is drilling two 9-16 in. holes, using the jig shown in Fig. 14. The casting is located by the machined vee slots and pushed against a fixed pin

at the rear with the thumb screw A; two screws B hold the piece in position in the jig.

The two holes noted are then drilled, the tool being guided through the bushings shown in the usual manner.

The small bosses through which the holes are drilled are next faced, no jig being used, however, to hold the casting, which is held on the drilling machine table. The graduations are next machined or cut on the bevelled surface of the base and the special machine used is shown in Figs. 15 and 16.

The casting is held on a stud as shown which fits into the 0.4375 in. hole.

The machine is provided with an index wheel A on the periphery of which 360 teeth have been cut.

When cutting the graduations the operator feeds around the index wheel by means of the level pawl B to obtain the 360 spaces or graduations.

The marker is shown at C, which is operated by a crank motion. Or the crank arm at D is a cam on the periphery of which notches are cut at various distances from its centre, which represent 1 deg., 5 deg. and 10 deg. The operator then indexes the wheel around and drawing the cam by means of the lever E to the first position with the machine in operation the marker makes, say, the first graduation representing 1 deg., which is a short line.

The next indexed position is then made and the cam being moved over another short line is made so on up to the fifth. At this position the cam profile is further away from its centre and the marker makes a longer line.

Then four short lines are marked and at the fifth a still longer line is made again owing to the profile position being further from the centre.

In other words, taking the profile stops in rotation we have four short dis-

FIG. 9—A FINISH MACHINED CASTING.

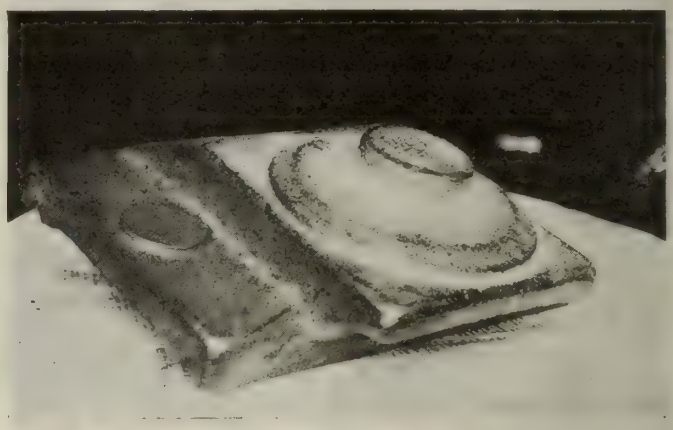


FIG. 10—A ROUGH CASTING.

FIG. 11—MACHINING THE VEES.

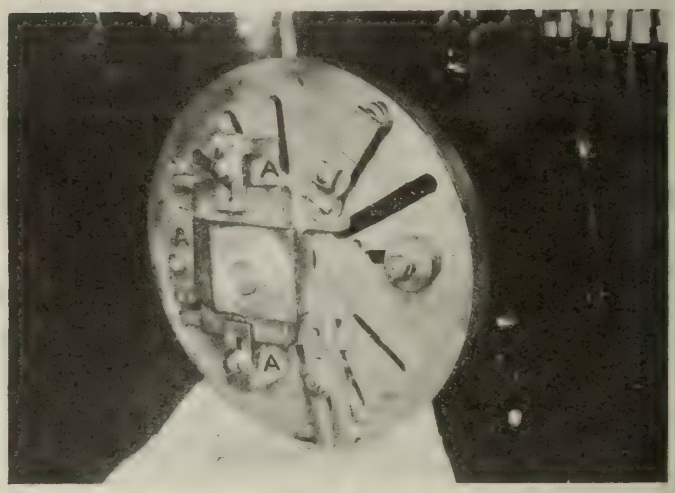


FIG. 12—MACHINING THE BOSS.

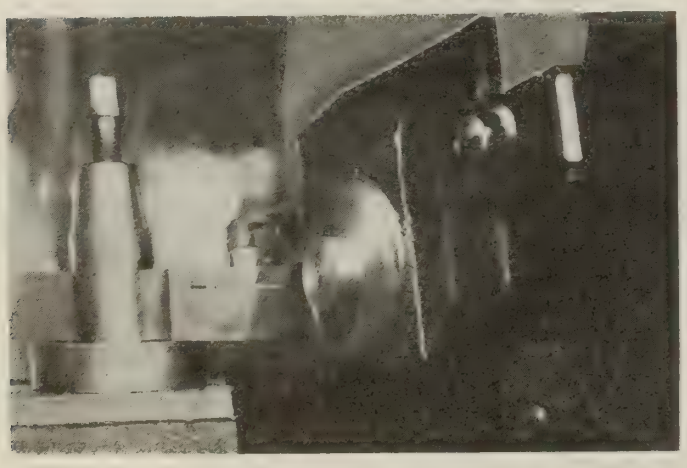


FIG. 13—FACING THE BASE.

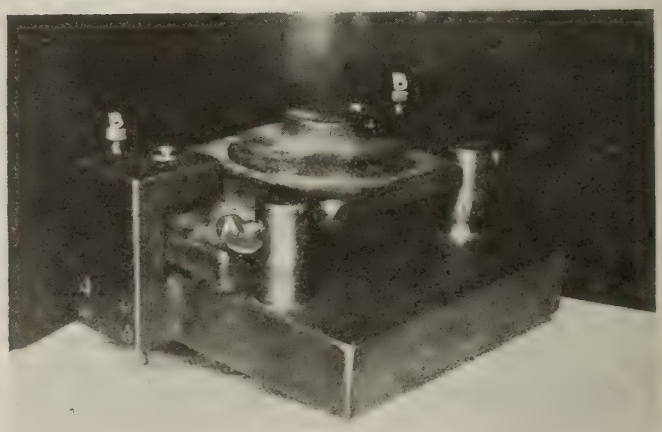


FIG. 14—DRILLING THE BASE.

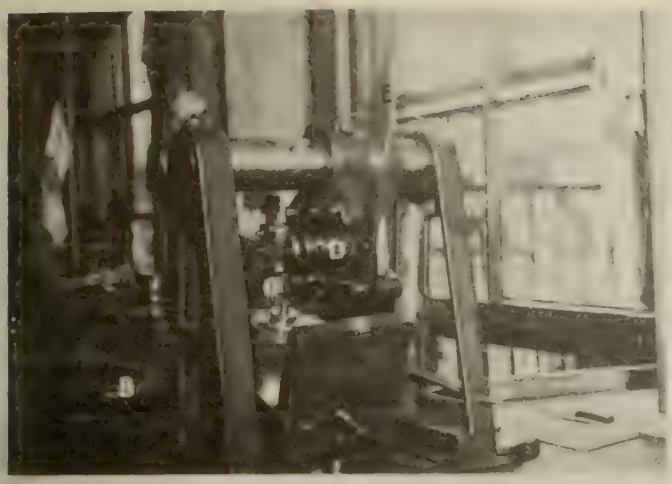


FIG. 15 GRADUATING THE BASE.

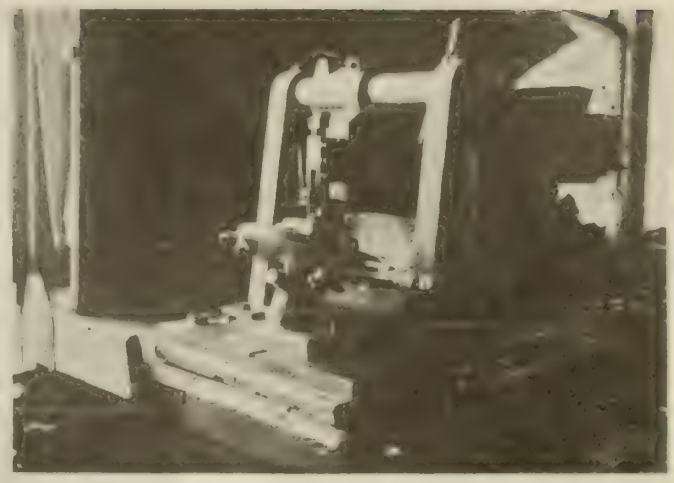


FIG. 16 ANOTHER VIEW OF GRADUATING MACHINE

tances, one long, four short and one the longest of all.

By this system we obtain the degrees by short lines, the fifth long, again four short and one the longest of them all. A similar system or method is used when making graduation to the English measurement, the only change being the substitution of a new cam and index wheel.

The graduations are next stamped with the correct reading 0 to 360 deg., after which the surface is polished to remove the burrs.

In Fig. 17 is shown one of the completely dividing head bases after it has gone through the various operations here described.

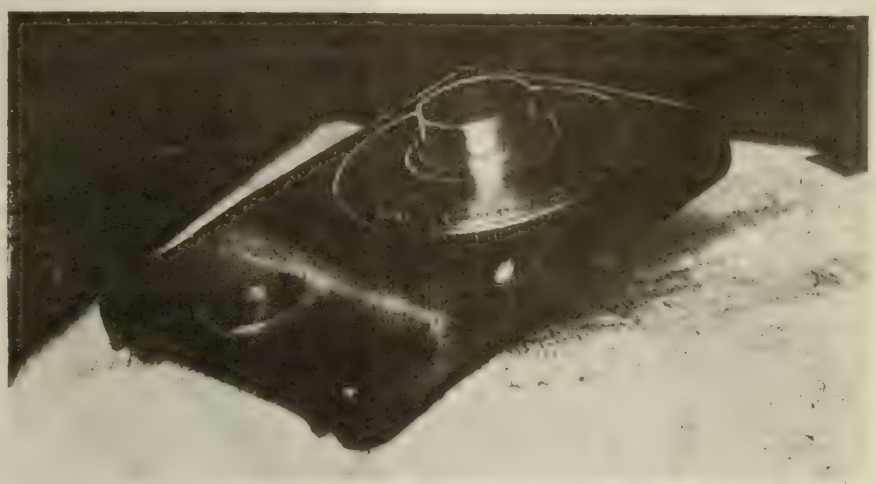


FIG. 17 A FNISHED DIVIDING HEAD BASE.

EASY METHOD OF LOCATING ARTICLES, PAGES, ETC.

By J. E. M.

Occasionally one requires to make frequent reference to some paeg or some tabulation in a book. In such cases I have found a Niagara clip very convenient. Obviously any other small wire paper clip may be used.

With this slipped onto the right leaf, one can pick up the book, place his thumb on the clip and immediately open the book at the exact place. The clip keeps its place well and may be left there indefinitely, as it will not cause any inconvenience at any time and is always ready for use whenever that page of the book is to be consulted.

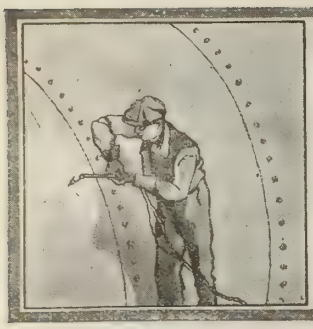
For reference books of five hundred pages or over and which are generally consulted by use of the index and find it facilitates page finding if small stickers are placed at every hundredth page. One end or side (about one-half the total area) of the sticker, is attached to the margin of the page and the projecting part of the sticker is doubled back upon itself, thus presenting a clear ungummed surface on either side. The first one is placed near the top of the book, the last one near the bottom, and the others evenly spaced between. With the book thus marked one can judge to within a very few pages of just where to open. Placed as above, the projections are about ¼ the size of the label.

Another method is to draw a mark across the edges of the leaves (closed) between pages 100 and 200, and a little lower down a line across those from 200 to 300. Then lower again mark across pages 300 to 400, and so on. Then close the book and it will present the appearance of a number of short straight crossbars at different points down the face of the leaves. Now place the figure one above first bar, two above the second, etc. To find, say, page 150, open at the middle of the first bar; for 250, the middle of the second bar, etc., the figure in each case representing the left hand figure in the required page number.

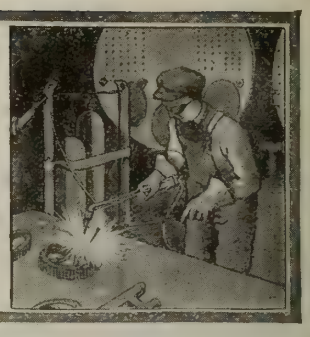
HOLES IN FIRES

It is highly important, in running a boiler fire, to avoid holes in the fuel bed. It is somewhat difficult to do this when the fire is thin, but an experienced man will be watching for the holes and will stop them as often as they are found. A "hole" in a fire is a place where the grate has become uncovered, or nearly so, by the burning away of the fuel, or from any other cause. Such holes have two detrimental effects. They allow large excesses of cold air to pass through the uncovered parts of the grate, thereby chilling the furnace gases and lessening the efficiency with which the heat is absorbed from them by the boilers, and their presence also cuts down the supply of air through other parts of the fire at the same time.

Ferrouranium is the latest of the ferro-alloys to enter the lists. Uranium is a very heavy and, chemically, very active element. It is found very sparsely as a black oxide in the mineral pitchblende—the mineral in which radium was first discovered. It is found more abundantly in the Colorado radium ore, a bright yellow oxide and silicate of vanadium, uranium and lime. After extracting the radium and vanadium, the uranium remains in the residue as a by-product, usually as a soda-uranium compound. This is treated so that uranium oxide is obtained, which can be reduced by carbon in an electric furnace in the presence of iron ore or scrap iron, to ferro-uranium (30 to 60 per cent.). The recovery of uranium is not high (50 to 70 per cent.), the rest being lost in the slag. Mr. R. M. Keeney has recently described these processes in detail for the first time in the August "Bulletin" of the American Institute of Mining Engineers.



WELDING AND CUTTING



SOME OUT-OF-THE-ORDINARY WELDING JOBS

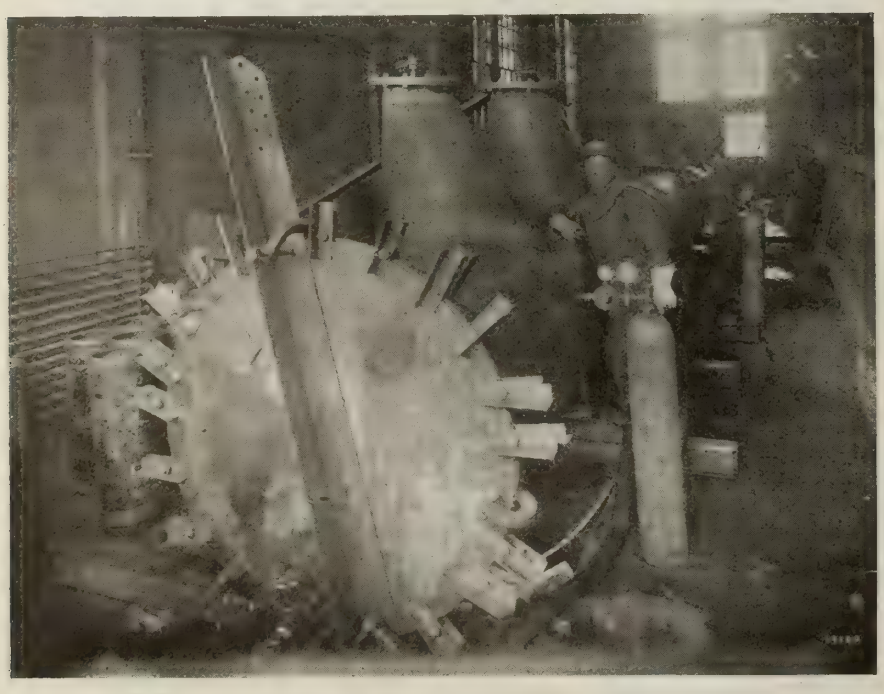
The illustrations show some examples of work which is successfully done by oxy-acetylene welding which would entail considerable expense if done by other methods.

It can readily be appreciated that to build up the header shown in Figs. 1 and 2 by riveting would result in much added expense, and would mean a much less sightly job. This header was fabricated and welded in a Chicago shop, and the method of welding on the blank head is clearly shown. All plate for the main body of the header, the four tees and the blank flange, was 7-16 in. thick. The tees, as will be noticed, are offset from the centre line of the main header necessitating careful laying off and shaping. Both the flanges and the joints of the tees, as will be noticed, were welded.

The method of welding on the blank head is clearly shown. The simple clamps shown were constructed of pieces of angle iron bolted together with one bolt, and held apart at their outer end by a metal spacer. The large angle iron clamped across the face of the head was of assistance in the preventing of warping of the metal disc.

The joint was first tack welded between clamps entirely around the circumference and the clamps then removed, after which the entire joint was finished.

WELDED HEADER COMPLETE



SHOWING CLAMPING USED IN WELDING UP END OF HEADER.

Fig. 3 shows a portion of a pipe tunnel one quarter of a mile in length. All joints in the two large pipes shown, for the whole length of the tunnel were welded, no screwed connections being used. This work was done in position, and, as will be noticed, the tunnel was trenched to allow the welder to work entirely around the pipe.

Figs. 4, 5 and 6 show another pipe job, although of an entirely different character. The cages shown were required by a large oil company for a job which called for care and neat workmanship. In all, about forty were used, although only five of them are shown in their assembled form.

The large rings shown were made up of 4 in. pipe bent to shape and welded together. In each of these rings one hundred and four circular openings were cut. These openings were cut with a Davis-Bournonville circular hand-cutting torch, and were just large enough to pass a 2½ in. pipe. The time for each hole was just 30 seconds, making it only a matter of an hour or so's time for the entire ring.

The connecting pipes between the two

PIPE TUNNEL, ¼ MILE LONG. ALL JOINTS WELDED.

rings were made of 2½ in. pipe, each 15 ft. long, and were welded into the ring headers. These welds would take about 10 or 15 minutes each.

The apparatus used for all these jobs was supplied by the Davis-Bournonville Co.

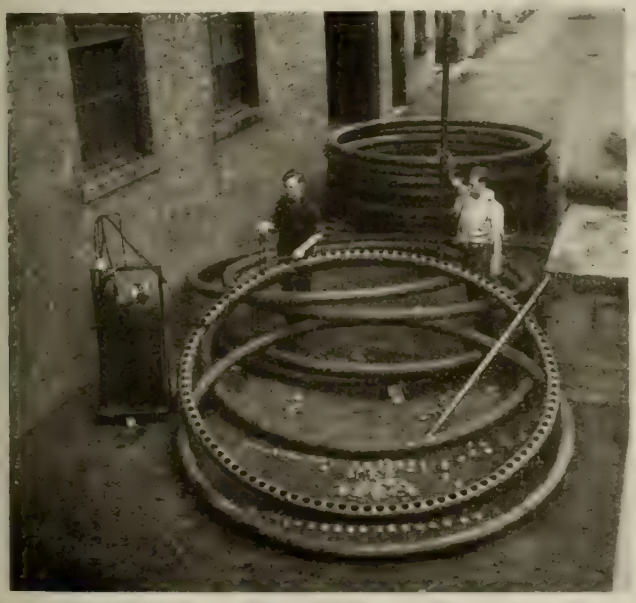
ELECTRIC WELDING ARRIVES

The British Government has invited the Institution of Electrical Engineers to put forward suggestions for ensuring the safety of operators engaged in electric welding. This circumstance, combined with the approval by Lloyds of electric welding for ships' hulls under certain conditions, is a proof that this process of jointing steel will prove a formidable rival of riveting. Hitherto no general regulations have covered electric welding, and the firms engaged in it have adopted their own methods, which seem to have been fairly successful in protecting the operator himself from material hurt. The main difficulty is apparently to safeguard other workmen who, especially in the open conditions of the shipyard work, will persist in watching the operators. The ultra-violet rays from the welding are having an injurious action on the eye, and the infra-red rays burn the skin. Sir William Crookes has invented a glass which protects the eye against both types of radiators; and if its use is made compulsory, together with efficient screening against onlookers, it appears likely that electric welding will become as safe as riveting. It is also admirably adapted to building up the framework of reinforced concrete vessels. Both in Great Britain and in America State research committees are busy perfecting the details of the process. A big fight is likely to be made by the vested interests (labor and otherwise) concerned in riveting, but electrical engineers are confident that welding will triumph both in the construction of hulls and in the making and repairing of tanks, ventilators and other portions of ship equipment.

FINISHED DRUMS.

ELECTRICAL ADVANCE IN GREAT BRITAIN DURING THE WAR

One of the most striking developments in industrial Britain during the war has been the enormous development in electricity supply and with a corresponding development in electrical manufactures as relating to the industrial applications of electricity, whether for lighting, heating or power. Between 50 and 100 electricity stations might be cited in which the plant capacity has been more than doubled during the past four years. The output of electrical energy has been increased to nearly the same extent. Unparalleled demands have been made upon manufacturers of lamps and lighting fittings, of motors and power auxiliaries, of electric furnaces and welding equipment, for munition purposes.



CUTTING OUT HOLES WITH CIRCULAR HAND TORCH.

THE FINISHED RING.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

THE MAN WHO THINKS CAN DO MUCH TO BETTER THE SHOP CONDITIONS

By WILLIAM EARNEST

IN a recent article in this paper, pointing out the numerous uses for old files, etc., there was much food for thought. By way of illustration let us in imagination leave our comfortable position and take a look inside the shop.

First of all, everything looks just the same as any other old machine shop; the greasy floors, that peculiar smell familiar to all machinists, the belts hissing, shrieking, and slipping as if in an angry passion because the good old lathes stand up so resolutely, as if arguing as to which was working hardest to turn up that shaft. The poor old shaft, having no say in the matter at all, trembles there between the centres like a sausage in a frying pan over the fire, and sends forth a savory smell. Everything looks lovely and going fine, but what a multitude of little worries each workman carries.

There is old Bill Slocum, who works on the bench, doing that fine filing and fitting, and a good mechanic he is, too. He says "it's a son of a gun to get a job done at all"; and he ought to know. He's been on the job for a long while, so we'll just ask him what's wrong. Of course, he's only too willing to have a little rest, so after spitting a wad of tobacco half-way across the room, alighting right on top of one of the boss's nice new blue prints, he begins:

"This shop's something awful since this here blamed war come: then them 'ere night men loses half the stuff around. They pinches the tool holders and tool post rockers, yer can't git a tap wrench or die stock, and if there wasn't a watchman at the shop gates, I'd be a thinking that some of them 'ere new fellers carried all the drill chucks and lathes wrenches home with them.

"Then there's them fancy toolmakers as comes from the States, sitting down to work as if they was playing pianers. They comes and borrows my screwdriver and wrenches just because they don't carry such things in their fancy crocodile skin-bound tool chests; and besides, they says as that they gits five cents more an hour than me that's worked here for years. I tell you after the war's over I'm going farming, where everyone gits a fair show, and yer don't need so many tools."

Well, old Bill always was a grouch, anyway, but I guess there's a whole lot of truth in what he says.

Now, let us go and have a chat with those white-collared Yankee toolmakers that we heard of, and see what they have to say. There's one chap that looks a little more sociable than the others, it won't be hard to get him to talk, so we'll quizz him right away. Of course, this is only an imaginary shop, so the boss won't fire anyone for talking, so I'll start him going and that's about the last chance we'll get to say anything until he's had his say; however, the whistle will soon blow, so we don't mind at all.

"Well, how do you like the new job?"

"Like the new job!" says he. "Well, not too bad, but say! down in the States it's away different. Why! there's some system down there; system, that's the stuff! The shop where I used to work in, they had everything you could ask for. Why! we had soap, clean towels, lockers, short hours, double time for overtime, and say, there was everything you could wish for: here you can't get a darned thing to work with; the boss seems to think I ought to chase around looking for wrenches, files, and screwdrivers.

"There aint a complete machine in the whole place. I tell you, Bud, if you want to see things done right, just go to the States; they'll use you right there. Here they expect you to make bricks without straw, like the Egyptians used to do."

After a few more explosive remarks with reference to the Huns and solemnly avowing that he was all for the Allies, our friend sat down on his stool, and relaxed into an attitude of intense and profound thought, which is perfectly natural to this type of toolmaker.

We must leave him here, for it would be too bad to stop an American from helping the Allies when he is in the mood.

Well! there is one thing we have found out; that is, that in this shop, being like most others, nothing in it is right.

It has been said that "It's a poor workman that blames his tools," and it might be added "or his place of employment, either."

Suffice it to say that there are a whole lot of things wrong in every shop, especially in the way of accessories and such things. This can hardly be controlled unless the management can see their way clear to purchase unlimited supplies, or on the other hand, the men take special interest in things generally.

Now comes the point where the old files and other small tools that are usually scrapped come in. This should especially appeal to the individual mechanic. If one gets stuck for a tap wrench, instead of racing all over the works for one, or if it is known that there is not one on the premises; what man with an ounce of backbone, couldn't fix one up out of an old file in a very little while? Or better still, if the foreman would get half a dozen old wornout files, and let the blacksmith forge them into half decent shape, and then get the apprentice boy to put holes of various sizes in each, it can readily be seen that for no appreciable cost, the missing tap wrench proposition can be solved once and for all.

Home-made stuff has a habit of lasting a long while; the polish and gloss is not there, but they are always ready for use, anyway. The same can be done in the case of missing machine wrenches.

A good heavy screwdriver can be made in three minutes by simply grinding the point of a file until it becomes red hot. Is there anything so aggravating as to have a good machinist ask for the loan of a centre punch? It is only the work of a few minutes to make a fairly good one from a round file. My belief is that there is more time saved by making an article, in the long run, than there is by borrowing and thus holding the other man up. As a matter of fact, lots of the things a mechanic requires are half-made if he only begins to look around him. If there is a moral to this story it must be "Where there's a will there's a way." The next time you are up against it, as in some of the foregoing

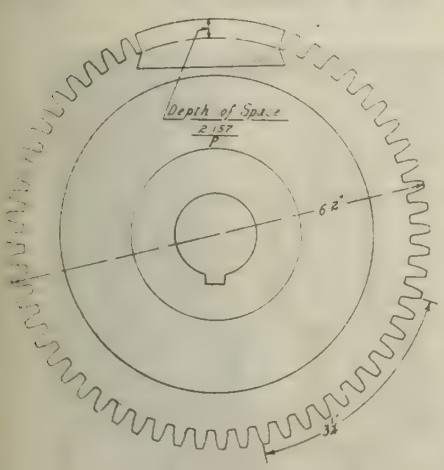
instances, just look around you and think for a moment, and then grab something at hand that will answer the purpose. If you form the habit of thinking, soon you will see in reality things in the shop that were never noticed previously. Instead of finding fault with conditions, your worries will cease, and everything around you will take on a useful aspect.

It might be advisable to add that if employers and foremen would allow thinking men a little license along these lines, there is not the slightest doubt that the expense for the class of goods mentioned would soon drop to almost nil. On the other hand, if the evil practice of borrowing and each man holding up his neighbor is continued, delays, dissension, and bickering will be the result, besides a real lack of small appliances on hand.

RECUTTING REPAIRED GEARS

By E. S. HALL

Machinists, when called upon to space teeth over a repaired portion of a gear, are sometimes at a loss to determine the pitch, not knowing the number of teeth contained in circle, or, through the old teeth being worn thin. A good plan is to measure round the circumference, approximate 3¼ in., and count the number of teeth contained therein; this will be the diametrical pitch. Next find the number of teeth by multiplying the whole diameter of the gear by the pitch and subtract two. Example: In 3¼ in. we have 10 teeth and the whole diameter of gear is 6.2 in., then $6.2 \times 10 = 62 - 2 = 60$, the number of teeth, and 10 the pitch. Now set the index head for 60 divisions and take a No. 2 10 pitch cutter (this to suit present example). Secure cutter on arbor and set centres to it, afterwards locking table. Next mount the gear on centres and locate depth of space (i.e. $\frac{2.157}{P}$) by touching the patch with the cutter in motion. Raise table



216 after withdrawing work from underneath cutter, and adjust space to cutter. When not in motion, use the fine adjustment on index. Crank is necessary but don't move table on any account. Start machine and proceed in usual manner and the gear will be as good as new.

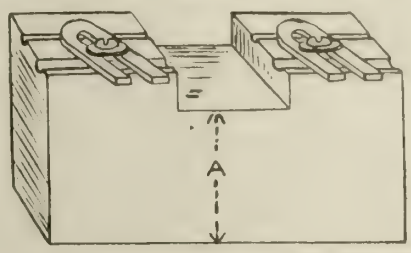
LENGTHENING TWIST DRILLS

By C. E. Hall

The accompanying sketch shows a block for holding twist drills while hard soldering extension shanks of any desired length, which has been used with great success for a number of years by the writer.

It frequently happens that an extra long drill is needed, but is not immediately obtainable.

By utilizing any scrap material, such as a piece of cast iron or cold rolled steel and shaping an opening across the centre, varying from about ¾ in. to 1½ in. wide, and ¼ in. to ¾ in. deep, according to the size of drill required, and shaping out any number of longitudinal grooves varying from, say, 1-32 in. wide and upward, a means is provided whereby quite a range of work may be handled economically.



LENGTHENING TWIST DRILLS.

File a long bevel on the end of the drill and the same on a piece of drill rod of the same diameter, as shown in sketch, lay them in a suitable groove with the bevel focus together, and any "high spots" will at once be apparent, and a few strokes of the file will bring them into perfect alignment. Clamp in position by U straps as shown in sketch with the joint over the transverse opening and hard solder. Silver solder is best for this purpose on account of its great strength and easy flowing properties. Use borax as a flux.

The U-shaped straps are better than washers as they are easily slipped under the screw heads and quicker to remove while filing the joint.

The distance A should be generous as a good body of metal in the block prevents distortion while soldering, which might impair its future usefulness.

In case of short drills, a wad of wet asbestos or wet tissue paper placed on the cutting end will prevent the temper from being drawn.

A joint made in this manner will resist any torsional strain that the rest of the tool may be subject to. This has proved a great boon in my own case and trust it may be of some use to other readers of your valuable paper.

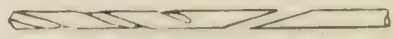
C. E. H.

A SIMPLE PRECISION CENTRE PUNCH

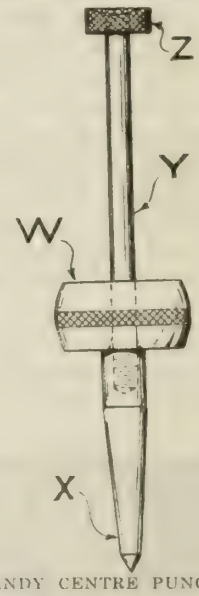
By Tyke

A very simple, practical and extremely accurate centre punch for precision work is shown by the accompanying sketch, and is made as follows: X is a piece of ¼ in. dia. drill rod, 1½ in. long, drilled and tapped to suit the piece Y, which is ⅛ in. dia. and ¾ in. long, threaded at both ends, the upper end of this piece being fitted with the finger button Z. The weight W is a piece of cold rolled, 1 in. dia. and about ½ in. long, turned to the shape shown, and knurled about the centre as shown. This piece is drilled to be a sliding fit on piece Y, the underside hole being very slightly bell-mouthed in order to overcome closing in on stem Y by continued use.

After the job has been marked off in the usual way, the punch is held with the weight W as close to the top of the stem Y as possible, and when this is



practically square with the surface of the job the weight is released with as little disturbance as possible, the slight impact of the weight is sufficient to neatly mark the job in question, and providing the punch point has been ground perfectly round, the impression thus



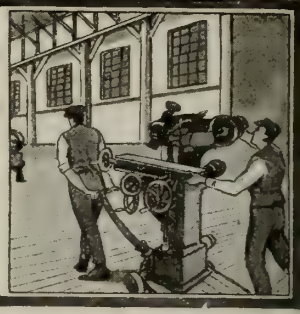
HANDY CENTRE PUNCH.

made lends itself to indicating with extreme accuracy.

The whole centre punch can be made in a few minutes, and is well worth having in one's tool chest.

Crystalline selenium, in which light produces so remarkable a lessening of electrical resistance, proves to be not the only substances so affected. In the experiments of the United States Bureau of Standards to determine precisely the properties of different materials, such compounds as jamesonite, cylindrite, silver sulphide, bismuthinite, boulangerite, stibnite, and molybdenite showed some change in electrical conductivity with varying light in the same way as the element selenium.

DEVELOPMENTS IN SHOP EQUIPMENT



Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

KENT KEG-KONVEYOR

An extremely simple device for the rapid handling of kegs has been placed on the market by the Kent Machine Co., Kent, Ohio. As may be seen from the illustrations herewith, it is of very simple construction, easily operated, and is said to have a greater capacity for moving more kegs in a specified time than many other forms of handling devices which can be operated by one man. In operation the device is extremely simple and a man can easily become accustomed to its use; he approaches the keg with the hoop up against the handle of the conveyor; then by a slight movement he drops the hoop over the keg and brings the handle down ready to start pulling the load. Two spurs on the lower part of the device help to pick up the heaviest load and prevent the keg from slipping while it is being transported.

Durable materials are used in the construction of the keg-konveyor, the sides and other wooden parts being made of ash with wrought iron fittings.

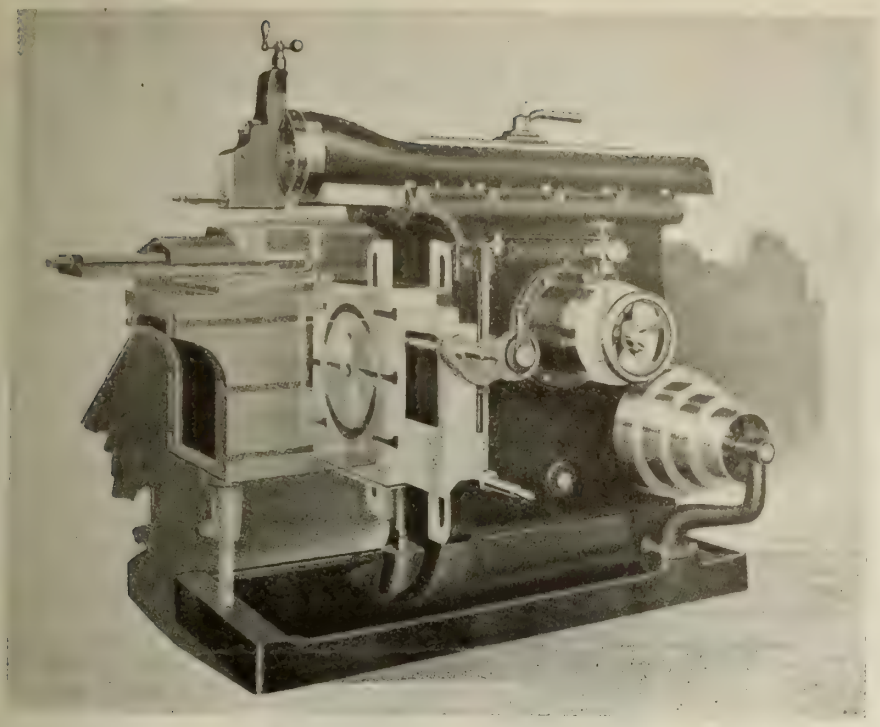
THE MILWAUKEE SHAPER

The tool described here is the latest to be turned out by the Milwaukee Shaper Co., Milwaukee, Wis. The makers claim for this machine extreme simplicity of design, embodying a minimum of working parts, with a consequent absence of jarring or vibrating. The stroke control is actuated by a rack and pinion, and a roller working in a cam on the barrel. It can be adjusted instantly. An indicator is provided on the hand wheel to show when the required length of stroke has been attained. A nut is provided on the hand wheel spindle to lock it when the stroke is set. The table can be swung to any angle by loosening three nuts, and a stop on the apron is provided to bring it back to true position. For some kinds of work the table can be removed, and the work strapped to the apron. The ram is designed with a view to strength, the bearings being made full in width, V shaped and scraped down to a perfectly accurate fit, insuring smooth working, and allowing for the wear to be taken up. The tool head is graduated, and can be swivelled to any angle, while the down feed is provided with a micrometer adjustment. The vise swivel is provided with a graduated base and heavy steel jaws, while for tapered work an extra set of jaws are furnished. The cross rail is designed with extra long, wide bearing surfaces, which are accurately scraped to a true bearing. For taking up wear, a taper key is provided in the apron. Besides the usual swivel table, a tilting table is furnished at a slight extra charge, which can be adjusted from 0 to 7 degrees. The feed arrangement is designed without connecting rods. The gears work on a spline and are always in readiness for action when the table has been set in position. The back gearing is strong, and the change from compound to single can be made very quickly by simply moving a lever at the back of the machine. The column is strong and rigid, the projecting slides giving increased bearing surface to the ram, and the base is cast with strong reinforcing ribs. The base is spread out from the column to make a perfectly stiff, immovable foundation when properly anchored. The table support is provided with an adjustable leg, which can be set to overcome any tendency to spring.

This is a compact and well designed

LIFTING KEG WITH KEG KONVEYOR

KEG KONVEYOR WITH KEG IN PLACE



MILWAUKEE SHAPER

machine, embodying some special features, which should make it a welcome addition to the available tools of this class.

THE "LLOYD ROYAL BELGE"

War-scarred Belgium has taken the first step towards her commercial rehabilitation. As plucky in peace as she was in war, she is not waiting for others to help her out, but is helping herself. And in token of her appreciation of Yankee friendship and Yankee worth, she has chosen an American to hew the way for her.

This American is Joseph A. Nash, for four years general manager of the Shipping and Purchasing Department of the Committee for Relief in Belgium. He arrived recently from London in New York in the capacity of manger for the United States and Canada of the Lloyd Royal Belge. This is a purely Belgian enterprise, the first attempt on the part of that country at direct trans-Atlantic connection between her own shores and those of North America, and the first step in the direction of weaving a strong commercial and industrial bond between the two nations. A pet project of King Albert, certain of government support, endowed with funds to insure almost unlimited expansion, the Royal Belge is in the market for ships, and assurances have already been received that every vessel that flies the red, yellow and black will cross the ocean filled with rich cargo.

The main offices of the company just now are in Paris, where the line's president, M. Arthur Brys, makes his headquarters while his old home office, at Antwerp, is being prepared for his return. The American branch is located at 11 Broadway, New York City, and from there Mr. Nash is conducting his negotiations.

The Royal Belge was organized as a corporation after the war had broken out. At that time it owned forty ships, and its head, M. Brys, turned them over to war purposes. In his own country, and in France, he is considered one of the most remarkable figures of the day —immensely wealthy, yet always at work; indomitable in his determination to win for Belgium a commanding position as a commercial power and ready to sacrifice his own interests and his own wealth in the service of the nation. The leading men of Belgium look up to him as minor officers in an army look up to their general.

Of the original fleet of forty, only sixteen vessels are left. The other twenty-four were sunk by submarines or mines. Twelve of the remaining ships are temporarily flying the British flag, carrying supplies to France and being engaged in other similar work. The other four are still in the service of the Belgian Relief.

The Royal Belge has a large liquid capital of its own and a great additional sum has been guaranteed for its enlargement. The first trip, as soon as the service has been organized, is to be made between Antwerp and New York; and just as soon as this route has been fully established, the great Belgian port is to send vessels to Philadelphia, Norfolk, Baltimore, Charlestown and even Galveston. Later, Canadian ports may be added.

What Belgium needs first of all, Mr. Nash said, is American machinery. Cotton and textile fibres are next required, as well as immense quantities of tobacco. In return, Belgium will ship us her linens and needlework. Much of this is being manufactured even now, more than 60,000 women and men being engaged in these industries. For, despite the havoc wrought by the Germans, enough has been saved to enable these people to keep at work and produce marketable goods. Glassware, too, is one of Belgium's specialties and its manufacture will be resumed on a large scale just as soon as a proper survey can be taken of what has remained intact of the country's industrial facilities and what is in need of reconstruction.

PREVENTING THE GROWTH OF CAST IRON

Amongst the fascinating problems which make engineering science at once a most exacting and a most fruitful study the characteristic behaviour of metals under varying conditions provides many curious cases. For example, grey cast iron grows appreciably in volume when exposed to high temperature. This characteristic, which causes much trouble in cast dies, valve seatings and other parts, is believed to be due to internal oxidation caused by the penetration of hot gases into the metal. A remedy recently suggested in England is to eliminate free graphite from the surface of the metal, this being the cause of its porosity. Successful results have been obtained by annealing the parts for several days in iron rust at a temperature of from 1,650 to 1,830 degrees Fahrenheit.

DANGERS OF STORING COAL

Coal deteriorates to a sensible extent upon exposure to the weather, and supplies that are held in storage should therefore be covered by a shed or roof that will afford a proper protection. Coal that is closely confined is likely to grow hot, below the surface, and good ventilation of the bins is therefore desirable, so that the coal may be aerated and cooled as thoroughly as possible. The heating is doubtless due to the slow oxidation of impurities, and under some circumstances it may be rapid and intense enough to set the coal afire—a phenomenon known as "spontaneous ignition." Fires sometimes originate in this way, deep down in a coal pile, and smolder, unsuspected, for a long time. They are often very hard to extinguish. To guard against the indefinite spread of fires in the coal pile, whether they are of spontaneous origin or not, the bunkers should be divided at frequent intervals into entirely separate pockets, by substantial walls of brick or other noncombustible material, especially if coal comes from mines the output of which is known to be especially prone to self-ignition.

In some parts of the United States natural cement rocks are found which contain nearly the proper proportions of materials to produce Portland cement; but even in these localities it is generally necessary to add either limestone or shale in order to get the proper mixture.

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Price Adjustment An Intricate Business

A FEW days ago two men met in the street car of one of the steel and iron cities of Canada. One man was a manufacturer who used a lot of pig iron. The other was engaged in the production of pig iron. The first man looked at iron as a raw material. He was not particularly concerned about what went into it, or whether the ore, limestone and coke were contracted for in advance at high prices, or if the labor costs were just the same as they were in war days.

The blast furnace man knew iron from the standpoint of the individual who computed the costs of raw material and labor, freight and insurance, depreciation and overhead.

The question that passed was this:—

"When is the price of pig iron going to come down?"

And the answer came back: "When is the price of soap and prunes and butter and eggs going to come down?"

An odd answer perhaps, but not so odd if you take the trouble to think it over.

As a matter of fact, there is an economic truth stated there that is too apt to be overlooked.

The prices of pig iron, soap, prunes, butter and eggs are very closely allied, and it is well to recognize it.

It is not only impossible, but dangerous, to grab any one commodity and say, "The price is too high, and it must come down regardless of the prices of other things that have to do with its production and distribution."

The idea has been popularly entertained that as soon as the war ceased we would at once move out of the era of war prices. As a matter of fact, it would amount to nothing short of industrial suicide to attempt such a course.

Prices now show a tendency to leave war levels, but the process must be gradual. High prices are part and parcel of the war machine. They were brought about, not always because there was profiteering—although there was enough of that—but by reason of unnatural and abnormal conditions created by the exigency of war.

In the process of recession in values it is fair and just that no section of the community should be called upon to bear a larger share of the attendant loss than the same section gained in the period when prices moved toward the higher levels.

This is an intricate piece of business, and its solution may yet have to be found in some cases in Government action by the placing of business at a compromise price, and allowing the margin to be absorbed by the public treasury. This might serve the dual purpose of avoiding calamity in price adjustment, and bringing buyers and sellers closer to the point where they can once more come together and do business on a satisfactory peace-time basis.

Another Jail Sentence

ONE Toronto man got three years and another six months for having literature in their possession that had been banned by an order-in-council. Such sentences are about the worst possible thing that could happen with the amount of unrest that is already painfully apparent in the country.

Not many months ago an Old Country publication was banned, and the fine for reading or having the thing in one's possession was stacked up in the four figures.

There was a large number of these copies in the possession of members of the House, and a number of publishing houses had had advance copies sent to them. Why, then, should there not have been action taken against all these "guilty" parties, in the House and in the publishing offices of the country?

Ottawa should make at once a very clear pronouncement upon this matter.

It is dangerous to allow men to be sent to jail, after the war is over, on the strength of orders-in-council that were passed during the stress of a world war.

IT'S hard to ship stuff to Siberia now because railroad conditions are bad. As a matter of fact, any Canadian manufacturer who wants to ship to that country also wants to know who's going to pay the bills.

* * *

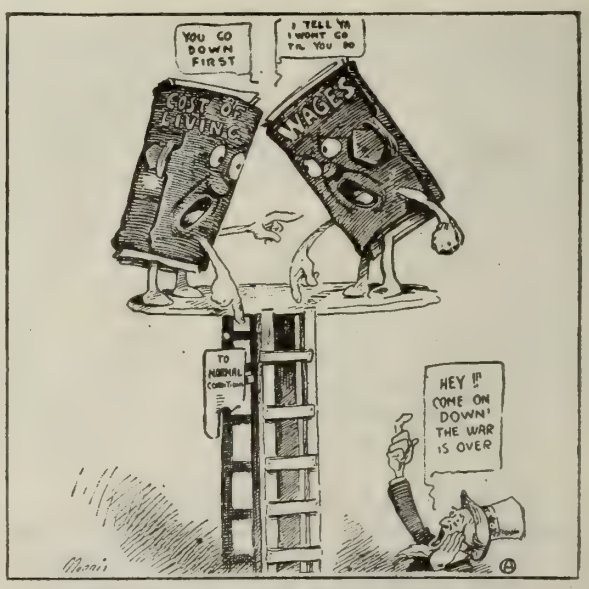
THE record for turning fuse heads in a big Toronto shop is held by a woman. There's nothing remarkable about that as women always have had a remarkable trait for turning heads.

* * *

AND now comes the word that the Kaiser is going to grow a beard. This fact will no doubt be speedily appropriated to boost the sale of all kinds of razors and chin scrapers in the Allied world.

* * *

IT HAS been brought out in the meetings of the Baptist convention in Toronto that there are plenty of ministers getting only $900 per year. One could hardly blame these if they listened pretty hard for a call to come up higher.



WHY NOT GO DOWN SIMULTANEOUSLY?
—Morris for the George Matthew Adams Service.

MECHANIC CAN'T GET TOO MUCH ARITHMETIC

Fred G. Adams, Factory Manager Russell Motor, Says it is Essential to Success

IT often falls to the lot of a man to get a presentation when he is pulling up stakes and making tracks for new territory. In fact, most folks have had occasion to fill the position that papers love to cover by stating that "the receipient replied in a few well chosen words."

But it's a bit different with Fred G. Adams, factory manager of Russell Motor. He's not leaving—in fact he's "left" after thousands of those who have been in the employ of the company during the war period have gone.

FRED G. ADAMS

Only a few days ago J. F. MacKay, treasurer of the company, dropped into Mr. Adams' office, and intimated that he wanted to see him about something out in the shop. That "something" was a regular old-fashioned surprise party conducted on a big scale. Some 1,500 employees were assembled in one of the big departments, and it did not take long for Mr. Adams to be made acquainted with the fact that he was "IT." Following an address by T. A. Russell, vice-president of the company, Mr. Adams was led over to a handsome grandfather's clock—in fact the clock was so big and so handsome that it was much easier to lead Mr. Adams to the clock than trundle the timepiece to him. George Ellis, superintendent of the fuse work, made the presentation. The gift was simply an expression of appreciation from the employees, who desired to pay their respects to Mr. Adams in this way before the winding-up of the production of fuses took place.

And again on Friday night at the Carls-Rite, the staff of Russell Motor tendered a complimentary dinner to Mr. Adams. The menu used on this occasion smacked strongly of shell and fuse production. It was a cleverly prepared card, and well worth reproducing. It follows:—

DETONATOR SOUP A LA TOMATO

SAFETY PLUNGER CELERY FIRING PIN OLIVES
PRIMER CUP ONIONS

STRIKER ROD BASS

THREADED MEUNIERE INSPECTED POMMES
SCRAPPED SWEETBREADS A LA III OPERATION

INTERMEDIATE ROAST GOSLIN

BELT DRESSING LARD OIL FRITTERS
SPLIT RING POTATOES
ZINC PLATED BEANS

SAFETY SPRING CHICKEN SALAD

BASE PLUG PUDDING

ASSEMBLED FRENCH PASTRY COUNTERBORED ICE CREAM
COMPOTE OF SALVAGED FRUIT
HEAD FROMAGE BODY SALTINES
EXTRACTED COFFEE
FULMINATED CIGARS

Montreal His Birthplace

Records will show that Fred. G. Adams was born in Montreal, although he's apt to tell you that Peterborough is his home town. As a matter of fact, he played so much hockey, lacrosse and football there that he probably does believe that he belongs to the town. Mr. Adams will not claim that mechanics had a particularly strong appeal for him when he started his trade. His apprenticeship was served with the Canadian General Electric at Sherbrooke, and also at Peterborough, when the firm moved there. A short time was also spent at Schenectady, N.Y., with the same company, and he also worked with the Welland-Vale Co. at St. Catharines. During this time Mr. Adams was following his trade as a journeyman toolmaker. It was in 1896 that he came to the H. A. Lozier Co., which came here from Cleveland. This firm was taken in when the amalgamation of bicycle plants took place about 1900. In 1904, Mr. Adams was foreman of the tool room of Canada Cycle, then assistant superintendent, and later superintendent of bicycles and automobile machine shop. When the subsequent changes were made, Mr. Adams became general superintendent of Canada Cycle and Russell Motor, and for the past three years has held the important position of factory manager.

The Training of Apprentices.

"I like to get boys about 16 with a good education," said Mr. Adams, when discussing apprenticeship with CANADIAN MACHINERY a few days ago. "The trouble with many boys at that age is that they do not appreciate the importance of what they have learned at school. The ideal thing would be to get a boy with a high school education, but they are too old then. It's almost impossible for them to have too much arithmetic if they intend to follow the machine shop. In fact they can go only a very limited distance without a very thorough grounding in this work."

"The lack of ambition to get ahead is another thing that holds back a lot of mechanics who have the ability to go on higher up," continued Mr. Adams. "I know it means work, hard work and lots of it, but the mechanic who is going to advance has got to work for every bit of advancement that comes his way."

It is doubtful if any man in the business has seen more of the production of shells and fuse than Mr. Adams. It was under his direction that the first 18-pound shells were produced and shipped early in September of 1915.

"Woman workers really did remarkable service in the shops here. In fact, they made a better showing than the men." That is the confession Mr. Adams had to make after a number of years' observation. "Why here is one record worth noting," he remarked, "a woman worker working at turning the heads of fuse completed 800 in the same time as the men averaged 300. Of course, that 800 was a shop record, but there was plenty of women getting five and six hundred per shift. Another girl centred 701 shells in 7½ hours, which is remarkable work. Another girl working on the cutting-off operation on the six-inch shell turned out 141 shells in 7½ hours. We had a cash bonus system in operation. When we wanted production we offered so much cash, to be paid at once, for every record that went by the boards, and in nearly every case the cash bonus slips were handed to the women workers."

Shell Shop Training.

"I wouldn't count too much on that," was Mr. Adams' reply to a query about the value of shell shop training to a person who had not served an apprenticeship "It may be that working around machines may have awakened instincts in a man with mechanical tendencies, but there are others, who, if they were put on a different make of lathe, couldn't go ahead and turn it over. Some of the women workers picked the idea up very quickly. We had them doing a great deal of the grinding of tools and they were able to set up the work and get results. But on the whole I don't think the trained mechanic—of whom we have never had too many—has anything to fear from the competition of the shell shop trained individuals."

Mr. Adams keeps up a keen interest in all developments that have any bearing on his line of business, and is a close student of anything that has technical value that can be used or applied to advantage

MARKET DEVELOPMENTS

Steel Prices Will Remain for Some Months

Trade Believes No More Reductions Will Be Made—Canadian Merchant Mills Are Meeting the Figures of U.S. Mills in This Country—Scrap Trade Still in State of Stagnation

PRICE-CUTTING on steel is not likely to continue. It seems very likely that base prices named recently will be the bottom of the market for some months to come. It is claimed that the concessions already have been made without any reduction in labor charges, and that anything else that is done in the way of price-reduction will only be possible if wages come to a lower level. It is claimed that 75 per cent. of the cost of producing steel is in the labor charges, and until this section is touched there can be no further reductions.

It is interesting to note, also, that Canadian mills, taking advantage of freight and duty, as well as war tax, are meeting prices quoted from U.S. merchant mills, and also in sheets and other lines. The Canadian mills have a much better delivery date for points in Canada than can possibly be secured from American mills.

Dealers in machine tools are not paying much attention to the war shop equipment that is being offered for sale. They refuse as well to consider taking this material in on sales of new machines. It looks as though, sooner or later, the greatest part of the war machines will have to be scrapped, and the feeling is that the sooner this is done the better for all concerned. The quantity of used material being put on the market by the Air Force and other shops is cutting into the selling of regular lines to some extent, but the feeling is that the stuff will soon be absorbed, and the market freed of any congestion.

Mills at U.S. points are operating quite a bit under capacity now. In fact, around sixty per cent. would include most of them. They have been keyed up for several years for tremendous production. In fact, their capacity is far in advance of the orders now coming on their books. There can be only one result to this, viz., the cutting down of production, and this is exactly what is taking place.

Conditions in the scrap market are not improving. Neither are they getting any worse, for the good reason that there is no business moving by which to judge. Although some dealers report fairly barren yards, they are not minded to go out and fill up even at the present low levels. Buyers are fairly well stocked in many cases, and do not want anything.

THE ATTITUDE OF MONTREAL IS WAITING FOR DEVELOPMENTS

Special to CANADIAN MACHINERY

MONTREAL, Jan. 23—Apart from the fact that labor appears to be more plentiful, the industrial situation here shows little change. Shipyards, locomotive and car shops are quite active, but many of the plants in this district are virtually closed except for light operations. A condition that might be mentioned here is the interest that is being taken in the rehabilitation of the returned men. At the Montreal Technical School a large number of men are receiving vocational training in connection with different trades. The classes are working in co-operation with various industrial plants, where the men spend a portion of their time in acquiring the practical knowledge necessary. The general activity in and about Montreal is well maintained, but reconstruction on a definite basis has not yet commenced.

Waiting Attitude in Steel

No marked change has taken place in the general steel situation, but the near future may develop conditions that will create a further return to a level more in accord with the wishes of the consuming trade. Many producers are operating their plants on a basis much below capacity as such activity is sufficient to meet the existing requirements. The prevailing high cost of raw materials and the high wages paid to operate, are prime factors in the operations of the day, as producers cannot be expected to stock their yards or warehouses with material that might require to be sacrificed should the market return to a position corresponding to pre-war levels. Not only is the producer influenced by these possibilities but dealers and likewise consumers are showing the same reluctant attitude towards future business. The entire situation is one of uncertainty, and while trading for immediate purposes is still of a steady character, the buying for future requirements is almost eliminated. Dealers here anticipate a gradual return to more normal conditions, but these are largely dependent on circumstances over which producers or consumers have no control, the chief of these being the labor problem. General inquiry is good, but present prices are little inducement for domestic operations of any magnitude. The trade as a whole is looking forward to still easier prices, which, with a more steady outlook of settled business, will no doubt result in increased activity. The new price list No. 38, for wrought pipe, has been issued. The gradual return to lower prices is noted in the revised quotations, which represent a decline of from 8 to 10 per cent. over those of the previous list. The prices quoted for one inch black buttweld are $11.56 per 100 feet, and for galvanized, $14.71 per 100 feet. The revised prices on lap-welded pipe are on a similar scale, the new price on 2 inch being $28.86 and $35.34 for black and galvanized respectively.

Metals Steady But Quiet

Little movement is reported in metals and the market is of a weak character. It is anounced that production has been reduced to meet the declining demand, and smelters and refineries are operat-

ing considerably below capacity to prevent the large accumulation of stocks on the prospect of lower price levels being established within a short time. Dealers here report a steady but light demand for the various metals, but state that the prices are about the same as last quoted.

Quiet in Machine Tools

Another quiet week has passed in machine tool circles. Dealers report a poor demand, and inquiry is light. At present many plants, formerly engaged in shell making, are settling up and making adjustments regarding unfinished products and equipment. Very little can be learned as to what these plants contemplate doing in the near future. Many of those formerly engaged in regular work are still operating steadily, but plants with no pre-war standing are invariably idle. Supplies are moving slowly but prices generally are strong in character.

No Movement in Scrap

Despite the fact that price quotations on scrap and old materials were severely cut last week, no increase in business has resulted. As stated by one dealer here, "the price quoted is of little material difference as the market is so dull that business would hardly develop at any figure, and therefore one price is as good as another. With the exception of small transactions for current consumption, there is nothing doing. We are not anxious to buy and consumers are acting likewise." This explains the stagnant situation, and these conditions will likely prevail until well into the spring. Last week's prices are still maintained.

POINTS IN WEEK'S MARKETING NOTES

Pittsburgh reports that mills are operating not over 60 per cent. capacity. They are strung up for tremendous production following the exertions of the past three years, and it will take very large orders to mean capacity business for them.

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Steel prices are likely to remain as they are for some time. Trade seems to consider that if cutting were to start, the buying public would expect a continuous performance, and no business would result. It is also claimed that labor cost reduction is the only chance now for prices moving to lower levels.

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The scrap metal market is neither better nor worse. The same conditions prevail all over the Continent. Buyers don't want to take on material although their yards are empty in some cases. Prices have been cut at nearly all points, but business remains stagnant.

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Dealers in machine tools are paying little attention to the offerings that are coming on the market in the way of shell shop machinery. Much of the material is not fitted for commercial work. They do not encourage the taking in of these machines for part payment on new equipment.

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Dealers who are handling woodworking machinery report that they will have a very good month's business by the time January bookings are closed.

CANADIAN STEEL MEETS U.S. PRICE

And Can Give Quicker Delivery Than Goods Coming From U. S. Producers.

TORONTO—There is a feeling in a good many lines that the confidence of the public is returning, and with this return there should come business. Reports of inquiries are frequent enough, and it is about time that some of these inquiries should be turning into real business.

Prices Have Steadied

Steel men seem to feel quite confident that the prices of steel have got past the danger mark that existed around the first of the year. There seemed to be a danger then that the price lists, with Government control relaxed, and with mills in many cases out gunning for business, would get on the toboggan, with the result that the market might be demoralized more or less. In fact, the first cut announced by the U.S. Steel Corporation was looked upon by many as only the first of many such reductions. But in the time that has passed since then, it has become apparent that this is far from the actual state. One of the representatives of the U.S. Mills, while in Toronto a few days ago, gave it as his opinion that the first reduction would be the last for some time. The cut made did not affect wages, he explained. In fact he claimed that the next cut would only be possible when wages were reduced. The concession that had been made, and which made three cents a base price for plate, was on the part of the mills, and it was as far as they dared to go at present costs of production.

Large Per Cent. Labor

It is estimated that almost 75 per cent. of the cost of steel is in the labor employed in its production. Thus it will be seen that the labor cost is the large item in the production figures.

Several Canadian mills that are maintaining merchant bar mills are giving quotations to the trade that put them in the position of meeting the 2.70 base price for U.S. steel. They have not dropped their price to the 2.70 mark; in fact, it is doubtful if they could do so and make any returns at all. But add freight, duty and war tax, and you will have almost the selling price of bars in Canada now. The same thing can be said of sheets. Another thing in favor of the Canadian mills, and one which would influence a good many orders, is the fact that they can make much better deliveries than can possibly be secured from the rollers in United States. The Canadian mills enjoy a protection of $7 per ton, and then there is the war tax of 7½ per cent. as well as freight.

Placing Orders Here

The Fabricated Ship Corporation orders that have been placed here are creating some call for ship plate, and also other lines. This company is acting for the French Government in somewhat the same capacity as the Imperial Munitions Board acted for the British Government in this country. The shipyards generally are quite busy and dealers and warehouses report that considerable business is being placed on the books for these interests.

The Machinery Business

Dealers at several of the largest centres in Toronto report that there are a good many inquiries coming in from various sources, and some sales are resulting, although there has not been what might be called anything approaching a revival of the machine tool business. "It has taken a good many people a long time," remarked one Toronto dealer, "to recognize the fact that the machine tool dealers are not in the market for their war shop equipment. We could close a good many orders if we were willing to include in the agreements a clause to the effect that we would accept in part payment some machine tools that they were very anxious to dispose of from a shell shop. Some of these machines are strictly war shop machines. They have not even the saving qualities of being a near approach to a general purpose machine. In many cases there is no present commercial use to which they could be put. We certainly are not going to touch this material, neither is any other dealer that I have heard of. The manufacturer who is planning to bring his shop into shape to compete for the business that will be offered will make a big mistake if he stops to dicker for the disposal of his shell shop outfit first. I don't look for any serious drop in the price of high class machine tools for some time. Certainly the market is not stocked with machines of this class, and in some cases it is almost as difficult to secure satisfactory delivery as during the months of the war."

There has been a large quantity of used machinery thrown on the market during the past few weeks. The air force have put out long lists of the equipment that was used in their shops, and other factories that are turning from war work have large offerings. All this has tended to some extent to interfere with the regular sale of new machine tools, but dealers are certain that the portion of this machinery that is going to be disposed of will be absorbed

very shortly, and its influence will not be long felt.

One class of machinery that is moving out fairly well just now is in the woodworking lines, and shipments are good as well as the business being booked. Some of the firms engaged in woodworking seem to think that the big overseas demand for timber may interfere with a good quantity being left for consumption in this country. Plants having use for woodworking machinery are among the first to have confidence to re-enter the market and make their purchases at prevailing prices.

Scrap Market Dead

There is no action in the scrap market yet. The situation is no worse nor better than it was a week ago, and there are no indications pointing to anything better coming soon. Dealers have enough material in their yards to take care of anything that may show up in the way of business for some time and they are not particularly anxious to buy even at the reduced prices they are now offering. Holders of supplies are hoping for a better figure and they are likely to hang on to their material if they can, unless there is an unknown urgency entering into the case. In fact, nearly every sale that has been made lately has some of these unusual circumstances connected with it. At some American points the market has been practically flooded with cuttings and borings from shell shops, and there are also large tonnages of shell billets offering at some points. The result of this large offering has been to send the market down to a low level.

SCRAP IRON TRADE REMAINS IN STATE OF STAGNATION IN U.S.

REPORTS from a large number of centres make it clear that there is no improvement in the scrap metal situation. In several cases it is reported that the bottom of the market has not been reached, and dealers are waiting for still lower levels to be reached before they decide upon any action. Conditions are reported to be as follows:

New York.—Prices for iron and steel scrap continue to slide, and there are hardly enough sales put through to make it apparent what the real bottom of the market is. Heavy melting steel would not bring anything over $14. Mills have at least three months' supplies on hand and they are not buying or sending in inquiries.

Pittsburgh.—Consumers in this district have enough scrap on hand to provide for all the calls that are being made on their stocks, and they are not satisfied that the lowest levels have yet been reached. Under these circumstances they are doing nothing at all.

Buffalo.—Mills are out of the market for the present for heavy melting. A few sales of cast boring are noted, but apart from that no business is recorded.

Chicago.—Conditions here are similar to those prevailing in nearly every other centre. No sales are recorded, and despite the low prices and the fact that many of the yards here are barren of supplies, there is no business being done.

Cincinnati. — There is considerable scrap being used by the agricultural foundries, but in spite of this there is an over-supply for sale, and this has the effect of keeping the offering down in price. Some orders placed prior to 1919 are being cancelled.

St. Louis.—During the last quarter of 1918 the Government recognized a price of $46.50 for iron car axles, but offerings now are as low as $28. There are no signs of improvement. Buyers of all sorts of supplies are staying very much out of the market, and even the lower prices that are offering have failed to bring a buyer to the surface.

Birmingham.—There are reports here that some of the larger dealers are hopeful of the future and are now making plans to go out and buy in large amounts of country scrap at present prices, looking for a revival before long.

U.S. MILLS RUNNING NOW AT FROM 60 TO 70 PER CENT. CAPACITY

Special to CANADIAN MACHINERY

PITTSBURGH, Pa. Jan. 23 — Steel mill operations continue to decrease. While there is noted an increase in specifications received in a number of lines, the increase is not sufficient to take up the slack caused by old orders running out. The current rate of operation is variously estimated, estimates ranging from 60 to 75 per cent. of capacity. The variation is doubtless due largely to the fact that the mills do not present an even front at all in this respect, some running much better than others, while there are also great variations in different departments in the same mill. Thus one interest states just to-day that it is operating 50 per cent. in ingots, 60 per cent. in one finishing department, 75 per cent. in another and 80 per cent. in another. The great divergence between its rate of steel production and its average rate of steel finishing is due to the fact that it had an accumulation of ingots, due to the sudden cessation of war work, and it is now seeking to finish all raw materials on hand. No one cares to carry any stock of anything, production costs being high with prospects of costs as well as selling prices coming down. There are probably many cases like that of this mill, where more steel has been produced than has been finished. That would explain the curious fact noted in last report, that production of ingots in December, taking the industry as a whole, was at a rate 2 per cent. in excess of the November rate.

Business Increasing

The common testimony is that orders and specifications are extremely light, but that they are increasing. They will have to increase quite a great deal in order to support the present rate of steel output, or indeed to keep the steel industry operating at 50 per cent. of its capacity, and doubts are entertained whether that can occur in the near future. A relatively hopeful view of the near future is entertained by some observers, who point out that so far as business is concerned the signing of the armistice came at the worst period of the year. By the time war work was largely stopped the holiday period was upon the trade, always a very quiet time in the industry, and so there has been no good opportunity thus far for business to revive. Now, however, it may do so. The season of the year, however, is still unfavorable. Trade revivals have never come in January, but rather appear in spring.

Prices

According to all accounts finished steel prices are being strictly held. This is regarded as perfectly natural in the circumstances. It is not that the mills do not need orders, for if they want to operate at anything approaching capacity they do need them badly, but because there is no incentive or temptation to cut prices. Nobody is placing temptation in the way of the mills by offering large tonnages of business at lower prices. Nobody is buying or specifying except those who must have material at once, and they are quite as ready to act at present prices as at cut prices, perhaps more so, as if there were cutting buyers would then begin to wonder how long the cutting would continue. So it seems to be settled that present prices will continue for some time to come, perhaps until spring.

Production Costs

All producers feel that there is opportunity for a very considerable reduction in cost of production without the rates of wages being reduced, and it is well settled that no general wage reduction is going to be attempted, or even thought of, for months to come. Labor performance has been very poor, but unemployment is increasing and workmen have become afraid for their jobs so that they are disposed to render more nearly a day's service for a day's pay. Those who are not willing, however, can be replaced by men who are now seeking employment. There have been printed rumors of men seeking employment and offering to work at reduced rates, but these rumors are not confirmed, and may have been put out from interested sources.

Apart from the reduction in labor cost that will come from a restoration or partial restoration of normal perfor-

mance on the part of labor, there are various decreases in production costs occurring. Scrap, for instance, has greatly declined. Heavy melting steel under Government control was $29, delivered, dealers being permitted to charge 3½ per cent. commission, making the actual cost about $30. Moreover, a great deal of material was sold as "unguaranteed low phosphorus scrap" at $34, this being an evasion of the regulations involving that higher price since the material was used as ordinary heavy melting steel. In the past week mills have bought heavy melting steel at $20, delivered, and now fear that possibly they paid too much. This is $10 to $15 decline in cost of that material.

As to coke, there has been a slight softening in the market. Before the announcement last Saturday that the Fuel Administration price control of coke and bituminous coal would come off February 1 there had been sales of off grade Connellsville furnace coke at $5.50, or 50 cents under the Government limit. While the sales were excused on the ground that the material was "off grade," the fact is that previously such coke, no matter if off grade, brought the full limit. With control to come off so soon, Connellsville coke operators will probably start cutting prices at once. They have had the idea, or professed to have it, that the Government limit was a minimum as well as a maximum price, but they have lately succeeded in getting that idea out of their heads.

The export situation has, of course, proved a very disappointing one. There has been a very considerable volume of enquiry, but mills have been unable to take much business because while, as a rule their quotations at seaboard were a trifle less than the British, the ocean freights have been adverse to the extent of, say $20 to $40 a ton. Possibly this situation will soon be improved, however. Last week the Shipping Board announced: "Through its division of operations, the U.S. Shipping Board today (Thursday) announced the release of all American-owned steamships from requisition charter, excepting those in the service of the War Department or employed in other Government service. In the case of these the owners are given privilege to obtain from the Shipping Board steamships of equal tonnage which they will be permitted to operate on their own account." The releases occur as ships complete their present voyages. Also, there is a cable from Paris, which may or may not be authentic, that the Shipping Board intends to write off a depreciation of $1,000,000,000 against cost of the ships it controls, and perhaps an equal amount against the cost of the shipyards, whereby the board will be able to figure much lower freight rates. All this indicates, however, that mills in the United States should be eager to book Canadian orders at the regular "domestic" quotations

NOT MUCH DEMAND FOR PIG IRON UNTIL PRICES ARE NAMED

At present there appears to be a great deal of uncertainty regarding the prices that shall be paid for pig iron. Contracts that were made covering periods in 1919 seem to provide the centre for the greatest part of the discussion. Some sellers are making reductions so that their list of buyers will not be made to feel any embarrassment by reason of retaining the contract. Reports from some of the producing centres are as follows:

New York.—Some of the producers of pig iron are giving their customers the benefit of the new prices that have prevailed since the first of the year. In other cases special arrangements are made. It is regarded as reasonably certain that there will be a large foreign demand for pig iron. Japan needs a great deal of iron and steel, and the chances are that the export business will develop as soon as ocean freight rates move to lower levels.

Pittsburgh.—Considerable progress is being made in the matter of price adjustments. Some producers are voluntarily cutting the price of contracts to the level placed at the last session of the Institute. As far as actual sales are concerned the market is extremely quiet.

Buffalo.—An effort is being made to hold business on the books to contracts, but in some cases it is apparent that concessions will have to be made.

St. Louis.—Leading foundrymen describe business as poor, but it cannot be said that they are pessimistic. There seems to be a tendency to wait for some person else to make the start, and until this start is made nothing much will move.

POWER SHORTAGE SAID TO HURT GOOD WELLAND PLANT

Welland Telegraph: The Union Carbide Company, Limited, one of Welland's largest industries, on Friday night laid off about two hundred men, cutting the staff from 450 to 250.

The root of the trouble is power shortage, but the gravest feature of the case is that even if abundant power were to be supplied it does not necessarily mean the resumption of work at the local plant to full capacity.

A furnace to take the place of the one at Welland has been opened at the company's plant at Niagara Falls, N.Y. A local official of the company stated to the "Telegraph" that he was pessimistic of the company's again operating the local plant to full capacity.

The Union Carbide Company, when it began operations here four years ago contracted with the Hydro-Electric Power Commission of Ontario for 40,000 h.p. All went well until the huge power demands for war manufacturing brought about the shortage. The commission cut the allowance to the Carbide to meet the situation. The company has been operating for the past two years with about fifty per cent. of the amount of its contract.

Up to the present time there has been no prospect of remedy. The great advance in manufacturing costs caused by reduced production due to the power shortage brought about the decision to transfer one process of carbide making to the plant over the river.

The most bitter irony of the situation lies in this:

A Canadian furnace, operated by 200 Canadian workmen is closed for want of electric power.

An American furnace, operated by 200 American workmen, is placed in operation to meet the case—and it is operated by Canadian power.

It is stated that everything possible was done by the company to get from the commission some satisfaction on the power question and the decision to close down part of the plant was reached only after all hope of success had died.

John White, local maanger, stated to "The Telegraph" that further reductions in the local staff might yet be made.

The curtailment of work at the Carbide is a grave matter for the city, and it does seem exceedingly futile that at a time when every agency, Governmental and otherwise, is using very effort to widen the calls for labor, that a public body like the Hydro-Electric Commission should permit the exportation of a job that requires the labor of two hundred men.

INQUIRING ABOUT CANADIAN GOODS

Trade and Commerce Department Have Inquiries From Several Sources

Information about any of the following matters can be had from the Commercial Intelligence Branch of the Department of Trade and Commerce, Ottawa, or the Secretary of the Canadian Manufacturers' Association at Toronto. The numbers should be used the same as shown in the items:

1. **Iron, steel and other manufactures.**—A London firm of manufacturers' representatives wish to secure the sole representation upon a commission or buying basis of Canadian manufacturers of the following goods: Malleable iron steam fittings; electrical plant and equipment for all purposes, including shipbuilding; brass fittings; pumps; forgings; stampings; machine tools, etc.; tools of all kinds; wood manufactures; chemicals;

household laundry machinery; toys; metal fittings for fancy goods, etc.

4. **Manufacturers' agent**, leaving for England end of January, would be glad to hear from Canadian manufacturers desiring representation in London, England, where he is to establish an office of the company. Over twenty years' experience in London, England, and seven years in Canada.

26. **Engineering Agencies.**—A South African engineer of many years' experience in engineering specialties and machinery is prepared to arrange for representation of Canadian engineering firms. Immediate correspondence is requested.

27. **Cast-iron Pipes.**—A South African commission agent, with an established connection, inquires for agency proposition from Canadian manufacturers of cast-iron piping for water and sewerage purposes.

28. **Sewing Machines.**—An established commission agent covering all centres of South Africa is prepared to take up a Canadian agency on sewing machines. Hand sewing machines are the principal sellers for the wholesale jobbing trade.

35. **Reconstruction Machinery, Implements and Raw Materials.**—A Belgian co-operative company has been organized for the re-equipment of Belgian industry and for the reprovisioning of Belgian trade. They wish to receive offers from Canadian manufacturers of machinery, implements and raw materials of every description for reconstruction purposes. This organization is recommended by the Consul-General of Belgium in Canada and it will have financial assistance from the Government of Belgium.

The Future of Shipbuilding in Nova Scotia

Large Trade Has Been Done in the Yards There During the Year —Shipbuilders Are Not So Certain About the Future of the Industry Now That War is Over

IN a recent special edition of the Halifax "Herald," considerable attention is paid to wooden shipbuilding in Nova Scotia, showing that 67 different companies are engaged in the work. The firms and locations are as follows:

Lewis Shipbuilding Co., Sheet Harbour; Eastern Shipbuilding Co., Ship Harbour; F. K. Warren, Halifax; Beazley Brothers, Halifax; Foley Brothers, Halifax; Chester Basin Shipbuilding Co., Chester Basin; J. Ernest & Sons, Mahone; W. M. McLean & Sons, Mahone Bay; Bridgewater Shipbuilding Co., Bridgewater; W. A. Naugler, LaHave; Leary Brothers, LaHave; Bobar Brothers, LaHave; J. N. Rafuse & Sons, Conquerall Bank; Boehner Brothers, LaHave; A. V. Conrod, Parks Creek; Smith and Rhuland, Lunenburg; Southern Salvage Co., Liverpool; McKean & Rodding Co., Liverpool; Nova Scotia Shipbuilding Co., Liverpool; Shelburne Shipbuilding Co., Shelburne; Joseph McGill Shipping Transportation, Shelburne; W. C. McKay & Sons, Shelburne; George A. Cox, Shelburne; Dr. T. McDonald, Meteghan; Thomas Gorman, Meteghan; Clare Shipbuilding Co., Meteghan; S. Robichaud, Meteghan River; A. H. Comeau, Meteghan River; Acadia Shipbuilding Co., Saulnierville; Comeau Shipbuilding Co., Comeauville; Innocent Commeau, Little Brook; Fred Comeau, Little Brook; Fidele Boudreau, Church Point; Miose Belliveau, Church Point; Amos Blinn, Grosses Coques; Hankison Shipping Co., Belliveau Cove; P. A. Theriault & Co., Belliveau Cove; Benjamin Belliveau, Belliveau Cove; Hilaire Boudreau, White's Cove; B. N. Melanson, Gilbert Cove; W. K. Smith, Plumpton; Annapolis Shipping Co., Annapolis; Captain Balcom, Margaretville; Harry Short, Port Wade; J. Willard Smith, Parkers Cove; Falmouth Shipbuilding Co., Hantsport; Martimer Parsons, Hantsport; O. O'Brien, Noel; Noel Shipbuilding Co., Noel; H. McAlloney, Canning; D. Huntley, Scotts Bay; B. L. Tucker, Bass River; Huntley & Sons, Parrsboro; S. Salter, Parrsboro; J. N. Pugsley, Diligent River; S. J. Soley, Fox River; G. N. Cochrane, Port Greville; H. Elderkin & Co., Port Greville; L. A. Graham, Port Greville; Smith Canning, Port Greville; J. E. Pettis, Spencers Island; Allan & Fraser, Fraserville; J. W. Kirkpatrick, West Advocate; T. Bentley, Advocate; Cumberland Marine Co., Wallace; Archibald McKenzie, River John; Charles McLellan, River John; Charles McNeil, New Glasgow.

Regarding the future of the business in the East there seems to be some difference of opinion. Statements made by several of the leaders in the industry are worth noting. In brief they are as follows:

T. H. MacDonald, Meteghan: "Wooden shipbuilding, in which I am specially interested, has been enjoying a boom in this province that is likely, in my opinion, to be short lived. War conditions responsible for its awakening after many years of slumber, cannot long survive; and with the passing of the emergency, it will become unprofitable for builders to continue in business."

H. A. Frank, Liverpool, N.S., managing director N. S. Shipbuilding and Transportation Co.: "We believe that the speculative period for vessels with the vessels such times carry, is already passed. It is true that vessels ready at this time for freight can command a very good price; but there is not the spirit of buying or the reckless disregard for cost which prevailed a few months since."

Stewart Salter, Parrsboro: "Shipbuilding in this town and the Parrsboro shore should be extra good for some time, as our own fleet of coasters is nearly extinct. Consequently, as soon as the war needs are filled with large class vessels, we will be obliged to build up our own fleet, which will take several years."

Boehner Bros., West LaHave: "We do not look for any slackening in shipbuilding in this province for the next six months. . . . . With the present production of wooden vessels in Canada and United States, and the very high price of material and labor this industry will be sure to fall off as soon as the wastage caused by the war is partially made up, unless the cost of production can be largely reduced."

J. Willard Smith, St. John: "My opinion is that the outlook for shipbuilding in Nova Scotia is anything but good. The present fictitious conditions cannot last. With 720 yards in United States producing vessels at a pace never before known, and every other country as well, the result can only be over-production, and though for a while a fair demand may exist for tonnage, a slump in freight rates must follow. Vessels being built at this time are costing far too much to face anything like normal conditions. Decline in freights will not be accompanied by similar declines in cost of operation, and as a result the owners must suffer."

Ernst Shipbuilding Co., Mahone Bay: "We anticipate a continued demand for wooden vessels for coasting trade to help reduce the congestion of freight, which we think cannot be avoided for the next couple of years. As regards fishing vessels we think the yards hereabouts will have all they can do to keep pace with the demand."

Reopen Quebec Shop.—D. B. Hanna, chairman of the Canadian Railways Commission, in a letter to Mayor Lavigueur, of Quebec, reiterates the intention of the commission to operate the St. Malo workshops there

Not long ago Dr. H. Kamerlingh Onnes, of Leyden, showed that by reducing the temperature of metals to the temperature of liquid helium, or to within less than 4 deg. of the absolute zero of temperature, or more than 450 deg. below zero Fah., these lose practically all resistance, and became nearly perfect conductors. Under these conditions an electric current, once started by an electromotive force applied to a cooled mercury ring, was found to persist for hours after the electromotive force had been removed.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$32 75
Lake Superior, charcoal, Chicago	37 50
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	37 25
Basic, Valley furnace	33 40

Government prices.

	Montreal	Toronto
Hamilton		.....
Victoria		50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Steel bars, base, Toronto	4 90
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	*2 90
Tank plates, Pittsburgh	*3 25
Structural shapes, Pittsburgh	*3 00
Steel hoops, Pittsburgh	*3 50

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

*Government prices.

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$ 27 00	$ 28 00
Electro copper	27 00	28 00
Castings, copper	26 00	26 00
Tin	75 00	78 00
Spelter	9 50	10 00
Lead	9 00	10 00
Antimony	10 00	11 50
Aluminum	43 00	50 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 7 00	$ 7 00
Plates, 3-16 in.	8 50	8 40

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	19 50	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	18 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5½-6	5 00
Heavy lead	5½	8 00
Tea lead	4½	3 50
Aluminum	18 00	18 00
	Per Ton	
Heavy melting steel	15 00	15 00
Shell turnings	9 00	8 00
Boiler plate	16 00	15 00
Axles(wrought iron	30 00	15 00
Rails	20 00	15 00
No. 1 machine cast iron	30 00	18 00
Malleable scrap	25 00	15 00
Pipe wrought	18 00	8 00
Car wheels	25-30	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove plate	16 00	14 00
Cast boring	11 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅝" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅝ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent.
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$47 50
Open-hearth billets	47 50
O.H. sheet bars	51 00
Forging billets	60 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 16
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... **list plus 40%**
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 00
Sheets, black, No. 10	8 00	8 50
Canada plates, dull, 52 sheets	9 00	8 65
Can. plates, all bright.	9 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	9 00
Premier, 10¾ oz.	.....	9 30
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 42
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.			Cts. per lb.
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

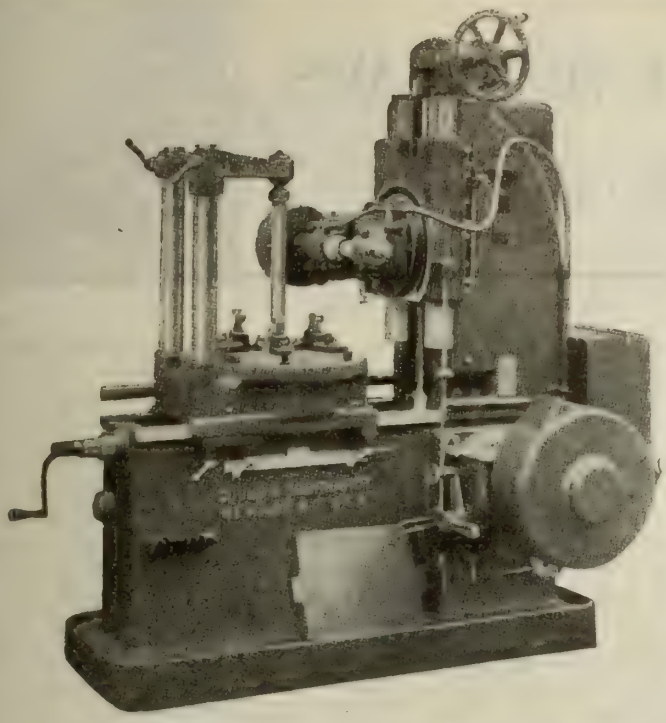
	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.



Gould & Eberhardt Gear Hobbers

For cutting Spur, Helical and Worm Gears up to 120" dia. Also

Multiple Spindle, Continuous Operation Automatic Roughing Machines for large production.

Put your gear-cutting problems up to us. Catalog on request.

Write for prices and deliveries.

A. R. Williams Machinery Company, Limited

ST. JOHN, MONTREAL
WINNIPEG, VANCOUVER

If It's Machinery, Write Williams"

64 W. FRONT STREET
TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

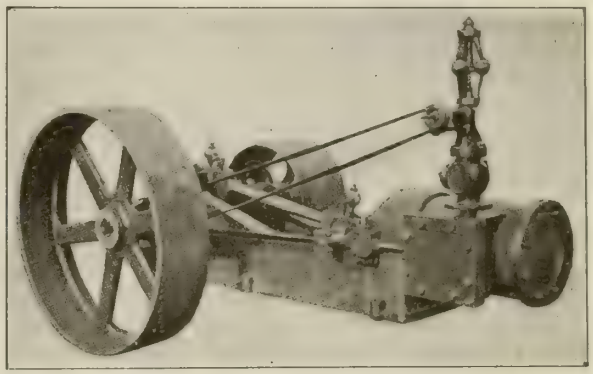
The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

For Sale at a Bargain



SECOND-HAND ENGINE

In Good Working Order

Cylinder 8" x 12". Centre Crank made from a steel forging. Pulley Flywheel 34" x 8¼".

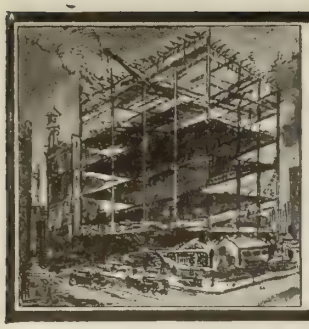
DEVELOPS 25 HORSE-POWER

This engine was used by us in our own shops with perfect satisfaction until we electrified our whole plant, since which time we have no further use for it.

Marsh Engineering Works, Limited

Established 1846

Belleville, Ontario



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

ENGINEERING

Toronto.—Dominion Shipbuilding Co. has taken out a permit to build a lumber storage shed and a boiler house at the plant at the foot of Bathurst street.

Welland.—The Maple Leaf Milling Co. last week let the contract to J. T. Tromanhauser, of Toronto, for the rebuilding of the mill at Welland, recently destroyed by fire.

The contract does not include the installation of machinery, for it is not the intention of the company to resume milling operations, at least for some time. The building will be replaced as it was before in regard to walls, roof, flooring, and heating. In fact, it will be made ready for the machinery when decision is reached as to putting it in.

Welland.—The Dominion Government contemplates the enlargement of the Government elevator at Port Colborne to double its present capacity by the erection of a new section with a capacity of one million bushels. J. H. Tromanhauser, who built the Maple Leaf mill at Port Colborne, has been asked by the Department of Railways and Canals to prepare an estimate on the cost of the addition, and this work is now under way. The Department has doubtless been actuated in its decision to enlarge by the tremendous congestion of grain in the past year.

MARINE

New York—The Cunard Steamship Company has purchased from the British Government six cargo steamships of an aggregate tonnage of 29,734, it was announced here to-night. The vessels, standard cargo carriers built by the British Government for use during the war, will soon be placed in active sevice by the company. The purchase price was not made public. The vessels, which were of the "war series," have been renamed.

Montreal.—Ocean freight rates have been reduced on commercial traffic, and the British Government is releasing a certain amount of space for commercial cargoes. Rates all around show a considerable reduction, and the indications are that by the time the season opens again in the port of Montreal freight rates will have been materially reduced. Three months ago the rate on general cargo was $6.50 per 100 pounds, and now it is $3.50.

Port Huron, Mich.—Supt. A. R. Morrison, of the Foundation Company, says that the company is making ready for the construction of what will be one of the largest drydocks on the Great Lakes. It will be 659 feet long and will have sufficient depth and breadth to accommodate the largest boats on the lakes. A wharf 1,100 feet long is now under construction for boats which will moor at the plant. Mr. Morrison says that contracts for the ten steel tugs for the French Government have been cancelled. His statement dispels rumors that the Port Huron plant is to be only a temporary affair. The construction of the dry-dock will be rushed in the spring. Meantime repair work will be done on five steamers. The two sections of the steamer Paipoonge are now in drydocks being welded together. Matters are now being adjusted with the steel mills to provide a supply of steel.

Hamilton.—The decision was reached at a special meeting of the Board of Control that a deputation should wait on the Dominion Government at an early date and have it include in its estimates for the year, public works for Hamilton, calling for an expenditure of about two and a half million dollars. Those who were appointed members of the deputation are: Controller Jutten, Controller Halcrow, T. J. Stewart, M.P., Industrial Commissioner C. W. Kirkpatrick, A. C. Garden, President of the Board of Trade, and Capt. George J. Guy, chairman of the Harbor Commission. The Government will be urged to commence work on the harbor development scheme, which will require about $1,500,000 to carry out. The scheme embraces the purchase of the Stipe's farm and converting it into a large basin and channel where steamers will be enabled to turn around without backing out into the bay from their slips.

BIG MERGER IN HAMILTON WHEN HARVESTER TOOK OVER OLIVER PLOW

HAMILTON—A. C. Dann, manager of the Oliver Chilled Plow Company, on Wednesday last made the following announcement:—

"The International Harvester Company of Canada, Limited, has purchased the Oliver interests in the Oliver Chilled Plow Works of Canada, Limited, located at Hamilton, Ont. The name of the company will be changed. The Harvester Company assumes immediate control and operations of the property."

Mr. Dann refused to discuss the matter, except for the official statement. Mr. Dann came to Hamilton in May, 1910, and saw the big plant erected, and has been here ever since, making many friends who are expressing the hope that he will remain in the city.

The Oliver Plant employs about 1,000 hands, and covers some 85 acres of land. The two plants, which adjoin each other, will occupy about 200 acres. Both plants now employ about 3,300 men. As the International Harvester Company have always acted as the selling agents of the Oliver Company, it is believed the merger will really result in very few changes.

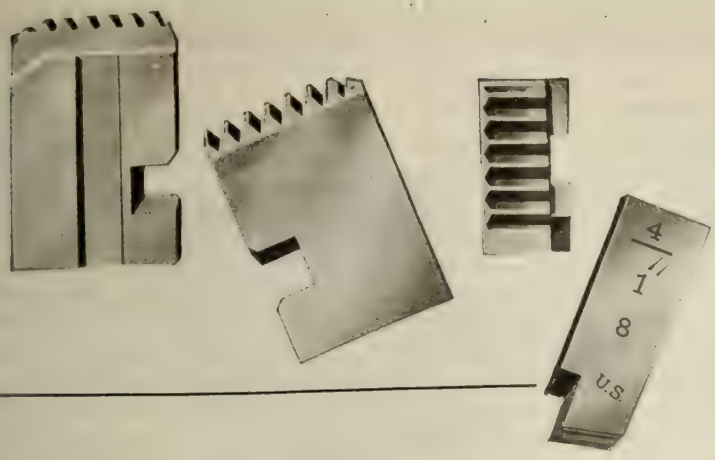
H. H. Biggert, superintendent of the International Company of Canada, made a statement that the International Harvester Company now owned the entire capital stock of the Oliver Chilled Plow Works, Limited, at Hamilton, and had assumed control and operation of the property. The operation will continue under the new ownership with the present personnel. However, the name of the Oliver firm will shortly be changed.

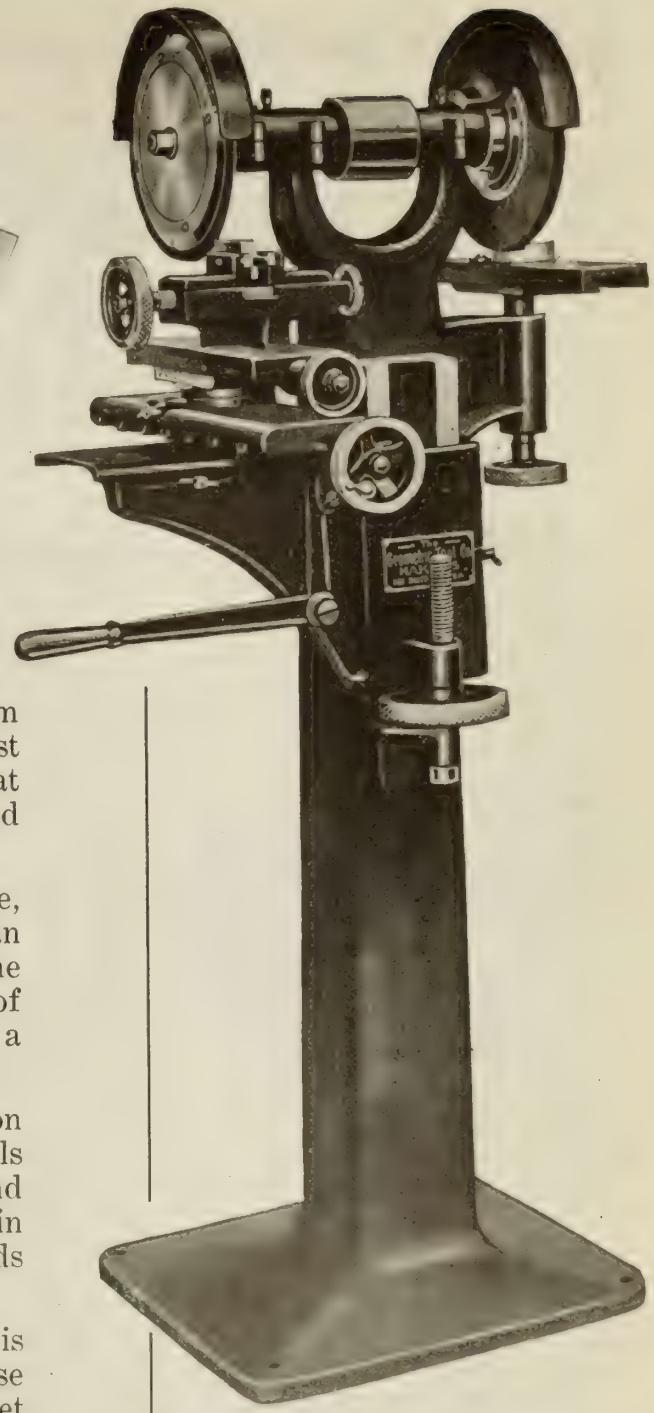
The manufacture of the types of plows made at Hamilton will be continued, but will be marketed by the Harvester people as their own product.

This was one of the largest realty deals that has been made in this city in a number of years, and is a follow up to the statement made by H. H. Biggert of the Harvester people a short time ago that his firm would enlarge its plant, in anticipation of an increased demand for agricultural implements, both for home consumption and export. It is said in civic circles that it may result in a saving of taxes, as the Harvester Company's fixed tax rate has several years to run yet, although full taxes on other industrial concerns will be collected this year. The Oliver Chilled Plow Comany, Limited, pays taxes now on 50 per cent. basis on $98,000, half valuation of $196,000. Its land is valued at $76,000 and the buildings at $120,000.

The former holdings of the International Harvester, according to the assessment books, were $1,255,000. The buildings are valued at $1,000,000 and the land at $255,000.

The Oliver plant is said to be one of the most modern in the county—plows





Sharp Chasers Cut Clean Threads

Accurate, uniform threads result only from dies which are maintained in the highest state of cutting efficiency. This means that chasers must be kept sharp, and ground uniformly.

Even if just touched up from time to time, the chasers respond splendidly, with clean threads. And with this machine — the Geometric Chaser Grinder—the matter of keeping threading tools up to scratch is a comparatively simple matter.

Various makes of chasers can be ground on this adaptable machine. The two wheels permit the easy grinding of both milled and tapped chasers. In addition, the plain wheel lends itself readily to various kinds of tool grinding.

Uniform grinding of a set of chasers is purely a mechanical matter through the use of adjustments which can be accurately set to govern the grinding of an entire set of chasers.

The Catalog describing this machine is a mine of information on chaser grinding. Write for it.

THE GEOMETRIC TOOL COMPANY

NEW HAVEN **CONNECTICUT**

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

only are made. In the Harvester plant almost every large implement—except plows are made—and this includes tractor engines and motor trucks.

The absorption of the Oliver Company by the International Company again draws attention to the fact that Hamilton has the largest farm implement plant in the British Empire, and it is still growing. The two companies have had friendly working relations in the past, not being competitors; the International Company marketed the products of the Oliver Company and made a sales force for the Oliver people unnecessary. The plants of the two companies are side by side on the water front; and it is said among official circles that there will be a saving among executive offices.

TRADE GOSSIP

Cars Scarce in Britain.—Extraordinary prices are being obtained for second-hand cars in England. A Rolls-Royce in good conditions has just changed hands for $15,000. The present condition of the motor industry is so behind that it is quite likely that a year will elapse before new buyers can be assured of supplies.

Hard on Siborian Trade.—C. F. Just of the Canadian Economic Commission to Siberia is at Vladivostok awaiting the arrival of his fellow commissioners. The Canadian Press is informed by competent authorities that the vast trade possibilities for Canada in Siberia are unavailable owing to the lack of transportation in the interior of the country. It is stated here that the railway situation is the dominating factor in the entire Siberian situation.

Flight Across Ocean.—Gen. Brancker, who is giving up his post as Master-General of Personnel in the British Air Ministry to devote his time to commercial aviation, in an interview with "The Daily Express," asserted that a flight across the Atlantic probably would be accomplished in May. He added that the trip was feasible at the present moment as there were three or four types of airplanes available which were capable of making the flight.

Priorities on Gas.—The Mayors of Chatham, Windsor and Sarnia, managers of gas distributing companies in those places, met in the office of Gas Commissioner Estlin, at Chatham, and evolved a scheme to put into force with the usual shortage of gas which follows a cold spell. In the event of a shortage consumers will be cut off in the following order: Libraries, clubs and theatres, schools, churches, and public buildings. Places with a reserve supply of fuel will be requested to use the same during a shortage.

Conditions in Windsor.—The big Maxwell plant here is shut down for the present. The Kelsey Wheel Works is about ready to begin operations. The Swedish Crucible Steel Company are now employing about 45 men, but it is anticipated that the excellence of their product will make extension inevitable Another advantage of the steel casting will be that they can replace the drop forging when the manufacturer wishes fifty or one hundred articles of a kind. The cost of expensive dies is saved.

Annual Gathering.—Agents and travellers of the Renfrew Machinery Co. were in Renfrew from various sections of the Dominion for the annual conference and banquet. There are about 150 of them, a record number—indicating a material increase in business during the past year. The company looked for a larger attendance than usual, but thought that perhaps the wave of influenza which has been felt throughout Canada and is still epidemic in many places would tend to keep not a few of the agents and travellers at home.

Now is the Time.—"Tell every Canadian who has anything to ship into the Maritime Provinces, whether it is pianos or soda biscuits, to ship at once," said an official of the Canadian Railway War Board. "To-day it is easy to get shipments into the Maritimes because Great Britain has embargoed shipments amounting to about 80 per cent. of the traffic from Canada, and we have therefore stopped the movement of overseas export stuff east to Halifax and St. John. Ordinarily that movement is so heavy that shipments for domestic consumption in those parts of Canada have a hard time getting through. Now is their opportunity."

Shell Shop Training—Speaking of the training that had been received in shell shops, J. S. Woodhouse, general superintendent of W. H. Banfield & Sons, Ltd., stated to CANADIAN MACHINERY:—"I believe that while a number of the best tool-setters, also some of the better machine operators, whom we have educated along these lines, would be far more readily trained as a machinist than absolutely green help; and there is little doubt in my mind but that the best of these tool-setters will be used on production work, setting up, etc., where we previously used machinists, but I believe that a skilled mechanic is in no great danger of being replaced by these specialists."

Trade Conditions.—G. T. Milne, His Majesty's trade commissioner in Canada, in an interview at Montreal, said, among other things: "It is an axiom of business that a country to export, must import," he continued. "That is rather a contradictory phrase on its face, but we must understand that if we are to sell our goods to another country we must also purchase some of their goods. If not, how are they to pay us for our goods. In gold? Never. In order to build up an export trade, one of the first essentials is to have a wide home market," he said. "This alone lays a strong foundation to an export trade. . . . This was peculiarly true of the British Isles. Canada no longer is a land of raw materials and natural resources. Many things that were previously imported will now be manufactured, and the close of the war leaves us with immense factories ready to be turned over into peacetime channels for the production of finished articles."

May Enlarge Plant.—Announcement comes from Hamilton that the management of Dominion Foundries and Steel are contemplating enlarging the scope of their plate department by the instal- the plate mill at the plant rolls 24-inch universal or 84-inch sheared. At present the plate mil at the plant rolls 24-inch universal, and it has been the plan of the company for some time to go ahead and roll the larger sizes. There is nothing to indicate that the work will be proceeded with immediately. Plate is imported largely from the U.S. mills and there is considerable business offering for a mill that can come into operation quickly and make definite deliveries.

PERSONAL

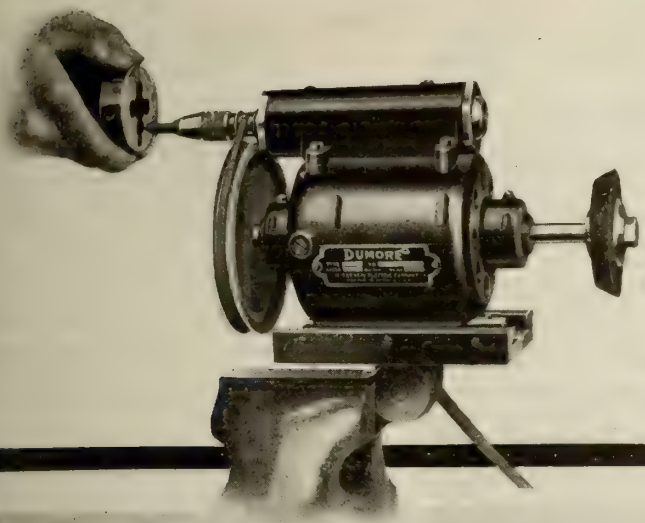
Col. Robert Lowe, of the firm of Bate and McMahon, died in Ottawa. The late Col. Low came into prominence in connection with several big engineering works which he had carried out while with Bate, McMahon and Company, the Ottawa contracting company. Among these was the building of Camp Borden, where he attained national fame as a builder, and later the reconstruction of Halifax.

Captain George L. Mackey, one of the best-known vessel and steamboat captains on the Great Lakes, died at his home at St. Catharines from apoplexy. He was born on Wolf Island 66 years ago, and had lived in St. Catharines for 40 years. He was in the employ of the late Sylvester Neelon for a number of years, and later with Miles Transportation Company and R. O. & A. B. MacKay, Hamilton, and latterly with the Canada Steamship Lines, retiring two years ago.

CATALOGUES

The Harvey Hubbell Co., Toronto, have issued a new catalogue on their electrical specialties. This catalogue features the many electrical specialties manufactured by the firm, and the many possible combinations of interchangeable sockets, pull switches, attachment plugs and plug receptacles are illustrated in chart form, and in such a manner that it is an easy matter to make up any particular combination which might be desired.

Across the top of the chart pages appear illustrations of various socket caps, wall and ceiling bases, and down the first column on the first page of each set is a series of socket and pull switch bodies. The rest of the page bears complete views of numerous combinations made up of these interchangeable parts. In addition to the above, the catalogue illustrates the other specialties manufactured by the firm, such as special sockets, both brass and porcelain and particularly Hubbell reflectors for industrial illumination. These reflectors are shown in such a manner that it is a very simple manner to pick out the proper reflector for any particular work.



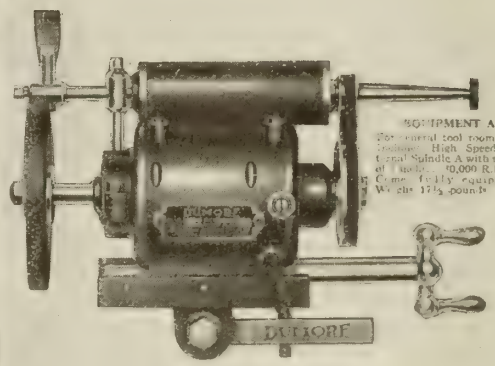
Regrinds Button-Dies in 3 Minutes

A GOOD example of one form of saving made possible through the use of the **DUMORE** grinder is found in the above illustration. Here is the attachment known as Equipment C that regrinds button-dies at the rate of twenty an hour. The special spring chuck holds an emery pencil that travels at the rate of 50,000 R. P. M. which has been found to be the correct cutting speed for work of this nature. Reclaiming these old and seemingly worthless dies, which formerly had to be discarded, means an enormous saving in the course of a few months.

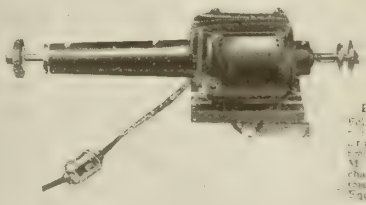
The **DUMORE** grinder is portable and so constructed that the attachments are interchangeable. In other words, Equipment C may be detached and Equipments A or B put on. This gives the tool a very wide range of operation and makes it indispensable to the shop interested in securing the very best results. The **DUMORE** grinder is in perfect running balance and gives even small emery wheels the correct cutting speed. Chatter, taper or bell-mouthed grinding is thereby eliminated.

If your dealer does not carry the **DUMORE** in stock, write us for specifications and prices.

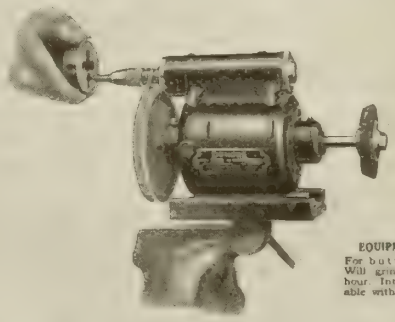
WISCONSIN ELECTRIC COMPANY
2907 16th Street — Racine, Wis.



EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 1 inch. 50,000 R.P.M. Complete fully equipped. Weighs 17½ pounds



EQUIPMENT B
For deep internal work. Extension reach has 10 inch reach. 50,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B

DUMORE HIGH SPEED GRINDERS

MUST WORK IN GROUPS TO SECURE FOREIGN TRADE NOW

In order to impress upon manufacturers the necessity for organizing into trade groups, to be ready to compete with American industries for a share of the work of rebuilding Europe, the Intelligence Department of the Canadian Manufacturers' Association is issuing a circular calling for concerted action. Manufacturers, it is pointed out, must be prepared to turn out standardized products in quantity, and the best way to do this is for each trade to organize into groups. Illustrating the opportunities, the circular points to a condensed list of the immediate requirements of a part of Belgium only. The list includes: Copper, sheets, bars and ingots, 39,000 tons; brass, sheets and tubes, 3,500 tons; machine tools, 60,000 tons; vegetable oils, 3,630 tons; mineral oils, 4,269 tons; hawsers, steel cables, belting, electric power plants, for colliery requirements; pig iron, 1,012,050 tons; iron and steel, worked and semi-worked, 825,000 tons; transport material for railroads, locomotives, trucks, etc., automobile transportation material, trucks, trailers, cars; depot materials, turntables, forges, pits, drilling machines, jacks, etc.; working material for reconstruction of destroyed buildings and public works; builders' and constructional work, crushers, mixers, hoists, cranes; bridges, locks, etc., pontoons, chain and accessories; dredging material, dredges, tugs, sand carriers, lighters; canal equipment, lighters, pumps, compressors, tugs; machines for road and construction work, scrapers, graders, rollers, etc., boilers, engines, pumps, steam shovels; small tools, shovels, picks, mattocks, etc.; railway construction materials, rails and accessories, tool, machine tools, motors, signalling apparatus.

Agricultural machinery. — Plows, single, 40,000 tons; plows, two or more shares, 20,000 tons; skimmers, scarifiers and cultivators, 20,000 tons; harrows, 75,000 tons; ordinary rollers, 20,000 tons; disc rollers, 10,000 tons; horse hoes, 10,000 tons; potato plows, 10,000 tons; seed drills, 2,000 tons; reapers and binders, 2,000 tons; mowers, 2,000 tons; horse forks, 2,000 tons; horse rakes, 2,000 tons; winnowing machines, 50,000 tons; root cutters, 10,000 tons; chaffers, 15,000 tons; churns, 50,000 tons; carts and vans, 100,000 tons.

Hides and skins.—Tanning material, tanned hides and skins, for belting and industrial purposes, 500 tons; for boot making, sole leather, 300 tons; for uppers, 450 tons; leather belting, 500 tons.

Outer garments for men, women, boys and girls, material cheap and durable, obtainable quickly in large quantities.

Stoves.—Plain, light type suitable for bituminous or anthracite. Knock-down form. Standard sizes.

Cooking utensils.—Plain, strong kitchen utensils, cheap and durable.

Boots and shoes for men, boys, women, girls and children. Must be cheap, of heavy leather.

Furniture.—Wooden tables and chairs, metal bedsteads, cheapest materials chipped knock-down.

SENDING WIRELESS VIA UNDERGROUND

Navy Department Lets Out Secret That Has Been Closely Guarded

How underground and through-water wireless was put into practical use during the war was disclosed by Navy Department officials at Washington, giving to the public another of its secrets, carefully guarded so long as it might be of value to the enemy. Government officials regard this development, originated in private research by James H. Rogers, a scientist, of Hyattsville, Md., as one of the war's major scientific advances of the kind.

In practical use, the new system so far is employed only for receiving. Radio messages sent out from powerful stations in Europe are now being read at underground receiving stations in the United States, and in some cases, better than when caught by the elaborate and expensive air stations.

In addition, it was revealed at the Department, through an adaption of the Rogers theory, submarines under water are intercepting radio signals sent from shore, and with crude apparatus the scientist has succeeded in transmitting signals two miles, from a submerged wire.

GERMAN POTASH MONOPOLY GONE

Britain Experimenting to Get Needed Materials From Blast Furnaces

Political conditions have been responsible for a heavy fall in mining shares in Essen and elsewhere in Germany, a leading cause being the uncertainty prevailing with regard to the potash resources of Alsace, it being understood that the reversion of the Alsatian potash mines to France would break down the German potash monopoly. The Allies command all the raw material needed by the chemical industry except potash; thus the restoration of Alsace-Lorraine is a matter concerning not France alone, but all the Allies. However, steps are now being taken in England with a scheme for recovering potash on a commercial scale from the blast furnaces used in the manufacture of pig-iron, the scheme being approved last year. The British Ministry of Munitions has encouraged the installation at various ironworks of gas-cleaning plant designed to extract from the furnace gases, potash-bearing dust. Certain of these plants are now in operation, others are under erection, while others again are in course of construction. A factory has also been erected at which muriate potash, free from deleterious impurities, is being manufactured from such dust. This factory is capable of dealing with all the dust that can be collected by the gas-cleaning plants now under erection and construction. As other gas-cleaning plants are installed it is proposed to erect other factories in suitable localities.

EVENTS OF THE WEEK IN MONTREAL

At a meeting of the Montreal Canadian Club last week, Major R. T. MacKeen, district vocational officer of the Department of Soldiers' Civil Re-establishment, gave an address in which he outlined the successful work that was being achieved by the department. In the course of his talk, Major MacKeen, himself a returned soldier, emphasized the essential necessity of close and willing co-operation between the industrial establishments and the military authorities, in order that the returned men be given every opportunity to make good.

It is expected that the St. Malo shops of the Canadian National Railways at Quebec will soon be in operation. D. B. Hanna, chairman of the Board of the C.N.R., has intimated this in a letter to the Quebec City Council.

According to a statement made by T. C. Denis, superintendent of mines for the Province of Quebec, the mining industry of the province has undergone marked changes during the period of the war. The production of substance needed for war purposes has shown remarkable development, the approximate value of the materials produced going from about 13 million dollars in 1914 to an estimated value of 17 million dollars for the year 1918.

An interesting description of the Canadian National Reconstruction groups for dealing humanely with the problems of returned soldiers and reconstruction matters generally, was given last week before Montreal Metallingical Association by Mr. Warwick Chipman, K.C., chairman of standing committee of groups, of which 150 had already been formed in the Dominion, voluntary and as a matter of social service. Considerable discussion followed the address, with a talk on reconstruction that traversed wide grounds, including the housing, living conditions and wages. At the conclusion of the meeting it was decided to aid in forming further groups in Montreal along the lines advocated by the speaker.

The Eastern Brass Foundry Company, with office and works at 387 Clark St., and foundry at 40 St. Vincent St., has been organized to carry on all kinds of brass and bronze casting work and also machining. The foundry has a capacity of two tons per day. In addition to carrying on the general foundry work, the company will act as metal merchants in all kinds of metals, and iron and steel.

The new factory of Crane, Limited,

now being erected at Cote St. Paul, Montreal, is rapidly nearing completion, one portion being almost finished. The main building is well advanced and with favorable weather conditions will be completed early in the Spring.

The members of the Belgian Chamber of Commerce, of Montreal, are developing plans to materially assist in the restoration of their mother country, and aid in returning her to that state of intensive economic activity for which Belgium was standing so prominently among the nations before the war. Better trade relations between Belgium and Canada are to be the basic principles of contemplated action. The board of directors for the present year are: Gustave Francq, president; Gh. Helen, vice-president; T. Braen, secretary; H. Hicquet, treasurer; J. B. Boulanger, assistant secretary; J. Mignolet, Ed. Backhoven, P. A. Seyewetz and A. Du Castel, commissaries; M. Simpson and H. Bernard, auditors.

Last week the express companies of the City of Montreal came to an agreement whereby the former guarantee free delivery to a greater area within the city limits. The city's application has not been granted in full, but a scheme has been proposed which virtually coincides with the request of the city. The plan advanced is on the basis of population, in relation to predetermined zones of one-sixteenth of a square mile in area, or in blocks one-quarter of a mile square. The proposition, however, will require to have the ratification of the Railway Board, and to be effective the latter will have to issue an order enforcing it.

The "annual" bursting of the thirty-inch water main on St. Antoine St. took place last week, flooding a number of streets and a large area in the vicinity of the Grand Trunk Bonaventure Station. Two hours elapsed before the water could be turned off and drained from the streets, during which period all traffic was practically suspended.

W. H. Rosevear, Canadian manager of the Independent Pneumatic Tool Co., is on a business trip through the West. He is expected back to Montreal about the 28th of the month.

The Canadian Railway Club will hold their annual dinner on Saturday evening at the Windsor Hotel, Montreal.

Mr. Morley L. Smith, of 365 Grace street, director of engineering at the Toronto Technical School, died instantly on Saturday while examining parts of a boiler in the boiler-room, which he had been told were in need of repair. It is believed that he was electrocuted. "He was in the boiler-room examining parts of the boiler. He carried an extension light from the Hydro service, and crawled under the boiler. He called for assistance, and when he was taken out by the workman who was with him, he was dead," said Principal A. C. McKay. The late Mr. Smith graduated in electrical engineering from the Faculty of Applied Science, University of Toronto, in 1912, with honors. He was a member of College Street Methodist Church, and is survived by his wife and three children. His mother, who resides in New Westminster, B.C., Dr. J. A. Smith, a brother, also of British Columbia, and Lieut. C. C. Smith, a brother, who is in command of a British destroyer in the Mediterranean, also survive him.

Before joining the staff of the Technical School, Mr. Smith was associate editor of technical papers with the MacLean Publishing Co., working particularly on "Power House" and "Canadian Machinery."

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For Heavy or Light Service
Last a Lifetime
Tolland Manufacturing Company, Limited
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Kerrchen Siphonage Ventilators, Bakers' Ovens, trucks, casters, etc.
Write for Booklet.
Brantford Oven & Rack Co., Ltd.
Brantford, Canada.

CASTINGS
Medium Weight Grey Iron, Brass, Etc.
JOBBING
GREENLEAFS, LIMITED
Belleville, Ontario

PATENTS FOR SALE
Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.
Allentown Experimental Works
Allentown, Pa., U.S.A.

The Financial Post on The Tariff

THE Government is disposed to let the tariff alone during the coming session. This is the advice of THE FINANCIAL POST'S Ottawa representative upon a matter which is to-day very important in the commercial and industrial situation However, there is one factor for uncertainty. The course of the Government may be changed by political currents; if the low tariff element, which is dominated by Western Canadian sentiment, can make a strong enough case, the 7½ per cent. extra war tax may be removed.

There is just one point to emphasize a fact generally ignored by those who contend for tariff reduction and that is that in Canada the tariff—a tariff which has for years been maintained by both political parties when in power—is primarily a tariff for revenue. The war has increased the country's financial burdens and the need for funds. The weakness of the argument for tariff reduction or free trade is that those who so advocate have no suggestions as to a practical form of direct taxation to supply the necessary money for carrying on the country's affairs.

Besides the important leading article of which the above sentences are a part,

THE POST
THIS WEEK CONTAINS:

Shipments of Flour Held Up
Readjustment of Prices Will Come Gradually
Proposal for French Exhibition Train
Should be Able to Supply More of Our Own Needs
Made-in-Canada Brand Popular With the English
King Edward Hotel May Pay Dividend
$7,300,000 Issue to Retire Old Tramways Notes
Labor the Big Factor in Future of Consolidated
Packers Worked on Small Margin During 1918
Holdings of U.S. Steel in Canada Being Reduced
Bank Stocks Still in the Limelight
Bookkeeping for the Housekeeper
Keeping an Eye on the Retailer and His Affairs
Make States' Banking System Like Canada's
Canada's Railways and State Control
Fair Business Being Done in Bond Market
Montreal Bonds Are Now Listed on Exchange
Fine Showing by Canadian Life Companies
National Life Moves Forward Conservatively
Bottoms Are Not Available for Export Trade
Employers Show Desire to Learn Labor Viewpoint

Above mentioned are a few of the more important contents of this issue of THE FINANCIAL POST. Send a subscription to THE POST and note its business value to you. Use this form in sending subscription which is $3.00 per year.

The MacLean Publishing Co.,
143-155 University Ave., Toronto.

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"HAWK" D CHROME VANADIUM STEEL

You Know How Greatly it Increased

Production

You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

Hawkridge Brothers' steel for every commercial requirement is just such production-increasing steel as proved this "Hawk" D. Chrome Vanadium. We make

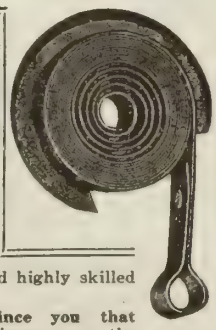
Steel of Every Description

Hawkridge Brothers Company

303 Congress St., BOSTON, MASS. U. S. A.

'Barnes-Made' Springs

are unusual in service and wear.



They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-Made" Springs are the best buy.

Established 1857.

THE WALLACE BARNES COMPANY

218 South St., Bristol, Ct., U. S. A.

Man'frs of "Barnes-made" Products

Springs, Screw Machine Products, Cold Rolled Steel and Wire

INDUSTRIAL CONDITIONS FOR THE YEAR REVIEWED BY OFFICIAL

Commissioner of Industries and Publicity C. W. Kirkpatrick presented to the Board of Control to-day a report covering the work of the department from April last, when he assumed office, until the end of the year. Among the concerns that made large additions were the Dominion Foundries & Steel Co.; the Steel Co. of Canada, which completed a $3,000,000 coke oven plant and has started work on a modern office building; the Westinghouse Company completed its handsome office building, the Canadian Cotton Co., Imperial Oil Co., Hamilton Bridge Co., Armour & Co., Slater & Barnard, Swift-Canadian Co., Hamilton Cotton Co., Brown-Boggs Co., Frost Wire Fence Co., Imperial Cotton Co., Canadian Cartridge Co., Wagstaffe, Ltd., and J. R. Moodie & Sons. These additions mean under normal conditions, the employment of upwards of 1,000 additional hands.

The Ford-Smith Co. also erected a large new factory building, doubling its former capacity. Besides the additions referred to, the following industries commenced operations during the year: The Monarch Metal Co., at the end of Main street west; Glendale Spinning Mills, Glendale avenue; the Fox Chain Co., Earl street, and the Canadian Toys, Ltd., Sherman avenue. These four new industries represent an invested capital of about $1,000,000, and under normal conditions will employ from 800 to 1,000 hands.

During the year several new lines of manufacture were added to Hamilton's already lengthy list. The Wagstaffe Co. erected a large new building for the manufacture of candied peel, it being the first concern of its kind in Canada. The Canadian Cartridge Co. have also put up a new building for the manufacture of steel barrels and containers, and now that the work on munitions has ceased, is developing this branch of its business. The Wentworth Manufacturing Company, which took over the holding of the old Wentworth Brass Co. started to manufacture a number of household specialties not heretofore manufactured in Hamilton, and many other local industries added new lines during the past yea.

FERRY BOAT HAD TERRIFIC BATTLE

Had to Weather Gale That Was Blowing From 60 to 85 Miles Per Hour

The big G.T.R. ferry, Ontario No. 1, which was on the way from Charlotte, N.Y., to Cobourg, had to battle with a heavy storm recently. The wind, it is said, in mid-lake, was at from 60 to 85 miles an hour, and the waves rolled very high. The open end of the ferry is but eight feet above the water, and great quantities of water were shipped, putting out the fire under two boilers and flooding out the men's quarters. Only the fact that there were 28 loaded

Ottawa Finds It Pays to Advertise

Now, when this country faces so many great issues, it would be a grave error indeed if that potent force, advertising, so successfully utilized by the Government to overcome its war-time problems—was not employed to the fullest extent in solving our peace-time difficulties.

Do you know how publicity helped to register 5,000,000 people in one day—
How it turned a nation into bond-buyers—
What it accomplished in food conservation—
How it eliminated waste and increased production—
How it aided administration of war measures?

If you do not—then read Mr. William Byron's article, "Ottawa Makes a Discovery," in the January issue of MACLEAN'S. Mr. Byron's article is not a cut and dried discussion of advertising, but a remarkable story of achievement. It proves by facts that through publicity, Canadian energies can be combined into mighty forces, that will help solve our peace-time problems.

READ IT IN MACLEAN'S

Over 65,000 Canadian Families Buy

MACLEAN'S

"CANADA'S NATIONAL MAGAZINE"

JANUARY ISSUE *Now On Sale At All News Dealers*

20c PER COPY. $2.00 PER YEAR.

cars on board, keeping the ferry from rolling, prevented it from rolling over.

The ferry left the south shore at 7.30 a.m. Friday, and when ten miles out from Cobourg had to divert the course in the face of the south-west to west gale. It reached shelter in the lee of Gibraltar Point, Toronto Island, at 12.30 Friday night, and remained five hours, reaching Cobourg at 10.30 Saturday morning.

Capt. McCuaig, of Toronto, was in command. First Mate Redfern (who commanded the Boys' Naval Brigade boat this summer) said it was the worst storm in his experience. Among the few passengers were a bride and groom, and the latter was overcome by sickness.

CLAIM FREIGHT RATES MILLS MEET PRICE

London Manufacturer Points Out Why It is Hard For His Firm to Compete.

LONDON, Jan. 23—"European markets are closed to us on account of the freight rates to the seaboard," stated Charles H. White, secretary of the London Rolling Mills Company to CANADIAN MACHINERY, in reply to the question as to whether his company would seek for trade in France and Belgium. "We cannot compete with the mills that are situated at or near the seaports." The London Rolling Mills Company has been exceptionally busy during the last three years, having turned down many orders on account of its inability to fill them. It turns out 1,000 tons of bar iron and steel every month when working full time.

Mr. White says that trade has slowed down somewhat, but he anticipates that the output from the mill will be as large this year as it was during the preceding years. Sales are not heavy at present as the manufacturers to whom the steel is sold are re-adjusting their factories from war to peace goods. This will not take long, he opines, and the outlook is good.

"Will the price of steel drop again quickly?" he was asked.

"I would not care to express an opinion on this," he replied.

Referring again to foreign markets, Mr. White said that his firm had seriously considered going after the trade and it had been discussed from all angles. It was firmly decided that there would be no use trying to compete with the mills that would not have to pay the rail freight rates on account of their proximity to the seaboard.

Looking at the situation squarely, he thinks the general outlook for Canadian manufacturers is bright.

According to good authority considerably more than 3,000 technical articles, dealing with the problem of nitrogen fixation from all points of view, have appeared in English and foreign languages to date. In the same period thousands of patents pertaining to the processes have appeared.

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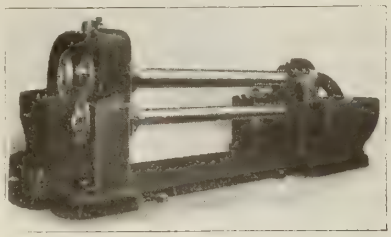

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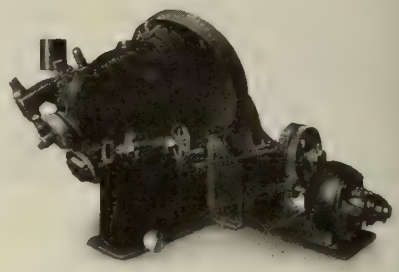

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a drill
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a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

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A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

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10' Bement Vertical Boring Mill, two heads.
36" Bausch Vertical Boring Mill, two heads.
48" x 48" x 12' D. & H. Open-side Planer, one head on rail, one on side.
36" x 36" x 10' Gray Planer, two heads.
3—36" x 36" x 8' Gray Planers, two heads.
36" x 36" x 8' Hamilton Planers, two heads.
30" x 30" x 10' Bement Planer, two heads.
1—No. 2 Kempsmith New Universal Miller.
5—No. 0 Steptoe Hand Millers.
2—3" x 36" Jones & Lamson, geared head.
13" x 5' 6" New Carroll-Jamieson Quick-change Lathe.
14" x 6' New Carroll-Jamieson Quick-change Lathe.
15" x 6' New Sidney D.B.G. Quick-change Lathe, swing 17"
12—17" x 8' New National Quick-change Lathe.
3—17" x 8' New Sidney D.B.G. Quick-change Lathe, swing 19".
18" x 24" New Rahn Larmon Lathe, D.B.G., quick change.
9—19" x 8' New Sidney D.B.G. Quick-change Lathes, swings 21".
24" x 20' Reed Lathe.
32" x 24' Fay & Scott Lathe, raising blocks to swing 53".
5' Bickford Single Pulley Drive Radial.
4' Mueller Single Pulley Drive Radial.
2—20" Rockford High Duty Drills.
250-lb. New Little Giant Belt Hammer.
100-lb. New Little Giant Belt Hammer.
30-ton Watson & Stillman Hydraulic Press

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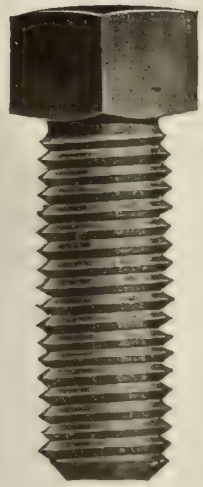

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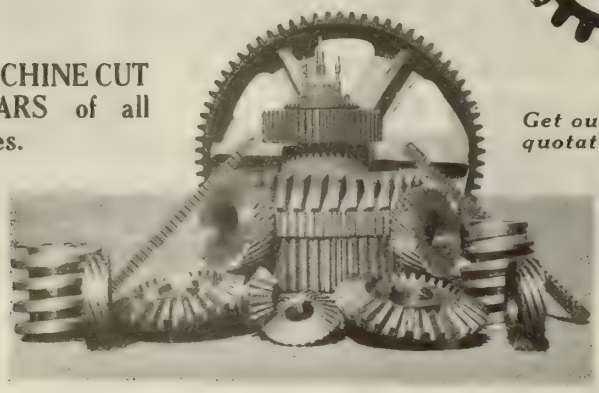

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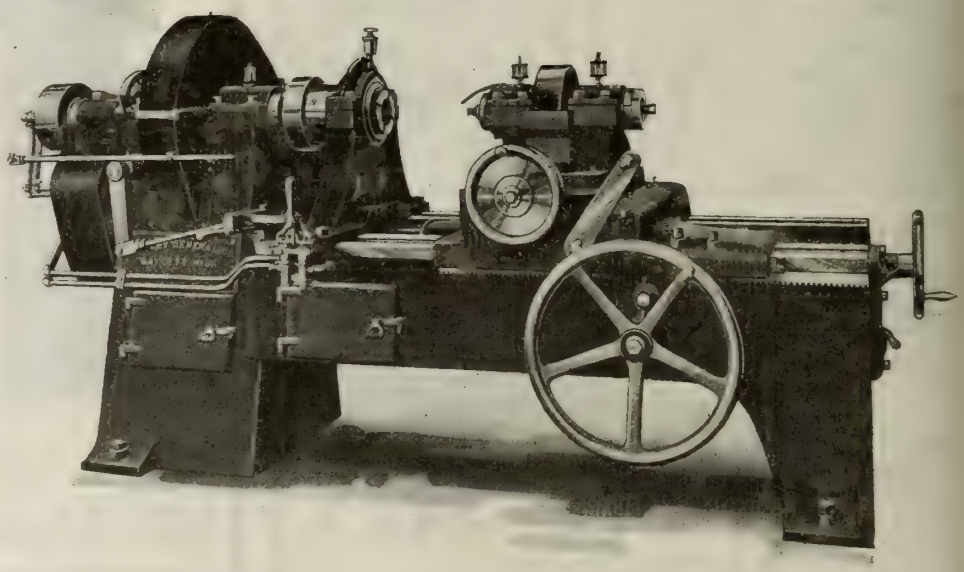

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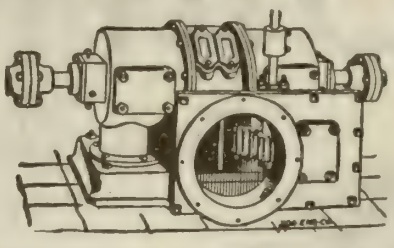

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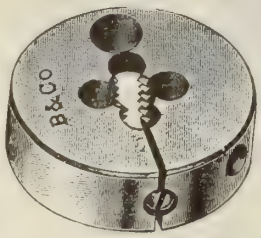

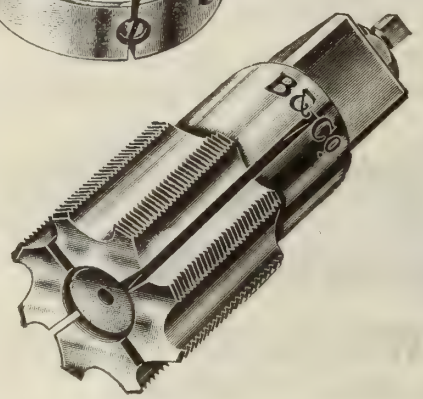

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This releases the chasers without any strain or twist on the threads.

It is only one of the good features of NAMCO DIES.

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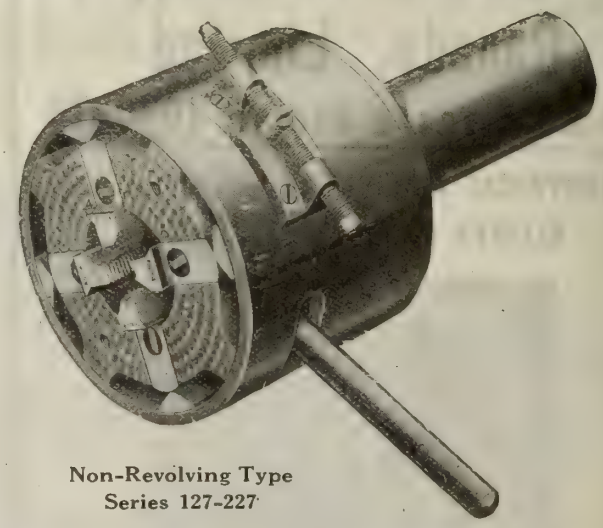

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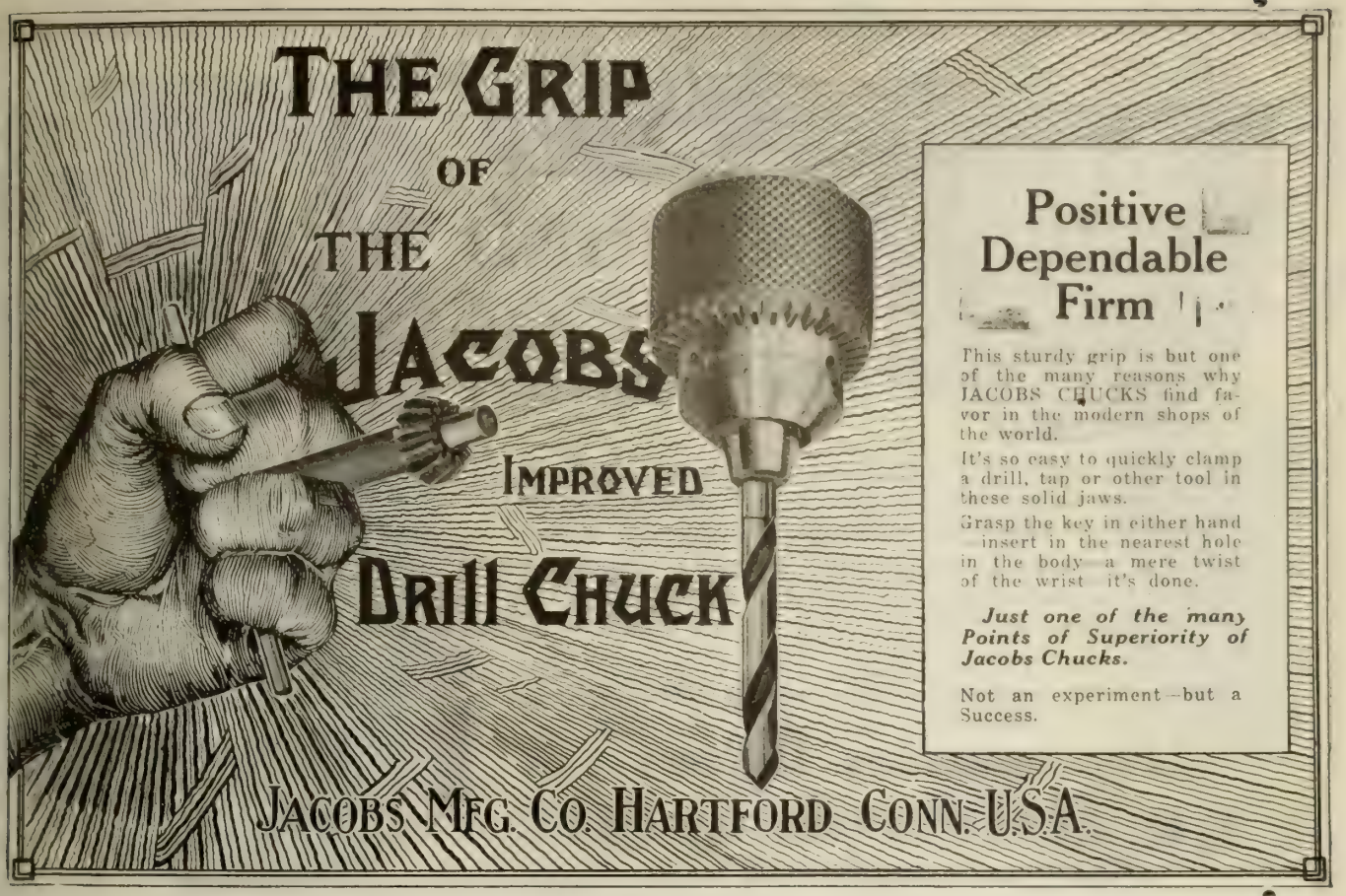

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This sturdy grip is but one of the many reasons why JACOBS CHUCKS find favor in the modern shops of the world.

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ALMOND CHUCKS ARE TOOL SAVERS

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ALMOND MICROMETERS recognize comparison with Johansson Swedish Gauges only.

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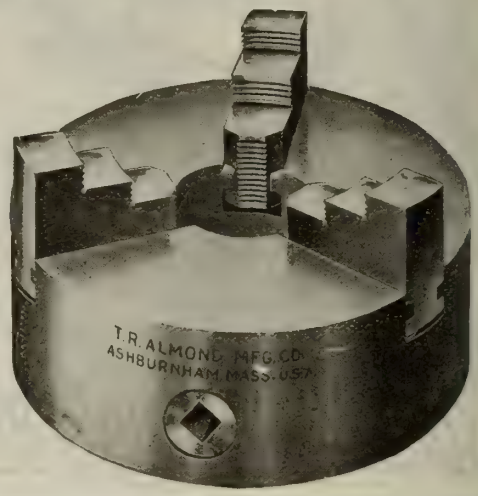

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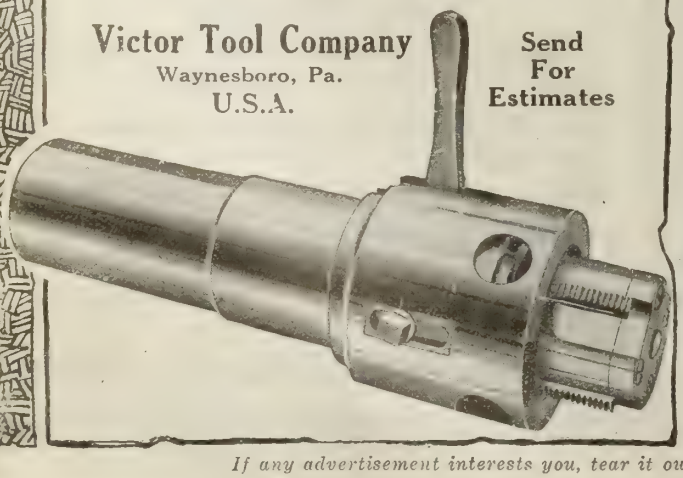

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It permits the operator, by merely raising the drill spindle, to reverse the tap at twice the tapping speed, while the spindle continues full speed ahead.

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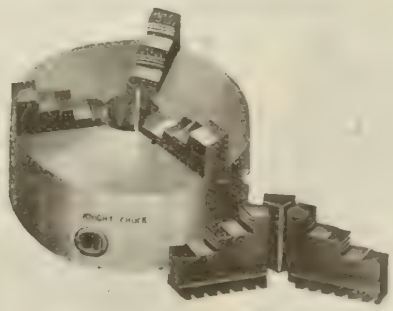

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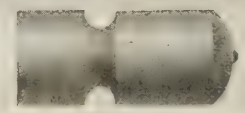

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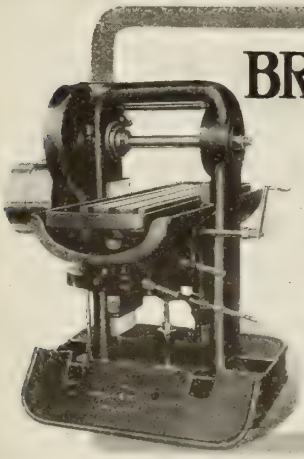

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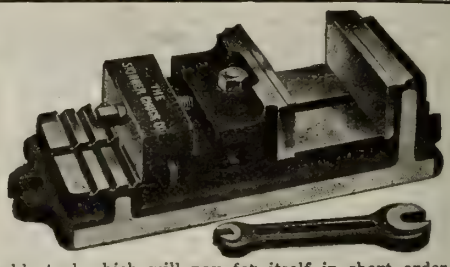

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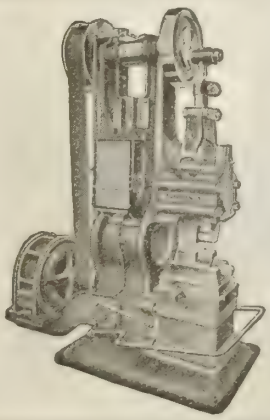

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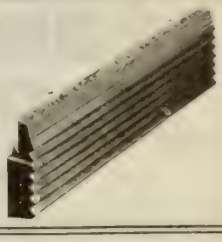

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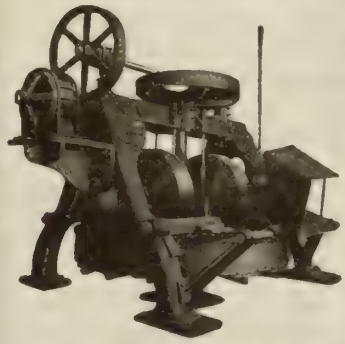

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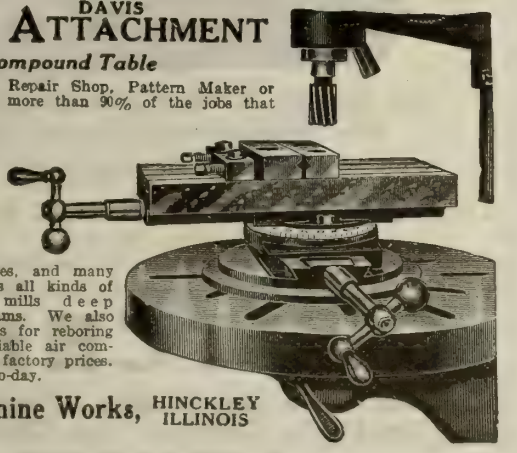

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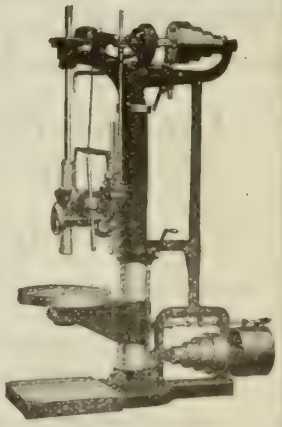

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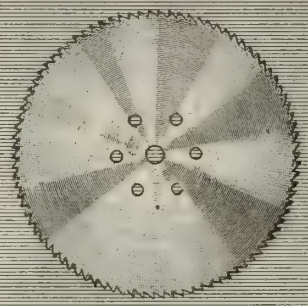

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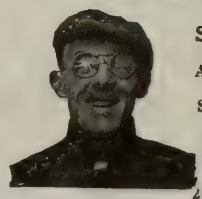

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And Everything for Safety

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Press Attachments, Automatic.
Metal and Wire Forming Machines.
Tumblers—Large Line.
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Special Machines.

Baird Machine Co., Bridgeport, Conn., U.S.A.

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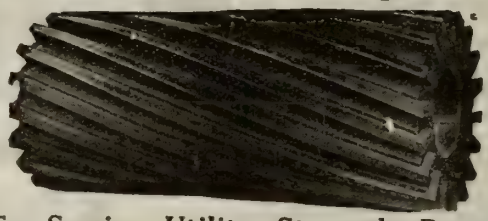
Fast Cutting

Powerful



Inserted Helical Blades of High-Speed Steel

For Service—Utility—Strength—Power
4-in. Diameter for General Use.

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Do you want someone to handle your small stamping work?

An advertisement in the contest section will put you in touch with firms who have the facilities for handling small stampings, small tools, jigs, fixtures, etc. If you need their help, tell them so here.

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Contract Work Section
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Combined Jaw and Friction. Friction only.
Gas Engine Clutches. Jaw Clutches.
Write for interesting printed matter.

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MONTREAL Factory: Aurora, Ont. TORONTO

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Oxy-Acetylene Welding and Cutting Apparatus

OXY-ACETYLENE WELDING DAVIS APPARATUS DAVIS-BOURNONVILLE CO. N.Y.

Carter Welding Co., General Dealers Toronto
For Davis-Bournonville Oxy-Acetylene Apparatus
General Office and Factory, Jersey City, N.J.
Canadian Factory, Niagara Falls, Ont.
Sales Offices: New York, Boston, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, San Francisco, Seattle.

WE MANUFACTURE RIVETS of every description, 5/8 inch. dia. and smaller

PARMENTER & BULLOCH CO., LTD.
GANANOQUE, ONT.

ARMCO IRON Welding Rods

OXY-ACETYLENE ELECTRIC

make *Safe* welding easy

ARMCO IRON Rods are practically pure iron and are peculiarly free from the sulphur, phosphorus, slag, oxides and other impurities that ordinarily destroy the homogeneity of the weld.

You will find it decidedly to your advantage to give ARMCO IRON Rods a careful test.

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11

HYGIENIC TABLE-CABINET SAND-BLAST

One of the many sanitary types of PANGBORN SAND BLAST EQUIPMENT

If you haven't seen what you want write us—if we don't build it, we will.

No requirement too large none too small.

PANGBORN CORPORATION

HAGERSTOWN, MD.

SAND-BLAST SPECIALISTS

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National High Speed Cutters

(The Cutter that gives service)

Let me quote you on your next requisition

Drills

High Speed and Carbon

Immediate shipment and right price.

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Machine Shop Supplies

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"THISTLE" BRAND RUBBER BELTING

"Maintenance of Quality"

is our motto, and our experience in the manufacture of belting since the year 1856 should be invaluable to you. Let us tell you all about this friction faced belting. The price will appeal to you.

Write to-day.

J. C. McLAREN BELTING CO., LTD.

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NEW AIR-TIGHT BLAST GATE

FOR LOW AND MODERATE PRESSURES

(Patented)

"The Air-Tight Blast Gates in use in our plant have given entire satisfaction."

CANADIAN PACIFIC RAILWAY COMPANY, Montreal, Canada."

Our NEW AIR-TIGHT BLAST GATE will save the air (money) you are now losing through leaky blast gates.

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Furnace Engineers and Contractors

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Canadian Distributors: Drummond, McCall & Co., Ltd., Montreal

You want Tool Holders that have made good

ARMSTRONG TOOL HOLDERS

Won The

GRAND PRIZE

THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

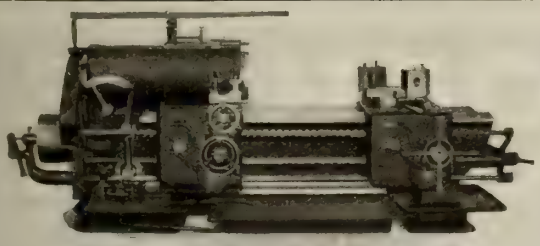
THEY ALWAYS MAKE GOOD

Write for Catalog.

Armstrong Bros. Tool Co.

"The Tool Holder People"

306 N. Francisco Ave., **CHICAGO, U.S.A**



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LET US TELL YOU ABOUT THIS MACHINE

Send Us Prints of Your Work

STEINLE TURRET MACHINE CO.

MADISON, WIS., U.S.A.

THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

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Formerly John Adt & Son. Established 1866.

Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

STEEL CASTINGS

1 to 5,000 pounds

Highest Quality

PROMPT AND RELIABLE SERVICE

We make a specialty of Carbonizing Boxes and Cyanide and Lead Bath Pots

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STEEL CASTINGS

We are well equipped to make all kinds of steel castings, 100 lbs. to 50,000 lbs.

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STEEL CASTINGS

ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.

PROMPT DELIVERY

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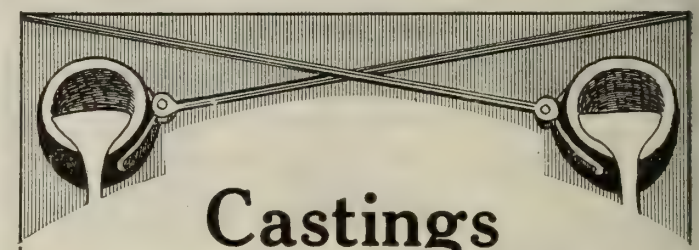

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Brass, Gunmetal, Manganese Bronze, Copper, Nickel Alloys, Aluminum, etc.

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SHAFTING

Cold Drawn, Turned and Polished Steel, Rounds, Squares, Hexagons and Flats, Steel Piston Rods, Pump Rods.

Special facilities for Keyseating up to 6 in. diameter.

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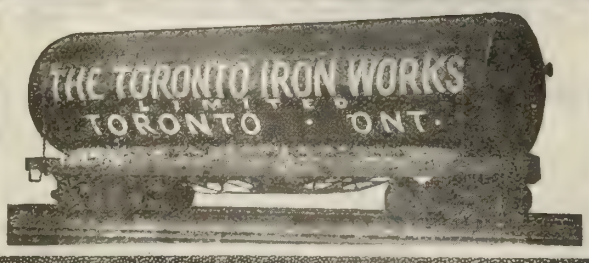
CANADIAN MACHINERY
When Writing to Advertisers

RIVETED STEEL TANKS FOR EVERY PURPOSE



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Our business is to solve your cleaning problem. Put it up to us!

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A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.

Catalog No. 6.

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WILLSON SAFETY GOGGLES

ONE PAIR OR 20,000 PER DAY

WRITE FOR DETAILS

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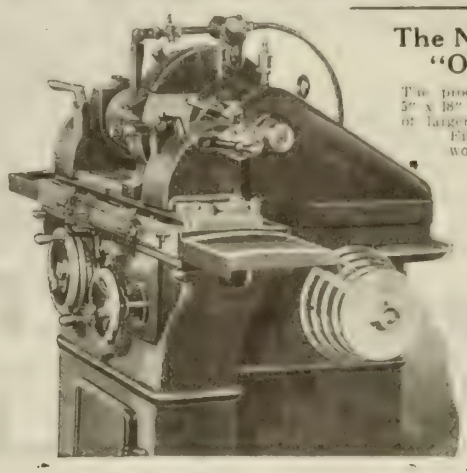

The Newest of the "OTT" Line

The production capacity of our 5" x 18" Plain Grinder is worthy of larger and costlier machines. Fifty-seven varieties of work, more or less, from cast iron bushings to high-speed steel cutters, take times accurate finish from OTT Grinders; and the initial machine in any plant — no matter what it makes — invariably recommends others.

Write for full particulars.

OTT Grinder Co.

Indianapolis, Indiana

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THAT ARE DEPENDABLE

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WRITE US

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All kinds of Shop and Foundry Trucks

Steel Frame Shop Truck

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Complete Foundry Equipment

WHITING FOUNDRY EQUIPMENT CO. HARVEY-ILL. U.S.A. CHICAGO DEALERS

Cranes of all Types

For Hardness Testing

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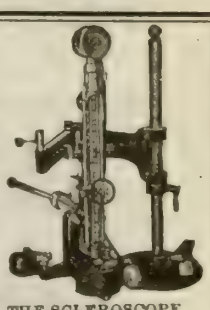
in shop and laboratory use the

Standard Scleroscope

Universally adopted; direct reading; inexpensive, and the only instrument that agrees with others of its kind in all parts of the world, thus solving problems of ordering materials to specification.

BOOKLET FREE.



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Heat Indication

by optical means is fast becoming the correct thing. The PYROSCOPE has solved the problem. Perfect constancy, inexpensive, no electricity used. Built to stand rough usage and upon common-sense lines. Used by the Government and best firms.

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Agents for Canada: A. R. Williams Machy. Co., Ltd., Toronto, Ca.

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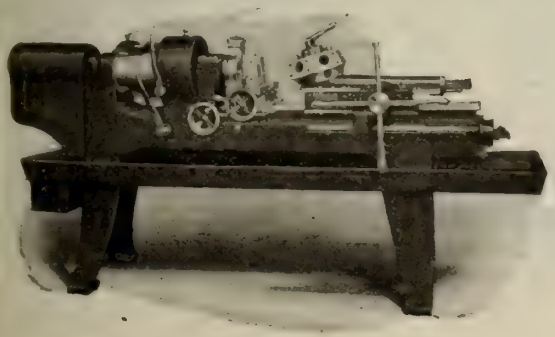
A CLEAR TRACK FOR THE STOCK



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SEND FOR

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OR

ASK THE USER

FIFTEEN YEARS OF SATISFIED USERS

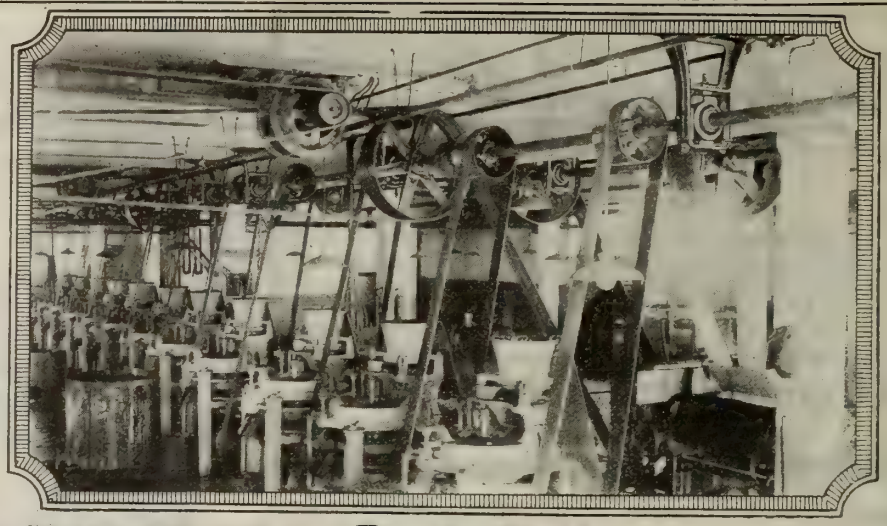
WOOD TURRET MACHINE CO.

BRAZIL INDIANA U.S.A.

Power Losses

Belt slip, air fanning, too heavy pulleys—account for losses of hundreds or thousands of dollars in many plants throughout the country.

Check these power and fuel losses. Reduce belt slip and windage (air fanning) to a minimum. Make every ton of coal do full duty by installing



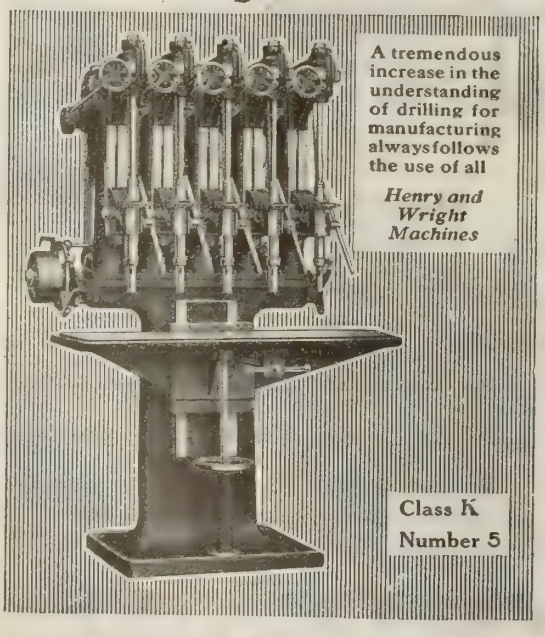
AMERICAN STEEL SPLIT PULLEYS

There are no "ifs" about these pulleys. They are **guaranteed** to minimize belt slip and wind resistance. They are guaranteed for double belt duty. They are **guaranteed** for rim speeds up to 6,000 feet per minute. There are over 4,000,000 in use because they transmit more power with less waste than any other pulley in the market.

Write for 37 page book "Getting Maximum Pulley Efficiency." It will tell you how to eliminate pulley waste.

The American Pulley Company Philadelphia, Pa.

HENRY & WRIGHT
Drilling Machines



The Henry & Wright Mfg. Co.
Hartford, Conn.

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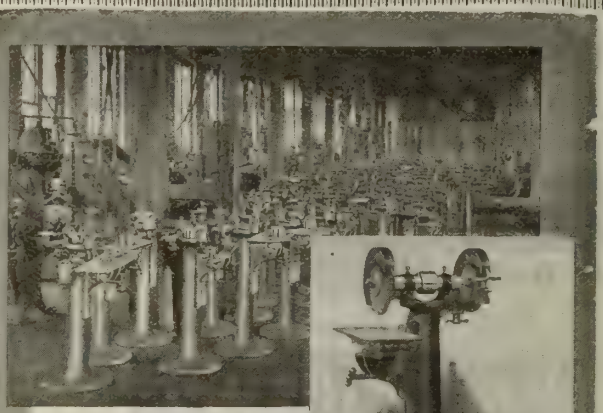

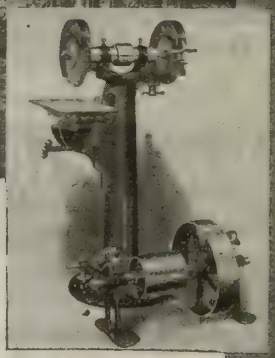

WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful Waterbury Grinder at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable, practical grinding outfit.

The Blake & Johnson Co., Waterbury, Conn.

Canadian Machinery BUYERS DIRECTORY

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Canadian Fairbanks-Morse Co., Montreal.
The Geo F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
Plewes Ltd., Winnipeg, Man.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Rice, Lewis & Son, Toronto, Ont.

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Carter Welding Co., Toronto, Ont.
Canadian Welding Works, Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.

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Prest-O-Lite Co., Inc., Toronto, Ont.

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Niles-Bement-Pond Co., New York.

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AIR CYLINDERS
Smalley-General Co., Inc., Bay City, Mich.

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Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.

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United Brass & Lead, Ltd., Toronto.
Tallman Brass & Metal Co., Hamilton.

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Boker & Co., Inc., H., Montreal Que.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Standard Alloys Company Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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J. C. Wilson & Co., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Sheldons Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Pangborn Corporation, Hagerstown, Md.

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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
National Acme. Co., Cleveland, O., and Windsor.
Riverside Machinery Depot, Detroit, Mich.
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto, Can.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
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Whiting Foundry Equipment Co., Harvey, Ill.

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Wilson & Co., J. C., Belleville, Ont.
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Wentworth Mfg. Co., Hamilton, Ont.

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Rice, Lewis & Son, Toronto, Ont.

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Can. Consolidated Rubber Co., Ltd., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
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BELTING, STITCHED COTTON DUCK
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Dominion Belting Co., Hamilton, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

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New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

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Wickes Bros., Saginaw, Mich.

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Bertrams, Limited, Edinburgh, Scotland.
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Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
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Niles-Bement-Pond Co., New York.
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Algoma Steel Corp., Sault Ste. Marie, Ont.

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Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

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Marsh Engineering Works, Belleville, Ont.
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Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y

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Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich
Williams Machinery Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que

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Jardine & Co., Ltd., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.

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Canadian Fairbanks-Morse Co., Montreal.
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MacKinnon Steel Co., Sherbrooke, Que.
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Tolland Mfg. Co., Montreal, Que.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
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Canada Metal Co., Toronto.

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Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.

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MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
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Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.

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Northern Crane Works, Ltd., Walkerville, Ont.

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Parmenter & Bulloch Co., Gananogue, Ont.

BUSHINGS, BRONZE
Oberdorfer Brass Co., M. L., Syracuse, N.Y.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

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Bliss, E. W. Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J
Brown, Boggs & Co, Hamilton, Can.

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Wilson & Co., J. C., Belleville, Ont.

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Swedish Crucible Steel Co., Windsor, Ont.

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CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal.

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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Marsh Engineering Works, Belleville, Ont.
Sheldons, Limited, Galt, Ont.
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CARS, STEEL BODY
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Winnipeg Iron Foundry Co., Winnipeg.
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Tolland Mfg. Co., Montreal, Que.

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Greenleafs, Ltd., Belleville, Ont.
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Kennedy & Sons, Ltd., Wm., Owen Sound.
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Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Tolland Mfg. Co., Montreal, Que.
Fittings, Ltd., Oshawa, Ont.
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Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ROUGH
Tolland Mfg. Co., Montreal, Que.

CASTINGS, NICHROME
Can. Driver-Harris Co., Harrison, N.J.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
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New Britain Machine Co., New Britain, Conn.
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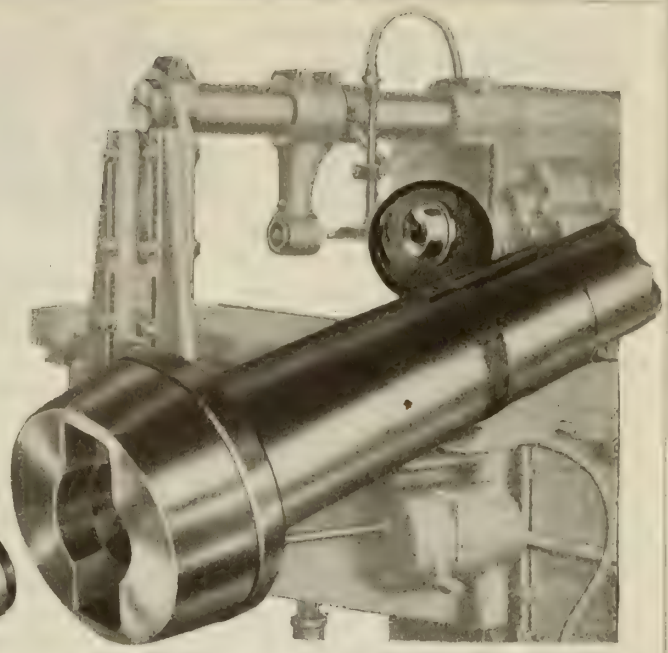

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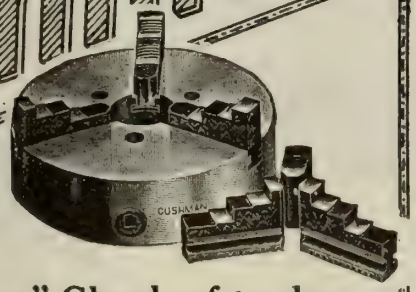

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Ford-Smith Mach Co., Hamilton, Ont.
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Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp, Galt, Ont.
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Garvin Machine Co., New York.
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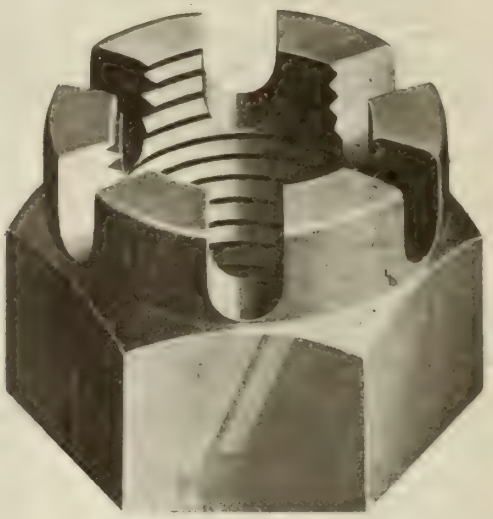

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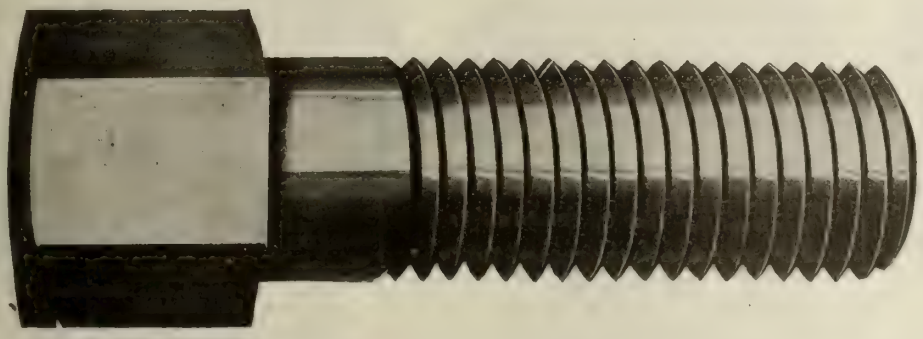

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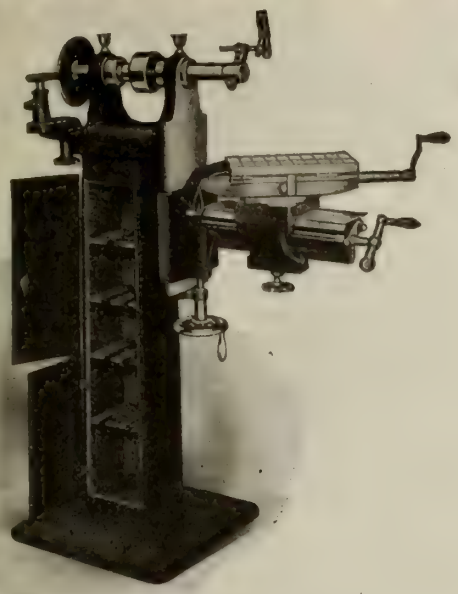

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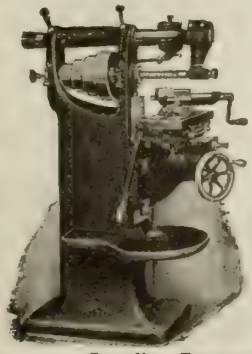

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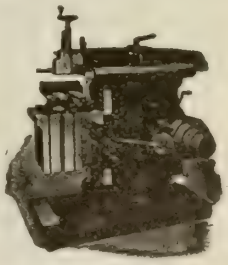

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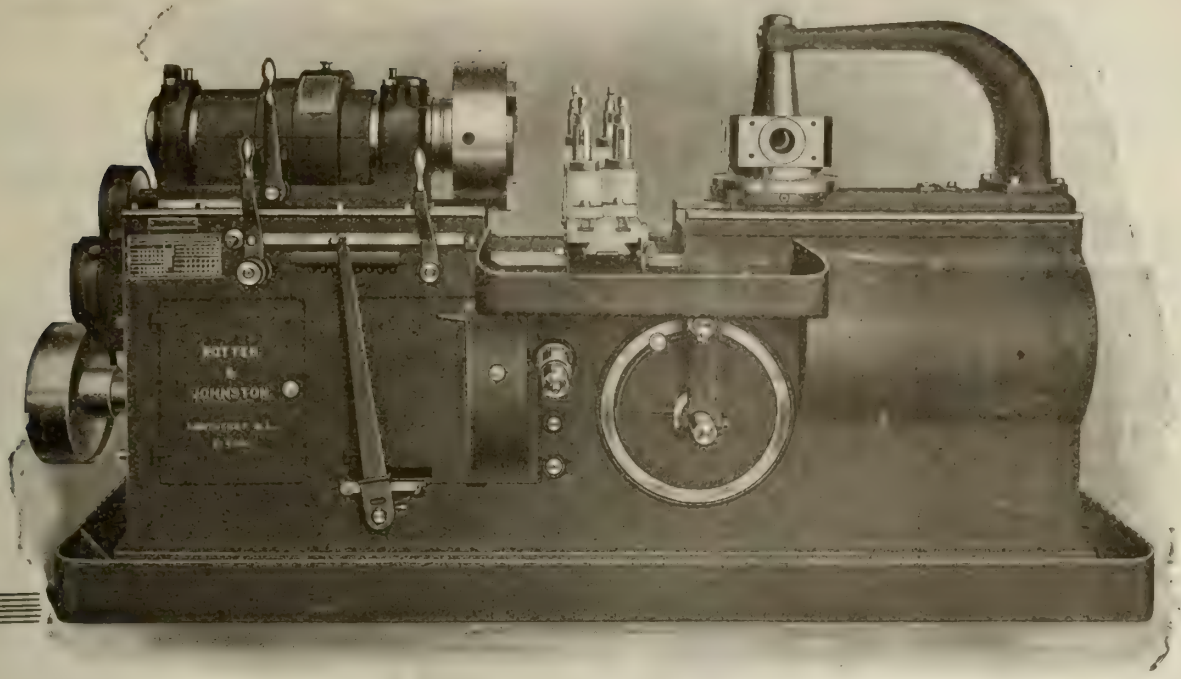

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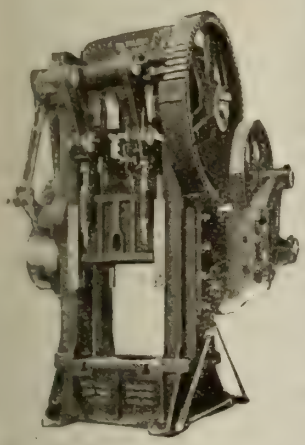

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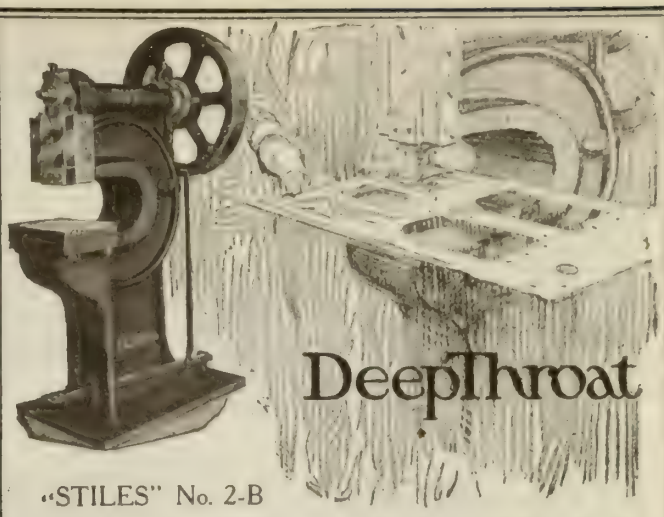

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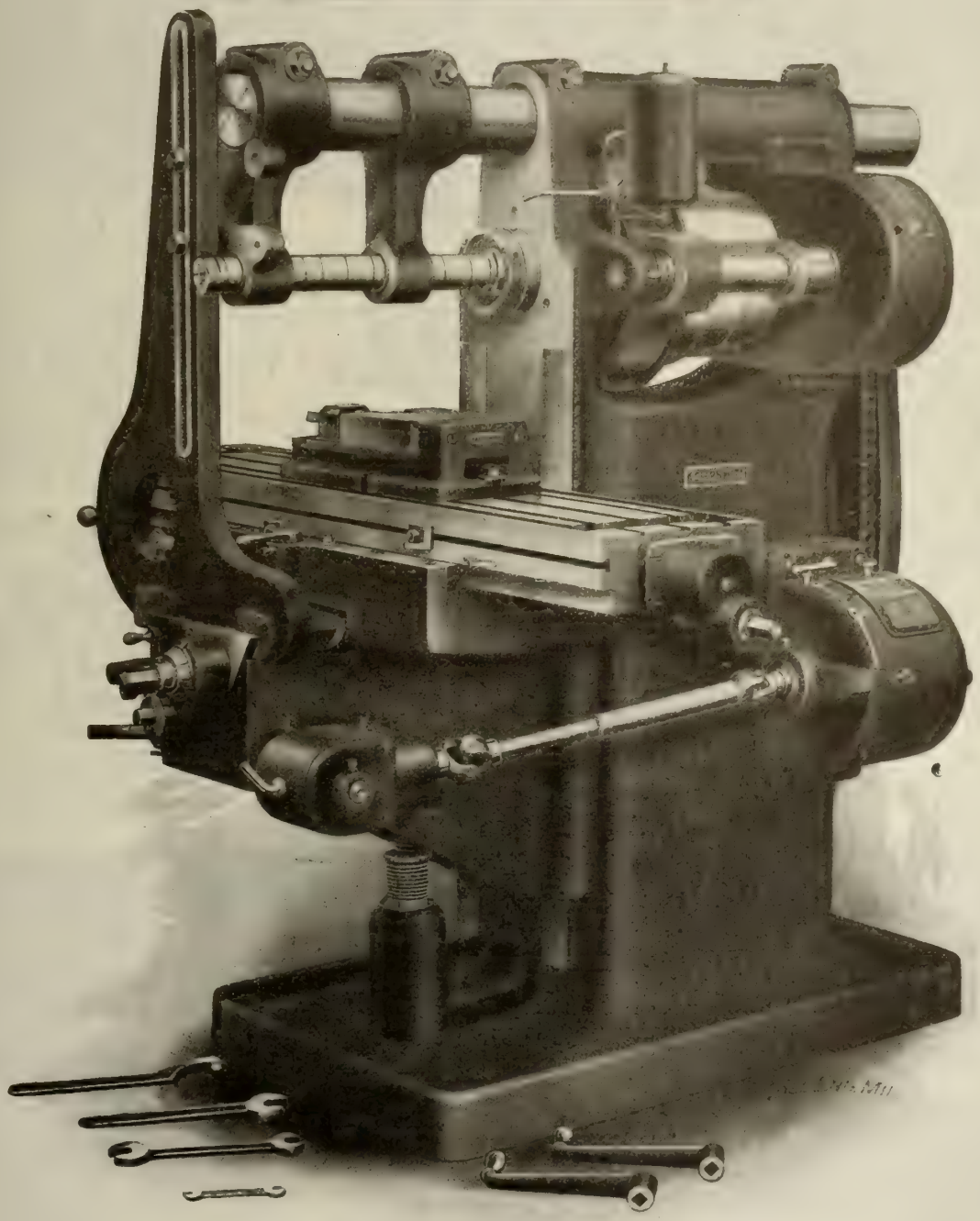

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Fry's (London), Ltd., London, England.

PUMP LEATHERS
Graton & Knight Mfg. Co., Worcester, Mass.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co. Brooklyn, N.Y.
Boker & Co., Inc., H., Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Can Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Mulliner-Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Stoll Co., D. H., Buffalo, N.Y.
Wickes & Co., Saginaw, Mich.

PUNCHES, CHROME, VANADIUM SHELL
Hammond Steel Co., Inc., Syracuse, N.Y.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

PYROMETERS
Bristol Co., Waterbury, Conn., U.S.A.
Shore Instrument & Mfg. Co., New York City.
Taylor Instrument Co., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS
Can. Welding Works, Montreal, Que.
United Brass & Lead, Ltd., Toronto, Ont.

RAIL BENDERS
Algoma Steel Corp., Sault Ste. Marie, Ont.
Niles-Bement-Pond Co., New York.

RADIAL DRILLING MACHINE, WALL
Lund-Farquhar Co., Boston.
Wickes & Co., Saginaw, Mich.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

RAIL OVERHEAD
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

RAILWAY EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
The McCrosky Reamer Co., Meadville, Pa.
The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER AND SELF-FEEDING
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REGULATORS, AUTOMATIC
Electric Steels & Metals, Ltd., Welland, Ont.

REGULATORS, PRESSURE TEMPERATURE
Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

ROAD BUILDING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

RODS
General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich.

ROLLER CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont.

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto, Ont.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
Pangborn Corporation, Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SASH WEIGHTS AND WRENCHES
Fittings, Ltd., Oshawa, Ont.

SAWS, CIRCULAR METAL
E. C. Atkins & Co., Indianapolis, Ind.
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)
E. C. Atkins & Co., Indianapolis, Ind.
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, SLITTING
E. C. Atkins & Co., Indianapolis, Ind.
Taylor, J. A. M., Stair Bldg., Toronto, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCREENING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

SCREW MACHINE PRODUCTS
Galt Machine Screw Co., Galt, Ont.
Knight Metal Products, Ltd., Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

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ENGLAND

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Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que.

SCREW MACHINES, AUTOMATIC MULTIPLE SPINDLE
National Acme Co., Cleveland, Ohio.
Cincinnati Automatic Mach. Co., Cincinnati, O.
New Britain Machine Co., New Britain, Conn.
Riverside Machinery Depot, Detroit, Mach.

SCREWS
Can. B. K. Morton, Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SCREW SLOTTERS
Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Riverside Machinery Depot, Detroit, Mich.

SEPARATORS, SAND
Pangborn Corporation, Hagerstown, Md.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn., U.S.A.
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Rhodes Mfg. Co., Hartford, Conn.
Steptoe Co., John, Cincinnati, Ohio.

SHAFTING
Algoma Steel Corp., Sault Ste. Marie, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Jones & Glassco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.

SHARPENING STONES
Norton Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas
Bertrams, Ltd., Edinburgh, Scotland
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

SHEARS, POWER
John Bertram & Sons Co., Dundas
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
A. B. Jardine & Co., Limited, Hespeler, Ont.
National Machy Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.

SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.

SHELVING, STEEL
Dennis Wire & Iron Works, London, Ontario.

SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn
High Speed Hammer Co., Rochester, N.Y.

SHIPBUILDING
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

SHOP FURNITURE
Dennis Wire & Iron Works, London, Ontario
New Britain Mach. Co., New Britain, Conn.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal
Williams & Co., J. H., Brooklyn, N.Y.

SILENT CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilkinson & Kompass, Hamilton, Ont.

SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.

SMOKESTACKS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Quebec.
Marsh Engineering Works, Belleville, Ont.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice, Lewis & Son, Toronto, Ont.

SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto

SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead, Ltd., Toronto.

SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SPIKES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

SPRINGS, MACHINERY
Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.

SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.
Banfield, W. H., & Sons, Toronto.
Beaver Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont
Elliott & Whitehall Mach. & Tool Co., Galt, Ont
Ferracute Mach. Co., Bridgeton, N.J.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
National-Acme Co., Cleveland, Ohio.
Mulliner & Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co, Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPROCKETS, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto
Wilson & Co., J. C., Belleville, Ont.

STAIRS, IRON
Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.
Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.

STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y.
Illingworth Steel Co., John, New York, N.Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.
Swedish Crucible Steel Co., Windsor, Ont.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.

STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que.

STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.

STELLITE, HIGH-SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.

STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.

STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que
Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
New Britain Machine Co., New Britain, Conn.

STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain, Conn.

STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.

STRAND
Page Steel & Wire Co., Adrian, Mich.

SUPPLIES, CONTRACTORS'
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

STRUCTURES, STEEL BUILDINGS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.

TABLES, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

TACK (DOUBLE POINT) MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

TAPPING MACHINES (PENUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto.

TANKS, GASOLINE AND OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Canadian Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.

TANKS, STEEL, WATER PRESSURE
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.

TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.

TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.

TAPPING MACHINES AND ATTACHMENTS
Bertram, John, & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven.
J. H. Hall & Sons, Brantford, Ont.
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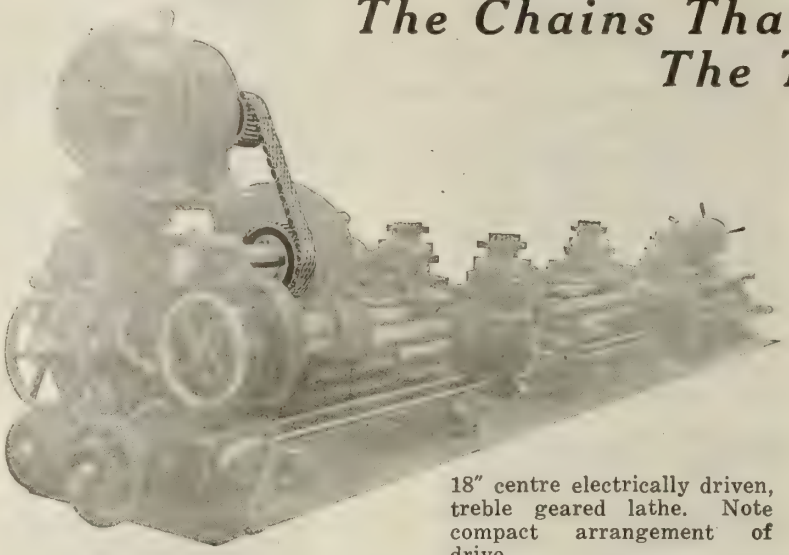

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AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

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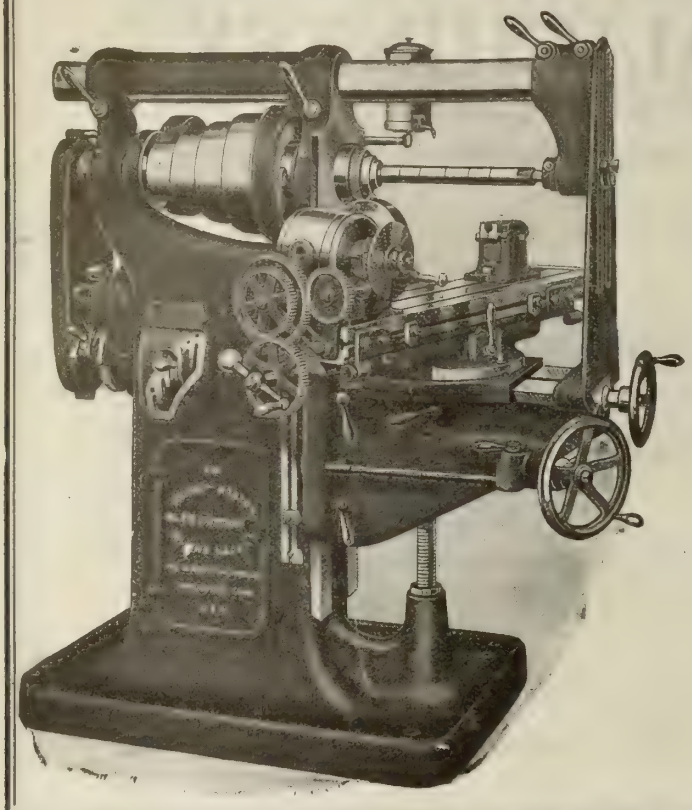

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Toledo Machine & Tool Co. .....
Toomey, Inc., Frank .....
Toronto Iron Works .....
Trahern Pump Co. .....

U

United Brass & Lead, Ltd. .....
United Brass Electrical Tool Co. .
United Hammer Co. .....

V

Vanadium-Alloys Steel Co. .....
Victoria Foundry Co. .....
Victor Tool Co. .....
Vulcan Crucible Steel Co. .....

W

Wentworth Mfg. Co. .....
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Wheel Trueing Tool Co. .....
Whiting Foundry & Equip. Co. ....
Wilkinson & Kompass .....
Williams, A. R., Mach. Co. 57,
Williams Tool Co. .....
Williams & Co., J. H. .....
Williams & Wilson, Ltd. .....
Wilson Co., J. C. .....
Wilson & Co., T. A. .....
Wilt Twist Drill Co. .....
Willys-Overland, Ltd. .....
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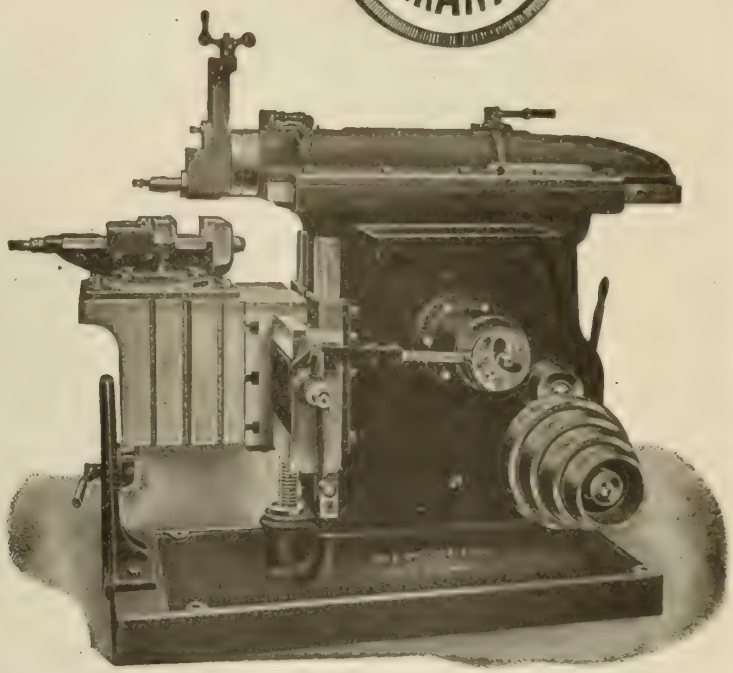
McDougall Shapers

These are up-to-date Shapers, designed for modern shop production.

They are plain in design, yet embody all essential features necessary for efficient work.

Every adjustment is convenient for the operator and fine for the most accurate work. Let us have your enquiry.

ARE-MAC-DEE IS A GUARANTEE



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Manufacturers

GALT, ONTARIO, CANADA

The Canadian Fairbanks-Morse Company, Limited

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Micrometers

And a Complete Stock of

Drills
Reamers
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Corundum Wheels
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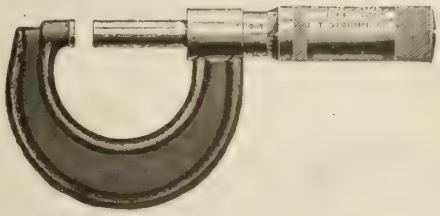
Files and all Supplies
Tungsten Hack Saw Blades

THE GEO. F. FOSS MACHINERY & SUPPLY CO. LIMITED · MONTREAL · Foss



As distributors of finest precision tools, we take pride in the fact that we handle J. T. Slocomb Micrometers. Their reputation in hundreds of tool rooms and metal-working plants is a gauge that indicates the depth and breadth of our own supply business.

You may, with complete confidence, put your finest work up to Slocomb Micrometers.

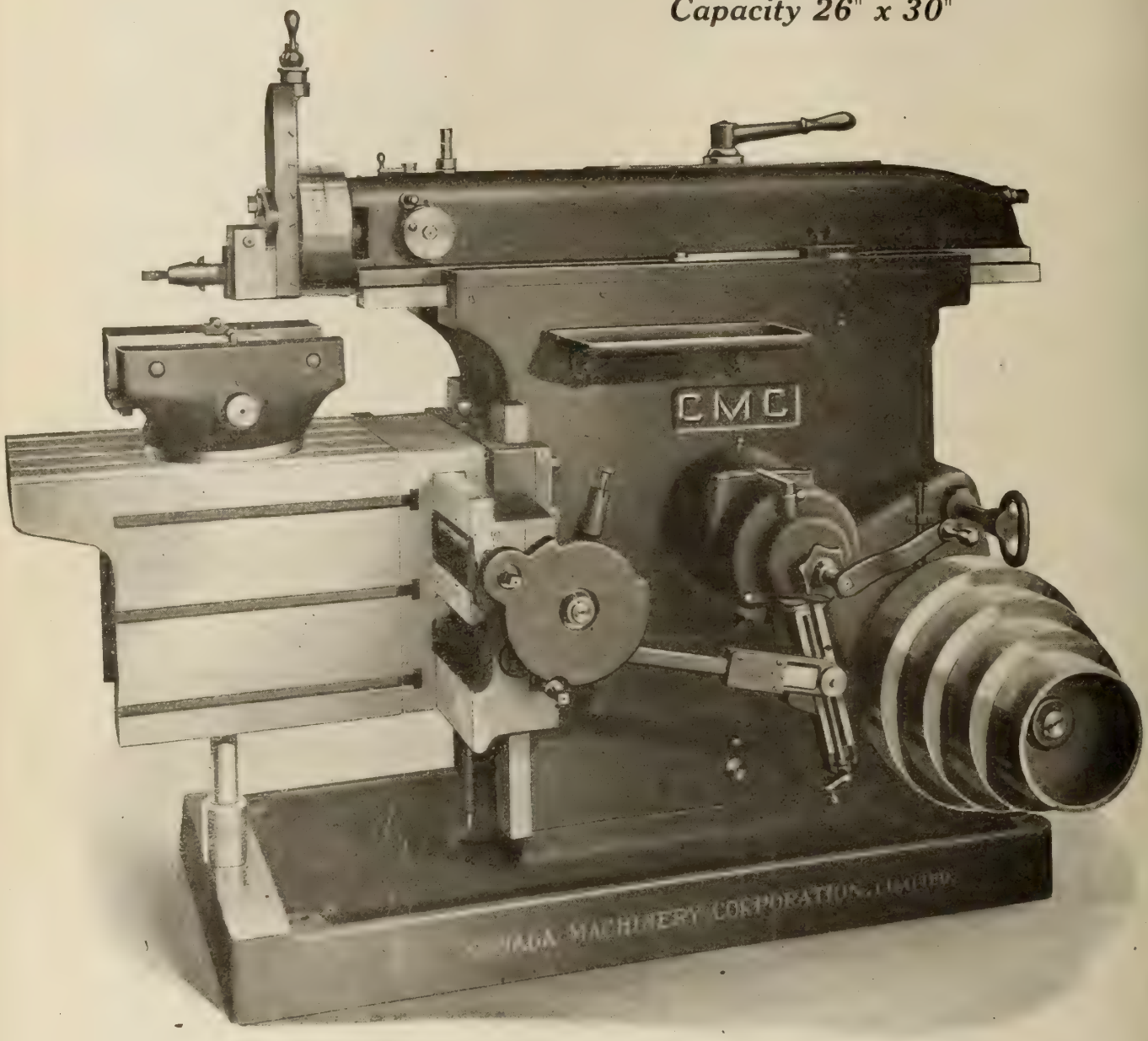
Write for full description and prices.

The Geo. F. Foss Machinery and Supply
COMPANY, LIMITED

305 St. James St. Montreal, Que.

CRANK C.M.C. SHAPER

Capacity 26" x 30"



A very heavy and accurate machine for exacting service.

Inquiries solicited. Details on request.

Prompt Delivery.

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EDITORIAL INDEX—PAGE 111 BUYERS' DIRECTORY—PAGE 30 ADVERTISERS' INDEX—PAGE 2

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 5. Publication Office: Toronto, January 30, 1919 Subscription Price $3.00 per Year

BERTRAM MACHINE TOOLS

30 in. Vertical Drilling Machine

LOCOMOTIVE AND CAR SHOP EQUIPMENT, STRUCTURAL AND BRIDGE SHOP MACHINERY, GENERAL MACHINE SHOP EQUIPMENT, REPAIR SHOP MACHINERY.

Photographs and full particulars of any kind of Bertram Machine Tools on request.

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Montreal, 723 Drummond Bldg. Toronto, 1002 C.P.R. Bldg. Vancouver, 609 Bank of Ottawa Bldg. Winnipeg, 1205 McArthur Bldg.

JB&SCo

SMALL TOOLS

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

P. & W. Die-Stock Dies

These dies are practically solid when in use and can be adjusted 1-32 in. larger or smaller. The chasers can be quickly removed for the purpose of renewal or sharpening. Standard sizes furnished include U.S. Standard, Whitworth Standard, S. A. E. Standard and "V" form, all right hand; also special right-hand Briggs Standard taper pipe thread.

The Pratt & Whitney policy of highest quality materials, together with the necessary refinement and accuracy, is maintained.

PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

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Works: DUNDAS, ONTARIO

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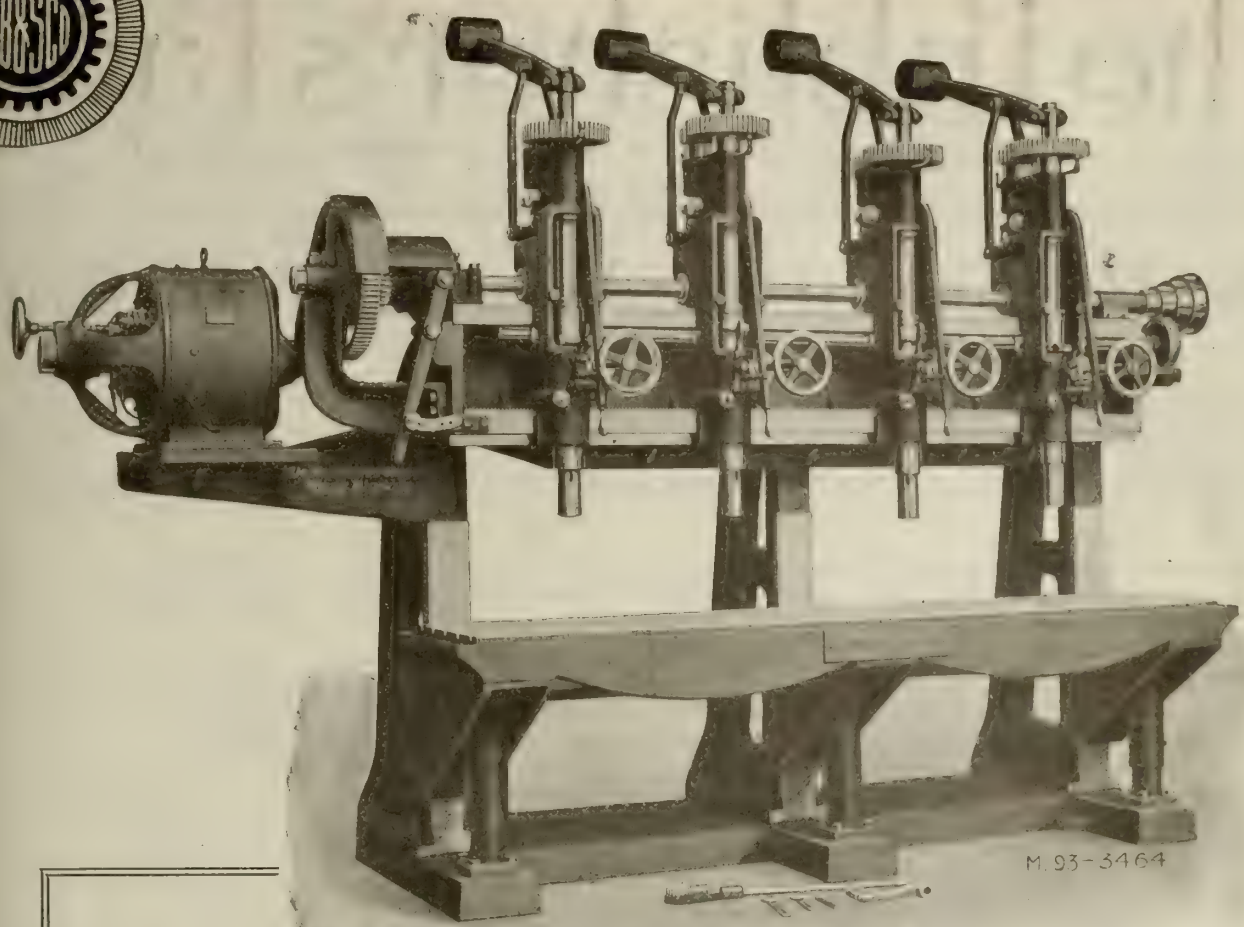

Multiple Drills

OF EVERY DESCRIPTION

Bertram 4-Spindle Multiple Drilling Machine for Locomotive and Other Work

SIMULTANEOUS OR INDEPENDENT FEEDS with INDEPENDENT KNOCK-OFF FOR EACH HEAD AND CLUTCH DRIVE FOR EACH SPINDLE.
CAPACITY, FOUR 2-inch HOLES IN STEEL.

Drop us a line for photographs and full particulars.

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The Publisher's Page

TORONTO JANUARY 25, 1919

The Picture of the Workman in Copy

BY R. BIGELOW LOCKWOOD

The following article by R. Bigelow Lockwood in that wonderfully useful publication, *Printers' Ink,* is reprinted for the benefit of our advertisers, and because it is generally interesting.

THE picture of the workman which is used in copy is apt to be either the traditional workman, and not as he is to-day, or an artist's conception which fails to hit the mark of reality. Either fault can seriously mar the force of perhaps an otherwise good advertisement, if it does not add a fatal touch of the ridiculous.

A few years ago a certain manufacturer of lathes conceived the brilliant idea of using as an illustration in his advertisement appearing in a technical paper a picture of a gentleman clad in frock coat and high silk hat, gleefully ascending a staircase and carrying upon his shoulders a two-ton machine, complete with tooling equipment. So lightly did the gentleman in question carry his burden that not a wrinkle showed in his faultlessly fitting coat, nor was the grain of his hat rubbed the wrong way. As an example of mis-directed originality carried to the *n*th degree the illustration was a gem. As an illustration of force, capable of properly advertising the product, the picture was of no value.

Between this extreme and the safe and sane policy of illustrating the workman as he really is, lies a no-man's land strewn with advertising debris in the form of countless pictures which fail in varying degrees accurately to portray the workman as he exists on the job.

Realism, however, is a thing which must be handled with care. The writer of this article, while directing the taking of photographs in a machine shop, has occasionally had to request a mechanic who was prominently in the foreground, to shift his plug to the cheek away from the camera. Realism, while a virtue, should never be carried to the point of possible offense.

The best results are secured by taking the camera to the workman rather than by taking the workman to the camera. In other words, pictures taken in the shop, or factory or on the job, are usually better than pictures posed in the studio. The reasons are obvious. Pictures taken on the job have the proper environment. The workman is caught in his proper working clothes amidst conditions in which he feels perfectly at home. He accordingly finds it easier to pose and the result is more likely to be natural instead of strained.

SOMEHOW, STUDIO PICTURES DON'T "LOOK NATURAL"

On the other hand, pictures posed in the atmsophere of a studio lose, by necessity, the local-color of the shop or job. The workman who is taken away from his machine instinctively starts to "clean up," thereby materially reducing at the very start the desired touch of reality. Work and dirt are usually closely associated, and for advertising purposes a coating of honest grease or a layer of foundry dust is infinitely better than a coating of soap and water. The one is true to life; the other is artificial as applying to actual working conditions. Hence, in this case, dirt is a thing to be respected and duly honored because of its advertising value.

Whenever possible, therefore, photograph the workman at his machine, and do it without giving him too much time to think about what is happening.

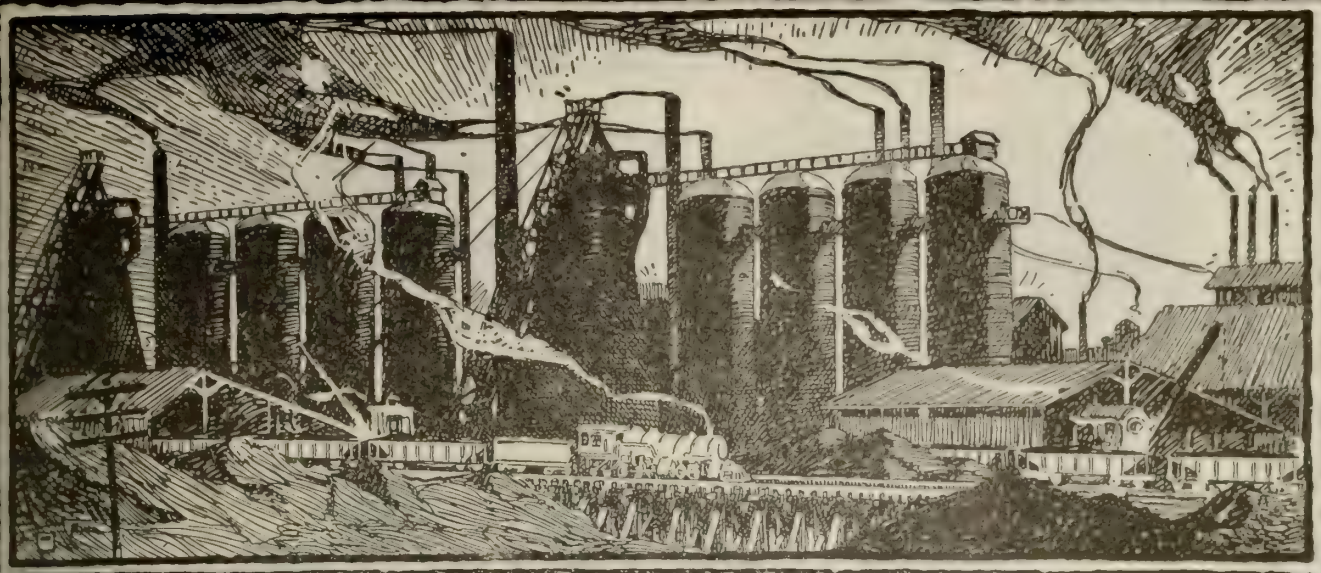
The request, "Stand still there a minute, Jim," will usually produce far better results than the command, "Come upstairs, Jim, to Mr. Tompkins' office. We want you to pose for a picture."

In the latter case Jim will not only get flustered, but on the way will probably stop in the washroom to "spruce up a bit."

Where it is desired, for advertising purposes, to show the workman in connection with the actual job, it is, of course, essential to take the picture on the ground. It often happens, however, that a picture is wanted featuring the workman alone, or in the simple act of pointing to some such device as a wrench, held in one hand. Such pictures usually call for a pleased expression on the face of the workman, and it is right here that grave mistakes can all too easily be made, due to the common practice of getting Smith, the office bookkeeper, to slip on a pair of overalls and pose.

After much coaxing Smith sheds his coat

CONTINUED ON PAGE 71



LITTLE WORDS WITH BIG MEANING

Quality

According to "Webster," Quality is "an excellence of character; natural superiority."

Service

Webster's definition of "Service" is; "The performance of labor for the benefit of another."

We use these words advisedly—fully understanding their definitions—and realizing the obligation we place upon ourselves by their continued use in connection with our products of Iron and Steel, and our attitude to the people we serve.

THE

STEEL COMPANY

OF

CANADA

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MONTREAL HAMILTON

Pig Iron,
Steel & Iron Bars,
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Steel Billets,
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Bolts, Forgings, Wire
of every description.

Algoma Steel Corporation Limited

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MARK OF ALGOMA O.H. QUALITY

BLOOMS, BILLETS, SLABS, STRUCTURAL STEEL, MERCHANT BARS, CONCRETE REINFORCING BARS, IRON, BRASS AND BRONZE CASTINGS

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

SPLICE BARS

STEEL TIE PLATES

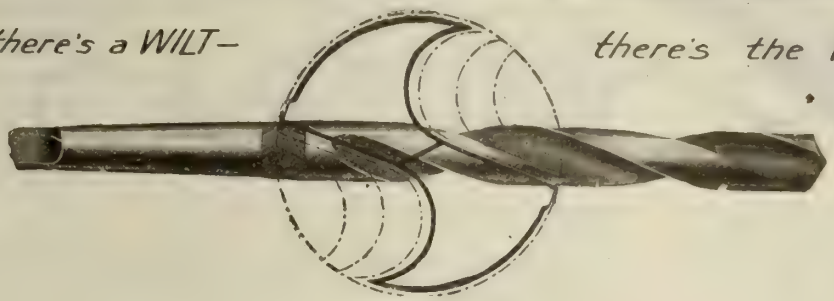
PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

Sulphuric Acid. Nitre Cake

WILT

"Where there's a WILT— there's the Way"



HIGH SPEED AND CARBON TWIST DRILLS

IN these days tools greatly define the extent of your production. The skilled mechanic, as good as he may be, must be supplied with good tools to turn out **quantity** and **quality** work. For drilling operations he must have drills of WILT quality—drills that can be driven hard and pushed to the limit, and a little beyond. Wilt Drills are designed to speed up production. You can rotate them at a greater speed than the average drill and thus produce a greater number of holes in a given time. They have the **quality** that endures and guarantees the best of drill service.

Wilt High Speed and Carbon Twist Drills are known as the standard drill in many of Canada's largest shops —a trial will prove their merits.

Wilt Twist Drill Company of Canada, Limited
WALKERVILLE ONTARIO
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England.

Drills for Heavier Feeds and Greater Speeds

Rich Drills stand heavier feeds and greater speeds than ordinary drills. They are FORGED, not milled, and the solid bar of the best grade of steel is used—therein lies the secret of their superiority. The same quality are seen in RICH Reamers, Track Bits, Flat Drills, Drill and Reamer Chucks and Rivet Sets.

Use RICH products for better and more economical results.

MACHINERY AND SUPPLIES — We have the facilities for adequately equipping all kinds of factories and mills. Modern ideas — quick service.

Machinery
Machine Tools
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Made by The Canadian Furnace Co.
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The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

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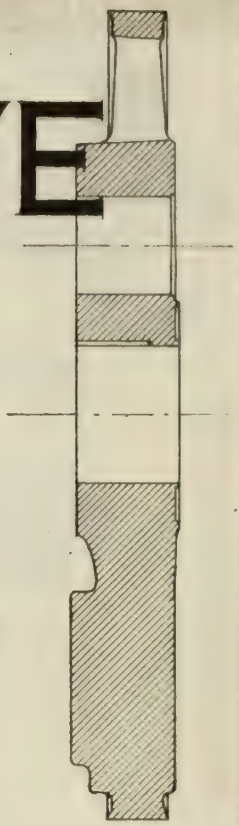
J. A. SHERWOOD
Canadian Manager

LOCOMOTIVE CASTINGS

CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL



Electrite Uranium

Electric furnaces, automatically regulated, the most modern methods, and **the introduction of Uranium** — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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ELECTRIC STEEL CO.
LATROBE, PA.

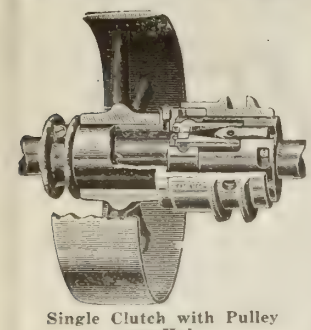
High Speed Steel

Forging Billets and Bars
Electric Furnace
Alloy Steels
Die Blocks
Annealed
Piston Rods Rough Turned
Annealed
Blue Ribbon
High Speed Steel

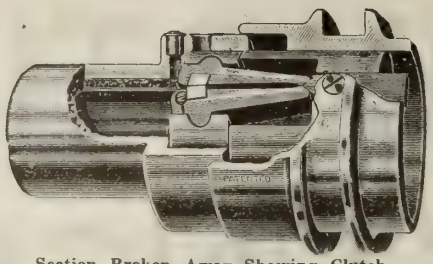
General Steel Company

Milwaukee, Wisconsin
DETROIT - 823 Dime Bank Building

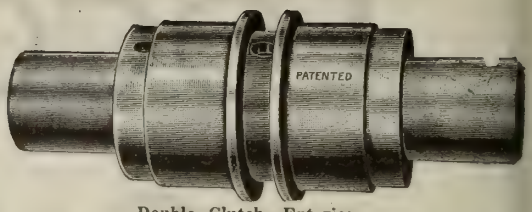
THE JOHNSON FRICTION CLUTCH



Single Clutch with Pulley on Hub (Clutch Engaged)



Section Broken Away Showing Clutch Disengaged



Double Clutch—Exterior

"A Machine is As Good As Its Clutches"

We are always ready to talk over any mechanical problem to which clutches may be applied and help the designer or machine tool builder. If our various types of clutches do not meet your needs we are prepared to make any modifications which may be necessary.

Send for our Yellow Data Sheets giving complete description of small compact clutches for use on feed and speed changes on Machine Tools. Also our Booklet, "Clutches as Applied in Machine Building."

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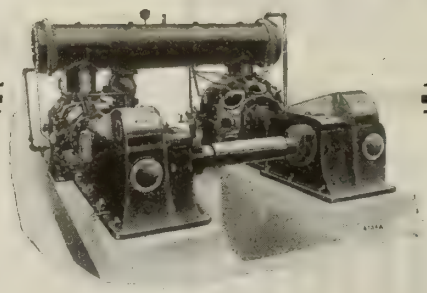
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



Air Compressors

For reconstruction work Canada needs compressed air. For pumping by the air-lift system, for hoists in all classes of work, for pneumatic riveters, chippers, drills, and grinders in structural work and in the shops. For spraying paint, cleaning out electric motors, operating air chucks, etc.

Use compressed air.

For all these uses of compressed air you must have a reliable source of supply. C-I-R-Co air compressors are reliable at all times; for steady, continuous operation they have no superior. They come from a plant that has been manufacturing compressed air machinery for twenty-five years.

Our experience counts.

CANADIAN INGERSOLL-RAND COMPANY

LIMITED

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

BETTS

Slotting Machines

Centralized Control

The complete line of Betts Heavy Duty Slotting Machines are so arranged that all drive and feed controls are operated from one position.

Thus the operator can command full use of them and at the same time watch the cutting tool.

The importance of this feature cannot be overestimated.

It means that every movement is under absolute control of the operator without his moving from one operating position .

It means time saved, with consequent less expense; and it means more work turned out in the same length of time.

This is only one feature of the Betts Slotting Machines; there are many other features worth investigating.

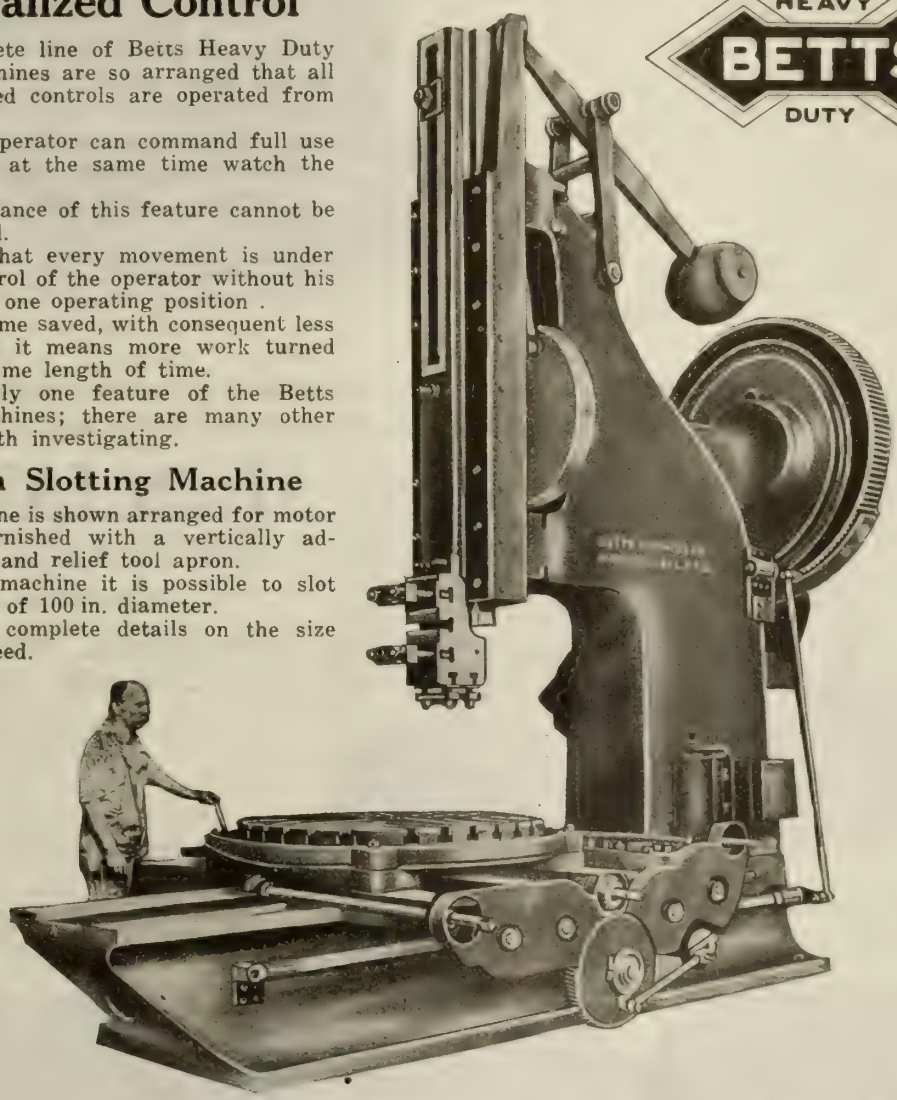
30 Inch Slotting Machine

This machine is shown arranged for motor drive; is furnished with a vertically adjusted guide and relief tool apron.

With this machine it is possible to slot in the centre of 100 in. diameter.

Write for complete details on the size slotter you need.

HEAVY BETTS DUTY



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Car Wheel Borers

Boring and Turning Mills
Horizontal Boring, Drilling and Milling Machines

Tire Turning Mills

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408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.

FORD-SMITH
MILLING MACHINES

Our Millers are built in four sizes
2 Sizes Plain
2 Sizes Universal

Our latest Catalogue describes these machines in detail

FORD-SMITH MACHINE CO.
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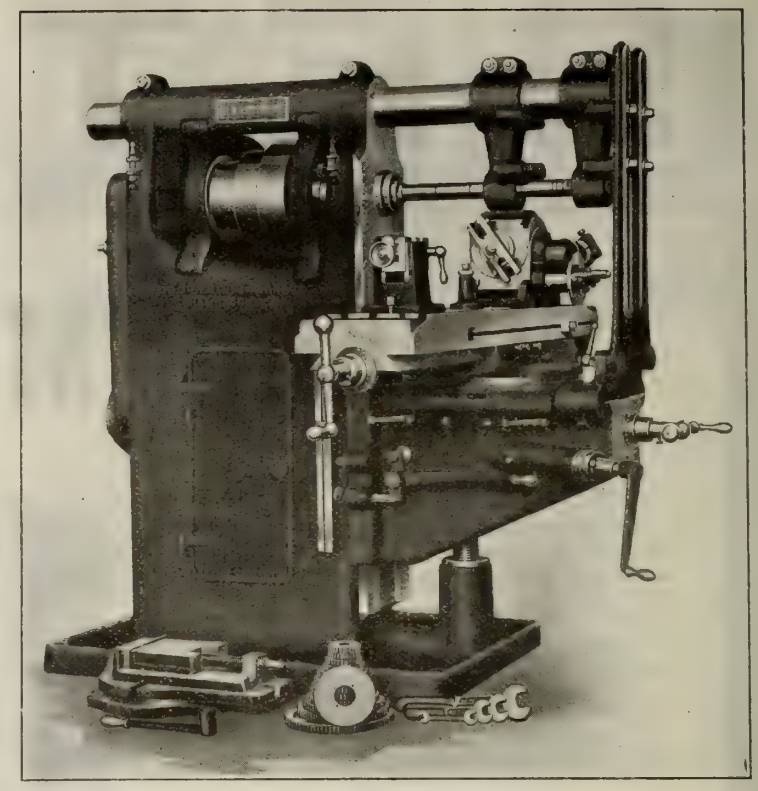
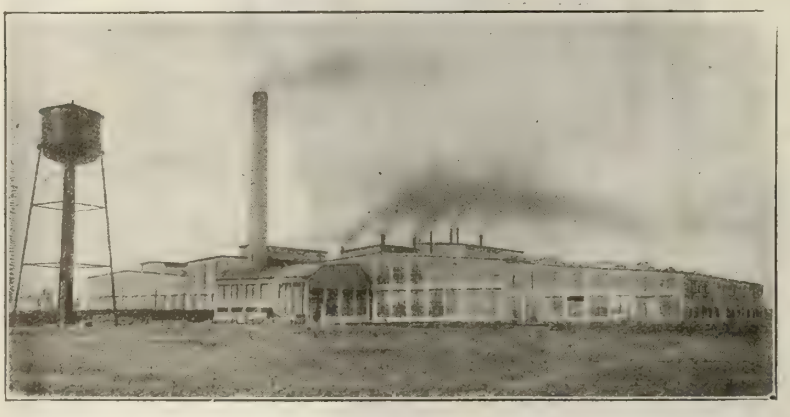
Manufacturers of Milling Machines and Grinders
HAMILTON, ONT. :: :: CANADA





STAINLESS STEEL
FOR CUTLERY PURPOSES

Prices On Application

Armstrong, Whitworth of Canada, Limited

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WORKS
LONGUEUIL, QUE.
BRANCHES
DOMINION BANK BLDG., TORONTO
27 KING WILLIAM ST., HAMILTON
McARTHUR BUILDING, WINNIPEG

IMPERIAL GENUINE BABBITT METAL
The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

STELLITE

"Not Steel but its Master"

STELLITE is now recognized as the master Cutting Metal, and has won for itself, during the War, a reputation in the Machine Shop not enjoyed by any steel.

STELLITE is hard, tough, acid-resisting, and is immune to heat up to 2000° F. — it might help you out of some mechanical difficulty. Why not talk it over with our Service Department?

The foremost Engineering Shops in Canada and the United States are now using it in a variety of ways and constantly increasing its use and their own production.

Deloro Smelting & Refining Company, Limited

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200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

Are your Tools made of Red Cut?

VANADIUM-ALLOYS STEEL CO.

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Works, LATROBE, PA.

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BUFFALO
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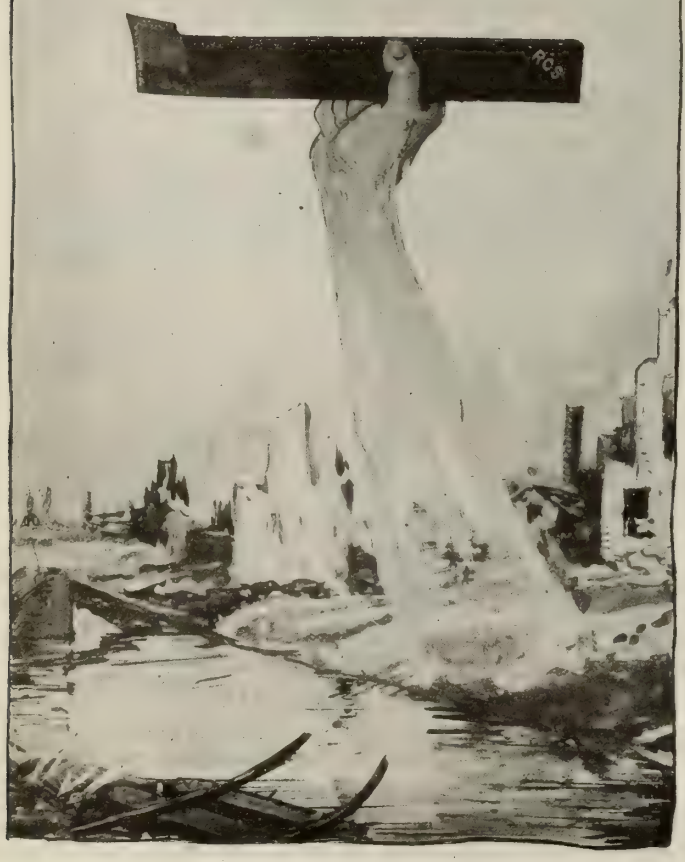
NEW YORK
TORONTO



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Montreal
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Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

A Keen Cutter

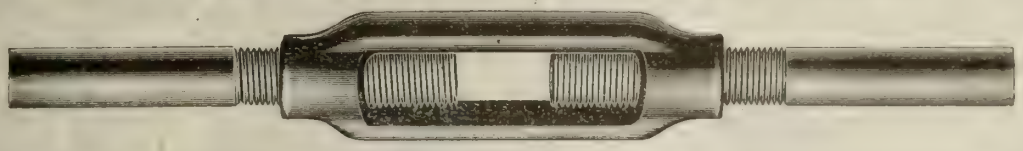
WOLFRAM Is Both

VULCAN CRUCIBLE STEEL CO.
ESTABLISHED 1900
Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company
MONTREAL QUE.

Strong in the Neck

CANADA
FOUNDRIES & FORGINGS
LIMITED

DROP FORGED STEEL



TURNBUCKLES
16 Sizes, with or without Stubs
Large Stock---Quick Action
Produced at
Canadian Billing & Spencer Plant
Welland

Rivet Speed

One every second is a speed which this Grant Rivet machine will keep up indefinitely, in any degree of tightness or looseness desired. Each rivet is finished with perfectly shaped head, polished and with no hammer marks showing.

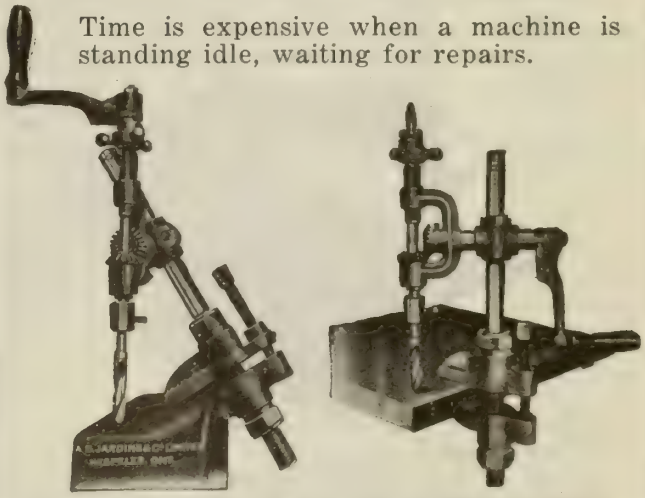
We claim this is the only machine manufactured that will accomplish this feat. Our claims are unchallenged. By writing for our catalogues you may obtain full information regarding the ability of this machine.

We are rivet machine specialists. Get in touch with us.

Grant Man'fg. & Machine Company
Holland Avenue - - Bridgeport, Conn., U.S.A.

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.
Weight, 40 lbs. Price, $26.50 net.
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

GEO. A. MARSHALL & CO.

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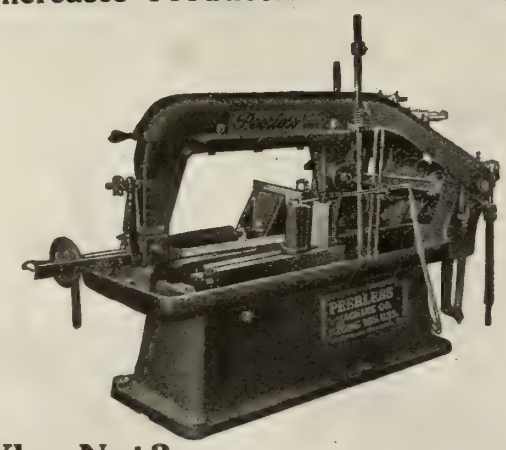
Phone Park. 250

Peerless HIGH SPEED

THE NEW STANDARD

Increases Production 50 to 100%



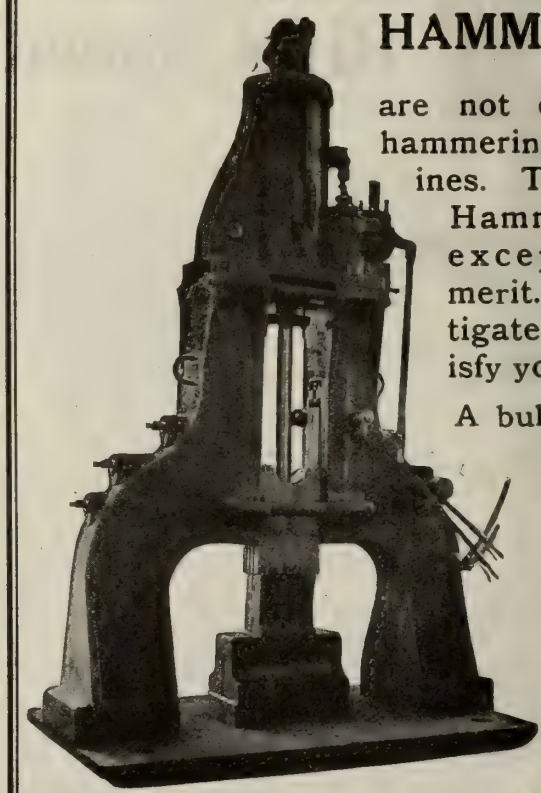
Why Not?

WHEN big plants of national reputation, who are using three, six, eight, twelve and up to thirty or more Peerless Machines say that they increase production from 50 to 100 per cent., saving in time, labor, blades and expensive material; AND WHEN we are willing to have you try out the Peerless for 30 days' at our own risk and expense, we paying freight both ways if it fails to make good; THEN WHY NOT try it out for yourselves, when the gain is more yours than ours if it makes good, and if it fails the loss is ours alone?

PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN

"ERIE" STEAM FORGING HAMMERS



are not ordinary hammering machines. They are Hammers of exceptional merit. Investigate and satisfy yourself.

A bulletin for the asking.

ERIE FOUNDRY COMPANY

ERIE, PENNSYLVANIA, U. S. A.

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
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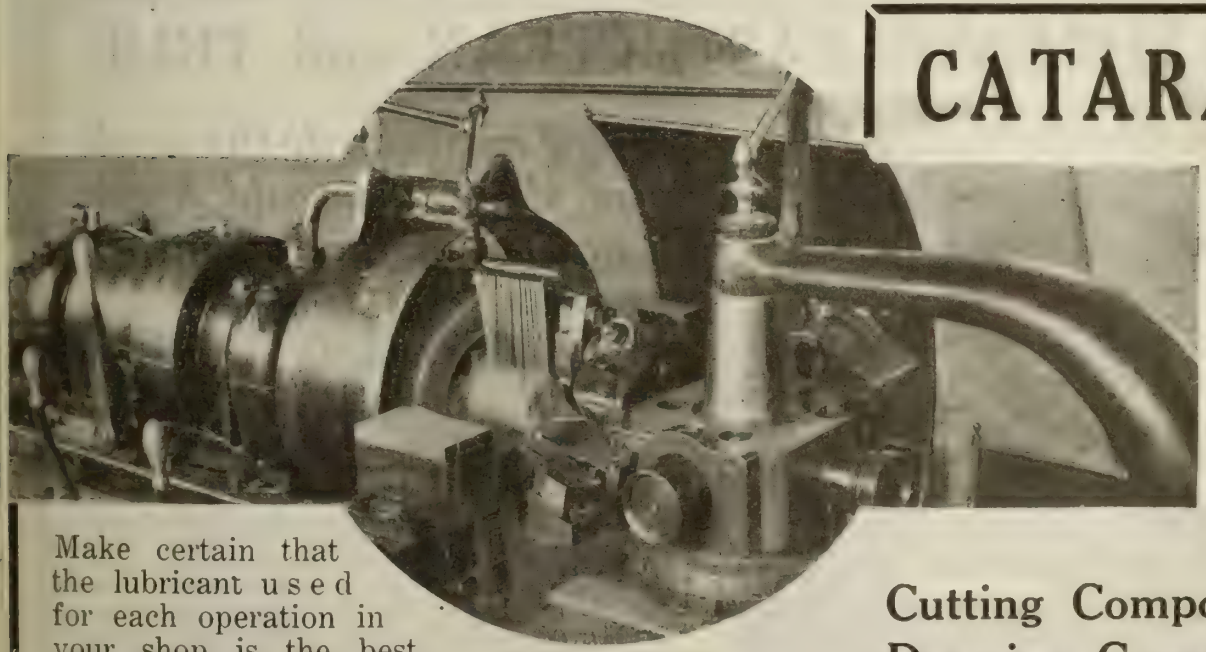
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process

CATARACT



ACME
MYSTIC
SPECIAL

Make certain that the lubricant used for each operation in your shop is the best obtainable for the purpose. Otherwise your men and your tools and your machines work at a disadvantage.

Write us to-day that we may demonstrate how Cataract Lubricants can increase production and reduce cost in your plant.

Cutting Compounds
Drawing Compounds
Cutting Oils
Quenching Oils

Cataract Refining Company, Limited - Toronto, Ont.

Chapman

Double Ball Bearings

CONSERVE POWER! There is too much power going to waste the world over. This fact has been noted by the British Government and sweeping reforms are contemplated in Great Britain.

Canada also wastes much power. A reform is necessary here, too. Babbitt bearings are being used too often where **Chapman Double Ball Bearings** should prevail. The adoption of Chapman Double Ball Bearings, wherever an axle or shafting needs support in the transmission of power, results in a saving of 75% of friction loss.

Now in use in over 2,000 Canadian factories. Fit any adjustable hanger. Adopted by Canadian and United States Governments.

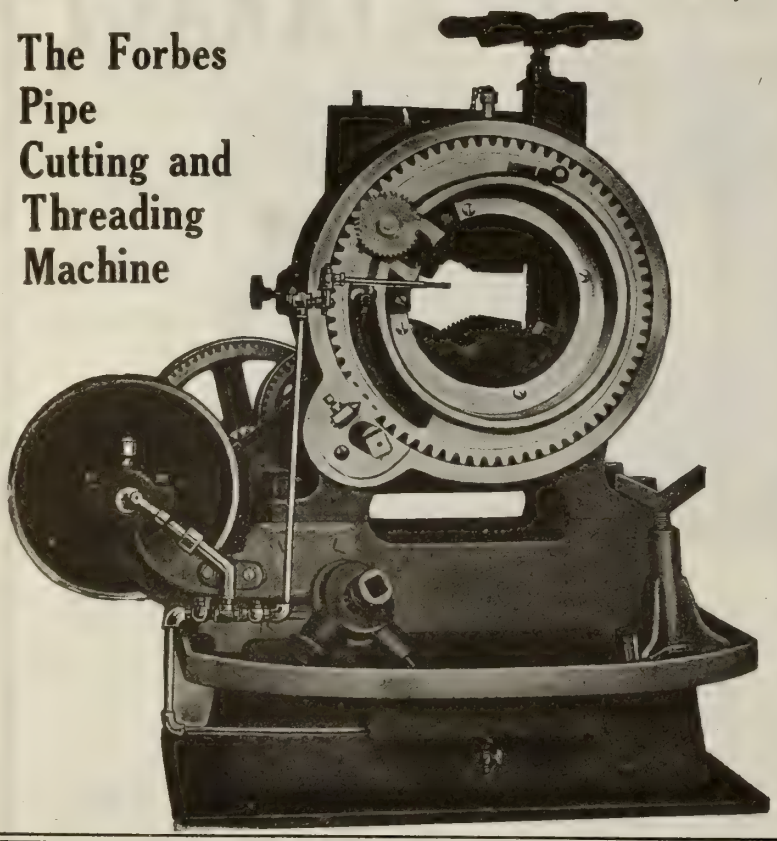
Write for full story of their efficiency.

Chapman Double Ball Bearing Company of Canada, Ltd.

Room 408 Shaughnessy Bldg., Montreal. 339-351 Sorauren Ave., TORONTO, Canada.
Transmission Ball Bearing Co., Inc., 1050 Military Road, Buffalo, N.Y.

CUTS THREADS FAST, CLEAN and TRUE

The Forbes Pipe Cutting and Threading Machine



One man can do the work of six against old Stock and Die method of cutting

These are not exaggerated statements—they are facts that are being proven every day by Forbes' Users. Inquire for yourself. Investigate its performance closely and you can't help but admit its labor-saving, perfect-working value.

Inexpensive to Operate

It is simple, compact, self-contained, and all wearing parts are adjustable. One man can operate it and for heavy pipe work it can be taken right to the job. Fitted with self-centering vise that holds the heavy pipe stationary, while the dies turn around it. The latter are clamped and released by a throw of the lever.

Write for our latest bulletin giving full details

THE CURTIS & CURTIS CO.

Garden Street, Bridgeport, Connecticut, U.S.A.

Do These Advantages Appeal

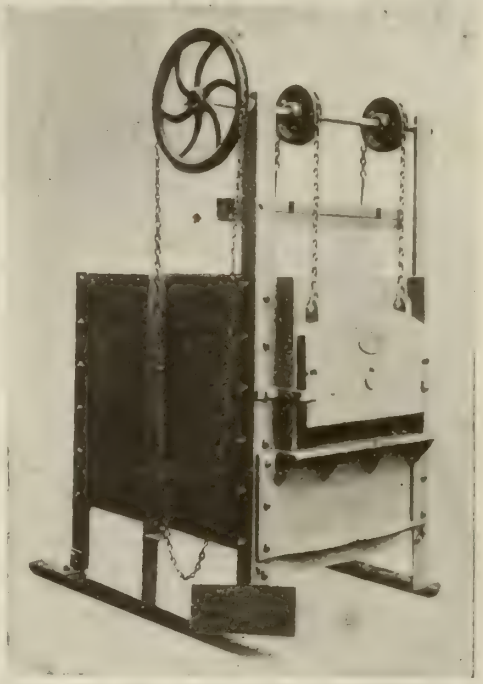
To Your Sense of Economy and Efficiency?

OIL FURNACE
VERSUS
COAL FURNACE

It's economy — requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. *Can you afford to lose the Advantages of this oil Furnace?*

Write To-day for Full Particulars.

Mechanical Engineering Company, Limited
55 Cote Street **Montreal Que., Canada**
PHONE MAIN 3585 Cable Address: *"Mecol"*



CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.
That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

Canadian Blower & Forge Co., Ltd.
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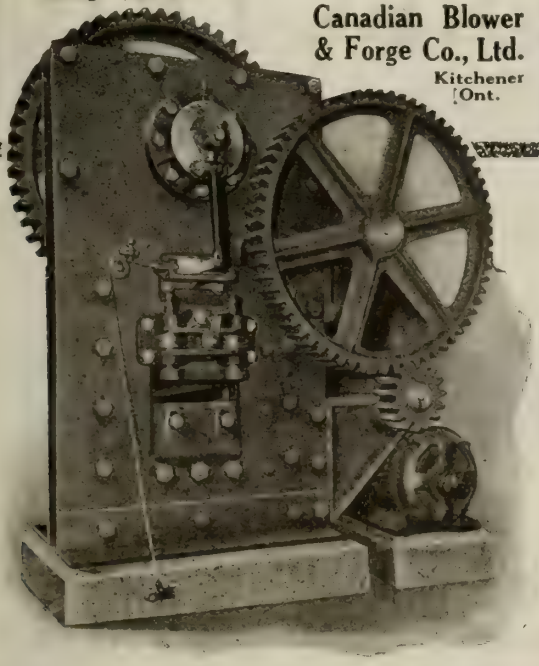

IMPERIAL CARBIDE

For Welding Cutting and Lighting

HIGHEST GAS YIELD
IMPERIAL CARBIDE
MADE IN CANADA

Manufactured by
Union Carbide Co. of Canada, Ltd.

Head Office: Dominion Bank Bldg. TORONTO, ONT.
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Large Stocks maintained at convenient distributing centres throughout Canada

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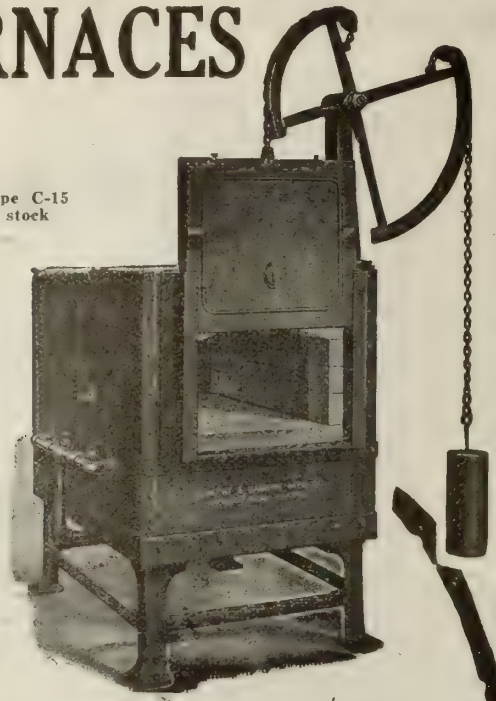
GILBERT & BARKER FURNACES



Type C-15
in stock

Shipped on Receipt of Order

If additional proof was required of the efficiency of Gilbert & Barker's heat treating furnaces, this proof was generously supplied during the World War. Industrial plants throughout the United States and Canada engaged on war contracts covering the manufacture of munitions, ordnance, airplanes, motor trucks, tanks, etc., found it necessary to secure on short notice a thoroughly efficient furnace. As designers and builders of heat treating furnaces for a period of more than 50 years it was quite natural that the demand for G. & B equipment should be heavy.

You don't have to pay for experience nor do you have to take chances on inefficient heat treating furnaces. G & B furnaces can be depended upon for accuracy and efficiency, plus low operating cost.

There is a G. & B. furnace for every heat treating requirement. Tell us your problem and we will promptly tell you the type of furnace best suited to your needs, but first send for Bulletin 24. Today is a better day than tomorrow—write.

GILBERT & BARKER
Manufacturing Company
West Springfield, Mass., U.S.A.

New York Office: 26 Broadway

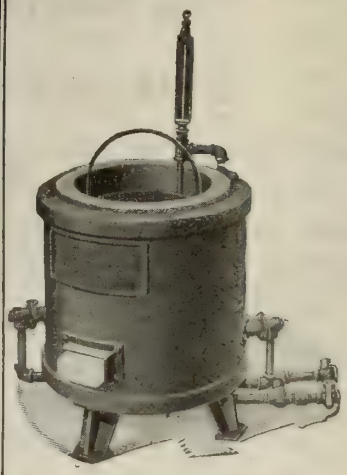
Canadian Agents:
WILLIAMS & WILSON, LIMITED
Montreal, Que.

GILBERT & BARKER MFG. CO. G&B SPRINGFIELD MASS U.S.A. EST 1865

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.



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For

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Furnaces built for special requirement

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High Grade STEEL Castings
Of Every Description

Prompt Deliveries

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PERFORMANCE
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In them you will find just the character of service you demand. Your requirements can hardly present unfamiliar angles to us; avail yourself of our suggestions catalogs, information

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Tycos Temperature Instruments, *Indicating, Recording, Controlling*

Electric Welding by Alternating Current

WELDING STEEL PLATE
HAMILTON BRIDGE WORKS, HAMILTON, ONT.

The

"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

Reduces welding costs to minimum
Does not require expert to operate

The Arcwell Corporation of Canada, Ltd.

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The "RACINE"

For Speed

For Accuracy

For Quantity Production

For Saving in Blade Costs

For Saving in Material

Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

RACINE TOOL & MACHINE CO.

Melbourne Avenue

RACINE, WIS., U.S.A.

SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

ST. JOHN MONTREAL VANCOUVER

HEAVY MACHINE SAW BLADE

ENOX 18 G 17 G & 10 TEETH ⅛ TO 2" WIDE ACCORDING TO

16 G THICK TO INCH TYPE & SPEED OF MACHINE

ENOX

Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

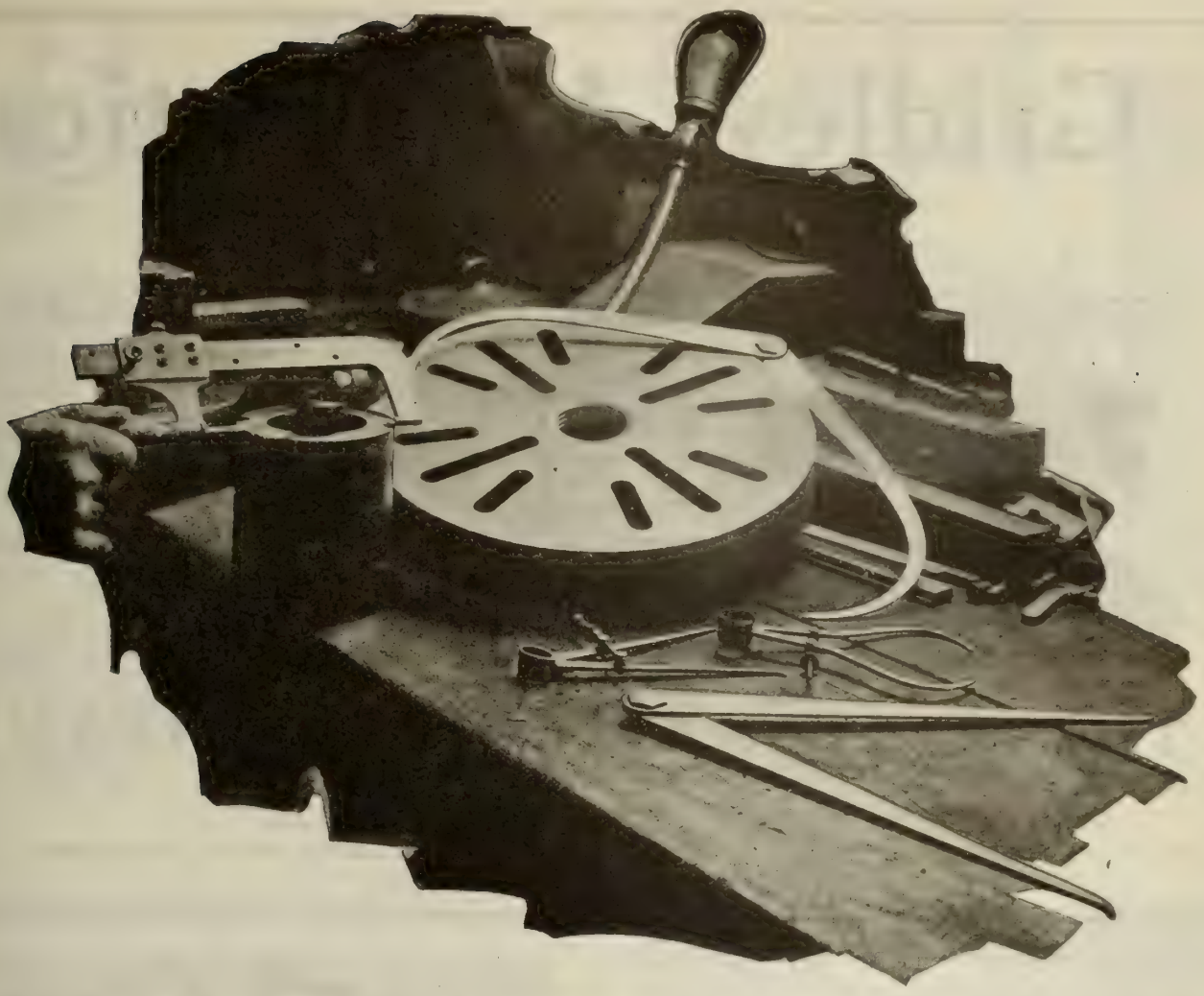
46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10

ENOX LIGHT 21 G THICK 14 TEETH

MACHINE BLADE ⅝ & ¾ WIDE TO INCH

ENOX HAND FINE TEETH

SAW BLADES 32 TEETH TO INCH



Not Merely Accurate Tools, but—

tools by which accuracy is determined or, in other words, tools that "check up" the accurate development of other work.

The L. S. Starrett Co. has built its reputation on this issue. That is why Starrett Tools to-day are recognized the world over as standard for accuracy. You can always depend upon Starrett micrometers, calipers, dividers, gages, squares, etc.

Write for our Catalog No. 213

It shows the complete Starrett line of fine precision tools and hack saws.

The L. S. Starrett Company, Athol, Mass.

The World's Greatest Toolmakers
Mfrs. of Hack Saws Unexcelled.

New York London Chicago

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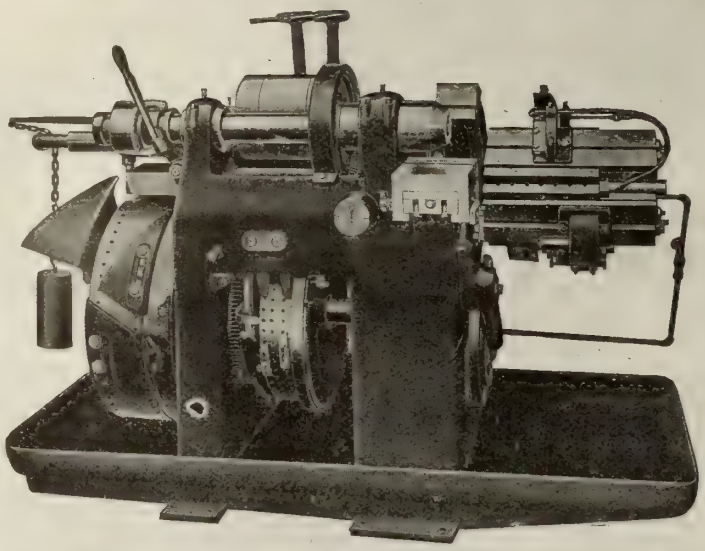
STARRETT TOOLS

Gridley Automatics



For the rapid production of duplicate parts

AUTOMATICALLY

Sizes up to 2⅝" diameter made on Gridley Multiple Spindle Machine.

For the larger sizes up to 5" diameter the Gridley Single Spindle Automatic Turret Lathe.

On both, duplicate parts are formed, turned, threaded — rapidly, economically and accurately.

Quotations on your blue prints or samples?

THE NATIONAL ACME COMPANY

General Offices: CLEVELAND, OHIO.

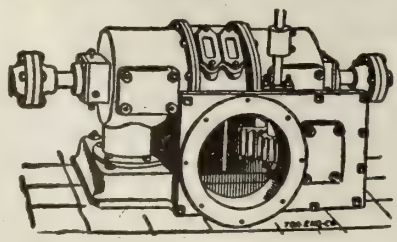
WINDSOR, VERMONT

Canadian Screw Plant MONTREAL, P.Q.

Branch Offices: New York, Boston, Chicago, Detroit, Atlanta, San Francisco
Warehouses: New York, Chicago. With Foreign Representatives

Makers of Gridley Single and Muliple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, Ohio

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

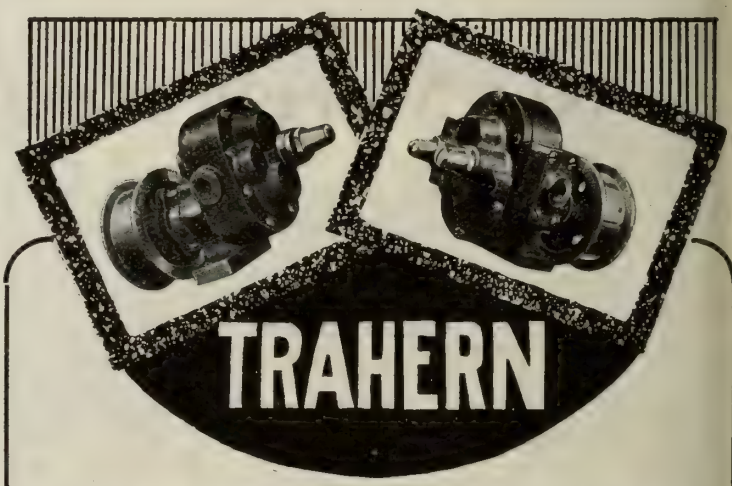
Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO



ROTARY GEARED PUMPS

The Utmost in Efficiency and Durability

Trahern Positive-drive Rotary-geared Pumps shoot the lubricant into deep bores or other work difficult to cool. Never need to lessen the speed of the cutting tools for the reason that Trahern Pumps, even at slow speed, flood the cutting tool with abundant coolant.

Let us send a sample pump free of charge—to prove that Trahern Geared Pumps are preferable.

Trahern Pump Company

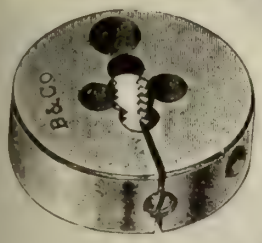
ROCKFORD, ILLINOIS

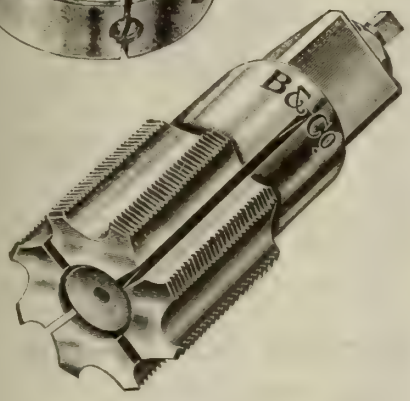
Canadian Agents:

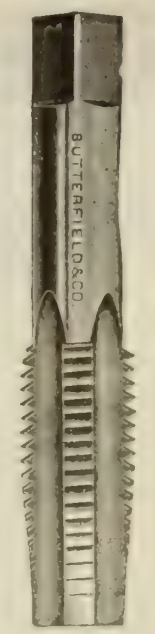
A. R Williams Machinery Co., Toronto

Butterfield

Taps, Dies and Reamers







The Deciding Factor in Tool Economy is Quality

Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.

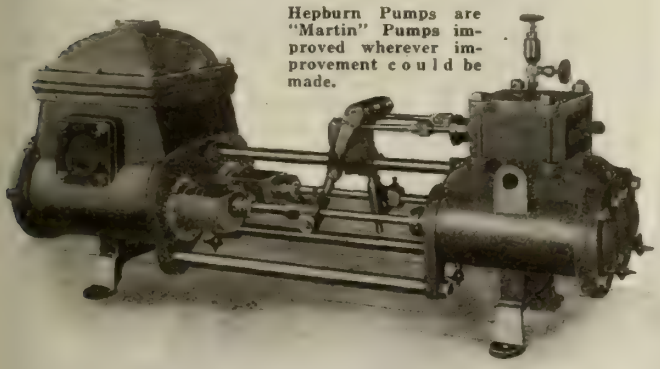
Send for Catalog No. 17. It's just out.

Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office: 220 King St. W.

Hepburn Pumping Machinery

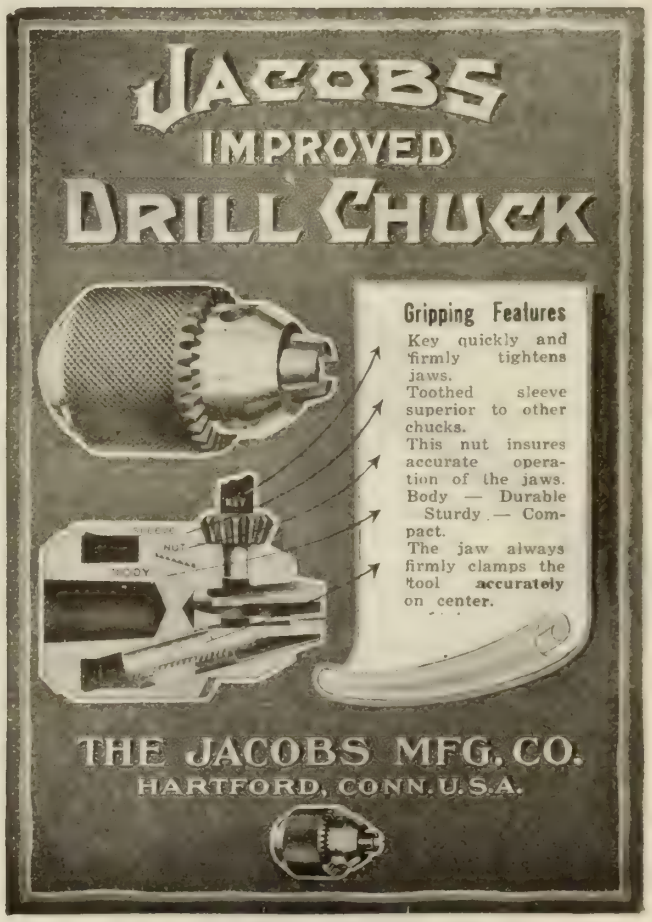
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED

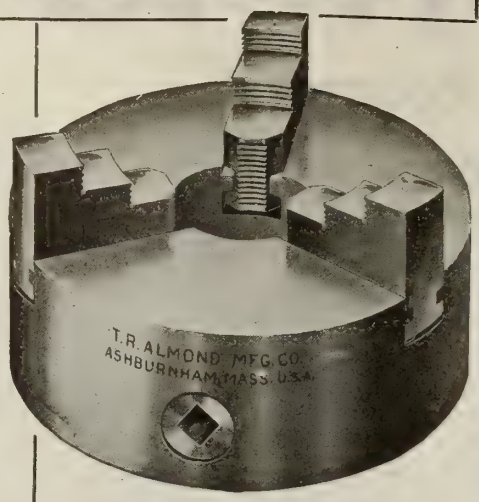
18-60 Van Horne Street Toronto, Ontario



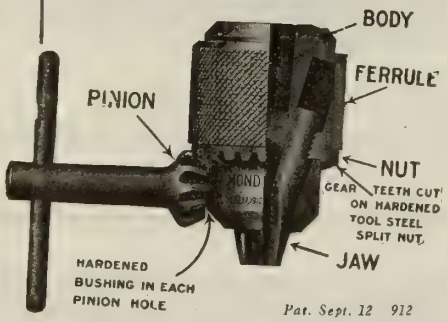
If any advertisement interests you, tear it out now and place with letters to be answered.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



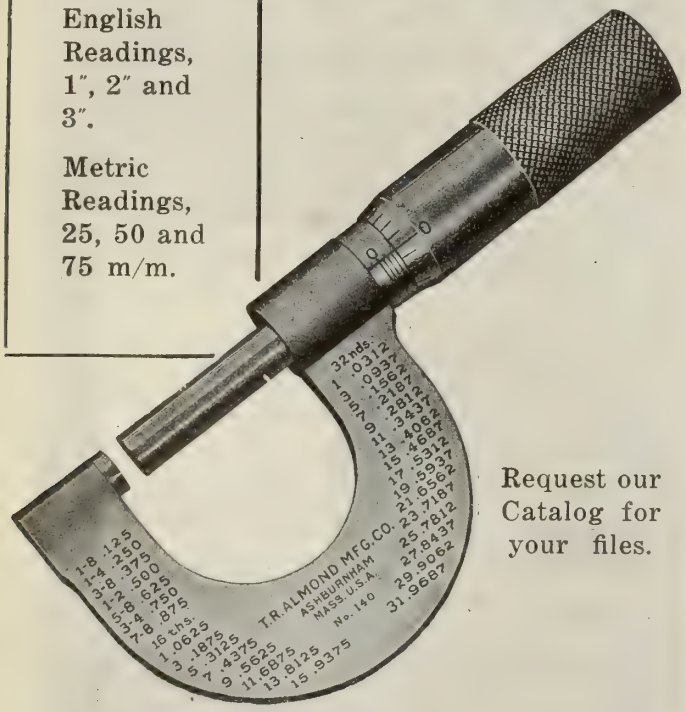
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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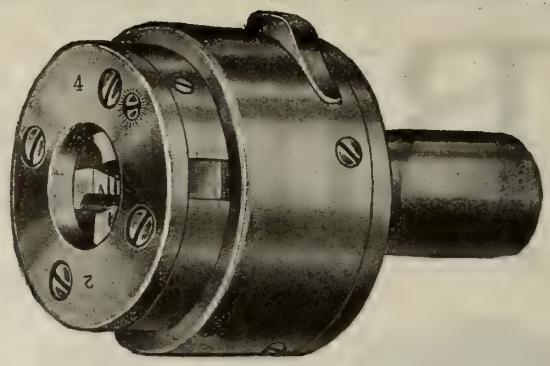
T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

CUSHMAN

We've been Manufacturing

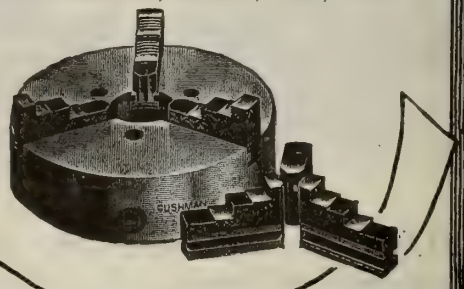
Nothing but Chucks and Their Accessories

FOR NEARLY 60 YEARS
AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.

Cushman Chuck Co., Hartford, Conn., U.S.A.



Our Six Chaser Model

Our Four-Chaser hand sizing tap made a big "hit" —then there came a demand for a six-chaser model. Here it is.

How They Keep Expenses Down

Those six chasers may be ground over and over again, making them as good as new with each grinding.
This gives a distinct advantage to the Murchey Hand Sizing Tap over any solid tap.
Murchey Tools handle threading and tapping operations in one-half the time of ordinary tools. If you want to keep your expenses down and get work out fast, use Murchey Tools.

We make a specialty of quick service—no waiting on chasers

Murchey Machine & Tool Company
75 Porter St., Detroit, Mich.

THE COATS MACHINE TOOL CO.,
Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne

FENWICK FRERES & CO.,
15 Rue Fenelon, Paris, France.

MURCHEY

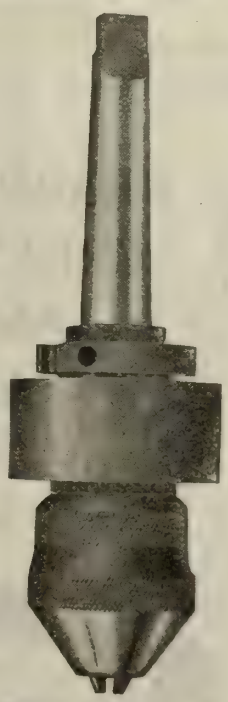
Saves Time and Taps

The Bicknell-Thomas Friction Chuck

Has a grip like a vise, but will release on the instant of o v e r strain. Reduces tap breakage to a minimum.

Small in size. Especially adapted to multiple spindle machines and for use in blind tapping.

The chuck is simple, strong a n d compact; the adjustable friction drive insures tap safety.



Made in 4 sizes, 1/8" to 1"

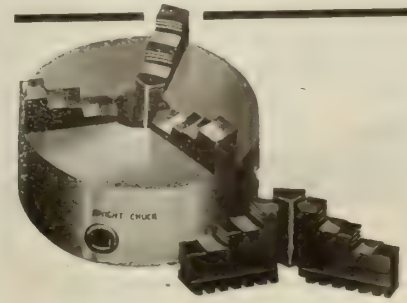
BICKNELL-THOMAS COMPANY
GREENFIELD MASS, U.S.A.

Any Cut a Machine Can Pull or a Tool Stand, the "Knight" Chuck Can Hold

The "Knight" Three-Jaw, Universal Geared Chuck is solidly constructed, its properly proportioned jaws are exceedingly powerful, and the scrolls are very strong.

Characteristics, ease of control, prompt adjustment, adaptability and great gripping power.

Knight Metal Products, Limited
119 Adelaide Street West - TORONTO, ONT.



Domestic and Export Trade Supplied

"Agrippa" Boring Tool takes any size or shape of bar and requires no bushings. Its sleeve bar cap admits a straight or angular cutter; either can be quickly inserted at the business end of the bar without removing the cap or disturbing the setting of either the bar or the holder.

Williams' "Agrippa" Tool Holders

"THE HOLDERS THAT HOLD"

YOU wouldn't use the best automobile produced in the *Nineteenth* Century if you could get it for nothing. You wisely prefer to buy a modern car because of its cheaper maintenance, improved performance and increased convenience.

In the shop you can obtain these same advantages through the *Twentieth* Century improvements of WILLIAMS' "AGRIPPA" TOOL HOLDERS.

Remember, too, that while improved roads have made automobile performance easier, tougher steel, heavier machines and higher speeds have rendered tool holder accomplishment more difficult.

Machinists' Tools Booklet on request

J. H. Williams & Co.

"The Drop-Forging People"

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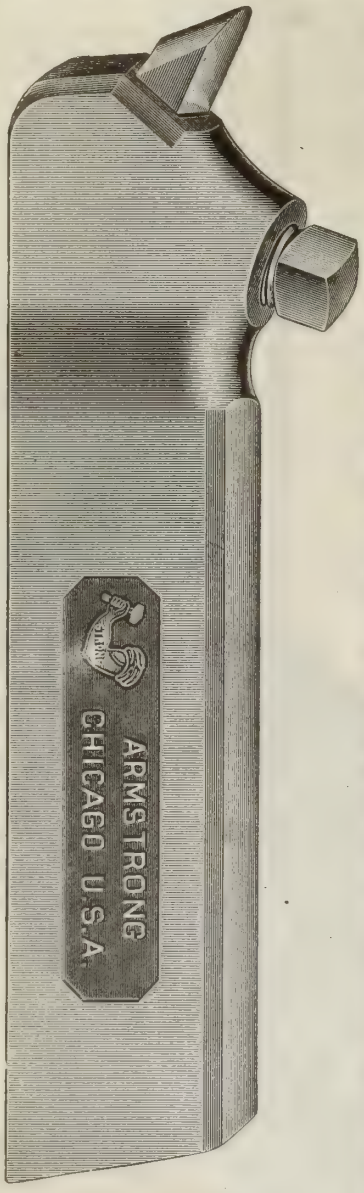

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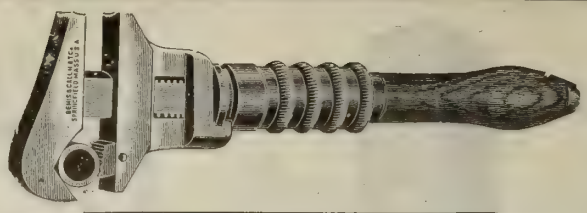

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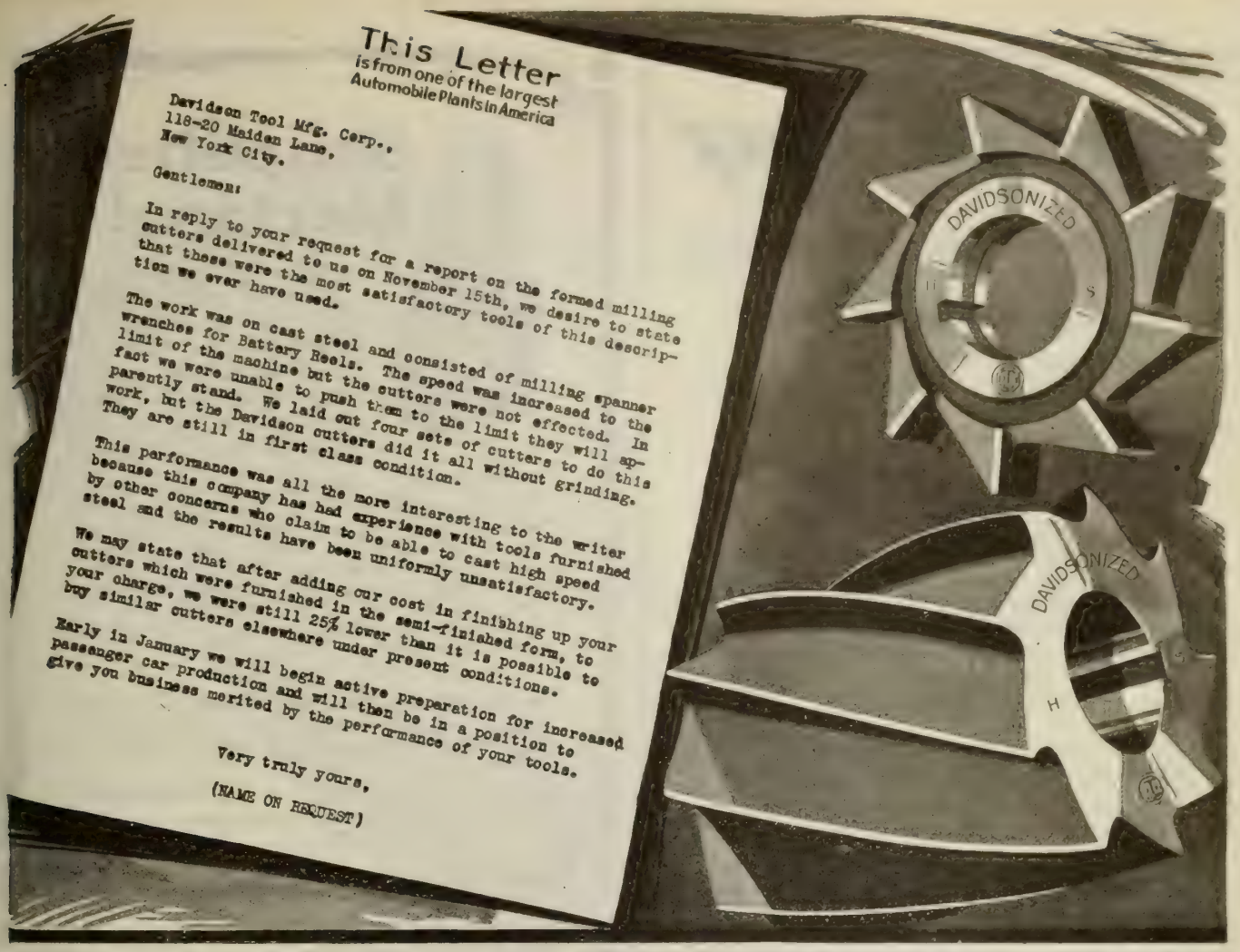

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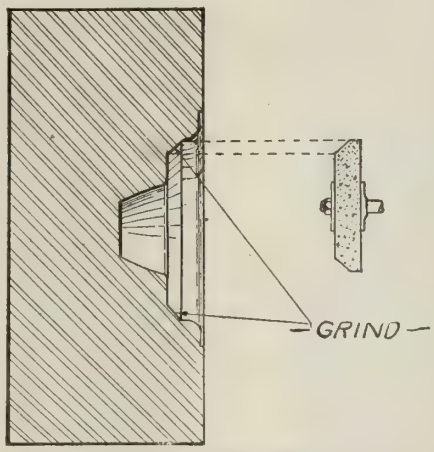

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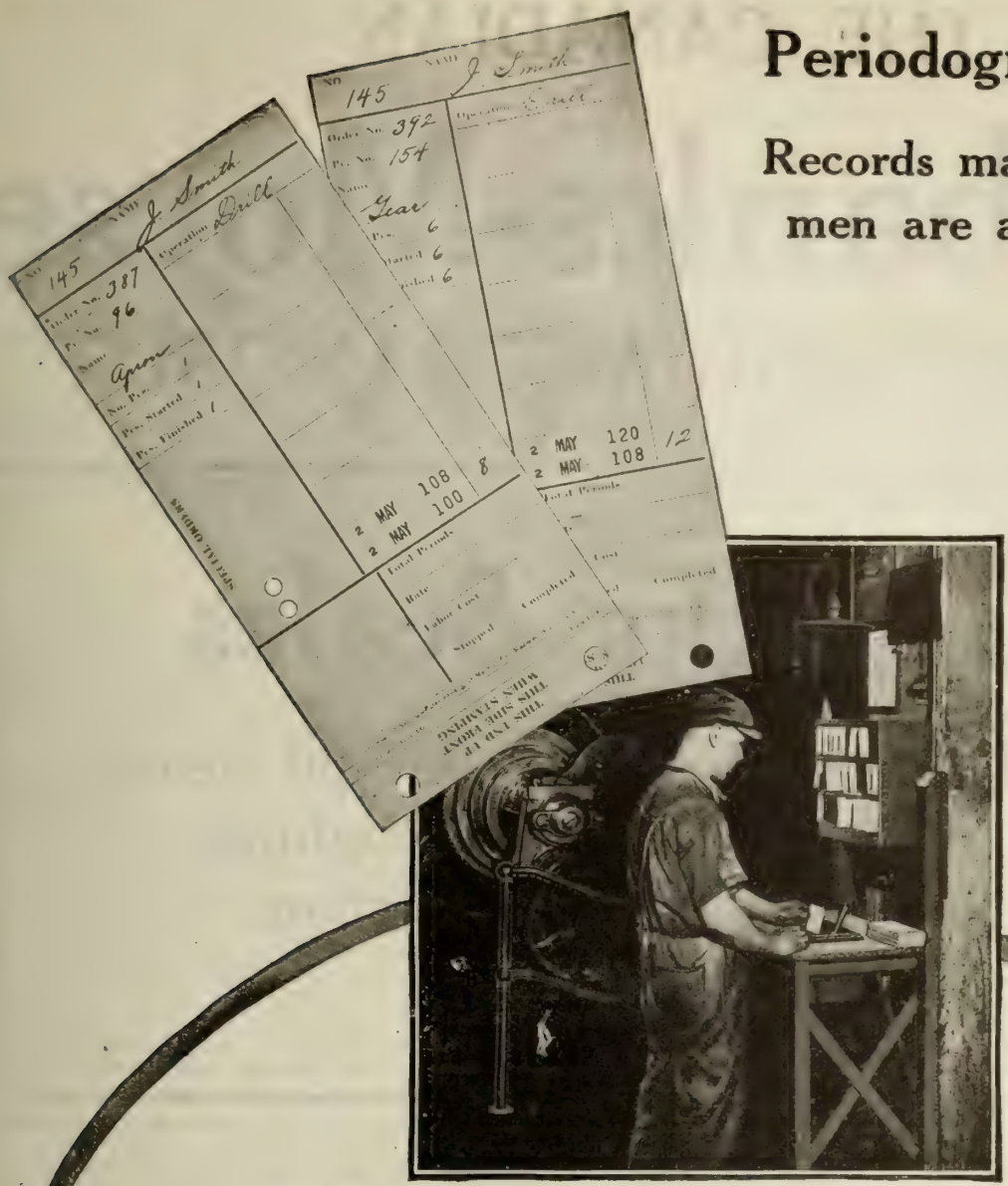

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Volume XXI. No. 5. January 30, 1919

Making Milling and Gear Cutting Attachment—III

In This Article is Described the Making of an Attachment For Lathes Which Performs Milling and Gear Cutting Operations—Various Tools and Operations Used in Machining Are Shown

By ROBERT MAWSON

IN this part of the article are shown the tools and methods followed when machining the vertical slide column base, dividing head, index bearing, and plates.

These, as well as the other tools shown in the series, are designed so that the first surfaces machined are used as the locating medium, thus ensuring interchangeability and reducing to a minimum any chance of error.

Two of the tools are worth particular attention, the first being a counterboring fixture, which employs an index line on the boring bar and pointer carried in the tool post to obtain duplication.

The second is a multiple jig, which is used for the various index plates, a pawl with separate spacing wheels being utilized for each different plate.

On the "Star" milling and gear-cutting attachment, which is manufactured by the Presto Machine Co., Inc., Brooklyn, N.Y., it will be seen (by referring to the first section of these articles) that the vertical slide column has a graduated base, which can be set to any angle within its range when milling such parts as bevel cutters, gears, taper reamers, etc.

The first operation when machining the base is milling, and is shown in Fig. 1.

The fixture is designed to hold two castings, which rest on pins and are located against stops A, being forced against them with the screws B. Four clamps, as shown, hold the castings securely in the fixture, which is located by tongues on the milling machine table.

The vee-shaped dovetails are then mascaped to a gauge to ensure the correct width and angles of 30 degrees.

After these surfaces have been milled the machine table is lowered, the correct amount determined by the graduations on its spindle, and the end of the same cutter used to machine the base of the castings. The dovetail surfaces are next scaped to a gage to ensure the correct shape and width.

The milled base is then placed in the fixture shown in Fig. 2 for the next operation. The casting is located by its dovetail surfaces, which fit accurately on machined registers and is pushed against a stop at the rear with the screw A.

The three screws shown, two on one side and the other on the opposite side, are then tightened against the piece to hold it securely against the machining stresses.

The end of the projecting surface is then faced, the boss turned to 1.374 in., a hole bored to 0.4375 in. and contersunk, also the lower surface faced and bevelled with an angle of 60 deg. in a manner similar to that described when machining the dividing head base.

The bevelled surface is then graduated, using the same machine as previously described and a set of graduations obtained.

These graduations are then stamped, the only difference between this and the dividing head base being that on this part the marking starts on a centre line between the vees with zero and reaches 90 degrees on each side, not being marked all the way around. The graduations are then polished to remove the burrs.

In Fig. 3, at the right, is shown one of the vertical slide column bases as re-

FIG. 1 MILLING BASE AND VEES.

FIG. 2—FACING, TURNING, BORING AND COUNTERBORING.

FIG. 13—A ROUGH AND FINISHED BASE.

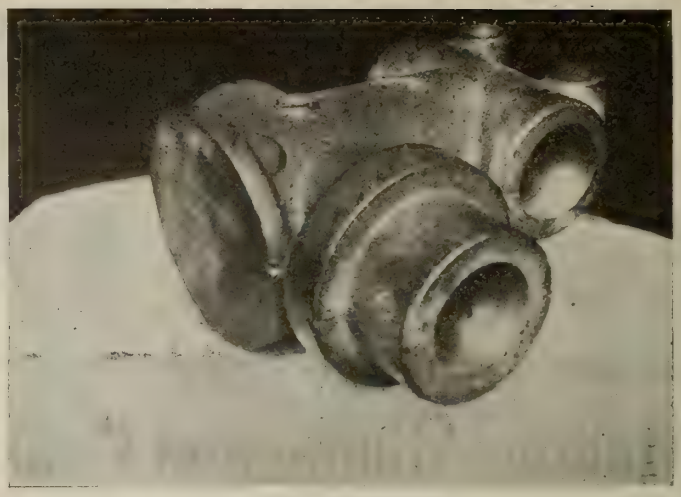


FIG. 4—DIVIDING HEAD IN THE ROUGH.

ceived from the foundry, and at the left may be seen one after being machined.

The method of graduations used so that the base may be swung 90 deg. each side of a centre line and its angle determined will be observed.

Machining the Dividing Head

The dividing head is the element which holds the part being machined and is attached to the vertical column by means of the base last described.

One of the castings before machining is shown in Fig. 4.

The fixture used for the first operation is shown in Fig. 5.

The casting is located with the bevelled stop A and bevel at B, the piece being forced against these two locations with the screws C in the swinging cover.

This cover is swung back out of the way when inserting the casting in the fixture.

The hole D is then bored out to 1.375 in., using a plug gauge for testing.

The fixture is made with a revolving sub base E and a pin at the rear (shown in Fig. 6) with two bushings for location.

After the first hole has been machined the clamps F are loosened and the index pin being removed the sub base is swung around on the fixture base to its next location, determined by the second index bushing.

The clamps are then again tightened to hold the sub base firmly on the base.

In this new position the boss G has been brought to the centre line of the fixture ready for machining.

The hole in this boss is then bored to 1.375 in., the edge faced and the boss turned to 2.001 inches.

It will be observed that the fixture is provided with a counterbalance to obtain smooth running when machining the piece.

A view of the other side of the fixture is shown in Fig. 6 and the vee surfaces used for locating the casting, also index pin, can be seen to better advantage.

The next operation is facing the base, which is performed in the fixture, Fig. 7.

For this purpose the casting is placed on two turned arbors, which fit into the 1.375 in. bored holes.

The cover A of the fixture is taken off and the casting placed in position, the two arbors fitting in vee blocks as shown.

The machined edge of the piece is located against the surfaces B of the fixture.

The nuts C hold the arbors securely and the set-screw D assists in holding the casting in the fixture.

The duty of the last feature, however, is very slight, as the holes are bored accurately and the arbors are made a good sliding fit, the only purpose of the screw, therefore, being to prevent the casting sliding away from the location B.

The base D is then faced and the outside of the boss turned.

The casting is then placed on two pins in the fixture, Fig. 8, for the next operation, which is milling a Woodruff keyway.

The open washer A and nut provides a quick setting of the piece and the fixture needs no further explanation.

The various holes are next drilled and tapped for 5-16 in. x 18 threads, no jig being used, the holes being spotted in the centre of the bosses.

Machining the slot for the binder bolts follows, the casting being located on two pins in a similar fixture to that last illustrated, the slitting saw used being 1-16 in. thick.

The edge of the turned surface, which was machined in the first operation, is then graduated and stamped, using the special machine previously described.

The purpose of these graduations is to facilitate quick and accurate adjustment to any desired hole when using the attachment.

An oil groove and straight keyway are next machined, but no special fixture is used for the work.

One of the dividing heads, after it has been completely machined, is shown in Fig. 9, and the result of the opera-

FIG. 5—BORING, FACING AND TURNING.

FIG. 6—ANOTHER VIEW OF FIRST TURNING OPERATION.

FIG. 7—FACING THE BASE.

FIG. 8—MILLING THE KEYWAY.

tions of varying character can be observed.

Machining the Index Bearing

The index bearing is the member which fits on the turned part of the dividing head. One of the rough castings is shown in Fig. 10. The first operation when machining this part is a centre in the tail stock of the lathe.

A hole is then drilled and reamed to 0.5625 in. through the entire length of the casting.

To perform this a special long drill is used, the drill being held and driven by the lathe chuck and the casting held on a centre in the lathe tail stock.

manner similar to that obtained when drilling.

The head end of the casting is then counterbored to 0.85 in. to a depth of 1½ inches.

The casting is next placed on an arbor and the opposite end turned to 1.374 in. and the boss faced.

FIG. 9—A FINISH MACHINED DIVIDING HEAD.

FIG. 10—ROUGH CASTING, INDEX BEARING.

rather interesting lathe job. The casting is just laid off and spotted at A.

The piece is then held in a steady rest, and the centre already made being carried on the live centre of the lathe. A centre is machined at B with a square

The hole is drilled half-way through the piece, which is then turned end for end and the rest of the hole machined in a similar manner.

By this means a straight hole is obtained. The hole is then reamed in a

The casting is then placed in the fixture, Fig. 11, for the next operation, which is boring and counterboring.

A rather interesting method is used for locating the piece for this work.

The casting is placed in a vee block,

FIG. 11—BORING AND COUNTERBORING.

FIG. 12—ANOTHER VIEW OF FIXTURE.

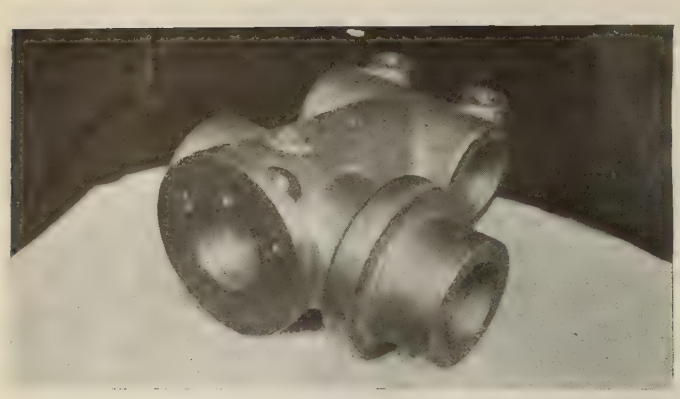


FIG. 13—DRILLING FOR CLAMP BOLTS.

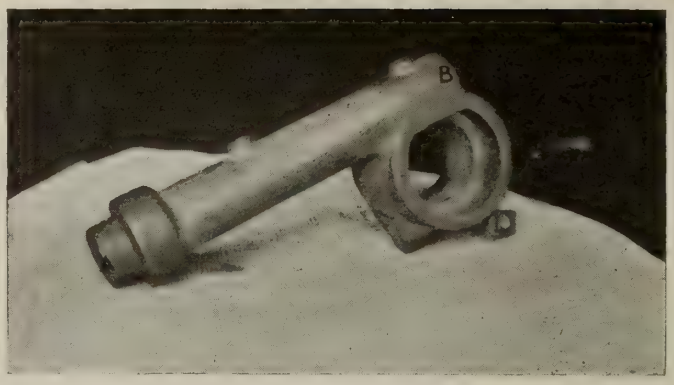


FIG. 10—ROUGH CASTING INDEX BEARING.

which is made to suit the turned shoulder.

The large boss is located by a swinging block, which is also made in the form of a vee.

The illustration, Fig. 12, shows these details to better advantage. A is the vee locating the turned surface, and B the swing plate used to locate the large boss.

The two screws C are tightened against the ears at the large end to assist in holding the piece.

The clamp B is also made with a bevelled edge, so that it not only locates the casting, but when tightened down tends to hold the same.

A 2.000 in. hole is then bored in the large boss with a tool in the bar, Fig. 11-A.

This bar, however, performs a double duty, as it carries also a counterboring tool to machine to 2.4375 inches. After the hole has been bored to 2.000 the feed of the bar is continued and the larger tool in the bar counterbores to the other size given.

The depth of the counterbore desired is 0.875 in., and as it would be a slow and, at best, an unsatisfactory job to have to keep measuring this depth, the method here described is followed.

On the surface of the bar at B is inscribed an index line.

The operator therefore feeds in the bar until the pointer C coincides with this index line, and after the pointer has been once accurately set the machining of this counterbore to the correct depth is one of quick duplication.

Two holes are then drilled as the next operation for oil holes, these being spotted in the centre of the bosses.

The jig shown in Fig. 13 is then placed on the casting, being located by a plug at A and fitting over the turned boss at B.

The jig is held with a screw C at the upper end.

This tool is made of sheet steel and as the plug is only of a relatively short length it can be sprung into position with the upper position fitting on the turned shoulder.

Two holes are then drilled for 5-16 in. x 18 thds. through the bushings C, these holes being used to attach the index plates onto the tail stock.

A slot 1-16 in. wide is then machined for stamping the tail stock on the dividing head.

An oil groove is also machined through the long hole, using a one point cutter held in a bar and employing an arbor press to force the bar through the piece. A finish machined index bearing is illustrated in Fig. 14.

Machining Index Plates

The index plate fits on the outer end of the index bearing and is the medium used for spacing the object being machined into any number of desired divisions. The first operation when making them is to bore and face one side, holding it in a chuck on the lathe.

The index plate is then reversed, being held on a face plate and the other side faced parallel to the first, the operation being again performed in a lathe.

They are next placed on an arbor, 20 at once, being located by the bored hole and the outside turned to the correct diameter.

A simple jig is then used, locating from the bored hole, and two holes drilled to suit those which were machined in the index bearing.

The index plate is next placed in the jig, Fig. 15, being held on the pin A and located by the two holes drilled in the preceding operation.

The index holes are drilled with this jig, the drill being guided through the bushings in the clamp cover B, which also holds down the plate.

Some of the interesting features of this jig are worth noting.

It will be seen that the tool is designed to suit nine index plates with different numbers of rows of holes.

To suit these various conditions the index finger C is set to suit the one being drilled.

This index controls the pawl which fits into the spacing wheel shown.

Bushings in the clamp cover are also marked with the same number as the index dial.

In operation, therefore, taking the one shown, which is No. 3, the man simply moves the plate around to the various spaces determined by the notches in the spacing wheel and feeds the drill through the bushings marked No. 3.

The advantage of such a tool is apparent, as it is easily set and operated; also is designed to take care of the full range of work desired.

It is further positive in its action, the pawl fitting into the spacing wheel, insuring the man of its accuracy.

The index plates are afterwards stamped with the correct numbers, polished and buffed.

FIG. 15—DRILLING INDEX PLATES.

CANADA IS ENTERING THE FIELD OF INDUSTRIAL RESEARCH

NEWSPAPERMEN have a saying that every man has at least one good story tucked away about him somewhere. Every man, also, probably has a message, if opportunity would present itself to deliver him of it. The outstanding message which King George, for example, had, was the one he delivered to Great Britain when he returned from his world circling tour as Duke of York, and, at a banquet in the Guildhall in London, told his people to "Wake up" to the opportunities for commercial expansion in which they had long been leaders, but which he feared they were neglecting. King George saw, as so many others who went abroad in the world could not help but see, that Germany was reaching out for control of the world's commerce, and was securing it as a result of the appplication of science to industry, and the fact that Germans everywhere were distinguished by an intense earnestness in the pursuit of science as applied to trade which was lacking in the other nations.

Let me give an instance of this, the personal character of which may perhaps be excused because it is so much in point. Some years ago the writer was in the laboratory of the Imperial Government science department of one of the West India Islands securing information regarding certain experiments which were being made with different sugar cones. There were three young scientists, two Englishmen and a German in the laboratory. The Englishmen were delightful young fellows, as talkative and full of life as the German was unattractive and reserved. Presently a bevy of pretty American girls from a calling steamer, who had made the acquaintance of all three of the young men, descended on the place, and, in short order, some pleasant excursion was arranged. The Englishmen were game for anything, and an effort was made to include the German in the party. He was full of regrets and apologies, but he "was engached in a mosd inderesding eggsberiment," which he would not leave even for the delights of rare female companionship. His companions had their picnic, and I suppose the German dug out and stored away the particular piece of scientific information about the sugar business he was after.

That incident illustrates the mental attitude of the two races such as it was before the war. The Briton, including the Canadian, left this sort of thing largely to the Teuton, with the result that Germany was admittedly securing almost a monopoly of trade secrets, and what she did not discover she calmly appropriated and perfected. The production of dyes from coal tar, for example, was discovered by the Englishman Perkins, but it was not long before Germany had so completely appropriated the discovery that the dye industry of the world had been monopolized by her, and when war broke out Great Britain and the United States had to get to work and learn the processes for themselves. They had been content to allow the German to appropriate to himself the position of scientific beast of burden for the world, ignoring the fact that the time might come when he would run away with his load of knowledge.

This question of the application of scientific research to industry is one to which the war has awakened the world. It is one of the numerous methods by which Germany, if her mad junker class had left things alone, might have accomplished that conquest of the world which she so lamentably failed to bring about by force of arms. It is one of the things to which the world now unanimously says: "Never again." England, in common with other nations, has at length listened to King George's appeal to "Wake up."

How she is doing this, and how Canada proposes to take part in the game, is a question of vital interest to our manufacturers. In Canada the work is being directed by the Council for Scientific and Industrial Research, working in conjunction with the Reconstruction and Development Committee of the Cabinet. It is proposed, as announced some months ago, that there shall be created a Central Research Institute for Canada, the Government of which shall be vested in the Council, and having associated with its administration the Canadian technical societies, the universities, and representatives from the manufacturing and labor organizations. All these interests are working harmoniously together to this end.

Britain Now Awake

In Great Britain the work was undertaken some time ago. Early in the war she "woke up." A department of research was established, a five-year programme laid out, and a vote of one million dollars a year made to carry it through. The method adopted there, which will likely be followed in Canada, was the formation of trade groups, or guilds, to conduct that work of particular significance to each of them. Every line of industry has, or will have, one of these guilds and new researches under the supervision of the British Research Council are constantly being conducted. Two members of the Canadian Council, Prof. McLellan of Toronto University, and Prof. Adams of McGill, are now in Great Britain observing and reporting on what is being done.

Science and Fisheries

As this is a typical instance of what research means for the manufacturer, it will be interesting to consider just how the fish canning and fishing industries may be helped by applying science to their problems. It is estimated that from five to ten per cent. of the annual lobster and sardine output of the Maritime Provinces goes to waste through spoiling, due to such causes as discoloration, bacteriological deterioration, and so forth. Science will be called on to study and remove the causes. Then, the Research Council estimates that, through the fish offal and non-marketed fish wasted on the Atlantic and Pacific coasts, about six million dollars' worth of fish oil, and enormous quantities of fertilizer and stock and poultry feed, is thrown on the national waste heap. The value of these substances is known. In many of the districts in the Maritime Provinces, where fishing and farming are combined, fish and fish offal is spread on the land, and is found an excellent fertilizer, even in its raw state.

The Alcohol Project

Take another instance: denatured alcohol. Here we have a chance to not only establish a new industry and give subsidiary aid to a score of others, but might, at the same time, help to solve the problem of utilizing the abandoned distilleries of Canada. As a result of a conference between the Research Council and the Government, it is probable that legislation will be passed removing the excise duty and restrictions on the making of denatured, or industrial, alcohol. The uses to which this substance can be put are legion. Canada has about settled forever that the use of alcohol as a stimulant in Canada must cease; and it would be a fine revenge, which even the most rabid prohibitionist would appreciate, if it were to have its sting removed and be applied to the stimulation and exhilaration of trade. The Research Council can show you a list of fifty or more commercial products, ranging from felt hats to fire-works, to the manufacture of which alcohol can be applied, and dozens of processes where its use is necessary. Even in the small way in which we were using it commercially before the war, nearly a million gallons a year were required, every drop of which we could produce from waste products in two or three of our many pulp mills, by the installation of recovery apparatus involving a trifling expense. All that is necessary is to remove certain restrictions.

The chief aids asked for are the removal of the excise duty, and permission for the denaturing of alcohol in the most convenient and inexpensive way possible. At present all alcohol has to be sent to Ottawa to be denatured before it is allowed to be sold for industrial purposes, involving double transportation charges. It now costs about a dollar a gallon in Canada, as compared with fifty cents in the United States. It is believed it can be produced here under unhampered conditions at less than forty cents a gallon. And it can be made non-potable (or unfit for use as a beverage) without detracting from its value for commercial purposes.

Coal of the Prairies

Take another instance of more immediate and particular value to the prairie provinces. The Research Council estimates that there are in Saskatchewan alone fifty-seven billion tons of lignite coal. The areas, which occur in the

Laramie formation, have been worked in a small way at Estevan, Rouleau, Bienfait, and other points in the southern portion of the province for a good many years. Some years ago thirty different mines were in operation, with a total production of about two hundred thousand tons annually, largely consumed locally, where, although of inferior quality in its "raw" state, it helped out where fuel of any kind is hard to get. The Research Council has made an arrangement with the Federal Government and the Governments of Manitoba and Saskatchewan for the establishment of a demonstration plant at a cost of about $400,000 for the production of carbonized and briquetted coal from these lignites. An exhaustive study of the subject will be made; and it is confidently expected that ultimately the West will supply all its own fuel for heating, lighting and power purposes. This will give the West cheaper coal, will save millions now paid for American anthracite, and will prevent shortage of the anthracite supply in the East.

Such instances as those quoted will show that Canada is thoroughly aroused to the problem. For its solution, she needs men and money. We have almost a virgin field to work in this matter of industrial scientific research. The United States have done a little better than we have. There are two institutions there, the Bureau of Industrial Standards at Washington and the Mellon Institute at Pittsburgh, which have done great work; all the big universities have faculties of applied science, and there are several well-known institutes of technology. Over fifty industrial concerns have well equipped private research laboratories. Private firms have research workers at the different institutions, and at the Mellon Institute the other day a bakery concern discovered a process for the prevention of loss from evaporation in baking, which it is estimated will save this company a million dollars a year. Another recent instance is that of a research worker at Columbia University, who discovered a new "wrinkle" in cold storage which may revolutionize that industry.

Need for Trained Men

In Canada our output of men qualified for research work equals less than five per cent. of the demand. Less than two per cent. of our industrial concerns have facilities for research work. The few research men we have been producing have been quickly picked up by our neighbors. The only Canadian universities which have given the subject any serious consideration are Toronto and McGill. The Research Council, therefore, proposes to the Canadian universities that they shall take hold of the matter seriously, and to this end studentship and fellowship will be established to be awarded annually to science graduates in conection with some specified research. As soon as facilities are available at the different universities there should be hundreds of young men preparing to take up for Canada a portion of the work which Germany relinquished by her own foolish act.—T.M.F. in "Financial Post."

PASSING OF THE SMALL FOUNDRY

When I say "passing," I take into account the fact which confronts me whenever I visit a small town, that somewhere within its boundaries there stands what was once a foundry, but which may now be only a ruin. In years gone by every town or village, no matter how small, had its foundry, and it was no uncommon sight to see two or even more foundries in a town with less than one thousand inhabitants, and I have seen the somewhat amusing spectacle of a village with about three hundred of a population supporting two fairly good foundries, each having a machine shop in connection and each proprietor being a machinist and, of course, managing his own machine shop, and then between the two of them they would engage a molder to work alternate weeks in each foundry. From this it will be understood that the molder would go into one foundry on Monday morning and cut up his sand and begin his week's work by sorting over the jobs laid out for him and making up what cores he would require and dry them in the smoke box of the boiler, or some such an improvised core oven. This would probably consume about all day Monday. On Tuesday he would start molding and continue this until Friday night, and then on Saturday morning he would be in shape to pour off.

Saturday afternoon would be devoted to shaking out and getting his castings in shape to be delivered, and also to wetting down his sand for next time. On the following Monday morning the same procedure would be in order in the other foundry. It was an interesting programme which this molder would have to go through in these little shops. A tin-pail kettle would be in the first mold; after this would be some plow work, such as land sides and mold boards, etc., and also innumerable bits of job work of every conceivable variety. Friday, the last day of molding, would be reserved for the chilled plow shares. These would be left open over night, so that the chills would not draw dampness and become rusty. These foundries always seemed to hold their own, but still, it is quite reasonable to expect, that their "modus operandi" would not stand the test at this late date. However, if managed under modern methods, there is nothing to prevent them from being valuable assets even now. Now, Mr. Reader, I served my time in a foundry which, while not so small, was run on similar lines. All foundries were run the same in those days. Loam molding was more common then than now, and the apprentice learned all branches, including melting, core making, brass molding, etc., and I want to say it required more ability to work in the comparatively small jobbing foundry of those days than perhaps the molders of to-day are apt to imagine.

As regards my own case, I never had any difficulty afterwards in holding my own in the big foundries, but I became ambitious to become a business man my self, and, ultimately, I opened up one of these small shops on my own account. I had an abundance of work, and had exceptional success in collecting my accounts, but I could not see that I was being repaid for my anxiety and worry, so I passed it on.

This was many years ago, but in the years which have passed since then, I have seen many of these little foundries standing idle. Thus the subject of my story, "The Passing of the Small Foundry." I am now more than convinced that if these small foundries were properly managed, they could not only compete with the larger ones, but could surpass them in economical production of castings, and that they could also produce a superior quality of castings. This may be all buncombe, but supposing we argue it out and see wherein I am mistaken. "'Figures will not lie" is an old saying, but unless we understand figures we can't use them. However, we will not jump at conclusions and say that a big furnace will melt more economically than a small one. How do we know that it will? Have we ever figured it out? Or, supposing we have 25 molders working in a row and we take away 24 of them, how does that affect the other one? In what way does it decrease his production? Or, supposing we have one man making a large mold and we put another one on with him, in what way does he cheapen the cost? Can the two make it in any less than half of the time that the one would have required? Now I am not answering any of these questions; I am just asking them, but I will say that I have worked in some very large shops where very large castings were being made, and it was proved by actual figures (according to the superintendent) that molders working in single units will produce more than if working in pairs or in gangs.

Now, to get back to our subject, I can take one thousand dollars and build a foundry which will produce three hundred tons of castings in a year. I am saying this advisedly and can produce the figures and back them up. Will ten thousand dollars build a foundry that will produce 3,000 tons of castings in a year? I could continue enumerate all of the details of a foundry and leave the figuring to my reader and I think he could prove to his own satisfaction that either in building or operating a foundry with a capacity requiring forty molders it will require at least ten times the cash which would be required for the foundry with four molders. Now, as I have already said, I am not answering these questions, I am simply asking them so that the prospective foundryman will have something to study over, and if he corners me up I will be glad of it; I well know that he is interested. I think I know what the first effort will be. As a guess, I will say that it will be to corner me up on that thousand dollar foundry with the three hundred-ton capacity. Of course this will not include a high-priced lot.

Electric Truck as a Means of Shop Transportation

The Truck Which Handles Baggage in Large Terminals is Also Admirably Adapted to the Handlling of Materials in the Machine Shops—Trucks May Be Adapted to Special Uses

THE accompanying illustrations show the use of the electric storage battery trucks in modern industrial life as utilized for automatic transportation in loading and unloading ships and railway cars, and in the up-to-date machine shop, tire factory and textile mill and electric wire insulating and manufacturing plant. The supremacy of electric power trucks is acknowledged by freight handling experts, a conclusion which has been reached after rigid tests have been made covering a period of a number of years.

These power trucks were designed not only for the special purpose of handling freight and merchandise at express and steamship terminals, but also in foundries, warehouses and at all other places that require trucking about the premises. The control of these trucks is very simple; they may be operated with equal efficiency forward and backward by unskilled labor. Wherever they have been installed an actual saving in wages of 25 to 50 per cent. has invariably been effected over the old method of hand trucking.

It is pointed out that one particular type of truck has been devised for railway or steamship terminals and industrial plants having 4,000 pounds capacity and easily controlled and readily turned in a very small space. The power for operating is supplied by storage batteries of the lead or Edison type, conveniently located so that they may receive proper attention at any instant without delay or trouble. One charge of electricity is sufficient to do a full day's work under normal conditions. The trucks are very powerful, and when loaded with negotiate grates of from 15 to 25 per cent., with ease will cover a distance in one quarter of the time, and handle about six times as much freight as hand-operated trucks, doing their work quickly, noiselessly, and efficiently.

It will be noted that one end of the truck contains the storage batteries, while at the other end of the truck is attached a movable end gate, which may be lowered to a horizontal platform. The end gate may also be lowered to the floor and used as a skid in loading or unloading the truck; this end gate may also be easily removed when not in use. Another pronounced advantage of these trucks is the fact that the platform and batteries are mounted on spiral springs which carry the load smoothly and reduce the possibility of breakage to a minimum.

The truck frame consists of two heavy 1 in. beam sections which extend the entire length of the platform, and which converge slightly into a reversed bend just back of the loading or steering wheels. The frame is supported on four tempered steel spiral springs, each of which is encased within a box and transfer the weights of loading directly to the steel axles. The pinion of the motor which through a silent chain engages the sprocket wheel about four times the diameter of the former and which contains a substantial and compact differential, transmits the mechanical energy through a Vanadium steel countershaft supported under two frame members of large annular ball bearings of ample capacity to two side chain drivers, giving a gear ratio with driving wheel of 12 to 1. This form of drive allows a speed change in four variations of from 1 to 8 miles per hour in either direction for freight and baggage trucks, and three variations of from 1 to 5½ miles per hour in either direction for industrial trucks.

The wheels revolve on a double set of annular roller bearings of ample capacity and are equipped with either solid rubber tires of demountable type or Divine fabric tires, making a wheel of 16 inches in diameter. The steering is done by means of a lever conveniently arranged which moves in a vertical plane, providing a quick and easy manner as in all standard makes of automobiles, the stetel axle itself being immovable. To one end of the freight and industrial trucks is attached a movable end gate which may be lowered to a horizontal position, thus increasing by nearly three feet the available loading space. This end gate may also be lowered to the floor and used as a skid in loading or unloading the truck, or removed from truck when not in use.

The power for operating is derived from a storage battery located in a steel case at driving end of truck, thus insuring maximum tractive effort. The current is taken from the batteries through a maximum capacity enclosed fuse, the circuit switch, and a specially designed drum type vertical controller, the latter being mounted on uprights convenient to operator and is connected to a set of resistances, and is operated by a lever moving in a vertical plane, giving four speeds forward and four reverse on freight trucks, and three forward and three reverse for industrial trucks.

Current cannot be sent into the controlling until the foot pedal has been pushed down by operator, which simultaneously releases the powerful bend brake on the countershaft and closes the circuit switch. The controller regulates the amount of current sent into the motor through specially designed resistances. From the controller the current is directed through insulated wires to a 2-3 h.p. motor.

The drum type controller and double

ADAPTABILITY OF THE INDUSTRIAL TRUCK FOR THE HANDLING OF PIPE OR OTHER LONG MATERIAL.

THE ELECTRIC TRUCK IN THE MACHINE SHOP.

break switch have proven so efficient as to eliminate the arcing and all dangers found in operating other electrical vehicles. These trucks may be operated without the slightest danger from fire. The current cannot be applied to the controller without first releasing the brake, which automatically closes the circuit switch, at which time the controller will carry the current from the batteries to the motor. The moment the current is cut off the brake will set automatically and remain set until the circuit switch is again closed, at which time the band brake is automatically released. The motor is 2-3 h.p., having a high starting torque and exceptionally high efficiency, and is series wound for 24 and 48 volts. The armature is carried on Hess Bright annular ball bearings, and has a sufficient capacity to handle a loaded truck up a 15 to 25 per cent grade.

This industrial truck is the model used for warehouse and industrial use, and has a very short wheel base, and will make exceptionally short turns. It is light and very flexible, and on account of its size may be operated in narrow aisles and run into elevators to be conveyed from floor to floor. Trucks of this design are proving a great convenience, making substantial savings in time and wages in the hundreds of plants where they are in daily use. The length over all is 7 ft., and the length of the platform loading space is 5 ft. 1½ ins., while the length of the platform loading space with end gate is 8 ft. The width of the platform is 36 ins. and the height of the battery box is 17½ ins., the width of the battery box being 14½ ins. The height of the platform is 20 ins., and the wheel base measures 38 ins., while the width of tread is 32½ ins., the drive being double side chain with 3 speeds forward and 3 reverse, 1 to 5½ m.p.h. The weight with Edison battery is 1,800 pounds, and with a lead battery 1,850 pounds, while the total capacity is about 4,000 pounds.

The electric battery truck was designed to haul four-wheeled or other trucks with loads of two to ten thousand pounds, thereby doing the work which is usually accomplished by men or with mules. One tractor will do the work of several mills of from four to eight men. The tractor does not operate on rails and may be used wherever required in and about factories and warehouses. These tractors have proven to be of great value in mills, industrial plants, factories, warehouses, and in many other places where trucking is usually done with four-wheel trucks. The tractor has a length over all of 6 ft. 2 ins., and a width of 36 ins., the height of battery boxes being 14½ ins., while the height of platform measures 20 ins. The wheel base is 38 ins., and the width of tread measures 33¾ ins., while the double side chain drive is used with 3 speeds forward and 3 reverse, 1 to 5½ m.p.h.; the weight with Edison battery being 2,200 pounds.

A novel electric battery elevating platform truck has been developed at Buffalo, N.Y., which is gear driven, all the gears being entirely enclosed in a steel case and in a bath of oil at all times, thus insuring perfect lubrication and silent operation. The steering is by all four wheels and operated by steering lever working in either vertical or horizontal plane. Turning radius is less than six feet, enabling the truck to turn sharp corners and operate practically any place where a hand truck may be used.

This truck is fitted with electric elevating platform with a capacity of 4,000 pounds, designed to convey tables or platforms of wood or metal on which loads may be carried from place to place as desired. Lifting planes are raised by means of an electric lifting device operated by individual motor, using power from truck battery of ample capacity to operate truck and elevating platform a full day. The lifting is by means of steel worm and phosphor-bronze gear, insuring extreme efficiency and the lifting device is controlled automatically, is silent in operation, sure in action, and dependable. This truck is also used for ordinary trucking purposes, carrying loads of its own or may be fitted with draw head and used as a tractor to haul the ordinary hand operated trailers from place to place.

A storage battery industrial engine has also been designed to meet the requirements of industrial railways in and about manufacturing plants and other large industrial concerns. It is compact and very powerful, and has a direct gear drive on all four wheels. The wheel flanges may be placed on either side or outside of the rail and adapted for all standard industrial trucks from 18 in. to 36 in. gauge. This engine is exceptionally efficient, and has a hauling capacity of 8 to 12 tons on the level, and is used in hauling trains of several cars.

Automatic charging rheostats have been developed expressly for charging trucks, tractors, and engines, and are equipped with underload and overload circuit breakers. These rheostats are intended to charge lead or Edison batteries. The lead battery rheostat is used to charge at three different ampere rates, and the Edison battery rheostat to charge at a single rate and is improved with a "boost" switch at a small additional cost while volt and ammeters are provided on the charging panels.

THE ELECTRIC TRUCK IN THE MACHINE SHOP.

A PRESS SAFETY GUARD

By F. C. P.

The accompanying illustration shows a safety device designed for punch presses and drops as developed at New Britain, Conn. The photograph shows a pillar press with bracket A arranged for the application of the safety device by first attaching bar G to bracket H with the square head clamp screw. If the trip rod is at the right hand side of the press, it is necessary to assemble the bamboo bar to bracket H with the aluminum casting attached to the bamboo bar at the right hand side and then assemble rod I through the holes in bracket H and through the loops of bamboo bar, holding bar I in position with the two small collars.

With the device assembled in this manner, it is necessary to place bracket A at the left hand side of the press at a height which will allow the bamboo bar—when the assembly is placed into bracket A—to have a position so that the operator's arm will come in contact with this bar as he places his work upon the die. This carries the bamboo bar forward and with it locking bar through the loops on bracket B and under dog C, which is attached to the trip rod in a position high enough to allow locking bar E to go between bracket B and dog C, preventing the trip rod from being drawn down by the operator until his arm is removed from the danger zone, returning the bamboo bar by gravity, carrying with it locking bar E.

The illustration, Fig. 3, shows the operator with his hand in the danger zone and in this position has carried forward the locking bar E over bracket B and under dog C, making it impossible for the operator or any other person to trip the press until the operator's arm has been removed. In noting how they pevent accidents in the plants of the American Hardware Corporation, New Britain, Conn., by the use of this guarding device, it is urged that it must never be assumed that the mere installation of a safety device will prevent the operator from being injured. The device must be carefully adjusted when the job is started and this adjustment must be maintained throughout the duration of the operation. The operators must not be allowed to tamper with, remove or render inoperative the safety device intended for their protection. Constant watchfulness on the part of the foreman is one of the conditions under which safety is secured.

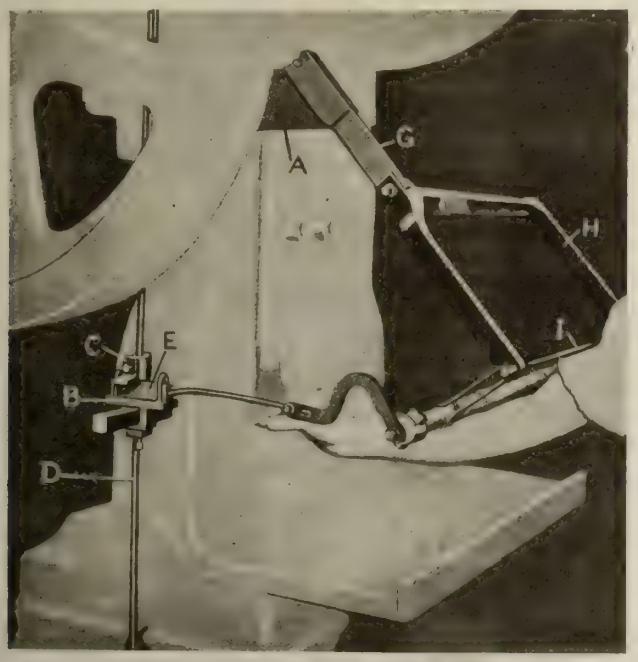
This guard consists of a free-swinging rod of light material, so attached to the machine that the trip canot be operated while the hands are in danger of injury. It touches the arms above the elbows with a pressure that is hardly felt, and does not in any way interfere with the use of the hands or arms, or require a single special motion. Workmen do not object to its use.

It is attached to a bracket on the machine, and can be instantly removed or replaced at will. It can be used upon any machine without interfering with the action of the trip or obstructing free access to the dies or other parts.

The power press is the most dangerous type of metal-working machine, and the danger is accentuated by the fact that in very many cases the operators are not recruited from the most intelligent class of labor. In plants where presses are used in large numbers the percentage of accidents and the resulting losses from idle hours and from compensation for injuries reach large totals unless the machines are equipped so that the man or woman is actually prevented by mechanical means from taking risks either deliberately or through carelessness.

With this device the operator works with the contact of a light rod against the arms above the elbow. The pressure is hardly felt and there is no interference whatever with the action of the hands. Production is carried on under a condition which secures the highest output, for both hands and one foot are used. After a very short experience the workman has no thought whatever of the presence of the mechanism. He does not see it, and he is unconscious of the bar. The weight against his muscles is never more than a few ounces.

However, before the hands can reach the danger zone of the dies, the pressure of the arms upon the bamboo bar locks the tripping mechanism so that the ram cannot descend. Before the machine can start both hands must be withdrawn. When it starts no danger exists unless the operator actually thrusts his hands over the guard, which would be a clumsy and difficult thing to do and would be so deliberate an action as to be classed as intentional.



SAFETY GUARD FOR STAMPING PRESS.

DESIGN OF FURNACE

To ensure good combustion it is of the first importance to keep the gases in the furnace as hot as possible, until the oxidation is entirely completed; but this fundamental condition is far from being realized in ordinary practice. In setting a horizontal tubular boiler, for example, it is usual to place one end of it immediately over the furnace, so that it is exposed to the direct action of the fire. In this way the gases, which are at a temperature of perhaps 3500° Fahrenheit as they rise from the fuel-bed, are covered, over the entire area of the furnace, by a metal roof or plate that has a temperature of perhaps 350°. In other words, the entire upper boundary of the furnace is maintained at a temperature some two thousand degrees lower than that of the furnace gases. The absorption of heat by this relatively cold surface chills the gases so that sensible portions of them are cooled below the temperature at which they are capable of uniting with oxygen; and if these cooled portions are not already completely oxidized, they are likely to escape up the chimney unconsumed, and a consequent waste of fuel is the result. The waste that is caused in this way can be minimized by properly proportioning the furnace, but it cannot be really eliminated so long as no attempt is made to burn the fuel under scientific conditions.

A Correction.—An unfortunate error occurred in connection with the advertisement of the Montreal General Tool Co., which appeared in our Annual Review Number, page 356. Under the heading of "Shop Equipment" the words, "10 Drill Presses Swing up to 60," should have read, "16 Engine Lathes swing up to 60." This firm is exceptionally well equipped to handle general machine shop repair work on very short notice.

Quebec.—Never in the history of navigation on the St. Lawrence has a steamer left Quebec for the open sea so late as did the "Canadian Voyageur," which left Quebec on the 23rd January for Halifax and then overseas.

Moulding and Pouring a Gasoline Engine Bed

Showing Method of Casting a Sheet Steel Bottom Into a Grey Iron Casting, Making the Entire Bed Into a Tank—Also Small Chamber Cored Off From the Large One

By F. H. BELL

THE "Ideal" gas, gasoline and kerosene engine, one style of which is shown in the accompanying illustration, and also shown in part in the succeeding engravings, is, and has for many years been manufactured by the Gould, Shapley & Muir Co., of Brantford, Limited, and viewing it from the exterior it is of similar appearance to the original engine built by this company, but on examination of its interior mechanism it will be found to be vastly different.

With the increased knowledge born of experience and the progress made in gasoline engineering generally, came the necessary alterations and improvements. This, coupled with the shortage of gasoline owing to exigencies of the war situation making a substitute for gasoline imperative, has made at least the foundryman's part of the work an entirely different proposition.

It is not our intention in this article to describe in detail everything which the foundryman has to do in the construction of the engine, but simply to confine ourselves to the molding and casting of the bed, it having probably undergone as many changes as any part of the engine. In order to properly understand these beds it is perhaps as well to explain what is required of them. The gasoline which formerly constituted the fuel was held in a container enclosed within the bed. The container consisted of a galvanized can of the proper dimensions to fill all the available space, but this galvanized receptacle would frequently be punctured in transit from the works to its destination or otherwise, and at best it was not any too long-lived. It was therefore deemed practicable and advisable to cast a bottom to the bed, thus utilizing it for the purpose spoken of. This was achieved with a fair degree of success but entailed a considerable amount of extra trouble and expense, besides additional risk of loss in the foundry as well as making a clumsy casting. The shortage of the gasoline supply as we have said made a substitute necessary, and coal oil has been found to do equally as well once the engine is under headway, but for starting purposes a small amount of gasoline is necessary.

The Steel Bottom

It therefore remained for the foundry superintendent, Mr. Robert Rutledge, to use his ingenuity in devising the means of "casting in" the steel bottom, which is now so successfully accomplished, as well as providing a small chamber for gasoline, while giving over the main space for the "new explosive" coal oil.

Making the Mold

By permission of Mr. George McCrea, the general superintendent of the works, we will endeavor to demonstrate how the molds are made.

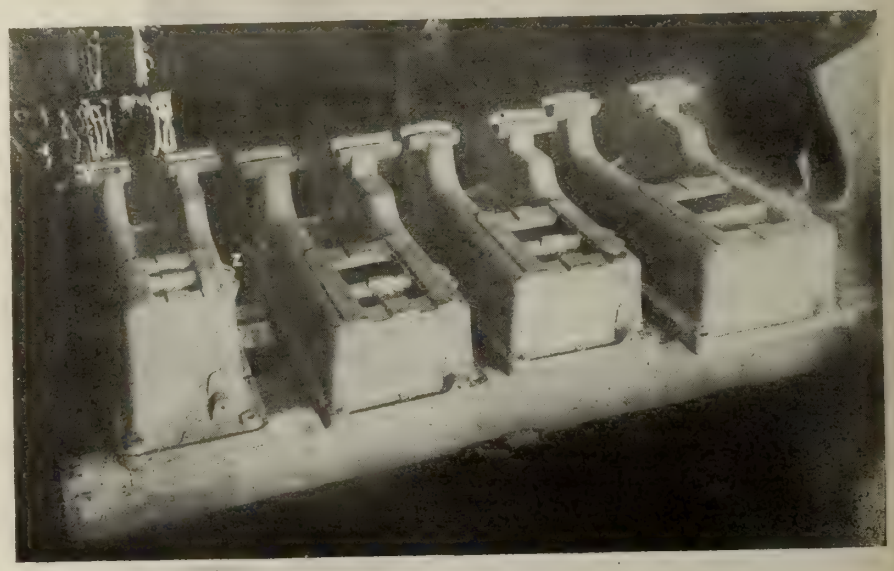
In Fig. 1 are seen four beds, the appearance of which might indicate a very simple design, and on taking into consideration the number of improvements and new ideas involved in their make-up, they may be truthfully termed simple. These four are but a few of the many sizes built by this company and ranging from one horsepower to fifty horsepower, being slightly different in design, but all having the same fundamental principles.

Originally when these beds were cast with the wide open bottom and the bridge wall shown at X, Fig. 1, was lacking, the molding was a much simpler operation. To mold a bed of this type requires a 4 part flask, viz., the drag or nowel A, the cheek B, the cope C, and the small cope D, which covers the bearings.

The first move to be made is to level the bottom board E, on the floor and ram up the drag A, right side up, and strike it off and sift it on a little facing sand, after which the pattern is centred and rapped down to a solid bearing, care being taken to always keep it level. The pattern, it might be explained, is solid and all in one piece, with the exception of the bearings Y, Fig. 1, and the small pipe connections on the side, Z, Fig. 1. The parting is next made by ramming in extra sand to insure a good solid joint and striking off even with the flask. It is now troweled smooth and parting sand put on, after which it is ready for the cheek B to be put in place and rammed. The top of the cheek, as will be seen in Fig. 3, comes even with the straight part of the pattern. This cheek is chucked to fit the shape of the pattern so that very little trouble is ever experienced in holding the sand in shape. After ramming the cheek and making the parting the cope is put in place, and as shown in the different illustrations has the shaft bearings protruding through it, and level with the top of it, also bars fitted down into the crank pit between the bearings. So complete are these flasks constructed that very little gaggering is required.

After the cope is rammed up to the shaft bearings they are bedded in and another parting made for the small cope D which covers this portion. After ramming up the small cope the remainder of the work as regards the molding of the outside of the casting will require very little detailed explanation. The small cope is lifted off and put to one side, the bearings are swabbed and vented and drawn out, after which the horns which hold the shaft bearings are rapped and the main cope carefully lifted off and rolled over. The cheek is now swabbed and vented all around and scored off as shown at F, Figs. 2 and 3.

In lifting the cheek the pattern is secured and lifted with it and rolled over on horses, thus giving the workman an opportunity to see that his joint is all right before drawing the pattern. After drawing the pattern the mold is finished and plumbagoed in the usual way.



ENGINE BEDS AS THEY COME FROM THE MOULD.

Building the Core

After the removal of the cheek and pattern the drag will show the imprint of the bottom of the patterns which is practically flat, all but the bearing strips on each side and which project a short distance into the sand. On top of this impression the core boxes are placed and the core built in its place (and it is right here that the real mechanical ability of the molder is put to the test). The steel bottom G, Fig. 2, consists of a sheet steel plate somewhat larger than the core. This plate is ground all around the outer edge so as to give a clean surface as well as an easily fused body for the melted metal to burn onto. The manner of "casting in" the steel bottom is to have it built into the core with the ground edge projecting out from the core as shown at G, Fig. 2, into the space allowed for the casting and about an inch above the bottom. This gives abundance of strength of metal below and also provides air space between the bottom and the foundation of the engine when in use.

In starting to build the core a frame of the size required for the core and of the depth required between the steel plate and the bottom is placed on the imprint left by the pattern on the drag. This frame is rammed full of sand and struck off level. The frame is now removed and the steel bottom put in place on top of this thickness of sand, after which the core box is placed where the frame was removed from, and the balance of the core H made up. The core I, Fig. 2, which is separated by the bridge wall X, Fig. 1, from the main core H, forms the small chamber in which is held the gasoline. This core I is a dry oil-sand core, so also is the portion of the core J under it, as well as the cores K and L. The balance of the core H is green molding sand. The core box for the green sand core is open-topped excepting the portion where the square opening is shown with the vent hole M and the iron post marked N. The balance is swept to shape with a strickle. The fact that the core rests on a steel plate makes it more difficult to hold down than if it were rammed into the sand forming the drag, and the fact that the vent has no means of escape excepting through the vent hole M makes it imperative that careful provision be made for securing the core as well as venting it.

Before putting in the sand to form the core a sectional grid is placed on top of the steel plate and over this a stout bar is laid running lengthwise, and on top of this is stood the upright bar which reaches to the surface at N, Fig. 2. This bar N, as will be explained later, is held down from the top and in turn holds the entire system of rods which keep the plate in place.

The green sand portion of the core is now rammed up, the interior of which is filled with fine coke. The top is put on the level part and the sand tucked under and also the cores K and L are tucked into place, the core box being a guide to go by. The curved part is now strickled into shape and the core vented down into the coke. The core box being lifted off the core is slicked and finished. The core J, which forms part of the main coal oil chamber fits tight against the plate and also against the core H. The core I rests on chaplets on top of the core J and is separate from the core H, thus forming the wall shown at X, Fig. 1. The vent from both of these cores is taken out through the top of the cope at the point also marked M. In gating this mold two gate sticks are stood at the points QQ, Figs. 2 and 4, and the gates are cut from these to the bed at point, just missing the core and traveling close under the steel plate so as to heat it, but not close enough to cut it away. Two overflow risers are taken off at P P, shown in all the different views in Fig. 4.

In closing this mold there is little to take note of. The cheek has to be closed so as to give even thickness on both sides and in case it is not properly centred, the cheek may be moved so as to rectify it by withdrawing the long guide pins which are not fastened. The top of the cheek is best to be floured and the cope tried on and off, thus giving the

FIG. 2—MAKING THE MOULD FOR AN ENGINE BED PLATE.

FIG. 3—SHOWING CHEEK IN POSITION AND COPE BEING LOWERED INTO PLACE.

workman an opportunity of seeing that it has not been crushed and also to see that iron cannot get into the vents. In ramming the cope an iron was rammed into it in such a manner as to rest on the iron N in the core and reach up through the cope, and when clamping the mold this iron is strapped down and clamped, holding that end of the core secure. Before closing on the small cope, stud chaplets of the proper length are placed on top of the cores K and L and the half round cores which form the shaft bearing are put in place in the prints and also resting on the chaplets. When the small cope is closed on top of these and clamped the entire combination of cores and chaplets are held as in a vise.

As shown in Fig. 4, the risers P P are headed up; these may have a basin of sufficient capacity to hold what is flowed through or they may be on a slant so as to flow the iron over into a sand bed. The runner basin is also raised to the level of the risers and the two gates are connected by this basin. This style of bed has been a decided success as not a complaint has been recorded against it. The steel plate instead of putting a strain on the casting actually strengthens it. The iron passing in from the gate heats the plate almost to the melting point and the casting being heavy and the plate light gives the plate time to become heated throughout before the casting sets. Thus, when the casting contracts the plate also contracts with it, with the exception of the central part, which might not be as hot as the rest, and this can easily buckle up or down without in any way doing harm either to itself or to the casting. The molding of this bed, like that of any other casting, depends for success on the care and good judgment of the workman. The gas or vent must have some means of escape else it will cause a blow. If the inside is properly vented to the coke, and if the outlet from the coke is well guarded so that nothing obstructs the way, and all joints around it are floured so that no metal gets in there should be no fear of trouble from that source. The gates should be of sufficient size to allow the iron (which should be in a good fluid condition) to flow in without hindrance, otherwise cold shots may give trouble. The workmen shown in the illustrations require no pointers on this score.

Another point worthy of note in connection with this work is the oil sand cores spoken of. These cores are made from silica sand similar to what is used in the manufacture of glass, and while it perhaps costs a little more than river sand there is a real economy in its use. One part of linseed oil or any good prepared core oil is sufficient for 65 parts of this sand. The advantages from this are apparent. The sand being pure silica generates practically no gas and the small percentage of oil required would create so little gas that it would be hardly perceptible. The grain being fairly coarse and ragged gives the core a chance to bake hard and at the same time have a good open structure, through which the vent can pass with ease, thereby obviating the necessity of venting to a great extent. This sand is used for jacketed cylinders, etc., with the best of success. Superintendent Rutledge showed us some very complicated cores which required no venting whatever. Cores which formerly had to have vent holes connected to the vent holes in other cores are now successfully handled without vent holes at all. From a monetary standpoint a cheaper sand with a higher percentage of binder, and more labor required would in all probability be the most expensive in the long run, particularly when the greater risk of bad castings is taken into consideration.

HEATON'S ANNUAL FOR 1919

The 15th edition of Heaton's Annual has been issued by Heaton's Agency, Toronto. Little need be said regarding the value of this work to those wishing statistics referring to matters of Canadian origin, and the present edition contains an official directory of prominent men of the Dominion, postal information, financial information concerning the financial life of the country, and commercial regulations dealing with the income tax, war taxes and other legal matters pertaining to business. Information of value to those transacting business with firms at a distance through the various means of transportation is contained in another section, and customs information is given in a very complete form. Much other information of the usual statistical nature is also given.

FIG. 4—TO LEFT, BUILDING POURING BASIN AND RISERS. TO RIGHT, WORKMEN CLOSING ON SMALL COPE.

WELDING AND CUTTING

A BELGIAN ELECTRIC CHAIN-WELDING MACHINE

By Frank C. Perkins

THE accompanying illustration shows a novel Belgian electric chain-welding machine of the Giraud type as made at the plant of the Electro-Mechanical Tool Co. at Arbre Benit in Brussels. These electric-welded chains are tested for 66 cwt. for rupture, while the Lloyd requirement for the same size, 5-16 in., is only 22 cwt. A metal selected suitable for welding electrically with low sulphur, carbon silicon and phosphorus, so that the place electrically welded becomes stronger than the other sections. The electric-welded chain does not break at the weld but on the solid part of the link.

It has been proved that a chain-bending and electric-welding machine has a capacity equal to the output of ten workmen for the quantity. There is the additional advantage that the rings are absolutely similar and the welding of the highest quality without changing the nature of the metal. If, for instance, a hand-made chain has a tensile strength equal to about 55 per cent. of the tensile strength of the double section of the wire used, then electric-welded chains are able to stand a strength of over 80 per cent.

It is said that these machines secure a saving of at least 80 shillings per ton, of products made compared with the actual cost of manufacture in England. The advantages of electric welding include the homogeneous nature of the weld as when the weld is made the structure of the metal at the joint is the same as elsewhere.

There is absolute control over the heat by simple appliances and the metal can be held at any temperature desired for any length of time, and the heat increased or decreased at will. The welding process can be continually watched as the metal, while heating, is visible instead of being covered with coal or hidden by flame, as in the forge process.

This process avoids flaws as the union commences at the interior of the joint and not in an uncertain way, consequently any flaw can be easily discovered and prevented. Electric welding is rapid as the process is almost instantaneous with small sections, while with larger sizes it requires but little time, depending upon the horsepower used.

The flexibility of the process is a great advantage applying as it does to various kinds and forms of metals, including those which have heretofore been united only by brazing. The welds are kept in perfect line by the clamps during the operation, and there is a localization of heat at the weld, consequently no heating effect elsewhere.

Its great cleanliness is apparent and the apparatus can be used in any convenient or desirable place as it makes no dirt or litter. There is no blistering or scaling and the heat is confined to the welded joint. The machine is simple and easy in operation, while the current used is of such low voltage as to render shocks even of the slightest kind impossible.

These electric welding machines produce chains for apparatus for hauling and raising, and the chains for railroad trucks, tenders, locomotives, tramways and mines, also electric-welded chains for different work in the country, on farms for agriculture work, and twisted chains for artillery and autocars.

It is pointed out that the most important item, next to the cost of production, is equality of production, and in this the electrically-welded chain has many points of superiority. To show the tensile strength of the electrically-welded chains, an American chain maker secured six pieces of 9.32 inch chains, two of common quality American make, two of steel, American manufacture, supposed to be the strongest possible chain, and two made by the electric welder.

One of the first samples broke at 2,200 pounds and stretched about 8 per cent., and the break occurred at one of the quarters of the weld. This is said to be a striking indication of the imperfection of the weld in common chain. The hand-made chain, supposed to be the strongest, used for logging purposes, where a chain of high tensile strength is demanded, broke at 3,500 pounds. This chain was purposely made heavier in the weld to strengthen the acknowledged weakest point. The elongation was 25 per cent.

The electric-welded chain broke at 7[illegible]0 pounds with an elongation of 40 per cent. Tests of chains welded at the end of the link show that 75 per cent or more break at the weld, due to imperfect welding. A perfect link must be welded at the side, where the wear is the least. A link tested in a fire is heated from the exterior inwardly, consequently the outer surface reaches the welding heat first. This is not true of the electric-welded link.

A new Belgian bending and electric-welding chain machine has been designed to manufacture automatically iron and steel chains up to ¾ in. diameter of wire. This chain machine, to weld electrically chains up to ¾ in. diameter of wire, has an electric consumption showing a saving of 28 per cent. against older types of welders.

The advantages of the mechanically coiled and electrically welded chains in comparison with the hand-made, or

BELGIAN CHAIN WELDING MACHINE.

chains made in any other way, are many. The mechanically-coiled chains are coiled on a mandrel by the machine itself, and all the links are and must be absolutely the same. Those chains are consequently, by their construction, especially well adapted for pulleys, blocks and similar tools. It is pointed out that the great regularity of the links gives to the mechanically-made chains an exterior appearance far more satisfactory than the hand-made chains, whose links are never of the same size in the full length of the chains.

On account of the electric welds these chains are also safer than hand-made machines, as in the latter process the weld is realized at one end of the links, so that, if the chains are at work, the load may be on a part of the chain where the metal has had an alteration in structure.

The electric weld is made in the middle of the long part of the links, and consequently when the load is on it is at a place which is safe in all cases. The superiority of these electric-welded chains is due to the fact that the weld of the links is made mechanically at the moment when the metal is brought to the welding heat and the weld can never occur when this heat is not obtained. In the older systems, on the contrary, the links are welded at the time when the blacksmith believes that the necessary heat has been obtained, and there is no doubt that in those cases the results always depend upon the ability of the workman.

ITALY UTILIZES VOLCANIC POWER

The present enormous price of coal in Italy, according to the Italian Bureau of Public Information, has resulted in the realization of an idea which at first thought seemed but a dream, but which instead has been developed in a marvellous manner and is assuming quite considerable importance; this is the industrial exploitation of one of the features of vulcanism and that is the natural heat emitted from the soil in those regions more or less volcanic in character.

The first experiments along this line were made some years before the war by Prince Ginori-Conti in Tuscany at Larderello, near the salt-mines of Volterra, a region extensively covered with volcanic formations, the most wonderful being the so-called "soffioni," which are certain volcanic vents emitting powerful jets of very hot steam containing boric salts and various gases used in the extraction of boracic acid. Instead of limiting the use of these steam-jets, as in the past, to extracting the salts contained in the exhalations of these natural vapor-vents, the ejection of the steam is stimulated by boring holes. In this way it is possible to obtain powerful jets at a pressure of two to three atmospheres, according to the locality, and in some exceptional instances as high as five atmospheres, the temperatures varying from 150 to 165 degrees centigrade. These jets maintain their force and temperature unchanged for many years, and they are not affected even when other openings, not too near each other, are bored in the ground, proving that they do not influence each other reciprocally, so great is the underlying thermic energy below. In 1905, Prince Ginori-Conti applied this natural steam to a 40 H.P. engine, using only a small section of the Nenella fissure, which is the most powerful "Soffione," the steam ejected having a pressure of five atmospheres.

The results obtained during several years of experimentation were satisfactory, so that he continued to make larger and deeper borings, measuring the force of the steam ejected; combined, this force could operate engines of many thousand horse-power.

In 1912 an experiment was made, very wisely on a more modest scale, but sufficient to obtain conclusive results, for which a 300 H.P. turbine-alternator was used.

Later, because of the enormous increase in the price of coal, the Prince decided to exploit the thermic energy of these soffioni on a much larger scale, but as other substances are emitted with the steam, among them sulphuric acid, which corrodes metals, particularly iron, and therefore the pipes in which the steam was to be collected, he attempted to use this steam only for heating. Three turbine-alternators of 3,000 kilowatts each were installed, fed by boilers at low pressure not heated by coal or other combustible fuel, but by the natural steam, superheated to 165° C., issuing from these soffioni and piped and carried to the boilers.

To-day the works at Larderello have a central plant of 16,000 H.P. operating without interruption and distributing current to Florence, Livorno and Grosseto; its capacity is soon to be increased.

Here we have a new and original utilization of Italy's natural wealth; current is generated not by the use of "white coal" (water-power), but by means of heat energy of volcanic origin.

As the natural steam available at Larderello and the surrounding country is, one might say, unlimited and depends upon the number of bore-holes made in the boraciferous soil, the great possibilities for further development are readily seen.

ELECTRIFYING ITALY'S RAILWAYS

Great savings in the use of coal, according to the Italian Bureau of Public Information, have been effected in Italy in the past few years through the electrification of railroads and harnessing the water power of the country to generate electricity. The percentage of railroads electrified in Italy from 1900-1915 is greater than in any other European country, and the economies resulting have been gratifying.

Electric traction of railroads began in Italy in 1900 with installations on the Varesina Line, which runs through Milan, Gallarate, Varese and Pontecer-esio, and on the Valtellinese Line, which runs from Lecco to Chiavenna.

Railways which run on mountainous routes and carry heavy trains have been installed with different systems. The principal mountain routes electrified are the Moncenisio line, the Ceva-Port Savona line, the old line of Giovi, and the new supplementary Giovi line. These cover some of the most difficult territories traversed by any of the railroads in Europe.

The Moncenisio line is the longest of the mountain railways. It is 8.5 miles long, travels at an altitude of more than 1,000 yards above sea level and is continuously on the ascent. It has a nominal carrying capacity of 640,000,000 tons per mile, and actually carries 240,000,000 tons. The Ceva-Port Savona line is a series of steep inclines and declines. The Giovi line has the most rapid descent of any railroad in Europe and the supplementary Giovi line carries the heaviest traffic in Italy.

The perfect systems installed on these mountain routes have made possible the increase in the carrying capacity and the speed of the railways. There is at present under consideration the electrification of 1,250 miles more of railways.

MECHANIC'S AND DRAUGHTSMAN'S POCKET BOOK

Sir Isaac Pitman and Sons, Ltd., London, have published a pocket handbook of the above title for use of draughtsmen, mechanics and others, who have frequent need of some reference work for the recalling of formulae, etc., used in every-day work. W. E. Dommett, the author, in his preface states that the work, notes and diagrams are not intended to replace text-books, but to act as a means for refreshing the memory in cases where the latter has become imperfect. Mathematical tables are given in compact form and include squares and cubes of numbers, square and cube root, temperature conversion tables, areas and circumferences of circles, trigonometrical functions, taper and angles and logarithms.

The above tables are those usually found in works of this type, and in addition to these some extremely useful tables are given, which are seldom seen. These have to do with the coefficient of friction of various materials, revolutions of wheels or discs per minute, and the centrifugal force exerted by a rotating mass of one pound, at various speeds, etc.

Wire gauge tables, specific gravity and other weight tables, thread tables and other tables dealing with the properties of materials are included.

The sections dealing with trigonometry mechanics, statics and logarithms together with that on mensuration, are of particular value, and while the book is of 125 pages, much information of real value has been condensed into small space and the book should prove a welcome addition to the reference library of those who have occasion to use material of this nature.

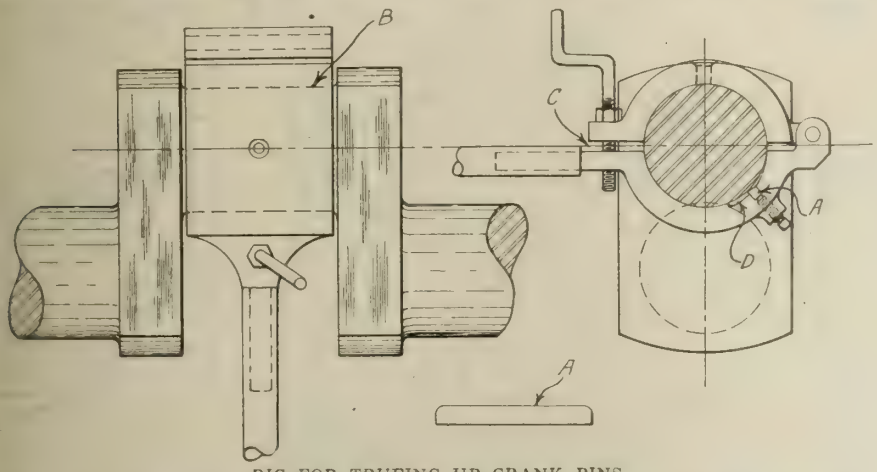
WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

ROUNDING UP WORN CRANK PINS

By A. L. Marshall

THE tool shown has given me so much satisfaction in rounding up worn cranks that I pass it along, hoping that it may be useful to others. The lower half of the tool-holder is made of machinery steel and case hardened; the upper half is of cast iron with a generous oil hole way cut through. The cutting tool at A is made as long as the crank is wide, while the body of the tool-holder is made slightly shorter. The hole is bored to the largest diameter of the crank pin B, with about 3-16 inch opening at C and the corners rounded to suit the fillets. In operation the tool-holder is clamped around the crank and as the tool-holder or the crank is revolved it is drawn together with the screw shown.. A small set-screw near each end of the cutting tool serves for adjustment. The space D serves for the collection of the chips, and care must be taken that it does not fill up and score the pin. With a good supply of lubricant and a little care a crank can be rounded up in about 10 minutes. In this particular instance it might be stated that the tool was used on cranks for nail machine spindles, where the wear is chiefly on the high side of the crank and the little difference in throw did not matter.



RIG FOR TRUEING UP CRANK PINS

SHOWING UP THE MEN

By D. A. Middleton

The introduction of women in machine shops has taught managers one thing—that but few of their men were doing their best in the past. Almost without exception women have done more and better work than the men on jobs that were within their strength and training. And none of those women would tell you that they were overdoing or were working harder than at their household tasks of old.

The truth of it is that the men have thought they could not be replaced, that the learning of their trade, or membership in a union, would insure them a position no matter how little they did. On the other hand there are thousands of conscientious workmen who have done their best and who bear the same relation to the men "shown up" that the women do.

It's the old story of to earn more and get ahead one must do a little more than he is asked to do and must turn a part of his spare time into learning. We are told not to expect an old head on young shoulders, but the corollary to that is that scatter-brains never led to fame and fortune. Some years ago in a village there was a shop of a dozen men, one of whom we will call Fred, a young man of ability and experience, but ready at any hour of the day or night to throw up work or business for a lark. The scale of wages, which was just for local conditions, was about fifteen dollars per week except the foreman and the man who did the drafting, some experimental work, and helped the owner with the business end of things. The man who had occupied the latter position died and the owner was talking to me about it: "Fred is just the man I want," he said, "but I dare not trust him for fear he will go off on a bust just when I need him most—I would pay him ten to twelve dollars more a week than he gets now, his work would be pleasant and interesting, and I would give him the job at once if he had ever kept his feet down for one whole month straight." Just an instance of where a man had to be imported to fill a place that should have been by promotion.

On repetition work women have shone particularly bright. Light machine jobs and assembling do not grow tedious to them, or else they have more will power to force themselves to stick at the work than the men. I have had women who would sit from seven until twelve, perfectly contented with their work, while a man or boy on the same job would lose from twenty to thirty minutes and insist that it was absolutely necessary to do so—and this on day work with no suspicion of a bonus. The women simply surpassed the roving spirit.

And these "girls" think about their work, too. In our own shop on Government work, we found that the finest way to speed up and to upgrade the quality of any unit was to place a woman or two in the gang that was turning out that unit.

One plant that used women almost exclusively for automatic machine work had the usual male setters and overseers. Some of the machines were roll fed and a girl tended several. One of these girls discovered that by unwinding a roll and straightening out a short section, placing the roll on her stool beside the machine, she could feed the strip in right after the old spool was exhausted without stopping the machine to thread up. It required a cool head and deft fingers, but it was perfectly possible with these and effected a big saving in a day's run. The setter in the department complained that the girl was disobeying instructions, taking things in her own hands—and the superintendent investigated. After seeing the trick done the setter was called to the office and most awfully censured for not being ready to learn from the women; the girl in the case being substantially remembered and detailed as instructor for the room.

It is true that the men have had a chance to squeeze that never came before and they have made the most of it for which they cannot be blamed, but

their very golden opportunity has opened the way for an influx of fresh troops who have won by their persistency and inexperience. To the foreman and all other executives, the advent of women

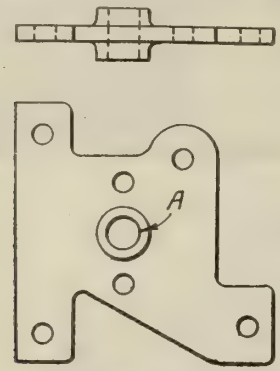


FIG. 1—PIECE TO BE DRILLED.

workers has been a bright spot on a dark and exhausting horizon. These executives have seen mere power to feed a machine earn more money than they with their years of training and their less manual though more taxing labor. If any one thinks it is an easy task to direct a gang of more or less willing workers, he is advised to talk over an exchange of positions with his immediate superior—the latter will not hold out very long before agreeing. A successful superintendent was heard to remark not long ago, "when this war work is over I am going to take a good, long rest—by working in the machine shop with the boys."

SIX HOLE DRILL JIG

By A. E. Kipps

The drill jig, as shown in accompanying sketch, was designed to accommodate the peculiar shaped casting drawn at Fig. 1.

It will be noticed that there are seven holes in this piece, but as the centre hole has already been drilled in a previ-

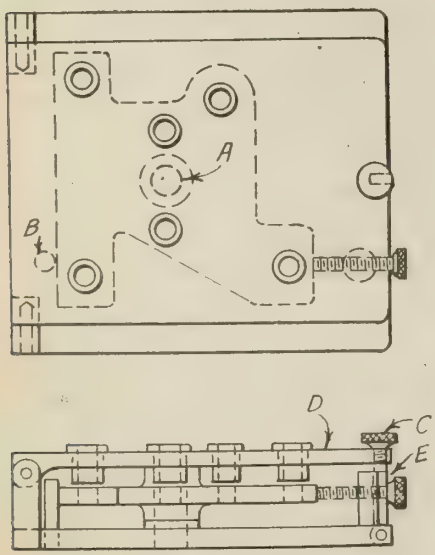


FIG. 2—JIG USED FOR DRILLING.

ous operation, and the bosses faced, we are concerned only with the remaining six holes to be machined.

The work is placed over the centering pin "A", and made to hit the stop pin "B." Fastening screw with knurled handle "C" is brought up and holds the work securely in place. Swinging bushing plate "D" is dropped into position, and fastened with eye bolt "E," when work is ready to be drilled.

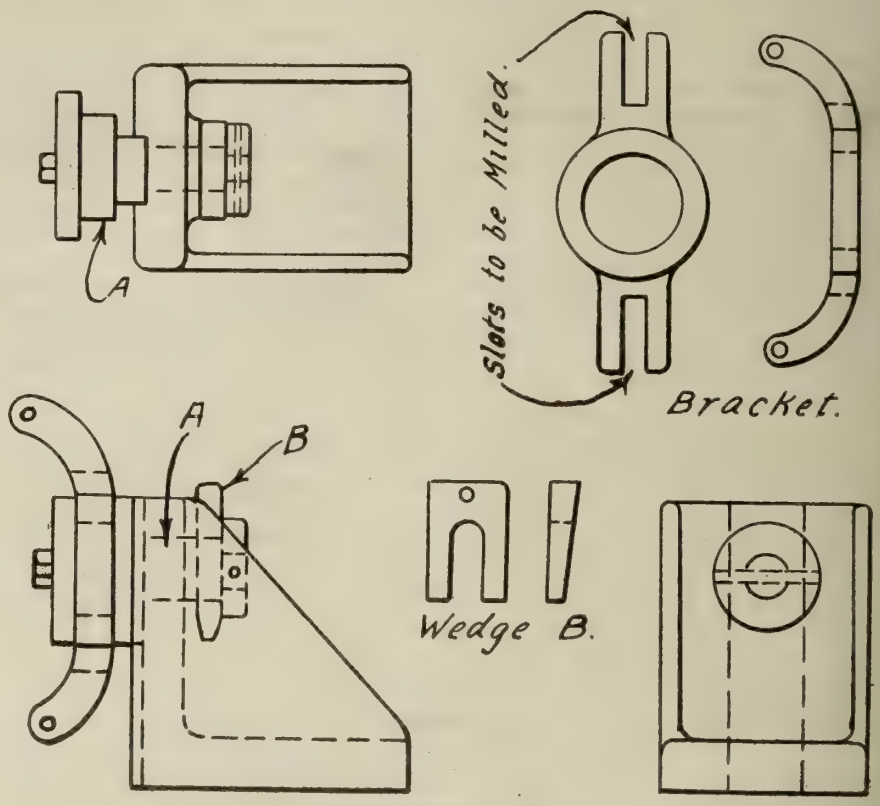
All holes are, of course, drilled at the one setting, and accuracy and interchangeability are assured.

TURNOVER MILLING JIG

By J. H. Moore

The turnover Milling Jig, as illustrated, was adopted to mill governor brackets on gasoline engine work, and has proved a huge success both as a labor saver and as a cost reducer.

The design is so simple that any explanation is hardly necessary except to say that the spindle portion A has a tongue which fits into a groove in the main body casting of jig, and in this



SIX-HOLE DRILL JIG.

way is held in position, aided by the wedge B.

Upon removing this wedge the spindle is pulled in an outward direction when tongue leaves the groove. Work is then revolved 180° and placed in groove as before.

This method ensures accuracy.

Where this operation cost 25c each before the jig was used the cost after the jig was installed was reduced to 7¼c, which shows clearly the advantages derived.

THE ESTIMATION OF ERRORS IN COAL ANALYSIS

In technical paper 171, recently issued by the Bureau of Mines, the authors, J. D. Davis and J. G. Fairchild, have sought to describe a definite method for estimating the probable limits of error in analyzing samples of coal and to show how this method, that of least squares, should be applied.

It has been shown that the method of least squares is applicable to the problem of sampling coal; and the authors have succeeded in deriving direct expressions for the magnitude of the errors in the work studied, or in other words, the answer to: What is the magnitude of the probable error of a single determination, and what is the maximum error to be expected, say, once in 1,000 determinations?

The authors have attacked the problem by first carefully working out the limits for a few coals that are selected as typical and then comparing the results so obtained with data compiled from numerous check determinations taken consecutively from laboratory records.

The results obtained through the theory of probability would seem to indicate rather clearly what degree of precision may be expected with the coal analysis when the quantities are defined by the actual methods used for analysis. It would seem that the limits allowed by the committee on coal analysis of the American Society for Testing Materials are not limits outside which, with ordinary care, determinations would never fall; it would seem rather that the committee means to designate limits within which a large percentage of errors would fall.

The treatment of the subject, while highly mathematical, is of interest and is a welcome addition to the literature on coal analysis.

DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

THE PRECISION MEASUREMENT OF THREAD GAUGES

FAR reaching advances have been made in the past few years in the precision measurement of gauges, etc., upon which the accuracy and interchangeability of the products of the modern machine shop depend for their usefulness. The National Physical Laboratory of Great Britain and latterly the Bureau of Standards of the United States have investigated the subject of thread gauges extensively, and as a result of their researches apparatus and methods have been developed for testing with a high degree of accuracy.

As might be expected, manufacturers of thread gauges have availed themselves of the facilities afforded them and have sent their gauges to the Bureau of Standards for testing, but it has only been recently that the equipment necessary has been made available for private use. The Arthur Knapp engineering Corporation, 101 Park Ave., New York, is now making commercial equipment similar to that developed by the Bureau of Standards, for the manufacturer who has sufficient work to render its purchase advisable.

When the demand for quantity production of threaded parts within the fine limits demanded in the shell industry first arose, it was seen that the measuring apparatus, then available, was inadequate to the task and the apparatus here illustrated was developed in the United States.

In the measuring of threads five distinct operations are necessary, the checking of pitch or lead, the measurement of form and angle of thread, the determining of the core diameter, the measuring of the full diameter and the measurement of the effective diameter.

The apparatus shown in Fig. 1 is used to determine the form and angle of thread. Its operation involves the placing of the thread to be examined in a beam of parallel light, the beam from an electric arc lamp being used as it most nearly approaches a white light in quality. The light from the lamp "L" is directed by the condensing lens A onto the projecting lenses B and C. The screw plug to be tested is placed at the focus of the lens combination B C. Its image is then, by means of a prism G, projected upwards to a mirror carried in a rigid housing, and from the mirror is reflected downwards to the top of the stage N. A standard angle M is shown which is used in checking the wave form. It is necessary for true measurement that the beam of light from the lantern should pass through the screw plug in a direction parallel to the helix angle of the thread, and, therefore, the lamp housing which carries the condensing lens is pivoted about a point beneath the lens B. This insures that the beam of parallel light will always be directed at and will fill the lens B, and the shadow cast will be a true cross-section of the thread form when the proper adjustments are made.

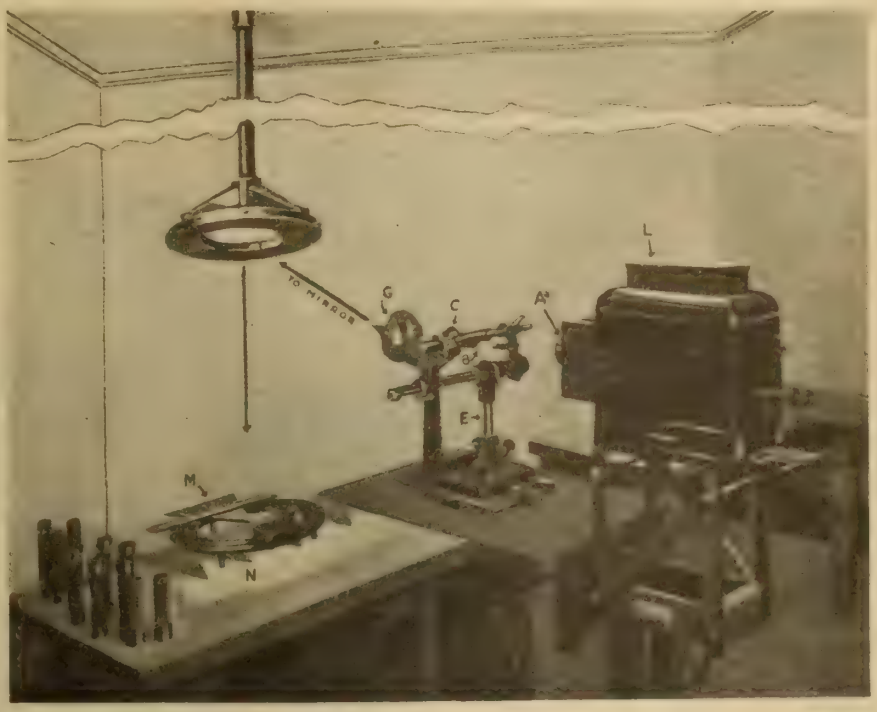


FIG. 1—THIS ANGLE PROJECTION APPARATUS IS OF THE TYPE DESIGNED BY THE BUREAU OF STANDARDS FOR THE EXAMINATION OF SCREW THREADS.

The setting up of a thread gauge for examination requires but a slight amount of adjustment. The stand E is provided with a motion for raising and lowering the threads, a motion for focusing the thread, and another motion for moving the thread along its axis in order that various portions of the thread may be brought into the centre of the screen. The screw to be examined is supported by spring centres which are carried on the stand E. For convenience in making observations it is raised until the centre of the beam of light is passing the under side of the thread. The lamp L is then turned about the axis of its support until the parallel rays of light emerging from the lens A pass through the helix angle. This is shown to be the case when the fringe pattern which is formed about the image of the screw due to imperfect focus is symmetrical. The screw is then brought into focus by a slow motion arrangement and the adjustments are complete.

The examination of the thread angle is made with the aid of a device shown in Fig. 2. The standard angle M known to be 60° is supported by three columns on the stand T, on which rests a protractor ring P carrying the standard angle and the straight-edge E. During the examination of the thread angle the standard angle is adjusted so that its

shadow occupies the light space of the projected image on the surface of the table below. The standard angle is revolved so that one side exactly matches the shadow of the thread and the reading of the graduated head is done by means of the magnifying glass R. The standard angle is then revolved until it

FIG. 2—BEVEL PROTRACTOR USED IN

coincides with the other side of the thread and a reading is again taken. The difference between the two readings gives the error of the thread directly. The protractor can be further used to determine whether the thread is symmetrical with D, a line perpendicular to the axis of the gauge being tested.

The use of the protractor results in a very high degree of accuracy being maintained. The eye is viewing two objects of similar character, two shadows and these can be made to approach until a faint, even thread of light remains between the two—an inaccuracy of only a few minutes can be easily detected. Photographic paper may be used where a permanent record is desired.

Equipments of this kind are made to provide for obtaining a magnification of either 44, 65, or 115 times actual size between the work and the face of the mirror; then by regulating the distance between the mirror and the stage N upon which the image is projected, a further degree of magnification can be obtained. The latter result must be calculated for the distance from the stage to the face of the projecting mirror. Tested under such conditions by a method where the personal equation is eliminated, it is obvious that extremely accurate results can be obtained.

The same equipment may be employed, however, for testing the accuracy of the thread form of female gauges. This result is accomplished by the use of a special core check composition with a known coefficient of contraction and expansion. With this composition a cast is made of a section of the internal thread and then after the cast has been hardened. the accuracy of the thread form of this cast is determined by setting it up on a special support on the gauge-holder and proceeding in exactly the same way as in testing the accuracy of a male-thread gauge. This projection apparatus is also adapted for accurately determining the perfection of thread form of such products as taps and threading dies. It may also be used for testing the accuracy of master templets, etc.

For use in testing the accuracy of the lead of thread gauges, the Arthur Knapp Engineering Corporation is making an apparatus illustrated in Figs. 3 and 4. Its construction is based upon designs furnished to the Bureau of Standards, Washington, D.C., by the National Physical Laboratory of England. The illustrations show machines set up for testing a plug thread gauge and a ring thread gauge, respectively. In addition to its application for testing the lead of thread gauges, this apparatus may be used to advantage in checking the lead of taps, hobs, threading dies and other work of a similar nature, where accuracy of the lead is important. It will be seen that thread gauge X, which is to be tested, is supported between centres carried by a fixed frame L, these centres being adjustable to carry thread gauges of different lengths. A stylus A enters the thread groove, this stylus being carried by a spring support secured to carriage T which is free to move longitudinally. When such a movement of the carriage occurs, the stylus swings on its spring support about a fulcrum at the point of the stylus which is in contact with the thread groove. At its rear end, stylus A carries a small projection lens D through which the light is transmitted from a straight line filament F. The image of this incandescent filament passes through lens D and then by means of two suitable prisms located beneath the table, this image is projected up onto ground glass G. There is a line scribed on this ground glass with which the image of the filament may be brought into coincidence by moving carriage T.

Mounted at the right-hand end of carriage T there is a micrometer head which reads to 0.0001 inch and carriage T is controlled by a counterweight so that the micrometer spindle is always held in contact with an accurately ground ball S at the rear end of the right-hand centre. In testing the accuracy of lead of a thread gauge with this apparatus, first set the gauge up between centres and then enter the stylus point into a thread groove, after which the image of the incandescent filament is brought into coincidence with the line scribed on ground glass G. When this result has been accomplished, the reading of the micrometer head is noted, after which the stylus point is withdrawn from the thread and placed in either the next thread groove or any known number of threads from the one in which the stylus was originally located. Before this change can be made, the micrometer head must be turned back so that the spindle is sufficiently released from the ball S to allow the required travel of carriage T. After setting the stylus in the required thread groove, the micrometer spindle is turned up into contact with ball S, and then by carefully turning the micrometer, a sufficient movement of carriage T will be accomplished to bring the image of the incandescent filament back into coincidence with the line on ground glass G. If the lead of the thread is accurate the difference in the micrometer readings between the first and second sittings will be equal to the lead of the thread or to some multiple of it.

The same apparatus is used in testing ring gauges, and an attachment is provided for this purpose. The set up for ring gauges is shown in Fig. 4 and consists of an auxiliary stylus E which has a bent point K which will enter the thread groove. Several sizes of style are provided to suit different pitches.

The pitch diameter of gauges is measured by a machine constructed by the above firm according to designs developed by the National Physical Laboratory of Great Britain.

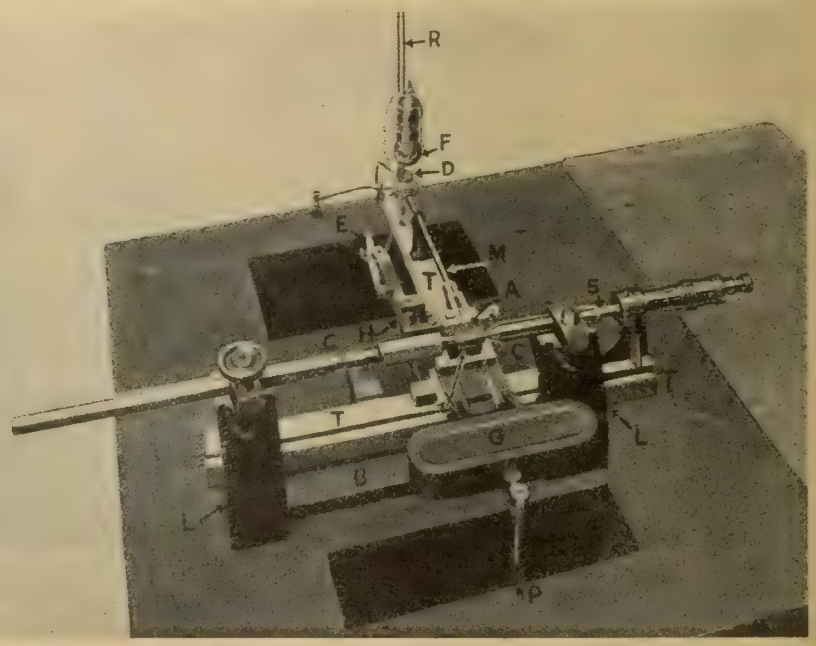


FIG. 3—OPTICAL LEAD TESTING APPARATUS SET UP FOR TESTING PLUG THREAD GAUGES.

Apparatus for Measuring Pitch Diameter of Thread Gauges

The thread gauge pitch diameter measuring machine shown in Fig. 5 is made by the Arthur Knapp Engineering Corporation according to designs developed by the National Physical Laboratory of England. It will be apparent from this illustration that the apparatus employs the three-wire system and the claim made is that exceptional facility is afforded the operator of the machine in carrying on his work. It will be seen that the three wires A are supported by a bridge B so that they are conveniently located in relation to the gauge. This is a far better method than employing rubber bands to hold the wires on the work, as the tension of the bands bows the wires and is likely to cause inaccurate results to be secured. At one end of bridge B it will be seen that there is a stop C which is adjustable for different sizes of thread gauges which may be tested; and at the opposite end of the bridge there is a micrometer head D, which is used in making the measurement over the wires. The entire bridge and other parts of the mechanism are carried on a cross-slide E, which is supported by two balls in one of the V-ways and one ball in the third way. This gives a free transverse movement so that the stop C and micrometer spindle D can instantly centre themselves in relation to the thread gauge and wires. It will also be seen that carriage E is mounted on a longitudinal slide F so that the micrometer and wires may be moved along to provide for taking measurements at different points on the thread gauge. It will, of course, be evident that the gauge is supported on centres G and that these are furnished with means of adjustment to provide for holding thread gauges of various lengths.

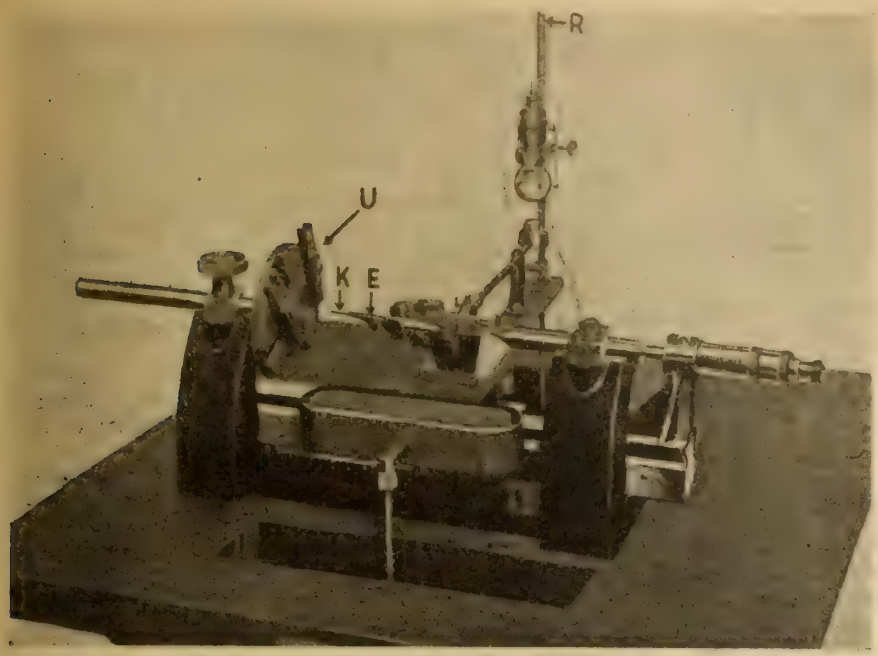


FIG. 4—MACHINE IN POSITION FOR TESTING RING THREAD GAUGES.

SMOOTHER SHIPS FOR SPEED

From the considerable amount of experience that has been obtained in England on the construction of steam and motor ships with electrically welded joints there is every reason to believe that welding will become one of the standard processes in shipbuilding. By the elimination of rivets and riveting much material and a great deal of costly and tedious labor are saved. The welded ship being lighter and having a smooth skin, can carry more cargo and make higher speed than a vessel with riveted joints. The welded joint can be made much superior to the riveted joint in compactness and strength. At present it would not be wise to have a welded vessel built by other than a firm of the highest repute, but there is no doubt that a first class shipbuilder, using all the resources at his disposal, can turn out a welded ship which offers more advantages, structural and otherwise, than are obvious from a first consideration of the problem.

TURNING OUT MACHINE TO MAKE THE SNOW FLY

Goderich Firm Could Hardly Get Enough Snow to Give a Demonstration

The Dominion Road Machinery Co., Ltd., of Goderich, this winter are making six more of their rotary snow plows, which were put on the market last winter. Two of these machines were manufactured last winter and have been in successful operation in the city of Montreal, where they had some real drifts to contend with. The third machine to be manufactured gave an exhibition on the Square at Goderich before its shipment to Montreal, but as there was little snow, only a faint conception of what the machine can do was got by the spectators. The machine is drawn by horse power, but the motive power to operate the rotary blades is supplied by a 60 h.p. gasoline engine. The blades are in two sections, one at each side of the machine, and are made to rotate at a rapid speed in the opposite direction to that in which the machine is moving. In the centre of the machine is a sort of plow arrangement, which divides the drift, causing part to fall to each side in front of the blades. These throw the snow up at each side through a sort of funnel, either scattering it broadcast or dumping it on a sleigh driven alongside, according as the hood is raised or lowered. The machine costs up in the thousands, but for a city with much snow to remove it should prove a great money saver in the speed at which it can work. The selling agents are the Canadian Fairbanks Morse, Montreal.

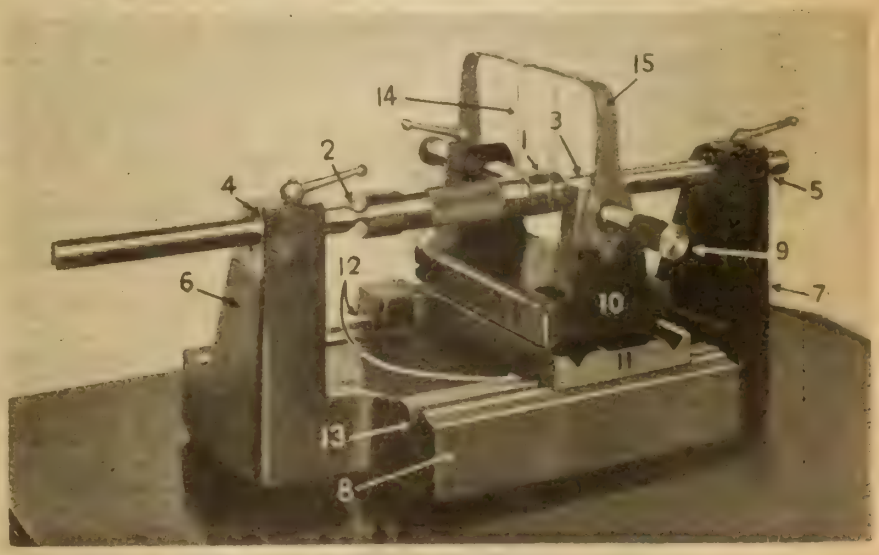


FIG. 5—PITCH DIAMETER MEASURING MACHINE.

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That European Business

THE much talked-of trade with Europe has not as yet materialized. It is becoming more evident daily that "the reconstruction of devastated Europe" is being attended to in a good many particulars by "devastated Europe" itself. The Ottawa representative of CANADIAN MACHINERY, in a recent despatch, puts it this way:—

"It begins to look as though our reconstruction trade with Europe, which was started after with considerable of a hurrah when the war ended, would not be something that would drop into the lap of Canada without effort, and a great deal of effort, at that. Our Trade Commission has now been in Europe for two months; reconstruction there has, presumably, been going on; but at the time of writing not a single definite order has come our way. It seems that the announcement of a forty-million-dollar order for lumber was premature; there is, at all events, a good deal of uncertainty about it still, and the impression here appears to be that all that was done was the establishing of a credit for that amount for the purchase of lumber. Norway and the other timber countries of Europe are after the business; and a Frenchman's business goes to the lowest bidder.

"Apparently the most we can expect from the Trade Commission is to locate business abroad in a general way, and advise Canada of its whereabouts. Orders will have to be secured by personal effort on the part of our manufacturers. The United States is going to compete with us for every dollar of it; and they have a competitive organization now on the ground.

"The American army was spread over a good deal more ground in France than the British, and probably came into closer touch with the people. The American is a good mixer. The study of French has been encouraged among American soldiers. American business methods applied to war were more spectacular, if no more effective, than our own."

It stands to reason that the nations of Europe, even those that have been overrun by war, are not going to stand back and see business going elsewhere that they can possibly handle. They will have their own people to look after, and the problems of unemployment will be just as keen in those countries as in the others that are there looking for business.

If Canadian manufacturers, separately or in groups, can send representatives to locate and LAND business, it would be good policy for them to do it. In the past Ottawa has not shown itself to be a prolific source of business for the Canadian shop, and it may not be well to rely too much on it now.

A Poor Way To Do Business

IN Toronto police court a few days ago six boys were arraigned in the criminal dock on the charge of having played cards on Sunday in some shop or factory.

The boys were gathered in by the police net on Sunday and locked up in the cells over night.

They were treated, to all intents and purposes, as though they were criminals.

Boys who play cards on Sunday, or any other day for that matter, for stakes or for amusement are not necessarily bad.

Putting them in police court over night is not going to make them any better.

The chances are that those boys are standing right at the point where they need a little care from a good man and a little love from a good, motherly woman.

It's worth asking whether the law is to protect, punish or improve. In the case of these boys if it does nothing more than accomplish the first two, it has failed and failed miserably.

Toronto has many institutions that claim to make a specialty of giving boys a second chance and a better start. Here's a chance for some of the theories to be put into actual practice.

The police court as an institution for dealing with boys who haven't had a good start has never shown itself to be a success, and it's a serious mistake and a poor blunder as well to herd boys behind the bars as a starter.

Prices After War Periods

ANYTHING that has a bearing on prices is a matter of interest right now. Eliot A. Kebler, special representative at Pittsburgh of the Matthew Addy Co., has sent to Judge E. H. Gary, chairman United States Steel Corporation, the following statement as to pig iron prices after wars and shortage of pig iron capacity shown by comparison with steel:

ADVANCE IN PIG IRON PRICES AFTER WAR

Russian-Japanese War	
War declared Feb. 10. 1904—Valley Bessemer	$12.64
War ended Sept. 9. 1905—Valley Bessemer	14.95
Price May, 1907—Valley Bessemer	23.28
Spanish War	
Really began January, 1898—Valley Bessemer	$ 9.12
War declared April, 1898—Valley Bessemer	9.66
War ended August, 1898—Valley Bessemer	9.60
Price December, 1900—Valley Bessemer	24.20
Franco-Prussian	
War declared July 10, 1870—No. 1 foundry, Philadelphia	$32.75
War ended May, 1871—No. 1 foundry, Philadelphia	35.50
Price June, 1872—No. 1 foundry, Philadelphia	53.37
Civil War	
October, 1862—No. 1 foundry, Philadelphia	$18.61
August, 1864—No. 1 foundry, Philadelphia (gold basis)	29.44
Average year 1866—No. 1 foundry, Philadelphia	46.61

Of course it is possible to advance all sorts of reasons why the same thing should not work out the same way in the present situation, but against this there is the weight of precedent worked out in cold figures. The record of past performance is worth remembering when making your future plans.

THE pork packers are bustin' out in cold sweats because the price of pork is apt to come down to the point where we can once more decorate the pine table with ham and——.

* * *

A WIDOWER is advertising in a Toronto paper, stating that he wants to meet a widow who has some means of her own. That's our idea of a real optimistic optimist.

* * *

THE scrap business has gone to pieces. The first man to spoil the business was the Hun with his scrap of paper. Now the scrap in Europe has petered out and the scrap metal market here is a dead one.

* * *

SOME experts say that the era of lower food and clothing prices is on the way. So be it. Perhaps we'll soon be buying tan boots for $2 a toss and gettin' T-bone steaks for a york shillin'.

Don't Pursue Waiting Policy Too Long

IT is now approaching three months since the signing of the armistice was announced that ended the European war. This act made it certain that the Allies—Canada included—were free to work out their own destinies without the fear of German domination.

That fear of German domination is being replaced in some quarters with a new fear—one that might be called the fear that we can't do things.

It is time for governments and manufacturers to look this situation right square in the face and find out what's the matter with us.

Let us admit that there is a certain element of risk in driving ahead right now with an industrial proposition. Any good business man knows that, and it's not worth while arguing the point.

There was also a certain amount of risk for the man who stood in the front line on that Western Front to keep German from being made the court language of Canada.

Is it a greater thing to ask a man to risk his dollars now than it was to ask and in some cases make a man risk his life a few months ago?

There's nothing particularly radical about that question. It's a plain statement of absolute fact.

And while some of our men were being shot at on the Western Front others were making money at home. Nor were they making it in hundreds or thousands. They were making it in millions.

These brave chaps are coming back now. Every week sees them landing here in thousands. They are desirous in nearly every case of getting their discharge. They want to return to their old lines. They want to work and earn their living.

As things are shaping at the present moment it looks as though many of them would find that the country that cheered their departure would now cheer them back to a jobless land.

Enterprises are held up in many cases on the expectation of lower prices farther on. Manufacturers hesitate to buy material out of a fairly high market, fearing that before they have finished their operations and distributed the product through their selling agencies, prices will have moved to a lower level, and they will lose money on the venture.

Well, supposing this feeling becomes general, and that this motive becomes the one dominant tone that is going to regulate business. What is going to be the result?

Again, there is hardly any need for answering that question, because the answer is painfully apparent to any person who cares to give any thought to the matter at all.

It spells stagnation in letters a foot high.

It would not be worth noticing were this policy being put into effect in only a few isolated cases, but when the industrial fabric becomes saturated with that same idea, it is high time to speak and find a solution.

Firms that have made money should, in fairness to the abnormal conditions that made it possible for them to make it in large quantities, be willing to risk some of it to bridge over the uncertain months that lie between an abundant war trade and a normal peace-time turnover.

The Dominion Government, which right now has available cash at its disposal, and which can secure more, should place all the orders it can for all the enterprises it controls.

The individual buyer should get the idea out of his head that the purchase he is figuring on is going to be made at a greatly reduced price in a few months from now. It may pay him to wait. Admit that. But what is going to become of the good home market in which he expects to sell if all purchasers take the same stand?

Remember we do not for a moment recommend blindfolded spending. Such a policy would simply aggravate the situation, and make matters worse.

But there must come a time very soon when we should be entitled to look for a display of courage and confidence on the part of our industrial community. There is a danger of the country sitting down on its haunches too long.

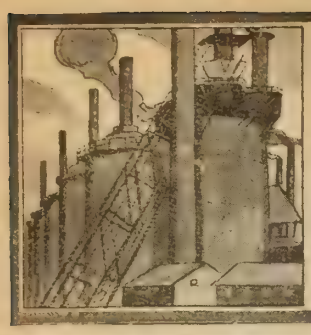
It is time that the commercial and industrial world in Canada began to stick up the sign "Buy Something."

Remember this country is in good shape financially. The banks have a lot of money on deposit. Farmers have money and prices for their produce are good.

We haven't suffered property loss through the ravages of war. As a nation we are richer than before the war started. The end of the war made it certain that the sacrifices and achievements of our men in khaki had not been in vain.

We'll admit that it is easy to sit down and blow in the other fellow's money on paper. But that's not the point.

The thing is this: Industrial Canada, in self defence must soon see to it that we do not drift into an era of unemployment and social unrest. Just now when men are being discharged from the army in large numbers is the season when employment should be provided to take care of them. It would be much better for this rich country to invest some of its millions in this way than to spend them later on combatting some of the seed of unrest that will certainly be planted if this policy of waiting be allowed to continue indefinitely.



MARKET DEVELOPMENTS

More Sales Are Being Reported This Week

Some Revival Noticed in Certain Lines of Trade—If U.S. Mills Are Running Past 60 or 70 Per Cent., Where is the Output Going? —Pig Iron Prices Are Not Finally Settled

THERE are some signs of an improvement in business conditions in so far as they have to do with the machine tool trade; but these are rather local, and can hardly be interpreted as forerunners of a general revival in this line of business. However, there are lines that are buying quite heavily, viz., some of the agricultural implement shops, rubber goods works, knitting mills, planing mills and furniture factories.

It is interesting to note as an aftermath of the war that British lines are making their appearance once more on the Canadian market. This week a good sized tube order went to a British house. They are also in the market now for furnaces, chains, anchors, and kindred lines. Exportation of these was prohibited during the war, but it is possible now, and there are increasing facilities for transportation as well.

Warehouse interests report that there is a lot of business moving in their lines. It is not coming from any particular section, but from shipyards, mines, and repair requirements to existing plants. Some of the latter have been run at top speed 24 hours a day for the last three years, and it is easy to see that they need repairs.

The Canadian National Railways are out this week with specifications for satisfactory orders for tubes, plate, etc., for boiler work. In fact, their buying of this material and of supplies for the machine shops has been about the best business offering.

Prices of steel are standing at the marks that have been passing for some weeks. Indications are that they will not move to any lower levels. There is talk of labor trouble breaking out in the Pittsburgh district, and it will be largely through prices that such trouble will come. The trade feels that it cannot keep prices up to levels and get trade, nor can prices drop until production costs are cut. In such circumstances it is not a hard matter to create trouble.

MONTREAL TRADE CONDITIONS ARE NOT RECOVERING QUICKLY

Special to CANADIAN MACHINERY

MONTREAL, January 29. — Nothing has transpired that would give an indication of an early renewal of industrial activity. After the four strenuous years of war even normal conditions seem quiet in comparison, and during the period of readjustment this absence of activity will be more pronounced than ordinarily. A factor that is affecting present business is the high costs of production, chiefly as a result of the high wages paid to workmen. The readjustment in this connection will be one of the most difficult tasks of officials in placing operations on a more normal basis. In ordinary times production could be maintained to relieve a serious labor situation, but existing high costs in the face of a lowering market almost prohibits the accumulation of stocks. It is hoped that the Government will take steps to relieve a situation that may gradually become worse.

No Market in Steel

Despite the fact that price declines are relatively few, the situation is gradually attaining the point where some definite action will probably be taken to free the market from its strained position. With the present reduced production far exceeding the trade requirements the surplus output must eventually create stocks that may have to be sacrificed in the early future. A further reduction on present production will mean the closing down of mills and resulting in the addition to the already large numbers of unemployed labor. Even should prices decline to a more normal basis it is doubtful if heavy buying would immediately develop owing to the marked uncertainty that prevails in all circles. It is not unlikely, however, that with the peace negotiations assuming tangible shape business activity will be resumed. At present it would appear that every one is waiting to see what the other is going to do, few having the courage to strike out for themselves. Dealers report a quiet demand but consider the volume of fair proportion in face of existing conditions. The bulk of the business now passing is almost exclusively for immediate requirements. little interest being displayed regarding future needs.

Weakness in Metals

Price quotations on the various metals are gradually declining, but activity fails to develop under the existing unsettled conditions. Production and supply is more than sufficient for present requirements, and unless buying on a larger scale becomes a feature of early future business prices are more than likely to go still lower. Local demand is very quiet, but business in some lines is fairly steady. Dealers here announce a decline of one cent on coppers, the quotations being 25 and 26 cents per pound. Tin requirements are comparatively light and the price asked is 70 cents, a drop of 5 cents per pound. Lead is weaker on poor demand, a decline of ½ cent. placing this week's quotation at 8½ cents per pound. The demand for aluminum has fallen off and quotations have declined to 40 cents per pound.

Machine Tools Still Quiet

General business in machine tools continues quiet but present inquiry is of a character that would tend to indicate that buying will develop when conditions become more settled. Just now there is little interest displayed on the part of metal-working shops, but demand for wood-working tools is relatively heavy. Some second-hand machines are being disposed of but these are invariably

those that are applicable to general use. Special shell machines are not occupying the attention of the dealers to any great extent. While dealers here invariably report a quiet week, it was stated by one that their sales for the month so far exceeded those of December and the turnover on small tools and supplies was exceptionally good under existing circumstances. One machine agency here stated that a sale had been made a few days ago in which he disposed of a hydraulic forging press from one Montreal firm to another for the sum of $17,000, the purchaser already being in possession of two of the largest forging plants in the city. Future industrial prospects are still more or less obscure, and until the veil of uncertainty is lifted the outlook for renewed buying is a doubtful factor. Present prices are still comparatively high and this is probably one of the conditions that influences current buying.

Scrap Very Dull

Stagnation characterizes the scrap and old material situation and present developments are little indication of a departure from these conditions. Dealers claim that large consumers are heavily stocked and consumption is light. Yards are well supplied and many dealers are reluctant to take any additional scrap when the same is offered unless a purchaser can be found for the same to permit of its transfer direct. Price quotations are nominal and can only serve as a basis of the market, as dealers claim they cannot give any definite price for the purchase of material, each transaction being conducted on its own merits. The quoted price on wrought iron axles is now $28, machine cast iron $28, malleable scrap $23, and wrought iron pipe $16, these prices representing a decline of $2 per ton.

POINTS IN WEEK'S MARKETING NOTES

The claim is made that production is greater than 70 per cent. of the steel mill capacity of United States at present. If this is so a Pittsburgh expert wants to know where the material is going.

—

There is some serious talk of labor trouble in the Pittsburgh district. Present selling prices do not draw business, and it is impossible to get lower unless labor costs come down. It is said that some shops are preparing against labor troubles.

—

Several fairly large sales have been made in Toronto during the week in the line of machinery. Some of the agricultural shops are in the market while others are contemplating purchases.

—

There is a nice amount of material going to the shipyards now and business there promises to be good for some months to come.

—

There have been no price reductions during the week and it looks as though present values would stand for some time.

—

The scrap metal market is no better. Neither is it any worse. Some of the larger yards claim to be losing money now, but contend that the present situation cannot last indefinitely. There is nothing in sight to indicate any betterment in the near future.

—

United States dealers are divided on the price of pig iron. The new price named by Judge Gary was $31 against the war price of $34. Some of the independents are holding out for the old price. There is very little selling beyond actual needs being done at either price.

REPORT SALES AS SHOWING GAINS NOW

Dealers in Several Lines Are Sure That Things Are Turning Out Better

TORONTO.—There are indications coming to the surface that show that business is improving. Sales are reported in a good many cases, and some of them run into very respectable looking figures. It cannot be said that these are along any particular line, but come from a great diversity of interests. In some cases they are orders that could not be placed during the war, because manufacture of the machinery would not be allowed in any of the Allied countries, while in others shipment was much interfered with. Many of the dealers expressed themselves as much more satisfied with the outlook than they have for some weeks past.

No Better—No Worse

"Just the same as last week. Not a bit better and not a bit worse." That seems to fairly well describe the market for second-hand material just now. Dealers find help—as least they say they do—in the thought that the present situation can't last indefinitely, and that sooner or later things will begin to move. "It's about the same as the first six weeks of the war," stated one dealer to CANADIAN MACHINERY this morning. "We are not doing a thing in our yards. In fact we are losing money now, but it can't last much longer."

There has been small lots of shell shop machinery come into the hands of the scrap dealers, and several more deals are pending now. This class of material would come under the heading of "Breakage," and $18 per ton would be about the market price for it now. That is rather low, but dealers would probably buy at that figure now, and the chances are that they could not be coaxed into going higher for the material in the present market. It is a mixture of cast iron and steel and would have to be separated and broken up into sizes to suit the cupola. It seems likely that there will be considerable of this sort of material offering before so very long, and unless the market changes for the better the returns from such sales will not be very heavy.

Scrap prices are not particularly high now if they are taken against a ten-year period in pre-war times. For instance heavy melting is now quoted at $15, which is away down from the prices that it has been bringing for a good many months past, but shortly before the outbreak of the war there were sales made as low as $9.25 per ton. However it would not be fair to put that up as normal price, as it was in reality an abnormally low price.

English Lines in Again

One thing is worth noticing as an after-war development, and that is that British lines are again coming into the Canadian market in several instances. During the war it was impossible for the Old Country firms to compete here. They could not secure permission to export such articles as tubes, chains, furnaces, nautical instruments, etc., neither was it possible to secure the shipping accommodation to bring it to this country. There was one good sized order figured on during the last few days by representatives of English firms for boiler tubes. There does not seem to be much uniformity about the price as in the bid for plain tubes the English price was away high, but on stay tubes they were well below the quotations of the American mills.

The Canadian National Railway is out again with some very nice inquiries for good amounts of tubing, plate, etc. Warehouse men here state that there is a very nice volume of business moving. They cannot place their finger on any particular spot and say that it is the source of their turnover, but it is a fact that they are receiving inquiries that are readily converted, from a great many different interests. Some of them are for repairs on a large scale, while others are for new work. Shipyards are also good customers for steel plate, and their orders are still proving quite a tonnage. Deliveries on this material are much better than they were some months ago.

Supplies Are Firm

An agent of one of the leading makers of drills, speaking to CANADIAN MACHINERY this week, stated that there were going to be no reductions in prices. He claimed the contracts for the raw materials were made pretty well in advance, and as this was being worked up into stock there was no chance of a decline in prices. Some of the interests seem to have been anticipating that there would be a drop, but this representative was certain that such would not be the case. In fact he said his company had already considered the matter, and he knew what their policy was going to be.

Selling Machine Tools

"Business is a long long way from being dead," was the remark of a Toronto dealer this week. He admitted that the equipment of the flying corps shops that was being placed on the market was interfering with the sale of new machinery in some cases, but apart from that there is business going. The agricultural implement houses are buying heavily in some cases. In fact there seems to be a difference of policy here. One large shop is buying equipment in big quantities just now, while others, which do business on a large scale, are pursuing a very conservative policy, and are not placing any orders that they do not immediately need.

Dealers are selling machinery to woodworking shops and furniture factories. Knitting factories are also good customers. Many of these lines have of necessity been neglected during the period of the war, and they are coming back now at the first opportunity. Shops that are making rubber goods are also in the market in many cases for machinery, in fact the demand in this class seems to be particularly brisk.

THE QUESTION OF PRICE KEEPS BOBBING UP IN PIG IRON DEALS

THE question of the price of pig iron is one of the matters that is holding the attention of American trade. The new price of $31 is not yet fully established, but is making rapid progress, and sellers find that they have to come to that figure in order to compete with those who are making the $3 concession.

Pittsburgh.—Disquieting reports are in circulation here to the effect that a strike may be called in several of the mills to head off a cut in wages. The market is extremely dull, and the only sales being made are in cases where there is immediate need. Quite a number of furnaces in this district have blown out for relining and repairs. Of course, this means that the record for output will fall down when compared to the previous month.

Chicago.—One of the largest producers and sellers has issued the following statement: "We understand that the market price of pig iron has fallen about $3 per ton. We followed the market and reduced prices on pig iron sold by us about $3 per ton. In view of the peculiar commercial conditions now prevailing, we have applied this reduction on some existing contracts where the circumstances seemed to warrant."

Philadelphia—Although some contractors have revised prices down $3 per ton, some are still arguing the point with their customers. Price revision is certainly becoming more general, and concessions to the trade will be more frequent. Lower prices are expected. The cutting down of costs, the sellers say, must happen before any reduction is possible now.

Buffalo.—A little demand for foundry, malleable and basic grades is developing, and this has the effect of making the outlook for business a little better, though no great improvement is noticed yet. Sellers are not out looking for business, but are cleaning up on contracts that have been on the books for some time.

Birmingham.—Some sales are now passing at the $31 mark. On the other hand independent makers are selling at $34 and getting a little business. Several small users are trying to get out of contracts unless they can get the $31 figure.

New York.—Some of the reports from the East are a little better. A few foundries that are working on malleable are securing some orders from railroad and automobile business. Small export bookings are also secured.

St. Louis.—There has been practically no change here during the week. Buyers do not show any tendency to come into the market. They have enough on hand for their immediate needs.

IF MILLS ARE RUNNING NEARLY FULL, WHERE IS PRODUCT GOING ?

Special to CANADIAN MACHINERY

PITTSBURG, Pa., Jan. 30.—Some of the mills claim that the majority of current estimates of the average rate at which mills are operating are too low, the usual estimates ranging from 60 to 70 per cent. of capacity. If the contention of these mills is correct, a mystery is created, for it is recognized everywhere that there is no market for a tonnage of steel at all approaching the productive capacity. If the present demand for steel is really absorbing an output almost equal to capacity, then if a general widespread demand for steel should develop the mills would simply be swamped. No one, however, would contend that this could occur, for throughout the steel trade, even among the more optimistic, doubts have arisen as to whether the steel industry can be fully supplied with orders even if business generally becomes good.

The mills could probably explain the discrepancy in reports if they would, but they are not any too communicative just now, feeling that the present is a very delicate situation. Possibly the explanation of there being such divergent reports as to the rate of operation is varying interpretation of the terms used in referring to operating rates. The common view of rate of operation of a steel mill is the actual tonnage output divided by the tonnage of which the mill is capable. A plant may report that it is "operating in full," however, when it merely has all departments in operation. Thus a plant containing ten open-hearth furnaces might be operating each of the ten, but by using a minimum of scrap, the charge being chiefly pig iron, might be getting only ten heats per week, whereas when production is pushed the furnaces might be capable of 16 heats per week. This would be "full operation" in one sense but only 62½ per cent. operation from the tonnage standpoint

Whatever the rate of operation, it has been decreasing since just before Christmas, and the present trend is downwards, as the orders coming in are far less than the orders that are being filled. The mills are running chiefly on old orders, and most of them frankly admit that they could not come anyway near operating at their present rate, whatever that rate may be, if they depended solely upon current bookings of business. Obviously the old orders will tend to play out from week to week, and smaller and smaller production is in prospect, until there is a fundamental change in conditions.

Production in Detail

For several weeks past the report has been quite general that the sheet mills were experiencing about the best operation of any branch of the finished steel trade. If that were true at one time it is no longer true, for sheet mill operations have decreased materially. Several plants closed entirely at the end of last week, and one plant containing about ten mills is to close at the end of last week, having practically no further orders on hand. While sheet demand from the automobile trade is excellent the heaviest tonnage the automobile shops can take is but a small proportion of the total sheet capacity. To make a full demand for sheets it is necessary that there be a fair degree of building activity, but there is practically none at all.

The wire mills are doing fairly well, the majority at 60 to 70 per cent. of thier respective capacities. Their trade prospects are fairly good, moreover. The wire mills are much less dependent on the building trades for orders than are some other branches of the finished steel trade. They look rather to the farmer, who has great consumptive powers in wire of various descriptions, and nails. In merchant bars there is a fair degree of activity, and this is true also of pipe. The structural mills are running very light, while there is hardly any rail production at all.

The plate situation is rather cloudy. Several plate producing interests claim to be operating quite well, but refer to orders from the Emergency Fleet Corporation as their chief business. From the shipyards, however, come complaints of overshipments, and the Fleet Corporation's orders, recently curtailed from the rate obtaining in the late months of the war may, therefore, be further curtailed. At their highest level, the Fleet Corporation's plate requirements repre-

sented a tonnage equal to only five or six per cent. of the total finished steel capacity of the country, and not even one-half of the plate rolling capacity alone.

Prices

So far as can be ascertained, finished steel prices are holding very firmly. Mills, however, do not feel that it is any great trick to hold prices in present circumstances, because orders offered are very small and there is no temptation to cut prices in order to get the orders. Cut prices, indeed, might frighten away what little buying there is. One delicate point in the matter of price guarantees. Many buyers ask mills to guarantee prices to date of shipment, and although shipment as a rule would be made in from two to four weeks the mills refuse to give any guarantee. In this they feel they are exhibiting some strength, but buyers assert that this shows the mills have no confidence in their market.

For a short time after the reductions made about the middle of December, $4 to $6 a net ton under the former government maximums, there were predictions that the new prices would hold for quite a while, say to April 1. In the past few days less confidence has been manifested on this head, and there are some predictions that there will be further declines in February, without detriment to there being also some reductions about April 1.

Labor and Wages

There is not much idleness of labor in the Pittsburgh district, not as much as in some sections of the East, but there is some, and additional men are being let off from day to day, chiefly common labor. The branch of the United States employment service located in Pittsburgh reports a large surplus of common labor, but an actual shortage of all-round skilled machinists, not the kind of "machinists" that were produced during the war, however. The policy of the steel mills continues to be that there should be no reduction in wages in present circumstances, and none at all unless prices should come down very considerably. In some quarters the prediction is made that after about two more reductions in prices of finished steel labor will be asked to bear part of the burden of further price declines.

SCOTIA COMPANY MAY CLOSE PART TO MAKE IMPROVEMENTS

NEW GLASGOW.—Asked as to the truth of the rumors that the Scotia Company contemplated the closing down of its steel making department of Sydney Mines, and the curtailment of its operations at New Glasgow, Mr. McDougall. president of the Nova Scotia Steel & Coal, stated that as was well known the several plants of the company had, during the past four years, been operated at high pressure. The present moment, when the cancellation of munitions contracts has left the tonnage on the company's order books at a lower point than at any time during the past four years, is considered an excellent opportunity for carrying out necessary repairs and renewals, which could not be done during the strenuous years when all efforts were bent on increased production without consideration of cost.

New business, said Mr. McDougall, is offered to a very limited extent and at prices which are not at present attractive to the Scotia Company, consequently now is the time to make the necessary preparations for the future. With this in view certain extensions of plant, which have been contemplated for some time, will also be planned and undertaken where possible during the shut-down.

The Coal Situation

What to do with its coal operations at Sydney Mines is the most difficult and complex question in connection with the Scotia Company. The cost of production at the collieries has for some time past been extremely high, making it impossible for the Scotia Company to compete in the general coal markets, and seriously affecting the fuel costs in iron and steel production.

We hope, however, to effect such improved general policy of operation and engineering that the Scotia Company will, in the near future, resume its position in the general coal market and will obtain coal for steel making at a cost which will enable it to meet the competition.

Above ground our plans contemplate reconstruction, chief among which will be the provision of new and thoroughly up-to-date by-product coking ovens.

The situation at New Glasgow is more difficult to determine and will require considerable additional thought. In so far as is possible it is our hope and intention to maintain and develop the steel manufacturing industry in all its departments in Nova Scotia on a successful and steadily growing basis.

Developments at Wabana

It is at Wabana, however, that the company is likely to make its most important progress in the near future. During the world war shipping conditions were such that the former trade carried on by the Scotia Company will produce iron ore for disappeared entirely. The development of the property was pushed forward during this period and it is my idea to so develop the Wabana Mines that the Scotia Company will produce iron ore far in excess of its former outputs, and at materially reduced costs. The company will then be in a position to enter the ore markets of the world on a scale commensurate with its vast resources of iron ore.

Considerable time and capital will be required for these plans and developments to mature. Fortunately, the probability of these developments was foreseen by the management and by Hayden, Stone & Company, who represent the large U. S. interests in this company, and through the fortunate provision of an additional $5,000,000 of working capital by the sale of that amount of stock in the year 1917, the company is now placed in a remarkably strong financial position, having net current assets of over $10,000,000.00.

WANT ASSISTANCE FOR STANDARDIZATION

Appeal Made to Ottawa For Assistance In Carrying Out This Work

OTTAWA.—A Government grant to help carry on the work of the Canadian Engineering Standards Committee and Government action to keep alive the airplane industry in the country were asked in memoranda which a deputation presented to Sir Thomas White, the Acting Prime Minister. The Engineering Standards Committee was formed a year ago as a result of a suggestion from the British Engineering Standards Association. The committee's object is to promote standardization of materials and machine parts with a view to expediting production, eliminating waste and reducing manufacturing costs. It received from the Government, through the honorary Advisory Council for Industrial and Scientific Research last year, a grant of $3,000, which was supplemented by an equal sum contributed by technical societies and manufacturers interested in bringing about standardization of materials and interchangeability of parts. The committee now proposes to be incorporated as the Canadian Engineering Standards Association. It estimates that it will require from $15,000 to $20,000 for its work during the present year, and of that amount is asking the Government to contribute $10,000. The committee has sub-committees on cement, bridge construction, materials, electrical standards, rails and other railway material, etc.

ROSS RIFLE WAS FINE FOR SNIPING

But Soldiers Preferred the Lee-Enfield For Hard Usage in the Trenches

It was unanimously decided at a meeting at the Windsor Hotel in Montreal of officers and other ranks interested in rifle shooting that the Montreal district should be represented at the meeting of the Dominion Rifle Association this year, and that a meeting should be held both for the Dominion and the Province. It was also decided by a strong majority vote that if the National Rifle Association should hold a meet at Bisley this year there should be the usual Canadian team of twenty members, probably ten from Canada and ten from the Canadian

overseas forces, with an adjutant to be appointed later. In argument as to whether the Ross or the Lee-Enfield rifle should be used, returned soldiers at the meeting all declared emphatically that the Canadian soldiers had thrown away the Ross rifle and secured Lee-Enfields whenever they could, finding the latter the best when it came to hard fighting, although the Ross was a fine rifle for sniping. A vote taken, however, showed a majority in favor of the Ross rifle.

THERE'S NO BOTTOM LEFT TO FALL OUT OF SCRAP MARKET

THE scrap metal market has fallen upon evil days. Apparently no person loves it. No person wants to buy, and no person wants to sell. Prices are on the skids and it may be that they will go lower than they are now quoted before they reach a basis from which a trade can be built up again. Reports from some of the larger American centres are as follows:

Pittsburgh.—The bottom has fallen out of the local scrap market and prices are on the skids. Heavy melting scrap has been offered as low as $17 per ton delivered at furnaces, but the offer was turned down. Low phosphorous borings and turnings are down to a very low level with no takers.

Chicago.—Market conditions here are about as low as they could be. Only an occasional small sale is made, and that only where the purchaser wants the material for some particular purpose. Railways are showing a tendency to take lower prices for their lists of scrap.

Philadelphia.—Prices have come down here through the week and there is nothing to indicate that recovery is in sight. Dealers have been forced to ship to save demurrage and this has forced prices. It is known that the Government has great piles of war scrap, which puts a damper on any rise in melting steel.

Buffalo.—The consumer can do what he wants in the market now. Prices have come down again, particularly in heavy melting steel. Some business has been started but only at the low levels of the new list.

New York.—There is only a nominal amount of trading and the tendency is very marked toward lower figures. Mills are fairly well filled and they are not going to come into the market until they have to.

St. Louis.—Trades among the dealers have almost disappeared, and no purchaser seems to have a desire to buy. All are contented to wait until some actual development has taken place.

WHAT GERMANY HAS PLANNED IN THE WAY OF HER AFTER-WAR TRADE

Kelley's Monthly Trade Review.—We have to recognize that Germany has prepared to win in the field of trade and commerce, when peace comes, what she has lost on the field of battle. The Germans have carried out a systematic plan for entering on peace with a great initial advantage against the countries which they have invaded, maltreated, and pillaged, but can no longer hold. The plan includes a good deal more than the destruction of factories, mines, farms, and gardens, which may be called negative measures. Her positive measures include stealing machinery and materials.

In the Lille-Croix-Roubaix-Turcoing area the mills and factories there were equipped with the most modern and costly machinery from Lancashire, Switzerland, Alsace, and America; the technical schools were storehouses of invaluable patterns and designs, which the Germans did not possess and cannot create. Then there are trade secrets, exclusive designs, and combinations, of which they have possessed themselves. Every manufacturer will understand what this means.

Herr Gwinner, of the Deutsche Bank, Berlin, and the late Herr Ballin, of the Hamburg-Amerika Line, have succeeded in establishing a bureau, which is provisionally named the "Company for Oversea Enterprises," with an initial capital of one million sterling. It has for its immediate object the "development of German trade, particularly in neutral countries." Large subscriptions have been guaranteed by wealthy firms, and the movement is one the importance of which our own commercial interests might do well to realize.

When final peace is concluded, the "Syndicate" will, among other things, take up such schemes abroad as waterway construction, harbor and dock works, and other projects of similar magnitude. Special attention is being given to the various South American States, notwithstanding the confiscation by most of them of German ships, one of the plans being to publish a newspaper in Spanish and Portuguese. Moreover, now that the Near Eastern oil fields are apparently beyond the possibility of German interference. Herr Ballin recently, with his late colleagues, negotiated wth Mexican interests for the purchase of adequate supplies, control of which he tried to obtain just before the war began.

AMERICAN METHODS IN FOREIGN TRADE

In a book of the above title recently published by the McGraw Hill Book Co., New York, the author, George C. Vedder, has written a guide to export selling policy. While the subject matter pertains largely to American conditions and manufacturers, it is of particular interest to the Canadian manufacturer at the present time, for the sound business methods outlined are applicable to the Canadian trade as well.

Facts are presented which have been gathered by constant association with successful exporting manufacturers, foreign sales managers, general exporters, and overseas buyers. The fundamental weakness of the German trade policy or Cartel system is pointed out, and the writer ventures the prediction that it will be recognized that the World War was precipitated by the German Government's realization that the inevitable decline of a world trade, built up to serve abnormal and selfish aims, was impending, or already begun. The German manufacturer looked after his coworkers because they were necessary to his country's aims, but that enlightened selfishness which recognizes distributors as co-partners and satisfied customers as the greatest of business assets, was never one of his characteristics.

The danger of allowing the national Government of a country to constitute itself an agency for doing the things which a manufacturer should, and must do for himself, is pointed out, and the dangers inherent in recent legislation carried into effect in the United States, which virtually permits combines in the securing of foreign trade is set forth.

Coming to the matters of more immediate interest to the manufacturer, the means whereby foreign trade may be secured are clearly set forth, and the first of these, the export commission house, is described at some length. The advantages resulting from the securing of an exclusive export agent are set forth and certain drawbacks are pointed out. The requirements of a successful export manager who has charge of this branch of a manufacturer's activities are given and features taken up are general merchandising, making a start in direct exporting, the use of circulars and export catalogues, the salesman in foreign trade and co-operation with foreign agents. Foreign credits are described and pitfalls to be avoided are pointed out. Several chapters treat of the handling of foreign correspondence, heavy machinery in foreign markets, and matter of a semi-political nature, such as tariffs and reciprocity.

As before mentioned this book should prove to be a valuable help to those wishing to make a start in the export business, as apart from matters of general interest it contains much of value for the guidance of the manufacturer in establishing of connections, the handling of correspondence and both the foreign and domestic ends of the business.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$32 75
Lake Superior, charcoal, Chicago	37 50
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	37 25
Basic, Valley furnace	33 40

Government prices.

	Montreal	Toronto
Hamilton		.....
Victoria		50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Steel bars, base, Toronto	4 90
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	*2 90
Tank plates, Pittsburgh	*3 25
Structural shapes, Pittsburgh	*3 00
Steel hoops, Pittsburgh	*3 50
F.O.B., Toronto Warehouse	
Steel bars	5 50
Small shapes	5 75
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

*Government prices.

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$ 26 00	$ 28 00
Electro copper	26 00	28 00
Castings, copper	25 00	26 00
Tin	70 00	78 00
Spelter	9 50	10 00
Lead	8 50	10 00
Antimony	10 00	11 50
Aluminum	40 00	50 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 7 00	$ 7 00
Plates, 3-16 in.	8 50	8 40

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	19 50	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	18 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5½-6	5 00
Heavy lead	5½	8 00
Tea lead	4½	3 50
Aluminum	18 00	18 00
	Per Ton	
Heavy melting steel	15 00	15 00
Shell turnings	9 00	8 00
Boiler plate	16 00	15 00
Axles (wrought iron)	38 00	15 00
Rails	20 00	15 00
No. 1 machine cast iron	28 00	18 00
Malleable scrap	23 00	15 00
Pipe wrought	16 00	8 00
Car wheels	25-30	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove plate	16 00	14 00
Cast boring	11 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅝" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅝ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$47 50
Open-hearth billets	47 50
O.H. sheet bars	51 00
Forging billets	60 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅝ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 16
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 00
Sheets, black, No. 10	8 00	8 50
Canada plates, dull, 52 sheets	9 00	8 65
Can. plates, all bright.	9 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	9 00
Premier, 10¾ oz.	.....	9 30
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.	Cts. per lb.		
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		
Colored.			
Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		
Wool Packing.			
Arrow	25	Anvil	15
Axle	20	Anchor	11
Washed Wipers.			
Select White.	11	Dark colored.	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

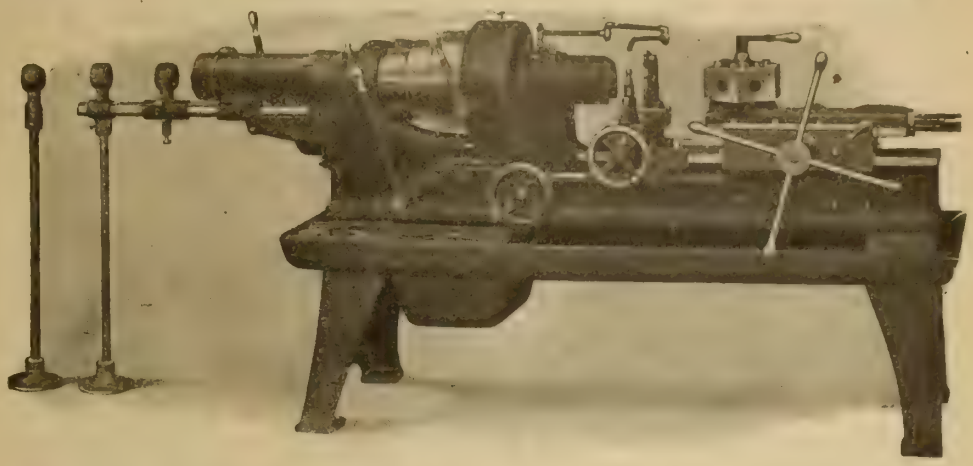
Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

Warner & Swasey Screw Machines

For large output and close limits—If you are figuring on screw machine work you can depend on W. & S. machines being right for the job.

We can supply you from stock immediately.



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ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

64 Front Street West
TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

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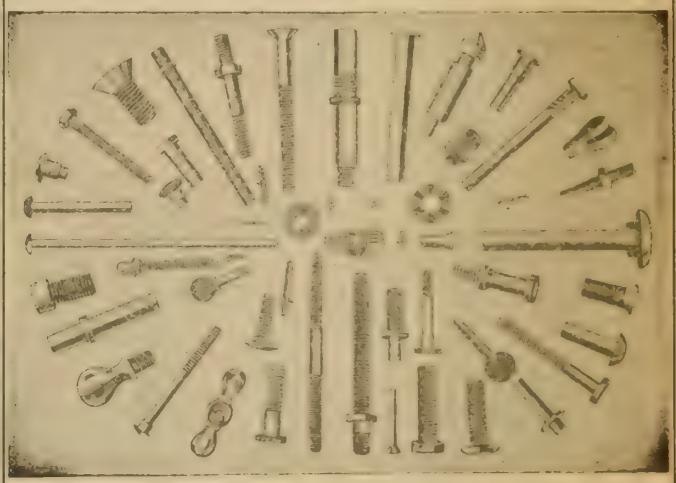
Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492



Automatic Screw Machine Products

ACCURACY QUALITY

Our Mechanical Engineers are at the service of our Clients.

United Brass & Lead, Limited

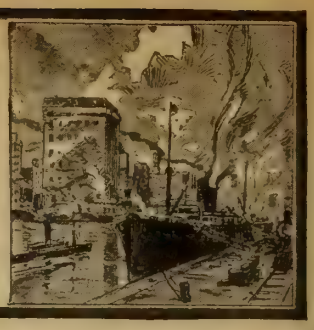
St. Helen's Avenue, - Toronto

W. L. TOBIAS, *Superintendent*

Formerly Superintendent National Cash Register Co.

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES



ENGINEERING

Estevan, Sask.—A meeting was held here of the municipalities interested in power development. One of the chief resolutions provided: "That the Provincial Government be asked to request the Dominion Power Board to at the earliest possible moment institute an enquiry into the development of power at the coal fields in Southern Saskatchewan for the purpose of distributing said power to Moosejaw, Regina, Welburn and intervening points that can be economically reached east, north and west of Estevan. Said enquiry to cover all questions related to the above project and that the Advisory Council for Scientific and Industrial Research be asked to co-operate." A permanent committee was named as follows: C. A. Manlove, Estevan; City Commissioners of Brandon, Weyburn, Regina, Moose Jaw; Major Cowan, M.P., Regina; C. C. Smith. Estevan.

PERSONAL

Charles Dawson, of Campbellford, who was superintendent of the Quinlan and Robertson Limited, of Montreal, munition plant, sued the company for $3,000, salary and bonus; $22,353.61, amount of a promissory note, and interest; and Mr. Justice Latchford has given him judgment for $24,353.61 and costs with interest on $22,353.61 from December 31, 1917. The company's counter-claim is dismissed with costs.

Col. Thos. Cantley, chairman of the board of directors of the Nova Scotia Steel & Coal Company sailed last week on the S.S. Metagama for London. The operations of the Scotia Company during the war period were very extensive, and it is understood that Col. Cantley during his trip to London will confer with the British iron masters regarding the extending of the terms of the contracts for the Wabana ore of the Scotia Company. Negotiations will also be carried out with the Canadian and Imperial authorities regarding the claims of Nova Scotia Steel & Coal Company for five steamers torpedoed by the enemy during the war period. Afterwards Col. Cantley will go to Paris and effect a final settlement regarding the transactions carried out by the Scotia Company with that Government.

Richard Llano Newman, naval architect and consulting engineer, who, until the end of last year, was resident in Montreal, died recently of influenza at West Point, Virginia, where, as president of the New York River Shipbuilding Corporation, he had gone to construct ships for the United States Emergency Fleet. Mr. Newman was born at Devonport, England, where his father was an important official of the Naval Dock Yard, but had lived in Canada and the United States about thirty years practising his profession. Mr. Newman lived for a time in Ottawa, where he did work for the Department of Marine and Fisheries in designing and supervising the construction of vessels for that department. He also designed and supervised the construction of ships for the Grand Trunk and Pacific Railway.

LONDON FIRM FIND IT PAYS TO BUY TRACTORS IN THE STATES

Arthur W. White, vice-president and manager of George White and Sons Limited, of London, Ont., in an interview with CANADIAN MACHINERY outlined a few reasons why he fears that the action of the Government in removing the duty from farm tractors was not a good one. He opines that it will have a large bearing on the prosperity of Canada during the period of reconstruction upon which this country is about to enter. According to Mr. White, owing to the removal of the duty his industry is running with about half the usual staff of men.

Mr. White says: "Since the Order-in-Council of February 7, 1918, removed the duty on tractors, we have purchased about half a million dollars' worth of tractors in the United States, and utilized our sales and distributing organization to dispose of them in Canada. If we could make them as cheaply as we can buy them in the United States, we would be making them. There have been between one and a half and two million dollars spent in the United States purchasing tractors since the Order-in-Council came into effect, and this amount of money has not paid one dollar on the Canadian War Debt, except the small amount of income tax on the profit of the distributors.

"As a quid pro quo the Government allowed a drawback of 99 per cent. of the duty on raw material entering into the construction of tractors. This is a vicious policy, as it forces manufacturers into the United States to purchase their raw material.

"Manufacturers of farm machinery sell to the final consumer, and between them and the original raw material—the ore and the forest tree—there are many intermediate manufacturers, all of whom are protected from 20 to 42½ per cent. Every manufacturer who is forced to buy his raw material in the United States, owing to being allowed drawback, is one less customer to the intermediate manufacturer.

"What Canadians have to determine is what is best for Canada. It is a question of economics. The questions of reconstruction, of caring for returned soldiers, of paying the war debt, are also questions of economics.

"Manufacturers of farm machinery in Canada, with a market of eight million, cannot compete with the highly specialized industries of the United States, with their market of a hundred million,—manufacturers who are close to their raw material and close to their selling market; manufacturers whose output is from 100 to 50 0per cent. larger than their Canadian competitors.

"If Canada is better off without farm machinery manufacturers, then the move is a good one, but it always has to be borne in mind that someone has to pay the war debt, and someone has to take care of the Canadian returned soldiers. The Extra War Profits Tax and Income Tax has drawn a very large percentage of the war loans and war debts from the manufacturers and the cities; a very small percentage being collected from the farmers. All manufacturers have pledged themselves to give jobs back to all men on their honor roll. This cannot be accomplished if the market for their goods is decreased. Men who have been through terrible years of war cannot be expected to have the earning power they had when they went away. The manufacturers will have to stand this loss, as the returned soldiers are entitled to the best wages going. It will be a matter of re-education. We have always had the question of the unemployed and employers of labor have found that it is more a question of men being 'unemployable' than being 'unemployed.' A large percentage of the returned soldiers, for a considerable time, will be actually unemployable, through no fault of theirs. It is up to the Government, to the manufacturer, the merchant and the farmer to take care of these men, and forcing manufacturers to purchase goods in the United States is a poor way to begin.

GEOMETRIC
SELF OPENING DIE HEAD
Specify Them for
- accuracy " "
- clean cut threads
- fast production
- long life " " "
The Geometric Tool Company
New Haven, Conn.
Canadian Agents:
Williams & Wilson, Ltd., Montreal; The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

Output of the 18 pr. H. E. Shells in Canada

In the Annual Review Number of CANADIAN MACHINERY figures were given of the production of British shells in Canadian shops. Following is a list that was not included. In some cases there may be some discrepancy in figures. This can, in many cases, be accounted for by the difference between the shells turned out and the shells shipped, due to storage. The 18-pound H.E. shell figures, however, are comparatively complete as follows:

Alberta Foundry & Machine Co., Medicine Hat	86,794
Alton Foundry Co., Alton, Ont	25,000
Beatty & Sons, Welland	39,947
Bell Engineering & Thresher Co., Goderich	55,212
Bertram & Sons Co., Dundas	75,000
Brown, Boggs Co., Hamilton	15,000
Buckeye Machinery Co	19,640
Calgary Iron Works, Calgary	15,992
Canadian General Electric Co	
Canadian Allis Chalmers, Toronto	75,670
Canadian Buffalo Forge, Kitchener	95,070
Canadian Crocker Wheeler, St. Catharines	25,158
Canadian Fairbanks-Morse, Toronto	10,000
Canadian Foundry & Machine Co	28,821
Canadian Ingersoll Rand, Sherbrooke, Que	78,155
Canadian Western Foundry	25,867
Canadian Westinghouse, Hamilton	150,210
Chapman Double Ball Bearing Co., Toronto	29,211
Chapman Eng. & Mfg. Co., Dundas, Ont	34,416
Cluff Bros., Toronto	50,038
C. N. R. Co., Winnipeg	33,867
C. P. R. Co., Winnipeg	62,678
Darling Bros., Montreal	35,606
Dickson Bridge Works, Campbellford, Ont	59,560
Dominion Bridge Co., Montreal	527,207
Dominion Bridge Co., Winnipeg	30,810
Dominion Harvester Co	7,670
Electric Steel & Metals, Welland	62,014
Edmonton Iron Works	48,433
Frost & Wood Co., Smith's Falls	24,978
G. T. Ry., Winnipeg	7,032
Holden Morgan Co., Toronto	87,919
International Supply Co	10,000
Invincible Machine Co., Walkerville	52,010
Lachine Mfg. Co	124,041
Manitoba Bridge & Iron Works, Ltd., Winnipeg	77,862
Manitoba Engines Ltd	35,185
Manitoba Shell Co	5,505
Mfg. & Contracting Co. of Canada, Ltd	225,156
Marsh & Henthorne, Ltd., Belleville	38,979
Massey Harris Co., Toronto	97,128
Mechanical Eng. Co., Ltd., Three Rivers, Que	22,000
Medicine Hat Pump & Brass Mfg. Co., Ltd	10,000
Metal Drawing Co., Ltd., St. Catharines, Ont	60,000
National Mfg. Co., Ltd., Ottawa	18,084
Northern Electrical Co., Ltd., Montreal	56,022
Northern Engineering & Supply Co	10,000
Northern Foundry & Machine Co., Ltd., Sault Ste. Marie	36,911
Otis-Fensom Elevator Co., Ltd., Hamilton	58,075
Peterboro Machine & Lub. Co	24,987
Prescott Emery Wheel Co., Ltd	24,625
Robertson Mfg. Co., Ltd., Milton	50,238
Rollefson Elevator Co., Ltd., Galt	25,015
Russell Motor Car Co., Ltd., Toronto	99,544
Saskatchewan Bridge & Iron Co	86,136
Sheldons, Ltd., Galt	70,000
Steel & Radiation Ltd., Toronto	98,691
Strong-Scott Mfg. Co., Ltd., Winnipeg	16,060
St. Thomas Construction Co	33,000
Transcona Shell Co	745,335
Universal Tool Steel Co., Ltd., Toronto	221,190
Vancouver Engineering Works	435,688
Victoria Machinery Depot	283,713
Vulcan Iron Works, New Westminster, B. C	414,229
Vulcan Iron Works, Winnipeg	72,552
Western Machinery Co	10,000
Western Shell & Box Co	7,914
Wilford Co., Ltd., F. R	49,984
Western Drydock & Shipbuilding Co	20,000
Western Foundry & Machine Co	10,000
Zenith Machine Co., Ltd	24,000

TRADE GOSSIP

Large Fire Loss.—Damage amounting to approximately $250,000 was sustained when the four storey building of the T. A. Walsh Co., Vancouver, was destroyed by fire. Large shipments of goods from the Orient and Mexico were held in bond in the building, and were a total loss.

Fire Cause Unknown.—The plant and buildings of A. Blair Company's tile plant at Woodstock were destroyed by fire, causing a loss of $30,000. The call was received at 4.15 at the fire hall, and was immediately responded to, but before the scene was reached the blaze was beyond control. The adjacent lumber yards were only saved by the absence of wind. The loss is only partly covered by insurance.

Elected Officers.—At the annual meeting of Toronto Builders' Exchange following officers were elected for the year 1919: President, A. D. Grant; first vice-president, Walter Davidson; second vice-president, A. H. Dancy; treasurer, John Altridge; secretary, David J. Davidge; board of directors: John V. Gray, C. B. Jackson, J. Robt. Page, Geo. E. Stocker, Gordon R. Douglas, A. Matthews, John Wickett, W. Boyce, Geo. Webb, W. R. Painter.

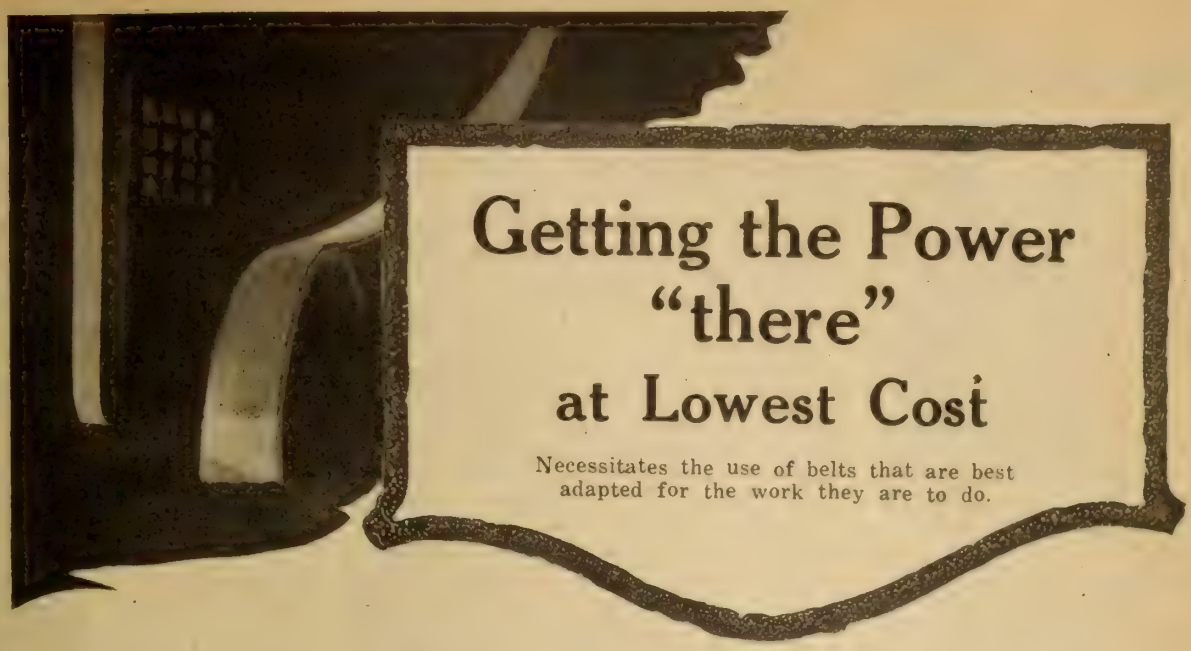
Trade With China.—Dr. George E. Morrison, one of the best informed authorities on actual conditions in China, speaking of the possibilities of Canadian trade in China, suggested flour, agricultural implements and machinery, and said that a man of high rank should be sent there to investigate trade conditions. The anti-opium laws are not so well enforced as formerly, but the traffic will ultimately be stamped out.

Calgary Firm Gets Contract.—The contract for the proposed new hospital building at Ponoka, in connection with the insane asylum there, has been let. The firm securing the contract is the Thomas Jamieson and McKenzie of Calgary, and the amount of the contract is $144,000. The building will be of brick, and will give accommodation to one hundred people. It is hoped to have the building completed and ready for service next fall.

Overseas Trade.—Col. D. Carnegie, ordnance advisor of the Imperial Munitions Board, has every confidence in Canada's future during the reconstruction period. Canada's workmen have proved themselves so skillful in the manufacture of munitions that he thought that it was "only a question of knowing where to go to get a share of the reconstruction work overseas." He did not think there was any immediate danger of over-production in the shipbuilding trade.

To Triple Output.—The introduction of mining machinery to the Minto Coal Mines is being considered by the C.P.R. magnates interested. Mr. John Henderson has left for the West Virginia, Ohio, and Pennsylvania coal fields to study the methods in use in these districts. The suggestion to instal machinery came from the experts of the U. S. fuel controller, who visited the mine to make a study and report on the best methods of speeding production.

Tried to Blow Up Bridge.—Last week an attempt was made to blow up the



A belt, no matter of what kind, is not the best belt for every drive in the plant.

The illustrations to the right will give you some suggestions as to where you can use Scandinavia Belting to advantage. These are not the only transmission conditions under which this material can be used, but they give you a general idea.

Scandinavia Belting is a solid woven belt and there are no plies to come apart. If you have a heavy drive and wish to use an adhesive dressing you can use it on this belt without danger of opening up plies and joints.

Have your plant men necessary information on using belts? We publish a monthly which is sent FREE for the asking.

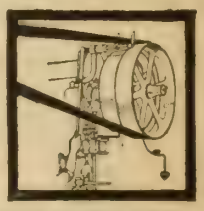
Lanco Balata belting makes a good motor drive belt as it has little stretch.

LANCO BALATA BELTING

GOOD MOTOR DRIVE BELT

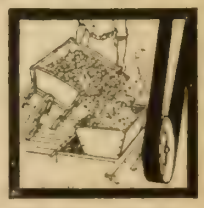
Federal Engineering Co.
LIMITED
172 John Street Toronto

SCANDINAVIA BELTING



GOOD ON BELT SHIFTERS

GOOD IN OILY PLACES



GOOD IN DUSTY PLACES

GOOD IN HOT PLACES

The Financial Post THIS WEEK

ON BANK MERGERS

"IN conclusion, let us repeat that THE FINANCIAL POST stands against bank mergers or other business or industrial combinations which will permit of restriction of public service or the exaction of undue profits, but favors such consolidations as tend to reduce costs of production or service rendered, which is in the last analysis in the interests of the whole people."

ON THE TARIFF PROBLEM

"THE FINANCIAL POST does not now and never has defended a 42½ per cent. tariff; it does not stand for any specific tariff, but it does stand for the intelligent and adequate protection of national industries so that Canada may secure the full benefits of the developments of all her natural resources. That this may be accomplished and that at the same time the necessities of a tariff for revenue may be carefully considered, we have time and again advocated the appointment of a tariff commission to treat scientifically with the whole situation and to provide a meeting ground for the divergent opinions of labor, industry and agriculture."

ON THE PORK SITUATION

"The newspaper contention that Mr. Hoover is getting the British business for American firms, and that the British Government is discriminating against the Canadian product, is hardly a correct or a fair one. The embargo is absolute, against both Canadian and American pork products."

Besides the important articles from which the above quotations are made, THE POST this week deals with the following, amongst other

SUBJECTS OF INTEREST

The Effects of Merger on Bank of Nova Scotia
Australia to Have Agent at Ottawa
Uniform Laws for All Canada
Peace Between Capital and Labor—And Prosperity
The December Bank Statement
Small Packing Plant to Close
Brompton Shows Slight Drop in Earnings on Common
Over $350,000,000 Put Into Electric Projects
Total Clearings for the Week Show Increase
Canadian and American Banking Interests Join
A Bank Misunderstanding With Customer
London Supreme in Money Market
About Bank Mergers (Editorial)
Farmers' Platform on Economic Issues
Scarcity of New Issues is Market Feature
New Pulp and Paper Issue Announced
Manufacturers of B.C. Discuss Income Tax
Ratepayers of Halifax Vote Dissatisfaction
Quebec Province Has Large Surplus
Excelsior Life Wrote Record New Business
Continental Life Writes $2,946,762 New Business
Border Cities Want Some of Housing Loan
The Sugar Supply
Larger Loans and Profits of Dominion Bank
Effects of the Merger on Bank of Nova Scotia
Profits of Toronto General Trusts Show Recovery
Development of Trusts and Guarantee

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Mountain street bridge on the C.P.R. railway in Montreal. The offenders were detected in the act of lighting the fuse that led to twelve large sticks of dynamite placed on top of one of the stone pillars. It is thought that the purpose of the desperadoes was to wreck the bridge and effect a robbery from the express car that was generally located near this point.

Lumber Trade Handicapped.—Canadian lumber supplies are fast being depleted, according to Mr. Alfred Clarke, president of the Wholesale Lumbermen's Association. Owing to the entire absence of snow, there is practically not more than 10 per cent. of the season's cut removed from the bush up to the present. Labor conditions are also bad, and some of the firms have given up operations for the winter. Under these circumstances, a further advance in prices of lumber is almost inevitable.

Gillette Report.—At the annual meeting of shareholders of the Gillette Safety Razor Company of Canada, held in Montreal, announcement was made that the company proposed invading such countries as Mexico, British East Indies, Cuba and the various South American countries, as well as Central America, while salesmen had already started for England, France, Italy, Russia, Australia, New Zealand, South Africa, China and Japan, where they will establish sales organizations and distributing stations.

Advises Agreement.—The question of the increased tariffs for local switching, which the Toronto Board of Trade and the C. M. A. are combatting, will be disposed of finally at a meeting of the interested parties before the Railway Board, at Toronto, unless they can come to some agreement in the meantime. Sir Henry Drayton, chairman of the commission, advised the contending parties to get together, explaining that it was a different matter to say what are fair charges on movements within terminals.

Damage Was Done.— Considerable damage to transmission and telegraph lines and suspension to railroad traffic resulted from a severe storm that passed over the St. Lawrence last week. The Canadian Government steamer Montcalm and the Canadian Voyageur, recently built at Montreal, and which left Quebec for Halifax earlier in the week, were caught in the storm and for many hours were unable to report their position, both vessels drifting along at the mercy of the storm. Subsequent reports reported all well.

Selling Agency for B.C.—For the purpose of enlisting practical interest in B. C.'s lumber export trade, Hon. T. D. Patullo, Minister of Lands, addressed a gathering of the lumbermen of the province. The Minister hopes that it may be possible to introduce machinery to deal with the whole question of export and shipping. As a result of his examination of the situation, he is convinced there is a large market for B. C. lumber, and he believes that what is wanted is a selling agency in Europe, to deal with B. C. products as a whole.

Will Keep Working.—On Tuesday and Wednesday of last week, W. A. Janssen, operating manager of the Canada Steel Foundries was in Welland on business in connection with the local branch of that corporation. Following his visit it was decided to continue operations as at present. The operation of the rolling mills will be continued. The position of the Steel Foundries is much the same as it was two months ago. The business of the concern is dependent on the general condition of the country, and if this remains good the business of the Foundries will continue as formerly. "As far as I can see," stated the manager, "prospects are good, and there is no danger of a setback."

According to a report made at the annual meeting by Managing Director A. A. Bittues, the year 1918 was the best in the company's history, sales increasing 20 p.c. over the figures for the previous year, while the blade production in Canada gained 160 p.c., and razor production 301 p.c. in the same period. It was also announced that the company's steel plant in Sweden was now able to supply steel in unusual quantities, while shipping facilities, which were approaching normal, permitted them to ship to foreign countries and go after business in a more energetic manner than had been possible during the four years of war.

Meet In Montreal. — Arrangements have been made to hold a meeting of the iron and steel men of this district, ranging from Gananoque, Ont., east to Quebec, in Montreal on Thursday, January 30. The meeting will be addressed by Col. David Carnegie, of the Imperial Munitions Board, who has recently returned from England, where he has made a thorough study of European market conditions as affecting the steel industry of Canada. Invitations were sent out by the Canadian Manufacturers' Association, and this, a matter of vital importance to steel men in Canada, now that the manufacture of munitions has been suspended, will doubtless arouse much interest. A large number of the prominent iron and steel men of the district are expected to be present.

Changes Announced.—The C. A. Dunham Co., Ltd., Toronto, announce that a change has been made in their branch sales office at Montreal. A. Kastello, recently superintendent of construction for Imperial Munitions Board at Trenton, but formerly with Dominion Government and Grand Trunk Railway, has been installed as new branch manager in charge of their office at 711 New Birks Building. Mr. Kastello is to be assisted in the company's business by F. O. Hamel as heating engineer, formerly first assistant engineer in the Public Works Department, Dominion Government, at Ottawa. The C. A. Dunham Co., Ltd., are very optimistic over the prospects of building activity, and this change has been made to strengthen their organization and to render better service to their trade and clients in

Montreal. This company has experienced a very healthy growth during the war period.

At Owen Sound.—The Wm. Kennedy and Sons, Ltd., of Owen Sound, have erected an extension to their already large iron and steel plant. The new building is a substantial one of concrete, stone, brick and steel construction 200 feet by 46 feet, the walls being about 30 feet high. It is to be equipped with two cupolas for melting iron, an elevator for carrying pig and scrap iron, and coke to storage bins, situated some 14 ft. from the ground, a heavy traveling crane, boring and planing machinery, etc., for large propeller work, ship-deck machinery, turbine water wheels, etc. This company, in conjunction with some others, lately took over the property of the Owen Sound Iron Works and are carrying on there (under the supervision of Wm. Kennedy & Sons) construction of ship machinery, boiler works, cement and sawmill machinery, etc. They are employing a full staff of mechanics in both plants at present.

MARINE

Vancouver.—The Packers' Association of Vancouver, in their statement, say that last year's salmon pack was the largest in the history of the industry. It consisted of 1,616,157 cases of all varieties.

Vancouver.—The first of the 1,500-ton steamers building in British Columbia for the French Government was launched recently from the Lyall Shipyards. There are forty of these ships, twenty being built in Vancouver and twenty in Victoria.

Victoria, B.C.—It is understood here, by advices from London, that the shortage of tonnage is the main difficulty in the way of large timber orders being placed by the British authorities. Strenuous efforts are being made to provide Canadian vessels, and Hon. T. D. Patullo, Minister of Lands, has suggested the chartering of foreign vessels whenever practicable.

Toronto.—A January launching without the necessity of blasting the ice previously, took place at the yard of the Dominion Shipbuilding Co. The "General Currie" was the vessel concerned, and she is the first of a series to be named after famous Canadians. She is 261 feet long by 43 feet 6 inches, by 23 feet 6 inches, with a deadweight capacity of 3,550 tons.

Montreal.—Announcement is made of a drop in freight rates to $1.50 per cubic foot. This is on business between Canada and the British Isles. Of course this is still much higher than the rates that were in use before the outbreak of the war. Shippers take this move to mean that before long the carrying companies will be out looking for business, which certainly has not been the case for some long months now.

Quebec.—An epoch-making event in the history of St. Lawrence navigation was the sailing of the Canadian Government steamer "Canadian Voyageur" from Quebec on January 21 en route to

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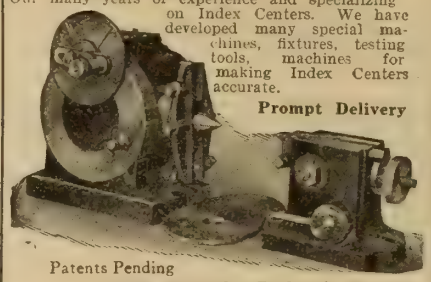

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BLACK DIAMOND OVENS

Halifax. This is the first time a vessel of the size of the "Canadian Voyageur" has made the trip down the St. Lawrence in mid-winter, and those optimists who look for all-the-year-round navigation are watching the experiment anxiously. Among these is the Hon. D. B. Hanna, president of the Canadian National Railways Commission, which will eventually have charge of the Government fleet.

Porcupine. — In connection with the great work done in the Temiskaming district for the Victory Loan Campaign last year, the District of Temiskaming won the honor of naming one of the boats being built at the Polson Iron Works for the Imperial Munitions Board. The Committee had some difficulty in the length of the name, but eventually "War Temiskaming" was selected as the best available. The new boat accordingly will bear the name "War Temiskaming." It will be launched about the end of this month and a number from the North Land may go south to be present at the ceremony of launching.

London, Eng.—The president of the British Board of Trade, speaking at Huddersfield recently, said that the Government were anxious to remove all restrictions as fast as it could be accomplished, but restrictions on exports must be maintained in the interests of allied nations. The blockade must also be maintained. He also made the statement that there was more shipping available than cargo tonnage to employ it, and a big slump in freight rates was bound to occur. This does not necessarily mean that tonnage is up to its former level, but that in the restricted state of trading there are more ships than are required to handle the freight available.

Toronto.—C. A. Bogert, retiring president of the Toronto Board of Trade, in his address to that body, said: "Let us not entertain any illusive hopes respecting the future of shipbuilding in Canada. It is possible that the ships that are now being built for the Canadian Government will cost us at least double what they could be constructed for in a year or two hence. Shipbuilding conditions in this country do not compare favorably with those prevailing in Great Britain, or any other European centres. The enormous tonnage being launched all over the world will soon overtake the demand, and with rates decreasing in consequence, returns on the original investment of capital will be wholly inadequate."

Welland. — The "War Badger" was launched from the docks of the British American Shipbuilding Company, the ceremony being witnessed by thousands of citizens. Both sides of the canal were lined with interested spectators of this unique midwinter launching. Construction of this vessel was started in May last. She is of 3,500 tonnage, being 261 feet long, 43 feet beam. She will be ready for ocean service early this spring. The boat was christened by Mrs. H. E. Davidson, wife of one of the directors of the British American Shipbuilding Company which built the "War Badger." A sister ship, the "War Weasel," was launched early last fall and is rapidly

nearing completion. Two more ships, 320 feet long, are being built by this company in Welland.

Vancouver.—The salvage claims of the steamer " Salvore" against the Japanese steamer "Canada Maru" were granted by a judgment of Justice Martin in the Admiralty Court here. It would be recalled that this case was commented on owing to a peculiar circumstance connected with the ownership of the salving steamer. At the time when the salvage services were rendered the "Salvore" had been sold by her owners, the British Columbia Salvage Co., to John P. Davies, of Montreal, but the latter had not yet accepted delivery. The judgment awarded the British Columbia Salvage Co. $162,700 without costs, and Mr. John P. Davies receives $10,000 and his costs.

The "Canada Maru" went ashore near Cape Flattery on July 30 last, and was refloated August 5.

Hamilton.—The annual report of the Harbor Commission shows that considerable work has been done in this regard, most important being a complete hydrographic survey, including Desjardine canal up to Dundas, in the course of which $5,000 soundings were taken. The new industrial area on the waterfront between Ferguson avenue and Wellington street, comprising about fourteen acres, is now in splendid condition. This industrial area is provided with a dock wall across the front of 650 feet and 1,150 feet on the east side, making a total of 1,800 feet of dockage, with a depth of water throughout of 18 feet. Railway connection can easily be made to this property from the railway lines which are already close to this point, and with the co-ordination of rail transportation and water shipping facilities, no finer factory sites could be found on any harbor on the Great Lakes.

MUNICIPAL

London, Ont.—The Government has handed over 7,200 wooden shell boxes to the city fuel controller to be distributed free among the families of soldiers who are in need of fuel. It is stated that the anthracite in the dealers' yards contains a great deal of slate and steps have been taken to cancel the license of the wholesaler responsible for the shipment.

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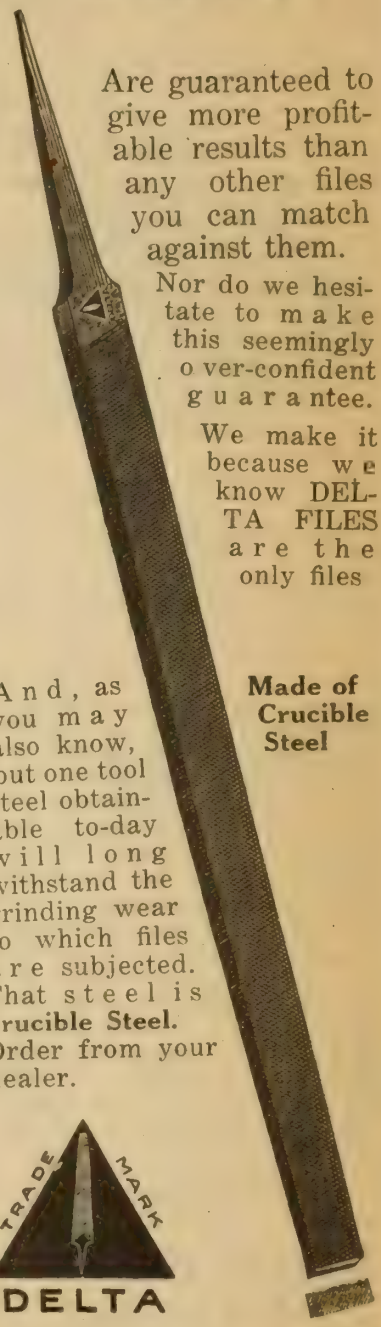

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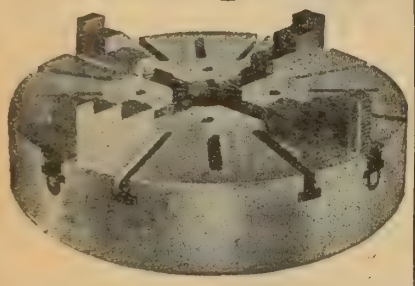

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Quebec.—Mayor Lavibueur has returned from a trip to Ottawa, where he saw Hon. Frank Carvell on the subject of the various public works which Quebec is interested in. The chief of these were the St. Charles River improvements in connection with the sewerage scheme, and the new car shops at St. Malo. Mr. Lavigueur expressed himself as well pleased with his trip and its results.

JAPAN GETS U. S. TRADE

Japan now has a monopoly of the cotton goods trade with Manchuria, though only about fifteen years ago the United States supplied 90 per cent. of the cotton goods imported by Manchuria, according to a statement issued by the Chamber of Commerce of Yokohama. Among the items Manchuria imported from Japan last year were 752,000 pieces of coarse cotton canvas, 327,000 pieces of printed cotton canvas, 350,000 pieces of fine cotton canvas, 162,000 pieces of sateens, 134,000 pieces of sheetings and about 56,000,000 yards of wide calico.

SWORDS INTO PLOUGHSHARES

It is not in the United States alone that the implements of war are being converted into those of peaceful pursuits. In France, for example, it has been found that the smaller armored tanks will pull a fleet of canal boats at a speed of two miles an hour, which is reasonably rapid transit as applied to canal-boats. Perhaps this will lead to the general retirement of those patient animals which have travelled towpaths for generations past. Commerce may approve the change, but the artist will be likely to throw down his brush with a gesture of regret.—Christian Science Monitor.

MACHINISTS' DATA BOOK IS ISSUED BY THE L. S. STARRETT CO.

For the convenience of the expert machinist who often wants certain shop information and data not easily remembered and seldom easy to find when needed, the L. S. Starrett Co., of Athol, Mass., has just published Volume II of the Starrett book, "The Starrett Data Book for Machinists." To insure its covering the field thoroughly, the Starrett Company secured as editors, Prof. H. P. Fairfield, of Worcester Polytechnic Institute; N. J. Bethel, production manager of The Taft-Peirce Co.; N. H. Edge, factory manager of The Locomobile Co., and J. C. Spence, superintendent of The Norton Co., and through their co-operation have been able to include practically all of the information, formulae, etc., essential to good shop-practice as found in the different classes of work produced in the several plants under the direction of the collaborating editors, and have avoided the elementary and theoretical matter which is of little or no value to a practical man. The new book, like Volume I, "The Starrett Book for Machinists' Apprentices," now in its thirty-fifth thousand, is of convenient pocket size, bound in red Athol leather, and is offered for examination, or for sale at 50c per copy at hardware dealers handling the Starrett line of tools.

ELECTRIC FURNACE INSTALLATION

The Electric Furnace Company, Alliance, Ohio, has just closed a contract with the Standard Roller Bearing Company, Philadelphia, for 190 kw. continuous, automatic, heat-treating equipment.

The set consists of one 150 kw. electric furnace for hardening and one 40 kw. electric heated oil drawing bath. There is supplied, in addition, an oil-quench bath located between the furnace and the electric-heated, oil drawing bath.

Material, which consists of alloy steel balls and ball races, is automatically handled through the furnaces, quench, and drawing baths in metal baskets.

FREQUENT FIRING A GOOD PRACTICE

It is far better to throw on a little coal at a time, and keep the fires bright, than to fire more heavily and at longer intervals. The loss from the distillation of unconsumed oily and tarry matters can be kept down in this way, because when fresh coal is scattered lightly over a bright fire the gases that are given off by each particle of coal become immediately ignited, if there is sufficient air present to burn them. The ideal method of firing would be to keep sprinkling small quantities of fresh coal upon the flame bed continuously, at a rate adapted to the rate of combustion that is to be maintained. This cannot be accomplished satisfactorily by hand-firing, but it may be approximated by firing frequently, using small amounts of coal, and seeing that what is thrown on is well distributed. The fireman should be careful not to carry out this idea too literally, however, because in so doing he might have the furnace doors open nearly half the time, and this would be bad practice. He should bear in mind the principle that the suggestion of frequent firing involves, and should endeavor to put it into practice as well as he can, consistently with preventing the inflow of an unreasonable amount of air through the furnace doors.

G. Clifford Walker, who, for the past three years, has been a salesman for H. W. Petrie of Montreal, died last week in Montreal, from influenza, after a few days' illness. Before joining the staff of H. W. Petrie he was manager of the Central Engineering Works of Montreal, and previous to this he was Western representative for Taylor and Arnold. Mr. Walker was 27 years of age and the son of the late Geo. Walker. One brother has been at the front since 1915.

Fred W. Evans, manager of the Toronto branch of the Canadian Fairbanks-Morse, is making favorable progress since his severe illness, and is able to sit up for a few hours daily now. Mr. Evans has been confined to his home since shortly after Christmas, and was critically ill for some time. His many friends will now hope for his speedy and complete recovery.

The Picture of the Workman in Copy

CONTINUED FROM PAGE TWO

and crawls into a pair of jumpers borrowed from the engineer. Smith is not over-enthusiastic about the proposition, because the jumpers are soiled and his grey trousers are in danger of spotting in consequence. The wrench is a weapon with which he is totally unfamiliar, and like the jumpers, it is greasy and unpleasant to hold. Inwardly blessing the boss who got him into this fix, he strikes an attitude, twists his features into a wan smile and is about to be snapped when someone suggests that workmen usually wear caps.

The wrench is heavy, and while a suitable headgear is being sought Smith takes a rest. Various attempts to make the traditional paper box cap out of office wrapping paper having failed, a cap is finally secured from a friend of the engineer who works in a machine shop down the street. The cap is dirty, and, moreover, it is three sizes too large. At this crisis the telephone operator mysteriously produces a safety pin, and the slack is taken up in the back. Again Smith gets set, and this time the picture is taken.

When it is developed some joy-killer blows in and calls attention to the fact that Smith had neglected to button his jumpers correctly, also that the average workman does not wear silk shirts, a high standing collar and a jewelled horseshoe pin on the job. Neither are his face and hands spotlessly clean, nor does he hold a pipe wrench as though it were a stick of dynamite. These kindly criticisms are harshly overruled, however, and Smith in all his misfit glory is handed down to posterity.

A lenient moving-picture audience may gaze with none too critical eye upon their favorite actor-hero clad in the faultlessly tailored garments of a hired man, a silk kerchief knotted carelessly around his throat and a wide Stetson perched at just the proper angle crowning his curling locks, but the reader of technical advertising copy demands something more from the advertising pages of his paper. Years ago he learned that there is no such thing as a left-hand monkey wrench, and his eye is super-critical in the matter of detecting flaws. The same man who will tolerate a technical blunder on the part of an idol of the screen will be the first to frown at an advertisement picturing a workman holding a micrometer the wrong way.

When it comes to relying upon an artist's conception of a typical workman the situation becomes far more complex and open to greater possibilities of misconception.

The distinctive badge of labor is supposed to be the paper box cap, yet in actual practice this form of idealistic headgear is about as commonly encountered as a high silk hat. Despite this there are many artists who readily yield to the temptation to draw the workman as tradition decrees he should exist, rather than picturing him as he really is.

Does a Machinist Dress Like His Picture?

For example, a typical type of modern machinist working in a machine shop at a lathe or grinder does not wear a red undershirt, sleeves rolled up over the elbows and buttons open at the neck to expose a chest resembling a male gorilla. On the contrary, the modern worker in a machine shop likely wears an old pair of dark trousers and a black shirt, buttoned at the neck. And instead of the paper box cap, his headpiece (if he wears any) is likely to be a cloth cap with a small peak, the front of the cap bearing the lettering, "Smoke Puff Puff Cigars." If this costume be varied, a change may be made by the addition of overalls and perhaps a jacket to match.

Upon consideration it is obvious that no standard figure, cut to pattern, can be used to personify the workman, because the garb of the workman changes to a great extent with his trade. The costume worn in the machine shop differs from that worn by the sand hog, and likewise the dress of a workman employed in the boiler room of a big central power station has little in common with the rig of the structural steel worker. To be true to life a drawing should properly fit the clothes to the job rather than hold to an established standard and attempt to make one pattern answer for all branches of labor.

A recent incident which came before the attention of the writer illustrates how quickly the trained reader grasps an inaccuracy of detail along the lines discussed above. This particular subscriber pointed in some disgust to a picture of a hand engaged in the act of placing some piston rod packing. The hand was supposed to belong to an engineer and just below a checked coat sleeve was shown a goodly expanse of white cuff. Closer inspection of the picture disclosed handsome cuff-links, an elaborate finger ring and carefully manicured finger nails. The whole made a combination which obviously was out of place and had nothing in common with the reader's practical conception of the attributes belonging to a real honest-to-goodness engineer.

The only way to gain a clear vision of the workman as he is, is to seek him out on the job. And the seeker after such information may run into some surprises.

Entering the lathe department of a busy machine shop, for example, his cherished vision of uniformity will likely be rudely shattered. Although it be zero weather in January, the foreman will probably greet him wearing a battered straw hat, thus making a far different impression from his idea of the traditional figure of labor. The men at the machines, while possessing a uniform coating of oil and metal rust, fail to apply this same uniformity to their clothing. In general their main idea appears to be to select garments which will absorb a maximum quantity of dirt with minimum damage.

Turning to the power plant engineer for further enlightenment we find a strange liking for derby hats. Thus are ideals ruthlessly destroyed. The power plant engineer who has a desk fondles a warm regard for the conventional derby. When called upon to repair a broken elevator he may put on a black cloth cap and a pair of overalls, but while "receiving callers" he clings to the dicer.

Of Course, There Are Exceptions

The traditional workman has grown to be a sort of idealistic conception; a being related in some way to Santa Claus, Uncle Sam and John Bull, holding in his left hand a square-shaped tin lunch pail with rounded corners and a peculiar top like the periscope of a submarine, his brawny right hand grasping a hammer. Upon his head reposes the famous box cap and his mighty chest is bared to the breeze. And he is partial to red flannels and a sort of leather apron resembling a horse's bib.

To associate him with Longfellow's poem, "The Village Blacksmith," is entirely pardonable, but actually to meet him in the foundry, or boiler room, or swinging from a steel girder is beyond belief. If any lathe hand affected such a garb he would be guyed from one end of the shop to the other.

The reader of technical advertisements expects accuracy of statement in copy. Likewise he should be presented with reality in illustration, else the force of the argument loses weight regardless of its technical accuracy and the advertisement falls short of its mark.

CLASSIFIED ADVERTISING SECTION

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

POSITIONS WANTED

EXPERIENCED INSPECTOR WITH EXECUtive ability. If you are going in for interchangeable manufacture and desire a man familiar with the most up-to-date systems of gauging and inspection which will reduce cost of manufacture and increase output, write stating full particulars to Box 543, Canadian Machinery. (c5m)

MECHANICAL ENGINEER AND DRAUGHTSman. Now open for position in the above field, have had extensive shop experience and am especially good at machine design. Have executive ability and have gotten results from men, principally for the reason that I speak a language that they understand. I have handled correspondence, am used to meeting the public and have a good record as a salesman. There certainly is a company to whom I would be valuable. My requirements in the way of salary would be moderate until I had proven my worth. Box 545, Canadian Machinery. (c4m)

FOREMAN PATTERNMAKER, TECHNICAL training. 20 years' experience in all classes of work. Foremen's references, covering past seven years. Age 36. Good executive. Energetic. Alive to latest methods. Box 546, Canadian Machinery. (c5m)

MECHANICAL AND STEAM ENGINEER open for appointment as plant engineer in an industrial plant or shipyard. Sound practical man with good initiative and executive ability, experienced in the maintenance and installation of medium and heavy machine tools, steam and air lines, transmission, etc. Age 37. Seventeen years' engineering experience, and held position as above in a large shipyard for seven years with marked success. Correspondence invited to Post Office Box 1965, Montreal. (c5m)

FIRST-CLASS MECHANIC, EDUCATED. MARried. 15 years' experience in practice and technique, desires to connect in above capacity with firm manufacturing traction and other farm engines for South, Central America or West Indian trade, with view to travelling afterwards in their erection, demonstration or sales anywhere in above territory. Am native of West Indies and have travelled South America; know the language and people, hence possess an advantage. Highest references. Box 550, Canadian Machinery. (c7m)

SITUATIONS VACANT

WANTED—A FIRST-CLASS DRAFTSMAN—one with experience on spiral and bevel cut gears preferred. State experience and salary expected. Apply McKinnon Industries, Ltd., St. Catharines, Ont. (c4m)

WANTED—FOREMAN FOR TANK SHOP employing 40 to 50 men. All classes of plate work, except boilers. Western Canada. Box 549, Canadian Machinery. (c5m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

FOR SALE

2 MOTOR DRIVEN COMPRESSORS, 329 FT. 2 Frog & Switch Planers. 2 Rail & Frog Fillet Multiple Drills. 2 Newton Cold Saws, Nos. 501 and 502. J. L. Neilson & Co., Winnipeg, Man. (ctfm)

ONE NEW NO. 2 WOODS ENGINEERING CO. make universal tool and cutter grinder, complete with full equipment. A bargain to a quick purchaser for cash. Canada Machinery Agency, 211 McGill St., Montreal, P.Q. (c6m)

ONE 3/16" ADT. MODEL AUTOMATIC WIRE straightener and cutting machine arranged to cut a maximum of 10 feet. E. M. Bride, 113 4th Ave. East, Calgary, Alberta. (c11m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

TWO NEW STEAM TURBINE BLOWERS for blast or cupola use. Size and particulars on application or can be seen running. Apply to Box 141, Tilbury, Ont. (c7m)

ONE CLAYTON 6" x 8" x 6" AIR COMPRESsor in first-class condition. W. G. Utley, Machinist, Yarmouth, N.S. (c8m)

SPECIAL MACHINERY

MANUFACTURERS—WE CAN UNDERTAKE work to any specification—munition production equipment or otherwise. Write W. H. Sumbling Machinery Co., 7 St. Mary St., Toronto (ctfm)

MACHINERY WANTED

SIX-FOOT RADIAL DRILL FOR BOILER shop; lathe to take in 12' between centers; air hoist, 10" cylinder, 4' lift with trolley; vertical air receiver, 44" inside dia., 14' high. The National Shipbuilding Co., Ltd., Goderich, Ont.

WANTED TO PURCHASE BY THE WILLIAM Kennedy & Sons, Limited, Owen Sound, Ontario—One 15-ton Electric Travelling Crane, 39' 10" span, 3 motor, 60 cycle, 3 phase, 550 volt circuit, for foundry and machine shop use. (c5m)

MACHINERY WANTED—ONE 36" X 36" IRON planer. A number of bench vises. One radial drill. International time clock. Kindly give full particulars as to condition, length of time used. Also best cash price. Apply Box 551, Canadian Machinery. (c6m)

16-8 AND 18-8 ENGINE LATHES. ALSO WET grinders. 24" Shapers. 3" Slotting Machines. 3 Vertical Millers. Stamping Presses. Sheet Metal Products Co., Ltd., Toronto. (c6m)

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

If you want something unusual

and it isn't advertised here, the logical thing would be to advertise for it. You'll find that a small ad in the Classified Advertising Section will save you a great deal of time in locating men or machinery. Look over these pages and if you don't see what you want, send us your copy to-day for next week's issue.

Canadian Machinery
Classified Advertising Section
143-153 University Avenue
TORONTO

NOW!

You've been going to send in that ad for weeks, so why not mail it now for next week's issue.

Canadian Machinery
143-53 University Ave., Toronto

IMMEDIATE SHIPMENT

LATHES.

12" x 5' LEBLOND, standard.
14" x 6' McKENZIE, standard.
14" x 8' LEBLOND Toolroom Equipment.
14" x 7' HENDEY Toolroom Equipment.
6—16" x 6" C.M.C. double back gear, quick change.
18" x 6' CISCO, double back gear.
19" x 10' LEBLOND heavy duty.
22" x 10' REED PRENTICE, geared head.
12—26 x 12 C.M.C. double back gear, quick change.
28" x 10' CONRADSON geared head.
36" x 14' NEW HAVEN triple geared.

SHAPERS.

15" McKENZIE B.G. crank.
16" RAE B.G. crank.
20" GOULD & EBERHARDT high duty.
24" and 28" GOULD & EBERHARDT high duty.

MILLERS.

No. 1½ and 2½ LEBLOND Universal.
No. 3H and 4 LEBLOND Universal.
No. 3 FORD-SMITH Universal.
BECKER vertical single pulley drive.
BECKER No. 7HS Lincoln type.

GRINDERS.

No. 3 LANDIS Universal.
No. 1 LEBLOND Universal Tool.
No. 2 OAKLEY Universal Tool, power feed and wet attachment.
GISHOLT Tool Grinder.
BAY STATE vertical surface.

DRILLS.

10" MYERS bench sensitive.
10" McKENZIE sensitive.
14" MYERS column sensitive.
14" PERFECT column sensitive.
15" BARNES lever feed.
20" BARNES back geared.
22" BARNES sliding head.
26", 28" and 34" BARNES sliding head.
26" and 28" BARNES with tapper.

RADIALS.

2' FOSDICK National pattern.
4' CINCINNATI-BICKFORD, speed box drive.
5' BICKFORD variable speed motor drive.

MISCELLANEOUS.

No. 2 BAKER Keyseating machine.
No. 2 MITTS & MERRILL Keyseating machine.
8" JARECKI pipe threading machine.
4" MERRILL pipe threading machine.
1½" WELLS bolt cutter.

The above list merely gives part of our stock, which is ready for immediate shipment from Toronto.

Write our Service Department and put your proposition up to them.

THE A. R. WILLIAMS MACHINERY CO., LIMITED

64 FRONT ST. W. - - TORONTO

USED MACHINERY

In stock at Moncton, N.B., and offered for sale:—

5—18" x 8' Mueller Engine Lathes.
6—26" x 10' Bertram Lathes.
2—22" x 10' Bertram Lathes.
1—16" x 6' American Toolroom Lathe.
4—3½" x 36" Acme Turret Lathes.
(All modern lathes)
1—No. 2 Kempsmith Universal Milling Machine.
4—6" Hall Cutting-off Machines.

Also

Belting, Shafting, Pulleys, Hangers, Pumps, Air Compressors, Grinders and Furnaces.

For particulars, write or apply at

RECORD FOUNDRY AND MACHINE CO.
Shell Dept.,
MONCTON N. B.

USED MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, Nova Scotia
tf

Riverside Machinery Depot

LATHES

1—28 x 14 Fay & Scott Engine Lathe. Used.
1—26 x 14 P & W Standard Engine Lathe. Used.
1—24 x 12 Perkins Blocked Engine Lathe. Used.
1—24 x 12 Springfield Ideal H.D. Engine Lathe. New.
1—21 x 10 Porter Standard Engine Lathe. New.
1—20 x 10 W & B Gear Head Lathe. Used.
1—18 x 8 LeBlonde Engine Lathe. Used.
1—18 x 8 Springfield Ideal G.H. Tool Lathe. New.
1—16 x 8 L & S Q.C. Engine Lathe. Used.
1—16 x 8 Porter Standard Engine Lathe. Used.
1—16 x 6 American Q.C. Engine Lathe. Used.
2—16 x 6 Filsmith Q.C. Lathes. New.
3—16 x 6 South Bend Standard Lathes. New.
1—7" x 12" Precision Bench Lathe. (Potter). New.
1—34" Fitchburg Low Swing Lathe. Used.

TURRET AND SCREW MACHINES

1—18 x 6 Springfield Fox B.G. Turret Lathe. Used.
1—14 x 5 Hendy Turret Lathe. Used.
3—12 x 4 Warner & Swasey Turret Lathes. Used.
1—12 x 4 B & O Turret Lathe. Used.
1—12 x 4 Pearson Turret Lathe. Used.
2—No. 107—11" Wells & Son Turret Lathes. Used.
1—28" N. B. & P. Rigid Turret Lathe. Used.
1—14" Warner & Swasey Turret Lathe. Used.
2—3 x 36 J & L Flat Turret Lathes. Used.
1—No. 2 Warner & Swasey Hand Screw Machine. Used.
1—No. 2 S & K Hand Screw Machine. Used.
2—No. 3 S & K Screw Machines. Used.
1—3.4 Cleveland Automatic Screw Machine. Used.
2—2" Cleveland Automatic Screw Machines. Used.
1—No. 515 4-Spindle National Acme Automatic. Used.
4—No. 52 4-Spindle National Acme Automatics. Used.
1—No. 53 4-Spindle National Acme Automatic. Used.
1—4¼ Gridley Automatic. Used.

SHAPERS AND MILLERS

1—25" Springfield H.D., B.G. Crank Shaper. New.
2—16" Springfield B.G. Crank Shapers. New.
2—24" Milwaukee B.G. Crank Shapers. New.
3—20" Milwaukee B.G. Crank Shapers. New.
1—16" Milwaukee B.G. Crank Shaper. New.
2—20" Columbia Crank Shapers. New.
1—16" Fox Crank Shaper. Used.
1—16" Hendy Geared Shaper. Used.
2—14" Hendy Friction Metal Shapers. Used.
1—No. 1 U.S. Hand Miller. New.
1—No. 1 Garvin Hand Miller. New.
1—No. 1 Burke Bench Miller.. New.
1—No. 3 Burke Bench Hand Miller. New.
1—Warner & Swasey Milling Machine. Used.
2—No. 0-B Fox Milling Machines. New.
1—No. 1 Dow B.G. Plain Milling Machine. New.
1—Fosdick 3½" Horizontal Miller. Used.
1—No. 10 Beeman & Smith 3½" Horizontal Miller. Used.
1—60" Bickford Vertical S.H. Miller. Used.

GRINDERS AND PLANERS

2—No. 4 Clizbe Bench Casting Grinders. New.
8—No. 3 Clizbe Casting Grinders. New.
3—No. 2 Clizbe Casting Grinders, on stand. New.
1—No. 3 Champion Bench Casting Grinder. New.
3—No. 0 Champion Bench Casting Grinders. New.
1—No. 3 Detroit Floor Casting Grinder. Used.
1—1¾ x 45" Standard Low Floor Casting Grinder. Used.
1—No. 14 Double End Pedestal Casting Grinder. Used.
1—Iron Foundry Builders' Pedestal Casting Grinder. Used.
1—8 x ¾ Casting Grinder on stand. Used.
1—American Drill Grinder. Used.
1—W & M Tool Drill Grinder. Used.
1—Washburn Drill Grinder. Used.
1—Yankee Drill Grinder. Used.
2—W & M Yankee Drill Grinders. New.
1—No. 20 Landis Plain External Grinder. Used.
1—No. 60 Heald Cylinder Grinder. Used.
1—No. 2½ Woods Universal Tool and Cutter Grinder. Used.
1—No. 1 Thomson Universal Tool and Cutter Grinder. New.
1—Cutter and Reamer Grinder. Used.
1—6-A Gorton Universal Disc Grinder. Used.
1—24" Disc Grinder Press. Used.
1—No. 34 Horizontal Disc Grinder. Used.
1—Temco Electric Grinder on Pedestal. New.
1—Temco D Electric Motor Grinder. New.
1—Temco G Bench Electric Grinder. New.
1—Van Dorn Portable Electric Grinder. Used.
1—Hand Electric Grinder. New.
1—P-Tool Electric Grinder. Used.
5—Dumore A.T.P. Grinders. New.
1—Dumore B.T.P. Grinder. New.
2—Dumore G.A.C. Electric Type Grinders. New.
3—Dumore, Jr., Electric Grinders. Used.
1—No. 1 Landis Internal Grinder. Used.
1—Morse Face Grinder. Used.
1—28 x 7 Planer Type Surface Grinder. Used.
1—No. 6 Bryant Chucking Grinder. Used.
1—52 x 45 x 13' 3" Patch 2 Head Open Side Planer. Used.
1—46 x 40 x 13' 2" Patch 2 Head Open Side Planer. Used.
1—44 x 34 x 11' 4" Lincoln 2 Head Open Side Planer. Used.
1—24 x 24 x 6 Wilson Metal Planer. New.

RIVERSIDE MACHINERY DEPOT
25 St. Aubin Ave., Detroit, Mich.

A MAN was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

Here's the opportunity you've been looking for

The Entire Equipment of the British Munitions Co.

FOR SALE

Lathes, Drills, Grinders, Furnaces, Punch and Shears, Milling Machines, Twist Drill Grinders, High Speed Hack Saws, Blowers, Compressors, Hydraulic Pumps, Motors, Arbor Presses, Bliss Presses, Oil Tanks, Electric Drills, and a very large number of Machine Tools.

Also supplies of all kinds, including Shafting, Hangers and Pulleys, Belting, Steel Lockers, Time Clocks, Trucks, Standard and Hydraulic Valves, Pipe Fittings and Packings, Tool Steel, Twist Drills, Milling Cutters, Taps, Files, and complete machine shop equipment.

WILLIAMS & WILSON, LIMITED

320 St. James Street :: MONTREAL, QUE.

2

IMMEDIATE DELIVERY

MONTREAL STOCK

Motors 3-Phase 60-Cycle

75	H.P.,	550	VOLTS,	450	R.P.M.....2
60	H.P.,	550	VOLTS,	450	R.P.M.....1
15	H.P.,	550	VOLTS,	1,200	R.P.M.....1
10	H.P.,	550	VOLTS,	720	R.P.M.....1
7½	H.P.,	550	VOLTS,	720	R.P.M.....1
7½	H.P.,	550	VOLTS,	1,800	R.P.M.....1
5	H.P.,	550	VOLTS,	720	R.P.M.....1
5	H.P.,	550	VOLTS,	900	R.P.M.....1
5	H.P.,	550	VOLTS,	1,150	R.P.M.....1
5	H.P.,	550	VOLTS,	1,200	R.P.M.....3
3	H.P.,	550	VOLTS,	1,200	R.P.M.....2
2	H.P.,	550	VOLTS,	1,200	R.P.M.....2

TRANSFORMERS....3

200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

550TRANSFORMERS, POLE TYPE—$\frac{220}{110}$ VOLTS

5 K.W.....2
10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

Prompt Delivery and Subject to Inspection.

Zenith Coal and Steel Products
LIMITED

402 McGill Building Montreal

MACGOVERN & COMPANY INCORPORATED POWER MACHINERY

In Stock for Immediate Delivery

Turbo-Generator Units
Direct Connected Units
Motor Generators
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Boilers
Smoke Stacks
Tanks
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Air Compressors

Separate Published Stock Lists for above apparatus. Staff of Engineering Specialists with three overhauling plants to SOLVE YOUR POWER PROBLEMS.

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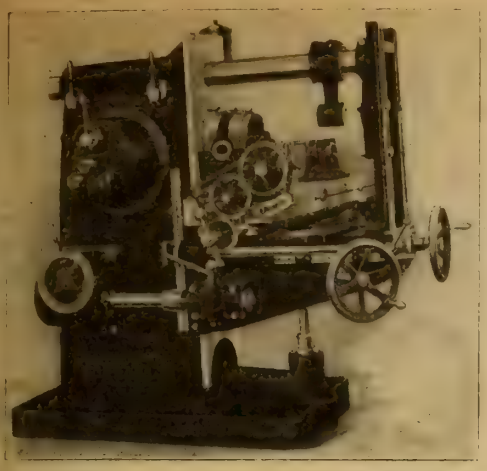
Offices: New York, Pittsburg, St. Louis.
Plants: Brooklyn, N.Y.; Lincoln, N.J., and Linden, N.J.

A Continent-Wide Service.



No. 3 Ryerson-Conradson High Power Single Pulley Drive Universal Milling Machine.

Some New Machines In Toronto Stocks

LATHES

1 16 x 7" South Bend Screw Cutting Engine Lathe.
1 18 x 8 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.
1 24 x 10 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.
1 18 x 8 Ryerson Cincinnati Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.
1 20 x 10 Ryerson Cincinnati Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.
1 24 x 12 Lodge & Shipley Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.

MILLING MACHINES

1—Ryerson-Owen No. 3 Universal, belt drive.
1—Ryerson-Conradson No. 3 plain, belt drive.

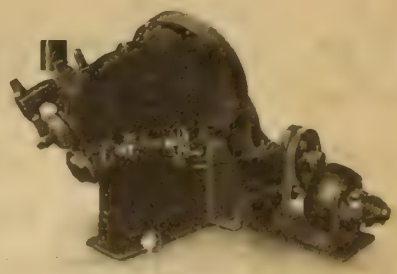
DRILLS

3—20" Ryerson Rockwell.
1—28" Ryerson Sibley Sliding Head.
1—4' Ryerson Radial Drill, Gear Box.
1—24" Ryerson Sibley Sliding Head.
1—30" Ryerson Sibley Sliding Head.

SHEARS AND PUNCHES

1—8' Lennox, Double Housing Type, Splitting Shear, capacity ¾" belt drive.
1—No. 3 Lennox Rotary Bevel Shear, arranged for belt drive, cap. ¾".
1—Ryerson Steel Frame No. 2 Hand Lever Shear, 6" blades, ¼" capacity.

No. 3 Lennox Rotary Bevel Shear, arranged for belt drive, capacity ¾-in.



The most efficient machine now on the market for beveling irregular and curved sheets, boiler heads, flanges, dome sheets, plates, angles, etc.

1—Ryerson Steel Frame No. A-6 Hand Lever Punch, 6' throat, capacity ¼ x ¼.
1—Ryerson Steel Frame No. C-6 Hand Lever Punch, 6" throat, capacity ½ x ½.
1—Ryerson Steel Frame No. 5-A Hand Lever Punch, 3' throat, capacity ¼ x ¼.
1—Ryerson Steel Frame No. O-A Hand Lever Punch, 3" throat, capacity ¼ x ¼.

Garlock-Walker Machinery Company, Ltd.

32-34 Front Street
TORONTO

Winnipeg — Montreal

IMMEDIATE DELIVERY—MONTREAL STOCK

Motors, 3 Phase, 60 Cycle

2 H.P.,	550 V.,	1700 R.P.M.—1
10 H.P.,	550 V.,	1200 R.P.M.—9
15 H.P.,	550 V.,	1200 R.P.M.—2
30 H.P.,	550 V.,	900 R.P.M.—2
40 H.P.,	550 V.,	1200 R.P.M.—1
50 H.P.,	550 V.,	900 R.P.M.—2
75 H.P.,	2200 V.,	850 R.P.M.—1
125 H.P.,	550 V.,	690 R.P.M.—1
150 H.P.,	550 V.,	600 R.P.M.—1
200 H.P.,	2200 V.,	514 R.P.M.—2
400 H.P.,	2200 V.,	160 R.P.M.—1

Transformers, Pole Type 2200—$\frac{220}{110}$ Volts

¾ K.W.—11	2¼ K.W.—19
1 K.W.—15	3 K.W.—12
1½ K.W.—26	3¾ K.W.— 6
1 K.W.—24	5 K.W.—55

Our stock changes constantly. If not listed above please enquire anyway.

DOMINION IRON & WRECKING CO., LIMITED

General Offices:—Transportation Building, Montreal

The MacLean Business & Class Publications in Canada

TO SELL or buy from Canada such lines as machinery, hardware, food products, dry goods, books and stationery, paper, printing machinery and supplies and general merchandise of almost every description, raw or manufactured, use or consult the MacLean Business and Class Publications, as per list below. For special information, write the publishers. Concerning the quality of the MacLean publications, let this copy of DRY GOODS REVIEW which you hold in your hands speak for all. The MacLean list of 14 publications is as follows:—

The Canadian Grocer (Est. 1886)
Serving the Grocery, Provision and Foodstuffs Trades. Published weekly.

Hardware and Metal (Est. 1889)
Serving the Hardware, Stove and Metal-working Trades. Published weekly.

Dry Goods Review (Est. 1889)
Serving the Dry Goods Trade generally; Wholesale, Retail, Manufacturing and Department Stores. Published monthly.

Men's Wear Review (Est. 1898)
Serving the Manufacturers of Clothing, Underwear, Shirts, Collars, Neckwear, Footwear, Hats and Caps and Allied Sundries, and their Retail Distributors. Published monthly.

Canadian Machinery (Est. 1905)
Serving the Machinery, Metal-working, Iron and Steel, Foundry and Allied Trades. Published weekly.

The Power House (Est. 1907)
Serving the Operating and Consulting Engineers and Power Superintendents, Devoted to the Generation, Transmission and Application of Steam, Gas, Electric, Air and Water Power; and to the operation of Refrigerating Machinery. Published monthly.

Bookseller and Stationer (Est. 1884)
Serving the Book, Stationery, Fancy Goods and Associated Trades. Published monthly.

The Sanitary Engineer (Est. 1907)
Serving the Manufacturers of Sanitary, Heating and Ventilating Machinery, Systems and Equipments, and those installing them. Published semi-monthly.

Marine Engineering of Canada (Est. 1910)
Serving the Marine Engineering, Merchant and Shipbuilding Trades. Published monthly.

Canadian Foundryman (Est. 1909)
Serving Foundries and the Pattern-making, Plating and Polishing Trades. Published monthly.

Printer and Publisher (Est. 1892)
Serving the Publishing, Printing, Paper-making and Allied Trades. Published monthly.

The Financial Post (Est. 1907)
Serving the Business, Investment and Financial Interests of Canada. Published weekly.

MacLean's Magazine (Est. 1896)
A popular family and literary magazine; the most important in its field in Canada. Published monthly.

The Farmers' Magazine (Est. 1910)
Serving the agricultural and rural communities of Canada. The only farm and country life publication in Canada having extensive national circulation. Published semi-monthly.

This fact may interest you: namely, the MacLean organization is the largest concern of its kind in the British Empire. The output of its mechanical department every working day is the equivalent of a 125-page publication of the size and type of this copy of *Dry Goods Review*.

Our London Office 88 Fleet Street, E. C.

Also at New York Boston Chicago Montreal Winnipeg

For over 20 years the MacLean Publishing Company has maintained a fully-staffed London office, and has rendered British and Continental manufacturers, shippers, and traders an invaluable service in many directions.

Specimen copies of the MacLean publications will be cheerfully forwarded to all asking for them. Address us at London or Toronto.

The MacLean Publishing Co., Limited

143-153 University Avenue Toronto, Canada

SPECIAL MACHINERY

Special Machinery, Gears, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Etc.

CONTRACT WORK

ELLIOTT & WHITEHALL MACHINE & TOOL CO.
GALT, ONT.

SPECIAL MACHINERY
JIGS AND FIXTURES PUMPS
GAUGES GASOLINE ENGINES
GEAR CUTTING

ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

EMERGENCY REPAIRS Electric, Thermit and Oxy-Acetylene Welding

Telephone us and we'll be on the job by NEXT train with our Portable Oxy-Acetylene Outfit and Skilled Mechanics. We're always ready.

THE
ST. LAWRENCE WELDING CO., Ltd.
A. M. BARRY, Managing Director
138-140 Inspector Street MONTREAL, Que.
Long Distance Phone Main 5779
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VICTORIA
Special Machinery

Designs
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VICTORIA FOUNDRY CO., LTD.
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1107 Currieres Street
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Que.

SPECIAL
MACHINERY
Consult us on all your special machinery requirements. Expert advice, prompt service, reasonable prices.

GREY IRON AND BRASS
CASTINGS
Light or Heavy,—True to Pattern
Quality Unsurpassed.
Special facilities for repetition work.

Manufacturers of the
famous TOMCO bearings
Used for light or heavy service. They practically last a lifetime. Send us your order.

Hyde Engineering Works
27 William St. - - Montreal

Enquiries Solicited for
General Machine Contract Work

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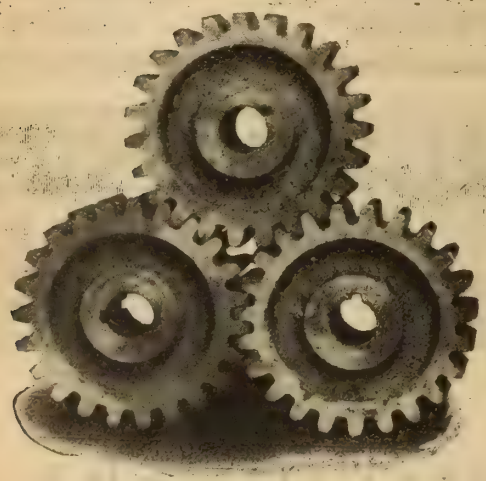

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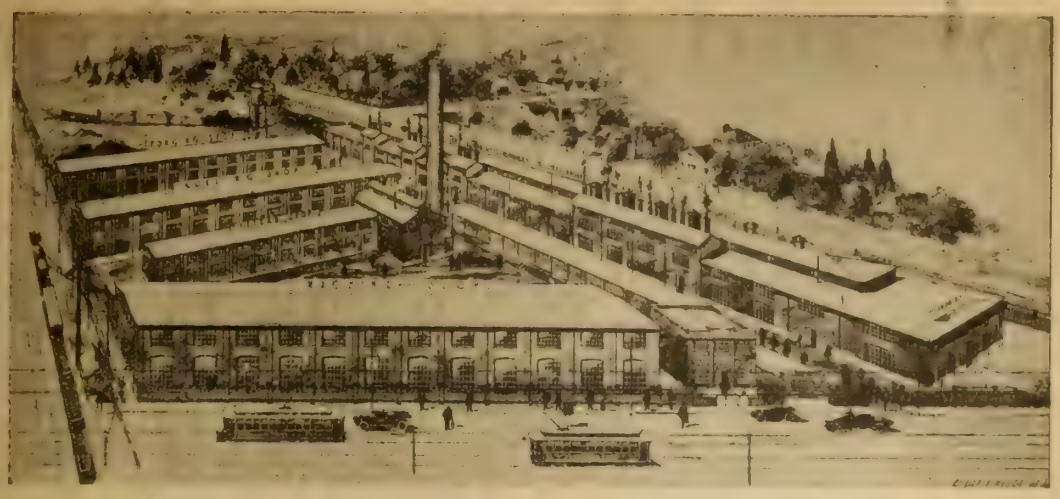

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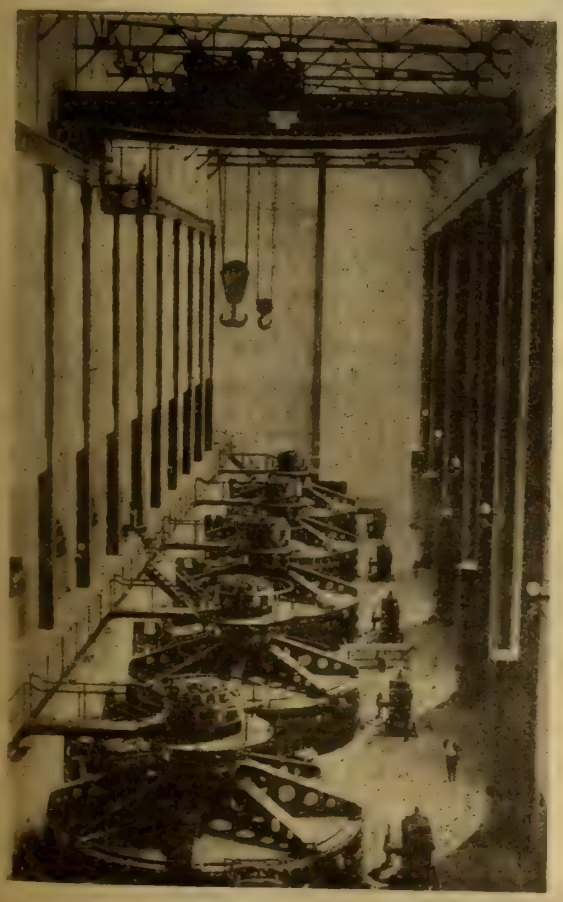

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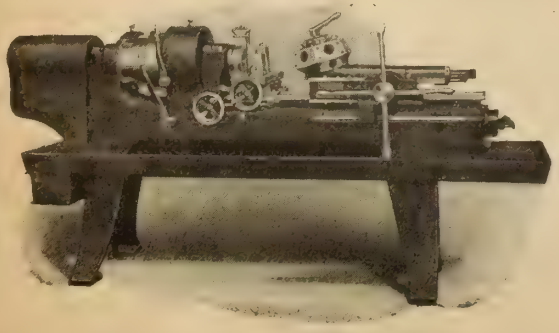

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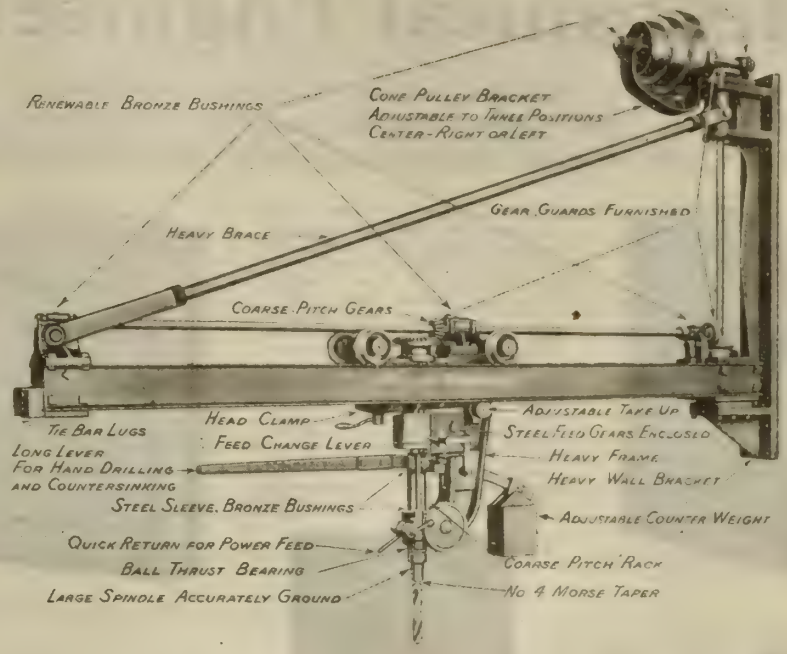

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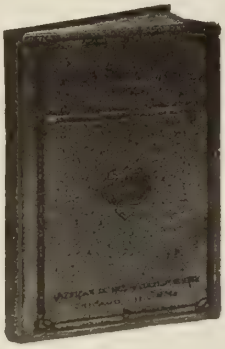

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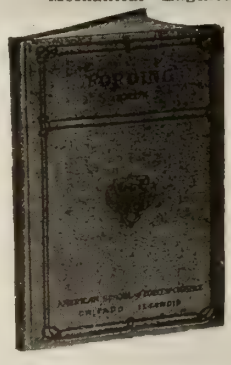

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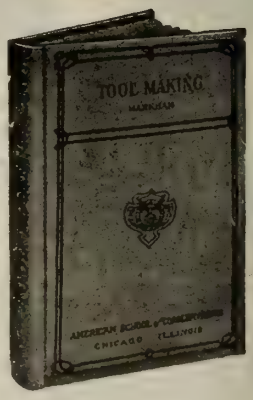

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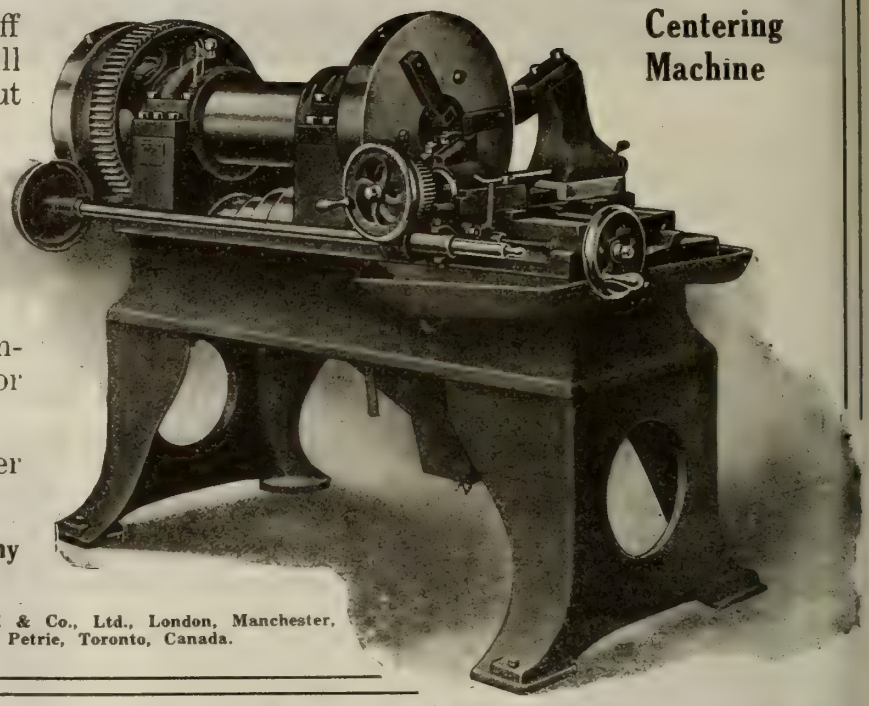

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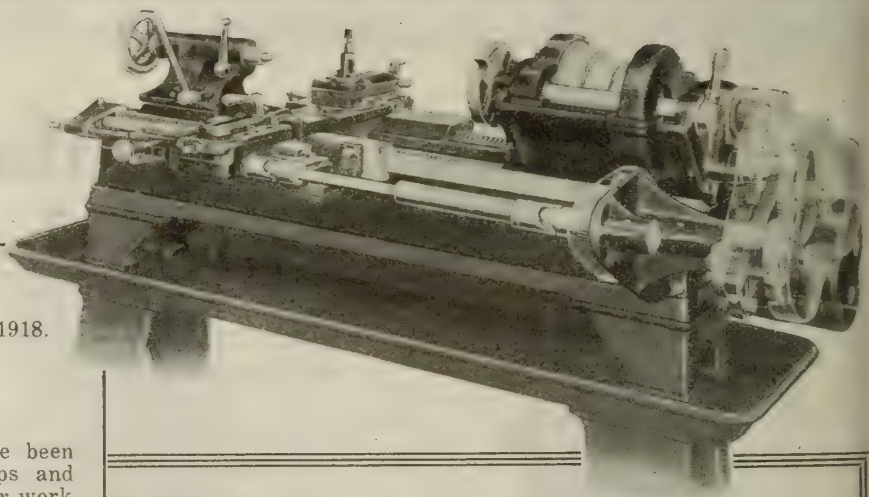

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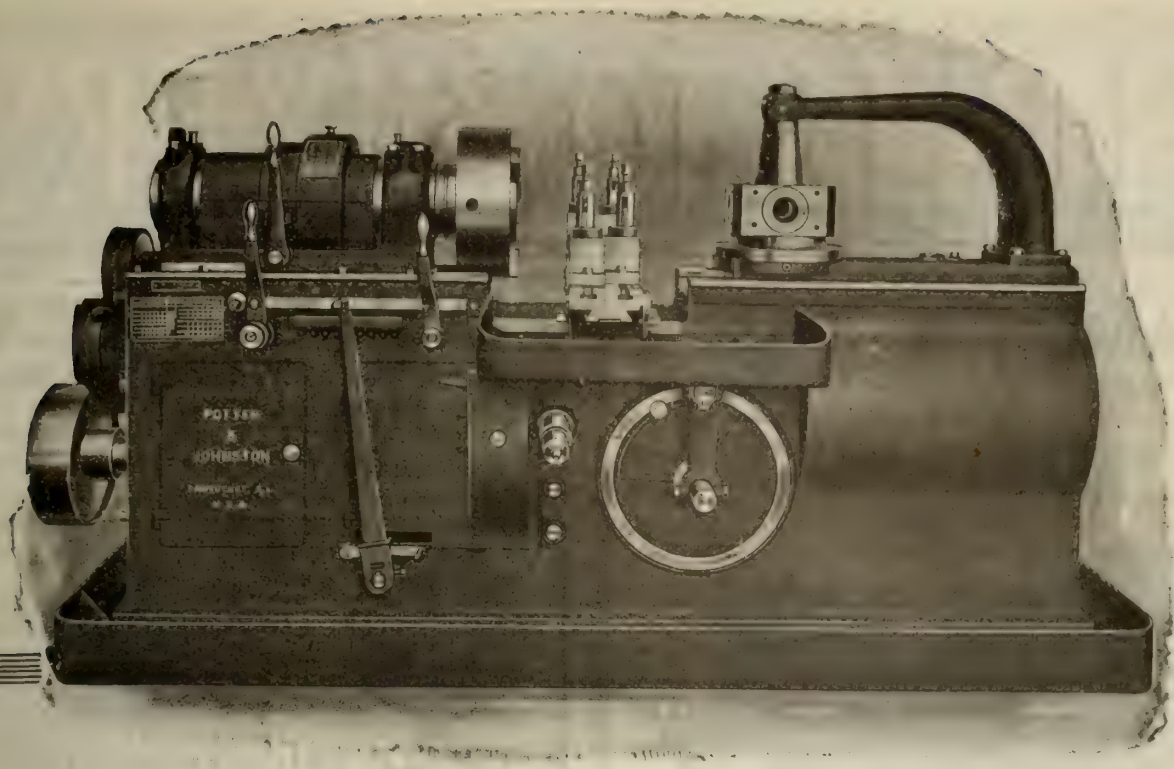

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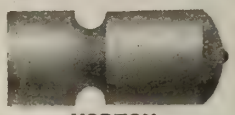

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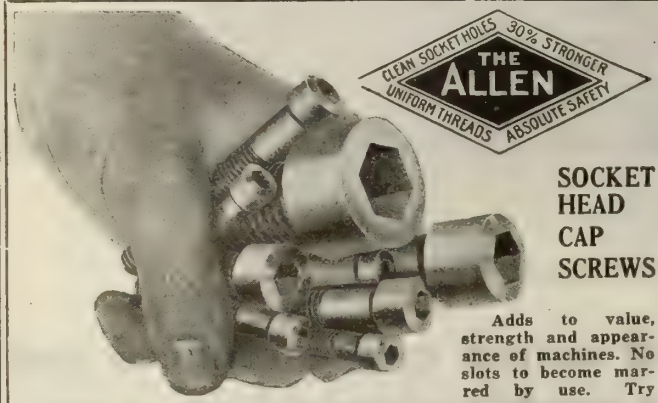

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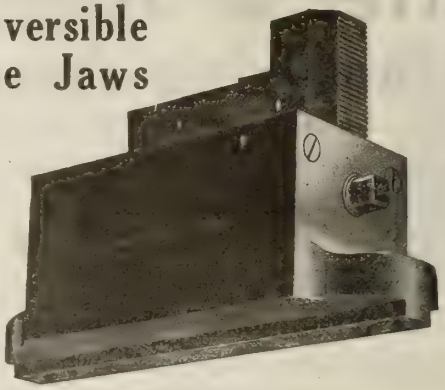

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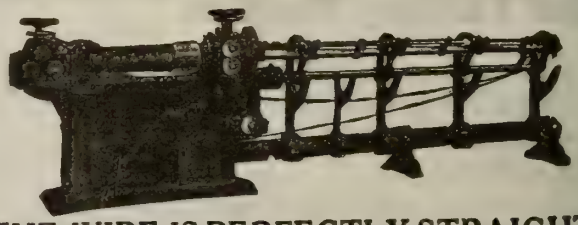

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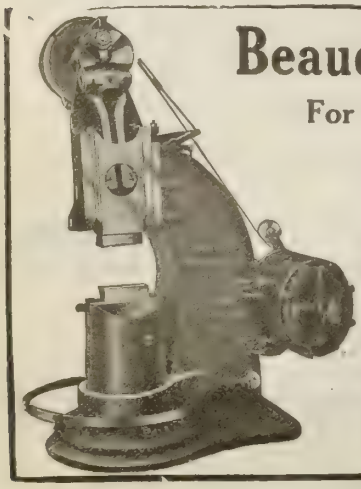

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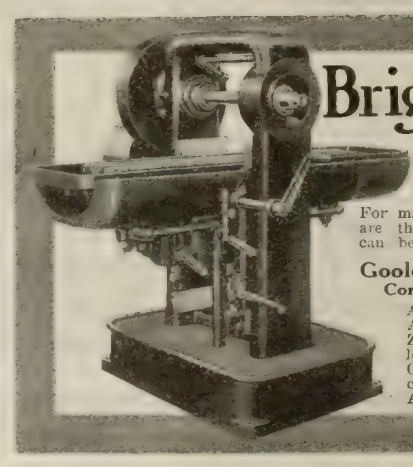

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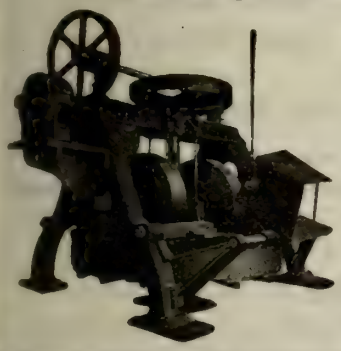

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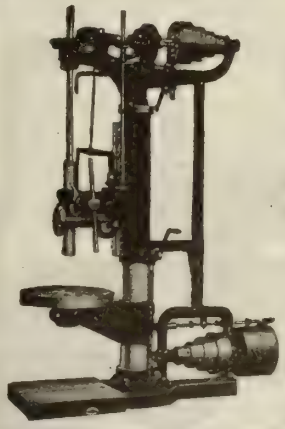

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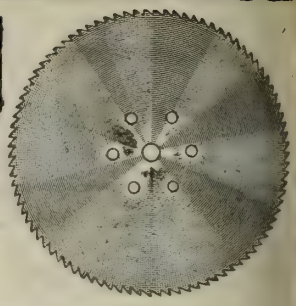

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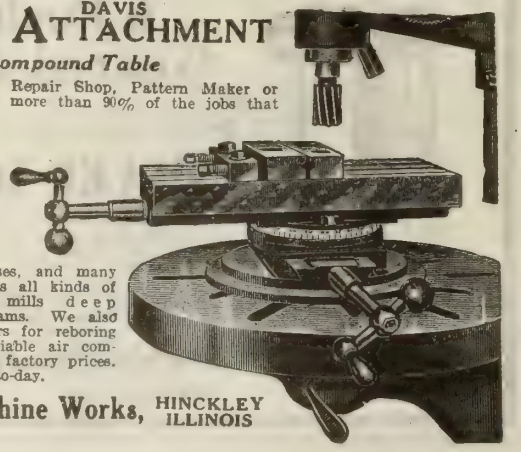
For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.



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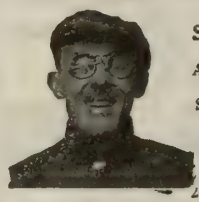

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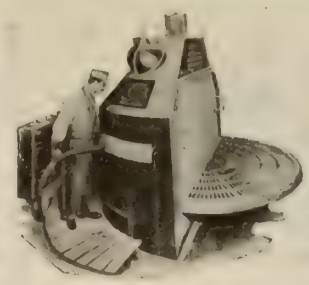

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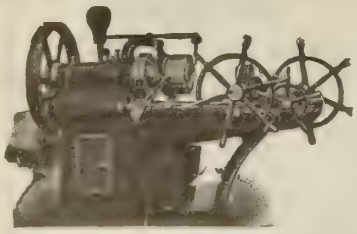

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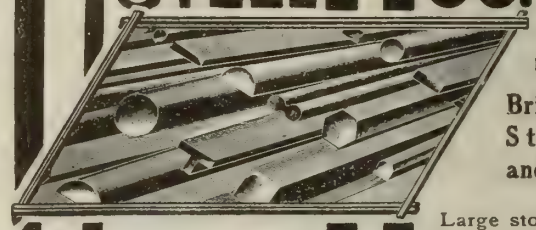

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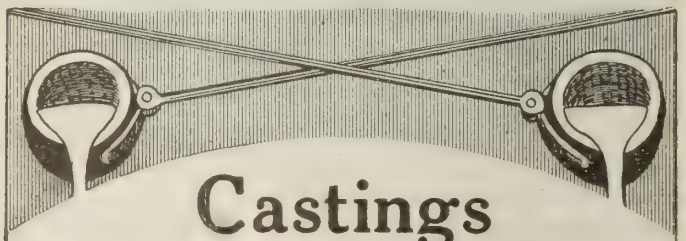

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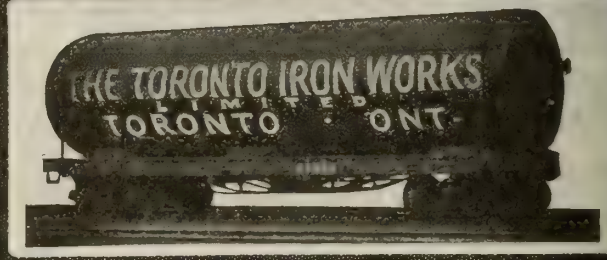

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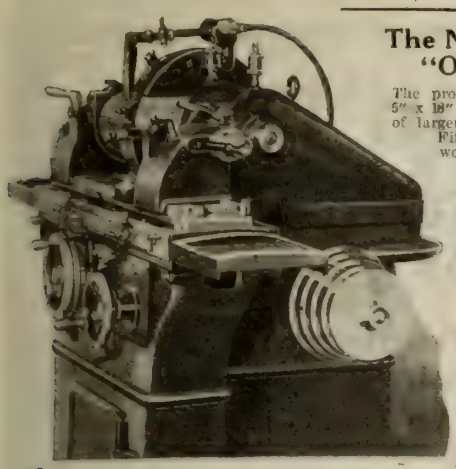

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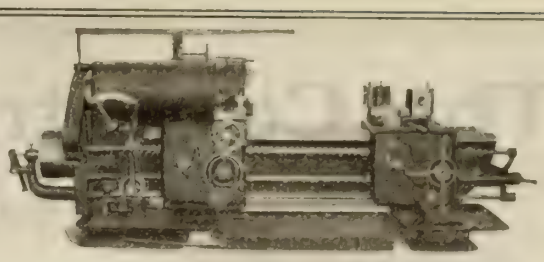

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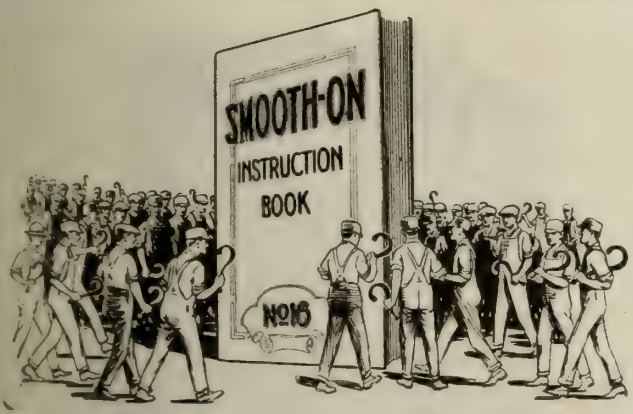

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One Left-Hand Improved Horizontal Simple Automatic Laurie Corliss Engine.

Diameter of Cylinder	28"
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No. of Revolutions per minute	75
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One 25" x 50" Left-Hand Wheelock Engine.
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These engines are in excellent condition.

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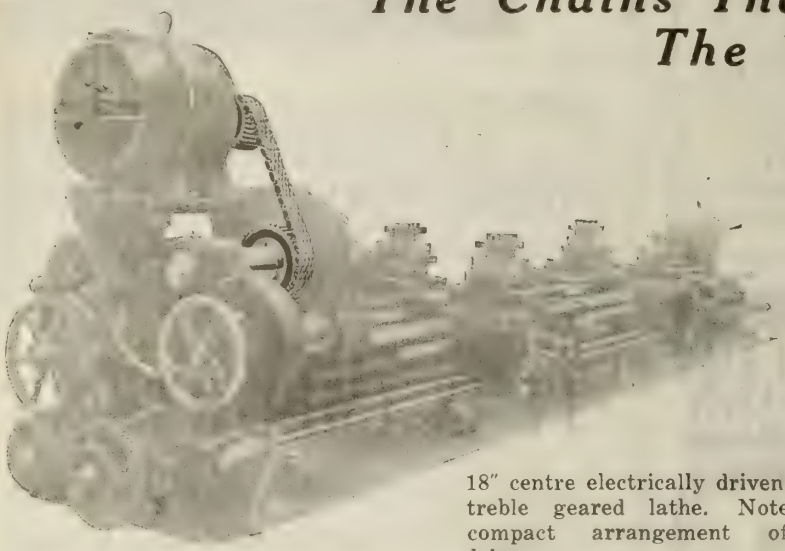
The Chains That Carried The Tanks To Victory



18" centre electrically driven, treble geared lathe. Note compact arrangement of drive.

Advantages of Chain Transmission

Will work at a high speed and in either direction. Positive yet flexible even turning movement. Will work on centres too long for gears and too short for belts, so that drive can be arranged to suit other details of design. Unaffected by heat or cold. Give positive velocity ratio, minimise journal friction. Will transmit considerable power with high efficency which is retained.

Increase output, give uniform quality of product, consume minimum of power. Minimum attention required for repairs or adjustment.

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Cables: "Chains, Coventry" *Codes:* ABC 4th and 5th Edns., Western Union and Marconi

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If you have a lathe
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a milling machine
a planer
a chain block
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a motor
a crane
a stock of belting
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a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

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Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

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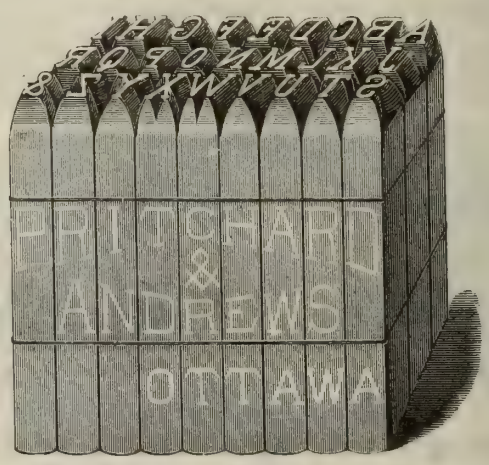

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General Engravers and Die Sinkers
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cKinnon Steel Co., Sherbrooke, Que.
Lawrence Welding Co., Montreal, Que.

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eldons, Ltd., Galt, Ont.

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ited Brass & Lead, Ltd., Toronto.
llman Brass & Metal Co., Hamilton.

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th & Sons, Thos., Montreal, Que.
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lcan Crucible Steel Co., Aliquippa, Pa.

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Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
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Williams & Wilson, Ltd., Montreal, Que.

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"Wanted—A National Plan"

An article of unusual importance, by Sir George Bury, formerly vice-president of the C.P.R., appears in the February issue of MACLEAN'S. He points out that Canada must more definitely shape her destiny if that destiny is to be as glorious as all Canadians hope. It is a stirring demand for Canadians to get together in the formation of a national plan, accompanied by many practical suggestions from his experience in transcontinental railroad building. An article of national importance.

"Germany From Within To-day"

The funniest thing that he has perhaps written appears in February MACLEAN'S from the pen of Canada's great humorist, Stephen Leacock—an imaginary visit to Berlin under the Bolsheviks. He finds Von Tirpitz planning a new navy, an *inland fleet;* Frau Krupp, an apple woman; Von Bethmann-Hollweg, a cab driver; Bernstorff, a Bolshevik and president of the Scavengers Union. He finds a *Get From Under* committee planning a trade war on the world and half the population of Berlin in English clothing or Scotch kilts. He finds—

But read the article. There's a long laugh in every line. It is farce, however, built up on pretty shrewd truths.

You will find this a remarkably interesting number. The bold, fighting face of Admiral Beatty is on the cover and inside are the following big features:

The Campaign Against Britain, by Agnes C. Laut.

The Farmer in Politics, by J. K. Munro.

The Strange Adventure of the Thumb Tap Clue, by Arthur Stringer.

Old Times in Canada, by Walt Mason.

Lend Me Your Title, by Onoto Watanna.

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The Anglicization of Katrina, by Mary Josephine Benson.

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Landis Machine Co., Waynesboro, Pa.
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Murchey Machine & Tool Co., Detroit, Mich.
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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Henry & Wright Mfg. Co., Hartford, Conn.
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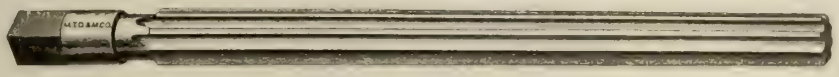

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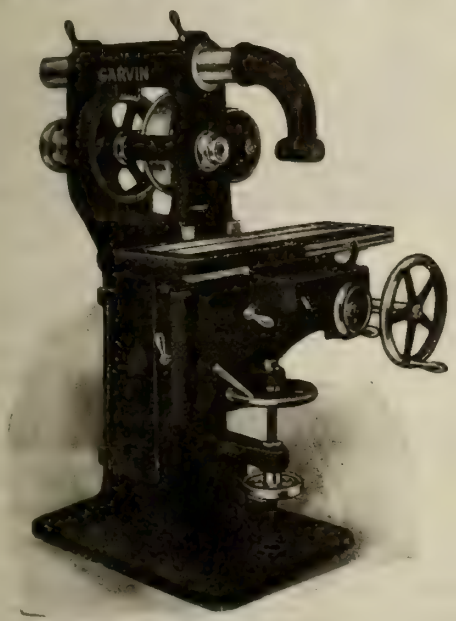

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Use Code . . . . Abode

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The Features of the Machine Are:

Telescope Arm.
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Power Feed driven by vertical worm shaft inside of column, which drives a worm gear clutched to the pinion shaft in the knee.
Feed Works located and protected inside of column.
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Micrometer adjustments of Knee and Saddle.
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Elevating Screw does not pass through the floor.

Power Feed of Table	12½ in.
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Vertical Adjustment	10 in.
Net Weight, Skidded	600 lbs.

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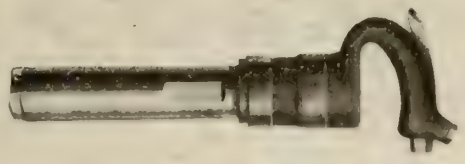

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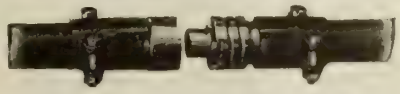

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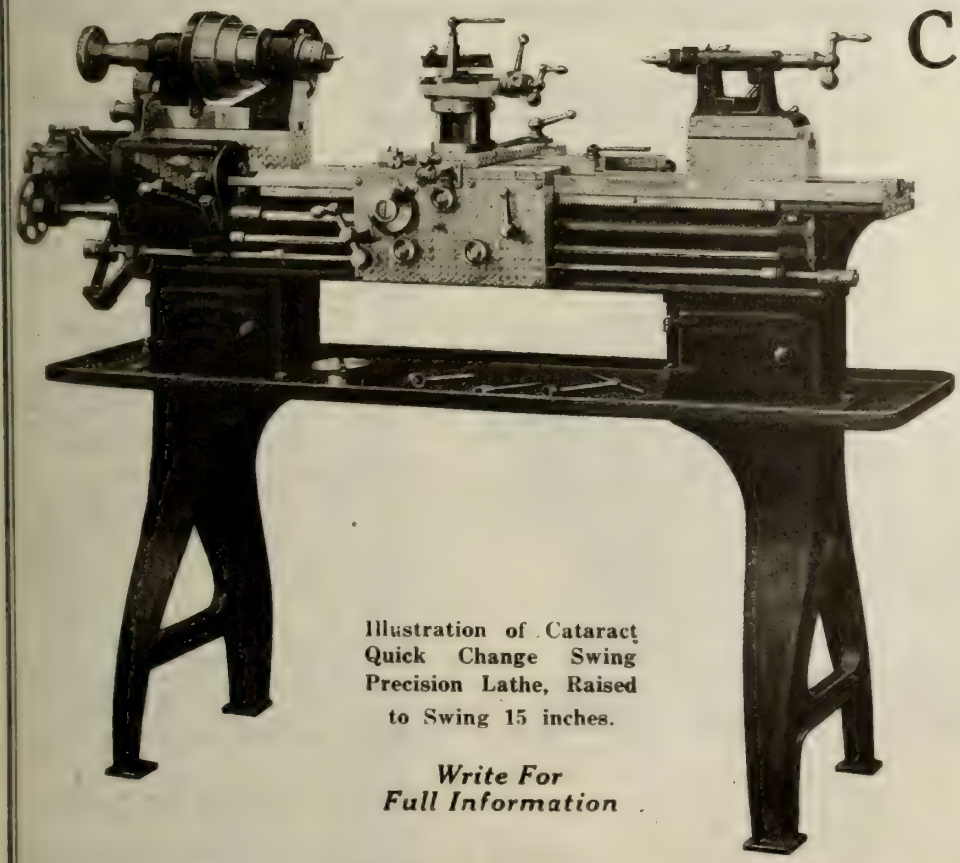

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Swing over Carriage 5½" and 11½'
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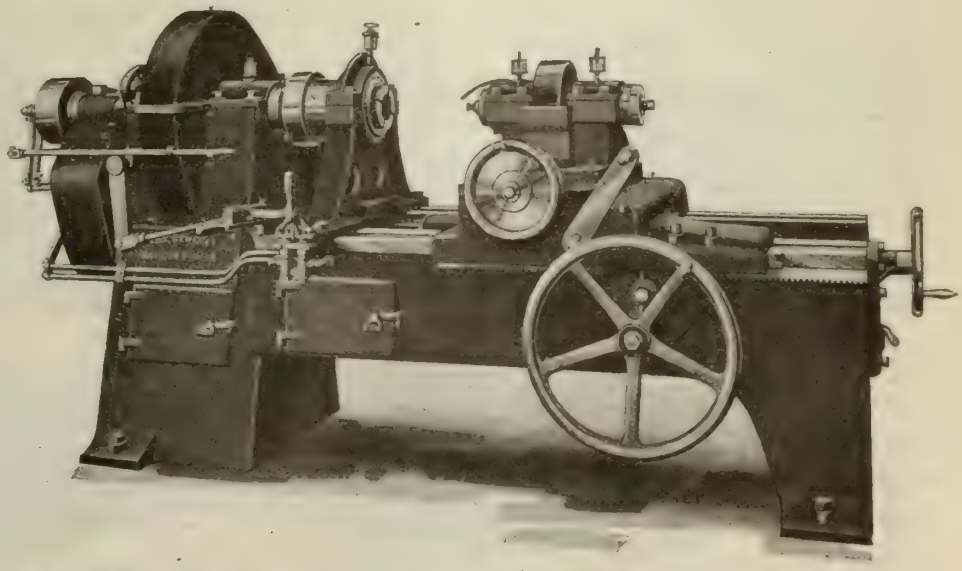

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LATHES, TURRET, HAND, HORIZONTAL
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Bertram, John, & Sons Co. Dundas Ont.
Blount, J. G., & Co., Everett, Mass.
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Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co. Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Warner & Swasey Co., Cleveland, O.
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Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.

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Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
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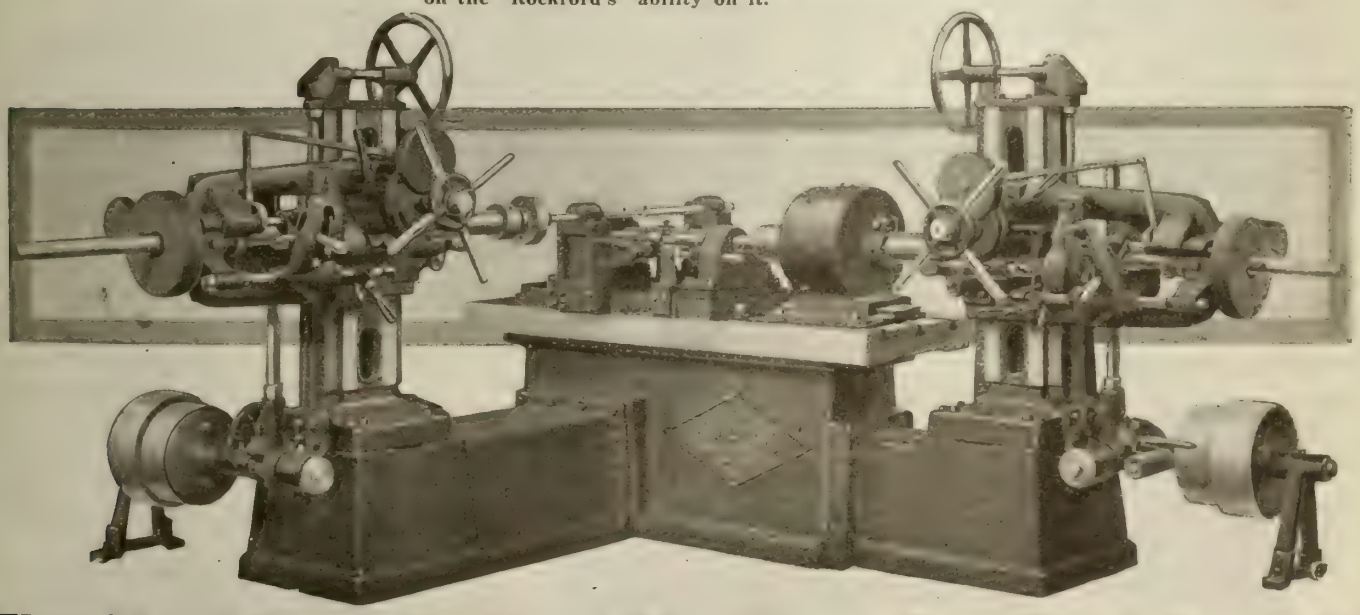

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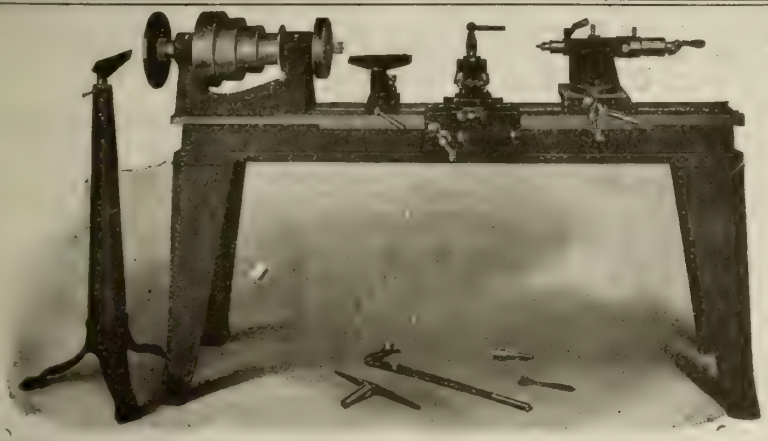

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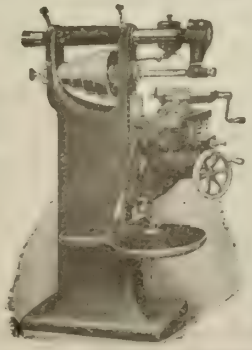

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PRESSES, SCREW
Barnes, W. F., & John Co., Rockford, Ill.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.
William R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Erie Foundry Co., Erie, Pa.
Ferracute Mach. Co., Bridgeton, N.J.
Stoll Co., D. H., Buffalo, N.Y.

PRODUCTION WORK
Windsor Mach. & Tool Co., Windsor, Ont.

PROPELLERS
Kennedy & Sons, Wm., Owen Sound, Ont.

PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
Algoma Steel Corp., Sault Ste. Marie, Ont.
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dodge Sales & Eng. Co., Mishamsha, Ind.
Ford-Smith Machine Co., Hamilton, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Positive Clutch & Pulley Works., Ltd., Toronto.
J. C. Wilson & Co., Belleville, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn.

PULP MILL MACHINERY
Hydraulic Machy. Co., Ltd., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, CENTRIFUGAL
Goldie & McCulloch Co., Galt, Ont.
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

PUMPS, FUEL OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec.
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, HIGH PRESSURE
Hydraulic Machy. Co., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.

PUMPS, ALL KINDS
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
William R. Perrin, Ltd., Toronto.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, HYDRAULIC
Garlock-Walker Machinery Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.

PUMPS, LUBRICATING, OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, HAND, FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, POWER FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, KEROSENE, OIL, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, ROTARY, POWER DRIVEN
Bowser & Co., Inc., S. F., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Trahern Pump Co., Rockford, Ill.

PUMPS, LUBRICANT, OIL, WATER
Darling Bros., Ltd. Montreal, Quebec.
Fry's (London), Ltd., London, England.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Trahern Pump Co., Rockford, Ill.

PUMPS, MOTOR AND BELT DRIVEN
Darling Bros., Ltd., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, SUD
Fry's (London), Ltd., London, England.

PUMP LEATHERS
Graton & Knight Mfg. Co., Worcester, Mass.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co. Brooklyn, N.Y.
Boker & Co., Inc., H., Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Can Fairbanks-Morse Co., Montreal.
Gardner, Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Mulliner-Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Stoll Co., D. H., Buffalo, N.Y.
Wickes & Co., Saginaw, Mich.

PUNCHES, CHROME, VANADIUM SHELL
Hammond Steel Co., Inc., Syracuse, N.Y.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

PYROMETERS
Bristol Co., Waterbury, Conn., U.S.A.
Shore Instrument & Mfg. Co., New York City.
Taylor Instrument Co., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS
Can. Welding Works, Montreal, Que.
United Brass & Lead, Ltd., Toronto, Ont.

RAIL BENDERS
Algoma Steel Corp., Sault Ste. Marie, Ont.
Niles-Bement-Pond Co., New York.

RADIAL DRILLING MACHINE, WALL
Lynd-Farquhar Co., Boston.
Wickes & Co., Saginaw, Mich.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

RAIL OVERHEAD
Morris Crane & Hoist Co., Herbert. Niagara Falls, Ont.

RAILWAY EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
The McCrosky Reamer Co., Meadville, Pa.
The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER AND SELF-FEEDING
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REGULATORS, AUTOMATIC
Electric Steels & Metals, Ltd., Welland, Ont.

REGULATORS, PRESSURE TEMPERATURE
Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

ROAD BUILDING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

RODS
General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich.

ROLLER CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont.

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto, Ont.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
Pangborn Corporation, Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SASH WEIGHTS AND WRENCHES
Fittings, Ltd., Oshawa, Ont.

SAWS, CIRCULAR METAL
E. C. Atkins & Co., Indianapolis, Ind.
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)
E. C. Atkins & Co., Indianapolis, Ind.
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, SLITTING
E. C. Atkins & Co., Indianapolis, Ind.
Taylor, J. A. M., Stair Bldg., Toronto, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCREENING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

SCREW MACHINE PRODUCTS
Galt Machine Screw Co., Galt, Ont.
Knight Metal Products, Ltd., Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

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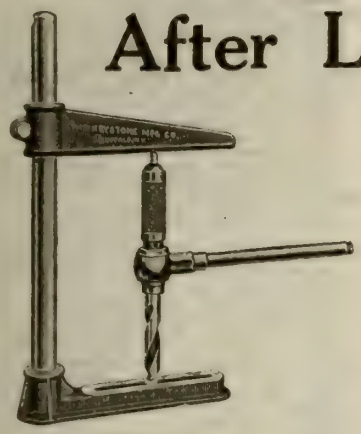

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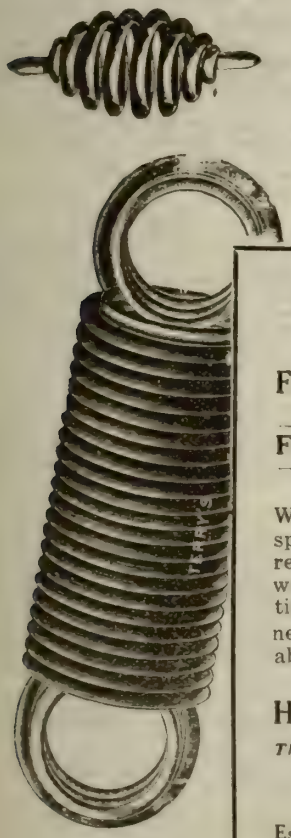

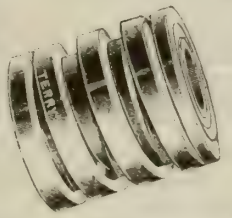

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Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que.

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Cincinnati Automatic Mach. Co., Cincinnati, O.
New Britain Machine Co., New Britain, Conn.
Riverside Machinery Depot, Detroit, Mich.

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Galt Machine Screw Co., Galt, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

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Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

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Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

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Wilkinson & Kompass, Hamilton, Ont.

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Jacobs Mfg. Co., Hartford, Conn.

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The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Rhodes Mfg. Co., Hartford, Conn.
Steptoe Co., John, Cincinnati, Ohio.

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Algoma Steel Corp., Sault Ste. Marie, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Jones & Glassco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.

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Norton Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

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Bertrams, Ltd., Edinburgh, Scotland
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Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

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Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
A. B. Jardine & Co., Limited, Hespeler, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.

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Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.

SHEET METAL STAMPINGS
Dominion Forge & Stmp. Co., Walkerville, Ont

SHELL BANDING MACHINES, HYDRAULIC
Garlock-Walker Machy. Co., Ltd., Toronto, Ont
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.

SHELVING, STEEL
Dennis Wire & Iron Works, London, Ontario

SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont
Sheldons, Ltd., Galt, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

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Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

SHOP FURNITURE
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New Britain Mach. Co., New Britain, Conn.

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Can. B. K. Morton, Toronto, Montreal.
Williams & Co., J. H., Brooklyn, N.Y.

SILENT CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SLEDGES
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Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilkinson & Kompass, Hamilton, Ont.

SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.

SMOKESTACKS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Quebec.
Marsh Engineering Works, Belleville, Ont.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice, Lewis & Son, Toronto, Ont.

SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto

SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead, Ltd., Toronto

SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SPIKES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

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Cleveland Wire Spring Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.

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Beaver Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
National-Acme Co., Cleveland, Ohio.
Mullner & Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co, Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont.
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPROCKETS, CHAIN
Can Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
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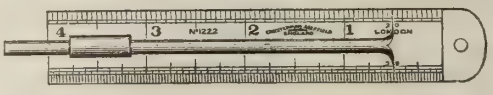

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and Turn Out a Pile of Work so Simple to Operate is the

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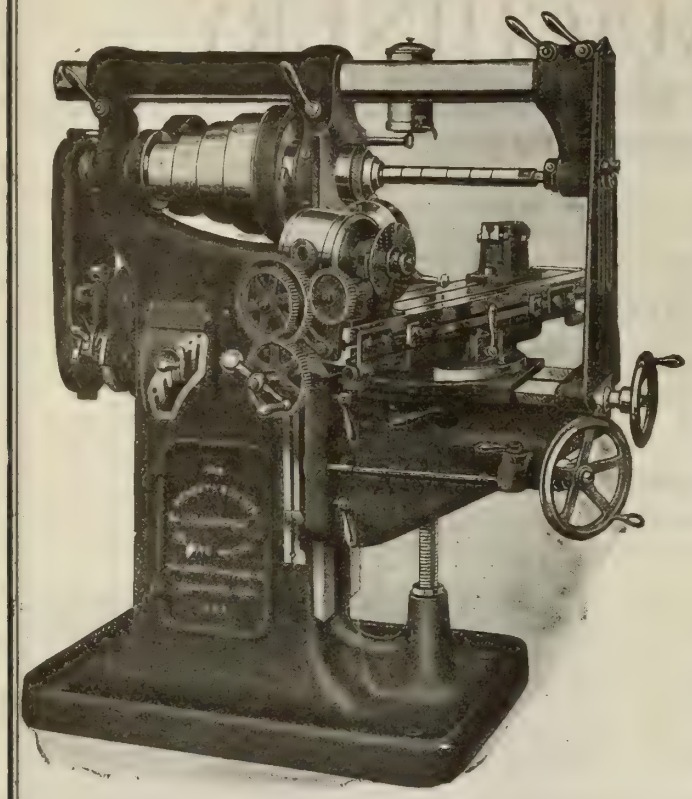

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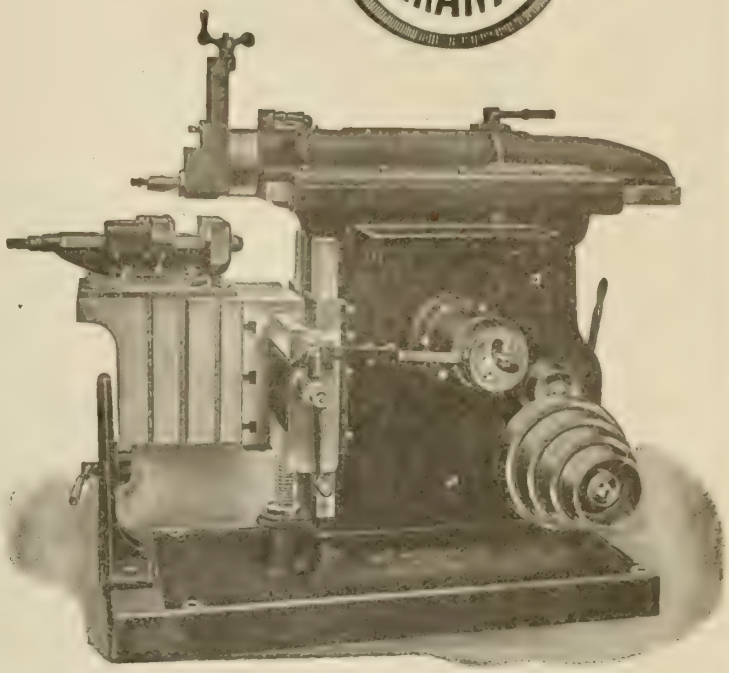

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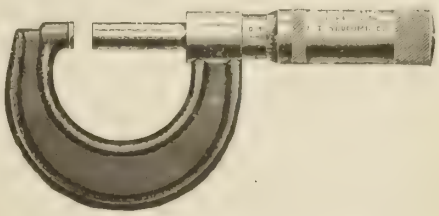

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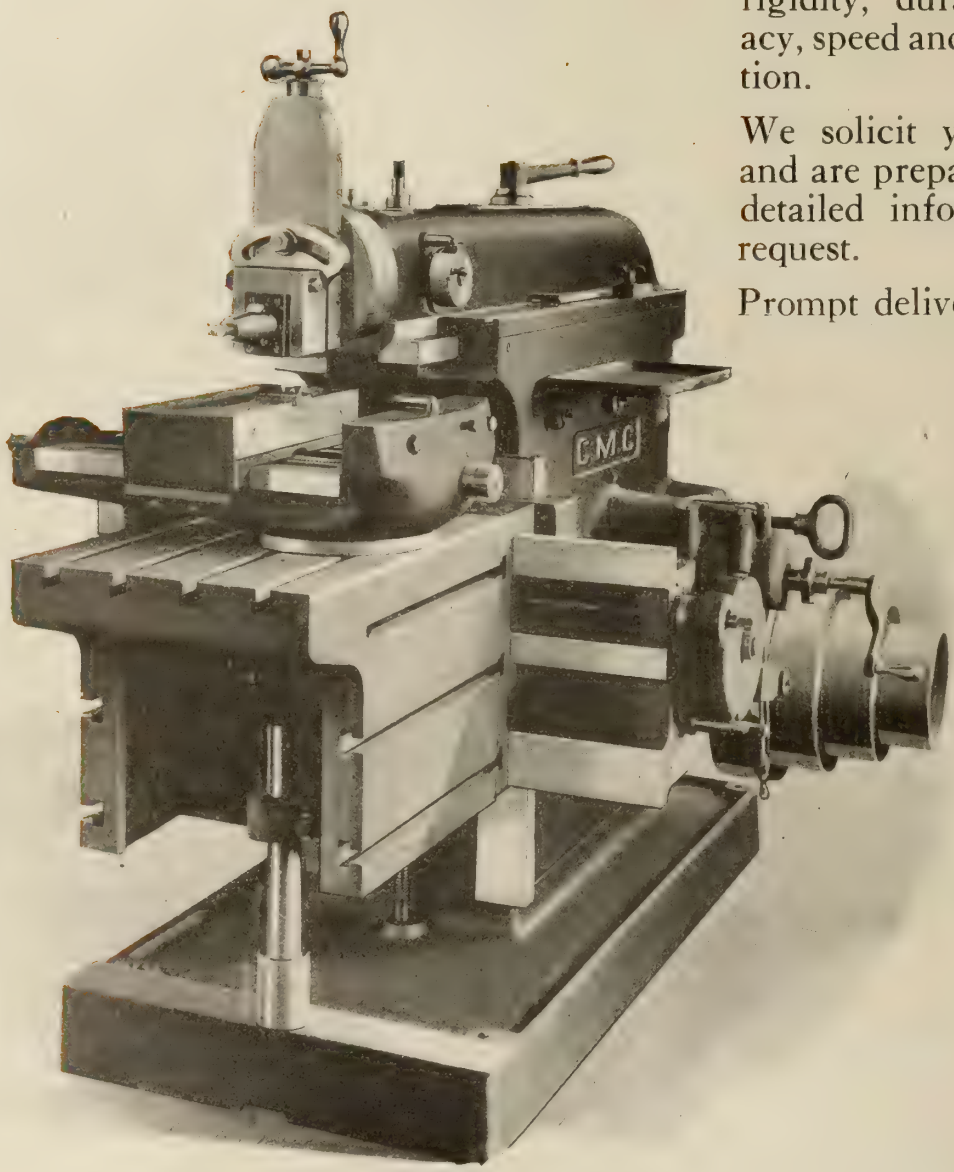

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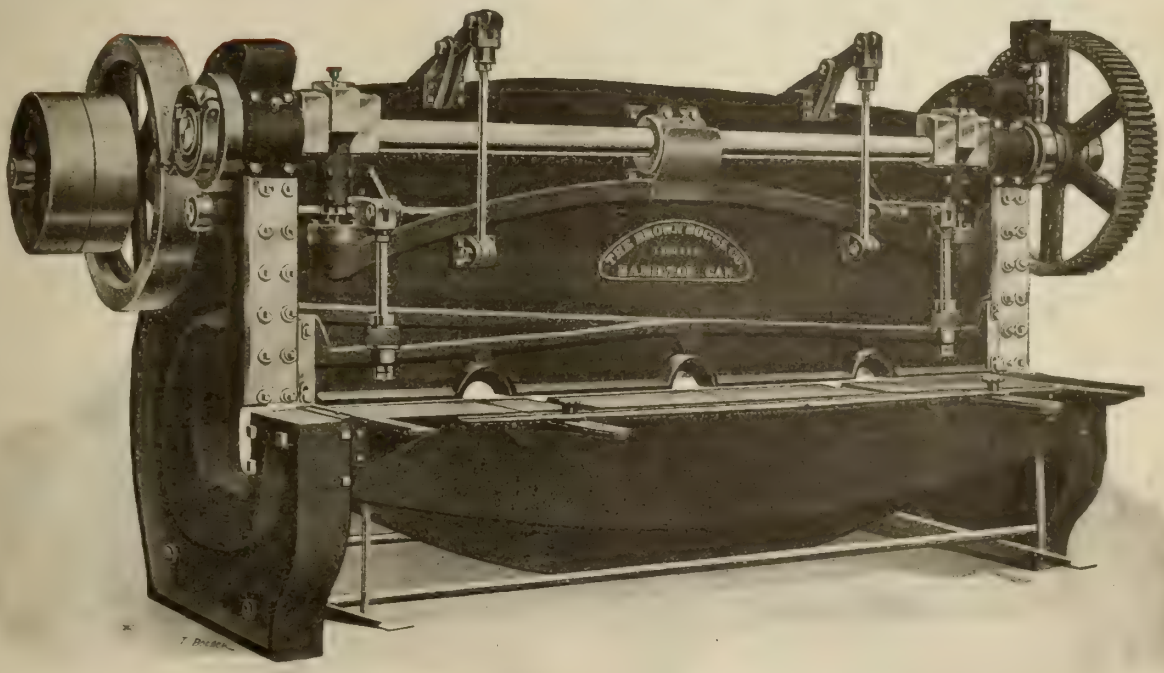

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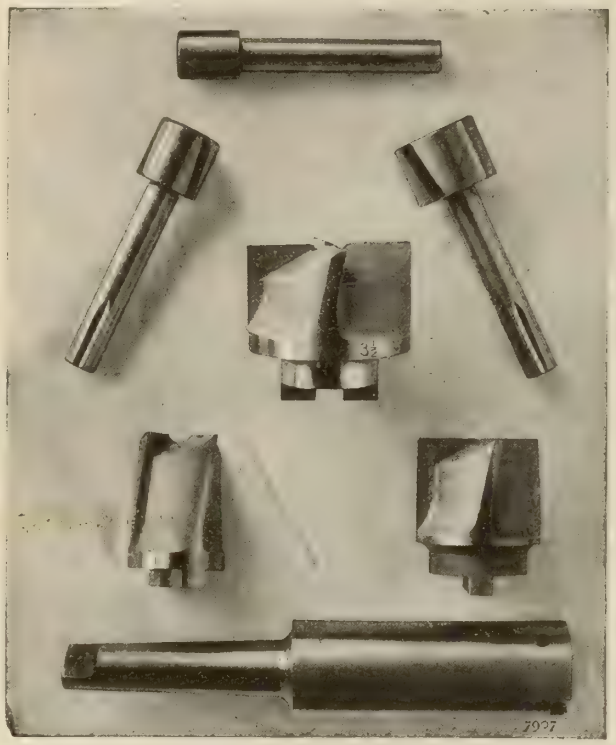

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With this combination you can immediately make the right combination for every counterboring job.

HOLDERS

End of holder is milled to receive the driving lug of the cutter, and there is also a hole and set screw to accommodate the shank of the guides.

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Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

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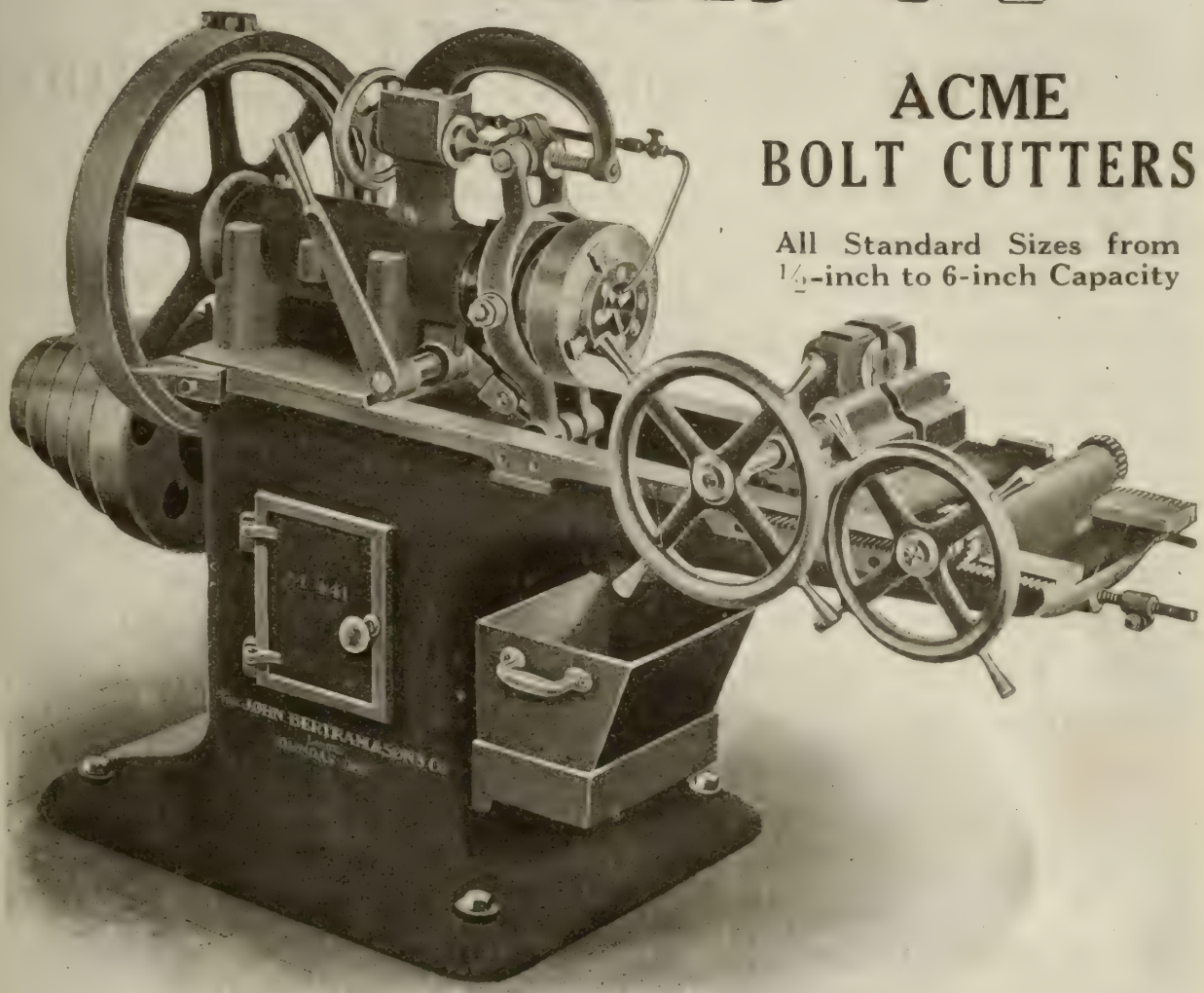

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The Publisher's Page

TORONTO FEBRUARY 6, 1919

To Former Munition Manufacturers

ONE by one manufacturers who for the past two or three years have been making shells are solving the problem of "what are we to make after the war."

The period of readjustment has been definitely entered upon. It was like setting out upon a long journey over a new and unknown road. The way is opening up. Hills which looked steep at a distance have a habit of levelling out when they are approached. Presently and in due season the end of the journey will be reached, and without serious mishap or disaster.

There is lots of advice we could offer at the present time, but advice is a drug on the market. Firms and individuals will go their own ways and will work out their own salvation. There is one piece of advice we can give, however, and we know it to be sound.

It is this:

We advise you to use the journal which served you so successfully during the period of the war when you were making munitions if you are about to engage in the manufacture of some new line which is to be marketed in the metal working field. If you have been an advertiser in Canadian Machinery, you'll know how sound this advice is. If you have not advertised and wish to test the soundness of our advice ask any regular advertiser.

We have lately received contracts for advertising from several manufacturers who had been making shells or component parts and who have found their peace time level.

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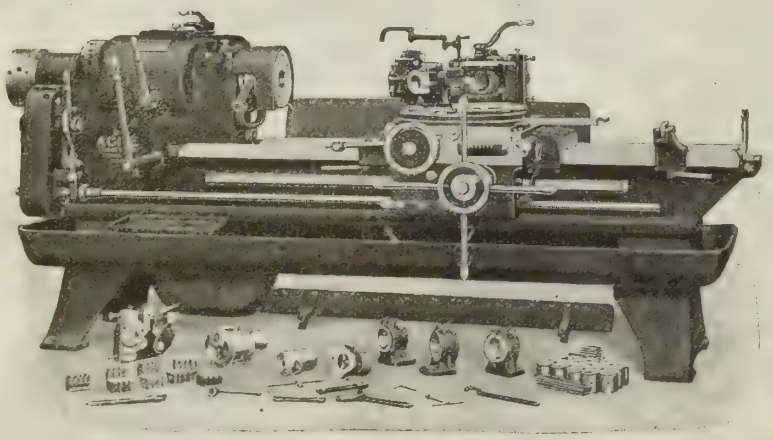

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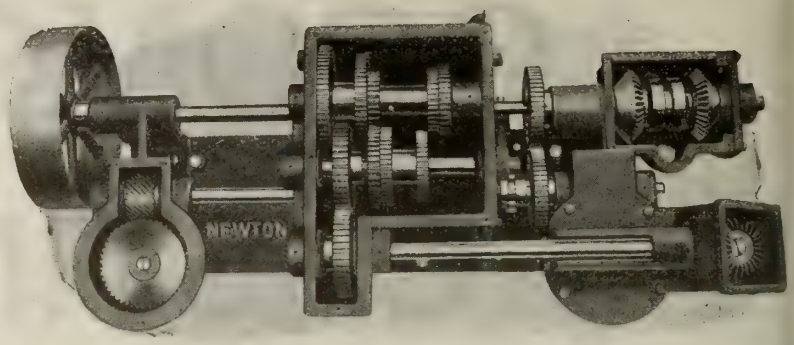
THE JOHNSON FRICTION CLUTCH

OVER THERE

is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.



Courtesy of Newton Machine Tool Works, Phila., Pa.

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads., note the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are your requirements?

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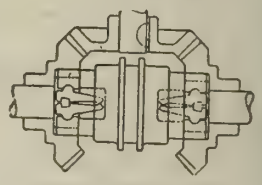

Double Clutch in Nest of Gears

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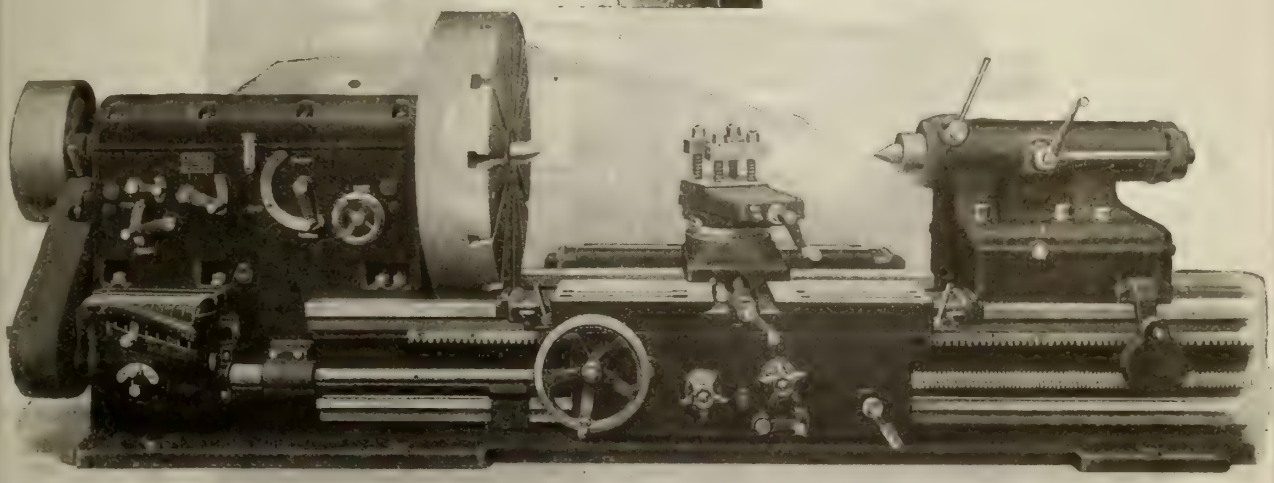
Heavy Duty Lathes



"I'm from Missouri," said the Superintendent of a large manufacturing plant who was in the market for several lathes. "All these catalogues look pretty and sound good but—*I want to be shown.*"

After much persuasion he finally agreed to install a Bridgeford Lathe as a "try-out."

The "Bridgeford try-out" was subjected to the severest tests, but its production, accuracy, power and all-round faithful performance converted the skeptical Superintendent, and several additional Bridgefords were soon installed.

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24″ x 19″ x 7½″

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No. 2
Universal
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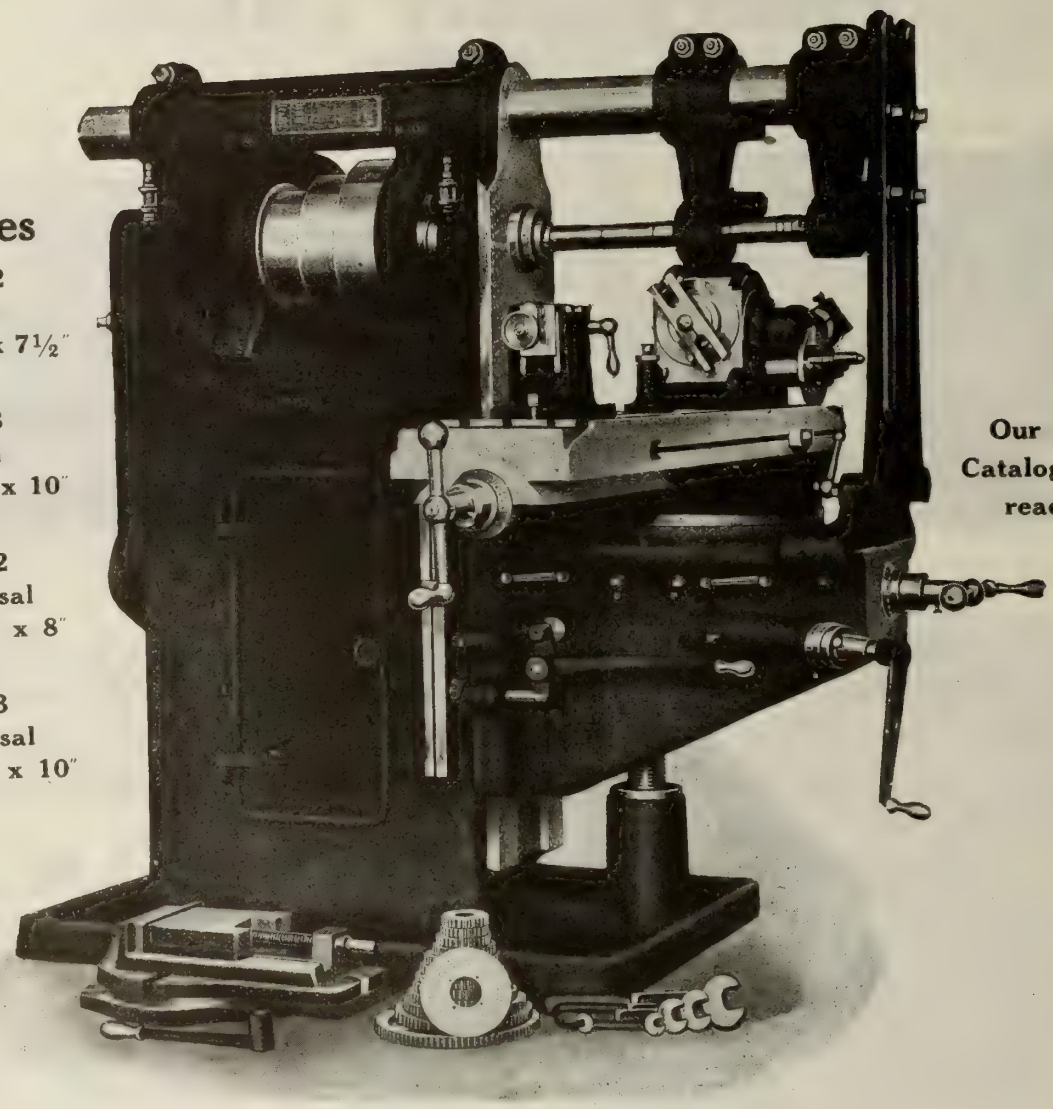
Universal
30″ x 19″ x 10″



Our new Catalogue is ready.

Ford-Smith No. 3 Universal

These machines are accurate, strong and rigid, with well-balanced design to handle rapid and accurate production.

MANUFACTURED IN CANADA BY

The Ford-Smith Machine Co., Limited

Hamilton, Ontario, Canada

Foreign Agents: W. E. Storey, 3 Arundel St., London England;
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WOLFRAM
HIGH SPEED STEEL

VULCAN
TOOL STEELS
for Every Purpose

Vulcan Special Vanadium—For Punches and Dies. Has wonderful wearing qualities.

Vulcan Non-Shrinkable—For Intricate Dies. Does not warp. Does not shrink.

Vulcan Regal No. 2—For Fine Finishing Tools. The Highest grade tungsten finishing steel.

Vulcan Hecla—For work requiring great strength. The first high grade Chrome Vanadium steel produced in America.

WRITE FOR CATALOGUE

Vulcan Crucible Steel Co.
ALIQUIPPA *Established 1900* PA., U. S. A.
Makers of Wolfram High Speed Steel

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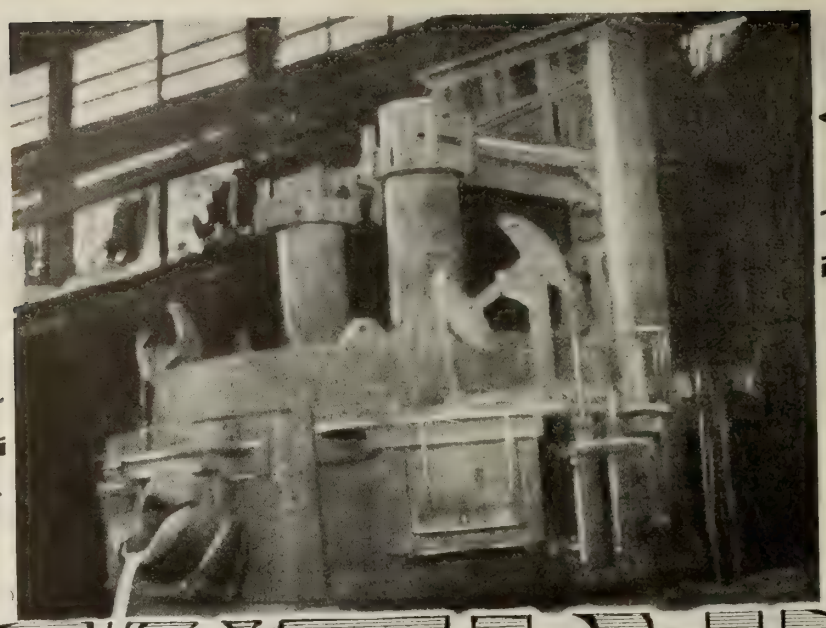
If our advertisement interests you, tear it out now and place with letters to be answered.



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High Speed Steel

SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art: Electric Furnaces—entirely infallible, automatically regulated, delivering the same result time after time.

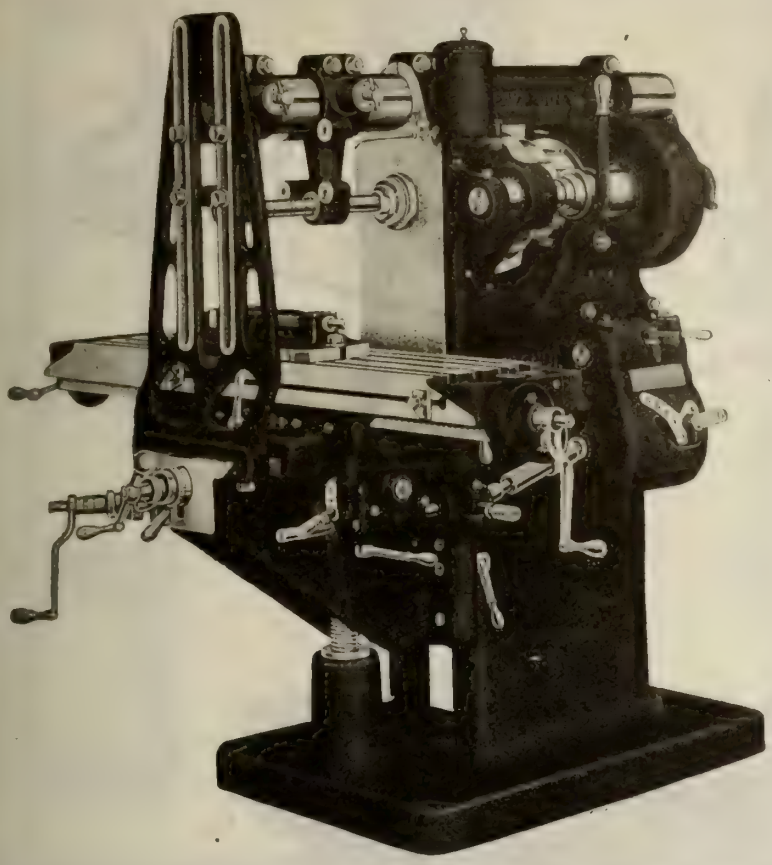
Uranium—this rare element, cousin to Radium, effects a profund change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.

LATROBE, PENN.

URANIUM



LeBLOND
Heavy Duty Milling Machines

Plain or Universal Types—Cone or Gear Drive. All commercial sizes No. 0 to No. 5.

Adapted for the Heaviest Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

Patent Self-Aligning Arbor Supports—

Hardened Steel Spindle Bearings—

Double-Friction Back Gears—and the simplest type of right-hand control, contribute to an increased production and longer life as a precision machine.

The R. K. LeBlond Machine Tool Company

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THE A. R. WILLIAMS MACHINERY CO., LIMITED
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ELECTRIC
Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

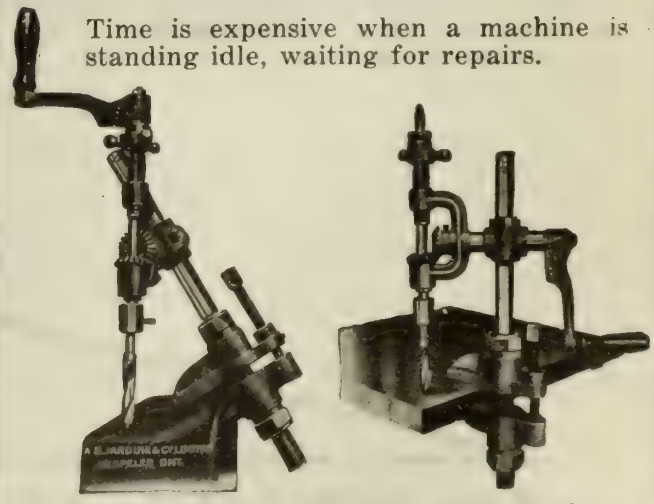
Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net.

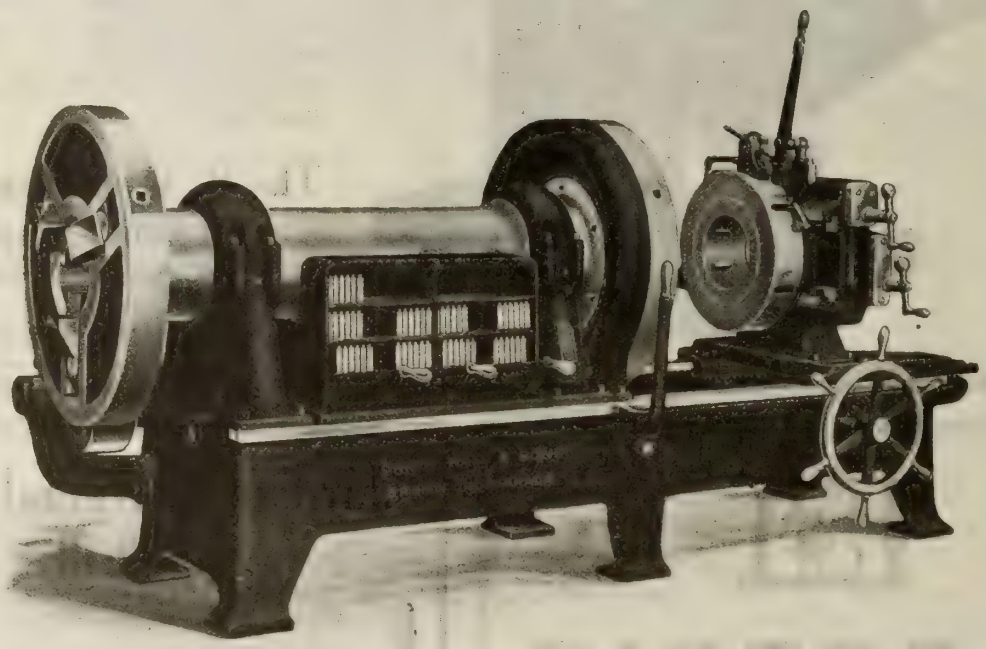
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited

HESPELER, ONTARIO

PIPE MACHINES

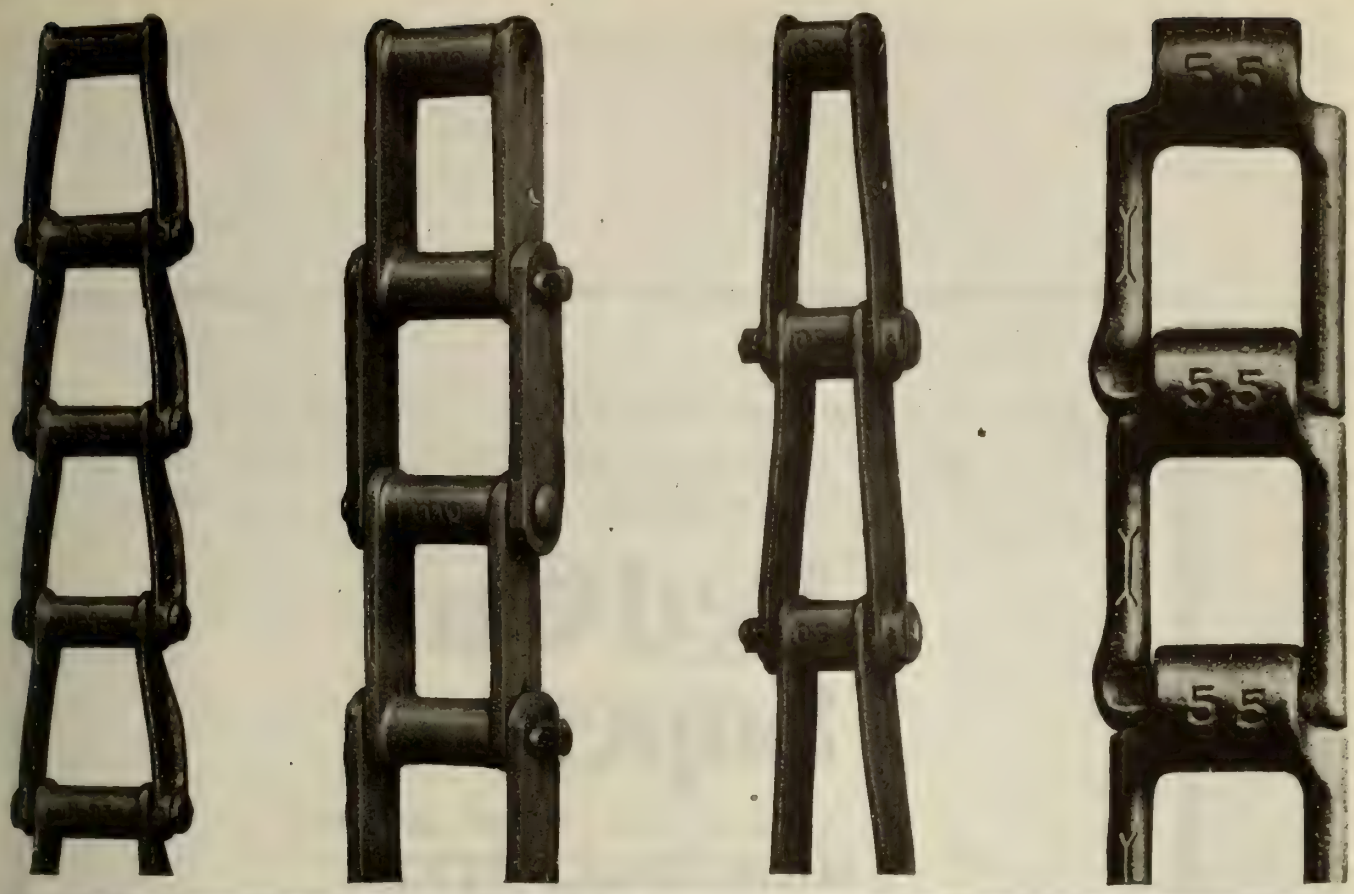
ALL SIZES



No. 8. CAPACITY 2½ to 8.

JOHN H. HALL & SONS
LIMITED

BRANTFORD, CAN.



LINK-BELT

FOR EVERY PURPOSE

Whether your problem is one of power transmission, elevating or conveying we have a type of Link-Belt especially designed for the purpose.

And when we say "especially designed," we mean it. For our engineers have spent years in the study of the peculiar conditions and requirements which various industries place upon Link-Belt. Each type has been designed not with the thought of how cheaply it can be made, but how perfectly it can serve its purpose. We show a few types of Link-Belt above. Our catalog shows many others. Send for a copy.

CANADIAN LINK-BELT COMPANY, LTD.

265 West Wellington St., Toronto

MADE AND CARRIED IN STOCK IN CANADA

If any advertisement interests you, tear it out now and place with letters to be answered.

MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times

Are your Tools made of "Red Cut"?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
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Where Carborundum Products Go

THE ATLAS BALL COMPANY
PHILADELPHIA, PA.

ACCURACY, uniformity and quality are the three great standards set by the Atlas Ball Company in the production of Atlas steel balls. Atlas steel balls are true to 1/10,000 of an inch in diameter and sphericity. Such a wonderful degree of precision is possible only by grinding.

Carborundum and Aloxite Grinding Wheels

Are used exclusively in grinding Atlas balls

Our service department, by closest application and study, has been able to give wheels that are absolutely uniform in grade and grit; that, therefore, remove just so much stock in a given time; that wear evenly and cut clean and fast, thus making possible a perfectly round ball, within the amazing limits of Atlas accuracy.

Carborundum Wheels rough grind Atlas balls.—Aloxite Wheels finish grind them.—They uphold the Atlas standard of accuracy

Carborundum service is versatile.—It may be able to do with your grinding just what it has done with the Atlas grinding work—that is, master it!

THE CARBORUNDUM COMPANY

NIAGARA FALLS, N. Y.

NEW YORK CHICAGO BOSTON PHILADELPHIA CLEVELAND CINCINNATI PITTSBURGH MILWAUKEE GRAND RAPIDS

"WACO"

TRADE MARK
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TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

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RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

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Coal
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The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

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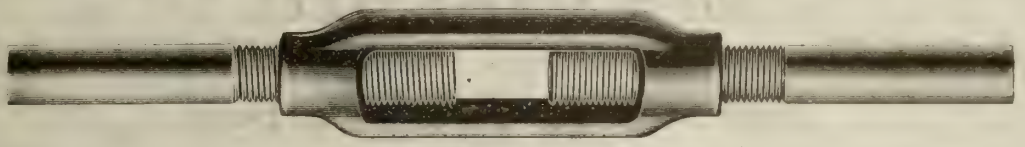

TURNBUCKLES
16 Sizes, with or without Stubs
Large Stock---Quick Action
Produced at
Canadian Billing & Spencer Plant
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The Hammond Steel Co., Inc.
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High Grade
Crucible and
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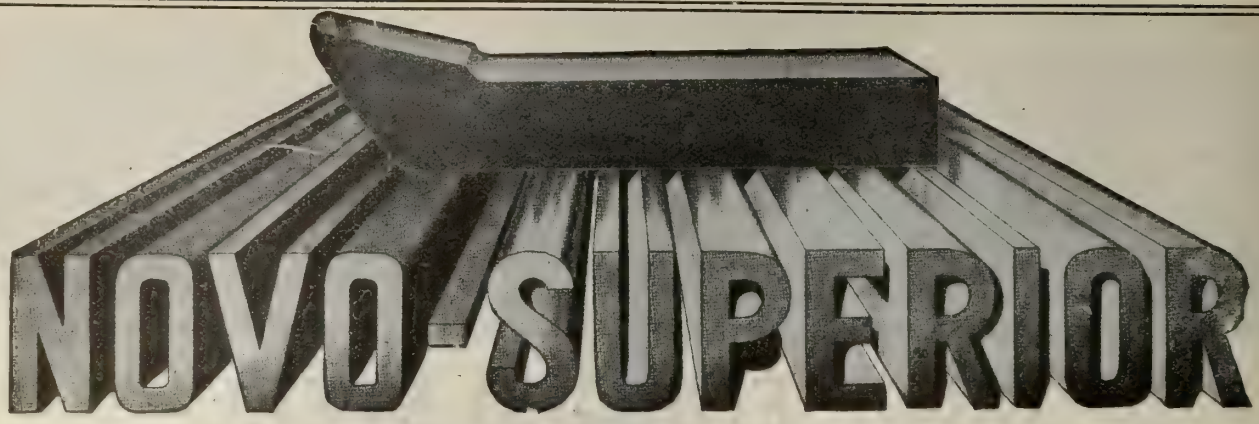
Equipped to Meet all Demands
Piercers
Punches and Dies
Made from Special Chrome Vanadium for Shell Piercing
Army and Navy
Specifications
All Classes



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
Music Wire for Springs, Steel Balls.
Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws – for wood and for hot or cold metal cutting
Machine Knives – for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James St., Montreal, P.Q.

URANIUM

HIGH SPEED STEEL

Accelerating Production

In these strenuous times the utmost is demanded from machine tools.

Machines with Uranium High Speed Cutting tools do more work in less time. For by the proper addition of Uranium the strength and toughness is greatly increased.

With this extra strength the cutting tools take deeper cuts with greater speeds. So production is accelerated.

Try it out yourself.

STANDARD ALLOYS COMPANY

Forbes and Meyran Aves. PITTSBURG, PENNA.

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HIGH SPEED STEEL

The Highest Achievement of British Tool Steel Metallurgy.

SABEN

H. A. DRURY COMPANY LIMITED
STEEL
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Crucible
AND
Open Hearth Steel

Tool Steel

"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856
Frankford, Phila.
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RALPH B. NORTON, AGENT
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Quality Service

Brass, Phosphor Bronze, Copper
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Aluminum Castings
of
Every Description

Over Twenty Years of Foundry Experience at your Service

Tallman Brass & Metal Co.
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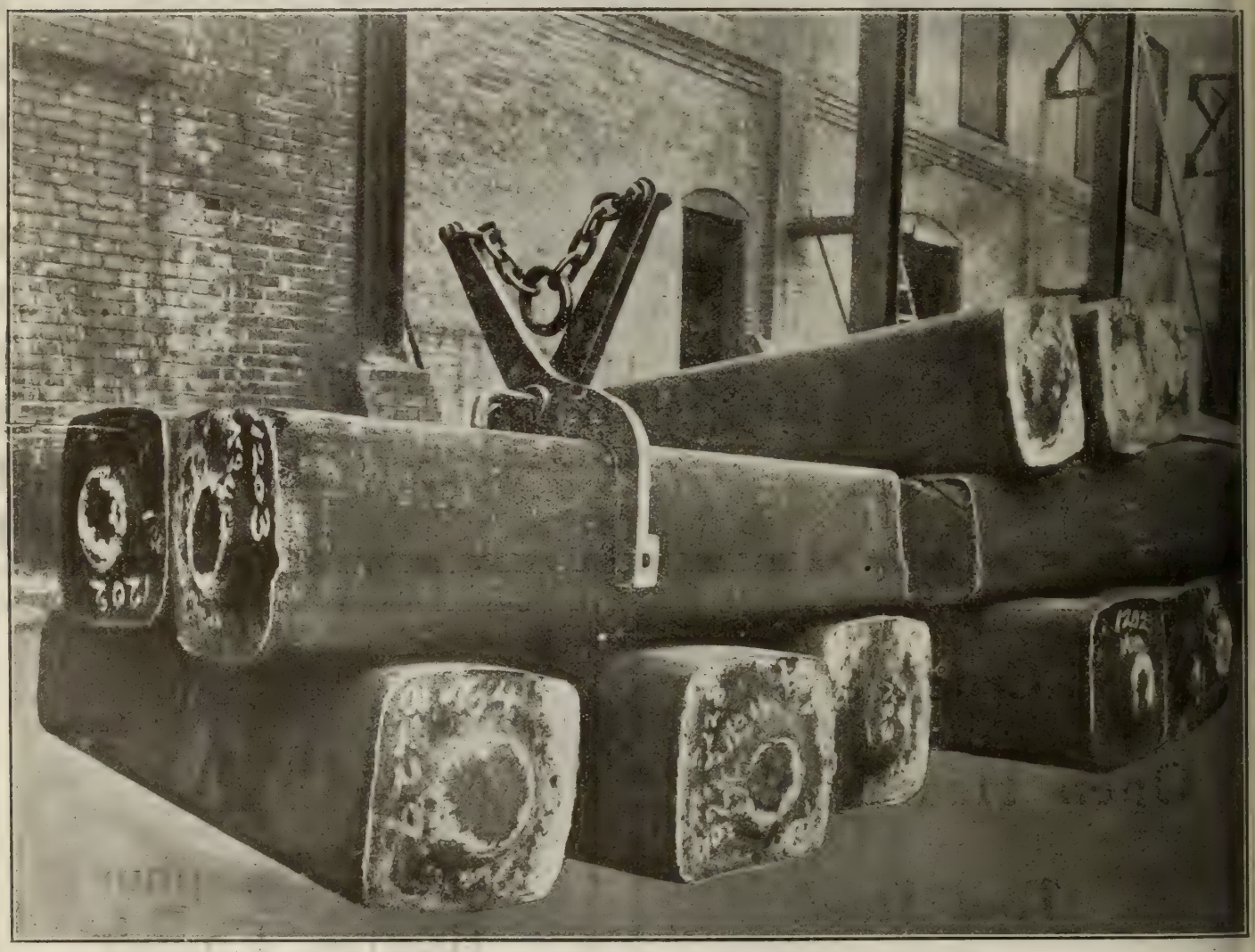
Nova Scotia Steel & Coal Company Limited

New Glasgow, Nova Scotia, Canada



THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade: in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

GEARS

Mortise Gears in Bevels, Mitres and Spurs.
Gears and Pinions accurately machine dressed.
Gear teeth made from best seasoned rock maple.
Pinions of Cast Iron.

Machine Cut Metal to Metal Gears — Bevels, Mitres, Spurs and Angle Gears, made from cast iron, steel and bronze.

Cast Tooth Gears — Bevels, Mitres and Spurs. Complete range of patterns.

Worm Gears — Machine cut in steel, cast iron or brass, made to any specification.

Gear Capacity up to 90 inches diameter.

Specialists in complete power transmission units.

Quotations given on all work—Are prepared to undertake work of installation in connection with any of our contracts.

J. C. WILSON & COMPANY

FOUNDERS and MACHINISTS

BELLEVILLE ONTARIO

Manufacturers "Little Giant" Turbine Water Wheel

STELLITE

"Not Steel but its Master"

STELLITE is not only the hardest metal on the market, but has other qualities possessed by no other metal.

The Alloy can be made in varying degrees of hardness, some of them being malleable.

They are highly resistent to acids being unattacked by Aqua-Regia and resist corrosion to a wonderful degree.

STELLITE might be of inestimable value to you in some of your mechanical difficulties. Consult our Engineering Department.

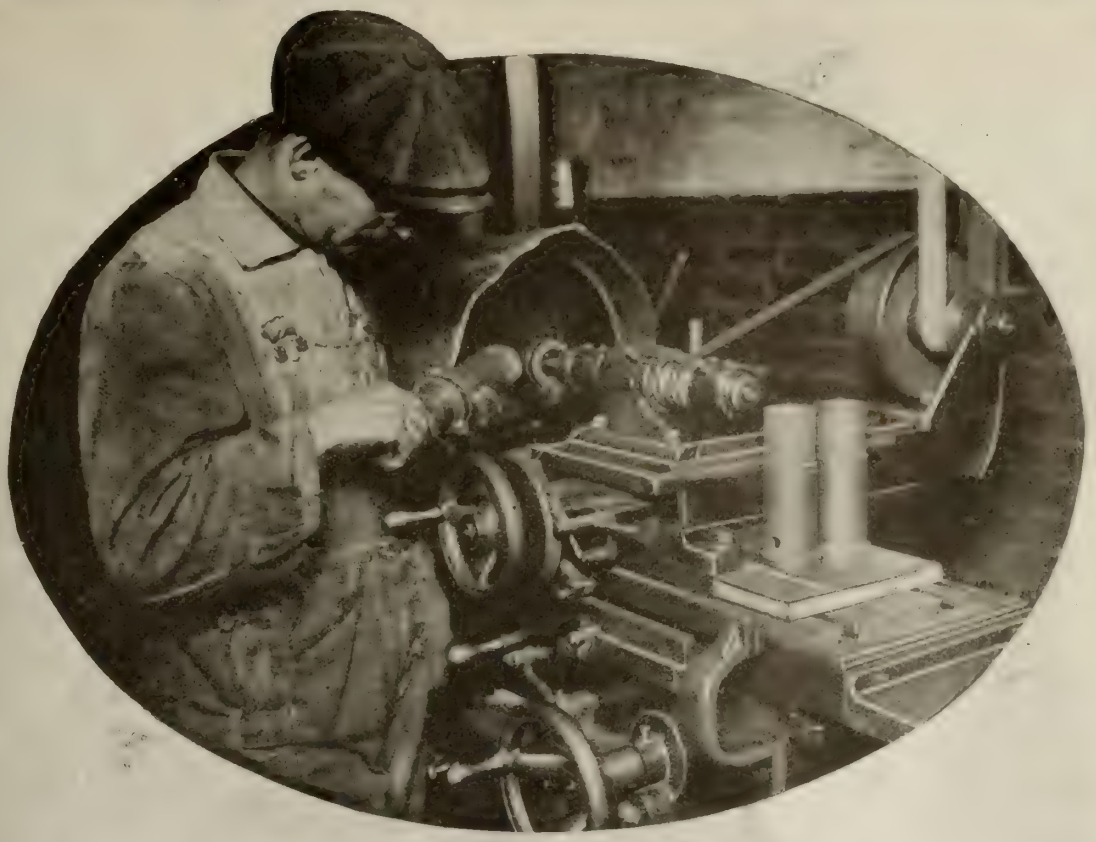
We may be able to plug the leak.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West



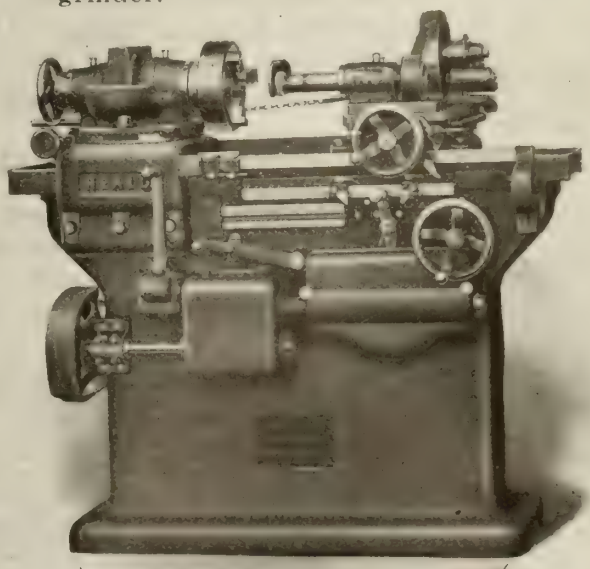
A Heald Internal Grinder Ten Years Old and Still on the Job

This internal grinding machine was installed at the Blanchard Machine Company's plant at Cambridge, Mass., ten years ago, and has been running continuously ever since on production and precision work.

In the above photograph this machine is grinding a steel sleeve from which it removes .025 inches of stock from a hole 1¾" diameter x 3¾" long to limits of plus or minus .0005 in 15 minutes.

Notice the lower cut and see if it is not a machine that you would be proud to have in your shop.

Heald Internals are not limited to accuracy and production, but do angular and face grinding on all kinds of work. Different style heads, instantly interchangeable, make this machine practically a universal grinder.

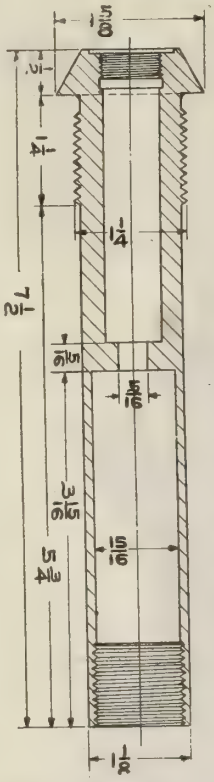


The Heald Machine Co.

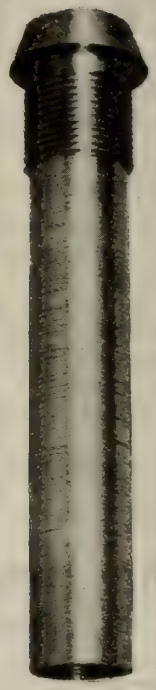
Worcester, Mass.

AGENTS: New York, 839 Singer Bldg. Philadelphia, 1408 Commonwealth Bldg. Chicago, 24 South Jefferson St. Detroit, 911 Majestic Bldg. Cincinnati, 311 Provident Bank Bldg. Cleveland, 721 Engineers Bldg.

WESTERN AGENTS: Eccles & Smith Co., San Francisco, Los Angeles and Portland. Salt Lake Hardware Co., Utah and Idaho. FOREIGN AGENTS: Alfred Herbert, Ltd., England. Societe Anonyme, Alfred Herbert, France, Switzerland, Spain and Portugal. Societa Anonima Italiana, Alfred Herbert, Italy. F. W. Horne Co., Japan. Wilh. Sonesson & Co., Sweden, Denmark and Norway.



Warner & Swasey No. 6 Screw Machine



HERE is an example of forced output on a battery of 40 Warner & Swasey No. 6 Screw Machines. (This picture shows one of them) machining detonators—one every 2½ minutes, and the battery in operation day and night. The stock is 1⅞", is drilled 15-16" for a depth of 3 15-16", turned all over, and cut off, ready for the second operation.

Best for Detonators

Piece work is considered best by a great many manufacturers on straight run work of this sort, especially when under penalties for delivery delays. And only the best machines can hold their accuracy under such continuous operation.

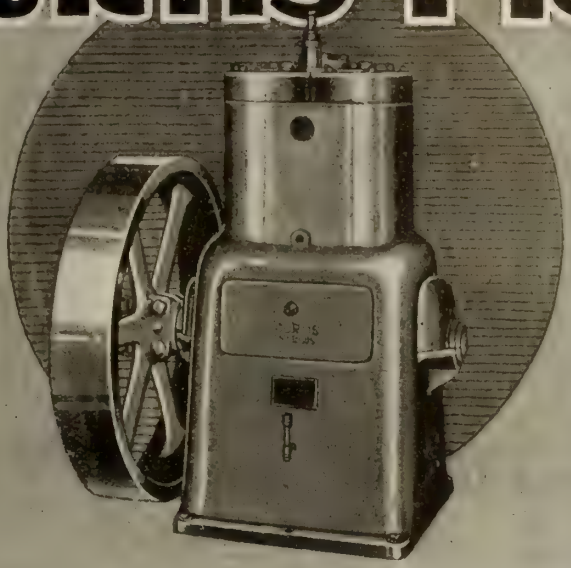
For unusual demands such as this, and for absolute certainty, in making delivery promises, specify Warner & Swasey Turret Lathes and Screw Machines.

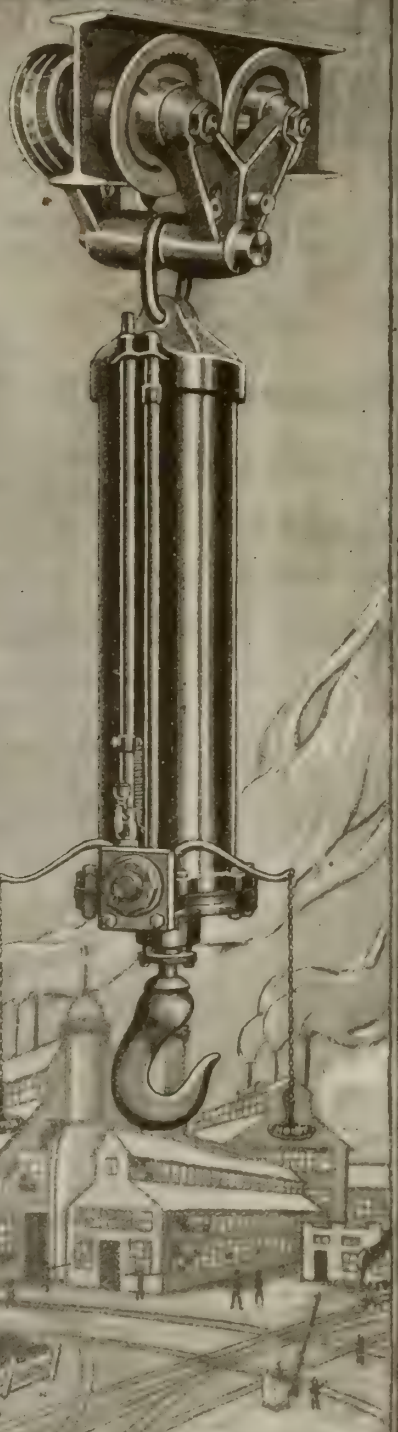
THE WARNER & SWASEY COMPANY
CLEVELAND, OHIO

New York Office—Singer Building. Boston Office—Oliver Building. Buffalo Office—Iroquois Building.
Detroit Office—Ford Building. Chicago Office and Show Rooms—618-622 Washington Blvd.

FOREIGN AGENTS—Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Allied Machinery Company, Paris and Turin. Van Rietschoten & Houwens, Rotterdam. Yamatake & Co., Tokio. Benson Brothers, Sydney and Melbourne. A. Asher Smith, Sydney. A. R. Williams Machinery Co., Ltd., Toronto, St. John, Winnipeg and Vancouver. Williams & Wilson, Ltd., Montreal.

CURTIS PRODUCTS





ESSENTIAL

in the Era of Reconstruction

To reduce labor costs, improve methods of handling, and speed up production to meet the after-the-war conditions, CURTIS PRODUCTS are dominant in their field. They are built up to the highest service standard and embody the results of our 25 years of specializing in the manufacture of pneumatic machinery.

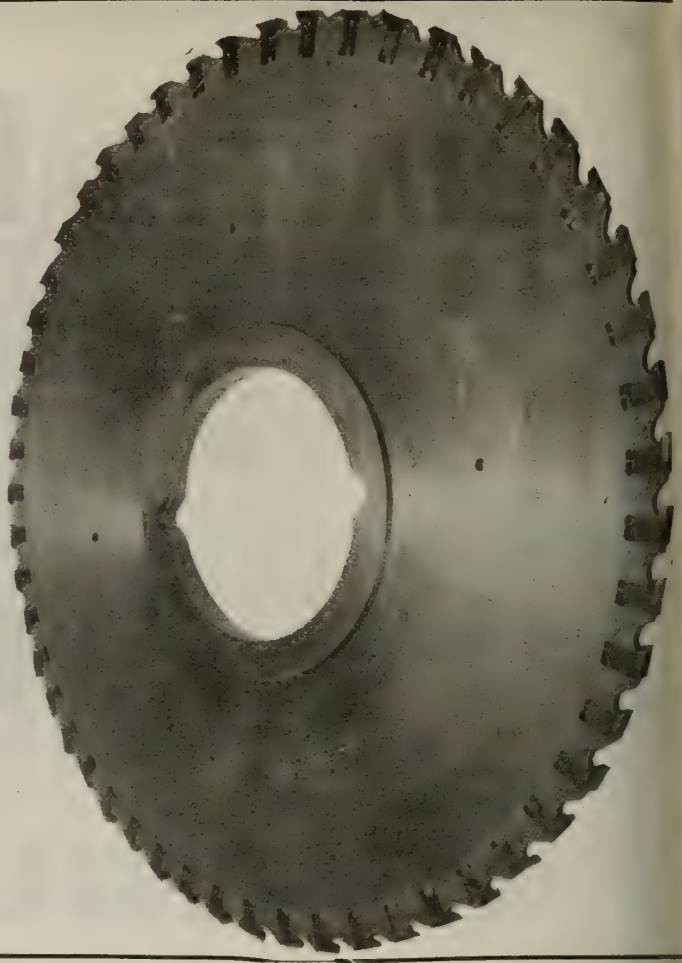
Curtis Air Compressors, Pneumatic Hoists, Cranes, and I-Beam Trolleys are carrying a mighty burden of production in scores of America's leading industrial plants — and will be called upon for even greater service in the new and better days to come.

Our engineering staff would appreciate the opportunity of collaborating with you in solving your production problems and recommending the most suitable of the different types of apparatus manufactured under the CURTIS name and guarantee. Catalog No. 63 will be sent on request.

CURTIS PNEUMATIC MACHINERY CO.
1585 Kienlen Ave. St. Louis, Mo.
Branch Office: 532-H Hudson Terminal, New York City

90-inches in diameter

Cut on right shows a Hunter Duplex Inserted Tooth Saw used by the Erie Forge Co. for cutting gun forgings. It is the largest inserted tooth saw blade we know of ever having been made in the United States or any other country —1" plate, 1 5/16" kerf, and contains 56 high-speed steel teeth, and weighs approximately 3,000 lbs.

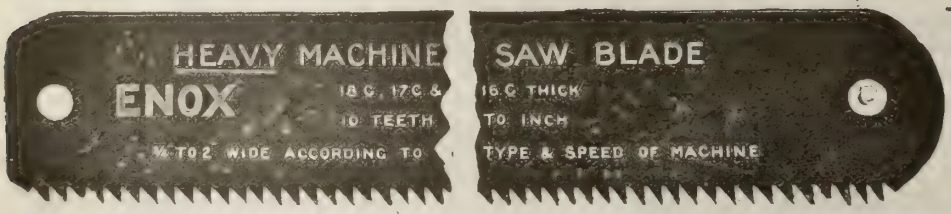


Hunter Duplex Saws

No matter what your sawing requirements may be, there is a Hunter "Duplex" Saw that is just right for the work. The discs are made of Chrome-Vanadium Steel, oil treated.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Grinders. Hardened Steel Specialties. Write for prices.

Hunter Saw & Machine Co.
Pittsburgh, Pa., U.S.A.



ENOX
Hacksaw Blades
ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

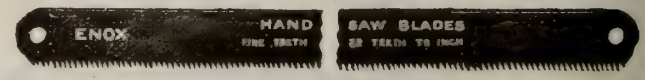
Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10



Starrett Hack Saws

for Hand and Machine

—economy
both ways

Whether you use hack saws in hand frames or power machines, the one brand that stands out pre-eminent is the STARRETT.

Starrett because you can depend upon them to give the most efficient service at the least cost per cut.

Use the Starrett Hack Saws in your machines and hand frames. One trial will convince you of their economy.

Write for our Catalog No. 213 on fine precision tools and hack saws

The L. S. Starrett Company

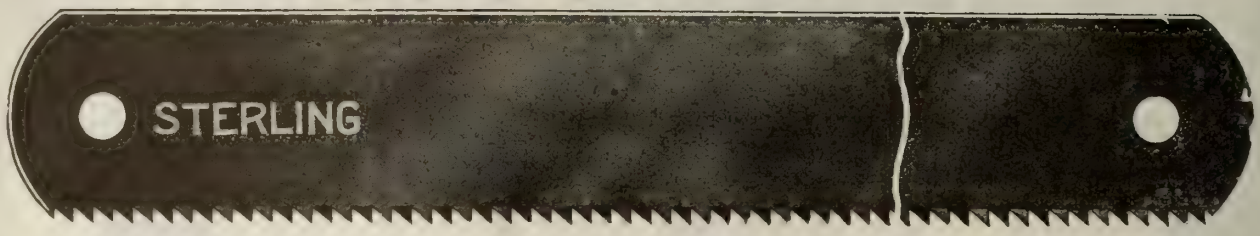
The World's Greatest Toolmakers
Mfrs. of Hack Saws Unexcelled

ATHOL, MASS.

12-878

STARRETT TOOLS

"STERLING"
HACK SAW BLADES



A brand once adopted, difficult to replace.

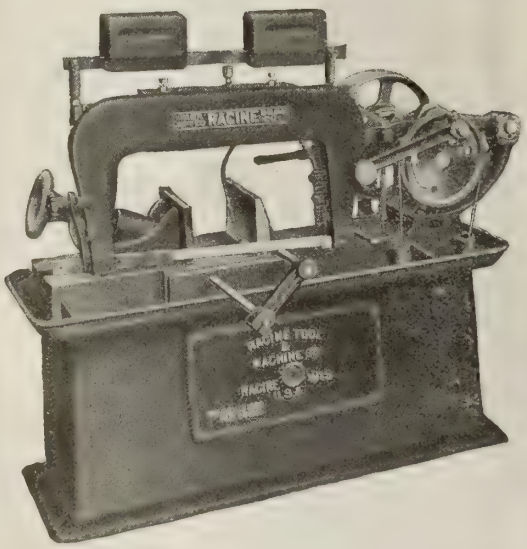
REASONS—High quality of material used, mechanical construction, and special heat treatment.

RESULTS—Economy, which means satisfied customers.

Write for information and prices.

DIAMOND SAW & STAMPING WORKS

BUFFALO, N.Y., U.S.A.



Use "RACINE" H. S. Tungsten Power Blades

Standard the World Over

Only on the draw stroke does the blade of

THE "RACINE"

High Speed Metal Cutting Machine

come in contact with the metal—then

How It Cuts--- Deep and Quick

Machine is of substantial construction, designed for accuracy, for speed, for long service of both machine and blade.

The "Racine" is the only machine that duplicates every cut exactly. It has no equal for quantity of accurate work done in a day, in a year, in a lifetime.

Proof for the asking.

Racine Tool & Machine Company

Melbourne Ave., Racine, Wis., U.S.A.

Kelly "Production" Tools that "Produce"

Here it is, Mr. Manager

"A TOOL ROOM IN ITSELF"

Every size in Roughing and Finishing reamers from 1" to 5⅜" diameter in Fractional or Metric sizes. No matter how odd the size, it's there. No delay, no holdup in production, always Ready for Service. They Adjust.

Indispensable to your tool room, Turret Lathe or Screw Machine Department. No machine shop should be without this set.

READY FOR SERVICE

READY FOR SERVICE

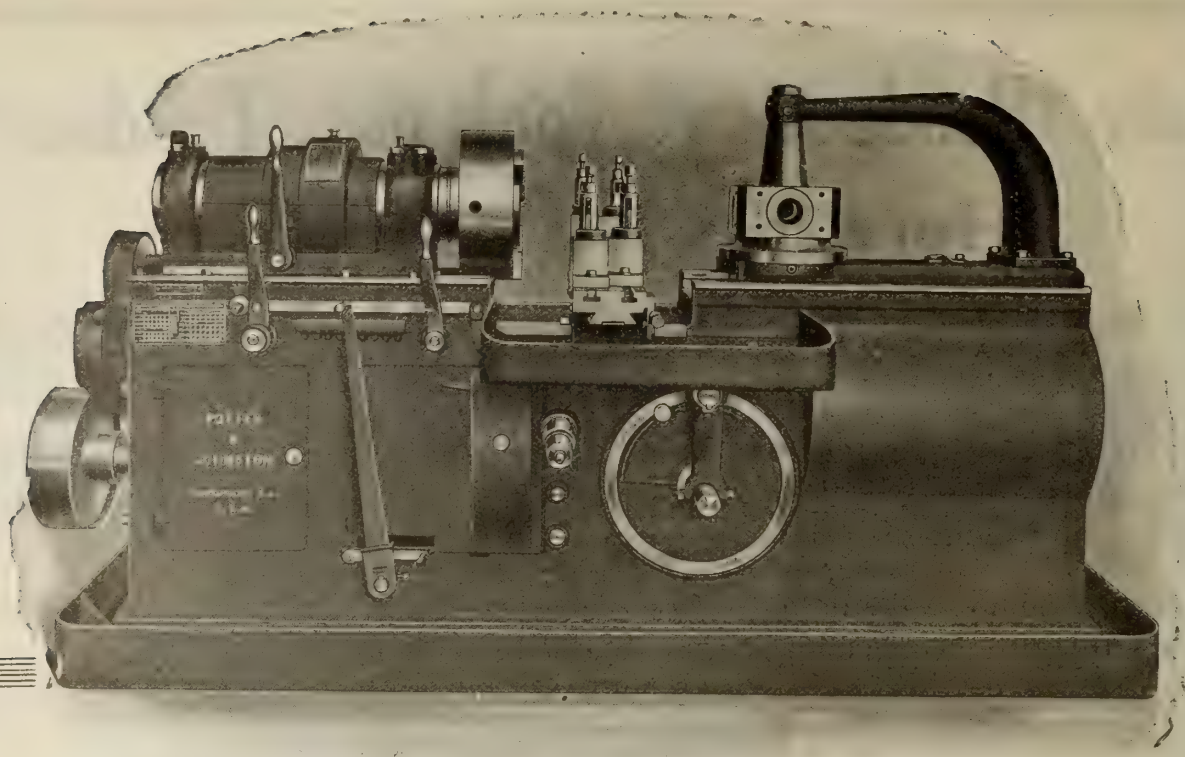
Just one of the KELLY TOOL FAMILY

Write for our new catalogue J-4 and see THEM ALL.

THE KELLY REAMER COMPANY

CLEVELAND, OHIO, U. S. A.

Burton, Griffiths & Co., Ltd., London, English Agents — Burton Fils, Paris, French Agents
40 Domestic Agencies



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cos; *both* are readily obtained on

Potter & Johnston Manufacturing Automatic

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

Catalog gives full particulars. Drop a card for it.

Canadian Offices : POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD

Head Office : 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse : Galt, Ont., Canada

BROWN'S

Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting. Extruded shapes.

Seamless Brass and Copper Tubes.
Guaranteed Ingot Metals—Yellow, Red and Composition Ingots.
We are Purchasers of Copper Bearing Material.

Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

MADE IN CANADA

Malleable and Cast Iron
PIPE FITTINGS

Both Screwed or Flanged,
Black or Galvanized—All Sizes

MALLEABLE AND
GREY IRON
CASTINGS

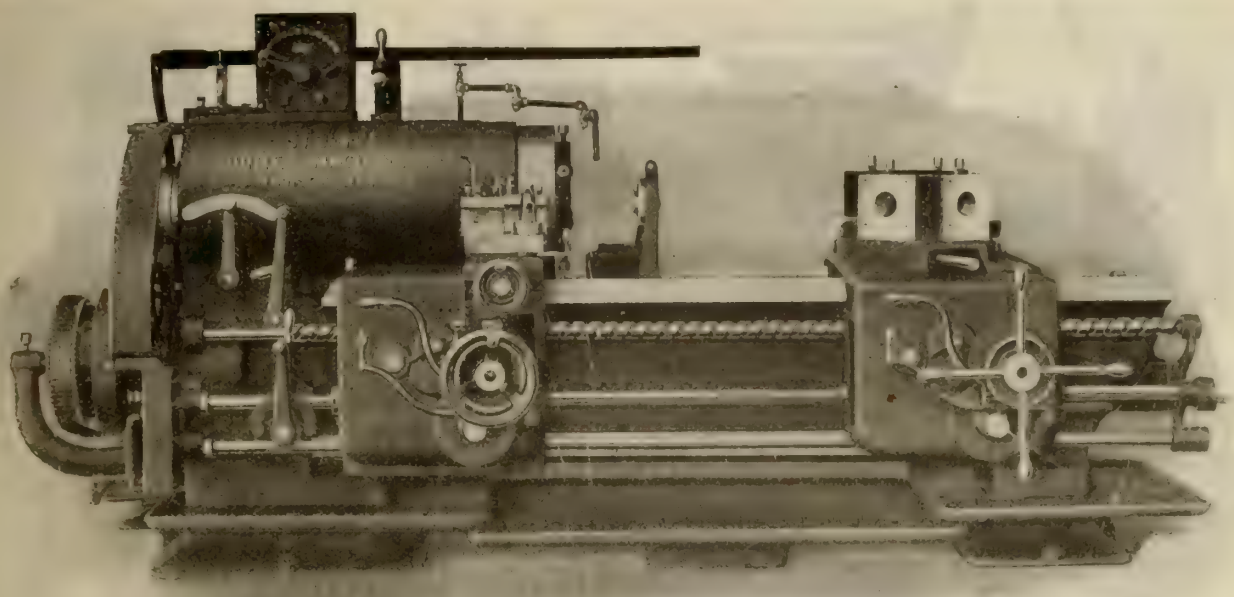
For General Machine Shop Work, for Manufacturers of Automobiles and Specialty Manufacturers.

Quality Products

We have the facilities for filling your orders with exceptional promptness. Annual capacity 6,000 tons.

Prompt Service

International Malleable Iron Co., Limited
Guelph, Ontario



WE are proud—and we believe justly proud—of the part the Steinle 24″ Full Swing Side Carriage Turret Lathe has played in helping to win the war. We sent this machine over the top first in the production of Liberty motor cylinders, 155 mm. shells, field artillery wheel hubs, and many other parts required in various classes of material used to prosecute the war. We have been on a 100% war footing.

Now we are ready to send it over the top again. This time on a 100% peace footing, helping the Canadian industrial manufacturer and Canadian farmer by turning out parts entering into the construction of a wide range of mechanical equipment required in industrial and agricultural enterprises.

This machine was originally designed during peace times as a general purpose high duty turret lathe, and it has an enviable record as a producer on industrial and railroad.

Send us drawings of tractor parts, such as cylinders, where cast singly, pistons, piston rings, transmission cases, differential housings, axle housings, hubs, transmission gears; stationary and marine gas engine parts, such as pistons, rings, fly wheels, gear blanks, etc.; locomotive parts, such as wrist pins, knuckle joint pins, valve motion pins, brake hanger pins, washers and collars of the larger sizes, air pump pistons, rings and heads, piston valves, bull rings and followers, small size pistons and rings, or any piece, such as castings of any kind of material up to 21″ in diameter that require boring, facing, or turning operations; forging requiring similar operations, or large pieces that it is desired to make from bar stock.

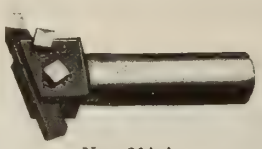
Our engineering department will gladly furnish production estimates on pieces shown on drawings furnished.

There are reasons why the Steinle 24″ Full Swing Side Carried Turret Lathe is ahead of all others in the economical and accurate production of many classes of work. We will give these reasons in future advertisements in this Journal. Watch for them. They will be interesting to you.

STEINLE TURRET MACHINE COMPANY

MADISON, Wisconsin, U.S.A.

No. 203—Slide Tool



No. 204-A
Angle Cutter Holder

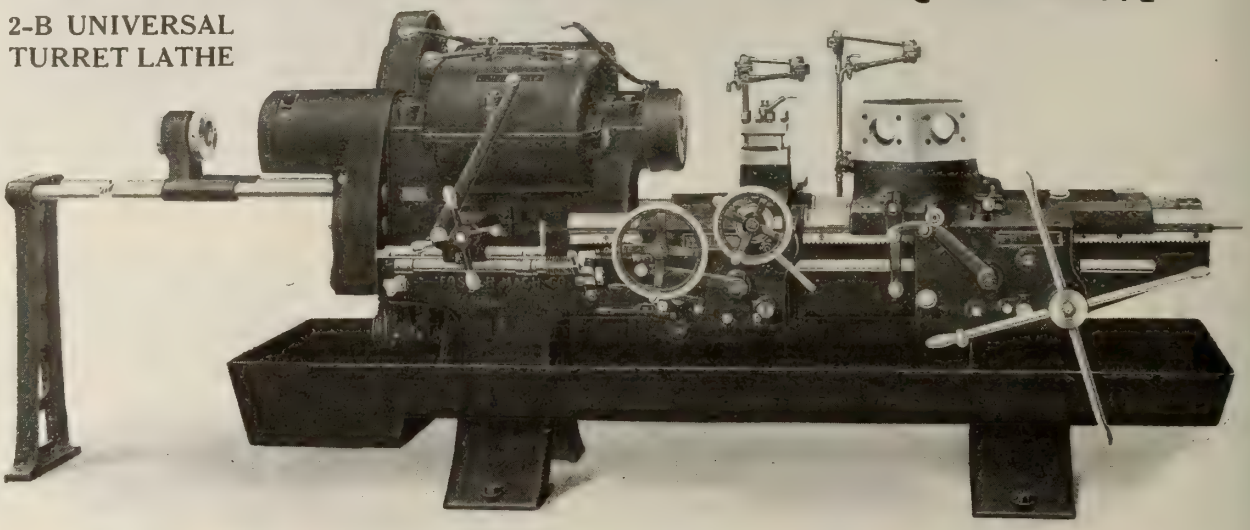
No. 204-B
Straight Cutter Holder

No. 204—Multiple Turning Head

No. 210—Rear Tool Holder

THE MACHINE WITH THE TOOL EQUIPMENT

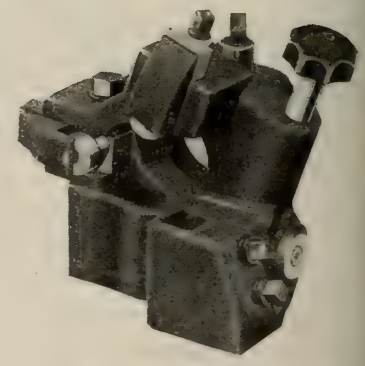
2-B UNIVERSAL TURRET LATHE



Push-Out Collet with Bushings

This is the equipment that you need to reduce your production cost to a minimum now that the war is over and the time of keen competition is here once more.

Don't delay. Investigate the merit and the tremendous capacity of production of the Foster 2-B Universal Turret Lathe. Send us blue prints of your work and give us an opportunity to show you what this machine can do.



No. 199—Single Cutter Turner

THE FOSTER LINE

No. 1-B UNIVERSAL TURRET LATHE
Bar Cap. 2" — Swing over Carriage, 14" over Cross Slide, 8"

No. 2-B UNIVERSAL TURRET LATHE
Bar Cap. 3¼" — Swing over Carriage, 20" over Cross Slide, 13½"

No. 0 PLAIN HEAD SCREW MACHINE
Bar Cap. 5/16" — 10" Swing

No. 1 PLAIN HEAD SCREW MACHINE
Bar Cap. 11/16" — 11" Swing

No. 2 PLAIN AND FRICTION HEAD SCREW MACHINES
Bar Cap. 1 1/16" — 13" Swing

No. 3 PLAIN, FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1 5/16" — 14½" Swing

No. 4 FRICTION HEAD SCREW MACHINE
Bar Cap. 1 9/16" — 17¼" Swing

No. 5 FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1 13/16" — 17¼" Swing

Nos. 6, 7, 8, 9, 10 FRICTION HEAD SCREW MACHINES
Bar Cap. 2 1/16"; 2 5/16"; 2 9/16"; 2 13/16"; 3 1/16" resp. — 20" Swing

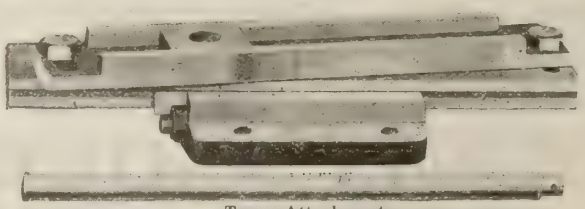
No. 2 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1 1/16" — 14" Swing

No. 2 FRICTION SET-OVER TURRET LATHE
Bar Cap. 1 1/16" — 14" Swing

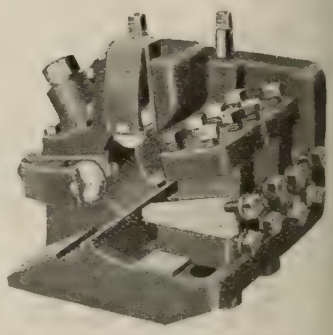
No. 3 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1 5/16" — 16" Swing

No. 3 FRICTION HEAD SET-OVER TURRET LATHE
Bar Cap. 1 5/16" — 16" Swing

THREAD MILLERS
Manufactured under the Holden & Morgan Patents



Taper Attachment



No. 200—Multiple Cutter Turner

FOSTER MACHINE COMPANY, ELKHART, IND., U.S.A.

EXTRA POWER BELTING

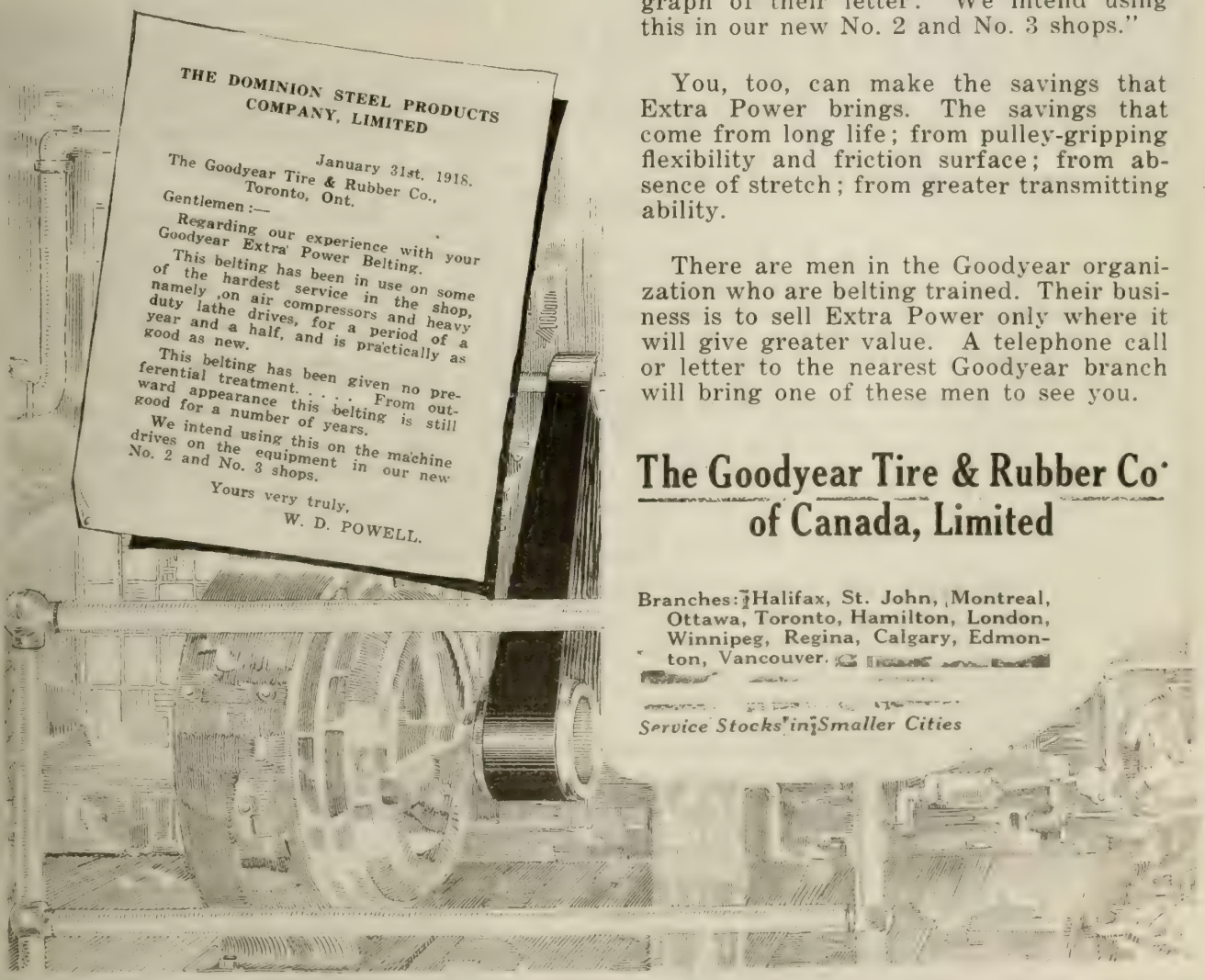
GOODYEAR

MADE IN CANADA

100% Service at a Saving in Cost

The swing to Extra Power Belting in Canadian Industry is unmistakable and rapid. As production demands become more insistent—as executives search more deeply into the means of increased efficiency—the sales of Extra Power Belting become larger and easier.

A dominant factor in the widespread knowledge of Extra Power's better transmission is the frank enthusiasm of those who use it. Their enthusiasm prompts them to write us about Extra Power.



THE DOMINION STEEL PRODUCTS COMPANY, LIMITED

January 31st, 1918.

The Goodyear Tire & Rubber Co.,
Toronto, Ont.

Gentlemen:—

Regarding our experience with your Goodyear Extra Power Belting.

This belting has been in use on some of the hardest service in the shop, namely ,on air compressors and heavy duty lathe drives, for a period of a year and a half, and is practically as good as new.

This belting has been given no preferential treatment. . . . From outward appearance this belting is still good for a number of years.

We intend using this on the machine drives on the equipment in our new No. 2 and No. 3 shops.

Yours very truly,
W. D. POWELL.

The experience of the Dominion Steel Products Company will point the way for other industrials who have war-time belting problems. At first dubious as to quality, they are now Extra Power enthusiasts. They say: "This belting has been in use on some of the hardest service in the shop . . . for a year and a half . . . and is practically as good as new." That the test was unprejudiced is evidenced in their statement: "This belting has been given no preferential treatment." They pay final tribute to Extra Power in the last paragraph of their letter: "We intend using this in our new No. 2 and No. 3 shops."

You, too, can make the savings that Extra Power brings. The savings that come from long life; from pulley-gripping flexibility and friction surface; from absence of stretch; from greater transmitting ability.

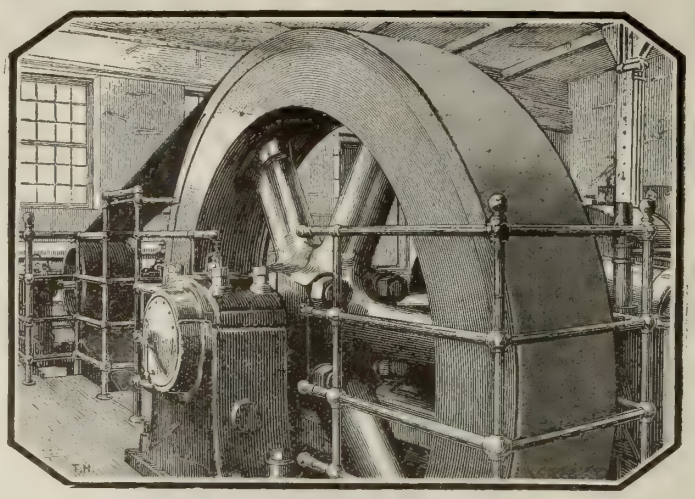
There are men in the Goodyear organization who are belting trained. Their business is to sell Extra Power only where it will give greater value. A telephone call or letter to the nearest Goodyear branch will bring one of these men to see you.

The Goodyear Tire & Rubber Co. of Canada, Limited

Branches: Halifax, St. John, Montreal, Ottawa, Toronto, Hamilton, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver.

Service Stocks in Smaller Cities

GRATON AND KNIGHT



GRATON AND KNIGHT

Doing the thing that "Couldn't Be Done"

This Graton & Knight Spartan 24-in. double belt was installed in July, 1912, on a generator drive in the plant of the Bosch Magneto Co., Springfield, Mass. The extremely short pulley centres caused some belting men to throw up their hands and say, "It can't be done." But this Spartan Belt has been doing it successfully for more than six years. Now, note its low cost. At the purchase price per foot, the bill figures ninety-six cents per week or .004½ per delivered horsepower per week.

The above result, at so low a cost, is due to the Graton & Knight standardization—using the right belt for the work to be done, at a price that it ought to cost—no more and no less. Economy in belting means the longest and best service possible under given conditions. We make all kinds of leather belting for all uses—large or small.

The nature of the drive always governs the wear of any belt. Two belts of exactly the same quality on two different drives will make showings varying greatly in length of service. Using Graton & Knight Standardized Series Leather Belts means full delivery of power for every dollar invested.

The G. & K. Idea is economy through standardization. It means the right belt in the right place.

For example, Spartan—the belt illustrated—is especially adapted for hard drives, high speed, intermittent loads and where belts are subjected to the action of steam, oil, water and other agencies destructive to ordinary belting. It may be that you are using too good a belt for some purposes and belts not good enough for another. Cost Equalization will spell Economy for you in capital letters.

One factor in the solution of *your* belting problems is the use of belting made from properly tanned leather. The hide of a steer is Nature's tough, elastic, resilient protection during years of activity. G. & K. tanning *preserves* all of those qualities. Nothing can really take the place of the matted *fibre* of leather which locks and unlocks in response to the demands of expansion and contraction, to the very end of its life.

It will save you money to let us recommend belts for every drive in your plant. Then, in buying specify "Graton & Knight——Brand or equal." This does not commit you buying our belts. It does put your buying on the one economical basis of the work to be done.

Write for Booklet on Standardization as applied to Belting

THE GRATON & KNIGHT MFG. CO., Worcester, Mass., U.S.A.

Oak Leather Tanners, Makers of Leather Belting, Lace Leather, Packings and Specialties

BRANCHES AND DISTRIBUTORS IN PRINCIPAL CITIES

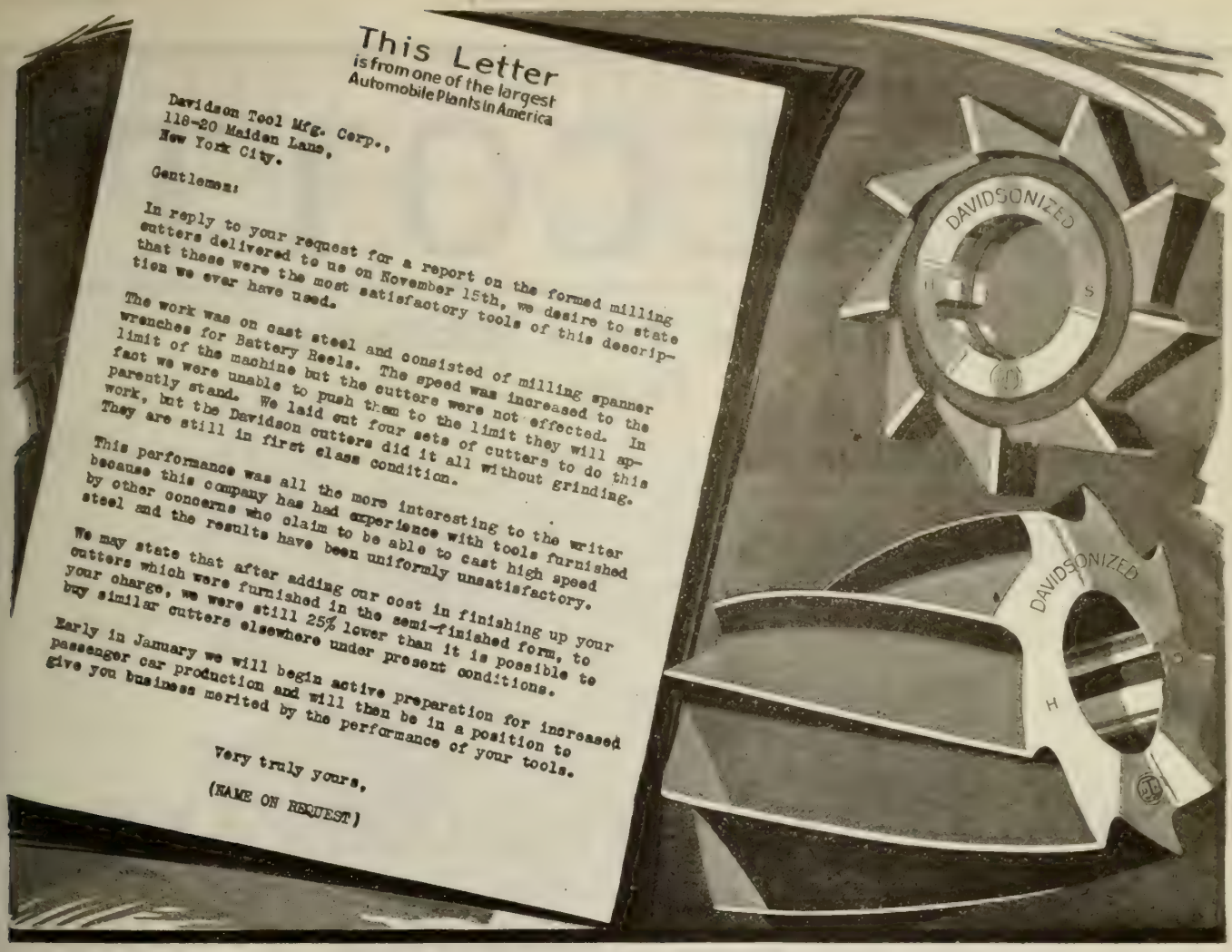
Canadian Graton & Knight, Ltd., Montreal. Canadian Representatives: The Canadian Fairbanks-Morse Co., Ltd., St. John, Montreal, Ottawa, Toronto, Hamilton, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria.

GRATON & KNIGHT

Standardized Series

LEATHER BELTING

Tanned by us for belting use



Cold Facts Convince Them All

300% Better Performance; 25% Saving in Tool Cost

Such a performance is beyond our guarantee and cannot be expected in every case. Yet we continually receive reports of similar remarkable records by

DAVIDSONIZED
High Speed Steel Tools

The biggest plants in the country are providing proof after proof of the increased production, longer service and tool-making economy which this remarkably advanced steel makes possible.

We guarantee any tool of Davidsonized High Speed Steel to give you at least 10% better service than any other tool you have been using on corresponding work. You will be the sole judge.

Such an increase, figuring factory overhead and labor, multiplies several times over the value of the tools.

Note our "Special Service" feature. It applies to standard tools, but is especially desirable for tools made to unusual shapes and other specifications.

Davidson "Special Service" costs you less than to bring your tools from the bar to the stage at which we furnish them. It eliminates loss by cracking in hardening. And it gives you **better** tools than you are now using, tools that increase production and last longer. Send us a trial order; you run no risk; our guarantee assures that. Correspondence invited.

SPECIAL SERVICE

We will supply Davidsonized Tools, semi-finished and easier to machine than any carbon tool steel, within approximately 1/64 of finish on face, 1/64 in bore and 1/32 in diameter, leaving only the final hardening and sharpening to be done in your tool room. A tool that takes 20 hours to make from the solid bar can easily be finished from a Davidsonized blank in about two hours. And we will guarantee our tools against breakage in hardening.

THE DAVIDSON TOOL MFG. CORPORATION

Main Office: 118-122 Maiden Lane, New York. Works: 56-62 North 6th St., Brooklyn, N.Y.

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

Halifax St. John Quebec Montreal Ottawa Toronto Hamilton Windsor Winnipeg Saskatoon Vancouver Victoria

WALCOTT

The Lathe for Continuous Duty

Hundreds of Canadian shops were working night and day to keep up with the demands of war. This continuous service put a heavy strain upon the machines used. These machines were of quality construction and modern design that stood the strain and gave economical and efficient service. Such is the WALCOTT LATHE. Here is a tool not just built for war purposes; it is a tool that will give you the best of service in peace time as well as war time. And in the WALCOTT you see a lathe with a price as low as possible, compatible with the cost of production.

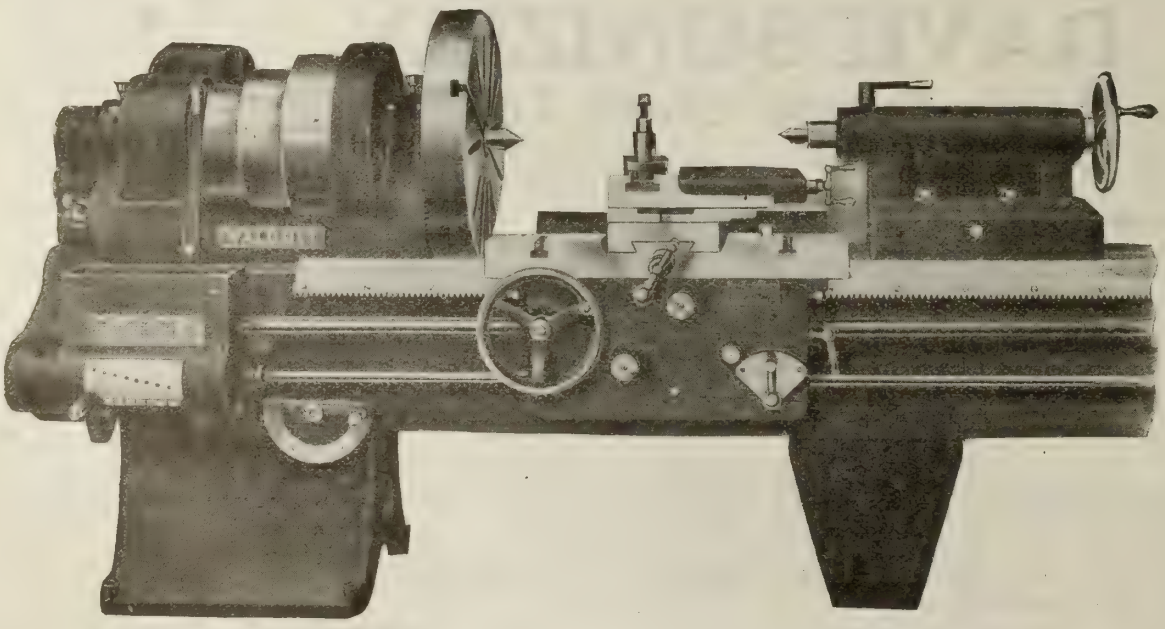
WALCOTT LATHES are in demand, but our increased facilities put us in a position to supply all Canadian requirements.

WALCOTT LATHE COMPANY

Engine Lathes

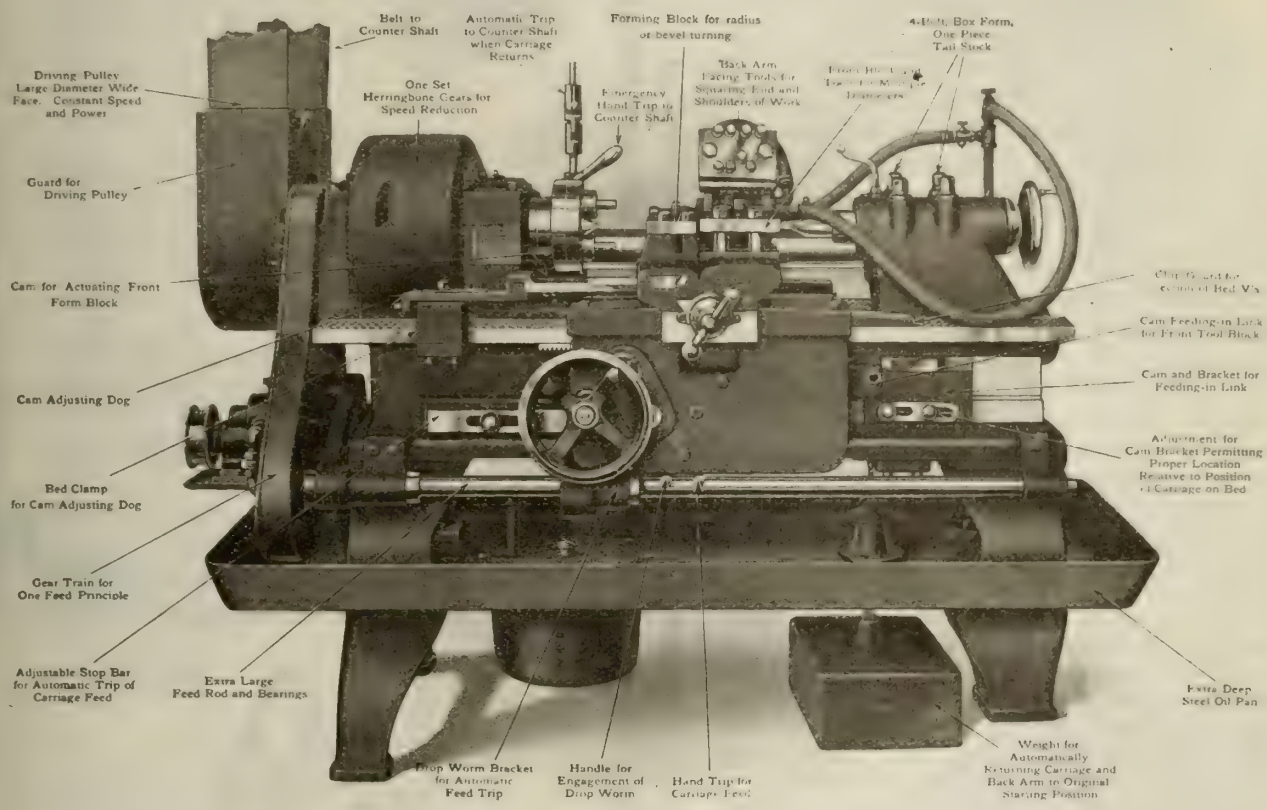
140 Calhoun Street - JACKSON, MICHIGAN

AGENTS:—Hill, Clarke & Co., Chicago, Ill. Frevert Machinery Co., New York City, N.Y. W. E. Shipley Machy. Co., Philadelphia, Pa. National Supply Co., Toledo, Ohio. Motch & Merryweather Machinery Co., Pittsburgh. H. A. Smith Machinery Co., Syracuse, N.Y. Wm. E. Duff, York, Pa. Wm. E. Duff, Jacksonville, Fla. Brown-McDonald Machy. Co., St. Louis, Mo. Smith-Booth-Usher Co., Los Angeles, Calif. Hendrie-Bolthoff Mfg. & Sup. Co., Denver, Col. Gordon & Finkbeiner, Portland, Ore. Northern Machinery Co., Minneapolis, Minn. Brownell Machinery Co., Providence, R.I. Chas. A. Strelinger Co., Detroit, Mich. Marshall & Huschart Machinery Co., Indianapolis, Ind. Fenwick, Freres & Co., Paris, France. Buck & Hickman, Ltd., London, England. Parke & Lacey Co., Sydney, N.S.W. Standard Machy. & Supplies, Ltd., Montreal, Que. Canadian Fairbanks-Morse Co., Ltd., Toronto, Ont.



REED-PRENTICE COMPANY

WORCESTER MASS. U.S.A.



FOR QUANTITY PRODUCTION.

A REED-PRENTICE AUTOMATIC LATHE IS A MULTI-TOOLED MACHINE WHICH, WHEN SET UP FOR THE WORK ON HAND, PERFORMS ALL FACING, STRAIGHT OR RADIUS TURNING, BORING, GROOVING, OR SQUARING OFF OPERATIONS SIMULTANEOUSLY.

WITH A LITTLE THOUGHT YOU CAN PERCEIVE WHAT A WONDERFUL TIME-SAVER SUCH A MACHINE WOULD BE ON YOUR QUANTITY PRODUCTION PIECES.

SHOULD YOU CARE TO SEND US ANY SAMPLES OR BLUEPRINTS OF YOUR WORK WE WILL BE GLAD TO SEND YOU ACCURATE FIGURES OF WHAT YOU COULD EXPECT FOR PRODUCTION FROM THEIR USE AND THE METHOD WE WOULD USE TO GET THE RESULT.

SINCE QUANTITIES OF THESE MACHINES ARE USED IN VARIED LINES OF MANUFACTURE WE CAN GIVE YOU MANY EXAMPLES OF SATISFACTORY PRODUCTION SIMILAR TO YOURS FOR REFERENCE.

CANADIAN FAIRBANKS-MORSE CO., LIMITED
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 24A

How to Test and Mount Grinding Wheels

Tighten the flanges only enough to hold the wheel firmly, avoiding any unnecessary strain. The importance of this statement is emphasized by the fact that in a 1½" floor stand, equipped with 8" standard relieved flanges, a man with a 24" wrench can easily exert a crushing pressure between the wheel and flanges of 3,600 pounds, or over 1¾ tons.

Every grinding wheel should be protected with a hood—in fact, in many States it is necessary to use a hood to comply with the laws for safety and dust removal. The hood should have some method of adjustment so that the top end may follow the wheel as it wears, thus giving ample protection for small wheels as well as large ones. If grinding is done dry, the hood should be connected with a suitable dust-removal system. After the wheel is in place, the hood should be adjusted to the side of the wheel and the rest should be so adjusted that work cannot be caught between the rest and the wheel. Spark brushes, glass shields or similar appliances may be used if desired.

The machine is then ready to start up, but after running a few minutes it should be stopped and a second inspection made to make sure that all parts have remained properly adjusted. Every grinding machine should be inspected each morning by some responsible person before the day's work begins.

There is a correct abrasive for every grinding operation, and Norton Grinding Wheels, with that correct abrasive, can be provided.

NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT. NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 111 NO JEFFERSON ST.

NORTON

Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assures accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

Canadian Fairbanks-Morse Co., Ltd.
Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.

Detroit, Michigan

Sales Representatives

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

Precision in Threading

Precision in threading can be attained only by the use of Precision tools.

The "Gun" Tap

The "Gun" Tap holds all records for accuracy, speed and durability. Its shearing cut requires a minimum of driving power and is self-cleaning — it shoots the chips ahead.

The "Gun" Tap maintains its size and lead in any material.

The Acorn Die

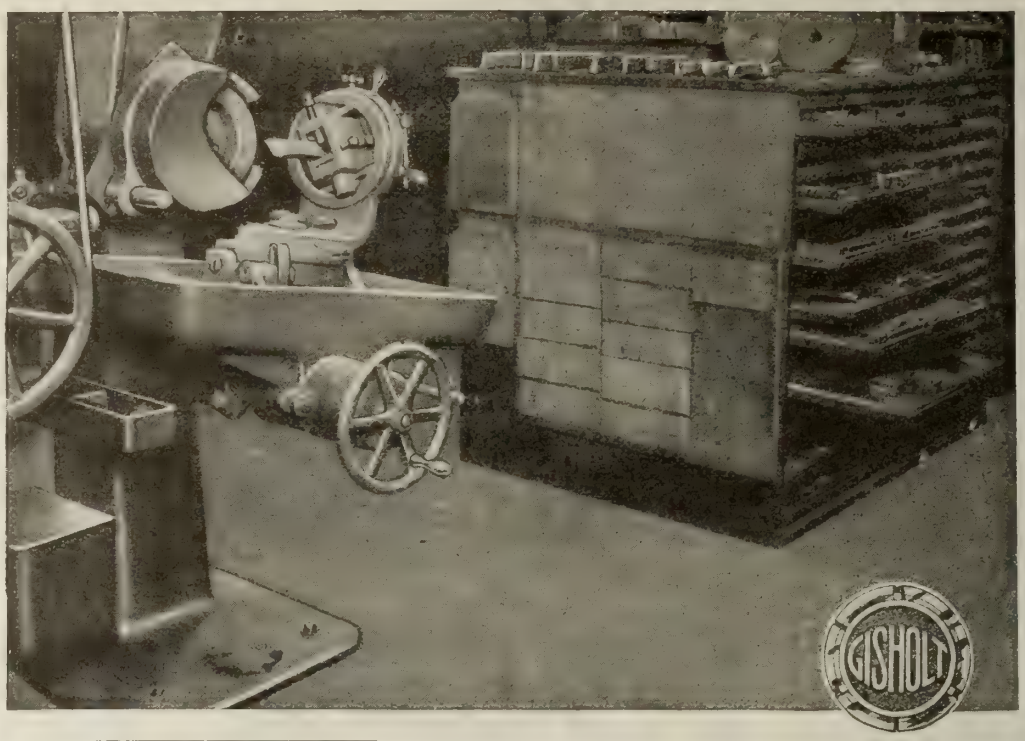
The Acorn Die is capable of a minute adjustment, holds its lead with accuracy, is absolutely rigid while cutting and will outwear a number of ordinary dies.

Nicely illustrated booklets describing the "Gun" Tap and the Acorn Die will be sent on request. Also new No. 40 Small Tools Catalog.

Wells Brothers Company of Canada, Limited

GALT, ONTARIO

Canadian factory of the Greenfield Tap and Die Corporation



Gisholt Tool Grinder

Fewer Tools Will Do If You Can Keep Them Correctly Ground

Correctly ground tools last longer and work faster than incorrectly ground tools—we all know that. Also, the use of the Gisholt Tool Grinder helps you to establish a system by means of which tools are collected at regular intervals, ground properly and returned promptly to the machines where they are used.

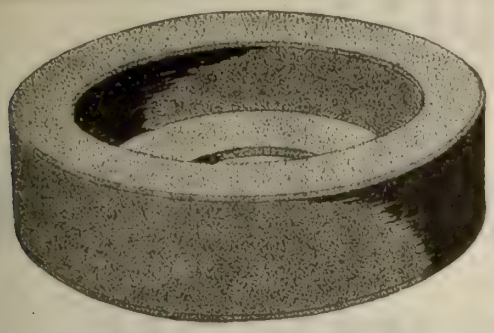
Not only are the tools ready when and where they are needed, but the tool investment is actually lower in an ideal condition such as this than where each man grinds his own tools.

Let us tell you more about the Gisholt Tool Grinder

Gisholt Machine Co., Madison, Wis., U.S.A.

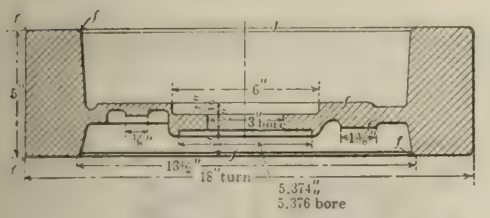
Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria



GISHOLT
Turret Lathes and Standard Tools

21 MINUTES



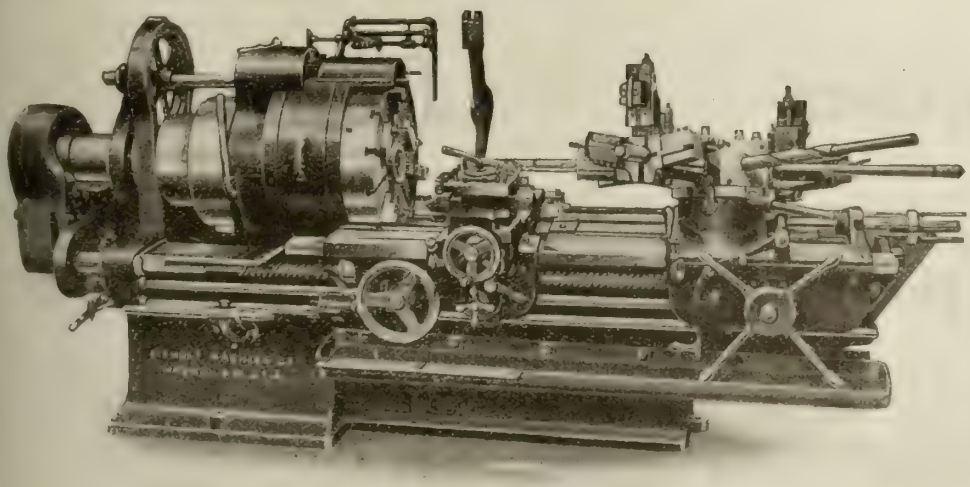
These Cast Iron Fly-Wheels 21 Minutes

There is a Gisholt booklet that shows work such as the above, and many other Gisholt jobs. Just drop us a line telling us to whom the booklet should be addressed.

Gisholt Boring Bar Cutters and Facing Heads are adjustable. These and other standard chucking tools have been developed to cover a wide range of work, thus affording users of Gisholt Turret Lathes an initial saving in the cost of tool equipment as well as a big saving in time in tooling up for a new job.

Why not put Gisholt Turret Lathes to work and pocket the profits their use insures?

If you want to increase output we'll be glad to show you the way we would do it.



GISHOLT

Send for the Gisholt Booklet

Gisholt Machine Co., Madison, Wis., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

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CANADIAN MACHINERY AND MANUFACTURING NEWS

Volume XXI. No. 6. February 6, 1919

Home of The Algoma Steel Corporation

By T. H. FENNER

SITUATED at Sault Ste. Marie, Ontario, on four lines of railway, and with direct water communication to all points on the Great Lakes, the Algoma Steel Corporation is well located for the reception of its raw material, and the dispatch of its finished products. The railways communicating with the plant are the C.P.R., the Algoma Central and Hudson Bay R.R. Co., the Minneapolis, St. Paul, and Sault Ste. Marie, and the Duluth, South Shore and Algoma Railroad. On the lake the corporation has a frontage of four miles, and the acreage covered at present is 60 acres. The corporation has 2,300 acres available when required. The plant has a capacity of 40,000 tons per month.

The Coal Dock

The coal receiving dock is 700 feet long, and is served by three clams, each of 300 tons per hour capacity, or a total of 900 tons per hour. The capacity of these clams per month is 150,000 tons. The clams dump into 20-ton hopper trucks mounted on a trestle, which runs the full length of the coal storage, and delivers on each side of the pile, keeping the high volatile and low volatile coals on their respective piles. The length of the coal storage is 1,700 feet, and 300 feet wide, and the amount of coal that can be stored is 375,000 tons. Naturally, in a pile of coal this size, spontaneous combustion is an ever-present danger. The pile is carefully patrolled, and whenever signs are found of heating up, the part that is in danger is dug out by the clam, and replaced on another part of the pile. In this way losses are minimized.

Coke Oven Charging

Spanning this immense coal pile are two coal bridges, each with a span of 300 tons. These bridges are for taking the coal from the two piles in their proper proportions, that is 60 per cent. of high volatile and 40 per cent. of low, and delivering to the pulverizer, where the coal is crushed to about the size of a walnut. The coal is handled by belt conveyors, with a capacity of 200 tons per hour, which carry it up to a large circular bin, surmounting the coke ovens, which has a capacity of 2,000 tons. From here it is delivered to the coke ovens, as required.

The Coke Ovens

The coke ovens are arranged in batteries, there being two of fifty-five ovens each, of the Koppers type. One of 25 ovens of the Wilputte type, and there is another battery of 25 Wilputte ovens approaching completion, which will be ready in February for operation. The Koppers ovens have a capacity of about 12½ tons each, and are in use about 20 hours per day, while the Wilputte ovens are a little larger, having a 14-ton capacity, in operation about the same length of time. The red-hot coke is discharged from these ovens into a large truck by an electric ram, which pushes the charge out from the back of the oven. The truck, with its glowing cargo, is run under a tower by a locomotive. In this tower are fitted a series of sprinkler pipes, which pour a fine rain all over the surface, damping it down, but not entirely quenching it. There is enough heat left in the coke to evaporate all the surface moisture on its way to the blast furnace, and when it arrives there, the coke contains only about 4 per cent. moisture. The coke oven reclaiming plant handles approximately 20,000,000 cubic feet of gas per 24 hours. From the crude hydro carbons are extracted benzol, toluol, and xylol, and the tar runs about 7.5 galls. per ton of coal charged. Any surplus gas remaining is used in the soaking pits and reheating furnaces in the mill. Truly, nothing is wasted but the smell, which could well be dispensed with. Those accustomed to living with

COKE OVENS, SHOWING COKE TRUCK.

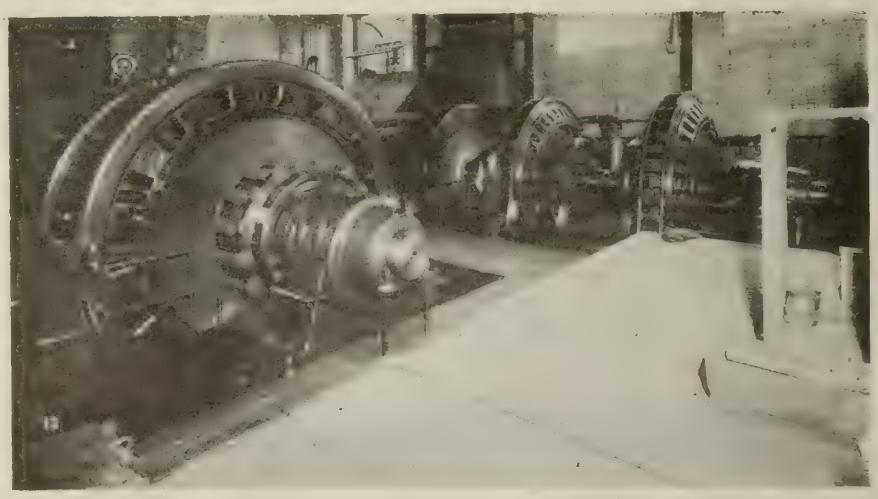
it don't notice it, but it makes itself very free with a stranger.

The Iron Ore Dock

The iron ore dock is a concrete structure, with a present length of 2,040 feet, to which an extension of 300 feet is in course of erection. The dock and ore storage are spanned by three cranes, one of which has a capacity of six tons per trip, and two with a capacity of four tons each. The amount of ore that can be handled by these three cranes is in the neighborhood of 160,000 tons per month. As all ore and coal have to be unloaded during the season of navigation, coal and ore docks are scenes of unremitting activity during the summer. A rail loading dock 400 feet in length is also available in summer.

Blast Furnaces

The blast furnace equipment consists of four furnaces. Nos. 1 and 2 are of 8,000 tons capacity each, No. 3 of 15,000 tons, and No. 4 of 12,000 tons per month. The charge is delivered on a high level track by electrically operated cars. The two small blast furnaces were part of the original plant, which was built in 1909, the other two having been added since then. The blast furnace air is supplied from two power plants, which will be described later. Gases from these furnaces pass to four gas washers of the sprinkler scrubber type, and then to four centrifugal type washers. There is a gas holder of 40,000 cubic feet capacity. In connection with the blast furnaces there is a battery of Carhall boilers of 3,000 H.P. capacity, operating on blast furnace gas, and the steam generated from these boilers is used to drive four steeple blowing engines. These are built by the Mesta Machine Company, Pittsburgh, and have each a capacity of 14,000 cubic feet free air per minute. Any surplus steam from these boilers is available to help out the mill battery of coal-burning boilers by a direct connection of the main steam lines. There is also in this power house a Rateau Turbo generator of 1,500 K.W. capacity, which is operated chiefly by exhaust steam from the battery of steeple engines.



4,000 H.P. REVERSING D.C. ROLLING MILL MOTOR.

The Open Hearth Furnaces

The open hearth furnaces are in two batteries. No. 1 consists of eight basic lined 50-ton furnaces, and No. 2 of three basic lined 75-ton furnaces. There is an electrically operated 300-ton mixer, to which hot metal from the blast furnaces is delivered, thus ensuring the proper mixture of the metal. There is also a 175-ton mixer in connection with a 20-ton converter vessel, from which the hot metal is delivered to an 150-ton basic lined tilting furnace. This is known as the Duplex plant. There are also 5 cupolas for the speigeleisen, and molten speigel can be transferred to mixers at either the open hearth or duplex plants. The whole of the plant is served by electric cranes running from twenty to one hundred tons. Mention should also be made of the rotary calcining plant, where the limestone and dolomite are treated. This is a rotary cylinder 125 ft. in length, on the same lines as a cement machine.

Power House

Before going on to the blooming and rail mill, it would be well to step aside and see the main power house, the source

of most of the energy utilized in driving the various mills. This is a truly imposing looking department, containing, as it does, probably the largest gas engine outfit in the Dominion. The plant contains four gas engines, each of four cylinders and two blowers, having a capacity of 25,000 c.f. free air per minute, delivvrereed at from 10 to 15 lbs., pressure per square inch. In addition to this are 5 gas engines, direct connected to 1,500 K.W. generators and two Rateau steam turbo blowers of 6,000 cubic feet per minute capacity each. The gas engines are built by the Allis Chalmers Mfg. Co., Milwaukee, and are splendid examples of their type. The cylinders are arranged in tandem, two on each side of the flywheel, and are equipped with electric ignition indicators, which light a lamp at each ignition, thus giving attendant quick indication of any trouble. The distribution is through oil switches, and is all controlled from a pilot house erected above the main floor, and giving a clear view over the whole engine room.

In a separate building is located the pumping outfit, which supplies the whole plant. The total pumping capacity is 57,000,000 galls. per 24 hours, enough to supply a good sized town. It consists of three steam pumps, each of 4,000,000 galls. capacity; three motor driven centrifugal pumps, each of 5,000,000 gallons capacity; 1 steam driven (turbine) centrifugal pump, and one motor driven centrifugal pump, each of 15,000,000 galls. capacity.

CHARGING AND WITHDRAWING CRANE.

Making the Ingots

From the open hearth furnaces the steel is drawn in fifty ton heats, and poured into the ingot molds. These are picked up by a crane and loaded onto trucks running on a narrow gauge rail, and taken to the stripping house. Here are located two 150-ton electric stripping cranes, the action of which is most fascinating to watch. An enormous pair of nippers, like a thumb and forefinger, descend over the mold and grasp it gently, but firmly. A ram comes down and holds the ingot down, while the nippers pull up, and the mold is lifted away from the ingot. Occasionally one proves recalcitrant, and in that case the ingot mold and ingot are placed to one side and dealt with later, after the ingot has cooled a little. There are comparatively few of these, however, and for the most part, the work goes smoothly. After stripping the ingots are weighed, and then proceed to the soaking pit, where heat is furnished by waste gases from the coke ovens. From here they are picked up by another crane and taken to the blooming mill. Of these there are two, a 32-inch and a 35-inch, but the 35-inch is the most used. This mill is a two high, driven by a 4,000 horse power D.C. reversing motor, shown in the illustration. The electric crane deposits the ingot, red hot, on the runway, and away it goes to the first pass, where it is flattened out and lengthened to correspond. Back again, the rolls coming closer together for second pass, and then 2 arms come out from side of runway and turn it over, putting the deep side on edge. This process continues until, instead of an ingot, about seven feet long, we have a bloom about 40 feet long, correspondingly decreased in width and depth. It is then ready to go to the repeating furnace, and a whirling crane picks it from the blooming mill slab, swings it around and shoves it into the reheating furnace. While this is going on, another ingot is on the way through the blooming mill. This mill can handle 50,000 tons ingots per month. Besides the motor there is a steam engine in reserve, twin cylinder 50 in. x 60 in. The motor here referred to was the first reversing motor for steel mill work built on this side, and numberless were the troubles experienced before

OPEN-HEARTH CHARGING FLOOR.

ROLLING MILL, THE ALGOMA STEEL CORPORATION.

the early difficulties were overcome. A comparison of the size of the man in the illustration will give some idea of the dimensions of this piece of apparatus. It was built by the Canadian General Electric Co. The 32-inch mill is two high, driven by a 28 in. x 48 in. twin reversing engine, and can roll 15,000 tons per month. This mill handled all the work in the early days of the company.

The Rail Mill

After the blooms have been reheated in the gas-fired regenerative reheating furnaces, they are removed by the electric charging and drawing crane already mentioned. There are two of these, and our illustration shows one in the act of removing a bloom from the furnace. This crane delivers to the tilting and travelling tables, of which there are three, one connected with each of the two roughing mills, and one to the finishing mill. In order to get the necessary production there must be always three blooms going through the mills, one to each. The roughing and intermediate mills are each three high, 23 in., and the finishing mill three high, 29 in. diameter. The roughing and intermediate rolls are driven by a 36 in. x 65 in. x 48 in. tandem compound condensing engine, and the finishing mill by a 40 in. x 48 in. engine. The tilting and travelling tables are electrically operated, and feed the bloom into the mill, pass it along to the next mill, and then to the finishing roll. The finished rail is carried along a travelling table to a circular saw, where the rail is cut to length, and a test piece cut from each rail, which is marked for number of heat, date, etc. The rail is passed under a hammer, and straightened by lining up with electric light. The size of rail rolled is from 56 lbs. to 100 lbs. per yard, and the mills have a capacity of 30,000 tons per month.

35-IN. BLOOMING MILL.

The finishing rolls deteriorate rapidly, and have to be changed almost daily. These rails have to be gauged very closely and kept to specified size. If too light the inspection will reject them, and if too heavy a considerable loss to the company would ensue. The roll designing department is kept busy checking up templates, and designing rolls.

The Merchant Mills

The merchant mills, as they are called, are employed in making of angles, channels, bars, I beams, etc. They comprise an 18-in. mill consisting of four 3 high stands with the necessary travelling tables and hook-up crane and cooling bed. This is driven by a 1,500 H.P. A.C. motor, and has a capacity of 6,000 tons per month. The 12-inch mill contains a 5-3 high stand, driven by a 900 H.P. A.C. motor, 2,500 tons per month capacity. There are four sheer and punch machines for making tie plates, which can turn out 25,000 plates per 12 hours, 1 splice bar shear, 2 notchers, 3 punches, and one hammer, turning out 6,000 splice bars per 12 hours.

Shops and Steam Supply

A battery of steam boilers of 5,000 H.P. burning coke breeze, supplies the steam for the various engines and is connected, as before mentioned, to the blast furnace gas boilers. To keep up with the repairs in the mill, a large engineering department is required—a foundry 100 feet by 250 feet, containing cupola for cast iron, and brass and copper furnaces. A machine, pattern, boiler, forge, and frog and switch shop, employing about 300 men, looks after this end of the mill's activities.

Other Properties

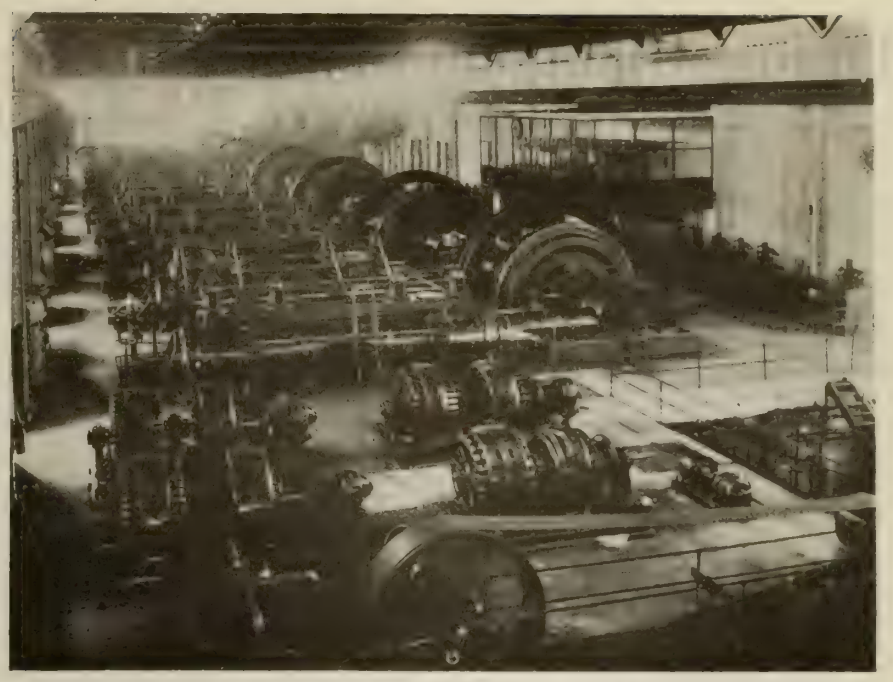
The company is well situated in being almost self supporting in its supply of raw materials. They own and operate the Magpie Mine on the Central Algoma Railway, which supplies about 18,000 tons of low phosphorous ore per month. Another mine, the Helen, has been closed through the exhaustion of the hematite, but there is a deposit of siderite nearby,

containing an estimated quantity of 100,000,000 tons ore. In West Virginia they have a property of 5,000 acres, containing three seams of high grade coking coal, one seam only of which has been opened, yielding 120,000 tons per month. From another property in West Virginia, of 2,100 acres extent, 3,000 tons of Pocahontas coal per month is secured. About 60 miles from the Soo they have large limestone and dolomite deposits, the limestone being 98 per cent calcium carbonate. Besides the power generated from their gas and steam plant the company purchases about 6,000 horse power from the Great Lakes Power Co., and this concern has about as much again available.

Making Better Men

In accordance with the view that better education makes better men, the company have, in conjunction with the Spanish River Pulp & Paper Co., inaugurated night classes for such of their men who are anxious to improve their status. A nominal fee of $1 is charged, which goes to the public schools. The course comprises arithmetic, physics, metallurgy, paper making, and manufacture of coke. The students are put through a preliminary examination, designed to reveal their exact status in educational ability, and after mastering arithmetic as far as involution and evolution, go on to drawing, elementary physics, and any of the before mentioned subjects which suits their needs. There is also a school for foreigners, where they are taught the rudiments of English.

It is a helpful sign when large corporations, such as this, show themselves to be awake to the necessities of the time, and the course they are following should ensure the development of men fitted to ably carry on one of the basic industries of the country.



POWER HOUSE, ALGOMA STEEL CORPORATION.

EFFICIENCY IN BELT DRIVES

By D. Street

In almost every factory and machine shop a certain amount of power is wasted in transmission through driving belts, the percentage of loss depending on the attention paid to the matter. Slipping, the trouble most frequently encountered, is common to all classes of belting, and generally speaking the remedy applied is to cut and tighten, or "take up" the belt so that it will run free from slackness with a better grip of the pulley; but probably more belts are broken and prematurely destroyed in this way than by actual use, not to speak of the additional load thrown on the engine and the consequent waste of power. To overcome slipping, many engineers incline to the principle of using belts wider than is actually necessary. This permits a heavier load to be carried, but when the practice is generally adopted all over a machine shop with fifty or more belt drives, the cost is very considerable. There is, however, a growing tendency to run belts slack, as not only is friction thus reduced and the life of the belt increased, but no power is wasted and the strain on the prime mover is considerably reduced. Immediately the tension is reduced the friction is proportionately lessened. Further increase of the arc of contact round the pulley (after the belt has been sufficiently slackened to have no initial tension) will not lessen the friction, but the load-carrying capacity of the belt is increased. As an example in many engineering shops it has been found that cuts 50 per cent. heavier can be taken on lathes where the arc of contact has been increased from 180 deg. (with a tight belt) to as high as 220 deg. (with a slack belt) and in one instance with a corn-crushing machine the increase in output was over 50 per cent. To permit of driving belts being run slack a proper belt dressing should be employed. Many belt dressings rely almost entirely on their capacity to "stick," due to the inclusion of rosin or tar in their composition, but others take the form of a non-sticky preservative or belt food free from acid or alkali action, which is absorbed into the belt, rendering it pliable and highly effective, and at the same time protecting it from the effects of moisture, dryness, or chemical fumes. Such a preparation properly applied tends to give belts a velvety cling through the setting up of a vacuum suction between the belt and the pulley face, and will permit of slack running without fear of slip, even under the heaviest loads.

"TURN DOWN YOUR PANTS."

At Coffeyville, Kan., a well-known pastor on a recent rainy Sunday turned up his trousers and trudged to church. Being of an absent-minded nature he forgot to turn them down on arriving at the church. His good wife from the pew noticed the trouble and dropped a note into the collection basket. The pastor took the note, thinking it was a notice, and read aloud:

"Henry, turn down your pants."

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT.

Making Milling and Gear Cutting Attachment—IV

This Article, the Last of the Series, Describes the Making of the Vise, Which is Part of the Milling and Gear Cutting Attachment

By ROBERT MAWSON

IN this installment of the article the various tools used when machining the vise which is part of the attachment are described.

Some of these tools are so designed that a number of castings can be operated upon at one sitting, care at all times being exercised so that the parts are interchangeable. Other smaller, yet necessary elements are also investigated, and the tooling processes illustrated.

In all the article has been written with the idea of showing how a modern machine shop goes about the problem of producing an article economically, using the best methods to attain the same.

The "Star" milling and gear-cutting attachment, which is manufactured by the Presto Machine Co., Inc., Brooklyn, N.Y., has also, as one of its elements, a vise which is attached to the vertical slide column. This part is useful for surface milling, cutting keyways and milling ends of shafts, etc., the milling cutter being held and driven by the lathe headstock and the piece being machined held in the vise.

Manufacturing the Vise

In Fig. 1 is shown one of the complete assembled vises used with this attachment for the purposes noted.

The first operation on the vise base is milling the jaws, and is shown in Fig. 2. The casting is located and held in a milling machine vise, resting on special jaws as shown to bring the casting in the correct alignment. The vise is then fed against a revolving cutter and the surface A machined. The end of the same cutter is then used to face the two surfaces B, thus making them parallel and at right angles to the first surface milled.

For the next operation the casting is placed in the fixture Fig. 3, being located by means of a tongue which fits inside the cored opening. The piece also rests on pins for height as shown, with other pins at the end for location. After the cover A has been fastened down the three screws B are tightened to hold the casting securely in the fixture.

The sides are then milled, using set blocks at C to obtain the correct width and height. After this has been performed the casting is placed in the fixture Fig. 4, which is essentially a special two-jawed chuck, on the lathe and the surface A faced and turned. It will be seen the casting is held by means of chuck jaws and located by forcing the edge of casting against the surface B. A hole is also bored in the base 1.375 in. diameter to suit the register on the base binder. When machining the vise slide the fixture, Fig. 5, is used for the first operation. This tool is designed to hold four pieces at once, which are dropped in from the top, resting against the lower face and held by means of screws at the rear. The faces A are then machined to the correct depth to suit the vise gibs.

The next operation is machining for the liners, and the fixture used is shown

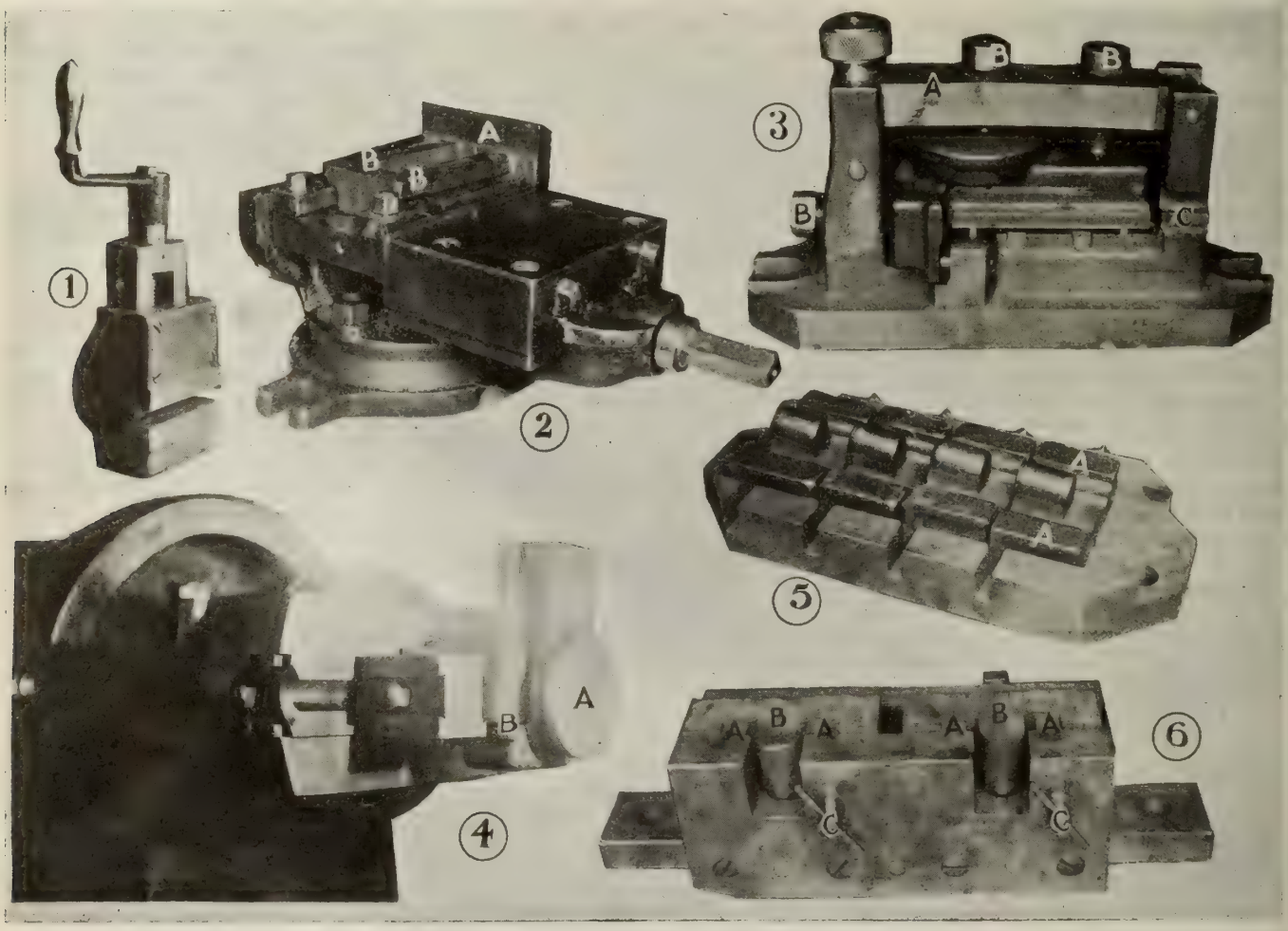


FIG. 1—A COMPLETE VISE. FIG. 2—MACHINING VISE BASE. FIG. 3—MACHINING BASE SIDES. FIG. 4—TURNING AND FACING OPERATOIN. FIG. 5—MILLING THE VISE SIDES. FIG. 6—MILLING FOR THE LINERS.

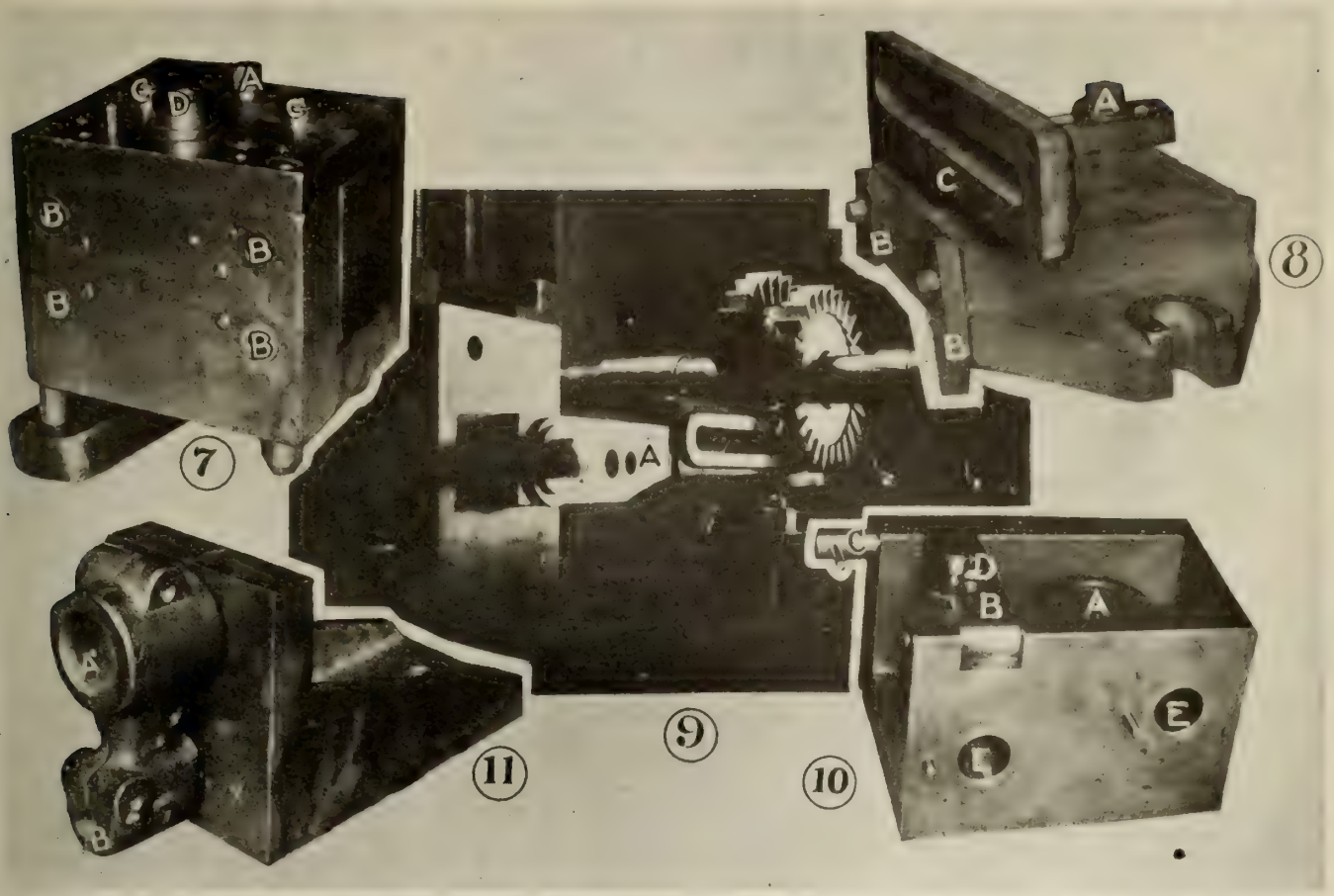


FIG. 7—DRILL FOR VISE SLIDE. FIG. 8—MILLING BASE. FIG. 9—MILLING THE ARM. FIG. 10—DRILL FOR TAIL STOCK. FIG. 11—MACHINING THE SLOTS

in Fig. 6. The castings, two at once, are located by the tongues A, which fit into the grooves machined for the gibs and forced against them with the screws shown at the rear of the fixture; the surface B is then machined to suit the steel jaw liners.

By this method of machining the surfaces milled in this operation will be square with those produced in the previous one. The screws C are utilized to force back the casting after the milling operations, thus affording an easy means to remove the piece should it fit tightly in the fixture. The jig used to drill the various holes in the vise slide is shown in Fig. 7. The casting is located by tongues which fit into the grooves machined for the gibs and held down with the screw A. Four holes are then drilled through the bushings B for the gibs, two at C for 5-16 in. x 18 in. screws, and one at D which is afterwards tapped out to suit the traversing screw of the vise. The rest of the operations on the other elements used on the vise are simple in their nature and need no description.

Machining the Angle Brace

The angle brace is the element which supports the overhanging bar and is adjustable to accommodate various diameters of work being machined. The first operation when machining the brace is milling the base, and the fixture used is shown in Fig. 8.

The casting is fastened on to the fixture by means of the bolt A. The two straps B are swung against the surface C which is pushed back against them. When the face touches both straps the bolt A is tightened to hold the casting in position. By this simple method of locating, the chance of machining too much stock from one end of the base is avoided. The face C is then milled, using the side of the cutter operated in a vertical milling machine. The long boss on the upper side of the base is next machined, the casting being held on the milling machine table, no fixture being necessary.

For the next operation the casting is placed in the fixture, Fig. 9, and located by a plate, against which the machined base is fastened. The strut A is then slid against the end as shown to resist the cutting stresses, a pair of side mills accurately spaced as shown perform the machining operation, both faces being milled at once.

The tailstock is the part of the attachment which is fastened to the overhanging bar and carries a centre on which the carrier is supported when having its plates milled or for similar work.

The first operation when machining this part is boring a 1.375 in. hole, the casting being held in a two-jawed chuck and the work done on a lathe. The casting is then placed in the jig, Fig. 10, being located on the pin A, the other end of the piece is held by two fixed pins. The cover B is then dropped down, being held with the sliding pin C. The screw shown in the cover, when tightened against the casting, forces it against the fixed locating pins. A 0.5625 in. hole is then drilled in the casting through the bushing D and two holes for 5-16 in. x 18 in. tap through slip bushings, which are placed in the fixed bushings at E.

For the last operation the casting is placed on two pins, which fit into the holes, Fig. 11, A and B, and the two slots shown machined using a 1-16 in. thick slitting saw for the work. The rest of the elements used on the milling and gear-cutting attachment are simple lathe or milling operations, for which no special tools are either necessary or advisable.

The tools which have been described and illustrated in this article will give the reader some idea, however, what special equipment is used for manufacturing this product so that intensive and accurate parts may be obtained in a modern, up-to-date machine shop.

Large Car Orders Placed.—Large orders for rolling stock have been recently placed with Canadian car manufacturing companies. The contracts which have been placed were on behalf of the Canadian National Railways by Mr. D. B. Hanna, and are for an aggregate of 2,840 cars of various classes. The contracts have been divided between the Canadian Car & Foundry, the Eastern Car Co., New Glasgow, N.S., and the National Steel Car Co., Hamilton.

MORE THAN 2,000,000 H.P. ELECTRIC ENERGY GENERATED IN CANADA

THAT there is upwards of 2,000,000 horse-power of electrical energy generated in Canada is demonstrated in the report on Electric Generation and Distribution in Canada about to be issued by the Commission of Conservation. The investigation into this subject has extended over a number of years and has been a most comprehensive one. Two of the principal points to bring out are the large part water-power plays in the production of electricity and the fact that over three times as much power is produced by privately-owned plants as by those publicly owned.

Water Power Predominates

There are, according to the report, 565 electric generating plants in Canada, with an aggregate capacity of 2,107,743 h.p. These supply 752 distributing systems, which serve 973 localities. Classified according to the prime-movers used, these plants are divided as follows:

270 hydro-electric, aggregating	1,806,618 h.p.
201 steam plants, aggregating	288,202 h.p.
49 gas plants (nearly all producer-gas), aggregating	8,157 h.p.
45 oil or gasolene engine plants, aggregating ...	4,766 h.p.

These figures give a very fair idea of the power situation, and show the unquestionable predominance of water-power. In the Maritime Provinces, steam and water-power predominate with the former in the ascendancy. In Quebec, Ontario and eastern Manitoba, water-power is the dominating source of power, every large centre and most of the smaller ones being supplied by electricity produced from water-power. In the Middle West, large plants are steam operated, while the smaller ones use internal combustion engines. In British Columbia and western Alberta, water-power again predominates, but the generous coal supply in certain districts also permits considerable steam operation.

In the large hydro-electric installations, the report says, the type of plant is of the most up-to-date and substantial construction, but the same, unfortunately, cannot be said of many of the small plants, particularly the older ones. Old, leaky dams and inefficient types of water-wheels in bad repair are often the real causes of shut-downs attributed to lack of water. Likewise in the large steam plants, efficiency is shown, but this is not generally true of the smaller ones. For the prairie provinces, where fuel and the cost of generation are high in price, the report suggests that it would be more economical to generate electric power in large central steam plants and distribute it over transmission lines.

More Privately-Owned Plants

The report shows that there are 207 municipal or publicly-owned plants of 452,508 h.p. capacity and 358 plants privately owned with a capacity of 1,655,235 h.p. The Niagara system of the Ontario Hydro-Electric Power Commission is the largest under public ownership. It has a load of over 201,000 h.p., supplies 120 municipal distributing systems and serves an area of 210 miles long by 85 wide. The largest privately-owned system is the Shawinigan in Quebec, with a load of 205,000 h.p. supplying 76 distribution systems and serving a triangular area with a base of 140 miles and a height of 75 miles.

The largest hydro-electric development is 488,800 h.p., in the three large power plants at Niagara. The large installations are not all confined to this site, however, as there are, in addition, 5 plants of over 100,000 h.p. and 36 plants of over 10,000 h.p. capacity. The large single plant is the Ontario Power Co., now operated by the Ontario Hydro-Electric Power Commission at Niagara, with a total capacity of 211,300 h.p. The largest single unit thus far installed in Canada is 20,000 h.p., at Grandmere, Que., though the Ontario Hydro-Electric Chippawa plant will contain units of 50,000 h.p., while future plans contemplate the use of 100,000 h.p. units.

The average head of water utilized is not exceedingly high, but many large hydro-electric plants operate under fairly high heads, such as 140 to 180 ft. at Niagara, 145 ft. at Shawinigan, 83 ft. at Grandmere and 400 ft. at the Coquitlam-Buntzen plants near Vancouver. The highest head in eastern Canada is 540 ft., at the 8,000 h.p. plant at Eugenia Falls, Ont., while, in the West, a head of 1,820 ft. is utilized at Britannia Beach, B.C., where the development also provides a total head of 3,530 ft. in two steps of 7,450 ft. and 2,080 ft. for the direct operation of other machinery. On the other hand, one of the largest plants recently installed at Cedars, Que., operates under a head of 30 feet.

The 26,667-horse-power plant at Hamilton, Ont., is the largest steam-power plant in Canada and is used as an auxiliary. The 14,234-h.p. plant at Edmonton, Alta., is the largest steam plant operated continuously.

Storage Reservoirs Increasing

No less than 59 plants report the successful operation of storage facilities to provide for increased flow at low-water periods. Among Government undertakings of this nature may be mentioned the three large reservoirs at lakes Timiskaming, Kipawa and Quinze to regulate the flow of the Ottawa river; La Loutre reservoir on the St. Maurice river; lake St. Francis dam for the St. Francis river, Que.; the extensive system of small conservation reservoirs on the Trent river, Ont.; lake Minnewanka, on the upper waters of Bow river, Alta., and the reservoirs on Jordan river and Goldstream, near Vancouver, B.C. Most satisfactory results have been obtained from storage undertakings, the capacity of plants being frequently doubled or more than doubled.

The utilization of the large peat areas in the north part of Jutland is receiving much attention. The area is said to be as much as 28,000 acres, which, according to "Ingenioren," could be completely drained by gravitation, and the total contents might be equivalent to 23 million tons of coal. It is suggested that the peat could be utilized (1) as air-dried briquettes used for heating the boilers of adjacent electrical supply works; (2) as machine made briquettes sold for general consumption as far away as the cost of transport will allow; (3) as peat litter to be sold to neighboring farmers; (4) the lower parts of the bogs should be reclaimed and used for agriculture. The heating value of the peat is assumed to be half that of coal The works required should be executed by private enterprise, aided by the State, and the cost of reclamation would amount to £50,000. The first 9,000 acres could be dealt with in twenty years, and the rest of the land occupied in course of time as the peat is cleared away.

ELECTRIC PLANTS IN CANADA, SHOWING CAPACITY, OWNERSHIP AND PRIME MOVERS

Province.	Plants.		Ownership. Private.		Ownership. Public		Kind of Prime Mover. Hydraulic.		Kind of Prime Mover. Steam.		Kind of Prime Mover. Int. Combustion.	
	Number	Capacity h. p.	No. of Plants	Total Capacity h. p.	No. of Plants	Total Capacity h. p.	No. of Plants	Total Capacity h. p.	No. of Plants	Total Capacity h. p.	No. of Plants	Total Capacity h. p.
Nova Scotia	38	27,177	24	23,064	14	4,113	12	3,474	23	23,478	3	225
Prince Edward Island	9	1,314	9	.....	...	.....	5	207	2	475	2	632
New Brunswick	23	18,607	16	16,212	7	2,395	8	7,463	12	10,014	3	1,130
Quebec	119	625,061	99	604,903	20	20,158	92	585,911	20	38,791	7	359
Ontario	173	899,856	105	609,658	68	290,198	113	831,004	50	66,519	10	2,333
Manitoba	23	103,015	8	53,706	15	49,309	4	78,550	13	23,841	6	624
Saskatchewan	62	30,593	26	2,682	36	27,911	...	.....	15	26,585	47	4,008
Alberta	52	85,117	27	43,235	25	41,882	4	31,980	42	51,805	6	1,332
British Columbia	63	306,776	41	290,234	22	16,542	1	10,000	2	227	...	2,280
Yukon	3	10,227	3	10,227	...	.....	31	258,029	22	46,467	10	.....
Canada	565	2,107,743	358	1,655,235	207	452,508	270	1,806,618	201	288,202	94	12,923

The Disabled Soldier and the Mechanical Trades

The Country's Responsibility Does Not End With a Pension, But Begins Where in Former Wars it Stopped—Vocational Training and a Keen Interest in His Welfare Are Necessary

By DOUGLAS C. McMURTRIE

Director Red Cross Institute For Disabled Men, New York

IN the past, our method of dealing with men permanently disabled in the course of employment has been to pay the worker a pension in the form of compensation and forget him and his injury. But the cost of disability to the machine industry has not been alone in premiums paid for casualty insurance. There has been the cost involved in training experience, and adaptation of a skilled worker who does not return to his job, and the fitting of a newcomer to take his place.

There are three means of reducing and approaching the complete elimination of the cost of disability: first, accident prevention; second, thorough medical attention to minimize the disability resulting from the injury; and third, salvage of the remaining abilities of the worker through rehabilitation for self-support. The first of these has already received wide attention from employers and has wisely been encouraged in a financial way by casualty insurance companies and state funds. The values of the two latter have, however, not as yet been appreciated. Their energetic application would effect a tremendous saving to industry.

Many injuries from which men would completely recover in a short time under adequate and high grade medical attention are treated for an insufficient time, or by incompetent physicians, and, instead of a prompt return to work, the case at best drags along over an extended period and at worst becomes chronic or develops into permanent disability. Some States require the insurance carrier to provide but two weeks of compulsory free medical attention to the injured man. For the insurance company to take advantage of this limitation is the most short-sighted policy possible, because for every dollar saved in physicians' or hospital fees the insurance carrier pays out later $10 in compensation. And what the insurance company pays is actually paid by the insuring employers in their regular premiums.

Unlimited medical attention of the highest grade should be an axiom of casualty practice. It should be insisted upon by employer and workman alike. The best outcome of any injury is to have the employee return to his job as a well man in the shortest possible time. It is well to develop a science of dealing with cripples, but the ideal is to have fewer and fewer cripples with which to deal.

The third method of attack on the cost of disability is rehabilitation for self-support—the re-education of an injured man for an occupation which he can follow, or a process which he can perform, in spite of his handicap. The science of rehabilitation is new, and the experience in it has practically all been gained in the effort to make sound and just provision for the disabled soldier or sailor Every country among the recent belligerents is to-day operating a comprehensive system of re-education for disabled soldiers, and is placing upon that system more dependence than upon the pension system.

Paying a man a small monthly or weekly stipend on which he is expected to live in idleness is not a very constructive method. With the breakdown of confidence in the pension system it was realized that the only real compensation for disablement was restoration of capacity for self-support. It was further realized that very few jobs require all the physical faculties and that in the present-day variety of industrial processes it is possible to find a job in which a man with a given type of disability can function 100 per cent. efficient. Some jobs are standing, some seated, others require walking about, some jobs at a bench working on small articles require but little strength, others involve great physical exertion. Still others do not require the sense of hearing, in others the sense of sight is not essential. Finding the future work of the disabled men, therefore, requires expert and painstaking choice, but a successful selection is possible even for the seriously handicapped. The first aim is to place the man back in a different job in his own trade or in a trade closely related. In such a job his past experience will stand him in good stead. Failing this he can be retrained for a different line.

The process of re-training the disabled is known as re-education, and can best be provided in a special school for crippled men. The first school of this kind in the United States is the Red Cross Institute for Crippled and Disabled Men, established in New York City through the generosity of Jeremiah Millbank. At this school, opened to disabled civilians and soldiers alike, six trades are already being taught: artificial limb making, motion picture operating, oxy-acetylene welding, printing, jewelry work, and mechanical drafting. More will be added as the demand develops. Graduates are already giving satisfaction in the jobs to which they have been graduated, so the enterprise has passed the experimental stage. And in the results attained with disabled soldiers abroad there is overwhelming evidence of the logic and practicability of rehabilitation.

The cost of soldier rehabilitation is being met by the United States Government and by the Governments of some of our allies. It will be admitted without argument as desirable that the advantages of re-education be made available to disabled civilians as well, but will not the cost be prohibitive? The fact is that rehabilitation effects a reduction rather than an increase in the cost of disability to industry or to the community as a whole.

A typical case will illustrate how the saving is effected. A worker in Massachusetts was injured by a fall while working inside a submarine and his hand became permanently crippled. In due course his compensation rate was determined and he was referred to the insurance carrier to be paid $10 a week for a long period, with a maximum total payment of four thousand dollars. Since the disability was manifestly permanent the insurance company wrote the case off their books as a four thousand dollar loss and transferred that amount to reserve to cover the weekly payments. After the compensation had been paid for nearly a year, a new official of the insurance company began looking over the list of men to whom the company was paying compensation. His attention was directed to the man in question, and the latter was requested to call at the office of the company. The case was like many thousands of others susceptible of rehabilitation for self support, so the insurance company official put a proposition to the man in very frank terms. "I believe that you can be trained to earn a good living. I want you to understand very clearly, however, that this proposal is to the financial advantage of the company, but I also believe it is to your advantage as well. A total income of ten dollars a week is not very attractive to you, and you would probably rather return to work at a good wage than remain idle. If you will consent, the company will send you to a school of re-education and see if we cannot get you back on your feet in good shape."

The injured man consented to the proposal and the company sent him to the Red Cross Institute in New York. They began to pay him not ten dollars a week as required by law, but forty dollars a week; twenty to him in New York and twenty to his wife at home. The company also paid liberally his travelling expenses in both directions. In the period of eight weeks he was re-educated in oxy-acetylene cutting and welding, and returned home. He is now making, not only a satisfactory wage, but twice as

much as he had ever earned before the accident took place.

In the whole transaction every party at interest was benefited. The man was advantaged in that his general living standard was distinctly raised, and the necessity of working for his living could not be considered a hardship. The company paid less than five hundred dollars for his rehabilitation, and this expense, in conjunction with the five hundred already paid in weekly compensation during the first year of idleness made a total for the case of one thousand dollars. They were thus enabled to charge three thousand dollars of profit to the account of profit and loss. The community was infinitely the gainer in that the man, formerly an unproductive consumer, became a useful producer instead. The community further gained in the elimination of the disabled man from the category of a prospective dependent because, while compensation might have taken care of him in a very insufficient way during the period of idleness, there would have come a time when compensation ceased, and then he would have been in a desperate economic status indeed—confirmed in habits of idleness, untrained for skilled work, and without any source of support.

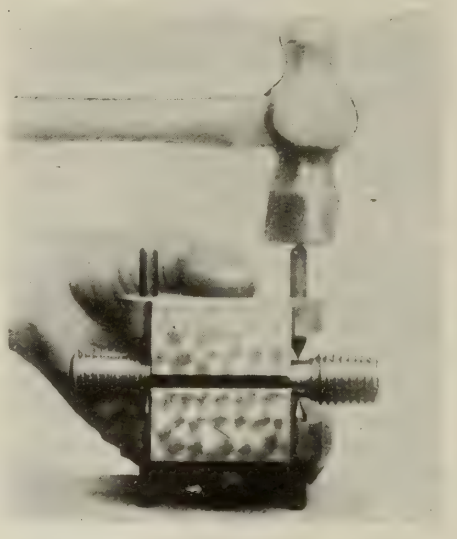
A more intelligent handling of disability by insurance carriers will, therefore, reduce their expense, and will thus cut the cost of casualty protection to the employer. There is needed also, however, some revision of compensation laws so that there may be definite encouragement to insurance carriers to offer opportunity of rehabilitation and definite encouragement to the disabled men to take advantage of it. Practically every compensation case that has ever come to the Red Cross Institute has come on the day his compensation expired. For one year, for two years, or for four years the man has existed in idleness, drawing compensation and cultivating habits of indolence. When his support was cut off he then became interested in rehabilitation. Present compensation legislation tends to encourage the man to remain idle because his payments are reduced by any improvement in earning capacity. A revision of this practice will make for more constructive provision.

In short, the first effort should be to prevent injury, the second to minimize its permanent effects, the third—when disability has ensued—to offset its economic consequences. The execution of this complete programme is not only sound humanitarian practice—it is good business as well.

DIAL EXTENSOMETER AND SPECIMEN-MARKING BLOCK

By F. C. P.

The accompanying illustrations, Figs. 1 and 2 show the dial extensometer and specimen-marking block, developed by the Riehle Bros.' Testing Machine Co., at Philadelphia, Pa. It is pointed out that with the use of these instruments a specimen can be quickly and accurately marked and the elastic limit seen as the hand travels around the dial. The extensometer meets the demands for a simple, compact, rigid, direct-reading and accurate instrument. The marking block is made in two pieces which are brought in alignment by two dowel pins. The specimen is placed as



MARKING BLOCK USED WITH EXTENSOMETER.

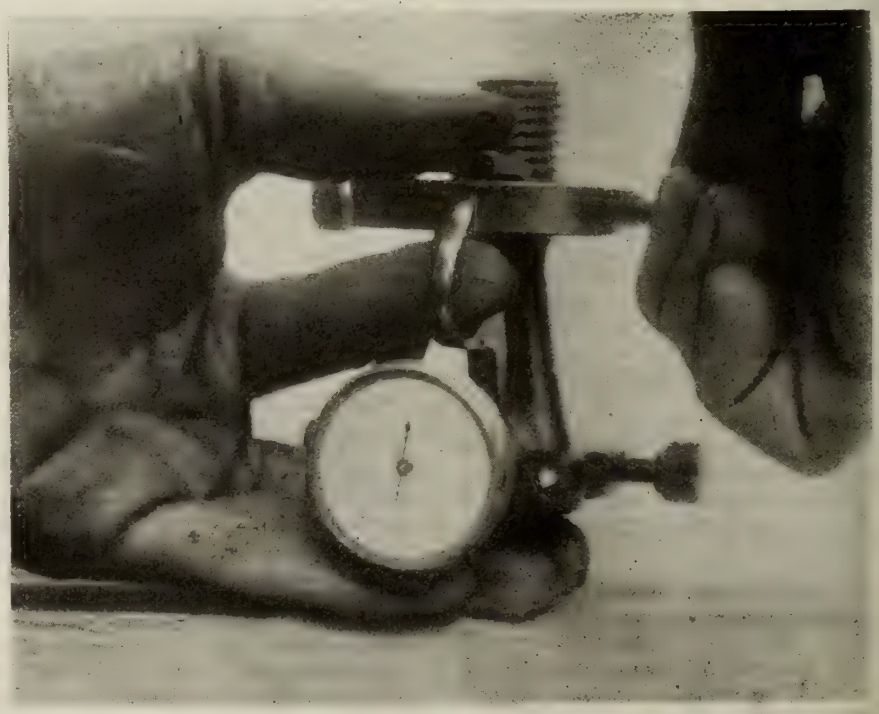
shown, and holding block in fingers the ends of two punches are set on a solid block while the opposite punches are hit with a hammer. The specimen is marked on an exact diameter the correct distance apart and very quickly.

It will be noted that the clip above the top frame is for the thumb and the hole under the same frame for the forefinger. When the extensometer is gripped as noted in Fig. 1, the thumbscrews are brought just the right distance apart to fit in the holes which have been made by the marking block as explained above. This is found very convenient besides allowing for rapid work.

There is the provision made for measuring the average stretch. The lower thumbscrews operate in a frame which swivels about a centre in the same plane as the screws but whose axis is perpendicular to the common axis of the screws. Thus, if one side of specimen elongates more than the other the lower frame will swing accordingly and its centre will have a moment which is the average elongation between the two sides. This adds much to the accuracy of the instrument.

There is also the provision for adjusting the instrument if it becomes inaccurate. If for any reason it is thought the extensometer is giving faulty readings, a suitably arranged micrometer attachment can take the place of a test specimen and the dial readings can be checked against the movement of the micrometer screw. The dial is held in a cup which is fastened to the strut by screws. The cup can be adjusted up or down until the readings correspond to those of the micrometer screw.

Rumored Change in Board.—There is talk of some changes in the board of the Canadian Car and Foundry Company after the annual meeting takes place. With the retirement of Hon. N. Curry from the president's chair, to become chairman of the Board of Directors, a new president will have to be appointed, the first change of this kind since the inauguration of the company. It is generally thought that W. W. Butler will be the man chosen. It is understood that J. Frater Taylor, chairman of the board of the Lake Superior Corporation, will join the board of the Canadian Car and Foundry Co.



EXTENSOMETER BEING PLACED IN POSITION ON TEST PIECE.

Some Pointers on Rail Mill Practice

An Analysis of Modern Methods With Particular Reference to Roll Designing and Shrinkage Problems—Experimental Data—Designing the Rail Mill Passes—Edging Pass Work Varies

By W. S. STANDIFORD

THE manufactured steel rails have reached a high grade of perfection, due to the fact that the producers have availed themselves of every advantage that science and research could afford, and railroad engineers have learned from experience the qualities that are most desirable under modern traffic conditions. Perfection, however, has by no means been reached, and the long reach of rail breakages each winter gives an approximate measure of the importance of the problems that are yet to be solved. In view of these conditions it is desirable to make a critical analysis of prevailing rail mill practice and roll designing methods as a basis for future progress; such an analysis is attempted in this article.

Particular stress is laid on rolling practice, the melting problems being less complicated; much of the writer's data is drawn from the Ohio Works at Youngstown, Ohio, operated by the Carnegie Steel Co. The ingot is bloomed at the Ohio Works on a 34-inch two-high mill, driven by a pair of 45 x 72 inch reversing engines with a hydraulic reversing gear. The top roll is carried by counter weights and is raised and lowered with a hydraulic screwdown; the blooming mills are steel and have a 2½-inch hole in the centre for the introduction of cooling water. These rolls are 57½ inches long with 18½ inch necks, and have three grooves, 18½ inch, 9½ inch, and 7½ inch; the ingot, which is 22 x 18 inches, is reduced to a bloom 7½ x 8 inches in 13 passes, as shown in the accompanying table:

Pass No.	Draft. Inches.	Groove No.	Size when leaving Pass. Inches.
1	2½	1	18 x 19½
2	2	1	18 x 17½
3	2¼	1 edge	17½ x 15¾
4	2¼	1	17½ x 13¾
5	2¼	1	17½ x 11⅝
6	2¼	1	17½ x 9½
7	2¼	2	9½ x 15½
8	2¼	2	9½ x 13½
9	2¼	2	9½ x 11½
10	2¼	2	9½ x 9½
11	1	2 edge	9½ x 8½
12	1	2	9½ x 7½
13	1½	3	7½ x 8

It will be noticed that the drafts are heaviest in the first passes, getting lighter towards the last pass. Some rollers think that this distribution of the draft causes the steel to open up and crack more than if the drafts were light at first and heavier toward the last of the blooming, basing their opinion on the fact that the ingots have no fibre and are more or less honey-combed, in which state they do not hold together as well as after work has been done on them and their structure is fibrous and more compact.

Experiments at South Chicago

Considerable experimenting has been done at South Chicago to determine what distribution of drafts gave the best results. The ingot used in the South Chicago mill is 16¾ x 18½ inches, and is reduced to a 7¾ x 8½ inch bloom in nine passes. The blooming mill is a three-high mill, so that each change in draft arrangement could only be accomplished by making new rolls, whereas, on a two-high mill, the drafts can be exchanged with no expense by simply varying the distance the top roll is raised or lowered.

After considerable experimenting, the South Chicago officials decided on the drafts they use at present, which reduced the percentage of seconds enough to more than repay them for the expense of the investigation. The following table shows the original distribution of drafts and that decided on by the experiments:

Pass No.	Original Draft Inches.	Present Draft Inches.
1	3 1/16	1¾
2	2 1/16	1 15/16
3	2 11/16	1¾
4	2 1/16	1⅞
5	2 11/16	3⅛
6	2⅛	2 3/16
7	2⅛	3 5/16
8	1⅞	2 1/16
9	1 11/16	2 3/16
Total	20¾	20¾

The design of the passes in blooming mill rolls is not such a difficult matter in a two-high as in a three-high mill, because in the former it is impossible to give the passes much shape, while in a three-high mill, the piece goes through each pass but once, and the pass can be shaped to the best advantage. In all square passes, such as blooming mill passes, it is the aim to get as much side work on the piece as possible, to counteract the tendency of the steel to shear. The latter is due to there being greater elongation on the top and bottom of the piece caused by the up and down work, than on the sides where there is much less work. It is impossible to get the elongation equal on all sides because it is impossible to have the work equal on all sides of a rectangular bar, except in a universal mill, but that condition can be more easily reached in a three-high than a two-high blooming mill.

This shearing tendency, due to unequal elongation, besides being greater in a two-high than in a three-high mill, is not counteracted as much in the succeeding passes. In a two-high mill the piece goes back and forth two or four times before it is edged up and work done on the opposite sides, while in a three-mill the piece has work done on the opposite side in each alternate pass which tends to remedy the harm done by the unequal elongation.

The best that can be done, then, in designing passes for two-high rolls is to make the radii large and have taper on the collars, so that when the piece does fill the pass there will be work done on the corners and part way on the sides, which will help to heal up the cracks. Aside from providing suitable radii in the corners of the passes and making the passes of the proper width to suit the drafts decided upon, there is little else to be observed in laying out the blooming mill passes, except the swell in the bottom of the grooves. This swell is put in the bottom of the pass to reduce the thickness more in the centre than at the edge, so that when the piece is edged up in the following pass it will have room to spread without overfilling the pass, causing a seam that would carry through to the finished rail. The amount of swell depends on the amount of spread the piece will have in the different passes, which is a variable quantity, depending on the composition of the steel and the temperature at which it is rolled. The bloom coming from the mill is from 30 to 40 feet long, depending upon the length the ingot was poured, which is governed by the section of rail to be rolled.

This long bloom on its way to the rail mill passes between the knives of the bloom shears, where the front end is lopped off back to the solid steel and then sheared into blooms of suitable length to make two or three rails, depending on the section to be enrolled.

Designing the Rail Mill Passes

The first six passes at the Ohio Works are called the roughing passes and the last five the finishing passes. The finishing passes are laid out first, using the finished rail section from starting point and working back through the other finishing passes, which will be dif-

OHIO WORKS PATTERN OF RAIL ROLLS.

ferent for each different section of rail.

The roughing passes are designed to suit the size of bloom to be used, and provision must be made to have them so constructed that different sections of rail can be made without changing the roughing rolls for each change in section. The most important thing in designing the finishing passes is to have the work equal in the head, web and flange; that is, to have the percentage of reduction as nearly equal as possible in the three parts of the rail. Every effort is made to do this, but certain requirements must be met, which makes this impossible to carry this out to the letter.

To get the exact area of the finishing or the last pass, the following calculation was made. The specific gravity of steel, as given by good authority, is 7,854, which figure has been confirmed by experiments made with bessemer steel at Joliet, Ill.

Weight per cubic inch = sp. gr. × 0.036085-Kent, pg. 163, hence weight per cubic inch = 7.854 × 0.2832 pound.

A bar of steel 1 square inch in cross section and one yard long would weigh 36 × 0.2832, or 10.195 pounds; therefore, a rail weighing 70 pounds per yard would contain 70 ÷ 10.195 = 6,863 square inches. The rail will have a greater area hot than cold. It is assumed that the steel at the temperature at which the rail is finished, has an expansion of 3-16 inch per foot at least. In all rail mills hot templates are laid out with a shrink scale having this amount of shrinkage per foot and the finished rail is of the correct weight.

Now, if in a foot the shrinkage is 3-16 inch, equivalent in decimals to 0.1874 inch, to produce a cold bar 1 foot long we must shear the hot bar to a length of 1.01575 feet. Likewise a bar 1 inch square cold will be 1.01575 inches square hot, and will have an area of 1.031 square inches. Since the area of the 70-pound rail given above is 6.863 square inches cold, the hot section will have an area of 6.863 × 1.031, or 7.075 square inches. The finishing pass was accordingly laid out to A.S.C.E. dimensions with a shrink rule having a shrinkage of 0.1875 inch per foot. This was done very accurately with fine lines on bristol board and they are gone over very carefully with a planimeter, which gave the area 6.99 inches, showing a difference of only 0.08 square inch from that called for by the above calculations; in other words, the 70 pound A. S. C. E. rail is a trifle less than 70 pounds.

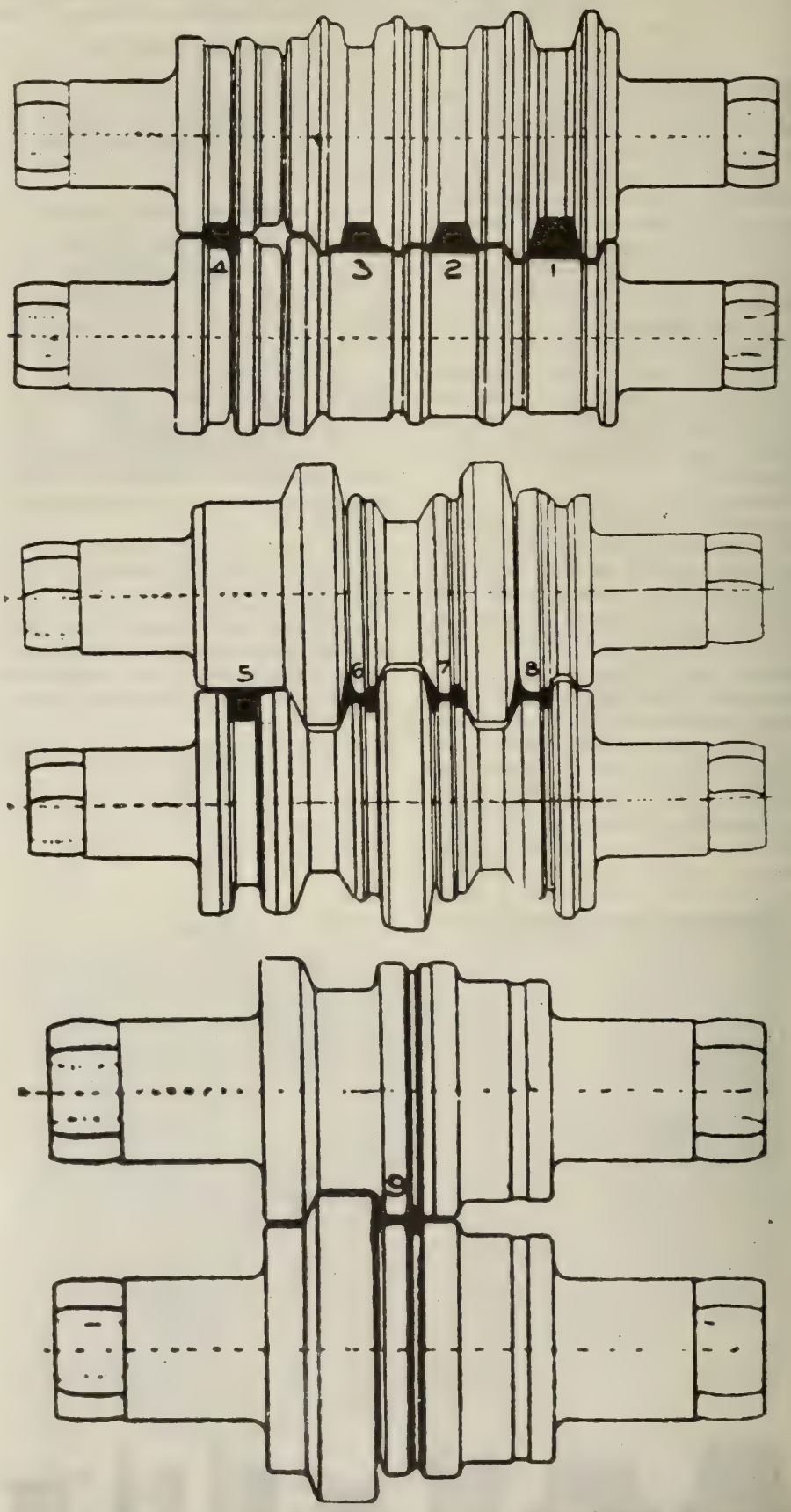
The other sections also show slight variations. This, then, is the design of the finishing or No. 2 pass, except that the flange in the closed roll is opened up 1-64 inch from a point ½ below the centre line, which, besides allowing the rail to deliver free, makes the base of the rail a trifle concave, which is desirable. It guards against a convex base, a serious defect in a rail. Careful work with the planimeter showed that the 6.99 square inches of area were distributed as follows:

	Square Inches.
Head	2.92
Web	1.5
Flange	2.57

or in percentage:

	Per Cent.
Head	41.77
Web	21.46
Flange	36.77

It has been the aim in the remainder of the finishing passes to keep the distribution of area as close to the percentage of the finished rail as possible after meeting other requirements demanded in the design. How successfully this has been done will be seen by re-



STANDARD PATTERN OF RAIL ROLLS. NO. 9 BEING FINISHING PASS.

ferring to the table showing the drafts in each pass.

There has been a trifle more work on the head than on the flange in each case, because the flange cools quicker than the head and is therefore harder to reduce. If this fact were disregarded the piece would have a tendency to deliver crooked.

Pass No. 10, called "the leader," is constructed to bring the piece as near to the shape and size of the finished rail as possible. As designed, it requires a reduction of only 3.59 per cent. to make the finished rail. The height is made 1-16 inch less than the finisher to allow for spread. The closed flange is made the same length as the finisher, so that the same angle makes it thin enough to go to the bottom of the closed flange in No. 2 pass, and the additional length will insure the work being done on it, filling the corners and giving the desired width. The fillets on head and flange are made 1-32 inch greater than on finisher, to give a little work at these points in working out the ¼ inch fillets to hold the piece in place. The head is longer on both sides than No. 2 pass to give enough to fill out the crown to 12 inch radius and fill under the head to give a tight fit on the splice bar.

The fillets are made larger than in the leader to give work at these four points, which steadies the piece in the pass. The head is made wider, 1-16 inch on the closed side and ⅛ inch on the open, to allow enough up and down work to force the steel to fill the head, which would not do otherwise, because it is necessary to carry a great deal more stock in the head from No. 8 than is needed. This makes the head thick and keeps it from entering the groove readily. The web is made thin enough to give the portion of work necessary to keep the percentage as near that required as possible, but on account of the large diameter of the rolls at this point the up and down work should not be great.

No. 8, called the first edger, is a very important pass, for, unless it is designed so that it will fill properly, the following passes will not work as designed. The height is made 3-32 inch less than No. 9 to allow for spread. The closed flange is made 1-32 inch shorter than the long flange of No. 9, from the edge of the web, to allow for its lengthening a trifle. The open flange is made 9-16 inch longer from the side of the web and the angle of the flange is made a little greater than No. 9 so that the flange will be thin enough to go home in the closed flange of the second edger. If successful in this, there is not much danger of a narrow flange, for most causes of narrow flanges come from the failure to bottom in the closed flange in this and the following passes.

TABLE SHOWING AREA AND REDUCTION OF RAIL IN VARIOUS PASSES

Pass.	Area, Square Inches.	Reduction. Per Cent.	Head. Area	Head. %	Web. Area	Web. %	Flange Area	Flange %
1	46.32	22.8						
2	36.63	20.92	5.14	43.34	2.48	20.91	4.24	35.75
3	29.58	16.05						
4	23.23	21.5	3.75	41.52	1.93	21.37	3.55	37.10
5	19.85	14.5						
6	16.52	16.7	3.02	41.65	1.55	21.38	3.68	36.96
5-H	21.87	5.84						
6-H	18.14	17.05	2.92	41.77	1.50	21.46	2.53	36.77
7	15.67	5.2						
8	11.86	23.68						
9	9.03	23.86						
10	7.25	19.72						
11	6.99	3.59						

There is only 1-64 inch up and down work required on the web, but this is enough to give the brand, while more work would tend to pull the metal away from the flange.

Edging Pass Work Varies

In all passes of this construction, which are called edging passes, there should be more up and down work on the flange than on the head, and more on the head than on the web. This is made necessary because the diameters of the rolls are different at each point and therefore have different peripheral speeds, which causes the metal to flow differently, pulling away from the slower moving parts of the rolls more than from the faster traveling parts.

Pass No. 9, called the second edger, is very similar in design to No. 10, but the work is 19.72 per cent. instead of only 3.59 per cent. The height is 3-32 inch less than No. 10, to allow for spread, which will be greater here than in No. 10, because of the greater reduction in the web than in the open flange in No. 10. The open flange is made ¾ inch longer from the edge of the web than the closed flange in No. 10 to give the closed flange from the preceding pass a chance to lengthen, which will make it thin enough to go in the closed flange of No. 10.

There is little more than a ½ inch up and down work on the head, which will keep the metal from pulling away from the head, which it is very likely to do, as there is much heavy work on the web. For this reason the fillets on head and flange are made larger. The corners of the head are well rounded to keep the steel from overfilling in the open roll, which would cause a fin. In this, as in all the edging passes, the flange is turned a trifle from the line perpendicular to the centre line, flaring out from the closed roll flange. This is done so that the piece will deliver freely from the pass without wearing the rolls excessively.

In the second edger and finisher, where it is more important that the rolls hold their shape, the head is also turned from the perpendicular. The rolls wear much less when this is done, and because of the taper they can be brought to the correct height with less dressing when they do become worn.

No. 7 is called the finishing dummy. It is the first of the finishing passes and is called a dummy pass because it does not assist much in shaping the rail nor does it reduce the area except by a small percentage. This pass is used to squab the piece down to the proper height to permit the spread in the following passes. Its most important function, however, is to make the flange thin. The longer flange coming from No. 6 is 11-16 inch thick at the point, while the same flange is only ¼ inch coming from the dummy, so it is seen that the flange is made much thinner and consequently longer in this pass.

It is to be noted that one flange is longer and thinner than the other. The longer flange is the one that goes into the closed roll of No. 8 and must bottom in that pass, or loss of width of flange would result, which defect would carry right through the balance of the finishing passes. The width of the head is made just enough greater than No. 8 to give the amount of up and down work desired, and the corners are well rounded to prevent overfilling in the succeeding passes, which would cause a fin. The top of this pass is made V-shaped to help force the metal out of the flange. As the rolls wear, the top roll must be lowered or the flanges will become too thick to enter the closed roll in No. 8. Frequently the top roll of the dummy is made a chill roll, so that the wear will not be so great. This then completes the design of the finishing passes.

The light and heavy sections cannot be made from the same roughing passes as there is such a difference in the amount of stock required to make the different sections. Sections from 50 to 70 pounds are made with the same roughing passes, and sections from 70 to 90 pounds are made on another set of passes. For all sections, the first four roughing passes remain the same, the change from the light to the heavy sections requiring a change in the last two roughing passes.

While the design of the roughing passes is not so particular as that of the finishing passes, there are a number of precautions to be observed or the passes will not work properly. The biggest difficulty in these passes is to get the reduction and shape the rail without making the flange too narrow.

In all the finishing passes the work that is done in shaping the rail tends to make the flange narrow, so that it is necessary to have the flange coming from the roughing passes wider than is required in the finish rail. To accomplish this, different style passes are alternated in such a maner that the edging passes, which do so much toward shaping the rail and thereby making the flange narrow, are followed by squabbing or dummy passes that do little or nothing toward shaping the rail but keep the height down and roll out the flange, making it thinner.

Passes Nos. 1 and 2 are box passes, and in both the reduction is heavy. These passes make the piece narrower in the head and shorter in height. The up and down work necessary to reduce the height causes the piece to spread and begin to form the flange, which effect is

exaggerated by putting a swell on the bottom of the passes; this also prevents the piece from overfilling in the succeeding edging pass, which would cause a seam.

No. 3 is called an edging pass because the piece entered on edge, that is, turned through 90 degrees from the position it was going through Nos. 1 and 2. In this pass the piece begins to take or get the shape of the rail, considerable more work being done on the web than on the head and flange. The part of the rolls that reduce the web is made quite sharp; that is, 9-16 inch radius rather than presenting a wide surface at that point, which would tend to pull the metal away from the flange more than would the narrow tongue. The swell made in the top and bottom of No. 2 prevents the piece from overfilling the pass when it spreads.

No. 4 is a dummy pass and does nothing toward shaping the rail, but makes the piece lower and the flange wider. The height is squabbed down to 4 3-16 inch in this pass and the top and bottom are made concave again to allow the piece to spread in the two following edging passes without overfilling.

In order to assure stock enough for the heavier sections, passes 5-H and 6-H are laid out for sections from 70 to 90 pounds as well as passes for Nos. 5-L and 6-L for sections under 70 pounds. By reference to the table showing percentage of reductions, the difference in the draft for the light and heavy section is seen.

Both Nos. 5 and 6 are edging passes and in both considerable work is done on the web of the piece. As in No. 3 effort is made to get the reduction and shape the piece without pulling the metal away from the flange any more than is necessary. The flange and head are tapered off in both rolls in these passes so that the piece is free to deliver itself without undue wear of the rolls. No. 6 is the first pass in which one side of the flange is made longer than the other. This is done as it comes out of No. 7, and will have one flange longer and thinner than the other, and will, therefore, go home in the flange of the enclosed roll in the edging or finishing passes.

The table shows the area and reduction in the different passes and the distribution of the area in the finishing passes. In turning the rolls, the pitch diameter of one roll is made about ⅛ inch greater than that of its mate, so that the piece will always deliver one way; that is, away from the largest roll, which makes it possible to do away with the one guide on the delivery side of the rolls. It is an advantage to have the piece deliver away from the closed roll in the finishing passes, so that the grooved roll shall have the greatest pitch diameter.

It is customary on a 24 inch mill to make the pitch diameter of the grooved roll ⅛ inch greater than that of the tongue roll. The parting between the finishing roll is ⅜ inch and between the roughing rolls ½ inch and the parting line, where collars and grooves of a pair of rolls are in contact, is made at an angle from 10 to 15 degrees, so that when the rolls are redressed, the lock can be re-established by turning off a very little at these points.

This is an important point and it allows a pair of rolls to be redressed more times than if the parting were made nearer a straight line. The rolls have to be taken out of the mill frequently to re redressed, sometimes because they have worn so that the rail becomes too high, but more generally because they become rough and do not make a smooth rail.

At the Ohio Works the finishing is in sand rolls, which will make about 3,100 tons in two passes without redressing. At Braddock, Pa., before the cold rolling process was adopted, 3,000 tons were finished on one pass to a dressing. It will be appreciated that the temperature at which the piece goes through the finishing pass has great bearing on the life of the rolls.

At South Chicago there is a chilled pass finishing as much as 5,187 tons in one pass to one dressing. Too little water on the rolls fails to keep them cool, and heat cracks or checks appear, which make the rolls rough. Too much water causes water cutting. The latter is harder on the rolls than the cutting done by steel. The water should run on the rolls with only about a 6 inch head and the quantity should be limited to the amount required to keep the rolls cool enough to prevent heat cracks.

Some time ago the Carnegie Steel Co. installed at its Edgar Thomson plant a cooling bed before the finishing pass, on which the rails are allowed to remain for a short time before going into the rolls. The rails are held on this bed about one minute and 6 seconds, during which time their temperature drops from 1,760 degrees Fahr. to 1,580 degrees, which gives the steel a close-grained structure and a nice finish. This cold rolling is much harder on the rolls than the old practice of finishing at a higher temperature.

In contrast to the cold rolling, now being employed in the above-mentioned plant, is the reheating of a certain percentage of blooms in the South Chicago rail mill. This reheating is done to make the steel roller easier and is a very effective means of reducing the percentage of seconds. But because of the rails being finished at this high temperature, it is said, the steel is not as fine a structure as when the blooms are not reheated but are finished with the heat given the ingots in the soaking pits, as at the Ohio Works.

The standard length of rails was 30 feet until recently, but now 38 feet is the standard, which requires a less number of joints per mile without making the rails much more difficult to handle or transport, as nearly all cars are 34 feet or more inside the bed.

The rails are cut to length at the Ohio Works by four hot saws, 42 inches in diameter, which revolve 1,400 revolutions per minute, are set the proper distance apart, and are so operated that all four come down on the rail at once. In order that the rail, when cool, shall have the proper length, the hot rail is sawed to a length to allow for the contraction, due to the fall in temperature.

It will be seen that the lengths vary for different mills, and will depend on the temperature of the rail when sawed. Even in the same mill different weight sections are sawed to different lengths, because the heavier sections are hotter when sawed than the lighter sections. Below is a table showing the lengths the different sections are sawed at South Chicago and Ohio to make rails that will be 30 feet long when cold:

Section lbs.	South Chicago Feet and Inches		Ohio Works Feet and Inches	
100	30	6½	30	5⅞
95	30	6 7/16	30	5 13/16
90	30	6⅜	30	5¾
85	30	6 5/16	30	5 11/16
80	30	6¼	30	5⅝
75	30	6 3-16	30	5 9/16
70	30	6 1-16	30	5½
65	30	5⅞	30	5 7-16
60	30	5¾	30	5⅜
55	30	5⅝	30	5 5/16
50	30	5½	30	5¼

It is noticed that the rails are sawed shorter at Ohio than at South Chicago, bearing out the statement made above, that the rail is finished at a lower temperature at first-named point. At Braddock, Pa., they are sawed considerably shorter than at either of the above mills because of the cold-rolling process. It is very desirable to have the saw mandrel bearings adjustable so that when they become worn, which they do rapidly on account of the high speed at which the saw revolves, they can be moved until the saw is plumb again.

WHY CONCRETE CHIMNEY STACKS FAIL

By M. E.

From the day concrete made its advent in building construction its merits were fully recognized. It must be admitted that for a large number of structures there is actually no better material than concrete. It became evident very soon, however, that it is entirely unsuitable material for any purposes where it is subject to the attack of heat, products of combustion, or undiluted acids. One of the best known structures in which such conditions prevail is the chimney.

For the moment we do not want to discuss those where the structure collapsed during construction or soon after. We refer for the present only to those which decayed very soon after being put in operation. The thin walls of the stack permitted a very rapid radiation of the heat. Condensation took place on the inner side of the stack, and the condensate worked its way into the fissures, rapidly destroying the texture of the material and attacking the reinforcing steel. The stacks started to lean, to burst open, or collapsed entirely. Recently this inherent defect has been in part overcome by using a lining of burned clay extending the full height of the stack of the chimney. In the United States of America there is little difference in the cost of a well constructed concrete stack, with a lining extending the full height, against the cost of a radial brick chimney.

WELDING AND CUTTING

THE OXYGRAPH

THE accompanying illustration shows the oxygraph in an improved form as made by the Davis-Bouronville Company, and sold by the Carter Welding Company, Toronto. With this machine steel plate up to 15 in. or more in thickness is cleanly cut with a narrow, smooth kerf, along straight lines, sharp angles or curves, according to the drawing or pattern. The pantograph principle is employed, the tracing wheel being guided along the pattern laid on the table and drawn to twice the size of the desired object.

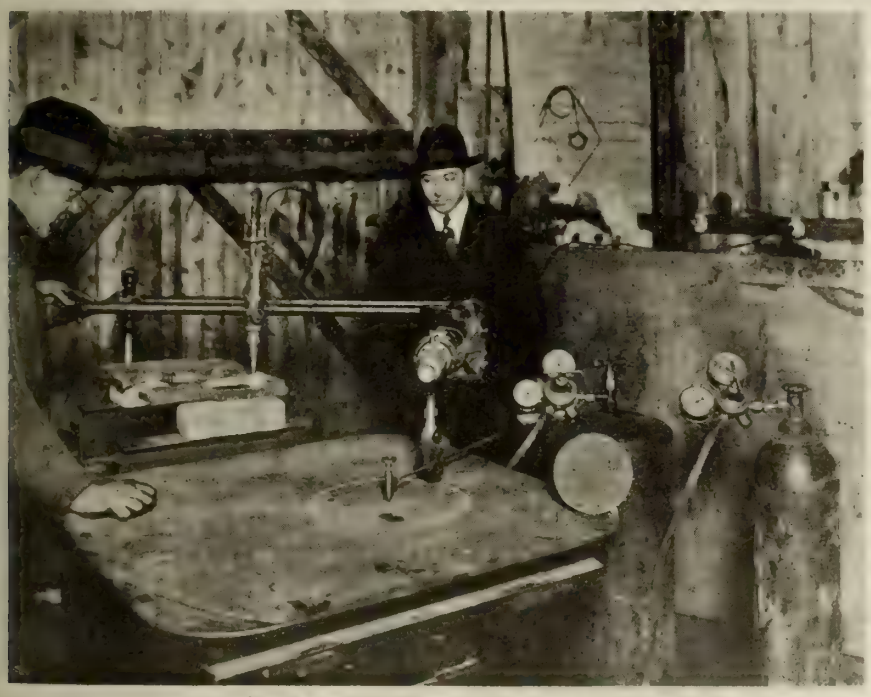
The hand of the operator only serves to guide the tracing wheel power for moving, it being supplied by a small motor which is attached to the tracing head and which may be connected to the ordinary electric light or power circuit. A universal motor, either direct current or alternating current is used, with provision for use on either 110 volt or 220 volt circuits. The speed of cutting varies from 2 in. to 18 in. per minute according to the thickness of steel being cut.

The incorporation of a positive feed by means of the motor-driven tracing wheel is responsible for the extremely clean and accurate cut made; this results from the steady advance of the cutting torch into the work.

The machine is made in two sizes. The No. 1A is applicable to small work and die cutting, within a cutting area of 16 in. sq., a circle of 18 in., or a rectangular form 12 in. by 40 in. by extension of the tracing table. With this machine a drawing or pattern double the size of the cut to be made is required, the drawing being placed on the tracing table shown.

The No. 2 oxygraph is for larger, heavier work, has a double pantograph frame, is fitted with two cutting torches for making duplicate cuts at the same time, the position of the torches and tracing wheel being adjustable, and the entire pantograph frame moving backward from the base to allow placing of heavy plate with a shop crane. This machine reproduces the cut of equal size with the pattern, or 1 to 1.

A small disc may be noticed on edge on the tracing table. This has been cut out of the sheet shown under the cutting head and the cleanness of the cut is apparent.



IMPROVED FORM OF OXY-GRAPH

The illustration also shows a recent development in reducing valves and gas control brought out by the Davis-Bouronville Co.

IMPROVEMENTS IN STEEL MAKING

Amongst war-time research work, the benefit of which will be permanent, better control of the heat treatment of steel promises valuable results. It is now widely recognized that comparatively few degrees of variation in the temperature make all the difference in the properties of the finished material. The difficulties are particularly great where large masses of steel are concerned because it is difficult to secure the same temperature at the surface and in the mass of metal. Other difficulties are introduced by the different scaling tendencies and different emissivities of various steels. Recent improvements in furnace construction facilitate the attainment of uniform temperatures, and the means and methods of pyrometry have been developed to such an extent that the most delicate heat treatment can be given with almost mathematical certainty and on the basis of a commercial repetition process.

WIRELESS FOR ALL COMMERCIAL AEROPLANES

One essential to the development of a long-distance aeroplane service for passengers, mails, and parcels' delivery is the use of wireless telegraphy. All the aeroplanes used in this service will, like every large ship, carry wireless and an efficient operator, thus making it possible to send telegrams from any part of the world, on sea or land, to the aeroplane during its voyage. The aeroplane will also receive regular messages regarding the weather conditions in the regions towards which it is heading, and will therefore be able to adjust its course to avoid fog and other dangers. It is curious that one of the first things to be transported over a long distance by aeroplane is a British wireless installation. Arrangements were recently made for the erection of Marconi wireless stations in remote parts of China—one on the frontiers of Cashmere and the other on the Chinese side of Siberia. As there is neither road nor rail available in these regions, the Marconi Company arranged for the transport of the plant by a large Handley-Page aeroplane.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

The Revolution of the Lathey Crew

The Chap Who Wrote This is Still Out of Jail

EVERY member of the crew had been together since their infancy, all slept on the same BED, and were ALL WAYS interested in the same WORK. Hardly a thing could be done without the assistance of the others. In the silence of the night they had decided to start something the following morning immediately the OPERATOR raised his hand. They claim they had been DRIVEN to it by the POWERS above. This may or may not have been the case, but at any rate it was easily seen that they were all GEARED up for some kind of ACTION. Well, it started when the OPERATOR threw the CLUTCH into the PULLEY.

The LATHE DOG, which had been resting quietly all night, shoved its TAIL into the FACE OF THE CHUCK and took firm hold of the HEAD OF THE BOLT, and began to DRIVE it ROUND and ROUND. This started a little REVOLUTION. First the TOOL moved into position and began to CUT loose until it was BLUE ON THE NOSE, the SHAFT GOT HOT with the continual FRICTION and thinner and thinner at every TURN.

The TAIL CENTRE supported the WORK at one end but was DEAD to all surroundings. As the BOLT looked ROUND, the GAUGE remarked: "A chap your SIZE should be just right for thiS CREW."

"What do you take me for—a NUT?" said the BOLT.

"Not yet but I'll soon make you one."

"We'll take the LEAD," said a couple of HALF NUTS, and immediately they became ENGAGED, grabbed the SCREW firmly, PITCHed the SADDLE forward steadily towards the HEAD of the BOLT, which was threatened with a severe CUT in the SHOULDER but for the QUICK ACTION of the OPERATOR, who CUT THE THREAD and with a CAM but FIRM MOVEMENT released the NUTS that were the cause of all the trouble, just as the POINTED STEEL reached the NECK. The TOOL was taken out and removed to the rear, but no sooner had it reached the END than the same thing happened again. This took place several times until the NUT being tried had a FIT.

"Let the TOOL-HOLDER," said the REST.

"I can't," said the TOOL. "I must stay at my POST, besides I get a RAKE off here CUTTING into the PROFITS on STEEL'n IRON."

"Give us a REST," returned the POST. "You can only WORK when I HOLD you."

The COMPOUND REST was an elevated sort of chap and MOVED ABOVE its fellows, having GRADUATED with DEGREES at the very BASE of its career, and whenever it MOVED it saw things at a different ANGLE.

"Less of your GIB," said the CROSS SLIDE, "can't you see I can hardly MOVE?" The GIB was WEDGED in between two DOVE-TAILS and the FEATHER in the FEED SHAFT was KEYED in a GROOVE.

All the GEARS had their TEETH into one another, but it was the OPINION of the RACK that the ROOT of the trouble lay in the COURSE FEED given to the TOOL.

"This is the GRUB," said the HEADLESS SCREW.

"Why, you poor insect," said the WORM. "You do nothing but TURN into a HOLE and pull your HEAD in after you." Even a WORM will TURN sometimes.

"Quit your pushing," said the BRACKET. "Every time you TURN you THRUST your COLLAR into my FACE."

"Oh, dry up," replied the WORM.

"If I do you'll be the first to SQUEAL," was the retort.

"CAN the stuff," said the OIL. "I'll reduce the FRICTION between you fellows."

"This is SHEAR madness," said the LATHE BED. "Can't we KEEP THINGS STRAIGHT?"

"Not with my help," rejoined the TAPER ATTACHMENT, "but I often have the INCLINATION."

"I'll SLIDE along and see what I can do," said the CARRIAGE, "I've ALL WAYS been called upon to SADDLE such responsibilities and will UNDERTAKE the work."

"Some UNDERTAKING," was the GRAVE reply of the DEAD CENTRE. "Move me a little and your troubles are over."

"DEAD TRUE," added the LIVE CENTRE.

Through all this it must not be surmised that the SPINDLE had overlooked its own responsibilities. It realized that its ACTION had GREATER BEARING on the REVOLUTIONARY MOVEMENT than all the others put together. Nevertheless it was BORED THROUGH and THROUGH with the hole proceedings.

The BACK GEAR was rather a SLOW MOVING chap and his SHAFT was very ECCENTRIC and as soon as he got free, the CONE and the SPINDLE became LOCKED TOGETHER and things began to move faster.

"Why should I have to HOLD these PIECES so often?" asked the CHUCK. "My JAWS are getting LOOSE and WORN and sometimes I think I will DIE with the GRIP."

When it came to the TURN of the LONG THIN SHAFT the CHATTER again started, and in sympathy, the STEADY REST said, "SHAKE old chap, I'll SUPPORT you."

However, as soon as the SHOULDER and NECK were DRESSED and the COLLAR CLEANED OFF, the HEAD was TURNED and SHAVED OFF, and immediately it was removed from the CENTRE of the REVOLUTION it made a BOLT for the DOOR and the trouble was over.

LATHE WORK—BORING

By J. J. DIXON.

In machine shops where a great variety of work is done it is almost impossible to keep the operation of boring to special machines and, therefore, nearly all lathes have to perform a certain amount of this work—usually by the use of the twist drill being held in the spindle of the tailstock. This method is, generally speaking, successful in the case of boring from solid metal, but where cored holes have been put in the castings it often gives trouble to the operator, and is the ruin of more twist drills than all the drill presses in the shop. The following are some of the causes of the trouble and the remedy for same. First, in too many cases the core holes have been made too large not leaving sufficient metal for finishing up to size. Cored holes should at least be ⅜ of an inch smaller than finished size of bore. This allows the drill to cut metal instead of sand, as is often the case; the best twist drill made for cutting metal will not cut molders' sand for long. Another point is that the operator often uses the drills ground in the same way as if boring from the solid metal; this is not a good practice and is also detrimental to the drill. The drill for cored holes should be ground with the same cutting clearance, but almost straight on the face instead of the usual long angle or pointed drill. As a pointed drill will follow the core hole the drill should be ground more like a flat bottoming drill, and a hole that is started true in this manner will keep true much better than when using a long angle on the drill, as it is more in contact with the metal to be removed, and has not the same tendency to follow the core hole, say with a job 8 or 10 inches long in the bore. The core hole is often more out of truth the further you get towards the back of the casting. With 3-16 or a ¼ of an inch a side of metal to work on the drill started true will bore a true hole, or true enough for a light cut by finishing tool. Another fault in using twist drills on the lathe is that in most cases no provision is made in the tailstock spindle for preventing the drills from turning except the pressure on the taper fit. A slot should be cut in the spindle to take the flat on the end of the drill exactly similar to the drill press spindle. This would save a lot of trouble, also the wear of tailstock spindle which occurs when drills turn on account of not having a slot cut to receive the flat, which is shaped on all twist drills with taper shanks. Three out of every four lathe tailstock spindles are spoiled, where twist drills are used; by not making the above provision. It also provides an easier method of removing the drill by being able to use a drift, and is a decided advantage when using a floating reamer, as the socket which holds the reamer, unless provided with flats shaped on the end and a slot to receive it in the spindle gives the same trouble by turning, as the twist drill, causing a bad fit for the centres, and will soon throw one centre out of line with headstock centre. It will also be found a great saving in using small drill chucks having the same above advantage. There have been a good many accidents to operators by the method of putting a lathe dog on the drill to prevent it turning in the sleeve or spindle. Sometimes, the dog not having been brought down to the rest, a little extra pressure on the drill results in the drill turning, bringing down the dog with the operator's fingers underneath, which means a case of compensation through not adopting a simple, practical, safety first device.

PAINTING GALVANIZED IRON

By M. M.

Galvanized iron is finished in a bath of palm oil, and, as a matter of course, some of this oil, a very thin film, adheres to the metal and prevents the perfect adhesion of the paint, especially if the iron is fresh from the mills. To remove this film of oil and also to give a more perfect surface for the adhesion of paint, various washes have been recommended by various authorities. Prepare a mixture of ½ oz. each of copper chloride, copper nitrate, and salammoniac. Place these in a glass or earthen jar and add 1 quart of soft water, stirring occasionally until all are dissolved; then add ½ oz. of commercial hydrochloric (muriatic) acid. This will coat about 500 square feet. Apply with a broad, soft, flat brush. The metal will at first turn nearly or quite black, but will change to grey in a short while.

When dry, it is ready for paint. Some have found that washing the new iron with a strong solution of carbonate of soda, rinsing with clear water and rubbing dry before painting, produced satisfactory results. Again, washing the iron with strong vinegar (practically diluted acetic acid), rinsing with clear water and rubbing dry, or letting the iron stand after rinsing for a week or more, answers the purpose. In priming galvanized iron or zinc, yellow ochre ground in linseed oil and thinned with varnish adheres to the metal better than any other mixture.

TREATMENT OF PEAT.

By M. A.

In the improved Ekenberg process of treating peat, as tested at Chateauneuf, Bretagne, France, the raw material is first compressed to reduce the water from about 90 per cent. to 60 per cent. It is then subjected to the action of superheated steam at 160 deg. C. for 25 minutes, and is afterwards again compressed, or at once dried in special chambers, or in the open air. "Turbon," as the product is called still retains 20 to 25 per cent. of moisture. It yields 61 per cent. of volatile matter, and its calorific value is 10 per cent. higher than that of ordinary peat. It is recommended for direct firing, for gasworks where ammonia can be recovered, and especially for power gas for internal-combustion engines.

Do You Know That

At the end of 1917 there were about 140 electric furnaces installed in Great Britain, and the number has been considerably increased since then.

* * *

That a leading British trade journal contemplates the sending of its overseas circulation to the British Dominions and Colonies and the great trade centres of the world by air as soon as it is possible.

* * *

The extremely minute globules of oil, which are often present in feed water from condensers, are only about 1-1000 millimeter in diameter, and pass through the finest filtering medium. Their removal has been accomplished by means of the action of electric current, which causes these globules to coalesce and to combine into larger droplets, which can be successfully filtered out. The same inventor has also devised an apparatus for removing dissolved air.

* * *

The oxy-acetylene process has been successfully applied to the burning of holes in the mass of solidified iron called a salamander, which accumulates in the bottom of a blast furnace. Instead of drilling holes for dynamite, with the aid of a diamond bit, the hole is sunk by means of oxy-acetylene. As the cutting action of the gases continues, the pressure blows the molten material from the hole. It is found that one tank of oxygen is sufficient to sink a hole four feet deep.

* * *

Germany, during the war, made transmission belting out of steel and paper. Steel belts have been in more or less common use for a number of years, but the use of paper for transmitting power is at first sight somewhat of a startling innovation. The belts are made by several different processes. Some are made of plaited or knitted paper yarn, and thus have no transverse threads, making the edges very strong and eliminating fraying. Other belts are woven or knitted in tube form, and afterwards flattened out and stitched together.

* * *

In a hand-fired furnace about one-half the combustion takes place in the fuel bed, and one-half in the combustion space? The fuel bed acts as a gas producer and a gas retort; in it the solid fuel is gasified by the combustion of the fixed carbon and the distillation of the volatile matter. The gases rising from the fuel bed contain, at times, as much as 32 per cent. combustible, and no free oxygen to burn it. Hence, to burn these gases, air must be admitted over the fuel bed and mixed with the combustible gases, and the mixture burned in the combustion space. The oxygen flowing through the grate is all used up as it passes through the first three or four inches of the fuel bed.

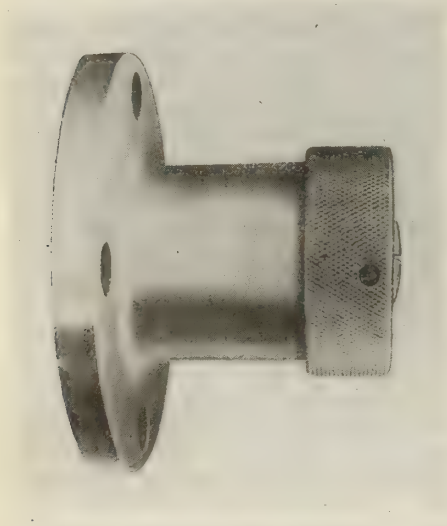
DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

THE BEMIS LATHE CHUCK

The collet chuck shown in the illustrations is the invention of Edgar W. Bemis, Worcester, Mass., and is being placed on the market by the E. W. Bemis Machine Co. of that city. While primarily a lathe chuck, its usefulness is evident in range of diameters handled and in quickness and accuracy of operation with all types of metal turning machinery.

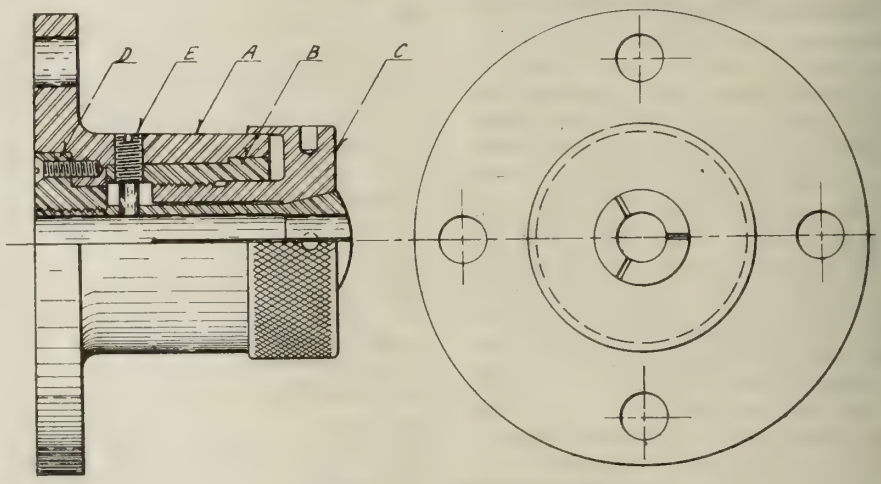
A distinctive feature of the Bemis chuck is the method employed for operating the collet jaws to centre and to grasp the work. The jaws have absolutely none of the longitudinal movement which characterizes the usual chuck of this type when the stock is of varying diameter. The jaws are held securely in the chuck body. They do not ride upon it. Instead a closing member rides upon the taper of the jaws, to open or close them. They themselves cannot advance towards or back away from the cutting tool. As a consequence absolute uniformity of length of work is assured, which is of great advantage in cutting off stock.



NEW COLLET CHUCK

Referring to the drawings, the chuck consists of body A reinforced by a sleeve B, which is threaded to receive the chuck-closing member C. This member is knurled for operation by hand, which under most circumstances is the means employed, and also is provided with holes to take a spanner wrench. The collet jaws, which are interchangeable for varying sizes of work, screw into the steel nut D, and are held firmly in place by the headless screw E.

The Bemis chuck is of rugged construction, designed to insure its long life, and is made in two styles, the one flanged for bolting to a face plate, the other threaded to screw onto the nose of the spindle. It is furnished in two sizes, the smaller taking collets from 1 32 in. to ½ in., the larger taking collets from 1 16 in. to 1 in.



SECTIONAL VIEW OF CHUCK

The Hanson Friction Clutch.—It is a well known fact that the majority of present day clutches are so large and heavy that they have a tendency to cause trouble due to their weight alone and do not lend themselves to their ready incorporation into machine tools and other locations where appearance and reliability are matters of some consideration.

The clutch recently developed by the Hanson Clutch and Machinery Co. of Tiffin, Ohio, eliminates the cumbersome features of many older types and permits the installing of an extremely powerful clutch in very restricted locations. Its light weight, small size and neat appearance make it particularly adaptable to machine tool use.

Its capacity for transmitting large amounts of power is very great and where the outside diameter of a clutch is limited by design requirements the required horsepower can be transmitted by decreasing the outside diameter and increasing the friction surface.

Owing to the fact that the clutch is of small diameter and carries no exposed members it is admirably adapted for high-speed work. When engaging it takes the load gradually without a jerk owing to the double cone wedge expansion of the steel ring which grips the cylinder.

Several types are made. Fig. 1 shows a friction cut-off coupling by means of which a line shaft or any part of it may be cut-off or operated without interfering with the rest of the shop. As will be seen two coned friction disks engage with a double cone friction ring when the clutch is closed by means of the lever system actuated by the operator.

DOUBLE CLUTCH EXTERIOR.

The clutch is adjusted by means of a threaded ring on the coned hub of the clutch. Its simplicity and positive uniform adjustment make it one of the simplest and most easily adjusted clutches and any unskilled workman can adjust it with success. All toggles are made of cast steel carefully proportioned and their complete enclosure by the

guard renders the clutch extremely safe in operation.

The guard serves another useful purpose as it is used as an oil retainer, eliminating the necessity of constant lubrication, it being necessary to refill only every few months.

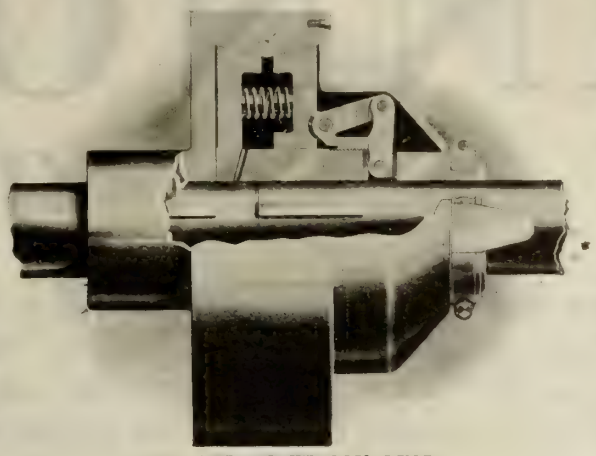
The clutch is thrown into and out of engagement positively and is locked in either position. It is impossible for it to engage itself even partially by centrifugal force.

In the friction cut-off coupling illustrated the ends of the shaft meet in the coned hub. This insures the absolute alignment of the shafts and a phosphor-bronze bushing is provided to carry the end of the extended shaft.

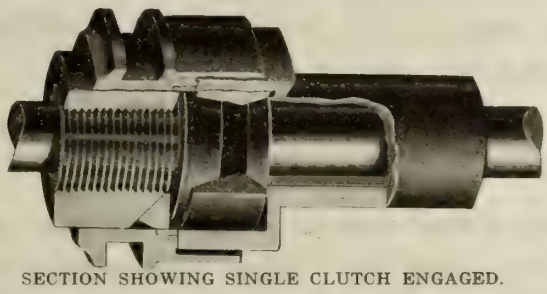
In the clutches used for machine tools and in other locations where small diameter is desirable a variation on the clutch above described is used. The operating sleeve engages with a wedge member, which in turn brings the two cones into engagement with the friction ring. As may be seen the resulting clutch is compact, cylindrical and perfectly balanced. All working parts are completely covered and are kept free from grit and dirt. The clutch can readily be adjusted to any desired tension without removing any parts by means of a single sleeve, which gives a uniform adjustment at all points around the shaft.

The double clutch shown in Fig. 3 requires but little more space than the single and is provided with two friction cylinders for mounting pulleys, gears, sprockets, etc., as desired, the dimensions of the sleeves varying to suit requirements.

Two varieties of friction surfaces are regularly applied. The standard surfaces are steel and iron bathed in oil and of long life. Where required friction surfaces are supplied of friction paper and steel. This type of clutch is designed for slow speed and heavy duty.



CUT OFF SHAFT COUPLING.



SECTION SHOWING SINGLE CLUTCH ENGAGED.

PAINT FROM A SANITARY POINT OF VIEW

By M. E.

Paint, considered in its broadest sense as including limewhiting, distemper, etc., is of marked value from a sanitary point of view. Hence the official regulations for limewhiting or whitewashing cattle pens, workshops, etc.

In cottages and tenement houses, frequent whitewashing is very desirable, but, unfortunately, in such cases the appearance not being of great importance, only too often the work is done in a slipshod manner. The common method is to "turn the ceiling over." which means that the whitewash on the ceiling is not washed off as it should be, and an entirely new coat put on, but that it is just damped sufficiently to moisten it through and is then allowed to remain on, having been redistributed, so to speak.

For several years past great outcry has been made as to the necessity for providing washable walls and ceilings, hence the production of the so-called washable distempers and water paints.

The extraordinary thing about the matter is that walls done with a washable material are, as a matter of fact, very rarely actually washed, once a year, at the time of spring-cleaning, being thought sufficient, and even then a dusting down being frequently employed instead. It is perhaps fortunate for the manufacturers of some grades of the paint referred to that this negligence is customary, because some of the paint sold as being washable is really far from possessing that quality, but can readily be rubbed off with a damp rag. The class of paints which are now coming to the front and known generally as "flat wall finishes" or "oil bound paints," are really washable and can be scrubbed even a day or two after the application.

There are several rooms where the provision for constant washing is imperative. The walls and ceilings of the bathroom and kitchen, for instance, should always be finished in such a way that the moisture which forms upon them may be frequently removed by a thorough cleaning, and this should be done at least once a week. Again in bakeries, where there is a moist, hot air, it is very desirable to give a finish to the walls which will permit of cleaning down at frequent intervals, while it is equally essential in hospitals. For both purposes the best finish is glossy enamel, and although this is costly at first, it becomes cheap in the end. Everything of course depends upon it being applied properly to a carefully prepared surface. One well-known maker advertises to the effect that the more his material is washed the better it will look. While this statement may be taken with a grain of salt, it is a fact that all good enamels—and the one referred to is certainly a good one—will permit of frequent cleaning down with water, to which has been added a very little ammonia or soda.

To promote cleanliness in rooms, it is well to adopt a plan followed on some Government buildings, which is to insert a hollow molding at the junction between all floors and walls and sometimes also between wall and ceiling, in other words, to round off the corner, and at each internal angle of the rooms is placed a piece of wood shaped like a quarter of a sphere, thus preventing the accumulation of dirt.

DESTRUCTION TESTS OF ELECTRIC PLANT

Tests to destruction are occasionally used in engineering works to discover how much ill-treatment a machine will stand and which part is really the weakest. During the war every electric power station in Great Britain has been subject to very much the same kind of treatment. Thanks to the tremendous demand for electric power in munition works (ninety-five per cent. of these works were driven electrically) all the plant in the generating stations, boilers, dynamos, switchgear, transformers, and mains, was overloaded to a pitch which might well have meant destruction. The manner in which the plant stood up to this long and exacting ordeal is a magnificent proof of the sound design and construction of British electrical machinery and appliances. The difficulties were increased by the fact that, owing to the night and day demand it was generally impossible to overhaul the plant. In one typical case most of the boilers in the station had not been cleaned for a year. Now that this tremendous strain is relaxed British engineers realize that their electrical machinery has done better than ever they, in their most sanguine moments, would have expected it to do.

HIGHER SPEEDS FOR ENGINES

The amazing pace of technical progress in petrol engines for airplanes and automobiles has its benefits in other fields. It is now seen that stationary engines driven by internal combustion can be made lighter and cheaper by adopting a higher piston speed. A radical departure from standard design is required. Again, it is believed that we are on the eve of far-reaching changes of practice which will facilitate the use of hitherto untried fuels and the economical combustion of weak mixtures when engines are running on light load. The whole effect of these discoveries should be a great impetus to the employment of stationary oil engines.

ANNOUN

TO OUI

FOR some time past we have been facing a vital problem, and the coming of peace has accentuated this to such a degree that a decision could no longer be delayed. As this decision directly affects our customers, we are losing no time in acquainting them with the situation.

Briefly, it is this:

On December 31st, 1918, the Victor Saw Works, Limited, completed their sixth year in Canada of the manufacture of VICTOR Blades.

Our experience during these six years, with the depressions of 1913 and 1914, inflated manufacturing periods of 1915, 1916 and 1917, and declining prosperity to a nominal base in 1918, has forced us to arrive at a conclusion which we at first refused to acknowledge.

There is not a market in Canada for hack saw blades which warrants a plant for the manufacture of this product.

We have been a long time in coming to this conclusion—we have analysed the past—investigated the future possibilities—considered various ways of meeting the difficulty, and have regretfully decided that there is no other course for us to adopt than to discontinue the manufacture of VICTOR Blades in Canada.

Of course we realize the possibility of staying in the market by reducing our quality, but this is an alternative which we refuse to consider. The VICTOR Blade is undoubtedly the leading hack saw blade on the market today. This is a statement we very seldom make, but one which we have demonstrated to be true. We are told that our service is not approached by any hack saw firm in America, and our policies are unique. We are naturally very proud of these distinctions, and we will not sacrifice them one iota to make a success of any market.

VICTOR HACK SAWS Get a Box and Try Em

CEMENT FRIENDS

CANADA has been good to us, and we have a strong, sentimental attachment to the business men of the Dominion that only the stern logic of facts has been able to offset. For the past six years we have been one of them, facing the same problems and contributing our mite to the common good. Our intercourse in the future will naturally be limited by our decision, but we hope and believe that our relations will be none the less cordial.

For the present we shall continue to do business at the same address. When our present stock is exhausted, our Canadian interests will be taken over by the Victor Saw Works, Springfield, Mass., who have been in business for the past twelve years, and who manufacture VICTOR Blades on the same high standard of quality and are governed by the same principles and policies as we have followed in Canada. If there is one essential that we will pass on to them, it is the necessity for giving the finest kind of service, and as we have been intimately associated with them, we can speak with confidence of their determination not only to maintain, but to improve our standards.

As an earnest of this, we would point out that Mr. C. C. Jackman, who was formerly superintendent at Hamilton, is now Factory Manager at Springfield, and that Mr. E. S. Bradford and the writer occupy the same position in both Companies—Treasurer and President, respectively.

Mr. H. W. Holmes, our Manager, will continue to care for our Canadian affairs, and our sales personnel will be as heretofore.

May we take this opportunity of thanking you in all sincerity for the splendid co-operation and encouragement you have given us in the past. We have tried hard to merit it—we will continue to try just as hard, confident that we shall receive a like measure of your support.

Yours very truly,

Victor Saw Works, Limited

W. F. POLLOCK, President

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Must Settle Tariff Soon

TARIFFS and politics have grown up together in Canada like crackers and cheese. The condition is unfortunate because it has prevented the study and application of tariffs becoming the keen scientific study that it should be. Just how far it is possible or desirable to take the matter of tariffs out of the arena of political platforms is problematical. Whenever a leader casts about for a platform he invariably lays hands on the tariff pile, and if he can't cart away sufficient lumber to build enough platform to stand on while getting elected his career as a politician is destined to be painfully short.

As a matter of fact, the Liberal party is not a party of free traders. They had for years plenty of backing in the Dominion House to sweep aside every trade barrier that had been erected. They had their opportunity to have "free trade as they have it in England." But they didn't do it. The real out-and-out free traders are in the new political party that is spreading eastward from Western Canada. The Grain Growers are free traders and nothing else, and the United Farmers of Ontario is the political reflection of the same belief. Both of these organizations possess great voting power, and they will have to be reckoned with. They have gone well past the experimental stage, and have a pretty certain idea of the direction in which they are driving.

Against these factions we have at the far end of the pendulum, the Haman's gallows group of protectionists. They would have Canada fenced around with a tariff wall so high that Jacob's ladder wouldn't reach up to the first knothole. And the unfortunate part is that these extremists seem to have developed the faculty of forcing themselves always to the top of the heaps and acting as spokesmen for men who do not hold views nearly as extreme as those expressed by these ultra-extreme leaders.

The present is not the time for tariff matters to be left to either of these extreme factions. Canada can't have free trade, neither can Canada have any Haman's gallows enactment, and that much might as well be recognized right at the start. The real solution will come when the great mass of farmers, who are moderate in their views, and the great mass of manufacturers, who are also moderate, come together and understand each other's problems.

At present they are not coming together. They are drifting apart.

They are trying to get into the impossible position where they would make it appear that the interests of any one section are greater than those of the entire community.

There are farmers in Canada now, and there will be farmers for all time to come. The more farmers we have and the more prosperous they are, the better for the country.

Likewise there are and will be manufacturers, and their success will be communicated to the entire district in which they operate. The preamble to any tariff discussion should be a sincere and an honest attempt to let farmers see the actual conditions under which the manufacturer works, and the manufacturer views the real conditions under which the farmer carries on his calling.

That's the big chance, and it's worth a big effort to bring it about.

One thing that would tend to popularize a tariff would be an enforcement of the principle that the protection of a tariff carries with it a very grave responsibility. Tariffs are not blanket orders for a man or a group of men to go ahead and make millionaires. The industry receiving favors under a tariff should discharge obligations commensurate with the considerations shown it, and the Government fixing a tariff should KNOW what these obligations are, and it should KNOW exactly to what degree they are being met or dodged. The Government should know also the conditions under which the Canadian manufacturer buys his raw material. If he cannot buy on terms equal to those secured by American firms making an article to enter the same competitive market, how can he be expected to meet the low-cost article, and operate at a profit?

The tariff and kindred matters should receive attention shortly. Business is being conducted on a hand-to-mouth basis in many cases because firms are afraid to launch out. They do not know what is ahead. They expect the war tax to come off, but they don't know when. Raw material is being held up for shipment into Canada in the hope that the tax will come off and the seven and one-half per cent. will be saved. These matters are not conducive to development.

A POLITICIAN regards "backbone" in a paper as refusing to see the other side of the question.

* * *

MUNITION boxes are being used in some places for garbage purposes. The trouble in such an arrangement is that the landscape suffers. For after all, what's more artistic than an old boiler, a soap box and a 1910 dishpan lined up to greet the garbage collector?

"Now, William, What Were You About To Say?"
—N.Y. Tribune.

Work is the Safeguard

DISCUSSING the very important matter of price adjustment, it is interesting to publish the opinion of C. Graham Drinkwater, vice-president of the Canadian Fairbanks-Morse. Referring to views expressed in a recent edition of CANADIAN MACHINERY, Mr. Drinkwater says:—

"The editorial on Price Adjustment in CANADIAN MACHINERY of Jan. 23rd is timely, but, in my opinion, the argument is unsound. To the question, 'When will the price of pig iron come down?' the man who answered by inquiring when prices in general would drop, should have been answered by a clear and definite statement—'Just as soon as the production exceeds the demand.' In other words, we **must** differentiate between classes of trade. We have stopped shooting each other, and this tremendous fact has suddenly affected a great many manufacturers who were on war work and on a war production basis, but feeding must go on and the demand for foodstuffs continues to be abnormally high. Therefore, lower prices in certain lines seem inevitable.

"Since dictating the above, a letter has been placed in my hands, reading in part as follows:—

"'We have dropped to the lower level at this time, not because of any justification for so doing due to any lower costs of manufacture (as such lower manufacturing costs do not yet exist) but because of a feeling that the jobber, in connection with the problem of his stock replenishments, will prefer right now a condition of known and easily recognizable stability to one of uncertainty as to the future.'

"This, we believe, is wise trading. If the demand can be stimulated by lower prices and our factories kept working, even at some sacrifice of profits, until the situation clears, surely both buyer and seller will benefit; factory organizations will be held together; and as much as is practical and possible done towards absorbing our surplus of labor."

The last point is well taken: If Canada wants to get safely over the period of unrest on which the world has entered; if she wants to nip the Bolshevist in the bud, and iron out as many of the social wrinkles as possible, **work and employment** will do it.

What will be the use of dividends and earnings if we have hungry men in the streets waiting for a pretext to throw brick bats through the windows?

THIS weather may be a bit mild, but if you've got any notion of shedding the old wool shirt and shakin' the moth balls out of the balbriggan, don't you do it, Si.

THEY do tell that a shell buster, applying for work as a full-fledged mechanic, struck a snag early in the game. The foreman asked him how many thousandths there were in an inch, and he replied, "Never counted 'em, but there must be a h—— of a lot."

TIMES have changed a powerful lot. About five years ago a paper would have got into trouble for calling the Kaiser a pinhead, an assassin and a jackass. And now you're apt to be took for a spy unless you do.

THE Halifax *Herald* tells us that Nova Scotia "is no place for calamity howlers." No doubt that's so. But sow thistles and mustard grow in the oats no matter how much you don't want them.

The Work of the Peace Conference

THE delegates that are going to determine the issues "Since dictating the above, a letter has been placed good many things to discuss.

They are talking of the formation of a League of Nations, of the disposition of colonies, of the freedom of the seas, of a hundred and one things.

Meanwhile the old mess that started the whole rumpus continues to dwell in safety, and latest reports state that he looks forward to the time when he will return to Germany.

One of the first things the peace conference ought to do is to make it certain that the arch-assassin of Europe shall look forward with certainty to the day when he shall stand on the gallows and pay the just penalty of his crimes.

THEY SEEM UNBELIEVABLY SMALL.
—Indianapolis News.

Why Should They be Held?

THERE are members of the Canadian army still in this country who want their discharge, and cannot get it.

They are not fighting. They are not drilling. They are not protecting property.

In one case a Toronto boy is trying to get his discharge because the manager of the factory in which his people are interested is sick and away from business. The soldier understands the business, which is a particular one, and his services are needed badly.

Requests have been made to several of the authorities, but without success. The only answer received is that he will get his discharge when the rest of his unit is let out.

If the chief work now is to get the army back into civil life, it would seem to be good policy to release that soldier now and be glad of the chance to do so. There is a position open for him and his services are needed.

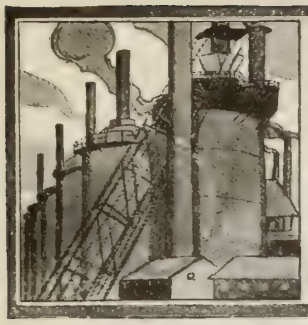
THE United Farmers of Ontario are organized to show how the man in the city should be taxed.

* * *

IF THE period of reconstruction is going to be made easy by the passing of resolutions, this country ought to find the grease on the skids a foot thick.

* * *

A WOMAN is left in Toronto with a family of seven children. Her husband died shortly after being discharged from the army, and according to some hitch she can't get a pension. Some person in authority ought to take a yank at the ball of red tape and see to it that support is forthcoming, whether it bears the regulation tag of pension or not.



MARKET DEVELOPMENTS

Buyer and Seller Are Coming Closer Together

Price Adjustment is Being Proceeded With—Some Equipment is Asked For by the C.N.R. Shops—Scrap Market Remains Dead as a Door Nail

CHANGES that have taken place in the price lists during the week indicate that the process is developing that will bring the buyers and sellers nearer to the point where they can proceed and do business. There's a big need for an acceleration of this movement, because in some sections it is quite evident that the holding back and waiting policy is going to be carried to a dangerously long extent. Steel plate is one of the greatest lines imported. In fact, for the fiscal year ending March, 1918, the imports of plates amounted to $4,569,231. The price has had a wild career during the war period in this country. They reached a point as high as 15c per pound, which is at the rate of $300 per ton for a short interval, and for some time 12c was the prevailing price. Government action placed the figure at 10c, and there it rested at the signing of the armistice. It has declined until now 6c can be stated to be the base price for plate at Canadian warehouse. This price came from a desire to protect jobbers and dealers against loss of business.

Sheets, especially the heavier gauges, invariably follow plate and they have done so, lower prices being quoted.

Steel mills in Canada will be well served if they receive generous orders for rails from the Government now. Their equipment for the most part is intact, and stands as it did when it was part of the war machine, and is capable of very large production. The shutting down of the steel making plant of the Scotia Steel and Coal Co., and the maintenance of the coal mining staff may mean a surplus production of coal there unless there is sufficient shipping accommodation to relieve the situation.

The scrap metal market remains dull. In fact, "stagnant" is a better word. There are no deals put through, and the chances are that the claims made by the dealers that they are losing money on present operations are quite correct. Dealers are not anxious to buy even at the present battered down list. They fear further drops in prices, and do not care to get caught in a declining market, especially when there is no urgency in the situation to force them to buy.

Dealers in machine tools are being asked this week for prices and deliveries on a number of machine tools for the Canadian National shops at Leaside. Sales are being made in several other lines, but they are not yet of sufficient volume to make it appear that anything approaching a revival of buying in machine tools is taking place. Dealers representing some of the large U.S. makers of machine tools report that a very large export business is being developed with Japan, and that big shipments are going forth regularly to that country.

MONTREAL CONDITIONS DO NOT SHOW MUCH TENDENCY TO REVIVE

Special to CANADIAN MACHINERY

MONTREAL, Que., Feb. 6.—In the face of the general unsettled conditions it cannot be said that business has improved, but a despondent feeling is far from being apparent throughout trade circles. Operations in many lines are less pronounced, but there is little to indicate that such conditions will continue for any lengthy period. It is anticipated that the Government will take some action to relieve the increasing unemployment situation, and with the industries gradually reverting back to pre-war enterprises the prospects for the future are more encouraging.

Steel Continues Quiet

Little can be added to previous reports setting forth the listless character of present steel activities. Mills are still in operation, but the high pressure of a few months ago is conspicuously absent. Present activity is confined to working off uncancelled orders that have remained on the books, and as contracts for future business are very light the curtailment of production is a natural consequence. Many mills and furnaces are being subjected to temporary shut-downs for the reported purpose of overhaulage and repairs, as it is affirmed that these are essential after the exhaustive operations of the past period of abnormal production. Operating conditions are considerably changed from what they were a few months back. Whereas, six months ago the price of the product was an inconsiderate factor, and when operations could be carried on without a thought of the cost involved, to-day the manufacturers are confronted with a situation where they must virtually stop production or continue to produce stock that must ultimately be disposed of at a figure much below the present cost of production. The Nova Scotia Steel and Coal Co. have announced their intention to suspend operations on their blast furnace and take advantage of the present quiet period to carry on the necessary repairs. Several of their coke ovens will likewise be closed for needed repairs. Further curtailment is also anticipated. Steel dealers here report a steady but comparatively light business. No tendency is shown to carry heavy warehouse supplies, but many are looking forward to a partial return of former activity in the early spring. Local prices are maintained, but basic supply quotations have declined. Future business is little in evidence.

Dullness Still Prevails

In addition to the general quiet tone of the metal situation the market might be characterized as listless, as little apparent interest is displayed at the present time. A feature of existing con-

ditions is the continued curtailment that is shown in production, as producers are showing a marked reluctance in stocking material in face of the high cost, and the gradual but steady decline to lower price levels. Trading in copper is very light and present business is apparently for immediate needs, as large sales are conspicuous by their absence. The local market is quiet but prices are maintained at 25 and 26 cents per pound. Tin is virtually in the same position with buying confined to present requirements. Imports are still controlled by certain British regulations. Quotations locally are nominally firm at 70 cents per pound. Demand or inquiry for all metals is very quiet but prices are relatively firm as producers claim that under the present high production costs it is impossible to decline much further. Last week's quotations are maintained on all metals.

Machine Demand Irregular

It would naturally appear, from the quiet tone of general business, that machine tool activity would be on a par with other industries. This, however, is not altogether the case, as reports show that the market is one of fairly good demand but rather spasmodic in character. The bulk of the business passing at the present time is in connection with pulp and paper machinery and shipyard equipment, with some demand for railroad tools. Dealers are not taking an active interest in the disposal of the equipment that has been used in the shell factories. A considerable quantity of these machines have been absorbed for general work, but the great volume of special machines are given little attention. Dealers are not anxious to take these for stock purposes but are willing to dispose of same if an inquiry comes through. Delayed settlements are a deterring factor in the readjustment of the industry.

Local Activity Only

"Let the prices quoted stand for another week. Trading is so quiet that we scarcely know we are in business. Our yards are well stocked and buyers are few. Light regular sales of machinery scrap are being made to small foundries, but general activity is very dull." This virtually defines the present situation in the old material market and indications seem to point to a continuance of such conditions for some time to come. The reported closing down of several blast furnaces is adding to the demoralization of the old metal and scrap industry.

POINTS IN WEEK'S MARKETING NOTES

Montreal reports little changes during the week. Conditions there are reported as dull.

—

As reported last week, the steel making plant of the Nova Scotia Steel & Coal Co. has shut down. Coal mining is continuing and there is a likelihood of a surplus production, unless the shipping facilities are quickly improved.

—

It is expected that the steel companies in Canada will soon get fairly large orders for rails from the Dominion Government.

—

The Canadian National Railways are asking for prices and deliveries this week on a list of some fifteen machine tools for the Leaside shops.

—

Steel plate was marked down this week to 6c per pound from Toronto warehouses. The explanation is that close competition and a desire to protect customers led to coming to the lower price.

—

A very low price is offered now for old auto tires, the market not being much over 3½c per pound. Those who have much of this material should hold for a better price, if they are in a position to do so.

—

The scrap metal market shows no change. Dealers don't want to buy at even present low figures, fearing further drops in prices. There are plenty of sellers who would lose if they cleared out at to-day's figures, but they fear larger losses if they hold on.

—

Pittsburgh looks for a decreased production at the steel mills, which increased their capacity 40 per cent. during the period of the war. Even a 50 per cent. operation now would mean more steel than the 1906 capacity.

GOVERNMENT WILL BUY STEEL RAILS NOW

Orders For Large Tonnage Are To Be Placed In The Near Future

OTTAWA.—Estimates for the Canadian National Railway System, which have been prepared by the Board of Directors, and which, it is said, call for expenditures totalling $60,000,000, will be before the Cabinet for consideration during the coming week. The appropriations proposed are for additions to railway rolling stock and equipment and for completion of certain branch lines in Western Canada which are required for feeders for the system's main lines. Already orders have been placed for a large quantity of steel rails and accesssories to be used in making the contemplated improvements and extensions of the national railways.

Proposals that the Government should add several lines of railways the Canadian system have been made to the Minister. It has been suggested that the Federal Government should acquire the St. John Valley Railway, already operated as part of the Government railways; the Alberta and Great Waterways Railway, now controlled by the Alberta Government; the Edmonton and Dunvegan Railway, and the Pacific and Great Eastern Railway of British Columbia.

RAILWAY SHOPS BUYING TOOLS

Other Business Moving is More Scattered—Prices of Plates and Sheets Are Lowered

TORONTO.—Some of the dealers seem inclined to think that the prospects for the Canadian manufacturer entering the export business are not bright at the time. They see in the list of restricted material entering the Old Country more symptoms of this. Machine tools are now included in those things that can only be allowed into Britain on the securing of a license for the purpose. In fact there is a feeling in some quarters that the British manufacturer had turned from munitions work well in advance of this country, or the States either for that matter, and was well in shape to turn out old lines as well as new when the war ended. It is known that orders are not coming to either United States or Canada in anything like the volume that was anticipated, and the supposition is that the firms on the other side of the water are in good shape to handle the business, and are not going to do anything to encourage importations where the bill can be filled by material turned out at home.

As noted in these columns before there are English lines on the market that have been absent for some time past owing to the war, and the effect is to bear down on prices by providing another active competitor in the market for business, for competition very often has more to do with prices than anything else.

No Improvement Here

Some of the transportation companies are holding their scrap rather than allow the yards to take it at present offerings, or grade it according to their own liking. Dealers state that little business is being done at the battered down price list that is quoted elsewhere in this issue. They are not anxious to buy material. Those who have any accumulation of stuff in their sheds are anxious to sell for fear that prices may go lower. They will probably lose money if they sold now, because the material they have has probably been taken in at war levels. But they figure out that it would be better to take the loss now and have it done with than to hold and take a chance on having to absorb a bigger loss a little later on. On the other hand the same condition keeps the dealers from showing much tendency to buy. They fear to move past present requirements for fear of being caught again on a declining market. As one dealer put it this morning: "There are lots of ways we can have a better time losing our money than by going out and buying heavily at the present

prices." These prices are low when compared to war figures, but they are not low when lined up against a ten-year pre-war period. For instance copper sells now for about 15c, while a pre-war price over a period of years would show a value of about 12½c to 13c.

Should Hold Rubber

A number of dealers in the country that have scrap rubber have inquired for a quotation. The same question is also of interest to garage men, where old tires very often accumulate. The present price for this material is 3¾ cents per pound. This is low, and the chances are that it will reach a higher level before so very long. In fact it would not cause any surprise to see this going to 8c. It would be much better for a person to hold this material for a while, as some of the mills are known to be short of raw stock, and the move toward a better price may be made almost any time now.

Prices Are Down

Further price concessions are noticed this week. Ship plate is quoted locally with a spread of $6 to $6.50, but we quote $6 as the base price because dealers will recognize that figure. Competition for business is really the cause for the lower figure. A big job that was being figured on in the eastern part of Ontario last week caused the 6c price to be introduced to the market. The jobber figuring on the work depended on his dealers here getting him the best possible deal on the supply of material, and for this reason the price was lowered to 6c, and it stays there. Local warehouses are beginning to get their stocks replenished with material that has been secured at the lower price, figuring on the three cent. price at U. S. mills. The amount to be paid in war tax varies according to the place of production and shipment. It is fixed by the Canadian Board of Appraisers who have an office located in New York.

Sheets show a tendency to come down also from the high levels of the past year. Thick sheets like ten gauge follow plate quotations very quickly.

Dealers do not seem to care to state definitely their feeling toward lower prices, but there is a feeling growing that they show a decided move now toward arriving as quickly as possible at the very best selling proposition they can hold out to the trade. In this way they believe they will be able to give some confidence and assurance to the man who does not know whether to come into the market or not. Some of the railway companies, steam and electric, are sending out "feelers" from time to time on purchases they have in mind, and some of them are about convinced that the time is ripe for them to get out and buy, as prices are highly satisfactory when compared to the quotations they received some months ago. And what is more they can get deliveries now within very good scope, whereas a few months ago a buyer was simply at the mercy of the mills, and the mills in turn were at the say-so of the war machine.

The Canadian National Railways have sent out specifications for some 15 machine tools for the shops at Leaside, which are to be used as soon as necessary for repair work. The machines asked for are not regular railway shop equipment, but mostly general purpose lathes, planers, etc.

There is a fair volume of business moving, and several sales have resulted.

Representatives of American machine tool makers in the city this week report that some of the plants in the States are working full time and that they are sending very large shipments to Japan. In fact it seems that they are developing a business there that is greater than anything they had in pre-war times. Sales are also reported in large quantities to Sweden.

PLANT OF NOVA SCOTIA STEEL AND COAL STOPPED MAKING STEEL

Special to CANADIAN MACHINERY

NEW GLASGOW, Feb. 6.—The plant of the Nova Scotia Steel & Coal Company suspended steel-making operations to-day. The blast furnace is being banked. One battery of coke ovens will be maintained in operation for the purpose of accumulating a stock of coke, and during the shut-down thorough repairs will be made to the remaining coke oven batteries.

The suspension of steel manufacture will lessen the demand for coal, and it is expected that some idleness will result at the collieries.

There is a tendency to increased production of coal, due partly to the return of miners from the front, but more particularly to the workmen attending their work more regularly. This is a result of the feeling that employment in coal-mining is not so assured as it has been for the past four years. While there is just as great necessity from the national standpoint for increased production of coal in Canada, yet the situation in Nova Scotia is approaching the point of over-production because export of coal to Montreal and other usual markets for Nova Scotian coal is temporarily prevented by the high cost of steamship freights. This particularly affects the Dominion Coal Company, and will necessitate the sale of its coal output in Nova Scotia itself. If the outputs increase by the return of miners from the front it will result in a surplus coal production in Nova Scotia, unless the Dominion Coal Company can obtain the release of its coal-freighting steamers which have during the war been under Admiralty requisition.

The suspension of steel manufacture at Sydney Mines is of course a prelude to the suspension of manufacturing and rolling operations at the New Glasgow Plant, after the stock of ingots has been used up.

Part of the recent orders for equipment from the Canadian National Railway has been allocated to the Eastern Car Company at New Glasgow, which will assure one or two months' work on a reduced basis of working organization, but the order is not of sufficient size to affect the situation so far as steel manufacture is concerned.

The Nova Scotia Steel Company is going ahead with the construction of two freighting steamships to the order of the Canadian Government.

The Dominion Iron & Steel Company is working on the completion of rail orders given by the National Railways before the signing of the Armistice, which will give this company a partial outlet for its production. Work is progressing normally on the construction of the new plate mill at Sydney.

It does not follow that if because of the temporary inaccessibility of the Montreal market to Nova Scotian coal some apparent over-production should result in the Province itself, that any cheapening of the cost of coal is possible in Nova Scotia. Nor is it any less undesirable from the Canadian standpoint that coal production in Nova Scotia should be lessened by lack of transport facilities than it has been desirable that production should be lessened during the war period by lack of labor. The result of interrupted work by lack of cheap transportation facilities will still further increase the cost of producing coal to the operators.—F.W.G.

WOULD TAKE EXPLOSION NOW TO CAUSE STIR IN SCRAP MARKETS

THE scrap iron market may almost be said not to exist. There is no demand for scrap, no matter how low the price may be set. On some lines the quotations are at the ante-bellum figure, and whether the limit has or has not been reached is a matter of conjecture. The story is the same in every district, and seems to be without any relieving feature.

New York: Some of the yards here have given up trying, and are practically closed down. The situation seems to be that no one wants to buy scrap, and dealers are making no effort to stimulate an artificial demand by making further bargain prices. Quotations of as low as $14 f.o.b. New York have been made without resulting in a sale. Consumers profiting by their bitter experiences of last winter are pretty well stocked up and they are likely to be very canny in their movements till a better market develops for their own products.

Pittsburgh: The same situation exists in this district, of dealers trying to get a nibble by their bait of still lower

prices, and the consumers still holding off. There is absolutely no demand, and the question of price does not enter into the matter. Heavy melting steel at $18 is meeting with no better favor, while machine shop turnings and borings are a drug in the market.

Philadelphia: There is a very small demand with prices showing marked drops in some places. Several thousand tons of heavy melting steel were sold direct from producer to consumer at $16 delivered. The general price on this material is $16.50 delivered. There has been an average drop of from $1 to $3 per ton in scrap prices in the Eastern Pennsylvania market this week.

Buffalo: Taking the fact that most consumers have large stocks on hand and the almost entire absence of any demand, it may be said that the worst is yet to come. Every grade in the market has taken a further step down, amounting generally to $2 and as mills are not interested at any price, the utmost depths have not yet been sounded.

Cleveland: The feeling among scrap men here is that the market is at its lowest, and in consequence they are laying down all the material they can get. Some of this scrap may not be turned over till the distant future, though dealers expect to move most of it in the coming year. Consumers are limiting their purchases to emergency requirements, and are buying turnings at $9 to $10 per ton, and heavy melting steel at $16 and upwards.

Chicago: From week to week quotations continue to show reductions, and the end is not yet. The scrap steel and iron market is still characterized by the almost complete absence of buying. There is a quantity of 2,000 tons offered by the Chicago Milwaukee & St. Paul, 1,000 tons of this being steel rails. One feature of the small amount of buying that does exist, is that immediate delivery is always asked, showing that the purchase has been delayed till the last minute. As there are no large holdings of scrap, it is felt by some dealers that when the market does take a change it will be in the form of a sudden jump upwards.

Cincinnati: In the absence of any trading, the time of many dealers is being spent in adjusting cases of rejections of shipments which are numerous. The only grade of scrap in which any interest is being shown is stove plate, which is holding its own fairly well. At the other end of the line are steel turnings, which seem to be in less demand than any grade of scrap on the list.

St. Louis: As both buyers and sellers seem to think that the bottom of the market has not yet been reached, apathy is the prevailing state of the market. Dealers have made further reductions in quotations, but as no sales have taken place, the value of these is problematical. The slackness is occasioned more by a lack of demand than by any actual surplus of material, and this is the most hopeful feature of the situation. Railroad interests are holding all the scrap they have storage for, till prices adjust themselves upwards.

PRICE CUTTING WILL NOT HELP TO BRING OUT MORE BUSINESS

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Feb. 6.—Only a slight improvement in current bookings is reported by the steel mills, and no substantial change in the rate of buying is now expected before early spring. Last December there were some predictions that conditions in the iron and steel industry would become more active after the turn of the year, but these predictions did not carry much weight with those who study the precedents in the industry, for it is noteworthy that when business in iron and steel improves it is almost invariably in the spring, not at the turn of the year. Accordingly not much disappointment was caused by business failing to improve materially after what was called "the holiday dullness." That dullness usually occurs in an active market but if it is to be followed immediately by activity it must have been preceded by activity.

The rate of buying in finished steel products represents probably less than one-third the productive capacity. As the mills are actually operating at 60 to 70 per cent. of capacity, on an average, it is evident that the major portion of the shipments being made is against old orders. As a rule these old orders will not last much longer, and a decreasing rate of production during February, if not through March also, is expected even though buying from week to week may increase somewhat. It is more likely than not that steel production will drop below 50 per cent. of capacity. However, it must be remembered that even a 50 per cent. operation represents a very heavy tonnage as compared with outputs in the past, since capacity has increased by 40 per cent. during the war alone. A 50 per cent. operation would mean more tonnage produced than in 1906, when the industry was extremely active and the existing capacity was strained to the utmost to take care of demand, which was heavy from all quarters.

Prices Firm

Prices are firmly maintained for pig iron, unfinished steel and the regular finished steel products. This price maintenance is regarded as perfectly natural in the circumstances, and not as remarkable in any sense. There is no incentive to producers to cut prices as there is no business in sight that could be booked at a cut price and could not be booked at current quotations. Those who do buy are buying only to supply known requirements that cannot profitably be postponed, and price is hardly an object at all. The buyers pass the material long very promptly, either as jobbers to retail buyers or as manufacturers to distributors of their various wares. Purchases are only for very early delivery, generally in from two to four weeks.

Producers know quite well that when prices are so high any cutting would likely precipitate a decline, probably a very extensive one, and the game would not be worth the powder. There are certain commodities which normally fluctuate more than do the regular finished steel products, and their behaviour at this time furnishes a good illustration of the principle that when prices once start declining they go quite a distance. Iron bars are an excellent illustration. Under Government control they were set at 3.50c. Chicago and Pittsburgh adopted this price as f.o.b. their respective mills, while eastern Pennsylvania mills held that this meant 3.50c f.o.b. Pittsburgh, and added freight to destination which made 3.745c, delivered Philadelphia.

When in December the steel mills made certain precise reductions in steel products, the iron mills did not reduce. Then the Chicago mills made a reduction in the curious form of taking 2.90c Pittsburgh, as their new quotation, which meant 3.17c delivered, Chicago. It would have been easy to adhere to this price if the Chicago mills had confined their sales to nearby territory, but when they sold towards the east they were shipping "against their freight," and thus received less f.o.b. mill than if they shipped locally or westward.

Some mills actually sold in Boston at 2.90c, Pittsburgh, making the delivered price 3.20c, but this was equal to only 2.66c mill, whereas at 2.90c Pittsburgh delivery to Chicago would be 3.17c, with just a little freight deducted to get the f.o.b. mill price. The next step was naturally to sell at 2.66c or thereabouts for local delivery, which resulted in 2.70c, delivered Chicago, being done, or far below the original cut price adopted, 3.17c. The Pittsburgh and eastern Pennsylvania mills refuse to cut prices and therefore are quoting, nominally, prices that are roughly $15 to $20 a ton above the Chicago mills. Should they undertake to meet the Chicago mill quotations there would be more widespread competition.

Scrap is another illustration. Heavy melting steel scrap was so scarce, that mills paid the full Government limit of $29, delivered, and in the case of Pittsbough mills paid also the 3½ per cent. commission allowed, making the cost about $30. Now scrap is going begging at $17, delivered Pittsburgh, having slumped and slumped, and still there is no demand.

Decline in Coke

Connellsville coke is the latest illustration. It was $6.00 for furnace, under Government control, but as soon as it was announced, about January 17, that Government control would cease at the end of the month, it began to decline. Some leading operators endeavored to hold the price at $5.50, but the decline hardly halted an instant at that figure, and there have been many offerings in the past few days of good grades of

furnace coke at $5.00. A similar effort was made to hold foundry coke at $6.5 , the Government limit having been $7.00, but there is foundry coke of at least fair grade available at $6.00.

These things are well understood, and the steel producers want it that when circumstances require a decline there will be a definite and precise one to some new level to which they can adhere. There is an idea quite prevalent that about April 1 some reductions along this line will occur, probably with the United States Steel Corporation taking the initiative.

Wages

The iron and steel industry has no intention of making any move whatever towards reducing its wage rates, at least for some time to come, say not before the middle of the year. The producers believe that wages in general should come down, but they feel that the cost of living should come down first. Moreover, they are not more concerned, if as much, in their own wage rates as in rates paid outside the industry. They would like to see their customers who fabricate or consume steel, not so much burdened with high wage rates, as that interferes with the consumption of iron and steel. Then, too, the industry buys materials which are high priced on account of high wage rates, and it pays much higher freight rates than formerly, the freight advances having been caused chiefly by advancing wages on the railroads. Thus while the cost of producing finished steel is high by reason of high wages it is not simply because the steel producers themselves are paying high wages.

SOME OF THE BLAST FURNACES HAVE BLOWN OUT DURING WEEK

THE main features of the pig iron market for the week just ended are curtailment of output and adjustment to present conditions.

The slack market has resulted in considerable piling of stocks, the output being reduced accordingly. Several low-phosphorous furnaces have been blown out, while others are making other grades as their orders require. Furnaces that cannot get business at the present prevailing prices face the necessity of either piling their iron, or blowing out. Production costs are at such a level that any concession in selling prices are out of the question.

Philadelphia.—The situation in the low-phosphorous industry may be said to be showing an improvement. This is being brought about chiefly by the curtailment of production, and it is estimated that the first half year's production for 1919 will not be more than half that for the corresponding period of last year. Enquiries for iron are few, and the tendency of buyers seems to be to defer their purchases. The policy of applying the $3 reduction, which has been adopted in some of the other districts, has found general favor here. It has not been granted by all sellers, some of them are taking the stand that contracts are binding, and will be strictly enforced.

New York.—Foreign enquiries are coming in, and enquiries generally are more plentiful than they have been lately. The foreign enquiries amount to about 15,000 tons. A lead has been set by a large producer in Buffalo, who has applied the base price of $31 to all contract business on his books. This has been an entirely voluntary movement on the part of the producer, and it will be interesting to see if this lead is followed to any extent by other Eastern furnaces. There are a number of domestic enquiries amounting to about 7,000 tons, deliveries to be made in some cases immediately and others spread over the first half year.

Pittsburgh.—There are rumors of decline in prices in this district, but so far there has been no change. The market has been practically quiescent this week, with sales of even small lots being far apart. The situation seems to be that the majority of consumers are pretty well provided for their first half requirements, and are not in the market for forward buying. The fact that here is a large supply of iron available for immediate delivery eliminates any anxiety they may have had about supplying sudden needs.

Buffalo.—The market here is quiet, with very small sales, and few enquiries. The sales are mostly carload lots, and the enquiries do not include any large amounts. An enquiry for 1,000 tons of foundry iron for the first half delivery is the largest thing that has transpired, and the uncertainty of the market precludes the possibility of much business developing.

Cleveland.—There has been a little more interest shown this week by enquirers, especially for first half delivery of foundry iron, but the demand for other grades is practically nil. In some cases where new orders are not sufficient to take up unsold surplus, furnaces are doing some piling, but most of the output is taken up on old contracts, and there are no cases of furnaces blowing out. Local foundry activities are showing signs of slackening off.

Chicago.—Adjustment is the order of the day in the Chicago district. Producers and consumers are getting together, the result being that the situation is adjusting itself without any serious trouble. Enquiries are few and involve only small amounts. There have been some cases where customers have asked for suspension of shipments, resulting in some iron being piled, but this is of small extent. There are rumors flying around that railways will soon be in the market for castings, and that will naturally give a fillip to foundries and react on the pig iron market.

St. Louis.—There has been a good demand for small tonnages during the week, and much satisfaction is felt over this favorable feature. A fairly large amount of foundry grade has been sold. Furnace stocks in the Southern district are almost without exception low, one concern that in the past carried up to 150,000 tons in its storage having at the present on hand not more than 6,000 tons. There is not much tendency to a reduction in prices, the uncertainty of the labor market and also the coke market being influences against any cut.

Cincinnati.—There is almost no trading going on in this district. The only sales that are being made are some of special metal, outside of that the market being dead. There has been no move made yet by Southern furnaces towards adjusting prices, but it is expected that they are waiting till present contracts expire. Some definite action will then most probably be taken.

Birmingham.—Sales are few and in small lots. The reduced price of $31 has not met with general acceptance, but large producers are selling at this figure freely. Blowing out of three furnaces and banking of several others may have a good effect on the market.

USEFUL FIREWORKS

It is not generally known that the smoke screen, which played so vital a part in the famous British naval attack on Zeebrugge, was devised by the late Commander Brock, of firework fame. The firework maker was also kept busy during the war producing flares, parachute lights, and other things for turning night into day. At first there was no means of finding out which composition or size of flare gave the most efficient light, and the Illuminating Engineering Society of Great Britain was asked by the Government to solve the problem. A new type of photometer or light-measurer was forthwith invented to give a rapid reading of the light given off at any moment by a brilliant source like a star-shell, or flare. It consists of a small tube with a tiny electric lamp inside it at one end. An opening is cut in the tube lengthways to admit a strip of metal stencilled with the letters of the alphabet. When the lamp is alight, each letter of the alphabet is illuminated in a descending scale, according to its distance down the tube. If the light, which falls on the instrument from the outside, happens to be the same as the internal illumination of any particular letter, that letter will vanish. Thus this ingenious invention provided a scale on which an observer could read off, second by second, the light provided by a flare. By its use the composition of flares was improved, and the Ministry of Munitions found that British chemists were able to make better flares than any of those captured from the enemy. Three or four British flares, burned together, reached a brilliance of from 120,000 to 130,000 candle-power, which is equal to about 1,000 arc lamps.

Take 10-Year Period to Absorb War Machinery

Serious Problem is Facing Many of the American Firms That Have Large Amounts of Money Tied Up in Their Equipment—Use Some Material in the Training Schools

Special to CANADIAN MACHINERY

CLEVELAND, O., Feb. 5.—The sudden cancellation of war contracts by the U. S. Government, and the attitude taken that many of the contracts for machinery necessary in their execution are invalid, because they did not pass in regular form through the office intended for that purpose, is causing much uneasiness among American manufacturers. Millions of dollars of industrial capital is tied up in this way in material and machinery, and should the Government not recognize the justice of the claims, the result, it is declared, will be nothing short of disastrous to many firms.

Manufacturers point out that they placed themselves unreservedly at the service of their Government. They were subject to somewhat peremptory treatment by its officers, all of whom were apparently authorized to demand whatever was required in the way of machinery, and material of all kinds was accumulated in order that production might not be hampered. In short, everybody responded in a patriotic way to the imperative call for munitions.

When the armistice was signed, war work suddenly ceased. There was a deluge of cancellations on machinery orders. The situation looked serious, but manufacturers asked each other, "Shall we accept these cancellations, or shall we protest?" They held conferences. Coupled with the cancellation problem was the other equally as serious as to the best plan by which the market could be made to absorb this surplus machinery—this Government equipment it was called — without disturbing industrial conditions, without, eventually, causing much unemployment and uneasiness.

Different Proposals Made

Several plans are being considered. One suggestion is that the manufacturers repurchase their machinery at a discount of 10 per cent. This was not altogether favored, because the trend of prices and materials indicated that even allowing for the discount, manufacturers were likely to lose heavily. The proposal that the manufacturers handle the machinery for the Government, filling orders on a 50-50 basis, that is, one-half from the Government's stock and one-half from the manufacturers' production, has been considered, but here, too, some manufacturers disapprove of a competition which, in a dull market would handicap their independent enterprise. "Better," said one, "to take the machinery and dump it in the ocean and then forget about it."

The plan which appears to meet with some approval, is that the Government should distribute the sales of this machinery over a period, say, of five, or even ten years, so that the market might absorb it very gradually without hindrance to industry in general. The Government, it is also pointed out, might use much of this machinery in the equipment of national schools for the education of apprentices, for an adequate supply of skilled workers is an absolute necessity, and one which, at the present time, does not seem to be anybody's business, that is on a scale calculated to meet the requirements of industrial development.

Various Classifications

A recent bulletin issued from the office of the War Service Executive Committee would indicate that manufacturers and the Government are getting together on the disposal of war-time tools by the War Department. Four clauses are of interest:

1. The inventory of all machines and equipment will be expedited to the greatest possible extent.

2. As soon as it is known that a quantity of machine tools is available for disposition the manufacturer of these tools will be given an opportunity to purchase them at a price, and the terms of settlement will be satisfactory to all parties concerned.

3. In case it is impossible for a manufacturer to purchase his product outright, an effort will be made to arrange for marketing the product by the manufacturer in an equitable manner, securing for the Government and manufacturers alike the best possible terms.

4. In case both these methods of disposition fail, the material will be offered for sale to the general public in the manner prescribed by law.

How the Trade Feels

The following letter issued "to customers," indicates pretty generally the attitude of American manufacturers with reference to the cancellation problem:

"To Our Customers:—

"The recent cancelling of many Government contracts has impelled some of our customers to request us to cancel their orders for machines and tools which were intended for use on Government contracts.

"While we are perfectly willing to suspend operations on these orders, under present conditions we would not be inclined to accept outright cancellations for any of the machines on order pending investigation as to what action the Government may take with reference to orders on hand.

"While the acceptance of any one individual cancellation would not prove embarrassing, the acceptance of cancellations of all orders intended for war use would, as that would practically embrace all work in process by machine tool builders to-day (this letter was written toward the end of November, 1918). A wholesale cancellation of orders would seriously disorganize, if not temporarily overwhelm American industries. For this reason, and to be entirely fair with all our customers, we felt it necessary to adopt a uniform ruling on these requests and to outline to our customers what action we think it is proper to take at this time.

"American manufacturers have responded patriotically to the call of the Government for increased production to supply war requirements. It has been a people's war, and the benefits of victory are shared by all alike. We are all merely the instrument of the people in providing the sinews of war, and the cessation of hostilities does not relieve the people as a whole of these obligations. The manufacturers should not be expected to stand the burden alone of holding capital invested in abnormal stocks produced at abnormal prices, but the burden should be distributed to the American people. It is not an individual proposition. It is a national one and should be so considered.

"We feel that the Government would not recognize us direct in this matter, as these orders for machines were not placed by the Government, but by Government contractors. We suggest a charge covering accrued cost on your work and in case of a declining market value a certain percentage on the cost or abnormal value entering into the machines. If, however, prices of material and labor are stabilized at the present level, no such charge covering shrinkage will be justifiable. We feel that this possible shrinkage in value is an important element in the cost. Our charge covering this would be included by our customer in his memorandum of costs to the Government as part of his preliminary expense incurred in getting ready for handling his contract, together with his costs for actual work performed. In this way the entire charge would be passed on to the Government and absorbed by it, which as we see it is the logical place for it to be taken care of.

"We have perfect confidence that the Government intends to deal justly and fairly by American manufacturers, and that no serious loss to anyone will be involved.

"We believe that our customers will grant that this is a perfectly logical and just position to take and that our situation will be fully appreciated."

A Serious Problem

The invalidation of contracts entered into in good faith does not, in the opinion of manufacturers, indicate a due appreciation by the Government of the industrial or even the financial situation. To lose the money which these orders represent means that industry will be seriously curtailed; there will be much

unemployment, and that the forthcoming Liberty Loan may meet with slim response.

Said one manufacturer to CANADIAN MACHINERY, "When one considers the matter in all its seriousness, he is justified in feeling that a volcano is gathering force for explosion. A crisis is imminent. It can be handled tactfully so as to stabilize conditions, and give to the men who have fought for us a helping hand instead of a cold shoulder. Or it can be bungled in such a way as to bring about something like the undesirable conditions existing to-day in some European countries The American manufacturer is always willing to co-operate in the interests of his country, but I'm beginning to feel that Mr. Wilson might better be on the job at home. I like the way the Canadian Munitions Board has handled this matter. They have intimated to the Washington authorities in positive manner that contracts entered into in good faith must be settled, and I understand adjustments are now being made."

The feeling seems to be that the Government cannot afford to ignore these claims, but that in the meantime some proportion of the funds tied up should be released to assist in the development of peace-time industry.

TAR VARNISH FOR IRON-WORK.

Heat about 100 gal. of tar to a low boiling point, and add 100 lb. of fresh slaked lime sifted over the top and then worked down. Boil this mixture until it becomes pasty. Let it settle for a few minutes and then add 20 lb. of tallow and 5 lb. of powdered resin. Stir until thoroughly mixed and all ingredients dissolved; then allow to cool. The mixture should not be raised to a higher temperature than 100 deg. Fahr. Should the preparation be too thick it can be thinned down with paraffin or naphtha.

This is said to give a finish like stove enamel. At a works situated near the edge of the sea, the south-east winds eat away iron work very quickly. All gas holders and galvanized iron roofs and galvanized sides of buildings are painted two coats with this tar varnish and then whitewashed thoroughly, protecting them from the weather and salt air. The varnish is elastic and will stop corrosion.

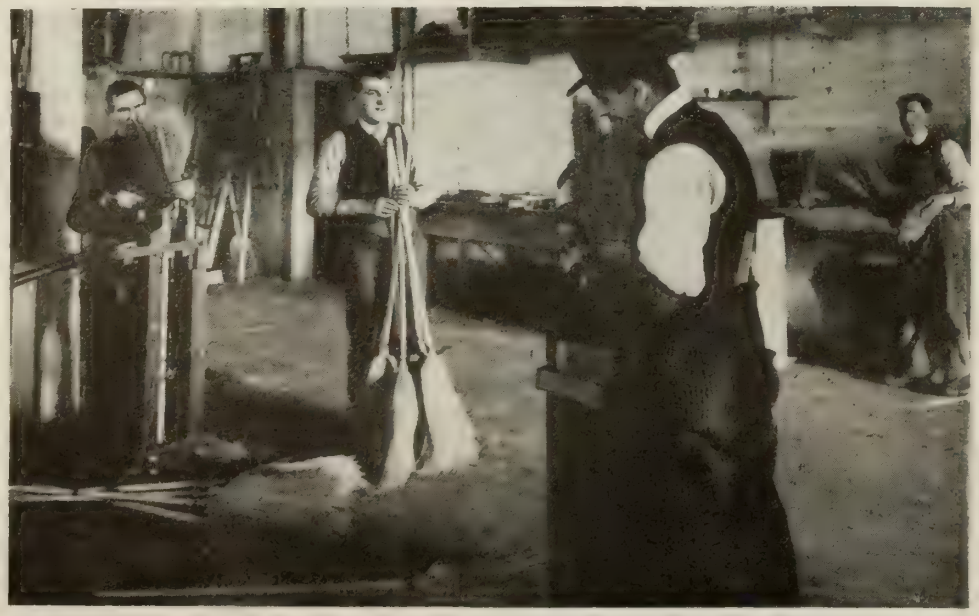
ALUMINIUM ALLOYS.

Aluminium was merely a scientific curiosity a generation ago, the production in 1883 having been but 83 lb.; but it is now one of the most common metals in use, with an annual production of hundreds of thousands of tons. It is most important in its alloys, especially in those with magnesium and copper. The alloy known as magnalium is a series of mixtures containing 10 to 30 per cent. of magnesium; it is silver-white in appearance, strong, ductile, easily cast, takes a fine polish, and has a specific gravity of only 2 to 2.5, somewhat less than that of aluminium itself. With 10 per cent. of magnesium the melting point is between 650 deg. and 750 deg. C. The metal is made harder, more brittle and finer in polish with additions of magnesium up to the practical limit of 30 per cent.; it may be given a dark color by maceration, or it may be nickeled or gilded. Duralumin, with 3.5 to 5.5 per cent. of copper and about 0.5 per cent. each of magnesium and manganese, has greater hardness, tensile strength and ductility than any other aluminium alloy. It takes a high polish and may be easily hardened, but it is given special value by its resistance to the action of sea water, and dilute acids. It is a little heavier than aluminium with a specific gravity of about 2.8. Other alloys similar to magnalium, but adapted to special uses, contain small percentages of nickel, tin, lead and iron.—M.M.

SELF-LUMINOUS PAINTS IN WAR AND PEACE

Self-luminous paints were largely used during the war for the dials of watches and instruments, for trench signs, for buoys, and many other purposes. Very little was known of the best composition of such paints and the best way of using them until Professor Clinton of University College, London, and Mr. J. H. Dow, of the Illuminating Engineering Society of Great Britain, carried out tests with special forms of electric glow-lamp photometer. They used paints made of radium bromide and zinc sulphide, which at first show a quick rise in the light given off, followed by a slow decay. They found that if more than a certain minute proportion of radium was used, the light fell away so rapidly that no advantage was gained. They also found that the same thing happened if the paint was laid on too thickly. Owing to the high cost of radium, these results enabled big savings to be affected in the expenditure on self-luminous paints during the war. They will be no less valuable in peace, when the use of these paints is developed for the illumination of instrument dials, electric switches, signs and sign posts, buoys, and other things, where it is desirable to provide permanent visibility.

Current Events in Photograph



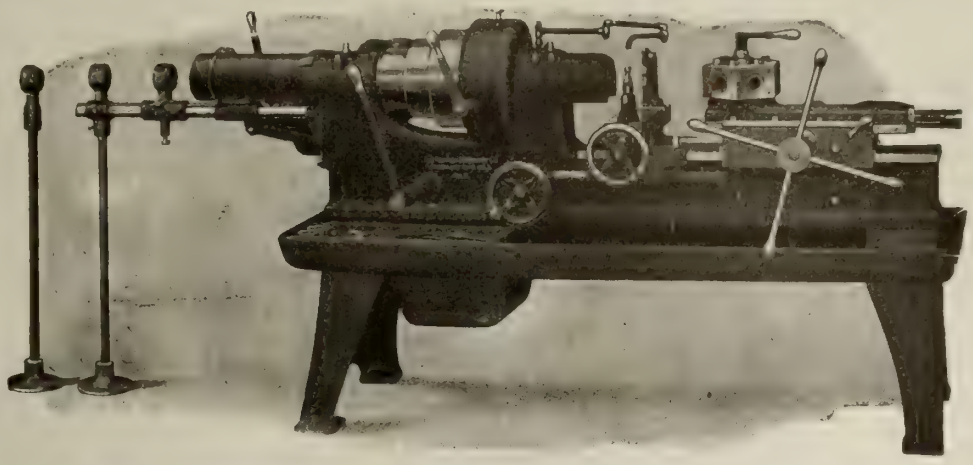
BLINDED SOLDIERS GETTING BACK TO WORK

The photo shows how broom-making is carried on at the Men's Industrial School, Canadian National Institute for the Blind, King St. west, Toronto. Thirteen men are being taught this work at the school, and the Institute finds employment for them after they have become sufficiently p r o ficient. The man in the centre of the group of three has been blind since he was three years old. One of the things which strikes visitors to the Institute is the cheerfulness of t h e blind workers at all times.

Warner & Swasey Screw Machines

For large output and close limits—If you are figuring on screw machine work you can depend on W. & S. machines being right for the job.

We can supply you from stock immediately.



The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

64 Front Street West
TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

THE
ST. LAWRENCE WELDING CO. LTD.

MONTREAL QUE.

A. M. BARRY, Managing Director

Office and Works:
138-140 Inspector Street
Telephone Service:
(Long distance) Main 5779 and at Night, Westmount 3483

Maritime Branch:
HALIFAX, N.S.

CONSULTING ENGINEERS on all kinds of welding.

BREAKDOWN REPAIRS handled at once; just 'phone us and we will be on the job by next train.

OXY-ACETYLENE WELDING of heavy cast iron frames, cylinders, gears, water wheels, etc.

STEEL, any kind of **welding** on parts of large or small machines, tanks, digesters, boilers, shafts, brackets, etc.

Can be welded in place when necessary.

ELECTRIC WELDING on boilers, digesters, leaking tanks, etc.

MARINE REPAIRS undertaken by our Marine Welding Tug which is equipped with Electric and Oxy-Acetylene Welding Apparatus with Compressed Air Plant complete.

OXY-ACETYLENE CUTTING of any kind of steel construction.

PORTABLE WELDING APPARATUS of all kinds with skilled operators always available to repair your breakdown at once.

THERMIT WELDING on all classes of work is a special feature of present activities.

Manufacturers of Steel Tanks, Air Receivers, Welded Tanks, etc.; Electric Welders, Oxy-Acetylene Welders, Boiler Repairs, Lead Burning and Thermit Welding.

(1)

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	....
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton	....	....
Victoria		50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$26 00	$ 25 00
Electro copper	26 00	25 00
Castings, copper	25 00	21 00
Tin	70 00	65 00
Spelter	9 50	9 00
Lead	8 50	7 25
Antimony	10 00	10 00
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 7 00	$ 6 25
Plates, 3-16 in.	8 50	6 00

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	19 50	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	18 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5½-6	5 00
Heavy lead	5½	8 00
Tea lead	4½	3 50
Aluminum	18 00	18 00
	Per Ton	
Heavy melting steel	15 00	15 00
Shell turnings	9 00	8 00
Boiler plate	16 00	15 00
Axles (wrought iron)	38 00	15 00
Rails	20 00	15 00
No. 1 machine cast iron	28 00	18 00
Malleable scrap	23 00	15 00
Pipe wrought	16 00	8 00
Car wheels	25-30	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove plate	16 00	14 00
Cast boring	11 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅝" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent.
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

Per gross ton

BILLETS

Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅝ in. and larger		$7 50
Spikes, æ and 5-16 in.		8 00

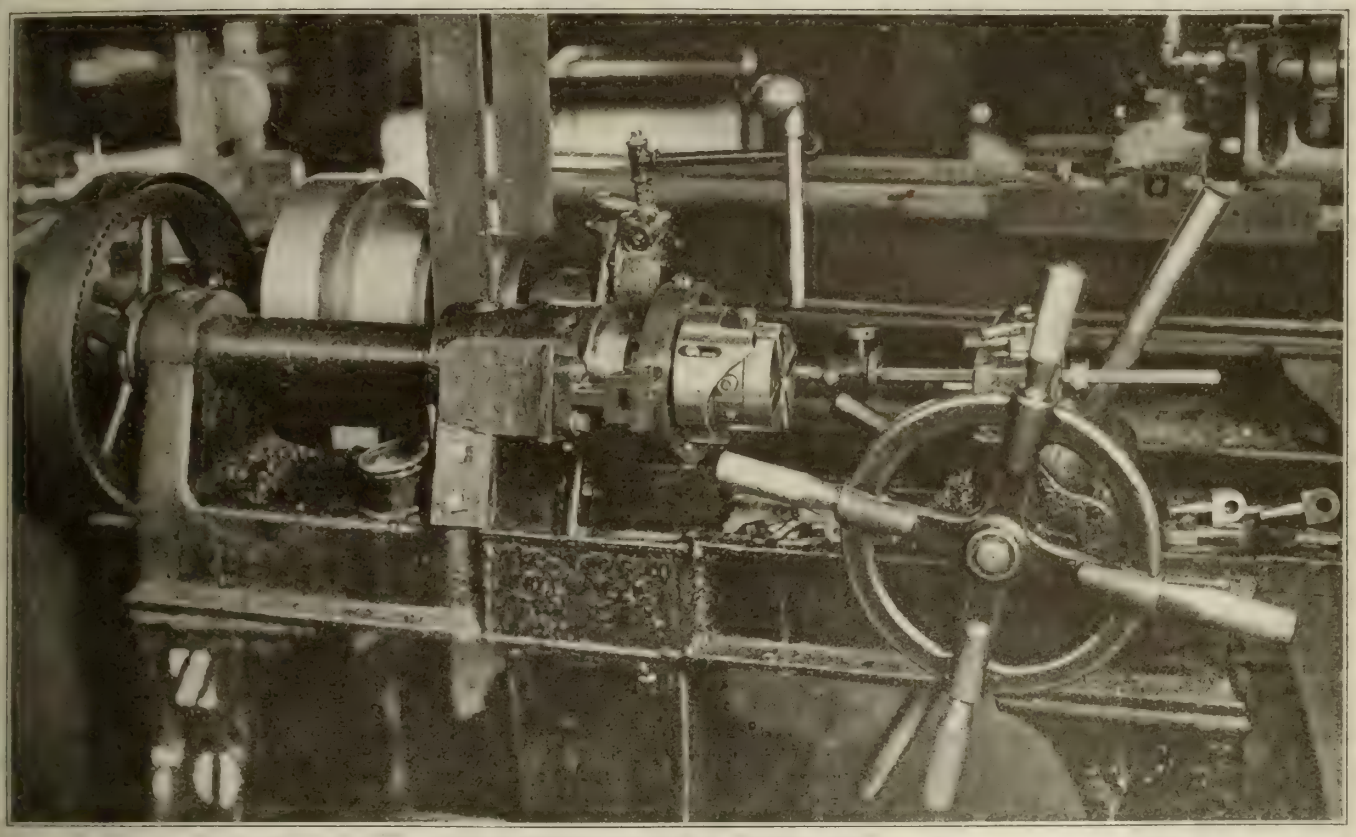
ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 42
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

BROUGHT UP TO DATE



This old Bolt Cutter has been turned into an up-to-date Threading Machine by the application of a Geometric Die Head.

The Connecticut Telephone Company removed from this Bolt Cutter the solid die head with which it was equipped, and put in its place a Geometric Self-opening Die Head of the type regularly furnished on the Geometric Threading Machine.

Thread is 7-16" diameter, 14 U.S.S., about 1" long, on switchboard terminals of a high class copper casting.

The best part of it is, that besides getting clean, sharp threads, they have increased the work about six times over what was being accomplished with a solid die head.

Has any threading operation been given the right chance unless a Geometric figures in it?

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal.
The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 16
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G." per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks...list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 00
Sheets, black, No. 10	8 00	6 90
Canada plates, dull, 52 sheets	9 00	8 10
Can. plates, all bright.	9 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.			Cts. per lb.
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.			
Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.			
Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.			
Select White.	11	Dark colored.	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

These Men

know how time is saved by

Aikenhead's

Van Dorn Portable Electric Drills

They know, as only men who have worked with Van Dorn Drills can know, the all-round serviceability of Portable Electric Drills that are both fool-proof and weather-proof.

Van Dorn Electric Drills go to the work wherever it is. They drill neat, clean holes 50% faster than the best pneumatic drills. If you have holes to drill in wood, steel, any metal—Van Dorn Electric Drills can drill them for you at lessened cost. Here is their

Capacity in Solid Steel

DAOOO	3-16 in.
DAOO	¼ in.
DAOOX	5-16 in.
DAO	⅜ in.
DA1	½ in.
DA1X	⅞ in.
DA2	1 in.

Write for catalog

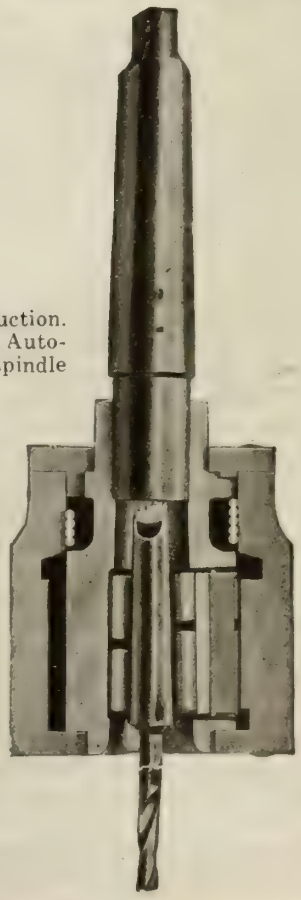
Aikenhead Hardware Limited

17 Temperance St. **TORONTO**

Aikenhead's

Wahlstrom Chuck

Is one of the best helps you could have toward greater and more economical production. With an ordinary chuck, minutes are required to change tools. With this Wahlstrom Automatic Chuck, one tool is removed and another is inserted in two seconds, and the spindle never stops.



50% GREATER PRODUCTION

has been obtained in many shops since the fitting of drill presses with Wahlstrom Chucks.

This Chuck automatically centres the tool. It grips by the entire shank, enabling you to use broken tang tools as well as perfect tools.

As resistance on the tool increases the jaws of this Wahlstrom Chuck grip more firmly. The cam action is such that slippage is impossible.

Write for booklet.

Aikenhead Hardware Limited

17 Temperance St **TORONTO**

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Montreal.—At a recent meeting of the Montreal branch of the Engineering Institute of Canada it was announced that the annual meeting of the association would be held at Ottawa on the 17th of this month. Following the business session, a professional meeting will be held during the two following days.

Vancouver, B.C.—The British Columbia Electric Railway Co. has made an agreement with the Harbor Board, granting the company exclusive light and power rights for a period of ten years on Industrial Island. The Western Power Company of Canada wants to connect up with the wire nail company's new plant on the island, but is prohibited from doing so.

Windsor, Ont.—A branch of the Engineering Institute of Canada was organized here recently. The meeting was held in the offices of J. J. Stevens in the Heintzman building. Mr. Stevens was elected chairman, and gave a short speech setting forth the objects and ideals of the society. The organization of this branch follows closely on the organization of a branch at the Soo.

Montreal.—The early future requirements of the City of Montreal in regard to the additional demand for water supply has been brought to the notice of the officials and residents of the city by the announcement of the City Engineer to the effect that he is about to ask for tenders for the construction of a conduit, which, when completed, will supply the city with 20,000,000 gallons of water per day additional.

Owen Sound, Ont.—The Grand Trunk are going to build a new steel bridge over the Pottowatamie River at the Grand Trunk crossing very shortly. This is necessitated by the introduction of heavier engines on the route, which are beyond the capacity of the old bridge. The new bridge will occupy the same site as the old one, and more piles are being driven and the foundations strengthened in preparation. It is said that other bridges along the route are to be treated similarly, and that the introduction of heavier engines and faster trains will tend to give real competition to the C. P. R.

Toronto.—The programme of the Toronto Harbor Board, as outlined by E. L. Cousins, chief engineer and manager, has as one of its most important items, the reclamation of ninety acres at the eastern end of the harbor. In the present year the board hopes to complete about $2,000,000 worth of the work. If the Dominion Government gives its approval, and the bonds are sold, the turning basin at the eastern end of the ship channel in the Ashbridge area will be constructed this year. There is also included work on the breakwater between Bathurst street and the Humber, and a section of the inner harbor near Spadina avenue.

Montreal.—Mr. Justice McLennan recently gave judgment limiting the liability of the Sincennes McNaughton line. This was in a case in which the court had previously held the company liable in damages to Lawrence C. Giff et al. The plaintiff company, owners of the tug "Virginia," sought to have its liability limited for damages resulting from the grounding of the canal boat Lawrence C. Giff and the barge "Lemay," the damage having been held by the previous court to have been caused by the negligence of the master of the tug. Justice McLennan held that the company was entitled to have its liability limited to $38.92 for each ton of the tug's tonnage.

Montreal.—In co-operation with the Administering Commission, a Housing Committee of the citizens of Montreal are preparing plans for a gigantic housing scheme to be carried on during the present year in the City of Montreal. It is anticipated that approximately $5,000,000 will be expended on this enterprise. The plan, if it goes through in its entirety, will be operated in connection with the Federal grant of $25,000,000, announced some time ago, to assist municipalities and cities throughout the Dominion in housing schemes that they may devise. Hopes are entertained that the Government will state their ruling in regard to this scheme as early as possible in order that a start may be made as soon as possible.

MARINE

Vladivostok.—The "War Charger," from Victoria, B.C., has arrived here with a full cargo. The "War Charger" is one of the vessels built on the Pacific Coast at Vancouver by the Wallace yards.

Vancouver, B.C.—It is understood here that the Canadian Pacific Railway contemplate making some improvements to their terminals here. A new ocean pier will be constructed, and the necessary studies of the site are now being made after which, the work of dredging and filling will be immediately started.

Victoria.—Since the Canadian Government placed the extensive orders for the fleet of vessels that are to compose the National Merchant Marine, the Imperial Munitions Board have ceased letting orders for wooden boats, and the forty seven that were under construction will soon be completed, which will conclude the operations in this line. The last of these wooden vessels is scheduled to leave British Columbia about the middle of the present month, sailing via Panama, with a cargo of lumber.

London, Eng.—In an interview given at Liverpool by Mr. Hannevig, of New York, president of the Dominion Shipbuilding Co., of Toronto., he gave expression to very adverse opinions relative to the U. S. shipbuilding programme. The American shipbuilding programme had become an orgy of extravagance and miscalculation, and the cost of building has become so high that the freight rates can never justify them. The United States would be unable to compete with Great Britain in the building and operating of ships.

Vancouver.—Speaking at Vancouver recently, C. A. Whitelock, manager of the Cunard Steamship Company, Ltd. said he thought there was a great future for the ports of Victoria and Vancouver. A large number of the lines now operating on the Atlantic would, he thought ultimately turn to the trans-Pacific field. The conclusion of the war had resulted in great many enquiries for passage across the Atlantic, said Mr. Whitelock and the modification of the passport regulations had brought about a revival in the Atlantic passenger trade.

Victoria.—The car ferry "Canora," built in Quebec, arrived recently after her long voyage to the coast, and was drydocked for cleaning, etc., before being put in commission. The general manager of the Western lines of the Canadian National Railways, Mr. A. E. Warren, said she would be put into commission as soon as she came out of the dock. She will be used between the terminus at Patricia Bay, on Vancouver Island and the mainland, but he was not prepared to say at what particular point of the mainland she would be located. Port Mann was originally selected, but

"Limits of .0001 are Easily Maintained with DUMORE Grinders"

IN selecting a grinding tool for your shop, consider the merits in the light of two all-important mechanical principles—**speed** and **balance.** The fact that small emery wheels will not cut properly unless driven at high speeds has been established beyond question. But with high speeds there must be perfect running balance **(dynamic).** Accuracy can be obtained only when chatter, taper and bell-mouth are eliminated.

The **DUMORE** grinder is mechanically perfect because these two great principles are incorporated in its construction. Speeds ranging from 10,000 to 50,000 R. P. M., combined with dynamic balance, insure accuracy to .0001. Then, too, the **DUMORE** is portable—easily carried to all parts of the shop and quickly set up ready for work. Its constant use and endorsement by thousands of mechanics is highest proof of its value.

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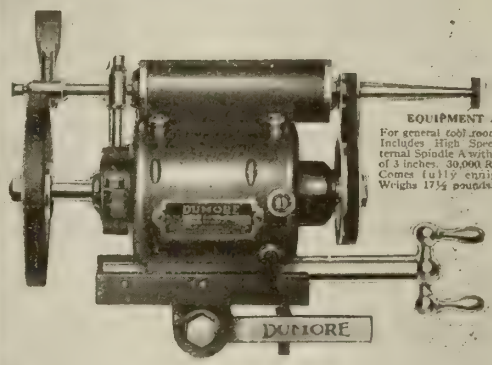
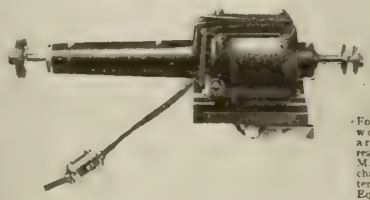
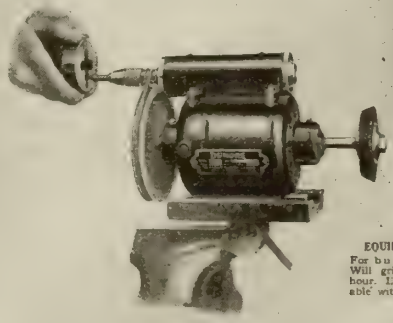


EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches. 30,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.



EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS

it is likely now that another point will be selected.

Ottawa.—It is interesting to note that the judge, who had the investigating of the charges of bad accommodation and feeding on the "Northland," states that he took particular care to find out if the newspaper reports of the men's statements were strictly according to fact. After painstaking enquiries he came to the conclusion that the reporters had faithfully recounted the stories as told them by the men themselves, and where anything that looked like a misstatement had occurred, it was due to the confusion existing in the excited state of the men, who expressed themselves in terms which did not convey the meaning that they afterwards claimed to have wished to express.

Quebec.—All St. Lawrence ports are watching the voyage of the "Canadian Voyageur" down the river and Gulf with the deepest interest. This mid-winter voyage is something so far out of the ordinary that it could not help but be fruitful of speculation. The old-timers hail it as a verification of their oft-repeated prophecy that winter navigation of the Gulf of St. Lawrence was perfectly feasible, and they now look upon the problem as being solved. However, one swallow does not make a summer, and one successful winter voyage does not make a winter route. It will take a considerable number of winter voyages down the Gulf of St. Lawrence to induce the underwriters to lower their rates.

Montreal.—Some interesting figures are given relating to the Canadian Pacific Ocean Services. From the outbreak till October 30, 1918, the steamers of the company carried a total of 1,041,000 passengers, both military and civilian, between ports all over the world. The ports included Chinese and Japanese coasts, Singapore, Bombay, Mesopotamia, Suez, Gallipoli, as well as North and South America west coast ports, Canadian and United States ports on both coasts, South African and Indian Ocean ports. The total loss of troops has been eight in number due to enemy action. Over 4,000,000 tons of cargo and munitions of war have been carried. The company lost the Calgarian, Hesperian, Missanabie and Ionian.

PERSONAL

Ronald G. Starr, B.A.Sc., of Toronto, has been appointed engineer of the Orillia electrical and water works plants, in succession to the late W. K. Greenwood. For the past two years Mr. Starr has been with the Moloney Electric Company. There were a large number of applicants for the position, which carries a salary of $2,400 per annum.

TENDERS

Pembroke.—Tenders are being called for by the Town of Pembroke, for furnishing and installing a waterworks pumping unit, comprising turbine pump of 2,000 gallons capacity against 300 feet head, and steam turbine or gasoline engine direct connected to pump. Full particulars may be obtained from the office of the Town Engineer, or at the office of Chipman & Power, Main Building, Toronto.

Edmonton, Alberta.—Tenders are being called for the T. B. Sanitarium, Alberta. The tenders are for the construction of Administration Service Infirmary buildings, three pavilions, power house, and tunnels near Keith Station, Alberta. Full particulars can be obtained from the Minister of Municipal Affairs, Parliament Buildings, Edmonton, Alberta, and the office of the Department of Soldiers' Civil Re-establishment, Engineering Branch, 407 Beveridge Building, Calgary, Alberta.

Ottawa.—Sealed tenders will be received up to noon of Thursday, February 20, 1919, for the purchase of naval vessels lying at Halifax, Sydney, and Liverpool, including : Steam trawlers —Length 125 ft. B. P. Breadth moulded, 23 ft. 4 in. Moulded depth 13 ft. 6 in. Steam Drifters—Length 90 ft. Breadth 19 ft., 3 in. Depth hold, 10 ft. 6 Patrol Vessels—Length 140 ft. Breadth, 23 ft. 6 in. Depth hold, 13 ft. 6 in. 4 Steam Fishing Vessels—Ranging in length from 130 ft. to 170 ft. Breadth 22 ft. 3 in. to 24 ft. Depth 8 ft. 8 in. to 9 ft. 6 in. Several small Steamers—of various dimensions, and motor launches of various types.

TRADE GOSSIP

Oil Found at Peace River.—A company drilling for oil near Peace River crossing reports striking oil at a depth of 1,120 feet. At 1,090 feet heavy impregnated sandy shale was encountered, and thirty feet lower, oil of apparent high gravity was found. This is said to be the fourth strike in this district.

Establishes Branch on the Coast.—L'Air Liquide Societe of Montreal is going to establish a branch at Vancouver. The company manufacture oxygen and carbide for oxy-acetylene welding purposes, and supply complete outfits, with instructors, to customers. A building permit has been issued by the building inspector for a $25,000 factory.

Fire at British Chemical Co.—The large storehouse of the British Chemical Co. at Trenton has been destroyed by fire. The contents were a total loss, and the value of building and contents is estimated at $200,000. A large quantity of stores, cotton, fire hose, locks, hardware, etc., were in the storehouse and were completely destroyed.

Electric Steel Industry.—There have been a large number of installations of electric furnaces in England. Probably one-half of these are located in the Midlands, in the Sheffield and Rotherham districts. Up to the end of 1917 there had been 140 of these furnaces installed, the heavy demands of the shipbuilding and armament industries probably having a large influence in their adoption.

The Automobile Trade.—The Montreal Automobile Association have decided to have individual exhibitions in all the private showrooms about the city, in place of the general show hold in previous years. The proposed plan is the result of the inability of the association to secure the Craig street drill hall for their usual exhibition, and the fact that no other convenient place is available.

The Lyons Fair.—The Russian steamer "Volonga" sailed from St. John, N.B. just recently with a cargo of exhibits of Canadian manufacture for the international fair at Lyons. This will be the first time that Canada has been represented at the Lyons Fair, but she will be well represented. No less than fifty five prominent Canadian manufacturers have sent samples of their products to be shown, and the total exhibits occupy a space of 30,000 cubic feet.

Cement Plant Wants Power.—The power plant formerly used by the Canada Cement Company at Port Colborne was taken last January by the Union Carbide Company. The latter company was compelled to close down a short time ago due to shortage of power, forcing 200 employees out of work. The Cement Company has orders sufficient to keep them busy for the whole of the ensuing season, chiefly on work for the contractors on the Welland Ship Canal, but they are prevented from starting owing to the lack of power.

Moving to Ingersoll.—The Port Hope File Manufacturing Company, Limited, has been purchased by interests in Ingersoll, who will immediately move the plant to Ingersoll, operating it under the name of "Ingersoll File Company, Limited." The whole north portion of the Noxon plant in Ingersoll has been taken, and is being equipped with additional up-to-date file machinery. The capacity will be very much greater than it was with the old company. The operating organization is the same as that of the Port Hope File Manufacturing Company, Limited.

Lumbermen Meet.—Between 50 and 60 of the members of the Canadian Forestry Association, who recently attended a convention at the Windsor and Ritz-Carlton Hotels, Montreal, are now in St. John, N.B., attending the convention of the Canadian Lumbermen's Association. At this convention there will be a number of discussions on export trade and other matters affecting the lumber trade. Among those attending the convention are: A. J. Price, G. W. Grier, T. W. Mason and Alex. MacLaurin, of Montreal; Messrs. Bolton and Slaton, Quebec; W. E. Bigwood, A. C. Manbert, A. E. Clark, J. G. Cane and W. E. Laidlaw, of Toronto; William Ross and C. R. Bremner, of Ottawa.

Work at Ojibway.—Much speculation has been indulged in at various times about the plans of the United States Steel Corporation in connection with the erection of their Canadian plant at Ojibway, Ontario. The construction of this plant was held up by the war, and

Detroit Store, 997 Woodward Avenue. Represented by Lewis G. Henes, Monadnock Building, San Francisco and Title Insurance Building, Los Angeles

has been proceeding on a comparatively small scale so as not to interfere with war endeavor. There is little doubt but that construction in a large way will be entered upon as soon as conditions will permit. It is not thought that the enlarged programme will eventuate in 1919, judging from the present outlook, but more men will probably be employed in preparing the site than was the case during the war. A great deal of money has already been expended in underground work, such as the laying of drains, sewers, etc. Several miles of roadway have been laid out in the townsite. The docks are well towards completion, and they will be among the most modern on the continent. The most improved labor-saving devices for handling iron ore and coal will be introduced. Foundations are being laid for four blast furnaces, and others will be built as circumstances make advisable. Four years would be required to complete the plant if construction work were to be speeded up immediately. Since the officials do not intend to hasten the building of the plant, the date of completion would appear to be thrust forward still further into the future.

WANT A BOUNTY ON IRON ORE MINED

Deputation At Ottawa Asks That This Encouragement Should Be Given

Ottawa.—In support of a movement to encourage the mining of iron in Canada, representatives of the Boards of Trade of Port Arthur, Sudbury, Sault Ste. Marie, North Bay, Vancouver, and other cities and towns, waited on Sir Thomas White, acting Premier, and other members of the Government. The delegation will be introduced by Mr. F. H. Keefer, M.P., Parliamentary Under-Secretary of State for External Affairs.

The deputation will suggest that one dollar shall be paid for every dollar's worth of iron ore produced in Canadian mines. When iron and steel bounties were paid on the tonnage of pig iron produced in Canada, members of the deputation state, the amount of Canadian ore used in smelters was comparatively small, American ore being used mainly. If the $26,000,000 so expended had been paid in the way now suggested, the deputation believes iron mining in Canada would have been much more advanced than at present.

MAY MAKE NO MOVE REGARDING TARIFF

Attitude on Tractors Taken to Indicate the Policy to be Adopted

Ottawa.—The fact that the Government has decided to renew the order-in-Council passed on February 7 last rebating the duty on tractors valued at $1,400 and under, is taken here as an indication that there will be few, if any, tariff revisions in the budget. Were actions taken under the budget the whole question of agricultural implements generally would be opened and the tariff controversy would at once be precipitated into Parliament.

From present indications the Government generally favors the stand of the Canadian Manufacturers' Association and believes that there should be no general tariff revision until the terms of peace, at least, are known.

There is a considerable body of opinion in favor of the abolition this session of the seven and a half and five per cent. war tariff. This was imposed overnight and it is contended that it can be taken off without disturbing the revision schedule of 1907. It is, however, rumored that Sir Thomas White is not at present even in favor of this reduction.

That a Government caucus on the tariff will be held shortly after the session opens is believed to be certain.

RE OVERSEAS TRADE

The British Trade Commissioners in Canada (G. T. Milne at Montreal and F. W. Field at Toronto) have received cable advices from the Department of Overseas Trade (Development and Intelligence), that the following wide range of British manufactures have been placed on the free list, and now require no export license:

Artists' materials, athletic goods, bicycles, but not tires, bicycle accessories (various), buttons, except military, horn and vegetable ivory, cigar and cigarette holders, china and earthenware, china clay, clocks, drugs (various), fancy goods of paper, ivory, leather, etc., films (subject to censorship), flower seeds, fountain pens, furs (dressed, dyed or manufactured), glassware, hardware (iron and steel builders), hats, household effects of wood, iron or steel, ink, jewellery (imitation or pearl), laces, laundry machinery, ledgers, marble, mineral waters (unsweetened), musical instruments, office furniture, pictures, paintings, phonographs, photographic materials (not chemical), razors (safety and blades), ribbons (silk), spectacles, sewing machines, wallpaper.

Lists of goods for which export licenses are still required for shipment from the United Kingdom will shortly be in the hands of the British Trade Commissioners noted above. They will also be advised weekly by cable by their department in London of the goods removed from such list and any alterations thereto.

The British Trade Commissioners will be glad to take up these matters with local importers and others interested.

The following are some of the principal commodities for which licenses are still required:

Abrasives, agricultural machinery, cement, chemicals (various), coal and coke, oils, pipes (cast iron), packing cases, railway material, rosins, coal tar products, copper (wrought and unwrought, including wire), alloys, dyes, foodstuffs, food for livestock, iron angles, bars, billets and constructional material, steel angles, ingot plates and similar raw materials, textile machinery, textile yarns, fibres and waste, tin plates, war material, wire rope, wood and timber.

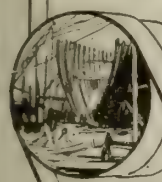
CATALOGUES

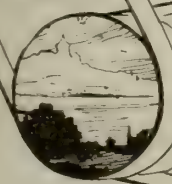
The Dominion Abrasive Co., Mimico, Ont., have issued an attractive catalogue listing the various types of grinding wheels manufactured by the firm. Where formerly wheels were sent out by the various wheel makers with only a certain amount of regard as to the speed of the wheel, and work, and other particulars as to the conditions under which they were to be run, science has stepped in and insisted that for every operation in grinding, the proper wheel made of suitable abrasives of exact grade and grain required to give the most satisfactory results must be provided. With this in view this catalogue has been compiled for the proper choosing of the right wheel for any class of work. The various processes used in making wheels are explained and the various grades and grain sizes are tabulated. General safety requirements and tables of proper wheel speeds are given. The mounting of wheels receives careful attention and protection hoods are dealt with. The various shapes of cup, cylinder, plain and special wheels are shown by means of engravings, and sufficient data given so that a wise choice may be made. An excellent index adds to its value for ready reference.

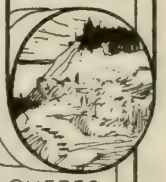
The Combustion Engineering Corporation, 11 Broadway, New York City, have recently issued a bulletin on their Type H stoker, which covers stokers for all classes of industrial and heat treatment furnaces. While many stokers are offered to the public for boiler plants, the Type H stoker remains the one best recognized in the following furnaces, and they are designed for sheet and pair furnaces, general forging, furnaces for drop forging, annealing furnaces, furnaces for rapid production of special shapes such as turnbuckles, sheet-steel, car wheels, arch bars, etc. The bulletin describes the mechanism of the stoker, its construction and operation, and explains the reason for its high economy in operation and ease of control. Adjustment for reducing or oxidizing atmosphere may readily be made. The results obtained from the use of this stoker are given as follows: Absence of smoke, elimination of destructive gases, equable distribution of fuel, a clean fire, easy control of heat and even operation, resulting in a uniform high quality product. Figures are given which show the merits of coal-firing and its cheapness as compared to oil or gas fuel.

The use of coal, stoker-fired also results in the prolonged life of the roof and furnace linings.

Bulletin 106 of the Engineering Experiment Station of the University of







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These technical experts are not merely salesmen, ***they know belting*** and its requirements thoroughly and their services are at your command without charge, whether you are a customer or not.

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DOMINION RUBBER SYSTEM
AND ASSOCIATED COMPANIES

Illinois gives the results of tests on a four-way reinforced concrete flat slab floor of the Western Newspaper Union Building in Chicago, Illinois. [illegible] the upper floor [illegible] tests were made on the sixth floor. A [illegible]

[illegible] effect- [illegible] aratus are very [illegible] The Canadian [illegible] Morse Company [illegible] these specifications to the engineering public [illegible] that they are offered with the hope that they may prove of value to the steam power plant engineer and designer. The information is intended to be of use in the design and operation of the modern steam plant and the specifications were originally written by a well known engineer and subsequently carefully checked. General specifications are included dealing with the properties of materials commonly found in power plants. Steam lines are treated of in detail, the proper sizes and weight of pipe are taken up for varying pressures. Grip piping is [illegible] and instruction is given for [illegible] bends. The [illegible]

[illegible] become white-hot, and the ignition [illegible] of the gases that come from the fuel-bed is thereby greatly promoted. The arch should be high enough above the grates to allow the fireman to throw coal upon all parts of the fuel-bed without inconvenience, and to clean and bank his fires readily whenever it is necessary to do so.

The chief objection that boiler owners urge against installing an ignition arch of this nature is, that by doing so they sacrifice the heating surface that is immediately over the fire. The loss of a few square feet of heating surface in this way is far more than compensated, however, by the much better combustion that the ignition arch ensures. Moreover, the gases should be as hot as possible when they enter the tubes of a fire-tube boiler, because it is there that the absorption of heat should mainly take place.

The ignition arch, when properly [illegible] the economy of the plant by improving the combustion, [illegible]

[illegible] tion [illegible] Company of New York, [illegible] had the personal [illegible] Mr. John R. Dunlap, the [illegible] of that company, who has found it to be a widely appreciated undertaking by engineers throughout the world. The development of his magazine in the specialized field of industrial management, however, made it seem desirable to place the Index in the hands of an engineering organization covering a broader field and serving engineers engaged in more varied activities. The Society immediately recognized the opportunity extended and purchased the Index, thus

bringing "The Journal" the prestige, name and other rights and privileges of what has been regarded as the leading index in the field. This establishes the "Engineering Index" on a secure and non-competitive basis as a logical Society activity.

Through the facilities afforded by the magnificent library of the Engineering Societies, which regularly receives 1,100 periodicals from all parts of the world, the Society has unlimited possibilities in publishing the Index. These periodicals comprise one of the most complete collections of current engineering literature in the world—in not less than ten languages and received from thirty-seven countries. The indexing of engineering articles can be best accomplished by a professional organization and the Society will consider it one of its greatest services to place at the disposal of engineers, through the "Engineering Index" in "The Journal," the means for using the wealth of data and general information published from month to month in the world's technical press.

The plan of classification to be used is as follows: The articles are listed in the general field of engineering to which they belong, and are then grouped together under the particular branch of the general subject. The following classifications give an adequate idea of the scope of the "Engineering Index" as it will be carried in "The Journal": Mechanical Engineering, 31 sub-heads; Electrical Engineering, 11 sub-heads; Civil Engineering, 9 sub-heads; Mining Engineering, 14 sub-heads; Metallurgy, 7 sub-heads; Aeronautics, 19 sub-heads; Marine Engineering, 4 sub-heads; Organization and Management, 13 sub-heads; Industrial Technology; Railroad Engineering, 15 sub-heads; Munitions and Military Engineering; General Science, 3 sub-heads.

NATURE OF COMBUSTION

The process of combustion consists in the active and rapid combination of the fuel with the oxygen of the air. If the coal were composed of pure carbon, and the combustion were perfect, the fuel would be entirely consumed, and would eventually pass up the chimney in the state of the invisible gas known as carbon dioxide (or, more familiarly perhaps, as CO_2 or "carbonic acid gas"); but even in this ideal case the chimney gases would by no means consist of pure carbon dioxide, because air is not pure oxygen. Four-fifths of its bulk, approximately, consists of the practically inert gas nitrogen, and hence, even with perfect combustion and a pure carbon fuel, four-fifths of the gas passing up the chimney is nitrogen, and only one-fifth, at most, is carbon dioxide. The nitrogen takes no part in the combustion, except that by diluting the oxygen it checks the chemical action and causes it to proceed far more slowly than it would if the nitrogen were absent.

In practice the chimney gases contain various other substances besides nitrogen and carbon dioxide, because the fuel is never burned under strictly ideal conditions. If an excess of air is admitted to the furnace, a certain proportion of free and unused oxygen will pass up the chimney, while if the air supply is deficient the chimney will very likely discharge more or less of the gas that is known to the chemist as "carbon monoxide," and which burns with a pale blue lambent flame in household stoves when fresh coal has been recently thrown in. Moreover, coal is never pure carbon. In addition to a certain variable proportion of entirely incombustible matter which remains behind as ash, slate, and clinker, all coal contains more or less combustible matter besides the free carbon of which it mainly consists, and the softer bituminous varieties are particularly notable in this respect. The additional combustible substances to which we refer consist mainly of carbon and hydrogen, chemically combined with each other; and when they burn they generate more or less water-vapor, owing to the oxidation of the hydrogen. The natural moisture in the coal is evaporated at the same time, and the chimney discharges a considerable quantity of water-vapor from these two sources combined. The heat-producing power of coal varies considerably, according to the proportion of these secondary combustible substances that it contains, and numerous formulas and tables are available from which the quantity of heat that will be given out by a ton of coal can be calculated.

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OFFICE & WORKS: MUSKEGON HEIGHTS U.S.A.

POLSON IRON WORKS HAVE BEEN IN EXISTENCE FOR OVER THIRTY YEARS

NOT all the shipbuilding yards of the Great Lakes have been brought into existence by the abnormal demands of the great war. The institution that is the subject of this article has been in active service since the year 1888 under the same name, the Polson Iron Works. During this long life they have built a great variety of vessels, ranging from the famous roller boat, which lies in the bay close to the yard, and the railway car ferry illustrated here, to the 3,500 ton steamers for the Imperial Munitions Board and other interests that have been built during the last twelve months, and which are at present being built.

The yard contains four berths for building, each of them long enough to build the full canal size steamer. They are arranged on each side of the plate shop, two in line. Each berth has a large gantry crane running the full length of the berth, electrically operated. There is a ship on each berth at present, and one is in the fitting-out basin, almost completed, while a second ship is all ready for sea, and only just missed getting away before the close of navigation. The company built and delivered last year the "War Taurus," "Asp," "War Hydra," and "Tento." Besides the four vessels on the stocks at present, the company have contracts for six others, so that they will be busily occupied for some time to come.

The Polson Iron Works build all the boilers for the ships they construct, and in order to carry this work on, they have a large and well equipped-boiler making department. In this shop can be seen the Scotch marine boiler in every stage of its construction. A number of corrugated furnaces stand in one end of the shop, waiting to be fitted in their respective boilers, while in another part are the uptake breechings with their accompanying perforated plates for the Howden forced draught system. Combustion chambers all riveted up ready for fitting in the shells, end plates being flanged in the 150-ton hydraulic flanger, and a large plate bending roll are in evidence.

Occupying a conspicuous place in the floor space is a boiler almost completed, with workmen busily engaged in drilling the shell plates for the rivets with air-operated drills. Further on is a boiler shell in the initial stages of erection. Hydraulic pressure is supplied for the flanging machine and bull riveter by a three throw Deane pump, belt driven, delivering to an accumulator at 1,000 lbs. per square inch. A Canadian Ingersoll-Rand two-stage air compressor supplies air for the air tools used in this shop. The usual complement of wall drills, shears and punches is installed.

The erecting and machine shop are large and well lighted, and are fully equipped for the work in hand. As in the boiler shop, work can be seen here in every stage of progression. A set of triple expansion engines, completely erected, occupy the centre of the shop, with another set about half erected right opposite them. One sees a large low pressure cylinder being bored on a one hundred and twenty inch vertical boring machine, while the bedplate for the same set of engines is being planed on a huge planing machine. Connecting rods, crank shafts, eccentric rods in the rough, half finished and finished stages are being turned in the various lathes, of which there are an ample number. A notable feature of the erecting shop is a vertical gas heating arrangement, for facilitating the fitting of the brass liners on the tail end shafts. This apparatus has been developed by Mr. Wall, the works manager, after careful experiments, and has proved a time saver as well as a labor saver. It consists of a number of perforated pipes arranged to form a circle of about 24 inches diameter. The perforations open to the inside of the circle, and when gas is supplied to the apparatus, for a number of equal sized burners. The liner is placed in the annular space between the burners, and a readily controlled amount of heat is delivered equally all over the surface, expanding it sufficiently for the shaft to slide in the full length. This method allows the liners to be fitted in one piece, and not only that, but makes it possible to easily remove them if necessary, instead of having to cut them off, as was the old practice.

The Punch and Plate Shop

The punch and plate shop is located in between the two sets of building berths, and right in line with the plate storage. The large machines are of the direct steam driven type, that is rather unusual to see in these days of motor drives. The plate and angle furnaces are located in the same shop as the punches, and the large plate rolls are also in this shop. The heavy plate machines are arranged down the centre aisle, and consist of the usual double ended punch and shearing machines, horizontal angle punch, etc. The lighter machines are located on the sides, such as wall drills, small angle shears.

The forge is located at the shore end of the yard, and contains two steam hammers, and ten hand fires; also a small bending slab. Most of the forging for ships and engines is performed in this shop. At the end of the forge is a steam boiler plant, supplying steam for heating and driving the air compressor, which supplies the air for all the air tools in the yard.

Haste Not Everything

Discussing the shipbuilding situation with Mr. Frank E. Wall, the works manager and chief engineer of the Polson Company, the subject of making records in shipbuilding was brought up. Mr.

Wall pointed out that building and completing a vessel in the shortest possible number of days was not so desirable an accomplishment as the general public might be led to believe. He pointed out that many of these ships, after a short trial trip, had to be re-docked and considerable time spent on them, before they could undertake a long voyage, but this phase was never referred to in the published reports of the records achieved. He held it was more desirable

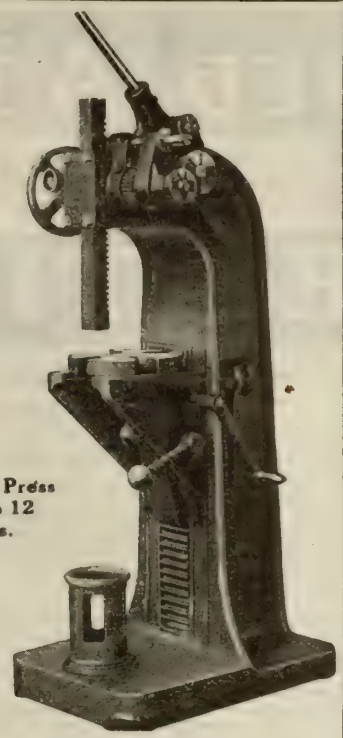
FRANK E. WALL

to take a reasonable length of time for the building and completion of the ship, so that when she was completed she was ready to start on a voyage of any duration without the necessity of dry docking.

Mr. Wall was born in London, England, in 1884, but came to the United States with his parents when only one year old. His development has been, therefore, under American manners and ideals. After serving an apprenticeship in the engineering trade, Mr. Wall went through a course of study under a private tutor in naval architecture.

His first important position was in the United States Navy yard in Norfolk, Va., in 1905, and from there he went to various responsible posts, one of them being on the engineering staff of the Public Utilities Commission of New York City.

In 1915 he went to Mobile, Alabama, to supervise the building of the shipyard there, and so successful was he here that the United States Government called for his services in 1917 as a supervisor of steel ship construction, which position he filled until coming to the Polson Iron Works in the spring of 1918.



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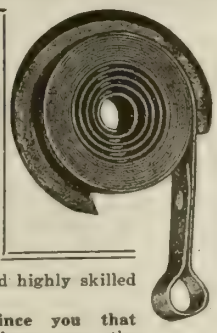

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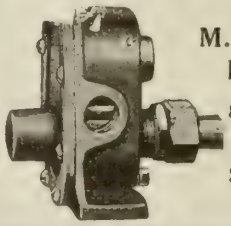

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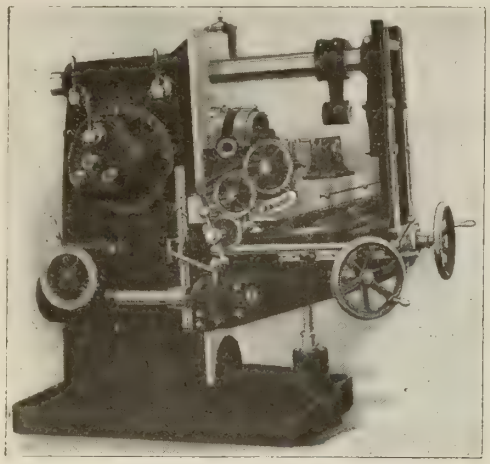

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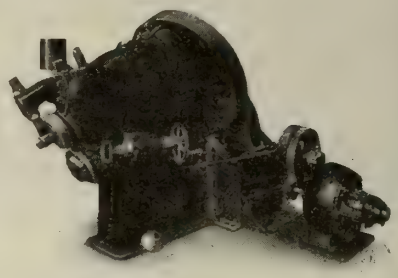

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1—No. 2 Kempsmith New Universal Miller.
5—No. 0 Steptoe Hand Millers.
2—3" x 36" Jones & Lamson, geared head.
13" x 5' 6" New Carroll-Jamieson Quick-change Lathe.
14" x 6' New Carroll-Jamieson Quick-change Lathe.
15" x 6' New Sidney D.B.G. Quick-change Lathe, swing 17".
12—17" x 8' New National Quick-change Lathe.
3—17" x 8' New Sidney D.B.G. Quick-change Lathe, swing 19".
18" x 24" New Rahn Larmon Lathe, D.B.G., quick change.
9—19" x 8' New Sidney D.B.G. Quick-change Lathes, swings 21".
24" x 20' Reed Lathe.
32" x 24' Fay & Scott Lathe, raising blocks to swing 53".
5' Bickford Single Pulley Drive Radial.
4' Mueller Single Pulley Drive Radial.
2—20" Rockford High Duty Drills.
250-lb. New Little Giant Belt Hammer.
100-lb. New Little Giant Belt Hammer.
30-ton Watson & Stillman Hydraulic Press.

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127-131 North Third St., PHILADELPHIA, PA., U.S.A.

IMMEDIATE DELIVERY

MONTREAL STOCK

Motors 3-Phase 60-Cycle

75	H.P.,	550	VOLTS,	450	R.P.M.....2
60	H.P.,	550	VOLTS,	450	R.P.M.....1
15	H.P.,	550	VOLTS,	1,200	R.P.M.....1
10	H.P.,	550	VOLTS,	720	R.P.M.....1
7½	H.P.,	550	VOLTS,	720	R.P.M.....1
7½	H.P.,	550	VOLTS,	1,800	R.P.M.....1
5	H.P.,	550	VOLTS,	720	R.P.M.....1
5	H.P.,	550	VOLTS,	900	R.P.M.....1
5	H.P.,	550	VOLTS,	1,150	R.P.M.....1
5	H.P.,	550	VOLTS,	1,200	R.P.M.....3
3	H.P.,	550	VOLTS,	1,200	R.P.M.....2
2	H.P.,	550	VOLTS,	1,200	R.P.M.....2

TRANSFORMERS....3
200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

550 TRANSFORMERS, POLE TYPE—$\frac{220}{110}$ VOLTS
5 K.W.....2
10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

Prompt Delivery and Subject to Inspection.

Zenith Coal and Steel Products

LIMITED

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The Entire Plant of the British Munitions Company

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Lathes, Drills, Grinders, Furnaces, Punch and Shears, Milling Machines, Twist Drill Grinders, High Speed Hack Saws, Blowers, Compressors, Hydraulic Pumps, Motors, Arbor Presses, Bliss Presses, Oil Tanks, Electric Drills, and a very large number of Machine Tools.

Also supplies of all kinds, including Shafting, Hangers and Pulleys, Belting, Steel Lockers, Time Clocks, Trucks, Standard and Hydraulic Valves, Pipe Fittings and Packings, Tool Steel, Twist Drills, Milling Cutters, Taps, Files, and complete machine shop equipment.

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3

PUNCH PRESS WORK

What Can You Save?

By Using Parts Made in the Punch Press

Look over your standard parts, Mr. Manufacturer, and see what parts can be made (or could be made by slight change in design) by this process.

You will be surprised at the saving you can effect.

We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

A Battery of presses is also available at our plant to manufacture parts for you with the understanding that you pay only for good parts made. Our facilities ensure prompt deliveries at right prices.

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IMPERIAL MUNITIONS BOARD OFFER FOR SALE

PLANT AND EQUIPMENT (IN PART) OF

British Cordite Co., Ltd., Nobel, Ont.

TENDERS, accompanied by marked cheque for 5% of the amount of the bid, will be received by the undersigned up to and including February 20th, 1919, for the purchase of the following, located at Nobel, Ontario:—

ITEM NO. 1. POWER HOUSE.—Building of steel frame construction on concrete foundations.

Boiler-room Equipment.—10-400 H.-P. Wickes, vertical, water tube boilers, equipped with Murphy Automatic Stokers and 2-1 ton coal-weighing lorries.

Ash Handling System—American Steam Jet Ash Conveyor.

Power-House Equipment. 3 Turbo Generators, 3 phase, 2200 volt, 60 cycle; 1-750 K.W. Allis Chalmers; 1-500 K.W. General Electric; 1-1000 K.W. Westinghouse-Parsons, complete with Westinghouse LeBlanc Jet Condenser and 80 H.P. Sturtevant Turbine direct connected to Booster Pump; 1-25 K.W. Westinghouse-Turbo Exciter Set, 125 volt; 1-25 K.W. Canadian Fairbanks-Morse Motor Exciter Set, 550-volt motor, 125-volt generator; 1-30 K.V.A. constant current transformer.

Switchboard—11 panels fully equipped, 1-10 K.V.A., 2200-110 volts and 3-40 K.V.A., 2200-550 volts, Pittsburgh Transformers; 2-18 x 10 x 12 Worthington Fire Pumps; 2-14 x 22 x 14 x 16 Ingersoll-Rand Air Compressors; 2 No. 785 Cochrane feed water heaters; 4 Alberger heaters; 2-Frick Ammonia Compressors, 30 and 70-ton capacity; 2-4" Goulds Centrifugal Pumps, direct connected to 15 H.P. motors; 4-1¼ x 8 and 2-5½ x 8 Deane Single Acting Triplex Pumps, belt driven; 1-42 x 10½ x 48 Hydraulic Pnuematic Accumulator.

ITEM NO. 2. PUMPING STATION.—Equipment—6-9 x 12 Aldrich Triplex Pumps, directly connected to 40 H.P. Canadian Fairbanks-Morse, 550 volt, 40 amp., 60 cycle, 3 phase motor, with starting compensators and switch boxes; capacity 500 gallons per minute; 3-75 K.V.A., 2200-550 volts and 1-550-100 volts Pittsburgh Transformers.

ITEM NO. 3. MACHINE TOOLS.—18" Engine Lathe; 20" Drill Press; No. 4 Power Saw; Keyway Cutter; 16" Stroke Shaper; 10" Emery Wheel Stand; No. 34 Little Giant Screwing Machine with taps and dies.

ITEM NO. 4. TANKS.—Steel Horizontal—33—6' to 20' diameter. Steel Vertical—41 3' to 8' diameter.

ITEM NO. 5. STOVES. 7 Nos. 41 and 42 Quebec Heaters; 5 Oxford Ranges and 16 Oil Stoves.

ITEM NO. 6. STEEL CANS.—12,900 Steel Cans, with lugs and lids, 11½" x 12" x 3-32".

ITEM NO. 7. COTTAGES.—15 Cottages, frame construction, 20' x 34'.

ITEM NO. 8. PRESSES.—8 Dehydrating Presses (Hydraulic).

ITEM NO. 9. PUMPS.—8 Gardner Duplex Pumps, 7" x 3½" x 10".

ITEM NO. 10. WRINGERS.—20 Centrifugal Wringers 24".

ITEM NO. 11. STOCK DRYERS.—3 Sargent (Stock Dryers).

ITEM NO. 12. PICKER MACHINES.—3 Davis and Furber Picker Machines 36".

ITEM NO. 13. KNEADERS.—52 Kneader Machines.

ITEM NO. 14. PRESSES.—19 Darling Presses (Hydraulic). 22 Inglis Presses (Hydraulic).

ITEM NO. 15. PUMPS.—46 Hydraulic Triplex Worthington Pumps, 1 x 4 for 2,000 pounds pressure.

ITEM NO. 16. PUMPS.—10 Vertical Triplex Single Acting, belt driven Worthington Pumps, 3½" x 6" for 250 pounds Pressure.

ITEM NO. 17. PUMPS.—6 Aldrich Pumps, Vertical, Triplex, Back plunger of the solid water end type, double reduction, direct geared for 900 R.P.M. Motor, 9" x 12", Cap. 500 G.P.M., lift 150'.

ITEM NO. 18. BELTING.—A quantity of leather and rubber belting.

Tenders for these items in whole or in part will be considered. The owner will dismantle and load on cars; bids are to be made on this basis. Intending purchasers will be given every facility to inspect the buildings and equipment. Complete information may be obtained from the undersigned.

The highest or any tender not necessarily accepted.

Cheques from unsuccessful bidders will be promptly returned.

R. HOME SMITH

AGENT IMPERIAL MUNITIONS BOARD

18 KING STREET WEST, TORONTO, ONT.

Phone, Ad. 1590

The Financial Post THIS WEEK

ON BANK MERGERS

"IN conclusion, let us repeat that THE FINANCIAL POST stands against bank mergers or other business or industrial combinations which will permit of restriction of public service or the exaction of undue profits, but favors such consolidations as tend to reduce costs of production or service rendered, which is in the last analysis in the interests of the whole people."

ON THE TARIFF PROBLEM

"THE FINANCIAL POST does not now and never has defended a 42½ per cent. tariff; it does not stand for any specific tariff, but it does stand for the intelligent and adequate protection of national industries so that Canada may secure the full benefits of the developments of all her natural resources. That this may be accomplished and that at the same time the necessities of a tariff for revenue may be carefully considered, we have time and again advocated the appointment of a tariff commission to treat scientifically with the whole situation and to provide a meeting ground for the divergent opinions of labor, industry and agriculture."

ON THE PORK SITUATION

"The newspaper contention that Mr. Hoover is getting the British business for American firms, and that the British Government is discriminating against the Canadian product, is hardly a correct or a fair one. The embargo is absolute, against both Canadian and American pork products."

Besides the important articles from which the above quotations are made, THE POST this week deals with the following, amongst other

SUBJECTS OF INTEREST

The Effects of Merger on Bank of Nova Scotia
Australia to Have Agent at Ottawa
Uniform Laws for All Canada
Peace Between Capital and Labor—And Prosperity
The December Bank Statement
Small Packing Plant to Close
Brompton Shows Slight Drop in Earnings on Common
Over $350,000,000 Put Into Electric Projects
Total Clearings for the Week Show Increase
Canadian and American Banking Interests Join
A Bank Misunderstanding With Customer
London Supreme in Money Market
About Bank Mergers (Editorial)
Farmers' Platform on Economic Issues
Scarcity of New Issues is Market Feature
New Pulp and Paper Issue Announced
Manufacturers of B.C. Discuss Income Tax
Ratepayers of Halifax Vote Dissatisfaction
Quebec Province Has Large Surplus
Excelsior Life Wrote Record New Business
Continental Life Writes $2,946,762 New Business
Border Cities Want Some of Housing Loan
The Sugar Supply
Larger Loans and Profits of Dominion Bank
Effects of the Merger on Bank of Nova Scotia
Profits of Toronto General Trusts Show Recovery
Development of Trusts and Guarantee

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Special Machinery, Gears, Jigs, Fixtures, Punches and Die
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MACHINE & TOOL CO.
GALT, ONT.

SPECIAL MACHINERY
JIGS AND FIXTURES PUMPS
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ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

Hyde Engineering Works
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Enquiries Solicited for

General Machine
Contract Work

P. O. Box 1185 Telephones 1863-1864

Automatic Screw Machine
ACCURACY Products QUALITY

Our Mechanical Engineers are
at the service of our Clients.

United Brass & Lead, Limited
St. Helen's Avenue, - Toronto

W. L. TOBIAS, *Superintendent*
Formerly Superintendent National Cash Register Co.

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When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

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GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

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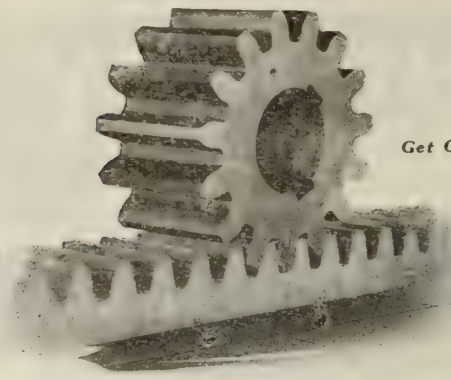
LARGE SIZES OR SMALL



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"Nichrome" Castings
"Made to Endure High Temperature"
CANADIAN DRIVER-HARRIS CO.
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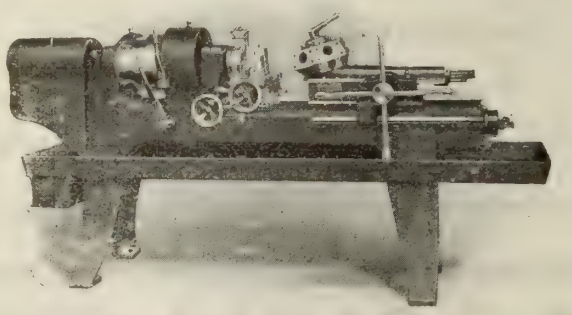
BRITISH WORKS MANCHESTER ENGLAND

The Advertiser Would Like to Know
Where You Saw His Advertisement
- - - - *Tell Him* - - - -

THE TILTED TURRET
A CLEAR TRACK FOR THE STOCK



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Automatic Machinery
for all purposes
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Consult us on your machine problems
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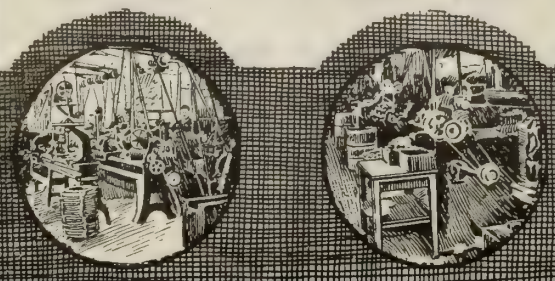

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Office and Works:
Fortierville, Que.

Practice Economy. How?

By sending me your orders for Wilt Twist Drills, both Carbon and High Speed.

Three points to consider:

First—Quality
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I can give you the advantage of all three.

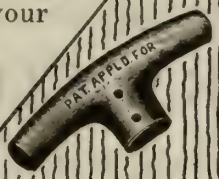
Just Phone or Write.

J. A. M. TAYLOR

318 Stair Bldg. M. 786 Toronto

TOOLS & STAMPINGS

We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.

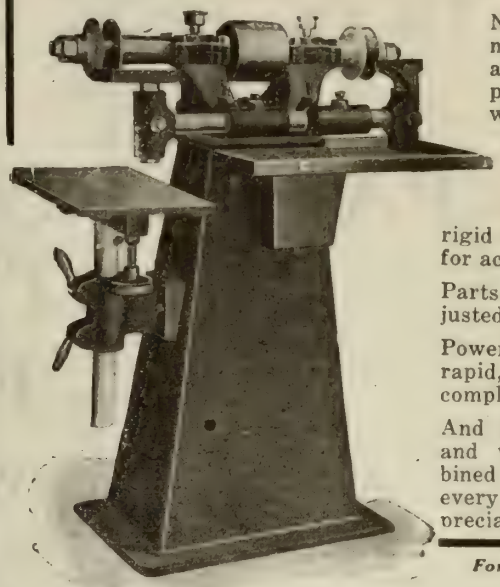


HOMER & WILSON

Stamping and Tool Works

1-5 Lancaster St. HAMILTON

WING
SURFACE GRINDER



Not a big, costly machine—a capable moderately priced grinder whose every part is extra strong.

The grinding surface is as rigid as it should be for accurate work.

Parts are easily adjusted.

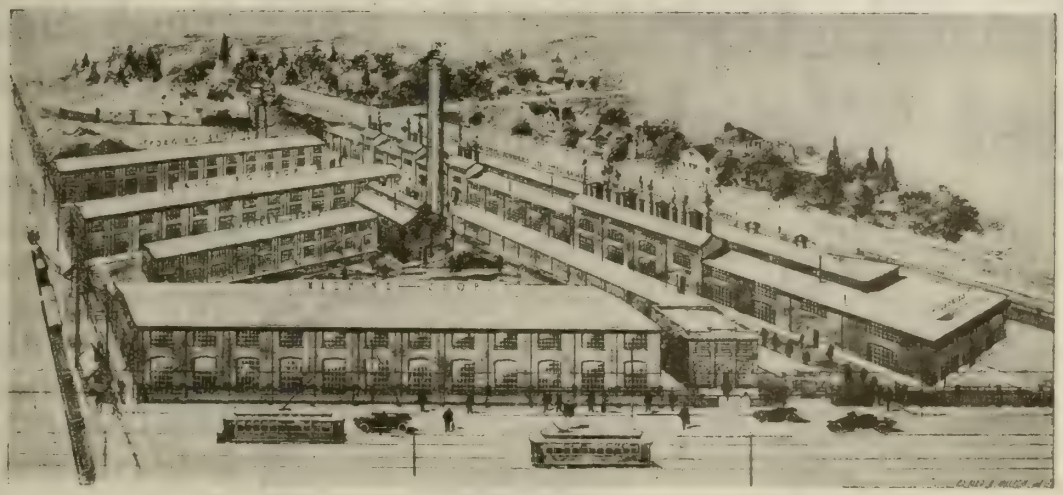
Power is ample for rapid, economical accomplishment.

And the large tray and water pot combined is a feature every operator appreciates.

For Full Particulars WRITE

J. E. WING & SON, Hamilton, Can.

WE ARE ENLARGING OUR PLANT



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"HISCO" will shortly have an increased capacity which will make it the largest foundry of its kind in Canada.
Two big new electric furnaces are being added to our present large equipment. A cleaning and annealing department measuring 300' x 100' is about to be completed.
This will place us in a position to handle orders big and small with unequalled facility.

We make steel, Chrome, Manganese and Nickel Steel Castings—annealed and unannealed.
Cement Mill and Mining Machinery Castings; Stamp Mills, Crushing Plants, and Excavating Outfits.
Steel Car Wheels, Locomotive Driving Wheels and Frames, and all Castings for car builders and locomotives.
GEARS—Machine moulded, any size up to 18 feet without patterns.

Hull Iron & Steel Foundries, Limited, Hull, Que.

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Let Us Quote on Your Contract Work

Our Staff is always available for Consultation.

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And Machine Work of all Kinds

VICTORIA FOUNDRY CO., LIMITED
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Dominion Cast Steel Parts

Open Hearth Products

Machinery Castings of all kinds, Motor Frames, etc., for electrical trade, Pedestal and Miscellaneous Bridge Work, Rolling Mill and Blast Furnace Castings, Gears and Gear Blanks.

We are also prepared to furnish steel plate to 20" wide — for prompt delivery.

We have recently increased the capacity of our plant and can guarantee quick delivery on castings weighing anywhere from 100 lbs. to 50,000 lbs.

Quick Deliveries

Quality and Economy

THE DOMINION FOUNDRIES & STEEL, LIMITED
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SPECIAL MACHINERY

Built to Orde

Also gauges, punches, jigs, dies, small tools, etc.
Prompt Service.
Moderate cost.
Send Blueprints for estimate.

MADE IN BRENCO CANADA

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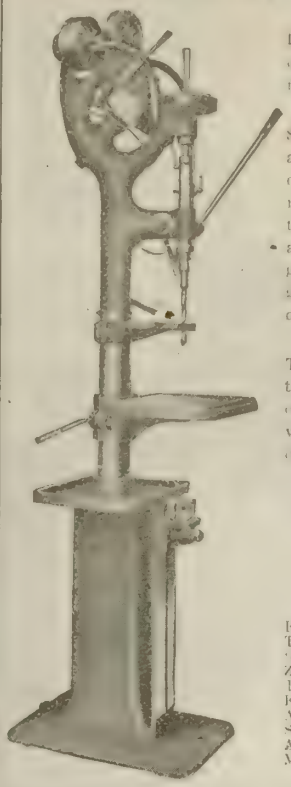
STEEL CASTINGS

1 to 5,000 pounds
Highest Quality
PROMPT AND RELIABLE SERVICE
We make a specialty of Carbonizing Boxes and Cyanide and Lead Bath Pots
SWEDISH CRUCIBLE STEEL CO. OF CANADA, Ltd., Windsor, Ont.

Can Ship at Once
Your Albany High Speed Tool Room Drill



It is ready for immediate use, and you can use it [illegible] at any speed from 200 to 2400.

Starts and stops quickly; speed changes are made easily, and both the speed the drill is running and the speed it should run in different metals are shown on the machine; changes of drills or chucks are rapidly made; micrometer depth gauge, with both metric and English graduations, accurately controls depth of drilling.

This is really a wonderful machine of the highest grade construction throughout, and absolutely guaranteed in every way. It will be a pleasure to send full description; ask for it.

Albany Specialty Mfg. Company
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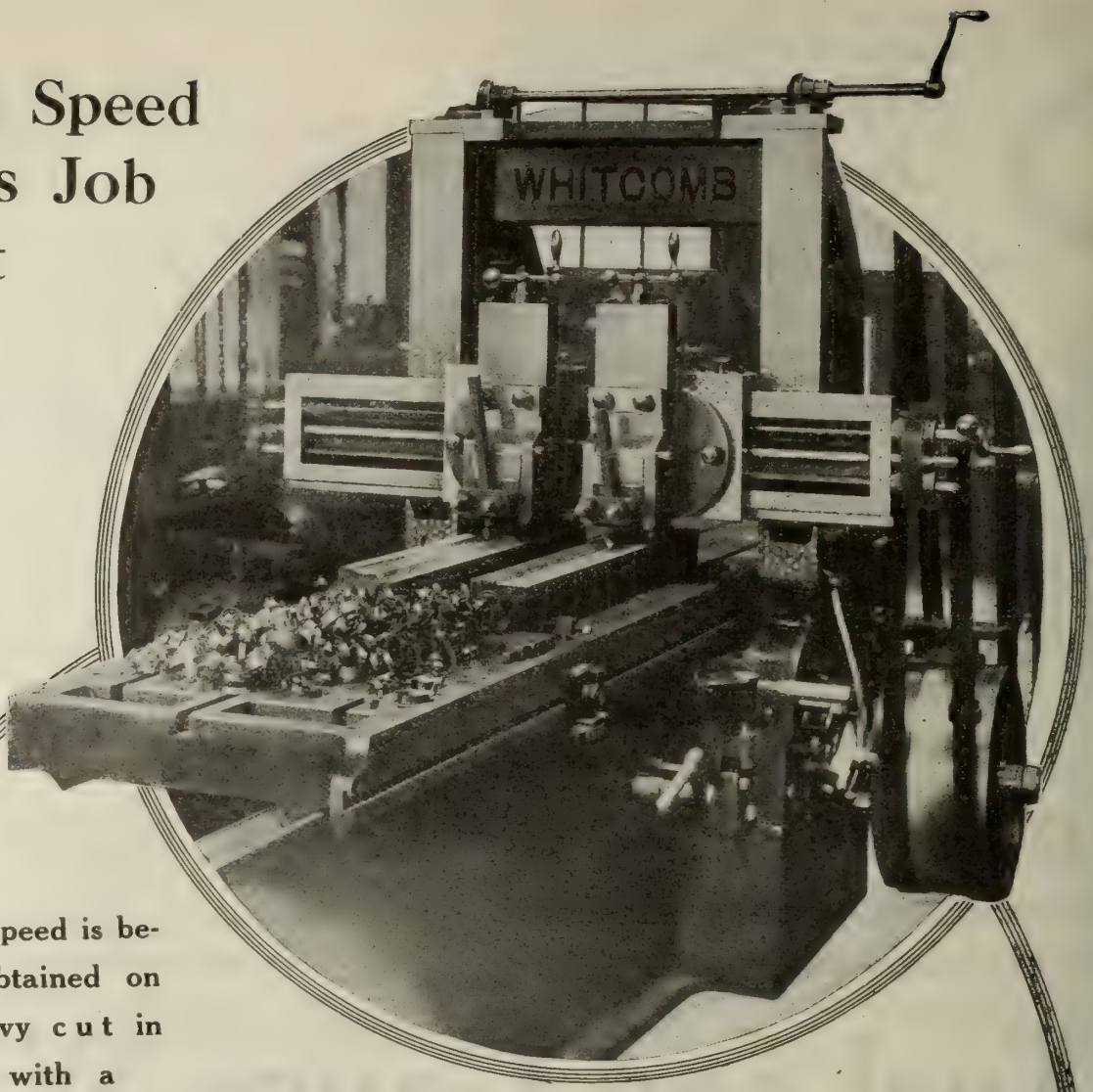
Our present equipment, which is unexcelled in Canada, enables us to produce Thread Gauges, Tools, Dies, Jigs, Fixtures and other gauge work upon short notice.

Our usual guarantee of quality supports our claims.

Windsor Machine & Tool Works
WINDSOR, ONTARIO
ESTABLISHED IN 1910
Representatives for Quebec Province: Canadian Utilities Steel & Engineering Co., 149 West Craig St., Montreal, Que.

Cutting Speed on This Job 70 Feet Per Minute



That speed is being obtained on a heavy cut in steel, with a

Whitcomb-Blaisdell Planer

The Planer with the Second-Belt Drive

The smooth, easy action and rapid, yet gentle, reverse required for such rapid cutting rates is secured by the distinctive table drive of the Whitcomb-Blaisdell Planer.

There are many other Whitcomb-Blaisdell Planers operating at similar high speeds in steel. In numerous cases they are planing brass, copper and other soft materials at one hundred feet per minute.

The Second-Belt Drive—using a belt and pulley to convey power from the pulley shaft to the drive-pinion shaft—eliminates the usual bull wheel and the rapid running train of gears.

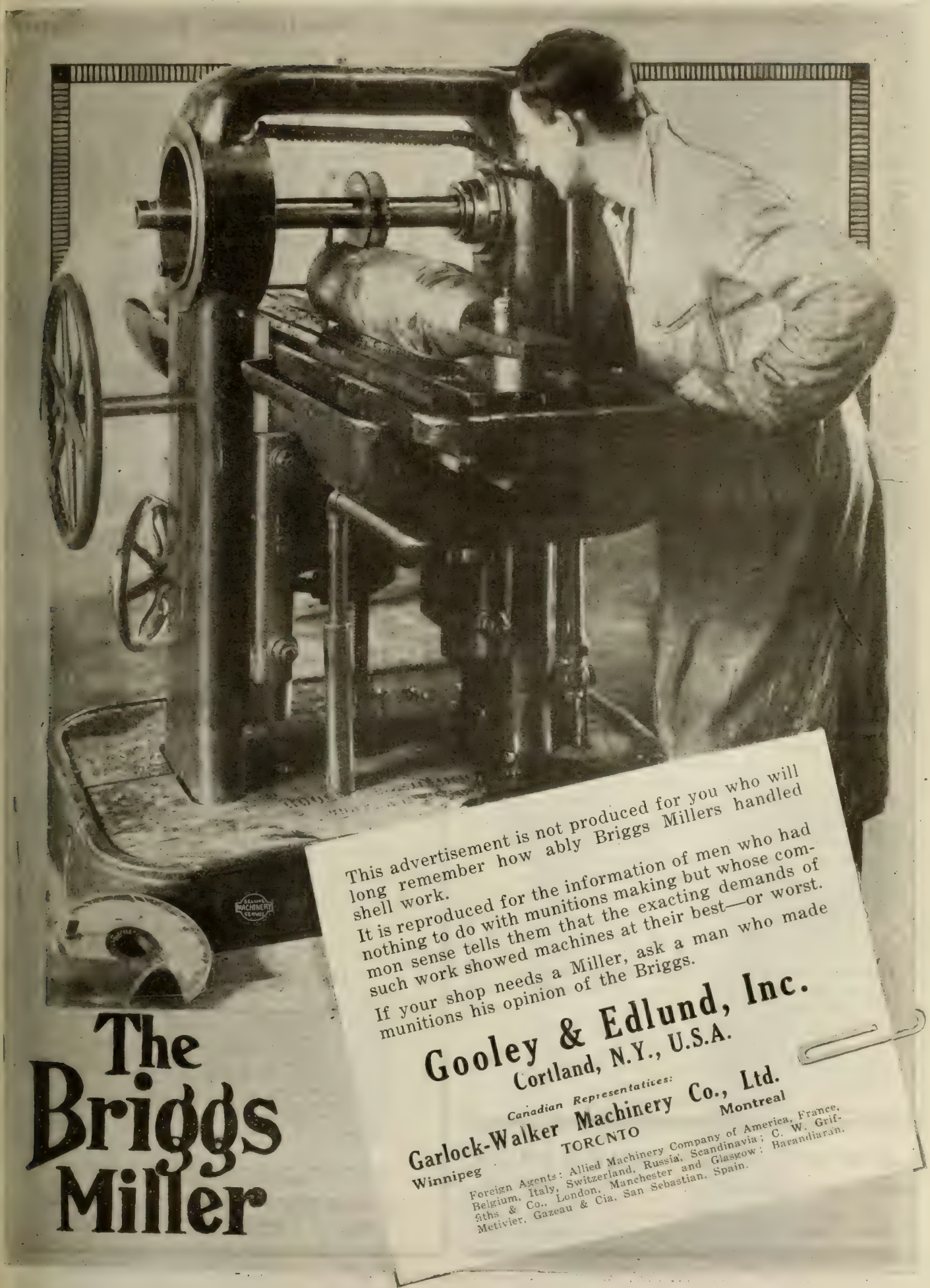
On the Whitcomb-Blaisdell Planer, the table is given a smooth, quiet, yet powerful drive. At the end of the stroke the belt transmission acts with a cushion effect and the planer reverses without shock or jar, yet with the utmost speed.

That is one reason why this machine attains the highest speeds without impairing the accuracy or finish of the work.

Write for Illustrated Catalog that tells all about it.
The big features of this machine will be of interest.

WHITCOMB - BLAISDELL
MACHINE TOOL CO.
WORCESTER, MASS., U.S.A.

LATHES PLANERS


This advertisement is not produced for you who will long remember how ably Briggs Millers handled shell work.
It is reproduced for the information of men who had nothing to do with munitions making but whose common sense tells them that the exacting demands of such work showed machines at their best—or worst.
If your shop needs a Miller, ask a man who made munitions his opinion of the Briggs.
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Canadian Representatives:
Garlock-Walker Machinery Co., Ltd.
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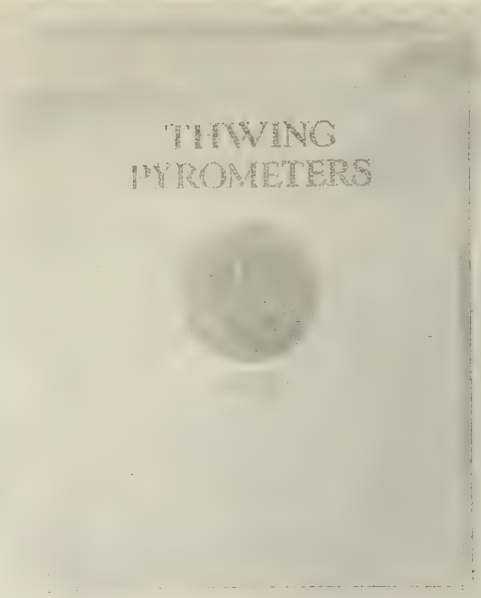
The Briggs Miller



Your Copy Is Ready For Mailing Send For It To-day

HERE'S a book that everybody with heat control problems ought to read—not a mere catalog of Thwing Thermo-Electric, Radiation and Resistance Pyrometers, but an engineering discussion of important economies and possibilities —a collection of good hints and advice on how to get accurate heat control with inexperienced labor, how to make conscientious men more valuable, how to compel proper attention, how to get a higher percentage of **first class** heat treated metal in shorter time and with less (often **very much less)** fuel, etc. Among interesting subjects on which every one interested in heat treatment should be posted, are included the following. Proper use and comparative advantages of multiple recorders and indicators for pyrometers; base-metal vs. platinum thermo-couples; correction of cold-end error-protection and mounting of thermo-couples; advantages of high-resistance galvanometers; theory of thermo-electric, radiation and resistance pyrometers; methods of determining critical points of carbon steels; calibration of pyrometers; helpful wiring suggestions, and miscellaneous data on exact melting points, heat treating temperatures in various industries and conversion of Centigrade to Fahrenheit temperatures and vice-versa.

In sending for your copy, tell us what you use pyrometers for so that we can give you additional interesting data applying to your individual conditions.

32

Thwing Instrument Co.

34th St. and Lancaster Ave. - Philadelphia, Pa.

Canadian Representative:
James DeVon, 227 Davenport Road, Toronto, Ont.

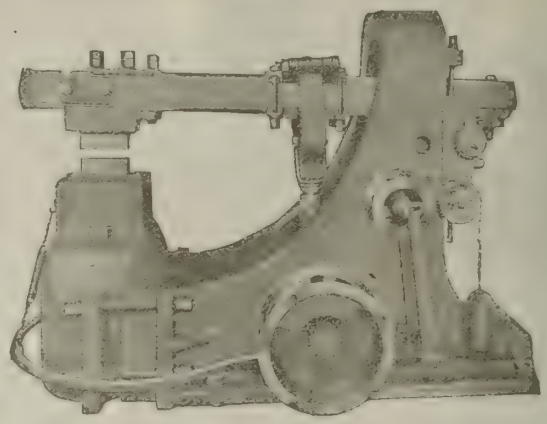
A Rochester Helve Hammer and a Smith are Mighty Good Company for Each Other

ROCHESTER HELVE HAMMERS

Six Sizes
Two Styles of Frames

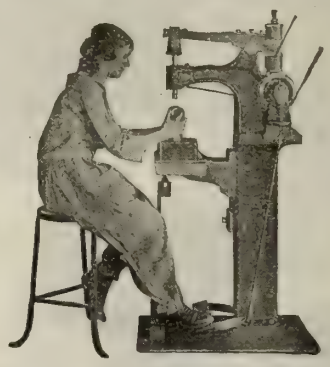
Are adjustable for length of stroke while running.

Long stroke provides for handling larger work than other hammers of the same head sizes and the springy forging blows delivered by the solid hickory helves combine advantages of forging and drop hammers.



THE WEST TIRE SETTER CO.
ROCHESTER, NEW YORK

The Hammer With The Human Stroke



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Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:—

A rivet a second, sizes up to 3/16".
A rivet in two seconds, size ¼" to ⅜".
A rivet in three seconds, size 7/16" to ⅝".

And on special order we build machines to handle rivets up to 1½" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the High Speed Riveting Hammer does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

and

Let us shoulder your riveting problems.
Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.
ROCHESTER, N.Y.

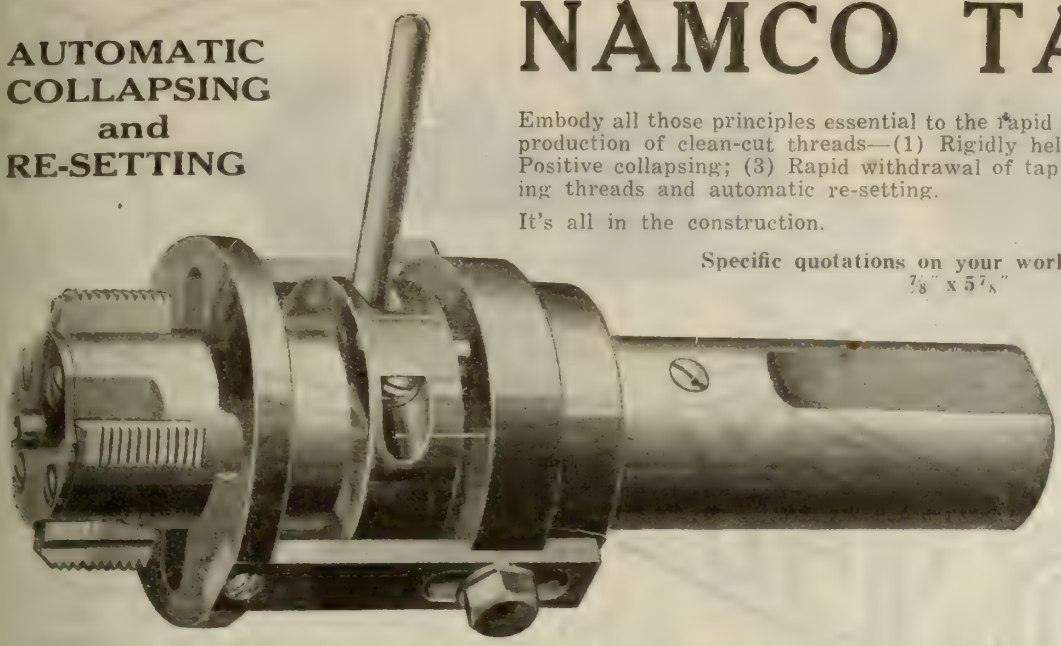
AUTOMATIC COLLAPSING and RE-SETTING

NAMCO TAPS

Embody all those principles essential to the rapid and economical production of clean-cut threads—(1) Rigidly held chasers; (2) Positive collapsing; (3) Rapid withdrawal of tap without injuring threads and automatic re-setting.

It's all in the construction.

Specific quotations on your work. Capacities, 7/8" x 5 7/8"



THE NATIONAL ACME COMPANY

New England Plant WINDSOR, VERMONT

CLEVELAND, OHIO

Canadian Plant MONTREAL, P.Q.

Branch Offices: New York, Boston, Chicago, Detroit, Atlanta, San Francisco
Representatives in Foreign Countries

Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, Ohio.

RICKERT-SHAFER TAPPERS

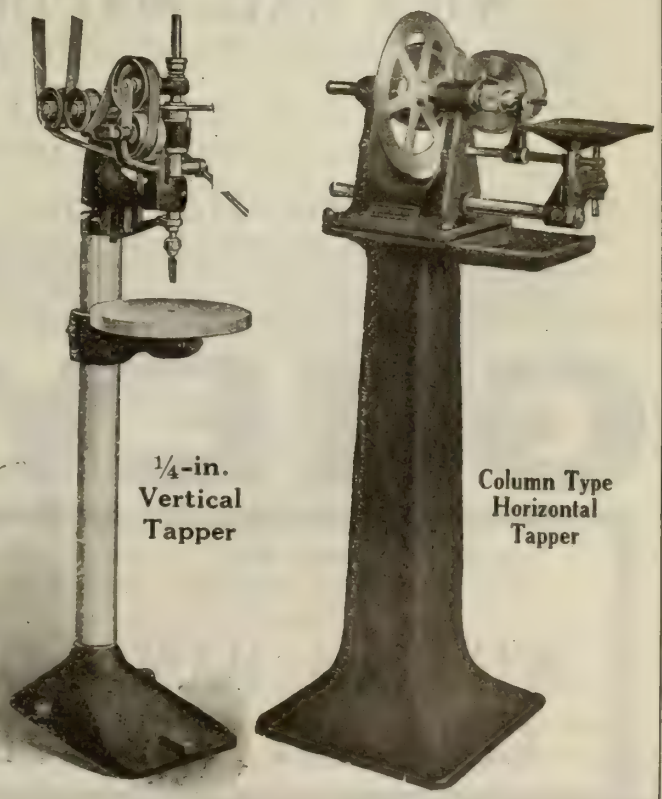
Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on 5/8-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.

Write for specifications



1/4-in. Vertical Tapper

Column Type Horizontal Tapper

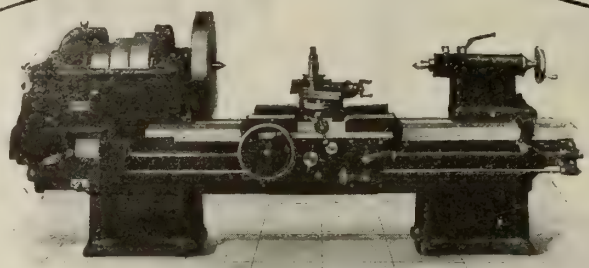
The Rickert-Shafer Co.

ERIE, PA., U.S.A.

FRED HERBERT, Foreign Agent, Coventry, England

Powerful ! Rigid !

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool-room work or the heaviest duty shipyard or munition plant rapid production work.



SIDNEY For Service

Illustration shows "SIDNEY" 25-INCH HEAVY DUTY LATHE. Takes deep cuts through the toughest metal—and does it without a pause and with never a chatter. Specifications include 3-step cone, double back gear, semi-quick-change gear lathe, built on 10-ft. bed. This lathe also furnished with quick-change gears. Bed lengths available, 10, 12, 14, 18 and 20 feet.
Be sure to write for our new Bulletin.

Canadian Agents
THE GEO. F. FOSS, MACHINERY & SUPPLY CO
Montreal, Quebec
H. W. PETRIE, LIMITED, Toronto, Ontario

The Sidney Tool Co.
Sidney, Ohio, U.S.A.

MAKE NAILS! NOT NOISE!

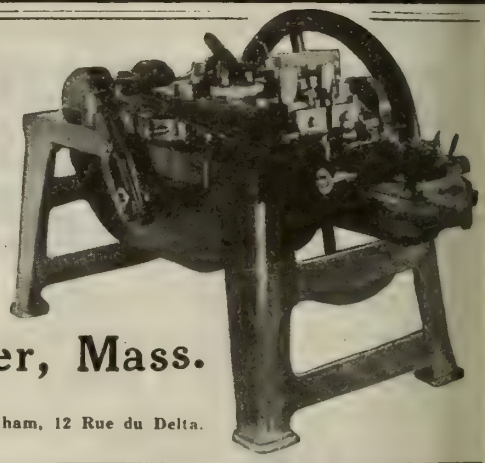
We offer the trade new types of

WIRE NAIL MACHINES

QUIET IN OPERATION; WITH VERY HIGH OUTPUT; ALL PARTS ACCESSIBLE; DECREASED MAINTENANCE COSTS; GREAT CAPACITY; OCCUPYING SMALL FLOOR SPACE.

Smoothly running machines, with balanced mechanical motions and no rotating cams. Built in 5 sizes, handling wire from No. 17 to ⅜" diam.

PRACTICALLY NOISELESS IN OPERATION



Sleeper & Hartley, Inc., Worcester, Mass.

CANADIAN BRANCH, COATICOOK, P.Q.

London, England, F. A. Perry, 63 Queen Victoria Street, E.C. 4. Paris, France, Edgar Bloxham, 12 Rue du Delta.
Australia: win ood Pty. Ltd., Melbourne.

GREY IRON Castings

Special Equipment Built to Specification
Steel Plate and Structural Steel Work
Quality and Prompt Service Double-Sure

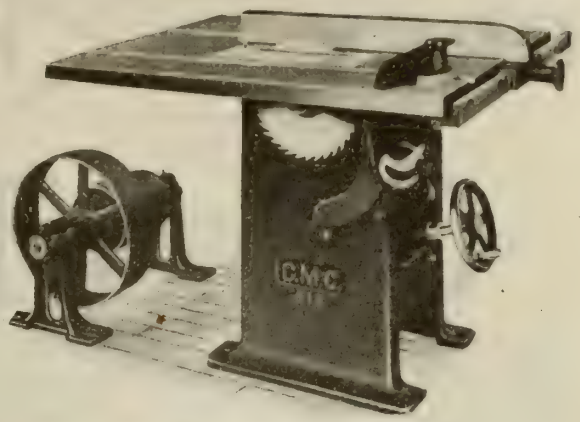
WILLIAM HAMILTON COMPANY, LIMITED, Peterborough, Ont.

"Treat Your Machine as a Living Friend"

When you need a thing you pay for it whether you buy it or NOT.

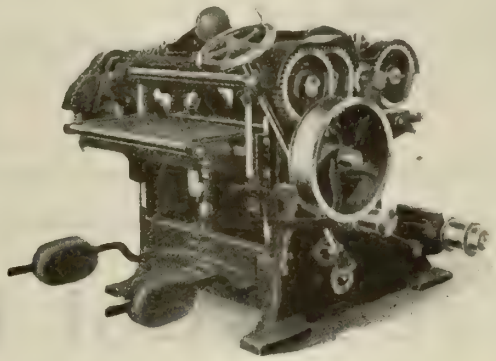
DO you need any Woodworking Machinery in your pattern shop or carpenter shop? A few suggestions are offered herewith.

Consult us if you want the best in Woodworking Machinery for making patterns, sashes, doors, furniture of all kinds, and any article manufactured from wood.



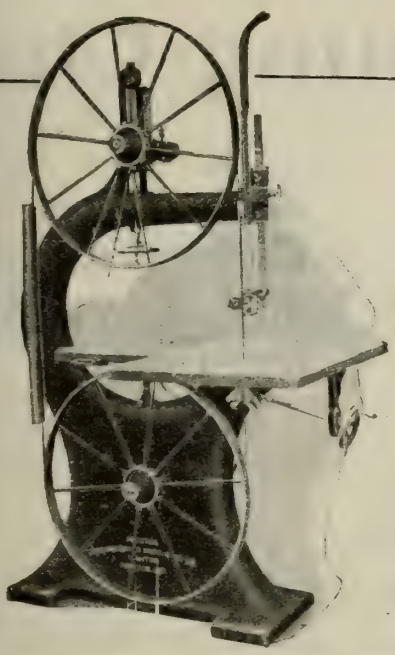
No. 125 Tilting Top Saw Table

A medium weight machine, very desirable for pattern shop work. Supplied with guard. Capacity up to 3" thick



No. 121 Light Surface Planer

Planes either 20" or 24" wide x 8" thick. Much superior to a larger machine for running material within its limit.



No. 132-36 Band Saw with All-Steel Wheels

Guarded to meet requirements of Factory Inspector.

No. 143 Buzz Planer and Jointer

With round safety cylinder and guard to conform with safety requirements of Government Inspectors.

The ***Preston Woodworking Machinery Co., Ltd.,*** *Preston, Ont.*

PLUMBING, BUILDERS and HARDWARE

Galt Ont.

GREY The K—T Foundry IRON

Trade Mark

CASTINGS

These are our SPECIAL LINES. But at this time we are prepared to handle contract work up to 15 tons per day. For gated pattern, match plate, stripping plate, machine and repetition work of any kind we are prepared to quote you most attractive prices and prompt delivery.

Would You Like to Know

the analysis and physical test of metal in your castings? How they could be made cheaper? What properties of metal would facilitate your finishing operations or improve their quality?

We can furnish semi-finished Castings, being equipped to do lathe drilling and reaming work—also expert metal pattern work.

Ask Us

Free Tool Grinding Chart

Grind your cutting tools in exactly the right way to get best results—and you save time. That's obvious. It is precisely that that this Tool Grinding Chart enables you to do.

It has been adopted as standard by many firms that found it a long way better than guess work.

CANADIAN MACHINERY would like to see this Chart in every shop in the Dominion. Mail the coupon below for your copy to-day.

Shows at a glance Correct Clearance and Rake Angles for Cutting Tools

CANADIAN MACHINERY,
153 University Avenue, Toronto.

Please send me/us free, one of your tool grinding charts.

Signed.....

Firm Name.....

St. Address.....

City.....

Prov. .....

Mechanical Engineering Books

If you are desirous of improving yourself in your trade and so putting yourself in the position of making more money, these Mechanical Engineering Books will be found helpful.

[illegible] paid on receipt of price. We can also furnish you with other standard works on [illegible]ineering in all its branches, including books for Civil Engineers, Contractors, Electricians, Foundrymen, Steam Engineers, Mechanical Engineers, Municipal Engineers, Railroad Engineers, Sanitary Engineers, Gas Engineers, Hydraulic Engineers, Technical Men.

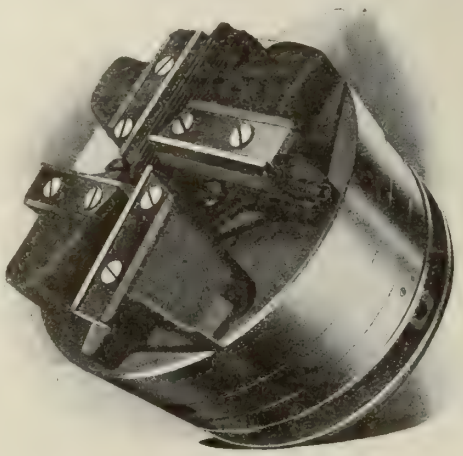
Technical Book Department

MacLean Publishing Company 143 University Ave., Toronto

LANDIS DIE HEAD PRODUCES 30 - ¼" BOLTS PER MINUTE

Threading 30 ¼" bolts per minute is the job of a Landis Die Head in a big plant. This production is not obtained spasmodically, but the head day by day has been maintaining this same steady pace.

The chasers used on this job have been ground but once in two weeks. Do you get the full meaning of this? The Landis Chaser has at least three inches of available cutting material and only 1/32 inch is removed at each grinding. Consider then the life of one set of chasers and the corresponding low cost of upkeep.



This same company have six heads in all installed, and every one is producing results which have one meaning—the superiority of the Landis Die.

Do you obtain such results? Send us your specifications and let us prove to your satisfaction that the Landis Chaser will insure better threads, a higher production, and an extremely low threading cost.

Catalogue No. 24 on request.

LANDIS MACHINE COMPANY
WAYNESBORO, PA.

An Innovation In the Field of Wall Radial Drills

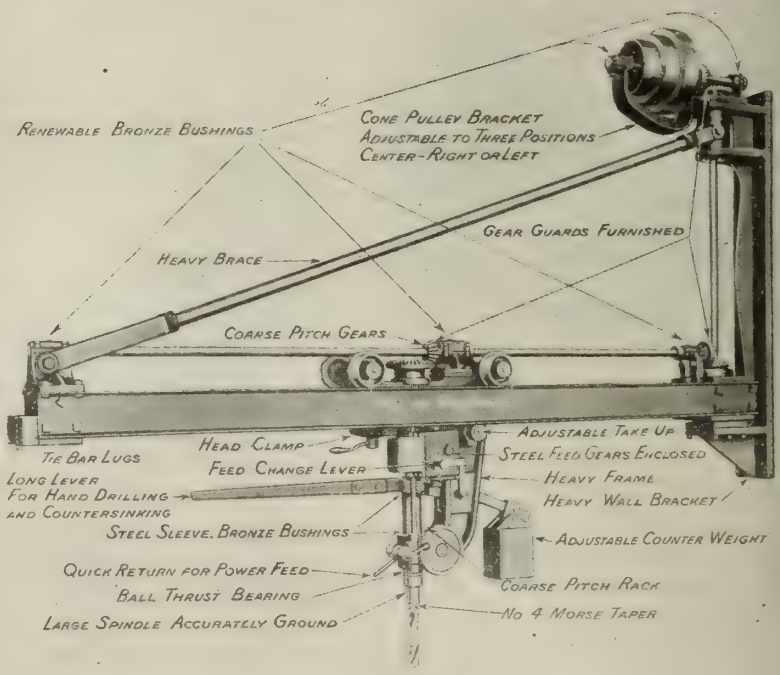
You really can't afford to be without this drill. It's a maximum producer, the entire control being placed within easy reach of the operator. Workmanship and material beyond criticism. Satisfied customers assure us the machine is a "dandy."

Better get our bulletin to-day, giving detailed description.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY
419-425 Atlantic Avenue BOSTON, MASS.

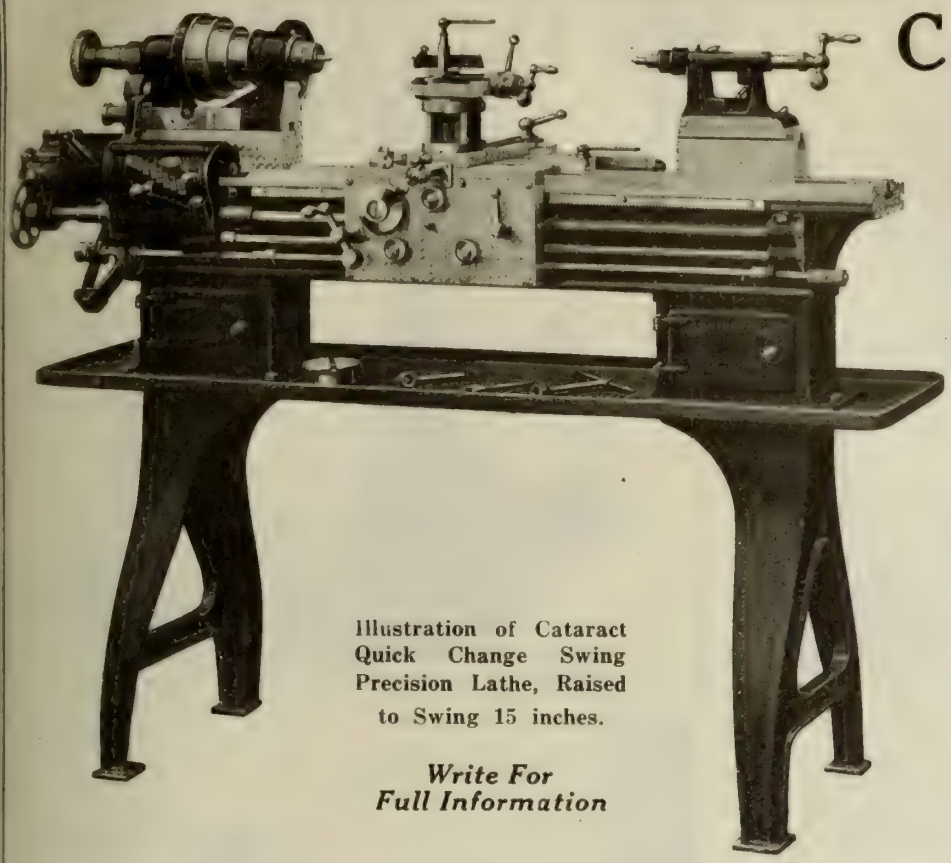


Illustration of Cataract Quick Change Swing Precision Lathe, Raised to Swing 15 inches.

Write For Full Information

CATARACT

QUICK-CHANGE PRECISION LATHE

Ideally designed for both ordinary and specially fine work. This Cataract lathe has accomplished so much in so many plants we'd particularly like YOU to know all the particulars of its unusual record.

Length of Bed .....52"
Total Length of Lathe .....65"
Distance Between Centres...28'
Swing .....9" and 15"
Swing over Carriage 5½" and 11½'
Diameter of Lead Screw 1" x 6 pitch
Diameter of Front Cover.2 1-32"
1 Diameter of Rear Bearing 1⅛"
Length of Spindle .....15"
Hole through Spindle.....1¼"
Draw-in Chuck Cap.1" maximum

Hardinge Bros., Inc.
1770 Berteau Avenue
Chicago, Ill., U.S.A.

STEEL CASTINGS

Mild Steel, High Carbon Steel, Manganese Steel, Chrome Steel

We are manufacturers of Steel Castings running from ½ lb. to 5,000 lbs. each and are in good position to furnish prompt deliveries at moderate prices. Try us with your next order.

The Wm. Kennedy & Sons, Limited, Owen Sound
ESTABLISHED 1850

"Curtis Facts"

[illegible] are convincing arguments for the construction and utility of this machine. Thread cutting can be performed fast, clean and true. Equipped with self-centering vise.

The Curtis & Curtis Co.
115 Garden Street Bridgeport, Conn.

IMPERIAL CARBIDE

For Welding Cutting and Lighting

[illegible] Ltd.

[illegible] uting

[illegible] out Canada

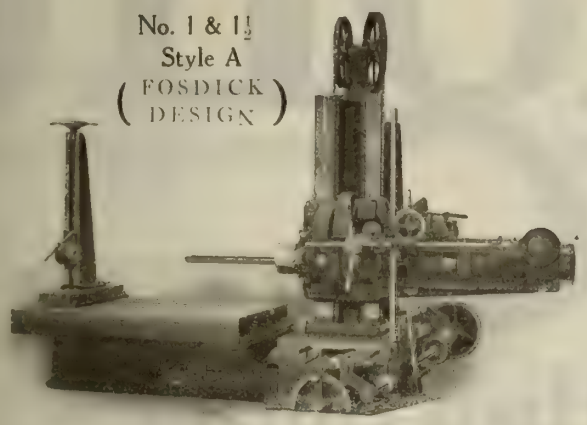
U.S. MILLER

[illegible] hand to use for [illegible] small parts. They [illegible] quicker, more easily handled and more capable for this work than big tools. You can actually reduce your milling costs one-third to one-half on each part by the use of the U. S. Hand and Weight Miller. Finely built to combine speed, accuracy and durability.

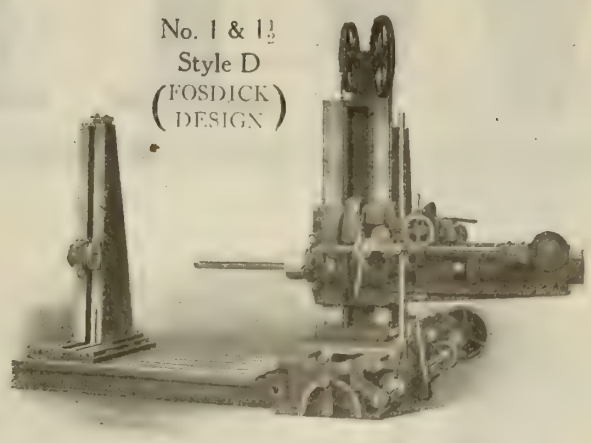
United States Machine Tool Co.
CINCINNATI
Ohio U.S.A.

HORIZONTAL BORING DRILLING AND MILLING MACHINES

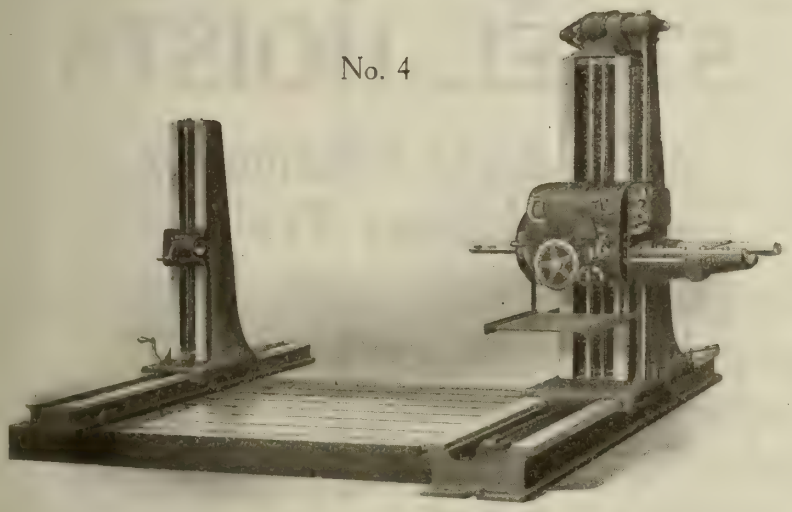
No. 1 & 1½
Style A
(FOSDICK DESIGN)



No. 1 & 1½
Style D
(FOSDICK DESIGN)



No. 4



	No. 1	No. 1½
Diameter of spindle	3½"	4"
Morse taper No.	5	6
Traverse of spindle	28"	30"
Vertical adjustment of head	36"	54"
Horizontal adjustment of column	36"	62"
Maximum, work bed to center of spindle (Style A)	44"	62"
Maximum, work bed to center of spindle (Style D)	58"	76"
Size of work bed	42"x72"	42"x120"
Speeds (4 to 255 R.P.M. geometrical progression)	12	12
Feeds, in all directions (.007 in. to ¼ in. per revolution)	8	8
Motor horse power	7½	10
Floor space	9'x15'	11'x19'
Total height of machine	8' 9"	10' 3"
Net weight (Style A machine)	16,000 lbs.	21,000 lbs.
Net weight (Style D machine)	15,000 lbs.	19,500 lbs.

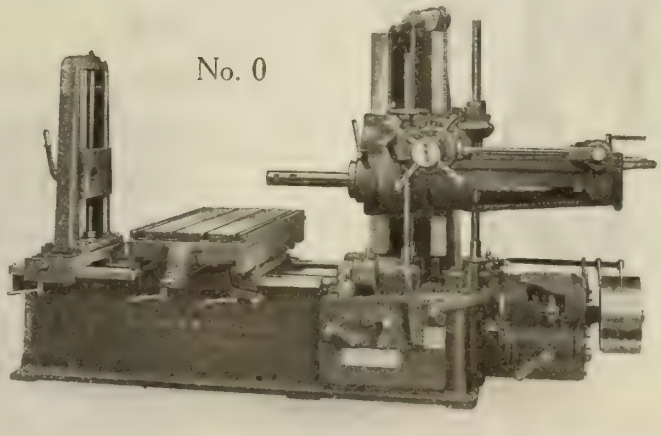
No. 4--FOR BIG WORK

Diameter of spindle	5"
Size of hole in spindle	Morse No. 6
Size of floor plate	8'x12'
Total height	13' 4"
Floor space required	16'x24'6"
Weight	50,000 lbs.

No. 0---FOR PRECISION WORK

Diameter of spindle bar	3⅛ in.
Spindle bored to fit Morse Taper No.	5
Longitudinal travel of spindle	26 in.
Vertical adjustment of head on column	25½ in.
Size of table	24 in. x 50 in.
Traverse travel of table	30 in.
Longitudinal travel of table	32 in.
Approximate weight	9500 lbs.

No. 0

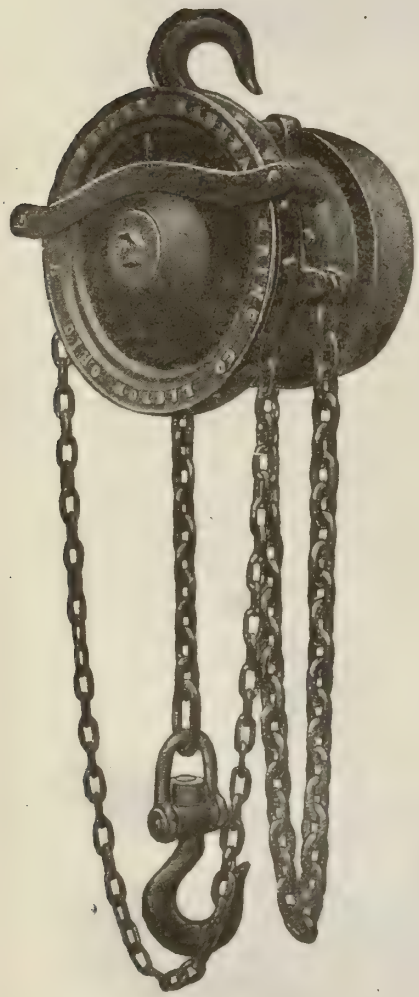


Write for detailed information and catalog.

Giddings & Lewis Manufacturing Company, Fond Du Lac., Wis.

Foreign Agents: Canadian Fairbanks-Morse Co., Toronto, Montreal, Winnipeg, Vancouver; Fenwick, Freres & Co., Paris, Lyons, Liege, Zurich, Turin, Barcelona, Lishbon; Burton-Griffiths & Co., England; Wynmalen & Hausmann, Rotterdam; R. L. Scrutton & Co., Ltd., Sydney, Australia; Rylander & Asplung, Stockholm; Wilh. Sonesson & Co., Malmo.

Wright



High Speed STEEL HOISTS

The Right Solution for Your Lifting Problem

Wright Hoists will outlift and outlast any other block on the market.

Every load sustaining part is practically indestructible.

Constructed of steel and cast iron throughout.

Wright hoists raise loads quickly, easily and economically—they are the Hoists that NEVER FOUL, the hoists that will save money for your plant.

Write for Catalog.

WRIGHT MFG. CO., LISBON, OHIO

Canadian Agents:

THE A. R. WILLIAMS MACHINERY CO., LIMITED

Montreal Winnipeg Vancouver Detroit St. John, N.B. Toronto Buffalo

"NEW BRITAIN" SHOP FURNITURE

"NEW BRITAIN" SHOP FURNITURE

1919

What Has It in Store for You?

Two sound reasons for entertaining an optimistic view of the business outlook for the coming year offset each doubt that may be raised concerning it.

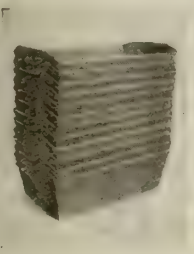
Upon its ability to adjust itself rapidly to changing conditions — rather than upon factors wholly outside its control—will depend the measure of the individual concern's success.

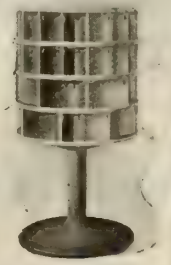
It will not be a time for relaxation of efforts toward production acceleration and waste elimination—on the contrary, the return of keen competition for the world's markets will call for even greater endeavors in this direction.

Every item of "New Britain" Shop Equipment is designed to promote the efficiency of the worker. Have you the catalog?

The New Britain Machine Company
New Britain, Conn., U.S.A.

NEW BRITAIN NB NONE BETTER





WELDING and CUTTING

THE CARTER WELDING COMPANY OF TORONTO, LIMITED, announces that in addition to their OXY-ACETYLENE WELDING and CUTTING DEPARTMENT they have added ELECTRICAL WELDING MACHINES, and THERMIT WELDING EQUIPMENT.

They are now equipped to handle everything in Oxy-Acetylene, Electrical and Thermit work. No job too small, and none too large.

OXY-ACETYLENE WELDING DAVIS APPARATUS DAVIS-BOURNONVILLE CO. N.Y.

THE CARTER WELDING COMPANY OF TORONTO, LIMITED, are the sole Canadian agents for the DAVIS-BOURNONVILLE Welding and Cutting Apparatus, and handle—

Portable Generators	Carbide	Carbon Removers
Stationary Generators	Welding Rods	Portable Trucks
Welding Torches	Flux	Compressed Acetylene
Cutting Torches	Carbonite Rods	Electrolytic Oxygen
Regulators	Goggles	99.80% pure
Hose		

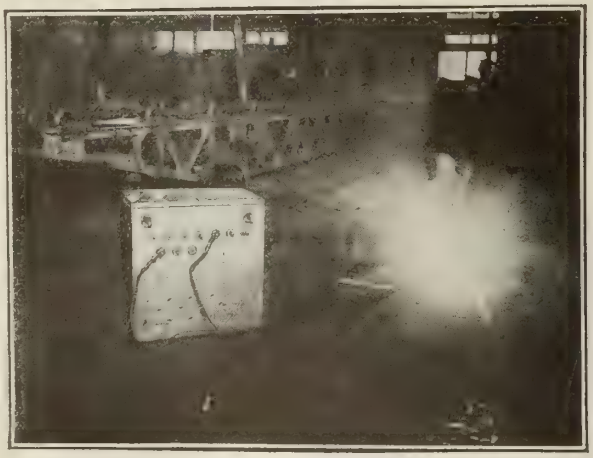
There is no connection with any other firm in Canada under a similar name. All correspondence to be sent to Toronto office.

The CARTER WELDING CO. of TORONTO

LIMITED

9 Sheppard Street - Toronto, Canada

Electric Welding by Alternating Current



WELDING STEEL PLATE
HAMILTON BRIDGE WORKS, HAMILTON, ONT.

The

"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

Reduces welding costs to minimum
Does not require expert to operate

The Arcwell Corporation of Canada, Ltd.

710 C.P.R. Building, Toronto

U.S. Office: 42 Broadway, New York City

That STOCO "CELOGLAS" SHATTER-PROOF LENS saved my sight

Your men will appreciate the protective advantages of this new **"Celoglas"** lens. It's the best possible protective lens in the best possible protection goggle.

The new **"Celoglas"** lens will be supplied only in STOCO safety goggles. It is composed of a sheet of thin celluloid cemented by an exclusive process between two clear glass lenses. It has practically the same percentage of visibility as a lens made entirely of optical glass, and a very much higher degree of eye protection.

"Celoglas" lenses may fracture through a severe blow from a flying missile, but they will not leave the frame and the glass will not fly into the eyes of the wearer. You can supply them to your employees with the assurance of perfect security.

STOCO safety goggles are supplied with either easy cable temples, as illustrated, or with elastic headbands, each pair in an individual carton. The price is the same with either cable temples or headbands.

Price with heavyweight optical glass lenses, $115.00 per hundred pairs.

Price with **"Celoglas"** shatter-proof lenses, $150.00 per hundred pairs.

Sample with either **"Celoglas"** or regular lenses will be sent without charge to any safety engineer or superintendent upon request.

STANDARD OPTICAL CO.
GENEVA, N. Y.

RHODES VERTICAL & HORIZONTAL SHAPER

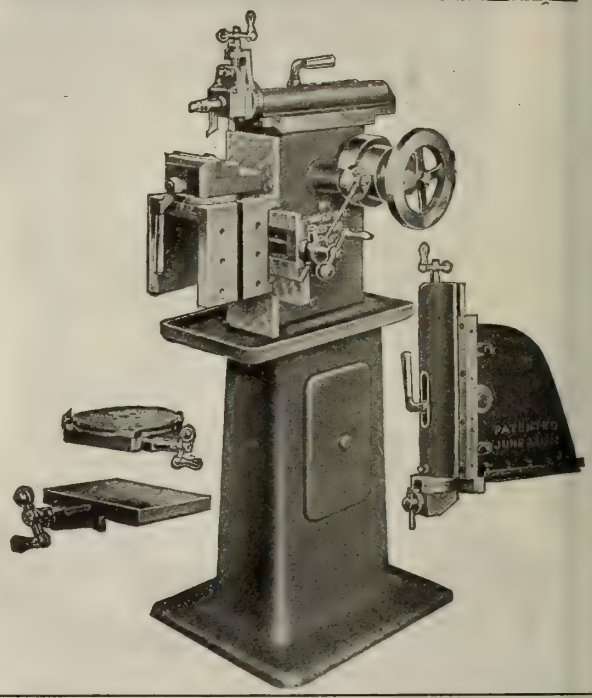
Saves Time and Expense

Not only does the Rhodes Vertical and Horizontal Shaper **save time and expense**, as compared with larger tools, but it does more accurate work and takes up less space.

Easily attached adjustments give the Rhodes an exceptionally wide range.

If you want the most economical and efficient production let a Rhodes Machine do your shaping and slotting, die-making, tool-making and similar light work.

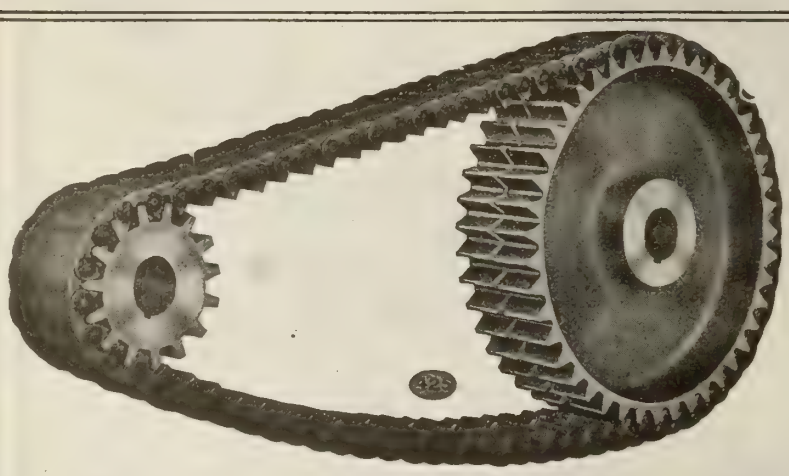
Rhodes Slotters and Shapers have many features which will interest you. Write.



The Rhodes Mfg. Company

Owned and operated by the Jacobs Mfg. Co.

HARTFORD, CONN., U.S.A.



Jones & Glassco (Reg'd)

ENGINEERS

MONTREAL AND TORONTO

Specialists in

POWER TRANSMISSION CHAINS

CANADIAN AGENTS FOR

"RENOLD"

Patent Silent and Bush Roller Chains

"MORSE"

Rocker Joint Silent Chains

Chain Drives from ¼ H.P. to 5000 H.P. in successful operation

Write for particulars to

Head Office: St. Nicholas Building MONTREAL

Branch Office: 1204 Traders Bank Building TORONTO

BERNARD WOOD SPLIT PULLEY

Why waste power that costs money?

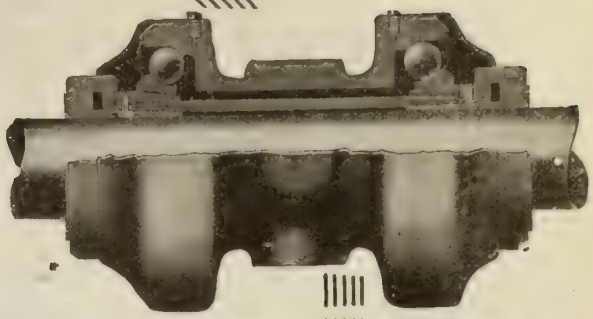
This can be effectively prevented by using "Bernard" Wood Split Pulleys.

Let us quote on your requirements.

The A. Bernard Industrial Company, Fortierville, Quebec

Manufacturers of High Grade Power and Transmission Appliances

Chapman Double Ball Bearings



Sectional view of Chapman Double row ball bearings.

One of the many types of frames we fit.

Pay You to Adopt Them

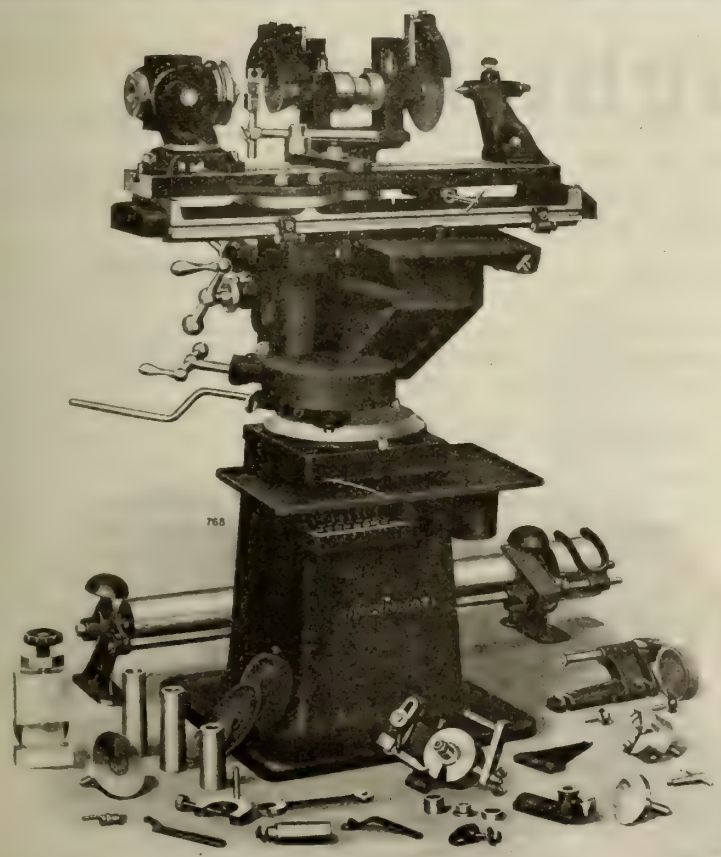
Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball Bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.

Chapman Double Ball Bearings practically eliminate friction, and they require lubrication only once or twice a year—therein lies the secret of their economy.

Chapman Double Ball Bearing Company of Canada, Ltd.

339-351 SORAUREN AVE., TORONTO
Room 408 Shaughnessy Bldg., Montreal; Transmission Ball Bearing Co., Inc., 1050 Military Rd., Buffalo, N.Y.

Have you received a copy of Catalog 3-G? Pay to send for one if you haven't.



Investigate Your Cutter-Sharpening Facilities

Our wide experience in milling has proved the necessity of having exactly the correct clearance on cutters. But cutter grinders were too incomplete to insure reproduction of the right clearance on repeated grindings. We set ourselves the task of solving this difficulty. The 40 per cent., 50 per cent. or 60 per cent. increased output that proper clearance means was certainly worthy of our best efforts. In the No. 1½ UNIVERSAL CUTTER AND TOOL GRINDER we offer you the result —a simple, correct clearance angle feature.

The machine carries a graduated dial on its headstock spindle from which the clearance angle for all cutters may be read direct.

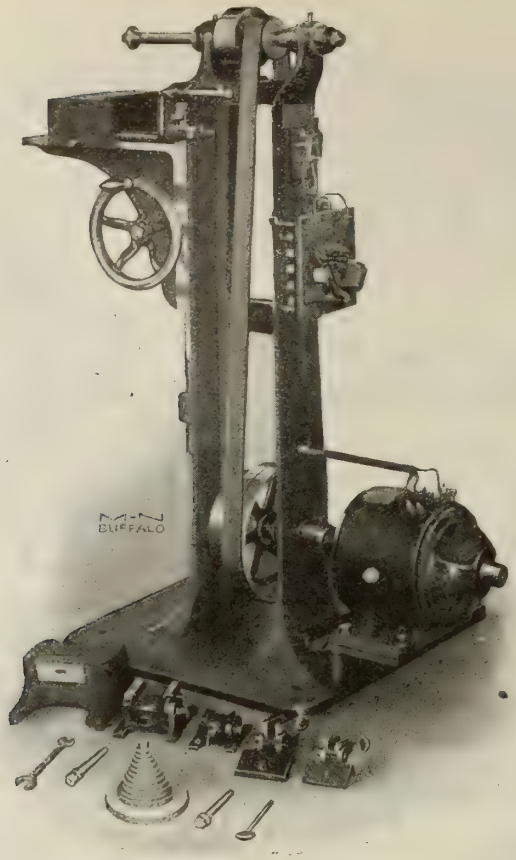
As a result of obtaining this correct clearance angle the feed may be greatly increased, the cutter cuts as it was designed to; the tendency to chatter is removed—and you get greater efficiency from your millers.

Send for the bulletin and get the whole truth of the matter.

Cincinnati Milling Machine Co.

Cincinnati, Ohio, U.S.A.

Canadian Agents: H. W. Petrie, Ltd., Toronto, Ont.; H. W. Petrie of Montreal, Ltd., Montreal, Que.; General Supply Co. of Canada, Winnipeg, Man.



The "MODERN" Die Chaser Grinder

Let Your Die Troubles End Right Here

Why let Die Trouble stand between you and maximum production?
In the

Modern Die Chaser Grinder

you will have a machine that does away with die trouble—because its output is **marvellously eccentric.**
Made for belt drive or a complete motor-driven unit. Special attachments for grinding Spring Dies, Pipe Dies, Reamers, Taps, Hobs, Spiral and End Mills, Milling Cutters, etc.; can be furnished with the regular equipment.

For Fast Accurate Work

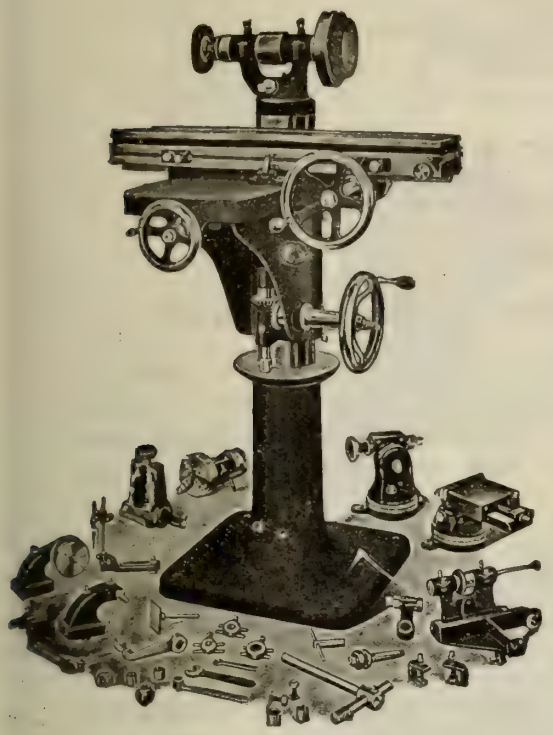
Bulletin C. G. will give you full details.
We would also be pleased to send you full particulars re **"Modern" Self-Contained Grinding Machines.** Tools splendidly adapted to meet the present demand for large production.

Modern Tool Company

Main Office and Works: State and Peach Streets, Erie., Pa., U.S.A.

Canadian Agents: Rudel Machinery Co., Toronto and Montreal

New York Office: - 50 Church Street
Chicago Office: - 32 N. Clinton Street
F. Wesley Parker, Resident Engineer and Export Agent, 2 Rector Street



The Greenfield Universal Grinder

For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

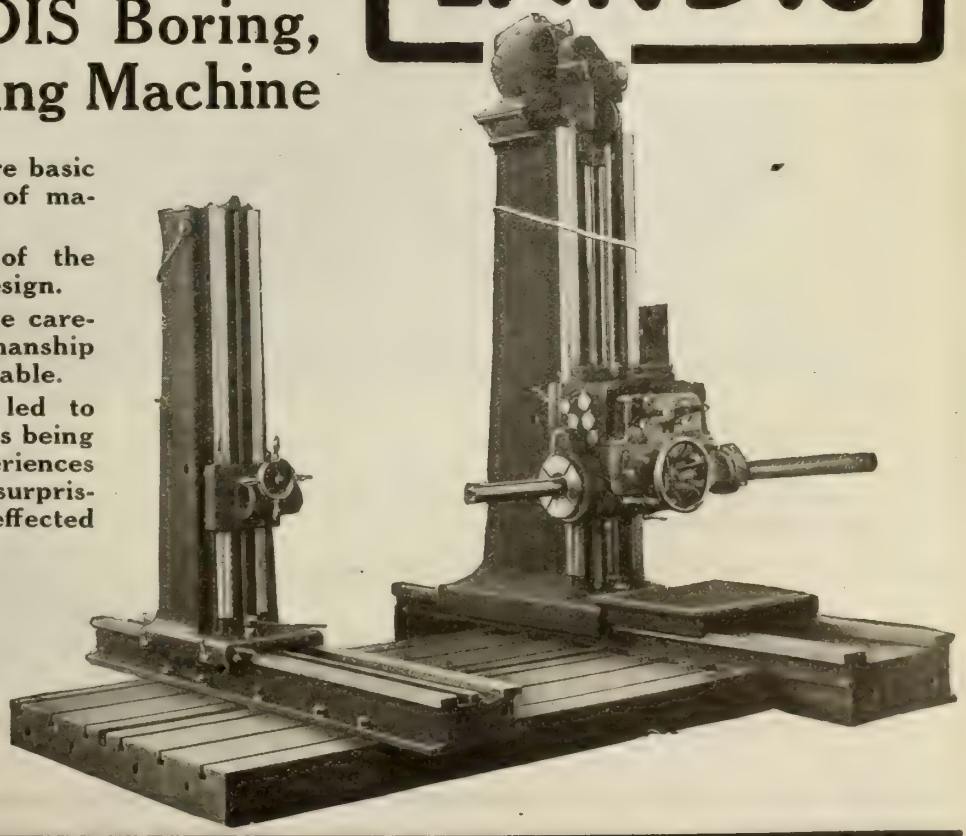
These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

Greenfield Machine Company,
GREENFIELD, MASS., U.S.A.

Some original features of the new LANDIS Boring, Milling and Drilling Machine

LANDIS



This machine can perform more basic operations than any other type of machine tool.

The concentric screw feed of the spindle is exclusively LANDIS design.

The gearing could not be more carefully enclosed; and the workmanship and materials are the best obtainable.

These facts have inevitably led to recognition of the new LANDIS as being in a class by itself, while the experiences of users have demonstrated that surprising increases in production are effected wherever it is installed.

Why not learn the full details. Catalog on request.

Landis Tool Company
Waynesboro, Pa.

New York Office, 50 Church St.

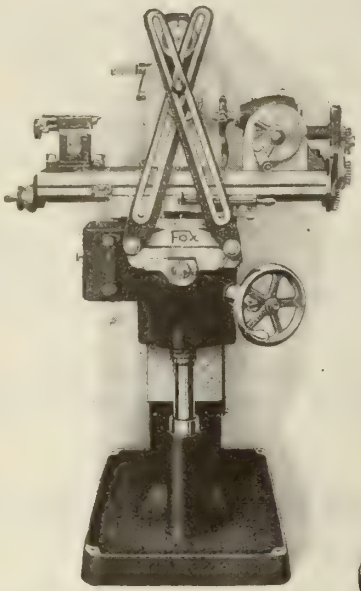
Agents:
Dewstoe Machine Co., Birmingham, Ala.; Harron, Rickard & McCone, San Francisco and Los Angeles.

TRADE **FOX** MARK
REGISTERED

MILLING MACHINES

FOR

Rapid Production of Motor Parts

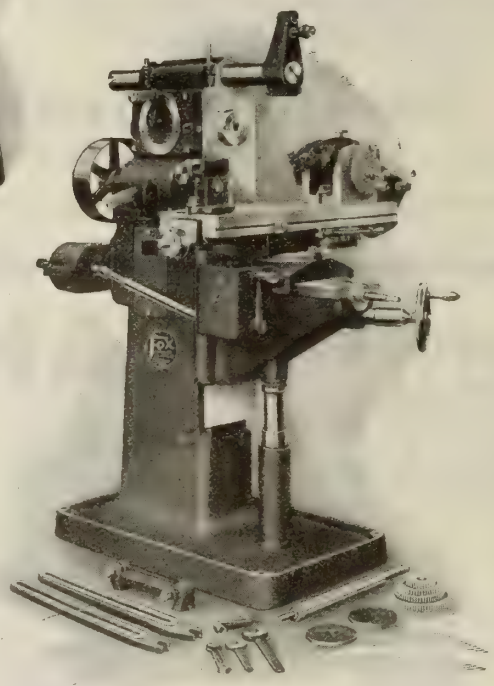


The **demand** for increased production **requires tools** of **great strength** and **durability;** the Fox 2-A Universal Milling Machine illustrated has met this demand, and is being used wherever extreme accuracy and quantity production are required.

The machine has a universal table, spiral cutting attachment, 10″ Dividing Head with 6″ Universal Chuck, making it a machine **especially adapted for Tool Room Work.**

The **United States Government** is using this machine in its various **repair shops** for **Aeroplane Motors.**

You should be using this tool to help the production of parts necessary for the prosecution of the war.



Specifications—No. 2-A Miller.

Spindle speeds 12
From 21 to 423 r.p.m.

Table feeds 6
From .317″ to 2.79″ per min.

Table .....8½ x 27″
Long. feed (power) 26″.
Vertical feed (hand) 13″.
Trans. feed (hand) 8½″.

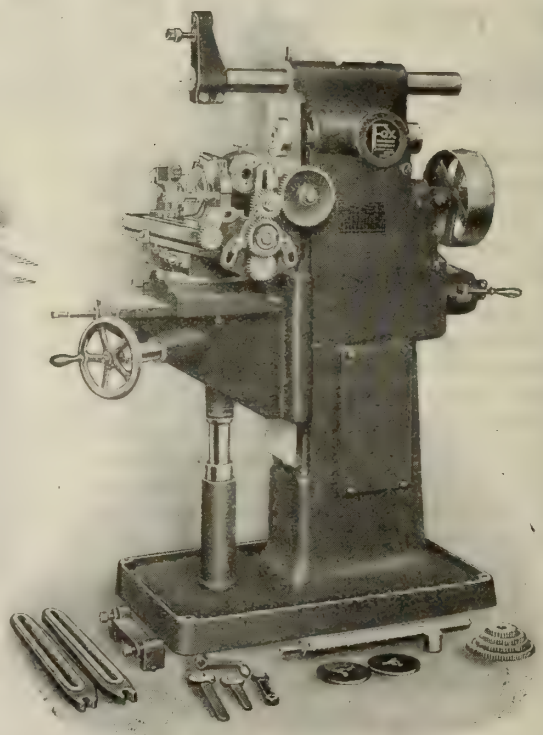
Drive...Single pulley 10 x 3″ running 250 r.p.m.

Gears — Hardened steel.
Weight .....1,500 lbs.

We build this same machine with a plain table, omitting the spiral cutting attachment and Dividing Head.

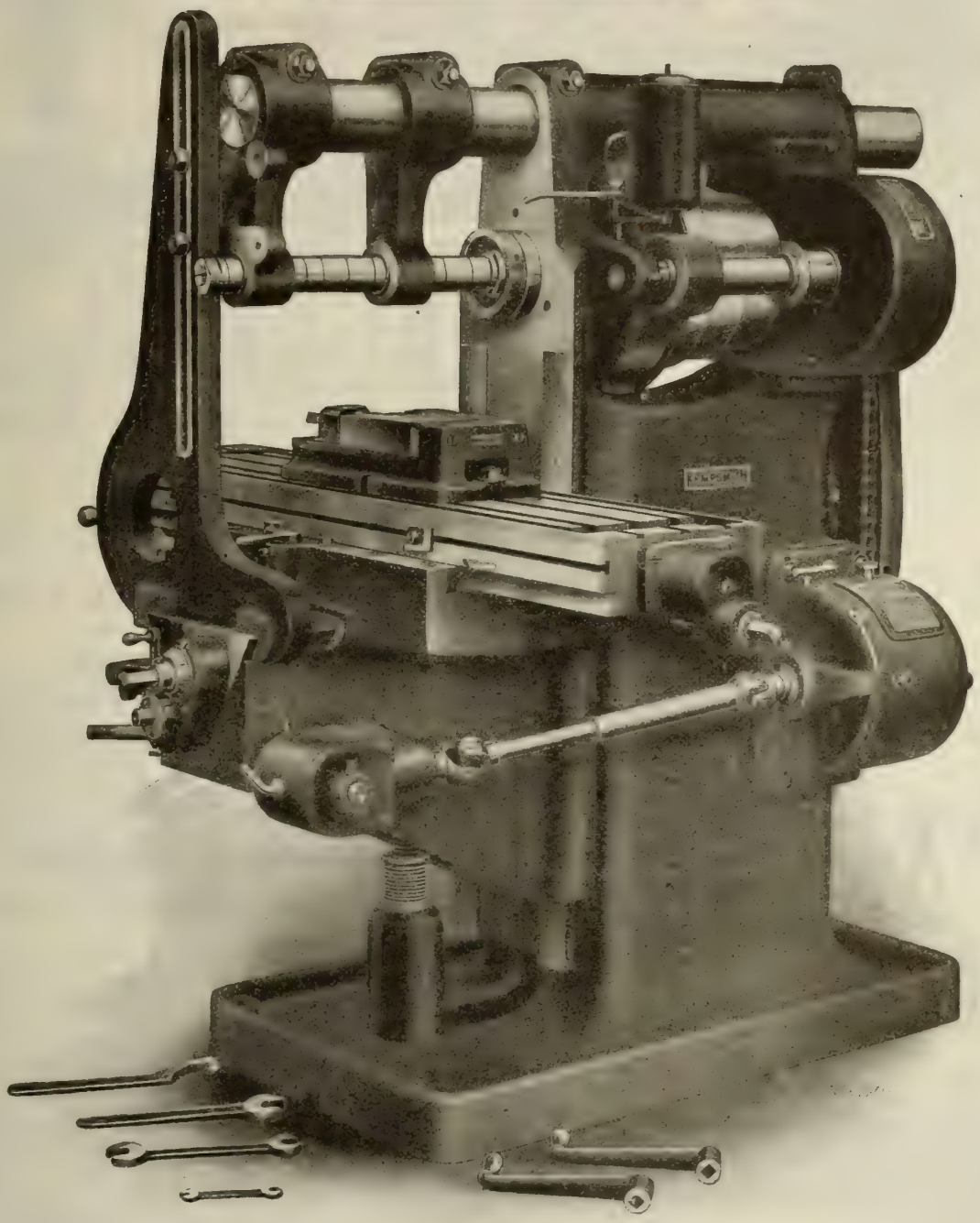
Our No. 1 type machine has a four-step cone drive, and while being a lighter machine is a "bear" for work. This is **proven** by **the hundreds** of **them in** the **largest munitions plants.**

We also build the Fox Multiple Spindle Drilling Machines.



FOX MACHINE COMPANY
1047 W. Ganson St., Jackson, Michigan, U.S.A.

KEMPSMITH



KEMPSMITH No. 3 Plain Milling Machine

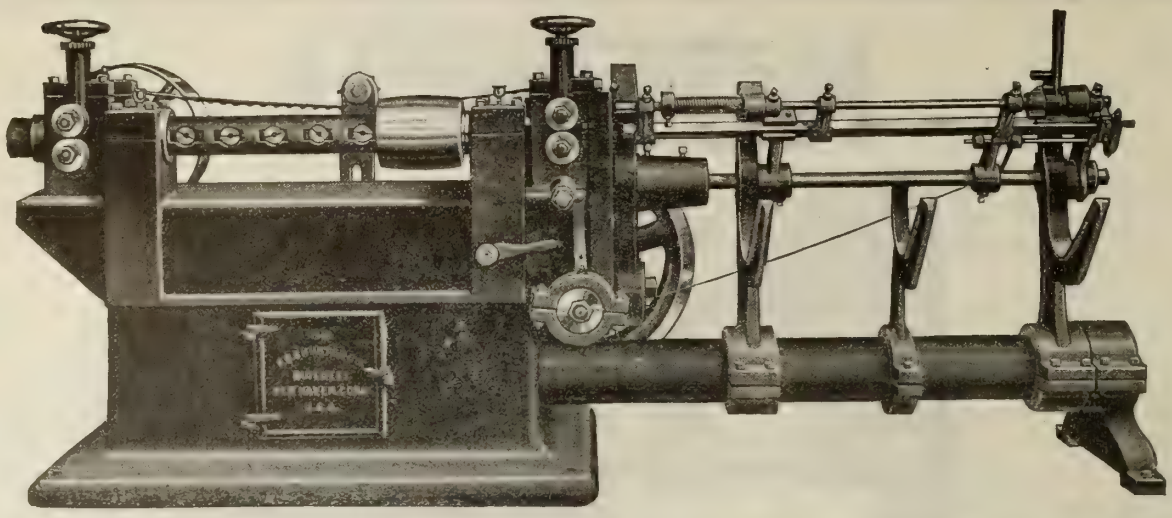
Double Back Geared

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our Catalogue "B" describes and illustrates many notable features of the Kempsmith Miller. Write for a copy to-day.

THE KEMPSMITH MANUFACTURING CO.

MILWAUKEE, WIS., U.S.A.

FOREIGN REPRESENTATIVES:—Barandiaran & Co., 3 Alameda, San Sebastian, Spain. Bevan & Edwards, Pty., Ltd., 117-29 King St., Melbourne, Australia. Edgar Bloxham, 12 Rue du Delta, Paris, France. D. Drury & Co., 1-2 Central House, Main St., Johannesburg, South Africa. Roku-Roku-Shoten, 3 Shinsakanacho, Kyobashiko, Tokyo, Japan. Nielsen & Winthers, Blegdamsveg 60, Copenhagen, Denmark. Parke & Lacy Co., Ltd., 60 Clarence St., Sydney, N.S.W., Australia. Selson Engr. Co., 19 Via Botero, Turin, Italy, and 85 Queen Victoria St., London, E.C., England. Spliethoff, Beeuwkes & Co., Leuvehaven, W.Z. 159, Rotterdam, Holland.



Perfect Wire Straightening Quickly and Profitably Done on Our

Automatic Wire Straightening and Cutting Machine

Just put your coil of wire on the reel, adjust the rolls and dies, and set the gauge for the length you want. The machine does the rest—thousands of feet per day, perfectly straight and cut to accurate lengths.

Catalogue tells more about them, and we'll be glad to send you a copy.

THE F. B. SHUSTER CO., New Haven, Conn.

FORMERLY JOHN ADT & SON ESTABLISHED 1866

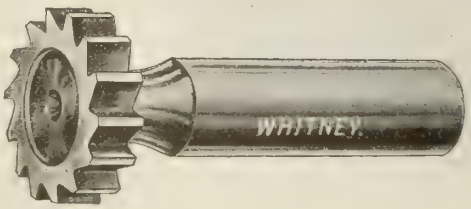
ALSO MAKERS OF STRAIGHTENERS FOR SQUARES, HEXAGONS, FLATS, ETC.

"WHITNEY"

KEY-SEAT CUTTERS

For the Woodruff System of Keying

GET OUR PRICES



We have learned from years of experience how to make these Cutters so as to insure high accuracy combined with lasting service. Immediate shipment in either carbon or high-speed steel.

The Whitney Mfg. Co., Hartford Conn.

Chains, Keys and Cutters, Hand Milling Machines

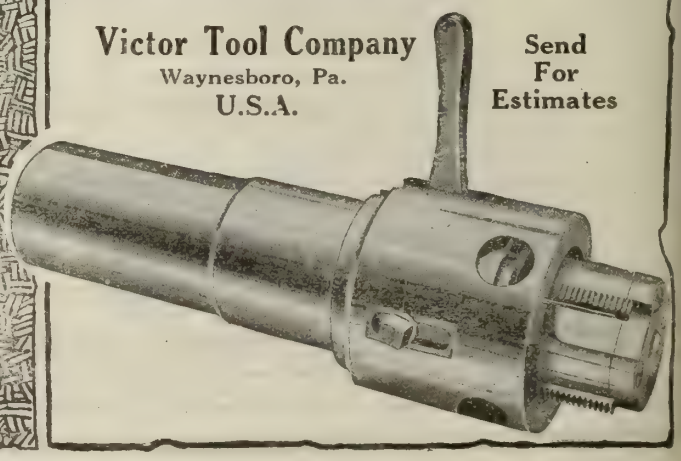
We wanted something original—this is what we got

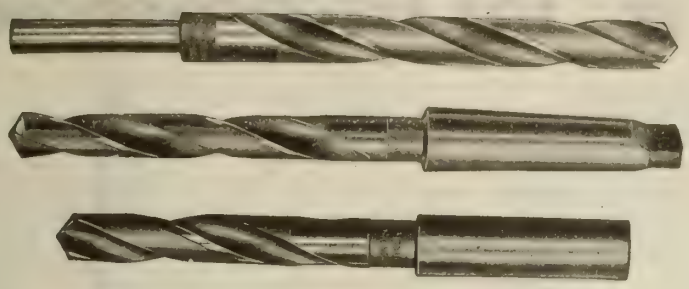
"BOTH these operations and half another—I'll show you later—completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
U.S.A.

Send For Estimates

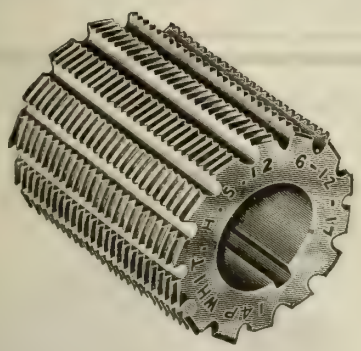




(*Carbon and High Speed Steel*)

BUTTERFIELD

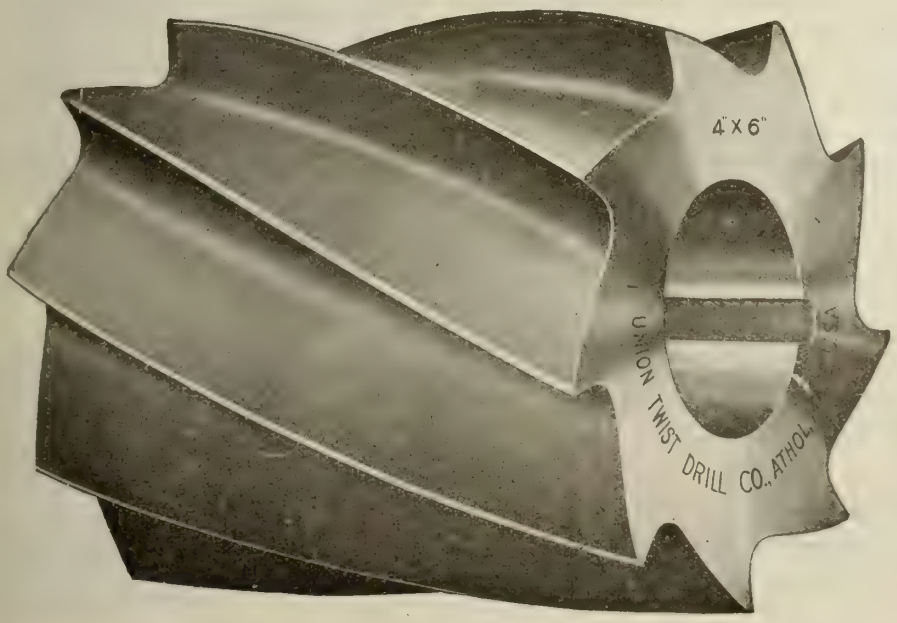
TWIST DRILLS, GEAR AND MILLING CUTTERS



Their ability to serve accurately and long equals that of Butterfield Taps, Dies and Reamers—the sincere praise of a thousand users wouldn't be a better recommendation.

They are the happy result of a great combination of specially trained men and the finest special machinery.

OUR COMPLETE LINE OF DRILLS AND CUTTERS ARE FULLY DESCRIBED IN OUR CATALOG A. Be sure to send for a copy.



Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office, 220 King St. West

If any advertisement interests you, tear it out now and place with letters to be answered.

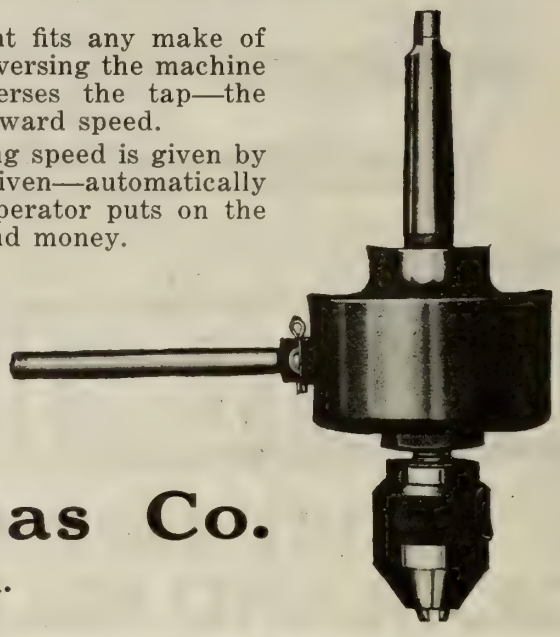
A Fitter Fit Is Impossible

The "B-T" Reverse Tapping Attachment fits any make of drill press. It eliminates the necessity of reversing the machine spindle. Simply raising the spindle reverses the tap—the machine, meanwhile, goes ahead at full forward speed.

A reverse speed twice that of the tapping speed is given by an internal gear drive. It is friction driven—automatically adjusted by the amount of pressure the operator puts on the drill spindle. It saves taps, trouble, time and money.

Can also be had with positive drive. Both plain and friction chucks are fitted with jaws to grip round and square end of tap.

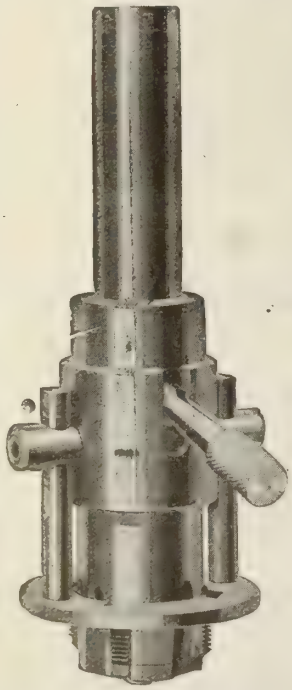
Get the details—In our Bulletin Write to-day.



Bicknell Thomas Co.

Greenfield, Mass., U.S.A.

"B-T" Reverse Tapping Attachment



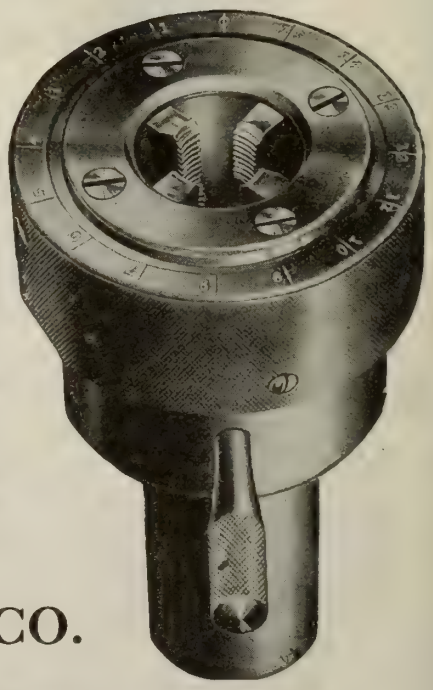
The Murchey Way!

The "Murchey Way" is to keep well in advance in the matter of all things pertaining to the **accurate** production of their well-known **Collapsing Taps** and **Self-Opening Dies.**

Every tool that comes out of the Murchey shop is the very best that modern machinery, modern ideas and years of experience can make it.

Murchey Taps and Dies last longer, do better and quicker work than ordinary tools. They combine cost-cutting features seen on no other tools of their kind.

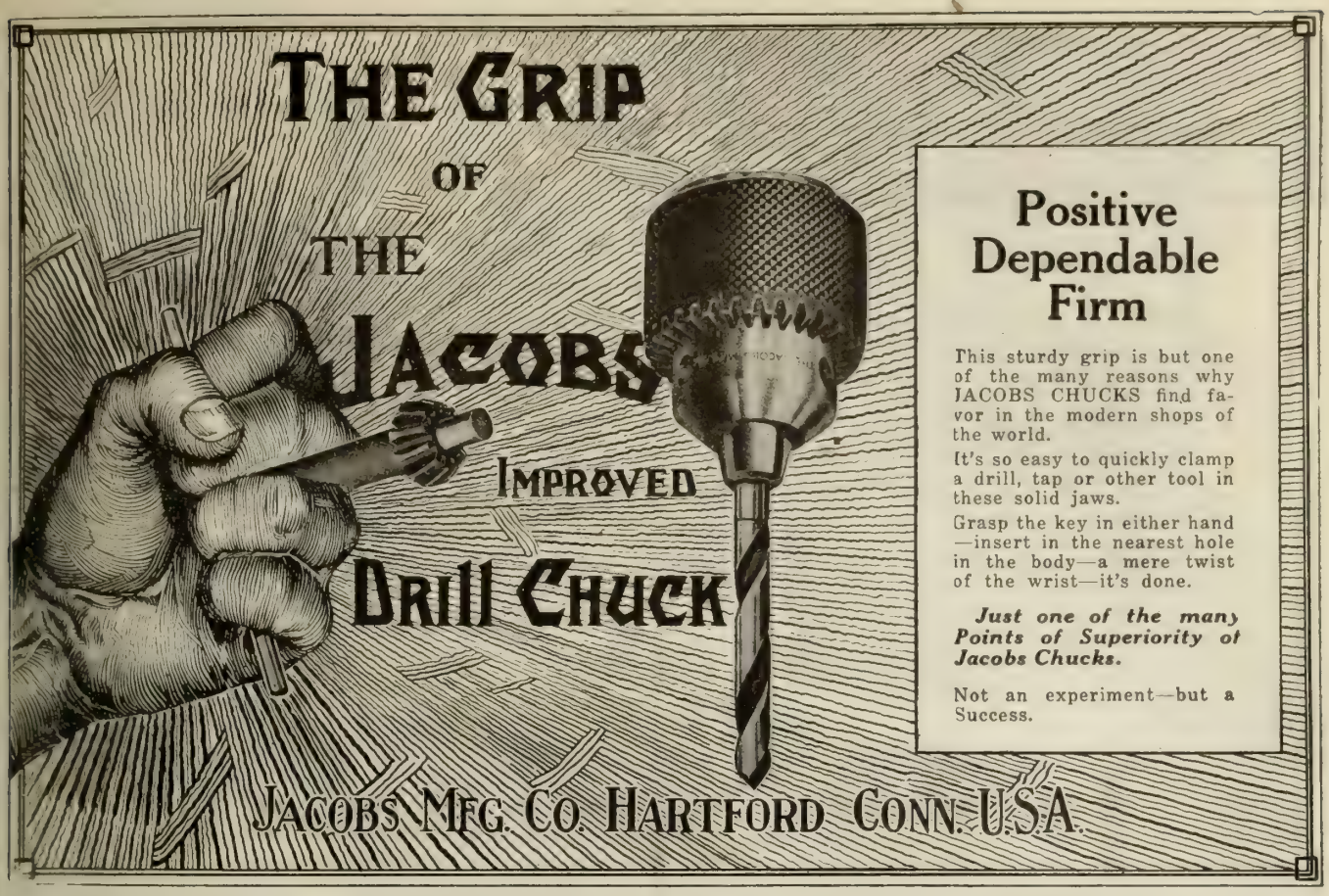
Sixteen years of experience in making Collapsing Taps and Self-Opening Dies places us in a position where we can make valuable suggestions on special threading tools. Write.



MURCHEY MACHINE & TOOL CO.

75 PORTER STREET, DETROIT, MICH.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
Fenwick Freres & Co. - - 16 Rue Fenelon - - Paris, France



H & G

Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝″ outside diameter, yet it will cut from the smallest up to 1″ standard thread and up to 1⅛″ fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16″, 1″, 1½″ and 2″ sizes.

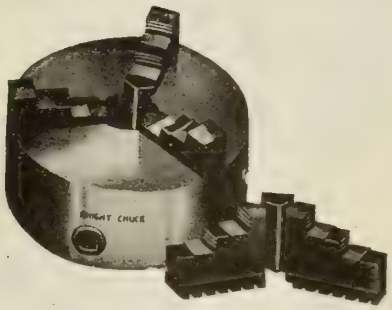
No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

Eastern Machine Screw Corp.

New Haven - Conn.



Scroll Chucks
Three-Jaw Universal Geared

The best material obtainable is used in the manufacture of KNIGHT Chucks. First grade gray iron bodies and backs, steel scrolls, pinions, jaws and wrenches. These chucks are thoroughly tested and inspected as to workmanship, position, synchronization and finish before leaving the factory.

Knight Metal Products
LIMITED

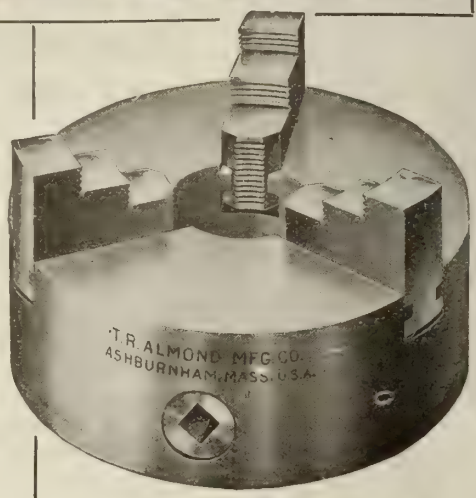
119 West Adelaide Street
Toronto, Ont., Canada

Cable: "Knightmetl"; Code, Western Union

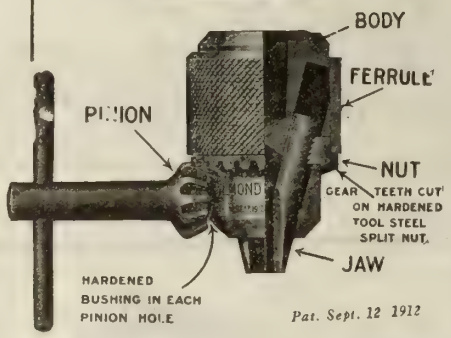
If any advertisement interests you, tear it out now and place with letters to be answered.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



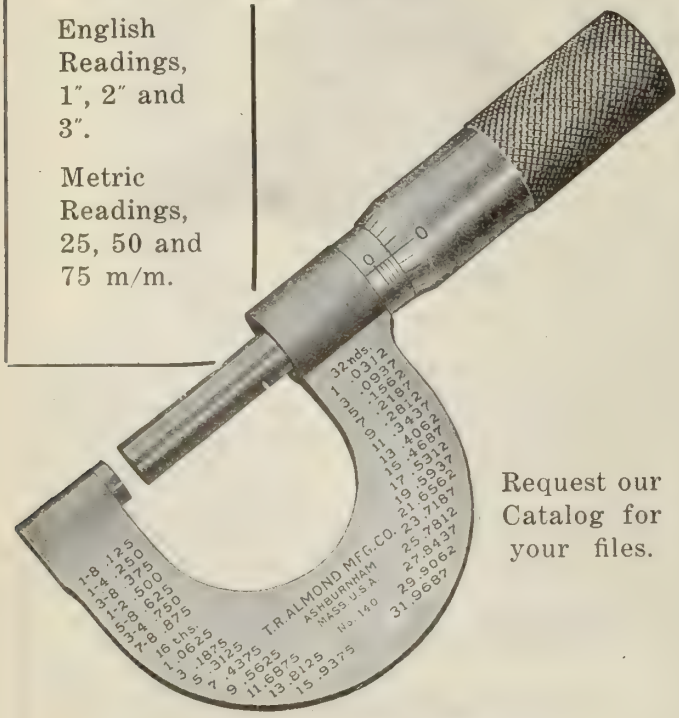
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.

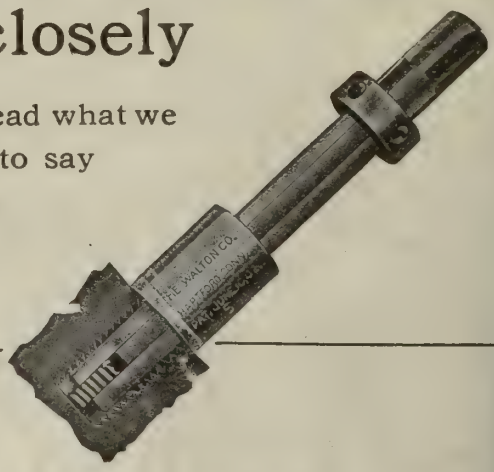


Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.

Look at this again —closely

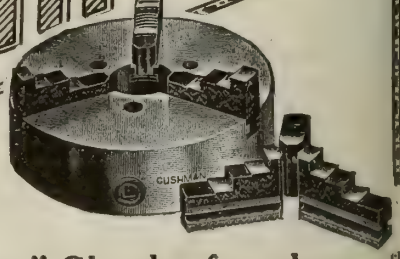
and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

CHUCKS

"We Have Eliminated Two Operations in this Cleaning Process".....

And we did it with Oakite Platers' Cleaner.

"It was always a difficult job to clean these steel parts and die castings before nickel-plating them.

"We had to scrub them and then copper-plate them to get them right—and then they were not as good as these pieces.

"Now we clean them in Oakite Platers' Cleaner, and just look at that plate—it's perfect!

"That's great work—and Oakite Platers' Cleaner cuts out scrubbing and copper-plating.

"Whenever I am up against a hard cleaning problem, I always send for the Oakite man."

This Advertisement is one of a series based on actual occurrences.

OAKITE MANUFACTURED BY OAKLEY CHEMICAL CO. 44 THAMES STREET · NEW YORK

The PHOTOSTAT—A Thrift

TRADE-MARK REGISTERED

The Troy Laundry Machinery Co., Chicago, says:

"Our machines going to the United States Army 'over there' must be transported 'knocked down.' That means setting them up by inexperienced men upon their arrival 'at the front.' What suggested itself as a real problem has been solved easily by the PHOTOSTAT—and has eliminated lost time, motion, and labor for the soldiers who do the 'setting up.'

"We make photographic copies of all parts—and their assembly. Then the soldiers merely take these photographic copies as a set of directions—and the job is completed in no time.

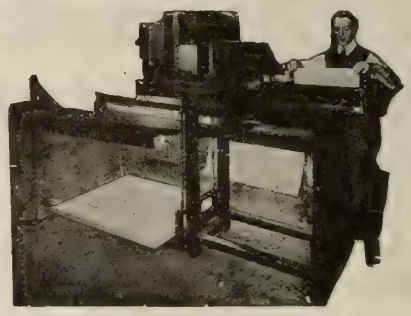
"But this is just one use we make of this real efficiency device. Here are a few others:

1. Specifications from the Government.
2. Samples of inventions to be tried out in our factory.
3. Parts of catalogs—which would take a stenographer hours to copy.
4. Cuts of machinery that are sent with bids.
5. Parts to be repaired when the original part can't be spared.
6. Posters from the Government reduced and sent to salesmen for advertising.
7. Illustrations for wiring in setting up machines.
8. Letters containing contracts.
9. Blue prints and tracings.

"We hope in the near future to use the machine for all routine work of the factory."

The PHOTOSTAT, which is manufactured by the Eastman Kodak Co., is a combined camera and copying machine. The copy is made directly onto a roll of paper. No intermediate glass plate or film or other negative has to be made. By copying thus directly onto the paper, the copy is made very quickly and at a low cost. Also the copy is a facsimile of the original, so that there can be no mistake in it. The print is developed and fixed right in the apparatus itself; this part of the process, as well as the focusing and exposing, all being mechanical. The print is then removed to a tank of running water, in which it is washed free from chemicals. Finally the print is taken from the water and dried and is then ready for use. The whole process is a rapid one, the average speed per print being from one to five minutes.

The PHOTOSTAT makes rapid, inexpensive and facsimile copies of Pencil Drawings, Ink Drawings, Tracings, Blue Prints, Maps, Sketches, Documents, Letters, Telegrams, Specifications, Data Sheets, Tabulations, Record Cards, Pages from Books, Insurance Records, Shipping Lists, Reports, Contracts, Illustrations for Salesmen, Cuts and Drawings for Advertising, etc., etc.



This cut shows the operator examining copy of a 36-in. drawing which he has just made in less than a minute.

A small book giving detailed description will be sent to you upon request to the

COMMERCIAL CAMERA COMPANY

ROCHESTER, N.Y.

Chicago, Ill. Philadelphia, Pa. New York, N.Y. Providence, R.I. Washington, D.C.

AGENCIES:
ALFRED HERBERT, LTD., COVENTRY, ENGLAND
SOCIETE ANONYME ALFRED HERBERT, PARIS, FRANCE
SOCIETA ANONIMA ITALIANA ALFRED HERBERT, MILANO, ITA

Standard Pressed Steel Co., Philadelphia, Pa., U.S.A.

Distributors for Ontario:

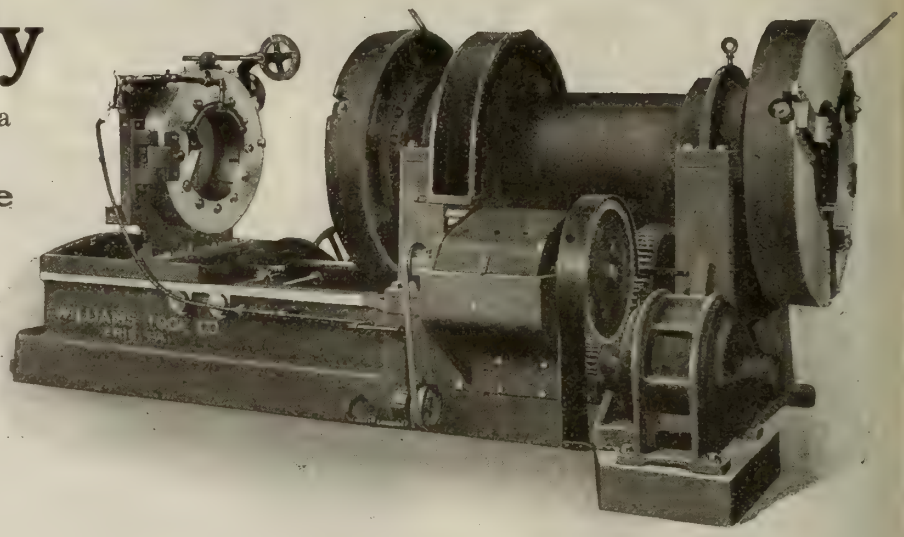
H. W. Petrie, Ltd., Toronto, Ont. and A. R. Williams Machinery Co., Ltd., Toronto, Ont.

Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

Williams Pipe Machine

that's on the job.
For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.
It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.
The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



Write

Williams Tool Company
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of every description

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Weld Your Sheet Metal Parts with ARMCO IRON Filler Rods

The economic saving and desirability of welded seams and fittings over the older method of riveting is now beyond question. The Electric Welding Committee of the U. S. Shipping Board conservatively estimates the saving on hull plating and other vital ship parts at 25 per cent. On minor ship parts, the labor saving is estimated to be from 60 to 70 per cent.

In the manufacture of boilers, plate shells, pressure containers, sheet metal pipe and the like, the saving in time, labor, material, the reduction in weight, etc., all indicate that welding is the approved construction for the future.

ARMCO IRON is a particularly desirable filler for welding seams of and attaching fittings to, sheet metal surfaces and containers for the following reasons:

1. Uniform purity and metal structure that produce welds of the highest efficiency and permit the standardization of repetitive welding operations with absolute reliability of the finished welds.
2. Free flow and action under heat, that make the operative's work easy and give him greater confidence.
3. The standardization of one metal composition in two tempers to meet all ordinary iron and steel requirements. ARMCO IRON rods for oxy-acetylene are the same as for electric welding except the temper, which for electric is harder to work equally well under the higher temperatures.
4. Readily obtainable in all popular sizes from conveniently located supply depots in all industrial centers.

Write for a trial shipment, and if you want free advice on welding subjects, your questions will be answered by engineers who have made welding a life study and who know from first hand experience what is being done in this line.

PAGE STEEL & WIRE CO.

Established 1883 as Page Woven Wire Fence Co.

Makers of "Copperweld" Copper Clad Steel Wire; ARMCO IRON Welding Rods and Electrical Wire; Wire Mill Products, Plain and Galvanized; Wire of Special Analysis, Wire Fencing for all Purposes; Factory Gates; Ornamental Iron Fence, Machine Guards; Tool and Stockroom Partitions; Architectural Iron.

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Sales Offices: 30 Church Street, New York

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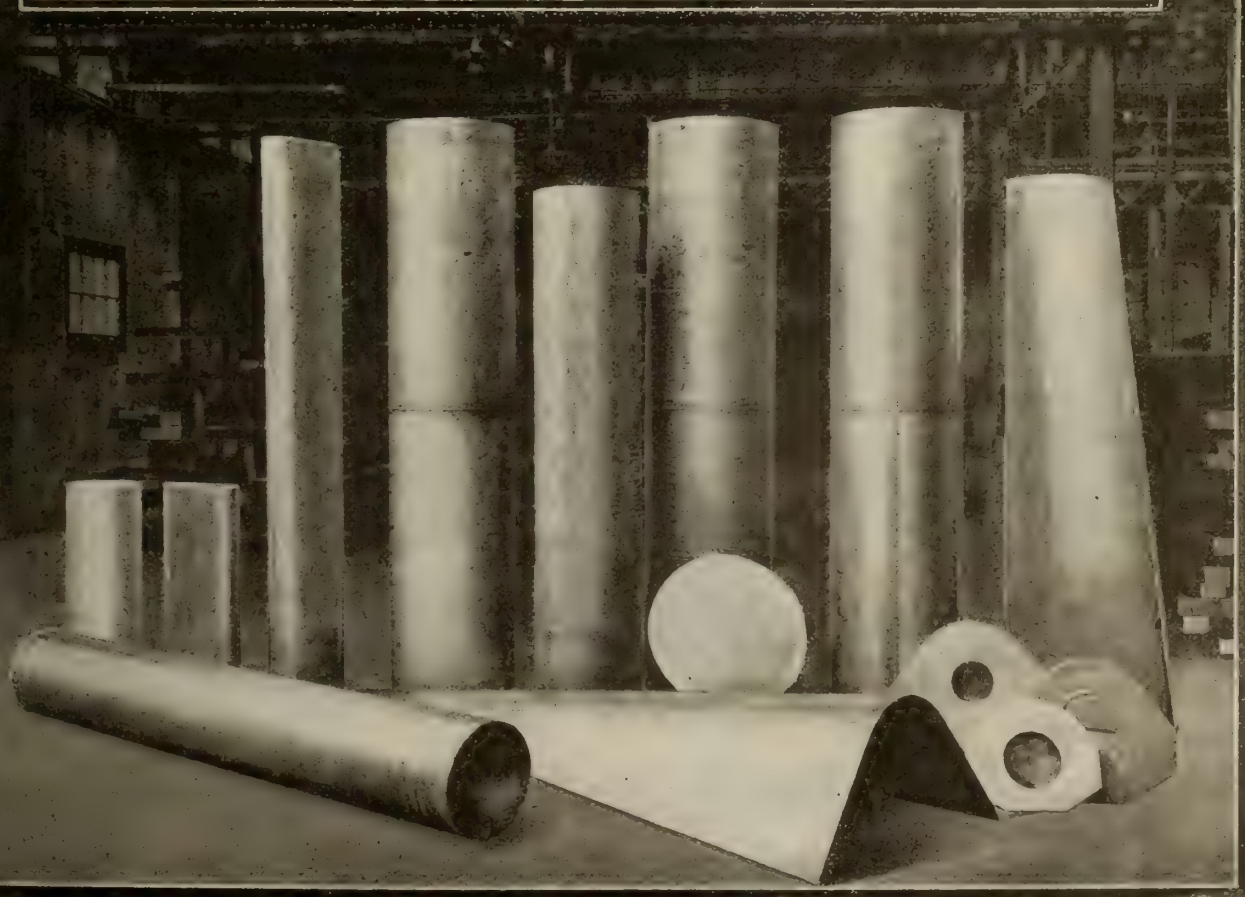
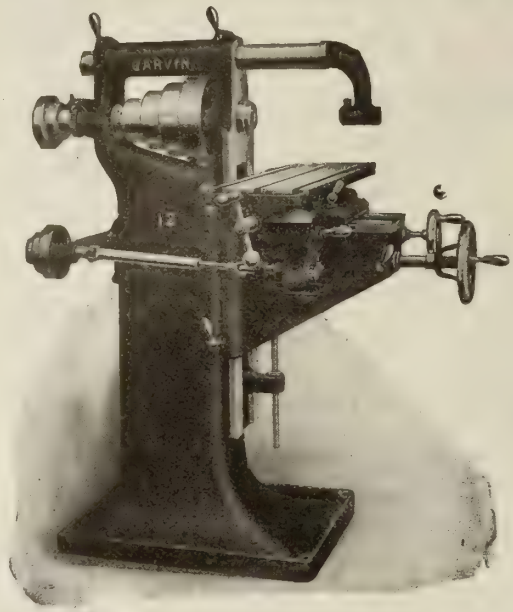


GARVIN



No. 12 Plain Milling Machine-Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....**18 x 6 x 15 in.**

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Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) **50 Years New York City**

Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

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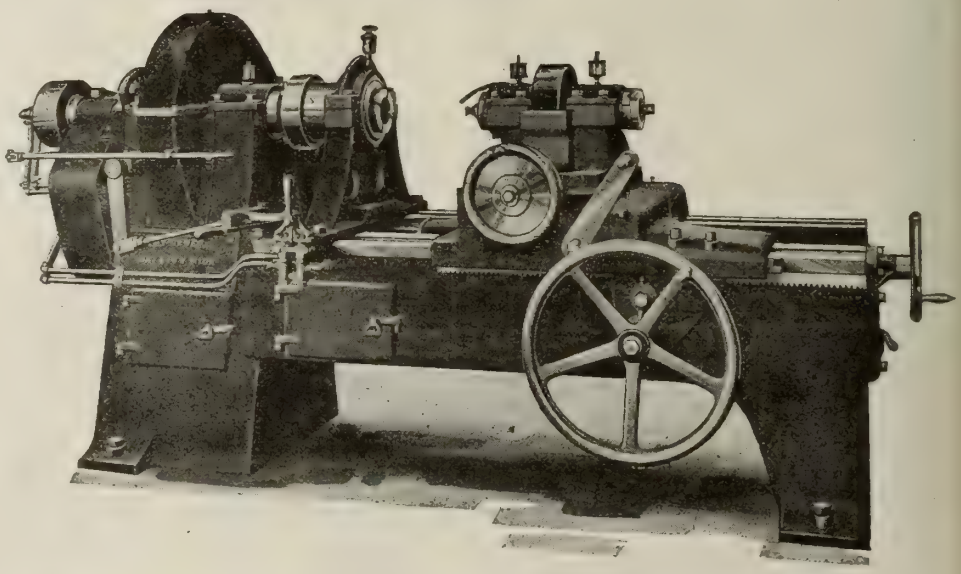

Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
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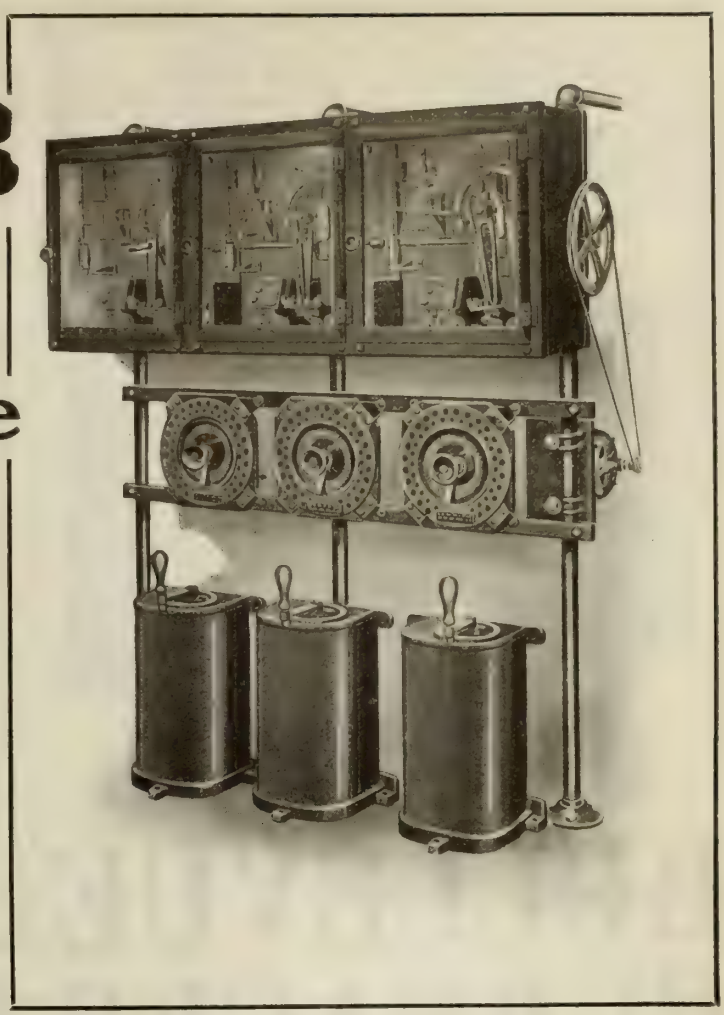
New Type B THURY Electric Furnace Regulator



A Regulator which will give a perfect control on an electric furnace operating on steel or alloys.

A Regulator in keeping with the advanced methods of electric furnace practice of to-day.

It allows of a wide range of power being used, so necessary in the melting or refining of steel.

Rugged and simple in construction, when once set it can be operated with a minimum amount of attention, and the operator can forget his power worries and give his whole attention to the steel, so increasing production at a low power cost.

Electric Steel Furnaces

The Electric Steel Furnace during the last few years has demonstrated its capabilities to produce castings which have superior physical properties, and at a cost which compares very favorably with open-hearth castings.

For the very best results the furnace must be complete with all the most modern operating devices, so that one heat follows another with a minimum loss of time.

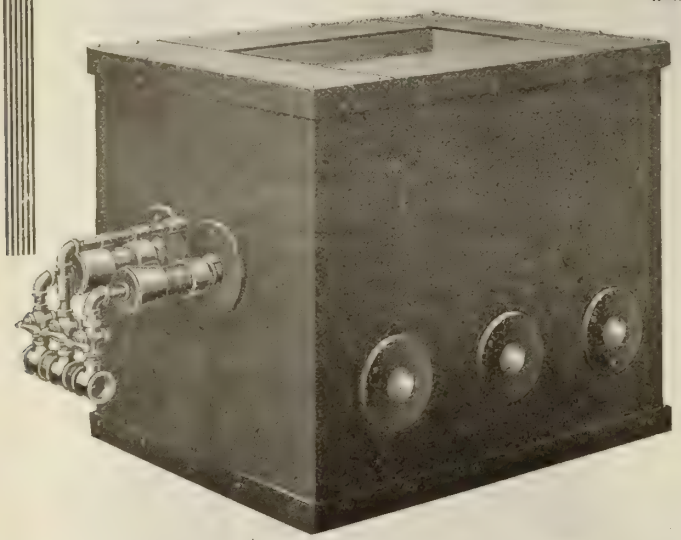
In the furnaces which we build, ranging from one up to six tons, nothing is spared to make them efficient. Our ten years of designing and operating is built into them and you get a furnace complete in every detail, ready to take current and turn out steel.

Interested parties would do well to put their electric furnace propositions up to us.

VOLTA MANUFACTURING CO.

WELLAND, ONTARIO

Oil Tempering



BELLEVUE FURNACES

are built in standard sizes, equipped with atmospheric gas burners, or in any special size to your order.

The one shown above is so designed that, to draw and temper steel parts, the oil bath is heated accurately and evenly up to 600 degrees Fahrenheit.

Bellevue Furnaces, in 79 different styles and 41 extra sizes, are illustrated and fully described in our catalogue. Write for a copy.

Representative in Canada:
H. W. Petrie, Limited, Toronto, Canada.

Bellevue Industrial Furnace Company

DETROIT MICH.

Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
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The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO
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DIAMOND TOOLS
FOR TRUEING GRINDING WHEELS

THE GENERAL SUPPLY COMPANY of CANADA, LIMITED

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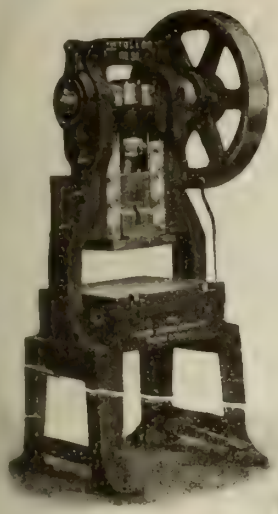
Arch for General Utility Presses



Speeds up the work in the shop and economizes in floor space. With slight modifications will operate nearly all of the blanking, forming, horning, wiring and combination dies used in the manufacture of pieced tinware, buckets, pans, etc.; also adapted to blanking armature discs, and with front removed will operate bumping horns and fixtures, wiring dies, etc. 12 sizes.

The Toledo Machine and Tool Co.

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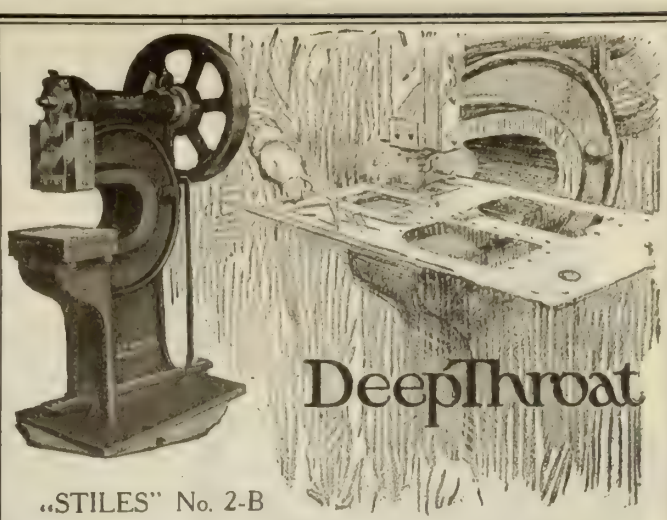

"STILES" No. 2-B

For reaching into the center of large sheets of metal, this model of the "Stiles" type of Press is provided. The massiveness of the frame and its special design make it rigid, even under the most severe punching strains.

E. W. BLISS CO.

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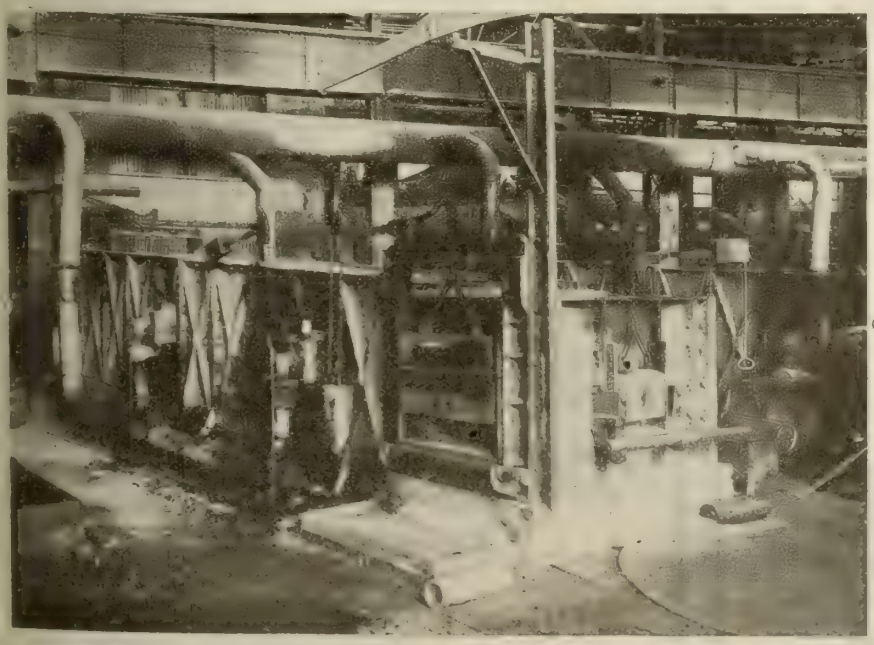
Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

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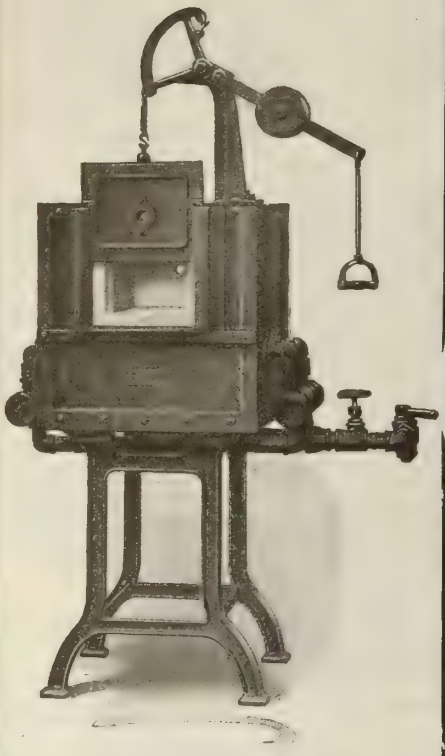
Mechanical Engineering

Company, Limited
Three Rivers, Quebec, Canada



TYPE K HIGH SPEED STEEL FURNACE

The Right Furnace for High Speed Steel

Too much—too little or an uneven heat treatment of High Speed Steel renders it practically worthless for the purpose intended.

This Gilbert & Barker furnace has been designed especially for the correct heat treatment of High Speed Steel. A temperature of 2400°F. is quickly obtained and **easily maintained.** The heat is uniform on all sides of the work and loss by radiation is reduced to the minimum by special insulation.

More than 50 years' experience in designing and building furnaces, especially for the accurate and economical heat treatment of metals is your guarantee of satisfaction.

PROMPT DELIVERY ON G. & B. FURNACES

Recent additions to our plant, already one of the largest in this field, make it possible to offer immediate shipment of your order.

Tell us your problem and we will tell you the type of furnace you require, but first send for Bulletin 24. To-day is a better day than tomorrow--write.

Gilbert & Barker Mfg. Co.

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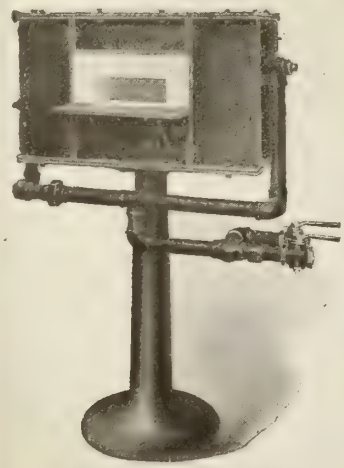
OIL or GAS

Prompt delivery on all tool room types.



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For

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Carbonizing
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High Speed Steel
Lead and Salt
Oil Tempering
Forging
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Furnaces built for special requirement

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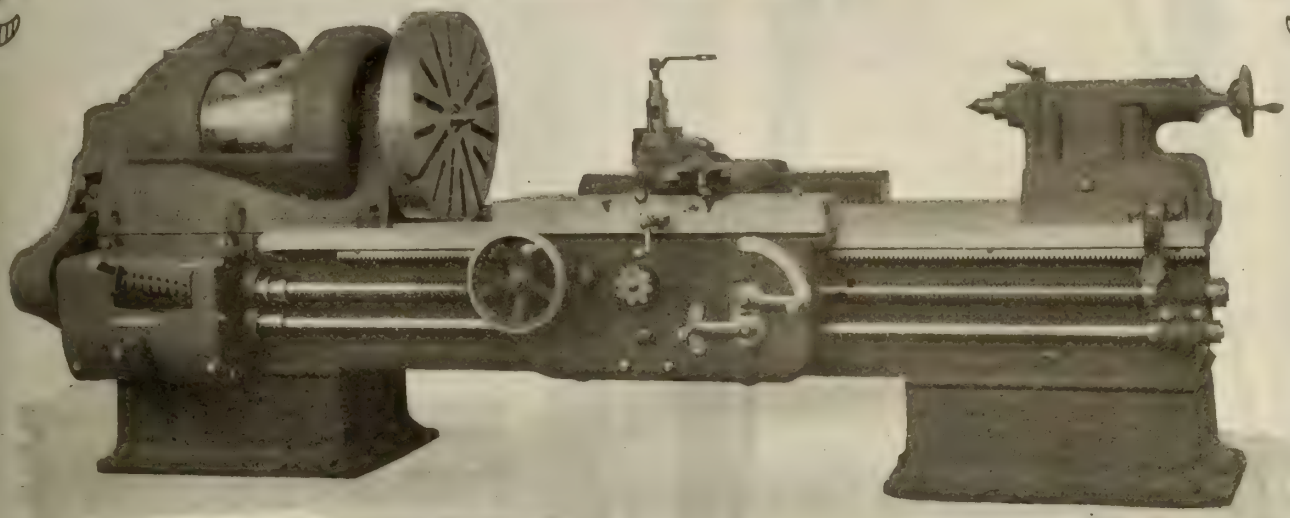


Double Back Geared Three-Step Cone. Double Plate Apron. Liberal size of parts, and high grade workmanship make the Wickes Lathe equal to the most severe service.

The Wickes has Special Ball Thrust Bearings; Steel Apron Gears, Coarse Pitch and Wide Face Gears, which are all well guarded. Let us tell you ALL about our lathes. Built for real service from 17" to 48" swing.

The Wickes 26" Heavy Duty Quick Change Gear Lathe

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

Marshalltown, Iowa
U. S. A.

"CANADIAN"

ACCURATE work demands accurate and efficient tools.

The Canadian No. 5 has some features worth considering.

Eight speeds, three power feeds—also hand and lever feeds.

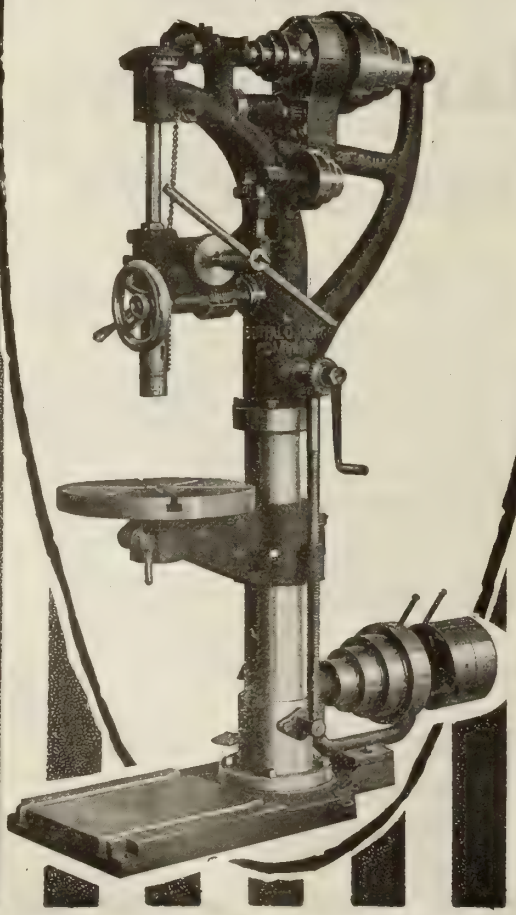
The twist of a knurled knob changes instantly plain drive to back geared drive—no tools to get lost or bother with.

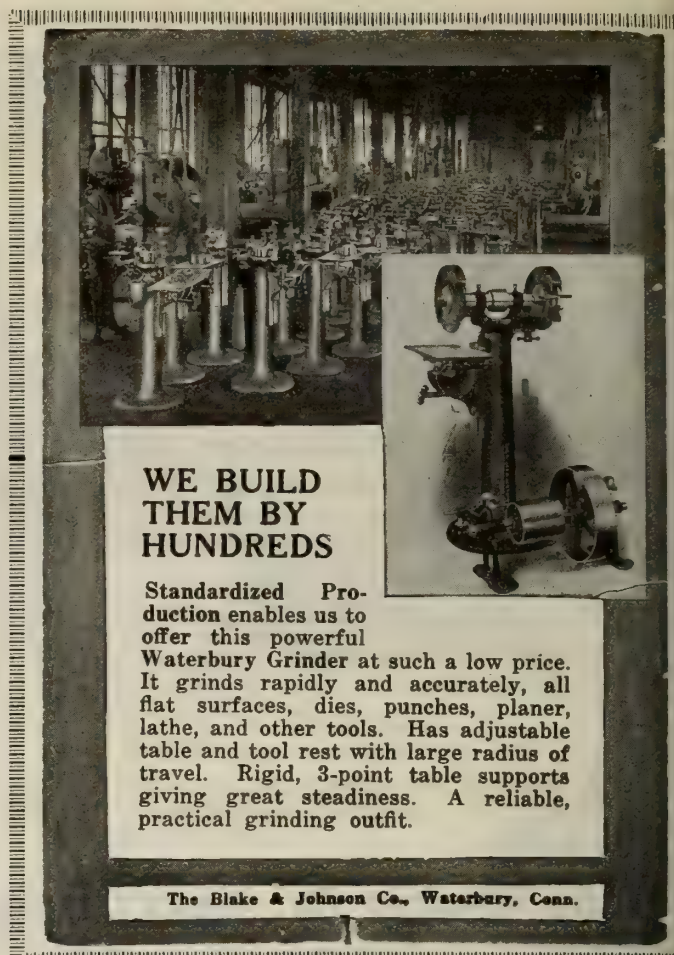
An adjustable automatic trip throws out power feed when piece has been drilled to required depth.

Split adjustable bearings, ball bearing graduated spindle—but then there are so many features — for complete description write for literature.

Circular 1199-16 describes the whole Canadian Upright Series

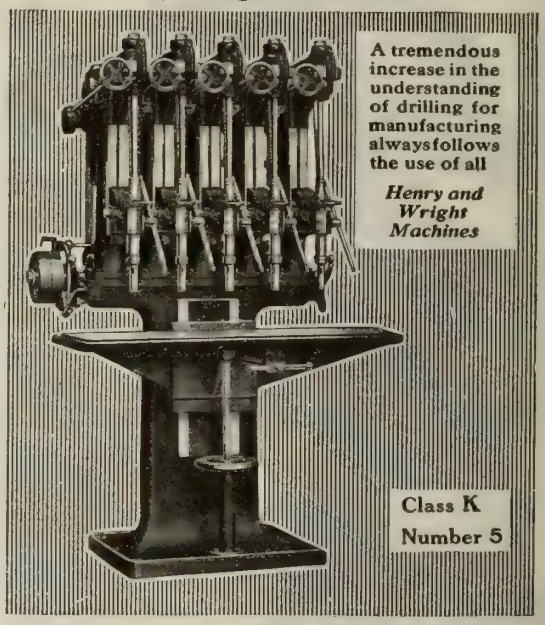
Canadian Blower & Forge Co., Limited
Kitchener, Ontario





HENRY & WRIGHT

Drilling Machines



The Henry & Wright Mfg. Co.
Hartford, Conn.

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.

Simmons Uni-Pole Magnetic Chuck with T-slot face-plate for heavy grinding and for use on Milling Machine or Shaper

TRADE T-P MARK

Rectangular Magnetic Chuck

for

Immediate Delivery

We offer the following sizes:

10″ x 8″—Plain or T-slot.
18″ x 8″—Plain or T-slot.
31″ x 10″—T-slot only.

Special Sizes to Order

Write for Descriptive Catalogue 105 E

Important Features

Simple Construction.
Insulated Correctly.
Multiple Poles, Unit Coils.
More Holding Power by 40%
Over Heating Impossible.
No Leakage of Magnetism.
Surface for Holding Completely Magnetized.

FACTS

Simmons Magnetic Chucks embody an entirely new feature in Magnetic Chuck construction, namely—absolutely "insulated" magnetic energizing means and "No Leakage" of magnetism into the machine or cutting tools. This same chuck is adaptable to either 110 or 220 volts by a simple change in connections.

Simmons Uni-Pole Magnetic Chuck with plain face-plate for grinding

TAFT-PEIRCE

Woonsocket, R.I., U.S.A.

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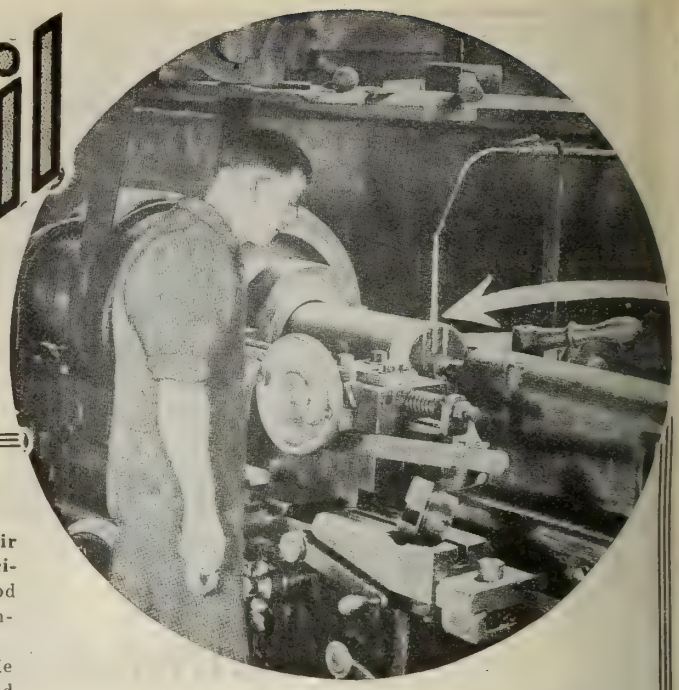
Elm Cutting Oil



To keep tools at their maximum cutting efficiency it is necessary to flood them constantly with high-grade cutting oils.

Elm Cutting Oil will not only enable you to speed up your production and get clean-cut threads, but eliminates repeats and greatly lessens the breakages of dies. **Once known, always used.**

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Another quality line. Absolutely carbonless and reduces friction. Maintains its body regardless of temperatures. Made in three grades: light, medium and heavy. Get acquainted with something really good. Try it.

Cutting, Drawing, Motor and Floor Oils
Linseed Oil Soaps and Cup Greases

Elm Cutting Oil Co.

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Production of Rare Quality at Lowest Labor Costs

There is unusual strength, accuracy, speed, convenience and range in

AURORA
Drilling Machines

You can use them to great advantage on **HIGH EXPLOSIVE SHELLS** or any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.

Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works

AURORA, INDIANA, U.S.A.

The BARNES DRILLS

TRADE MARK

Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

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W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.

Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

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Saves Labor
Saves Time
Saves Costs

One ton of Angular Grit equal carloads of sand

Quicker and Better

ANGULAR GRIT offers you the most advanced and economical method of cleaning castings, etc. Its angular and irregular cutting points clean raw castings and forgings more thoroughly and with greater speed than either sand or shot.

ANGULAR GRIT dispenses with sand bins and sand dryers, and there is no dust nuisance where it is used.

If you are using sand, think of the labor you can save by adopting ANGULAR GRIT in its place.

Used for all kinds of cleaning operations —best materials for cleaning shells. Prove its superiority by giving it a trial.

Pittsburgh Crushed Steel Co.
Established 1888
Pittsburgh, Pa., U.S.A.

Canadian Representatives:
Williams and Wilson Ltd., Montreal, P.Q.

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THE old reliable stand-bys are now being utilized in the industries of peace. The pencil is the first tool used in the change. The long established famous VENUS Pencils (made in 17 degrees) always can be depended on for the most exacting work.

17 black degrees
and 3 Copying
For bold heavy lines
6B-5B-4B-3B
For general writing and sketching
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For clean fine lines
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Special 14c. Offer

Send 14 cents for 3 trial samples, mentioning degrees. After you find how perfect VENUS Pencils are, buy them at any dealer.

Of all stationers and stores throughout the world.

American Lead Pencil Company
238 Fifth Avenue, New York
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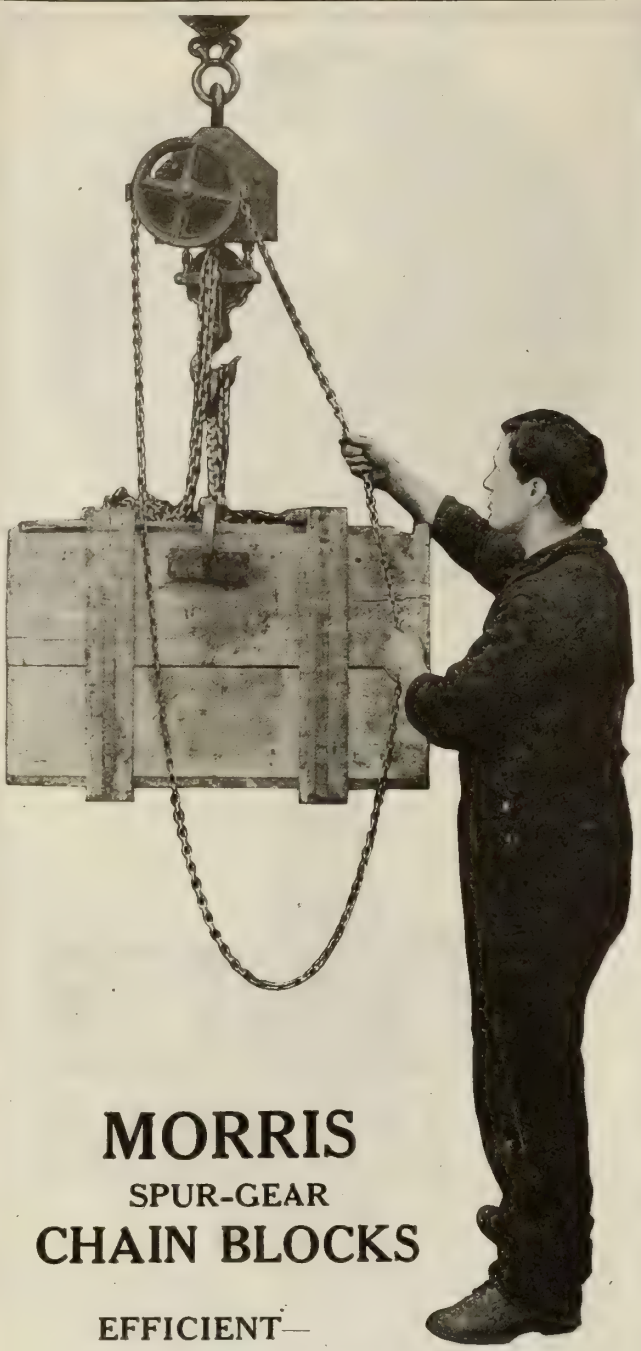

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CHAIN BLOCKS

EFFICIENT—
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DURABLE.

MORRIS CHAIN-BLOCKS ARE USED IN GREAT NUMBERS IN THE INDUSTRIAL PLANTS OF CANADA AND HAVE GAINED A MOST VALUABLE REPUTATION.

THERE IS A SIZE TO MEET YOUR PARTICULAR NEEDS. MAY WE TELL YOU MORE ABOUT THEM?

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296 ST. JAMES ST.

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VINE STREET PHILADELPHIA, PA.

Spur, Bevel, Herringbone, Spiral and Intermittent

Gears and Pinions

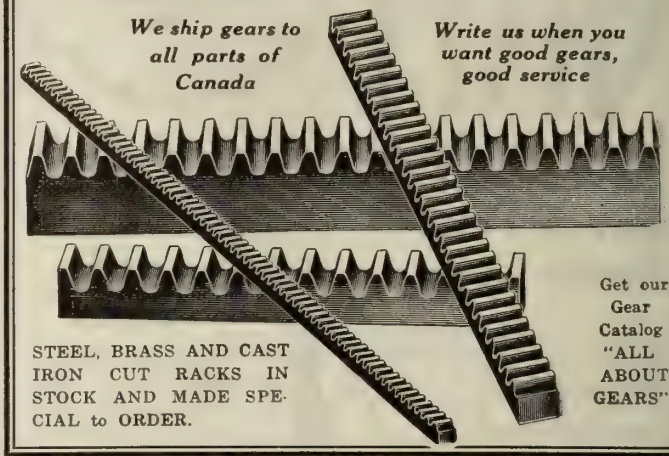
Made in all kinds of metals, rawhide and fibre

SPROCKET WHEELS made to order.

DIAMOND CHAINS for Power Transmission, Machinery, Motor Trucks, Motorcycles and Bicycles.

We ship gears to all parts of Canada

Write us when you want good gears, good service



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USED STEAM ENGINES
FOR SALE

One Left-Hand Improved Horizontal Simple Automatic Laurie Corliss Engine.

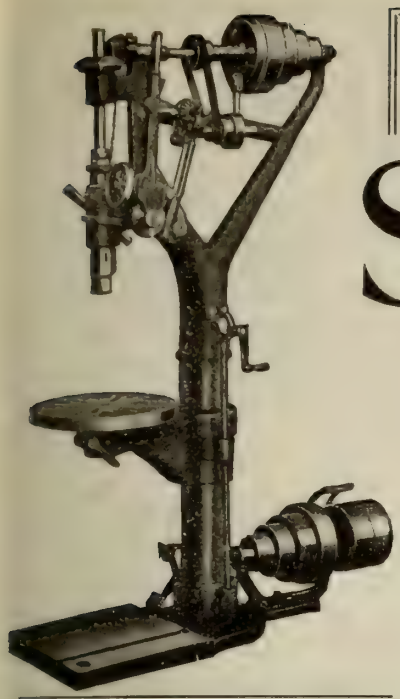
Diameter of Cylinder	**28″**
Length of Stroke of Piston	**48″**
No. of Revolutions per minute	**75**
Fly Wheel	**18′ x 12½″ Face**
Weight	**40,000 lbs.**
Rated Horse Power	**625**
I. H. P.	**700**
Max.	**950**

One 25″ x 50″ Left-Hand Wheelock Engine.
One 20½″ x 46″ Left-Hand Wheelock Engine.

These engines are in excellent condition.

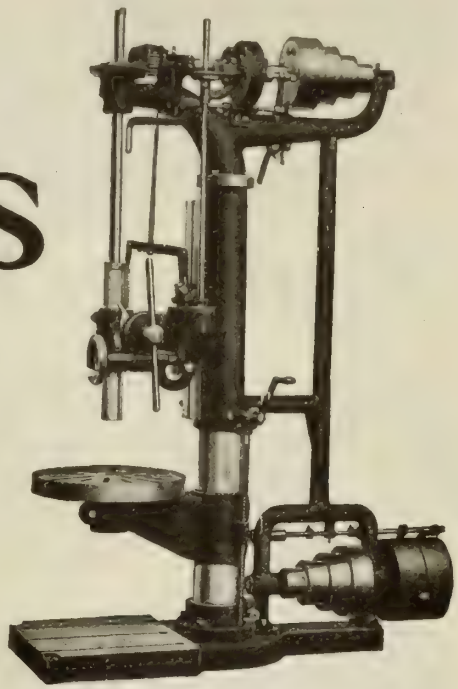
Photograph and full particulars will be sent on application to

GUTTA PERCHA & RUBBER
LIMITED
Toronto, Canada



Meet the keen competition of peace times by putting into your shop faster, stronger and more accurate upright drilling machines. Sixty-four years' drill building experience is back of these perfected

Silver Drills



The 25" Silver Drill has eight spindle speeds and six positive geared feeds. The 20" Silver Drill is built in four distinct styles with round or square base. Furnished singly or in gangs of 2, 3 or 4 spindles.

Write for further facts.

SILVER Salem, Ohio USA

The Silver Mfg. Co.

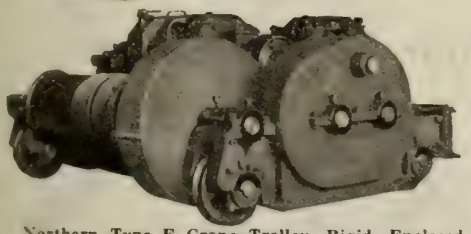
290 Broadway

SALEM OHIO

CANADIAN MADE CANADIAN MADE

Electric and Hand Traveling Cranes

Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons



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We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.

Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

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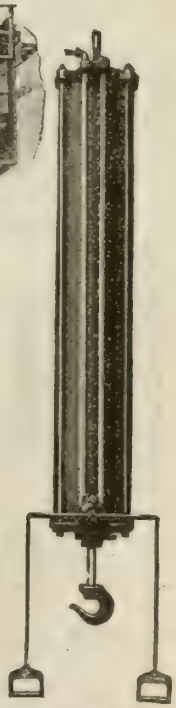

Type No. 20 Air Hoist.

Northern Crane Works, Limited

Walkerville, Ontario, Canada

"Wanted—A National Plan"

An article of unusual importance, by Sir George Bury, formerly vice-president of the C.P.R., appears in the February issue of MACLEAN'S. He points out that Canada must more definitely shape her destiny if that destiny is to be as glorious as all Canadians hope. It is a stirring demand for Canadians to get together in the formation of a national plan, accompanied by many practical suggestions from his experience in transcontinental railroad building. An article of national importance.

"Germany From Within To-day"

The funniest thing that he has perhaps written appears in February MACLEAN'S from the pen of Canada's great humorist, Stephen Leacock—an imaginary visit to Berlin under the Bolsheviks. He finds Von Tirpitz planning a new navy, an *inland fleet;* Frau Krupp, an apple woman; Von Bethmann-Hollweg, a cab driver; Bernstorff, a Bolshevik and president of the Scavengers Union. He finds a *Get From Under* committee planning a trade war on the world and half the population of Berlin in English clothing or Scotch kilts. He finds—

But read the article. There's a long laugh in every line. It is farce, however, built up on pretty shrewd truths.

You will find this a remarkably interesting number. The bold, fighting face of Admiral Beatty is on the cover and inside are the following big features:

The Campaign Against Britain, by Agnes C. Laut.
The Farmer in Politics, by J. K. Munro.
The Strange Adventure of the Thumb Tap Clue, by Arthur Stringer.
Old Times in Canada, by Walt Mason.
Lend Me Your Title, by Onoto Watanna.
The Three Sapphires, by W. A. Fraser.
Wild Miners I Have Met, by E. Ward Smith.
The Anglicization of Katrina, by Mary Josephine Benson.
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The Veins of the War God, by Corporal Herbert Forder.

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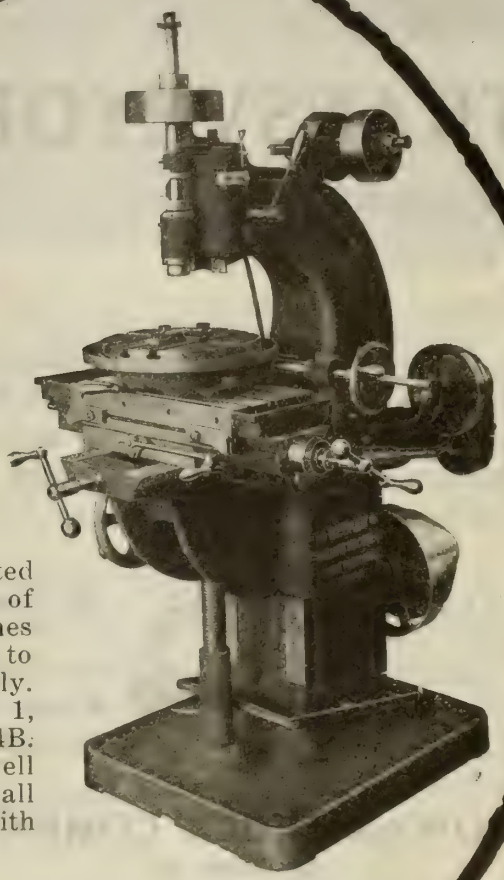

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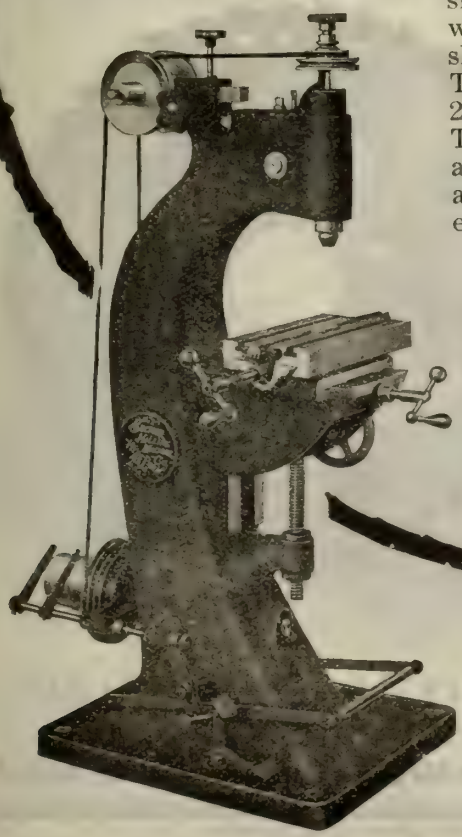
—The machines that give the smooth finish.

The "Beckers" illustrated here represent our line of small milling machines which we are prepared to ship to you immediately. The line includes: No. 1, 2, 2A, 2H, 3 and 4B. These machines are well adapted to Milling small and medium parts with exceptional rapidity.



It is not only from a point of rapid delivery that Becker Milling Machines should appeal to you. They are built on the most advanced and original lines. All of which combines to obtain the greatest capacity and range with least weight and horse power. The "Becker" is a Miller you should know more about—let us get in touch with you without delay.

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—Reduce labor.

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Place material on Cowan platforms—and you are through handling. To transfer the load slip the Transveyor under the platform, pull the handle forward—the load becomes mobile.

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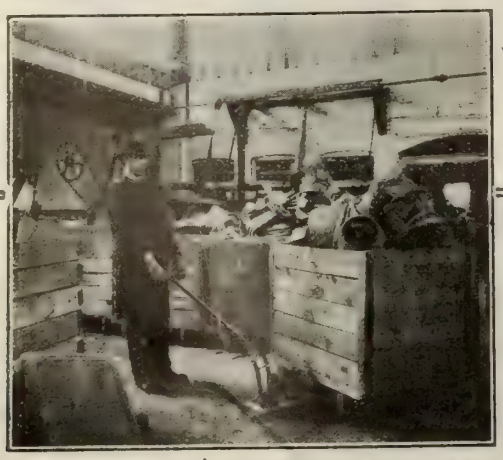

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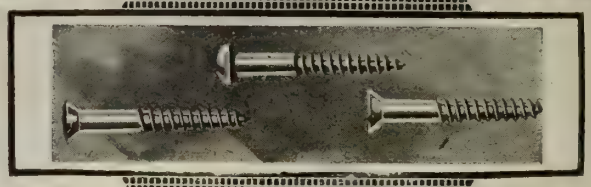
Works Founded 1858

Cable Address "Cook" Hartford, U.S.A.



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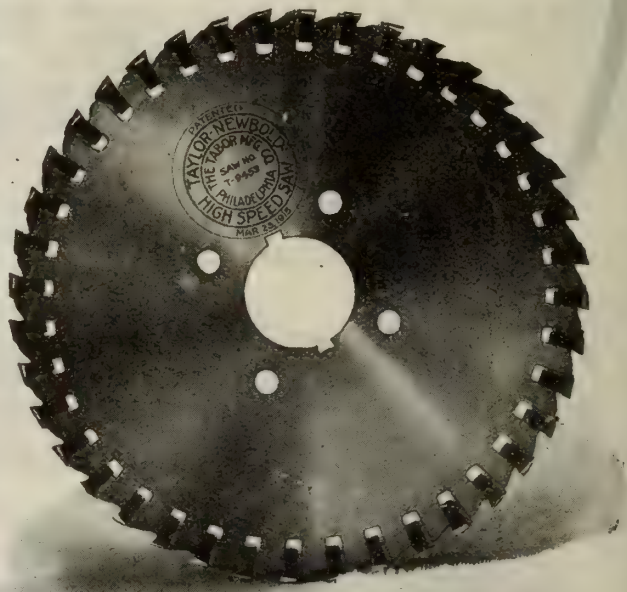

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The Utmost in Efficiency and Durability

Trahern Positive-drive Rotary-geared Pumps shoot the lubricant into deep bores or other work difficult to cool. Never need to lessen the speed of the cutting tools for the reason that Trahern Pumps, even at slow speed, flood the cutting tool with abundant coolant.

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Canadian Agents:

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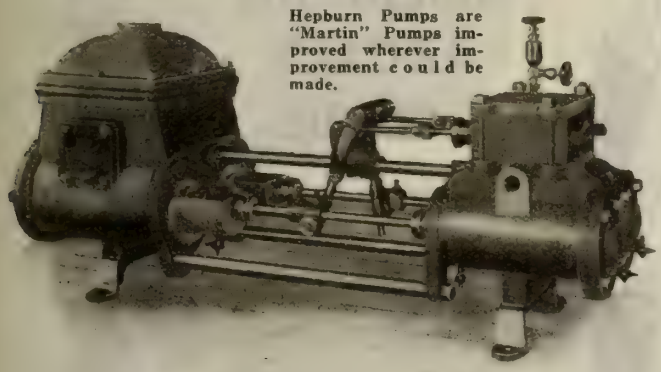
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



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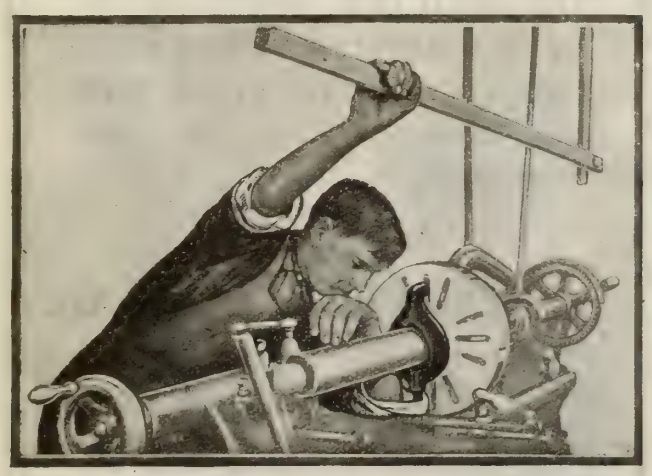

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It's Their Time

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It's Your Money

A man with a sharp file will work faster than a man with a dull file; and he'll be more contented and less tired at the end of the day.

The cost of a new file as a rule is less than one hour's wasted time. You gain, therefore, by telling men to turn in files when they have passed their efficient point. You also gain by ordering Famous Five Files. They give long and efficient service.

Specify them when ordering.

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If you break it we will furnish a new one free of charge.

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Increases Production 50 to 100%

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THEN WHY NOT try it out for yourselves, when the gain is more yours than ours if it makes good, and if it fails the loss is ours alone?

PEERLESS MACHINE CO.

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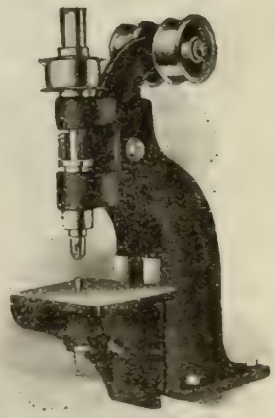
The GRANT



Grant Noiseless Rotary Rivet Spinning Machine.

Spins a Polished Rivet Head Every Second Without Noise

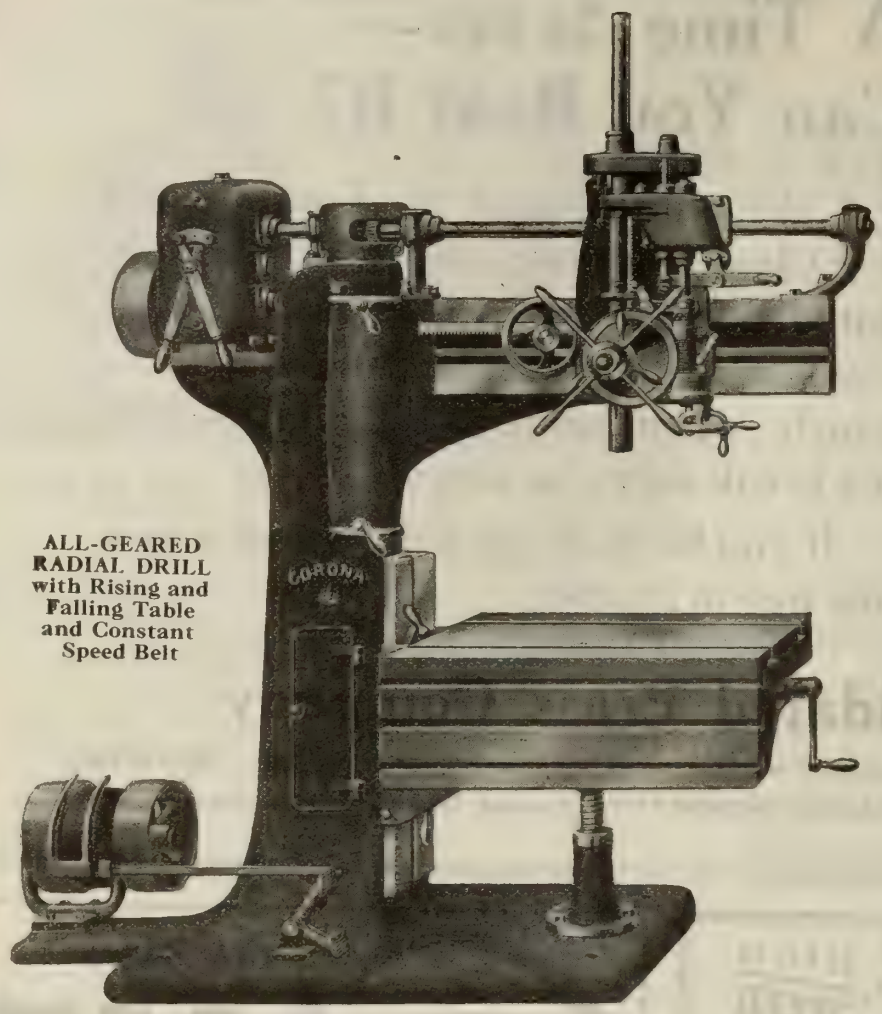
A dozen of these GRANT ROTARY RIVET SPINNING MACHINES going at full speed would not awake a light sleeper in the same room.

The GRANT is fast. In one second it will quietly spin a polished rivet head without breaking or in any way marring the casting. It will rivet tight or loose, as required. The GRANT boosts the output, cuts the cost, and turns out perfectly accurate work.

Pleased to tell you more about it. Write..

The Grant Mfg. & Machine Co.

Holland Ave., Bridgeport, Conn.



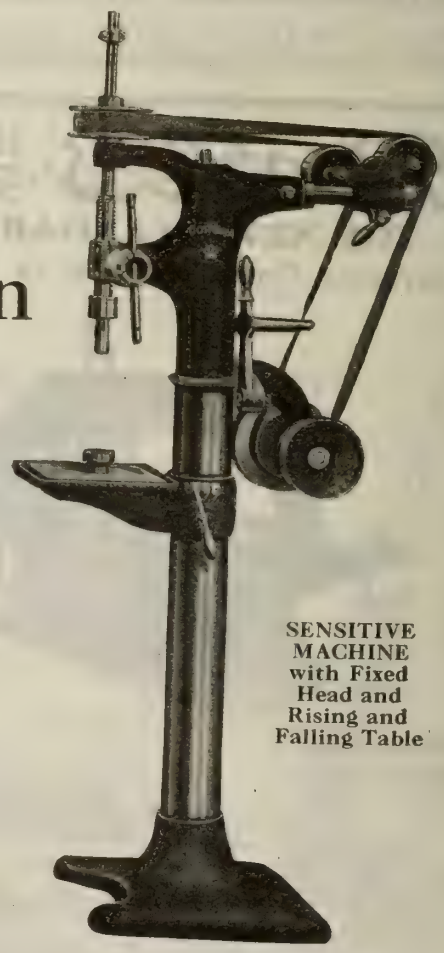
ALL-GEARED RADIAL DRILL with Rising and Falling Table and Constant Speed Belt

THIS Radial Drill is an excellent example of "Corona" quality and fine workmanship. It is built for drilling holes of different sizes up to 1½ inches diameter. It promotes rapid and accurate operations as its rising and falling table enables the material to be brought up to the drill so that the operator can work at a convenient height.

MANY important improvements over other drills will be found in the "Corona" Sensitive Models, of which the picture underneath is a typical example. Some of their leading features are—graduated steel rack bushes, adjustable feed handles, and two driving keys to all spindles.

The Corona Campaign

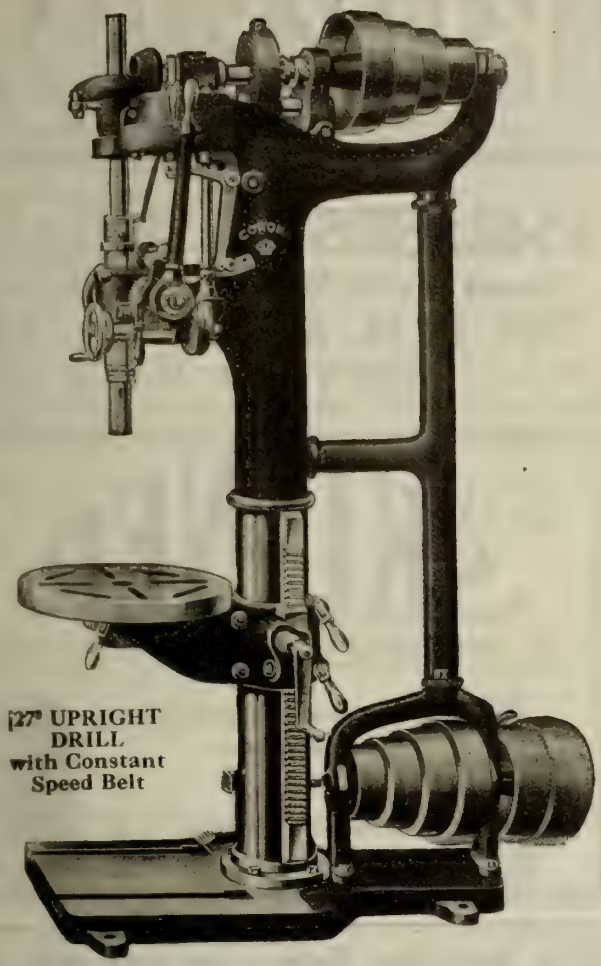
THE object of Corona publicity is to ever broaden those fields in which the name "Corona" is already well established and is recognized to mean the best that is procurable in drilling machines. Our aim since the earliest days of our activities, has been to design and construct such drilling machines as will perform their respective operations in the most efficient, time-saving and economical manner. We have specialized and we've experienced that success which such a policy ensures. When you buy a Corona you not only obtain a drilling machine of unusually skilful workmanship and ingenious design, but one into which has gone the experience we've accumulated in over twenty years' unwavering effort to surpass all other manufactures in this line. To-day we cordially invite your correspondence.



SENSITIVE MACHINE with Fixed Head and Rising and Falling Table

Fredk. Pollard & Co., Ltd.

Corona Works - Leicester, Eng.



27" UPRIGHT DRILL with Constant Speed Belt

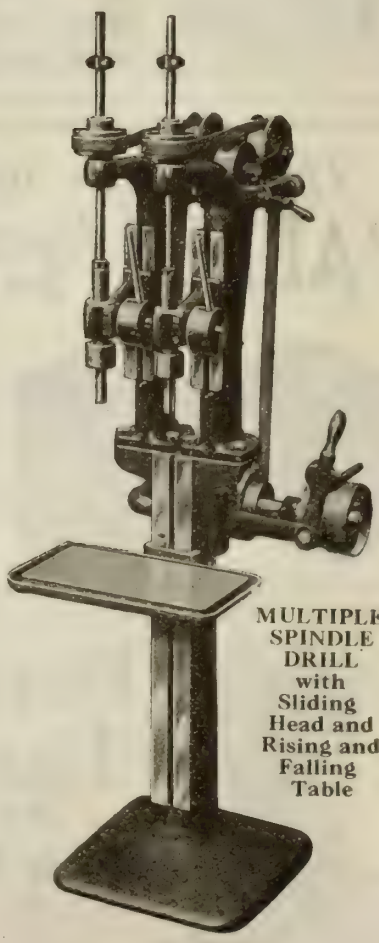
BENCH DRILL with Sliding Head, Cone Pulley Drive, giving Three Speeds

Typical Corona Machines

"Corona" Upright Drills have renewable cast iron self-oiling bearings, spindles have two driving keys and an additional slot for cottering up facing bars, etc., graduated rack bushes made from bar lined with gun metal and teeth cut from solid; back gear pinions, bevel pinions and feed driving pinions are made from steel and are accurately machine cut.

The Bench Drill we illustrate is entirely self-contained; it has two driving keys, large diameter pulleys, graduated steel rack bush, adjustable feed handle and will efficiently and speedily drill holes of ⅝-inch diameter. This model will be found exceptionally convenient for arranging in gangs and will make for economy in shop room.

"Corona" Multiple Spindle Drills have been specially designed for small work when the maximum hole to be drilled is ½-inch diameter. They are ideal for such work as that for which they are intended. The fine workmanship put into their construction is a guarantee of their durability.



MULTIPLE SPINDLE DRILL with Sliding Head and Rising and Falling Table

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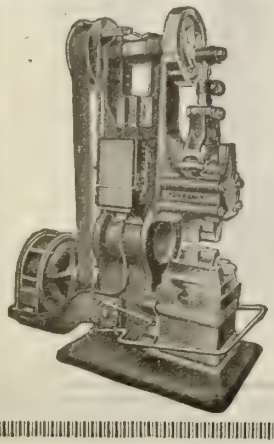

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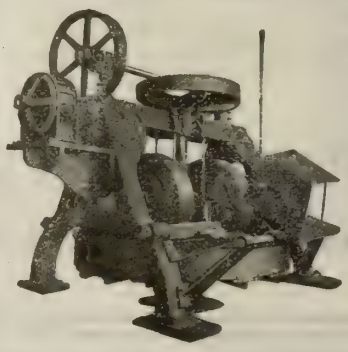

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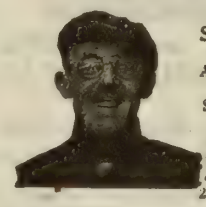

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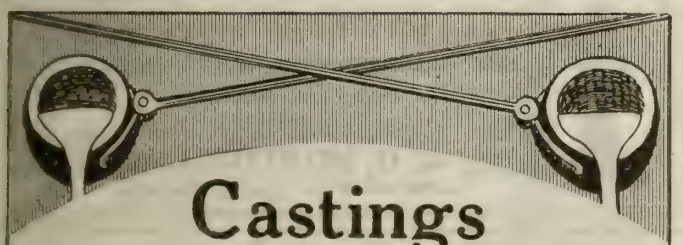

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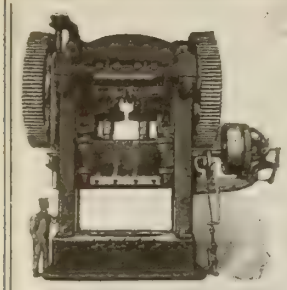

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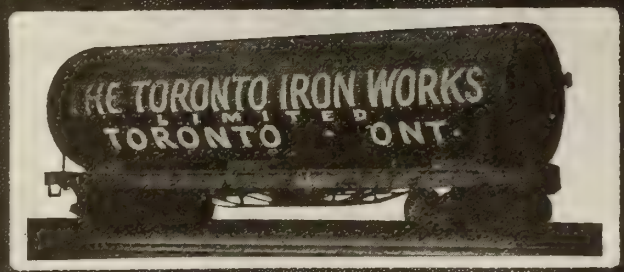

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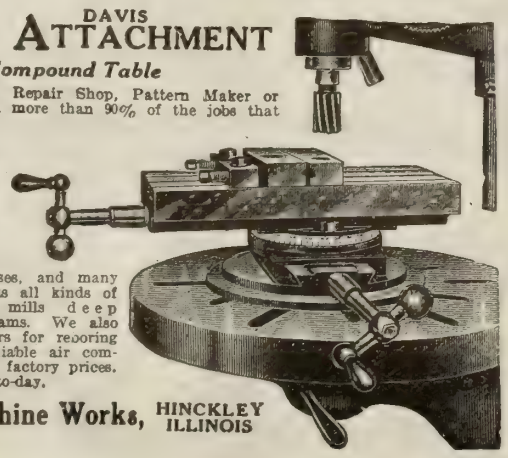

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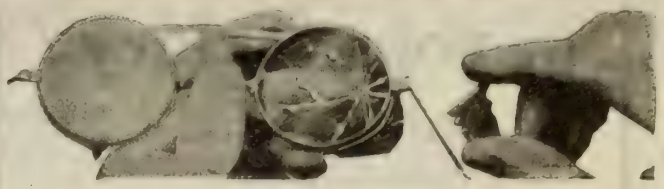

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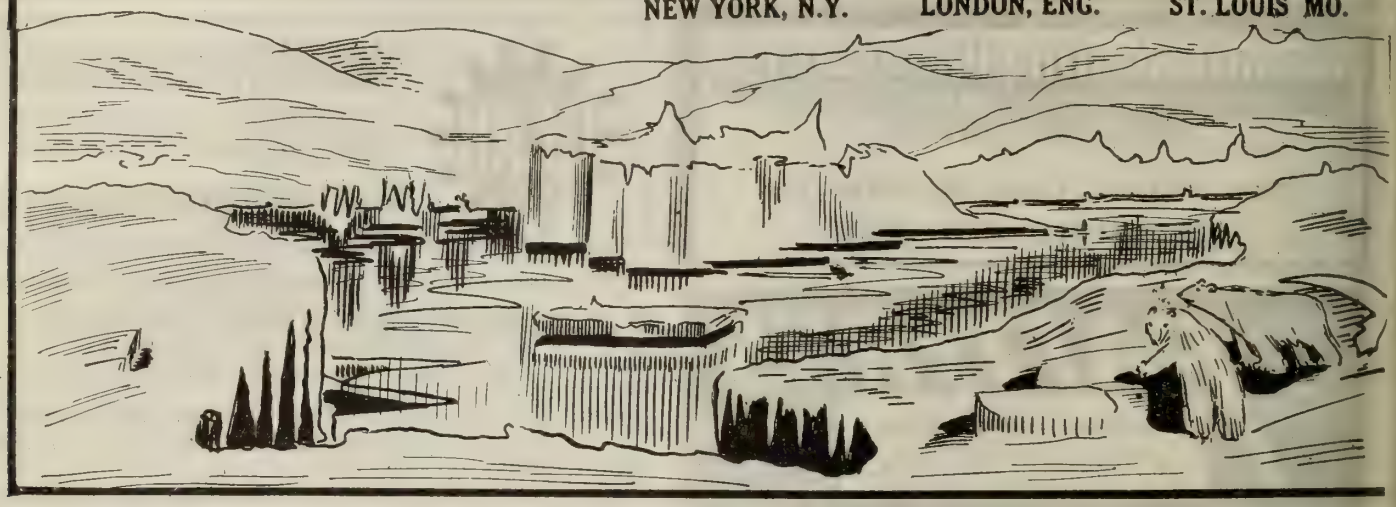

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Wells Bros. Co. of Canada, Galt, Ont.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Wright Mfg. Co., Lisbon, Ohio.

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Morse Chain Co., Ithaca, N.Y.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
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Morse Chain Co., Ithaca, N.Y.

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Coventry Chain Co., Coventry, England.
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CHESTS, TOOL
Mechanics Tool Chest Co., Toronto.

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General Steel Co., Milwaukee, Wis.

CHROME NICKEL STEEL
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General Steel Co., Milwaukee, Wis.

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Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Smalley-General Co., Inc., Bay City, Mich.

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Almond Mfg. Co., T. R., Ashburnham, Mass
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Can. Blower & Forge Co., Kitchener, Canada.
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Gardner, Robt., & Son, Montreal.
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Gisholt Machine Co., Madison, Wis.
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Knight Metal Products, Ltd., Toronto, Ont.
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Heald Machine Co., Worcester, Mass.

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Ford-Smith Mach. Co., Hamilton, Ont.
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Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.

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Marsh Engineering Works, Ltd., Belleville, Ont.
MacGovern & Co., Montreal, Que.
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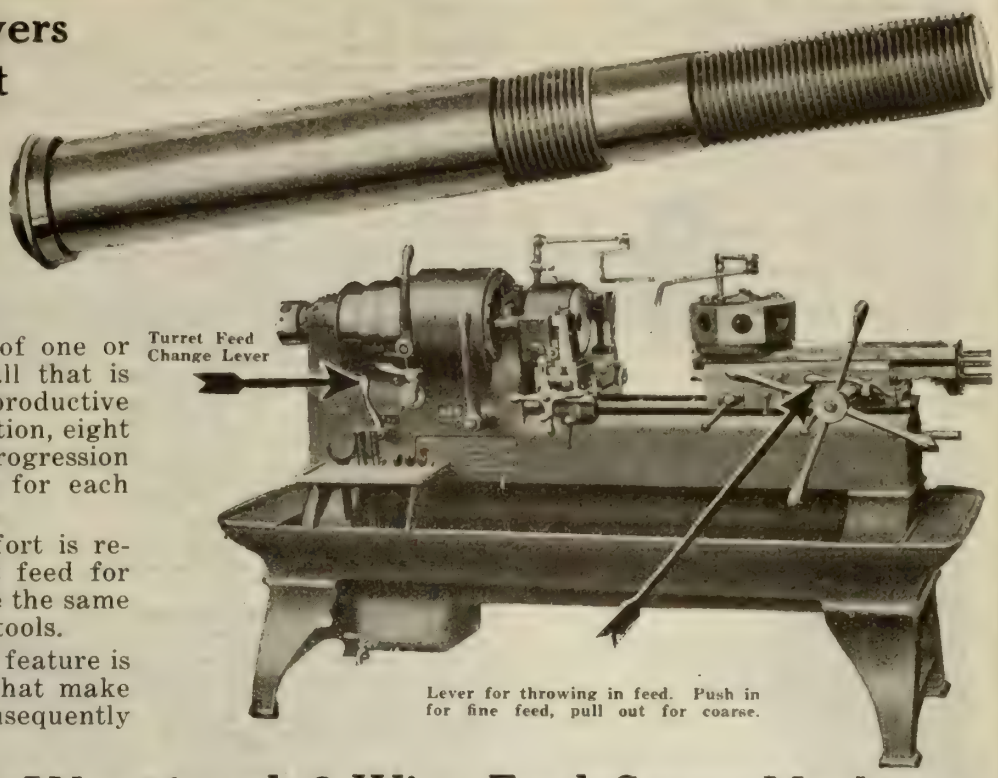

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Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
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Dominion Bridge Co. Montreal.
Marsh Engineering Works, Belleville, Ont.
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Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.

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Banfield, W. H., & Son, Toronto.
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Canadian Fairbanks-Morse Co., Montreal.
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Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
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Pratt & Whitney Co., Dundas, Ont.
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Normac Machine Co., St. Catharines, Ont.
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Niles-Bement-Pond Co., New York.
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Fox Machine Co., Jackson, Mich.
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Henry & Wright Mfg. Co., Hartford, Conn.
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Niles-Bement-Pond Co., New York.
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Canada Machinery Corp., Galt, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Landis Tool Co., Waynesboro, Pa.
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Niles-Bement-Pond Co., New York.
Pollard & Co., Ltd., Leicester, Eng.
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Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
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Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Pollard & Co., Ltd., Leicester, Eng.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Rice Lewis & Son, Toronto, Ont.
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Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Millers Falls Co., Millers Falls, Mass.
Pollard & Co., Ltd., Leicester, Eng.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

EFFICIENCY ENGINEERING SERVICE
Anderson's Efficiency Service, Toronto, Ont.

ELECTRIC FURNACES
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Volta Mfg. Co., Welland, Ont.
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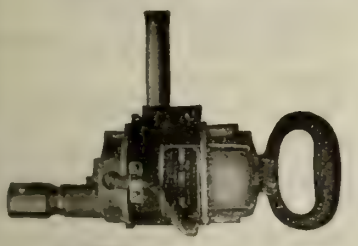

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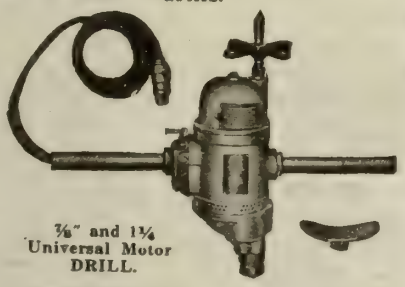

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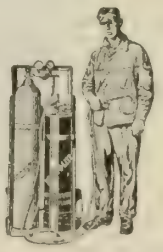

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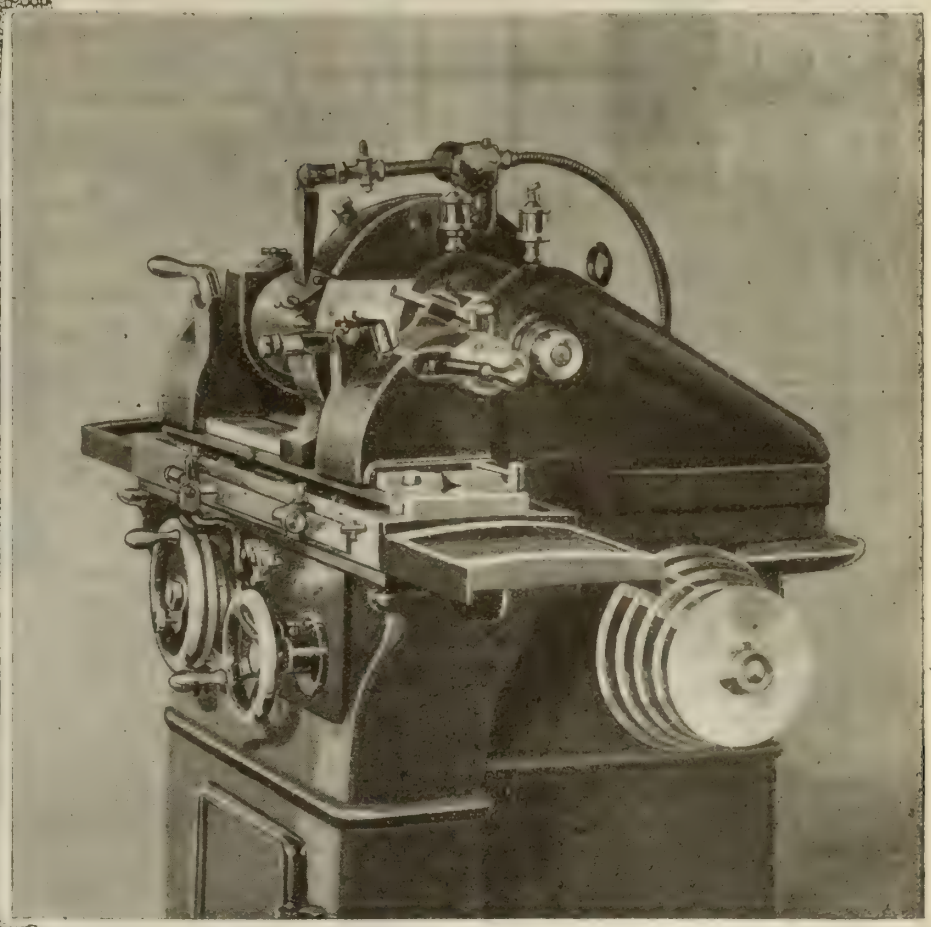

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Riverside Machinery Depot, Detroit, Mich.
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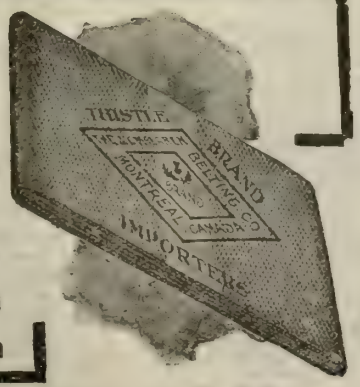

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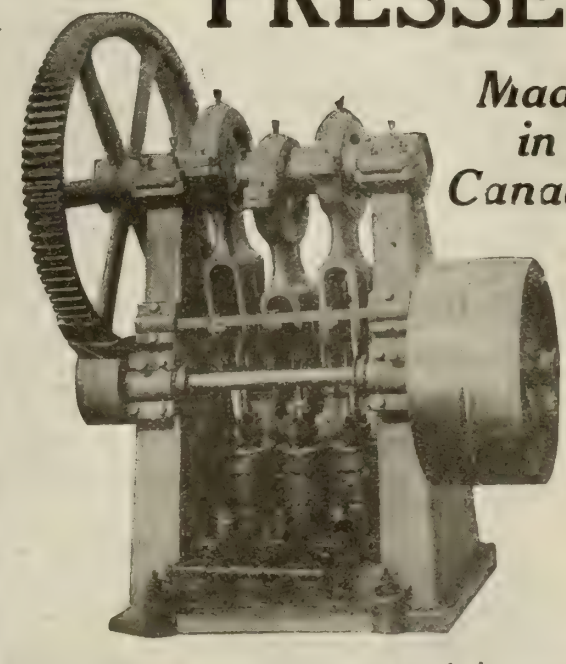

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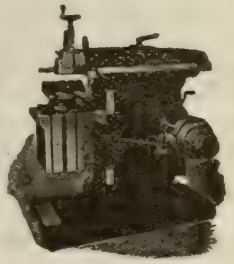

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REAMERS, PIN
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Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

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Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

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Lufkin Rule Co. of Can., Windsor, Ont.

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Lufkin Rule Co. of Can., Windsor, Ont.

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SAND MILLS
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SAND BLAST MACHINES
Pangborn Corporation, Hagerstown, Md.

SAND BLAST SUPPLIES AND ACCESSORIES
Pangborn Corporation, Hagerstown, Md.

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SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

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Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

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Wells Bros. of Can., Galt, Ont.

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Taylor, J. A. M., Stair Bldg., Toronto, Ont.

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Lufkin Rule Co. of Can., Windsor, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

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Knight Metal Products, Ltd., Toronto, Ont.
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Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
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Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que.

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Galt Machine Screw Co., Galt, Ont.
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Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

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A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

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National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

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Rice Lewis & Son, Toronto, Ont.
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Bertrams, Ltd., Edinburgh, Scotland
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Garlock-Walker Machinery Co., Toronto, Ont.
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Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

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Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
A. B. Jardine & Co., Limited, Hespeler, Ont.
National Machy Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.

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Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
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Stoll Co., D. H., Buffalo, N.Y.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
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Marsh Engineering Works, Belleville, Ont.
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Modern Tool Co., Erie, Pa.
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Niles-Bement-Pond Co., New York
Rickert-Shafer Co., Erie, Pa.
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Lufkin Rule Co. of Can., Windsor, Ont.

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Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.

APS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

APS, GUN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

APS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

APS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

APS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

APS, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

APS, STAYBOLT, "MAX" TAP
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

APS, TAPPER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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The Geo. F. Foss Mchy. & Supply Co., Montreal
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
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TAP EXTRACTORS
Walton Co., The, Hartford, Conn.

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Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, ENGRAVED
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, TEMPERATURE AND PRESSURE
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, RECORDING AND INDEX
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Taylor Instrument Co., Rochester, N.Y.

TESTING INSTRUMENTS METALLURGICAL
Shore Instrument & Mfg. Co., New York City.

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Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
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Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

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Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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Taft-Pierce Mfg. Co., New York, N.Y.
Smalley-General Co., Inc., Bay City, Mich.

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Williams & Co., J. H., Brooklyn, N.Y.

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Brown, Boggs & Co., Hamilton, Can.

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West Tire Setter Co., Rochester, N.Y.

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Aikenhead Hardware Co., Toronto, Ont.
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Armstrong Bros. Tool Co., Chicago.
Deloro Smelting & Refining Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL POSTS, LATHE
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Williams & Co., J. H., Brooklyn, N.Y.

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Canada Wire & Iron Goods Co., Hamilton.

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Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
Deloro Smelting & Refining Co., Toronto, Ont.
General Steel Co., Milwaukee, Wis.
H. A. Drury Co., Montreal.
Firth & Sons, Thos., Montreal, Que.
Hammond Steel Co., Inc., Syracuse, N.Y.
Harvey & Co., Arthur C., Boston, Mass.
Hawkridge Bros. Co., Boston, Mass.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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Rice, Lewis & Son, Toronto, Ont.

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Independent Pneumatic Tool Co., Chicago, Ill.
Stow Mfg. Co., Binghamton, N.Y.
A. R. Williams Machinery Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
United States Elec. Tool Co., Cincinnati, O.

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Davidson Tool Mfg. Co., New York, N.Y.

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y.

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind.

TORCHES, STEEL
Armstrong, Whitworth of Canada, Ltd., Montreal
Prest-O-Lite Co., Inc., Toronto, Ont.

TRACK, PORTABLE STEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

TRANSFORMERS
MacGovern & Co., Montreal, Que.

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American Pulley Co., Philadelphia, Pa.
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Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y.
J. C. Wilson & Co., Belleville, Ont.

TRANSMISSION POLES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

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Jones & Glassco, Montreal, Que.
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Wilson & Co., J. C., Belleville, Ont.

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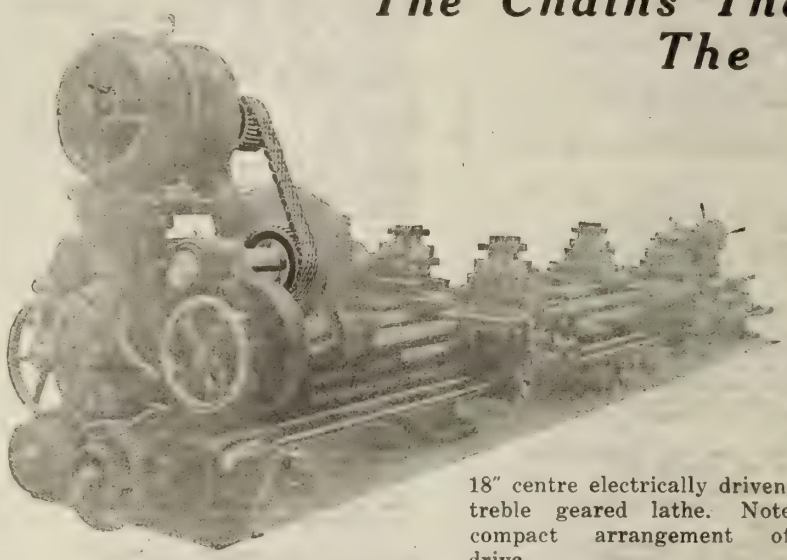

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A weekly newspaper devoted to the machinery and manufacturing interests.

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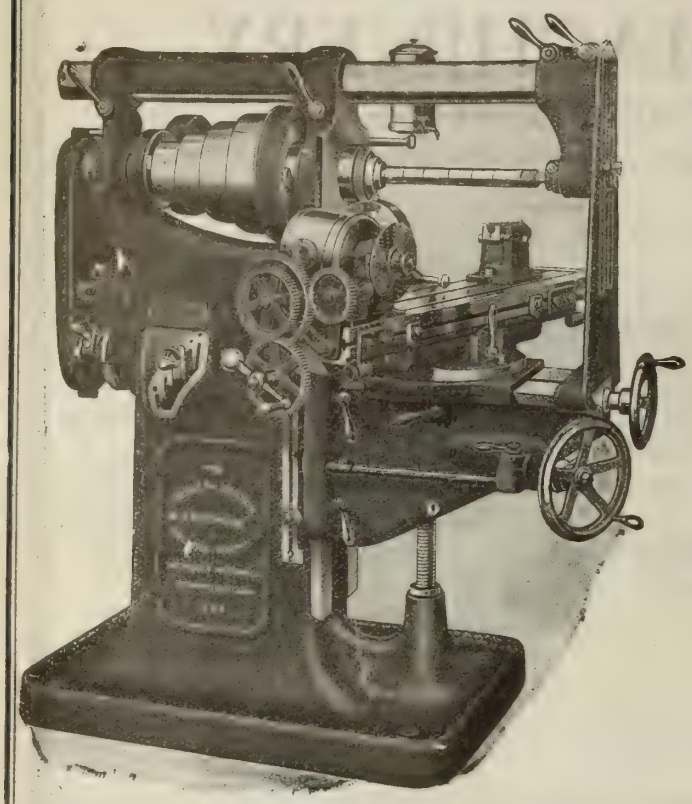

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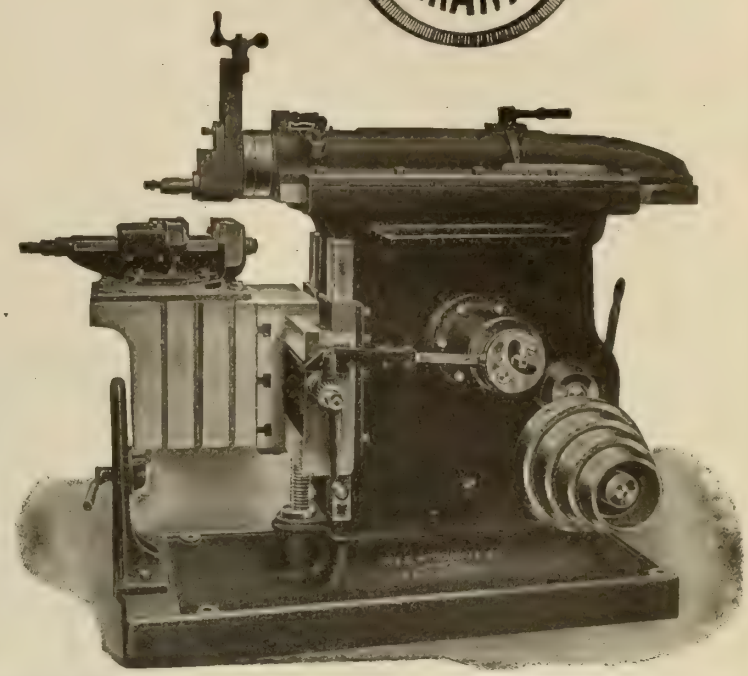

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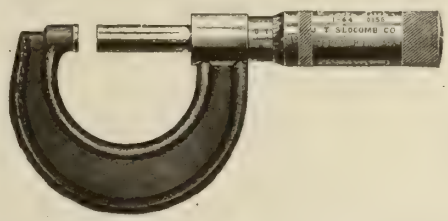

As distributors of finest precision tools, we take pride in the fact that we handle J. T. Slocomb Micrometers. Their reputation in hundreds of tool rooms and metal-working plants is a gauge that indicates the depth and breadth of our own supply business.

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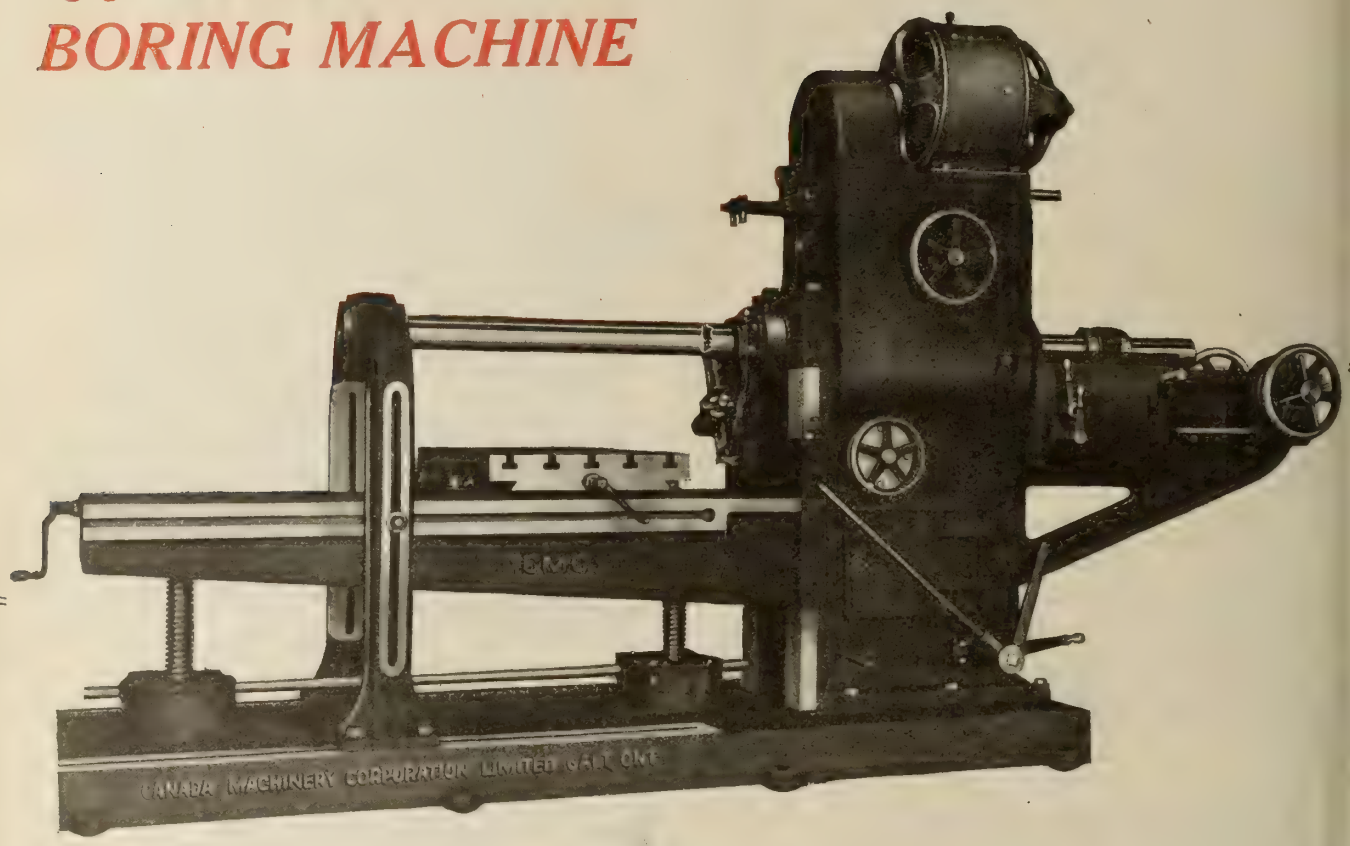
60" HORIZONTAL BORING MACHINE



This boring machine is of new design in which much attention has been given to compactness and ease of manipulation. All gears are enclosed and safety devices are provided to prevent accidental meshing of conflicting gear ratios.

The machine may be driven either by variable speed motor as shown in the illustration or by means of a separate countershaft, cones and back gearing.

Special descriptive bulletin gladly furnished upon request. For sale direct or by all leading machinery dealers.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

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EDITORIAL INDEX—PAGE 103 BUYERS' DIRECTORY—PAGE 85 ADVERTISING INDEX—PAGE 104

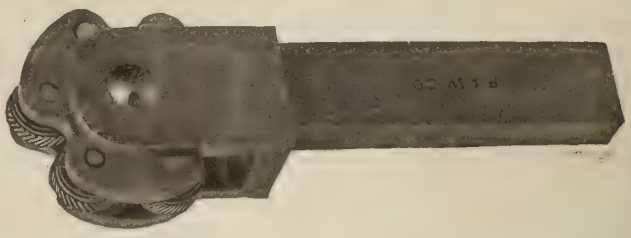
CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 7. Publication Office: Toronto, February 13, 1919 Subscription Price $3.00 per Year

SMALL TOOLS

P. & W. Combination Lathe Knurling Tool



PROMPT SERVICE

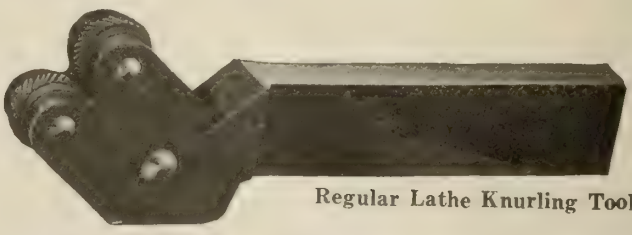
is assured at our present store where P. W. Small Tools are carried in stock. Place your order there to-day.

Combines Three Distinct Knurling Tools in One

You will save time by using this three-in-one Lathe Knurling Tool.

It carries three pitches of knurls fine, medium and coarse, as shown in sample. This does away with necessity of having three holders or of changing knurls where but one holder is available. Same knurls can be used in this holder as are used in our regular Lathe Knurling Tool.

Fine Medium Coarse



Regular Lathe Knurling Tool

Precision Machine Tool---Standards & Gauges

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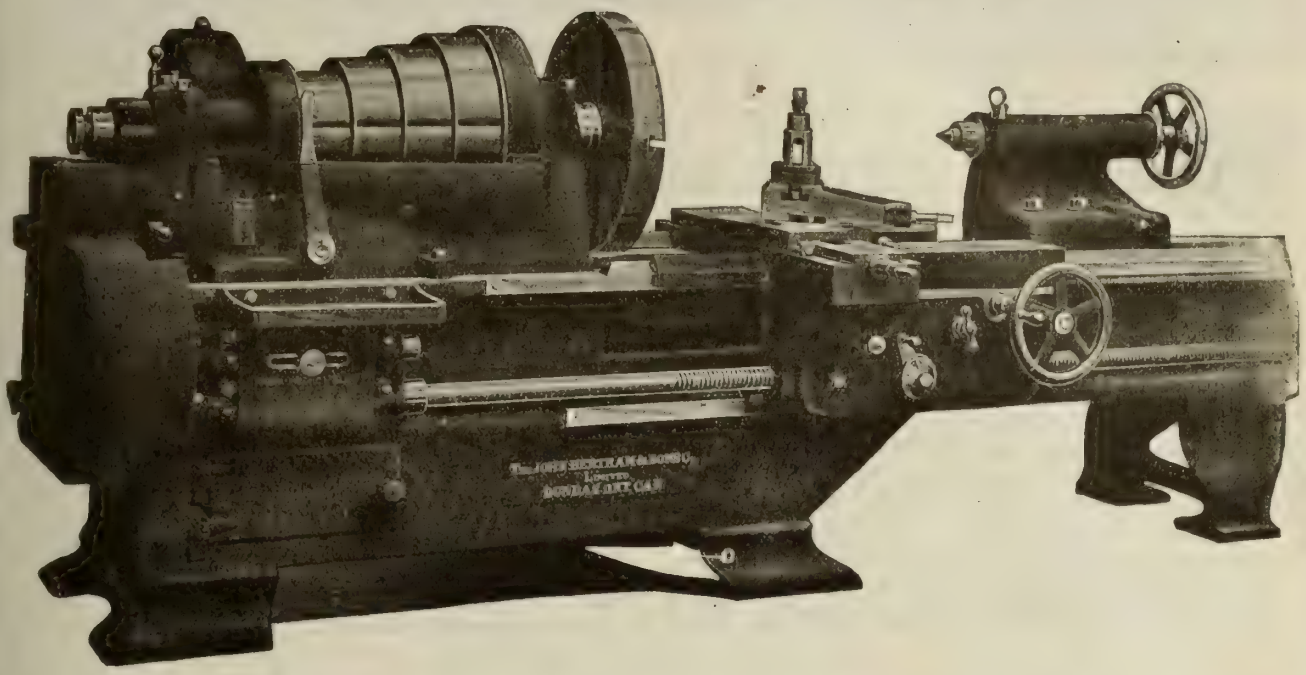
BERTRAM MACHINE TOOLS



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26-inch x 42-inch Swing

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The Publisher's Page

TORONTO FEBRUARY 13, 1919

Advertise Bolshevism and You Destroy It

Why It Cannot Stand the Light

By J. T. M. in Printers' Ink

ONE of the foulest crimes perpetrated by Germany against the nations of the world was the organizing against them of the Bolshevist movement.

The Russian of tousled hair and bushy black beard, with bombs protruding from his person, was regarded by most of us as merely a comic opera figure. But he existed. England and Switzerland tolerated his presence. Usually he did not directly abuse their hospitality. He conspired—for that was his business in life—but against other countries. It was part of the routine of slumming in the Whitechapel region of London twenty odd years ago for strangers to attend a Nihilist gathering, and in Swiss cities also the visitor was generally welcome, if he brought tobacco or money for the brethren.

The "group" generally consisted of a central directing figure of keen shrewd appearance, the herder of the flock, surrounded by a number of freaks, male and female; idealists and brutes: mental, moral and emotional defectives. Sunday afternoons were the popular gathering occasions for the Nihilists in the Houndsditch and old Spitalfields sections of London.

In a badly-lighted, evil-smelling garret the unkempt fraternity would hold meetings when strangers arrived, and seemingly more for the benefit of the latter than for any other discernible reason. The wise, and usually wolfish-looking, person in charge would designate a "speaker," and some poor blear-eyed degenerate would arise and rave and lash himself into a frenzy in a foreign tongue, until the slumming party became gradually nauseated and disgusted and decided to go, glad to donate a piece of silver for the "cause," especially as by that means there was better prospect of getting out once more to the fresh air unmolested.

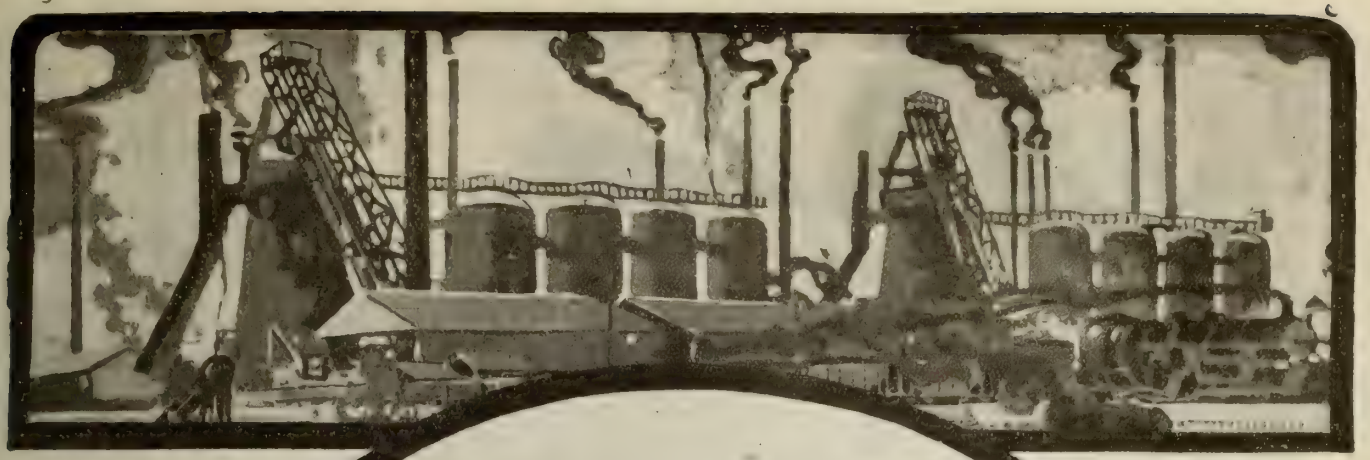
Who ever would have dreamed that a great nation would one day capitalize the Russian Nihilist, would one day organize such criminals and madmen as these for the spread of anarchism and for the destruction of that nation's adversaries?

Even before the war, Germany had begun to turn them to practical account. They were injected into the "Syndicats" in France and the sabotage committed against the French Government property, railroads and industrial plants by the Syndicalists is now known to have been carried out by anarchists under the direction and inspiration of individuals who were in relation with the German Secret Service. France never succeeded in rooting them out, and they are to-day the source of the most serious concern for her statesmen and officials. They were the criminal element also in the Internationalist body, with headquarters in Berne, which worked to such dangerous effect in Belgium before the war, and which during the war scattered funds lavishly among the Anarchist-Socialists of Italy, with results which at various times made the condition of Government in the Peninsula exceedingly insecure.

The grand coup by Germany, however, was the financing of Lenine and Trotzky and the dispatching of them to Russia to subvert law and order and to turn anarchy loose. How the emissaries worked and the methods they followed need not here be described, nor need there be mention of the retribution which Germany brought down on herself through the orgy of crime which she had so wantonly started. There are serious grounds for suspicion that organized anarchist movements in various lands are still directed from Germany.

Wars are usually followed by "waves of crime." The atrocious business of killing has a depraving effect on the morally weak, with psychological results which are fairly well understood. Such natures do not revert promptly to the modes of thought and sentiments of orderly life. Murderous brutality as it was taught to the German soldier could only leave a moral ulcer not easily eradicable. The wave of crime is intensified where civic discipline has broken down, where social disorder is attended by privations of every kind. Poverty and hunger breed the bandit and the outlaw. Germany taught the vilest outlaws of our time how to organize, and on Germany falls the responsibility for whatever waves of

CONTINUED ON PAGE 61



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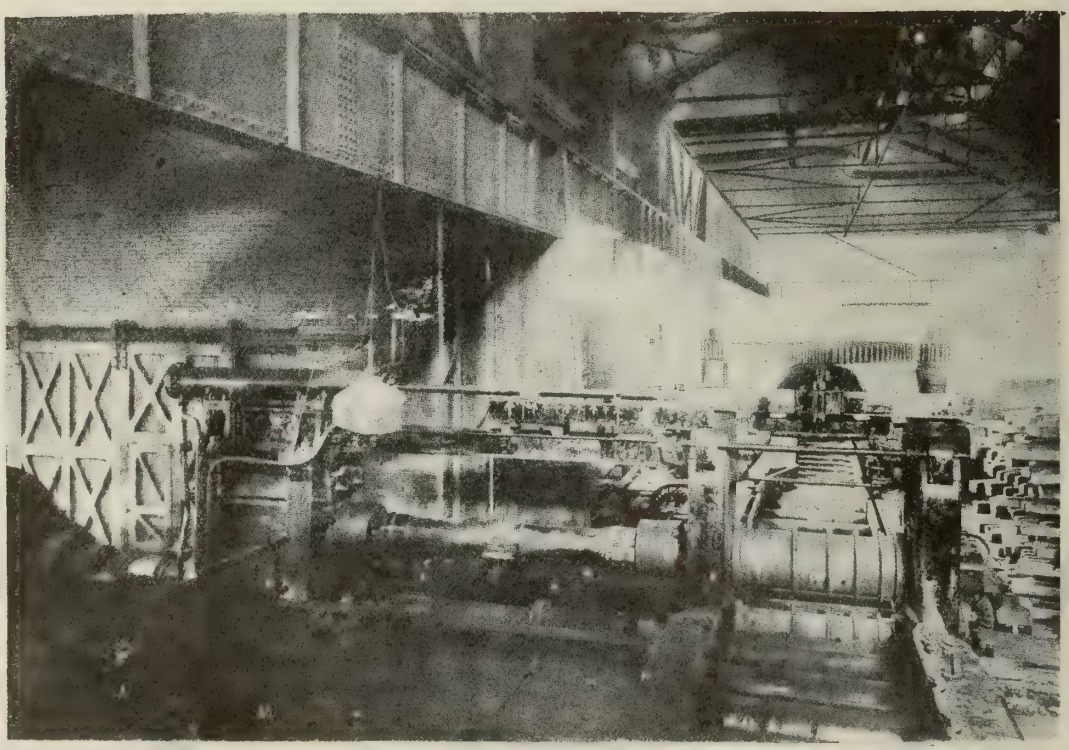

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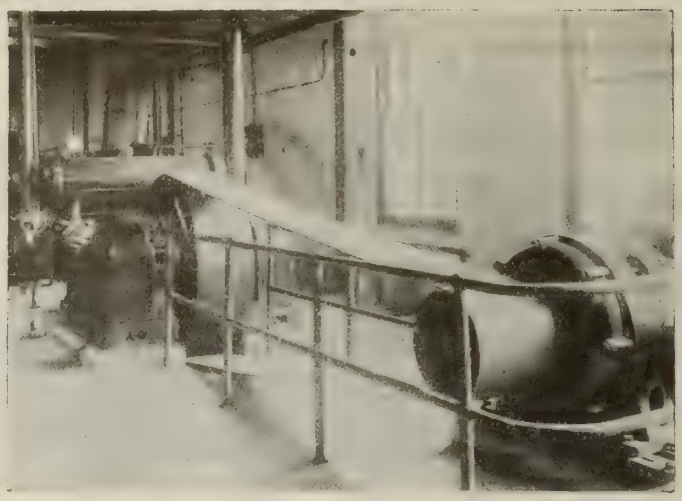

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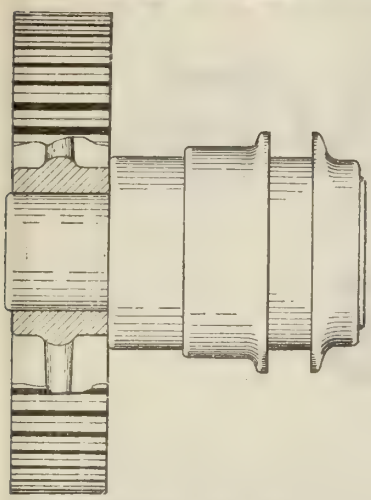
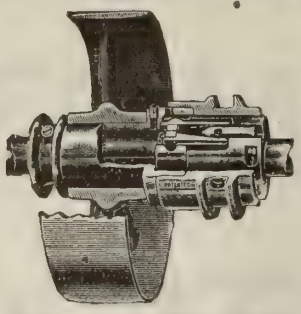
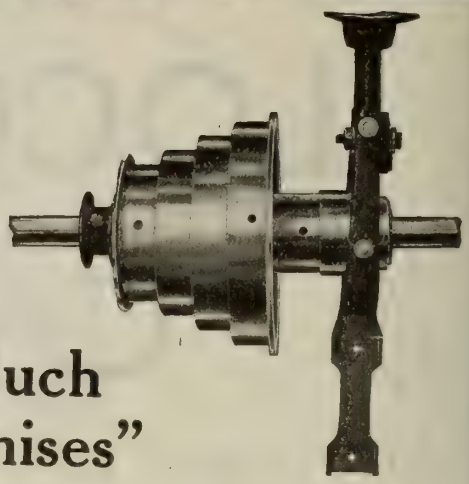
THE JOHNSON FRICTION CLUTCH



Gear Mounted on Clutch Hub.



Pulley on Hub Clutch Engaged.



Cone Pulley on Hub and Style "A" Shifter.

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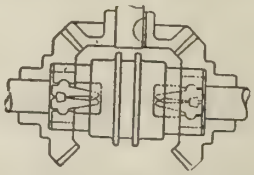
Ask us for the names of builders of machines such as you make. For every requirement there is a JOHNSON FRICTION CLUTCH.



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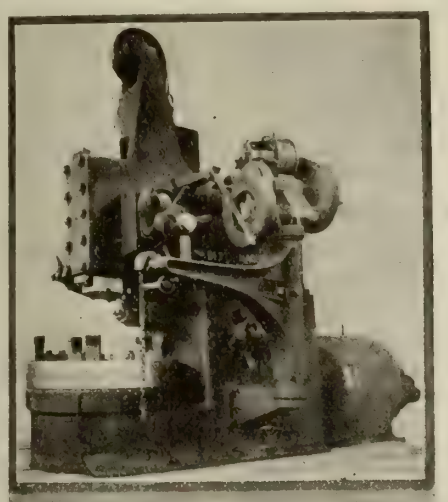
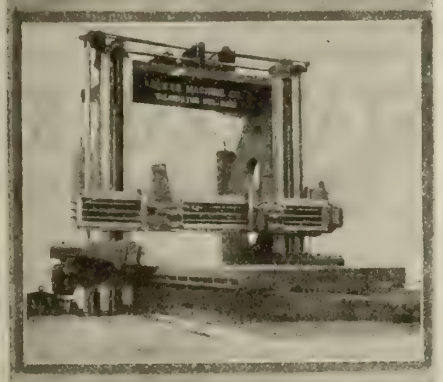
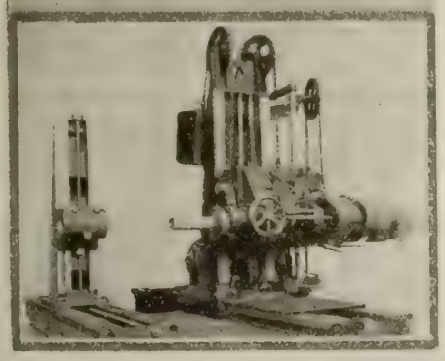
BETTS







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A quantity, imported from England, made with diamonds weighing about a carat and a half each and of the very best quality.

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Seven No. 4 Single Friction Clutches, manufactured by Carlyle-Johnson Machine Co., Manchester, Conn.

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Three No. 2 Plain Millers, complete
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Eight 6½″ Air Cylinders, manufactured by Manufacturers Equipment Co., Chicago
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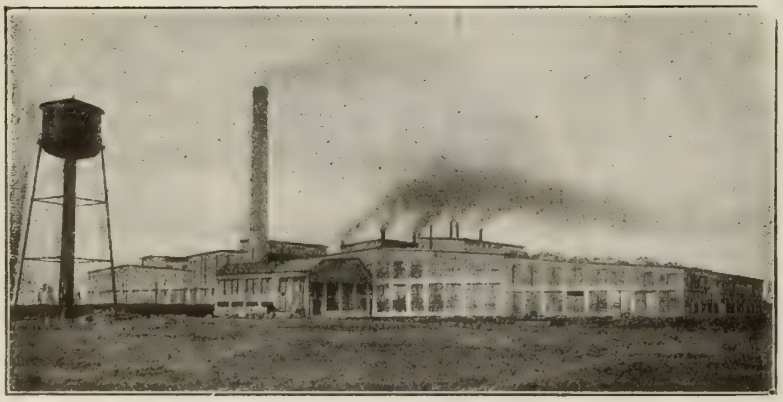
Hamilton, Ontario, Canada



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They are highly resistent to acids being unattacked by Aqua-Regia and resist corrosion to a wonderful degree.

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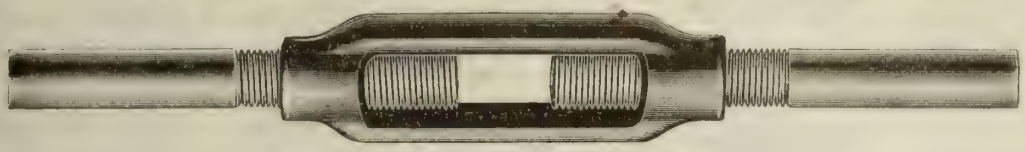

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Of Every Description
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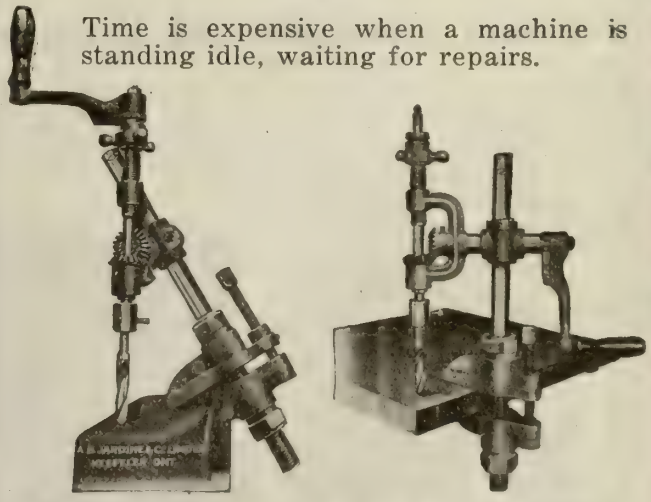
Jardine Universal Ratchet
Drill

Time is expensive when a machine is standing idle, waiting for repairs.



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They insure absolute temperature control, hence uniformity of product, perfect combustion and low cost of production.

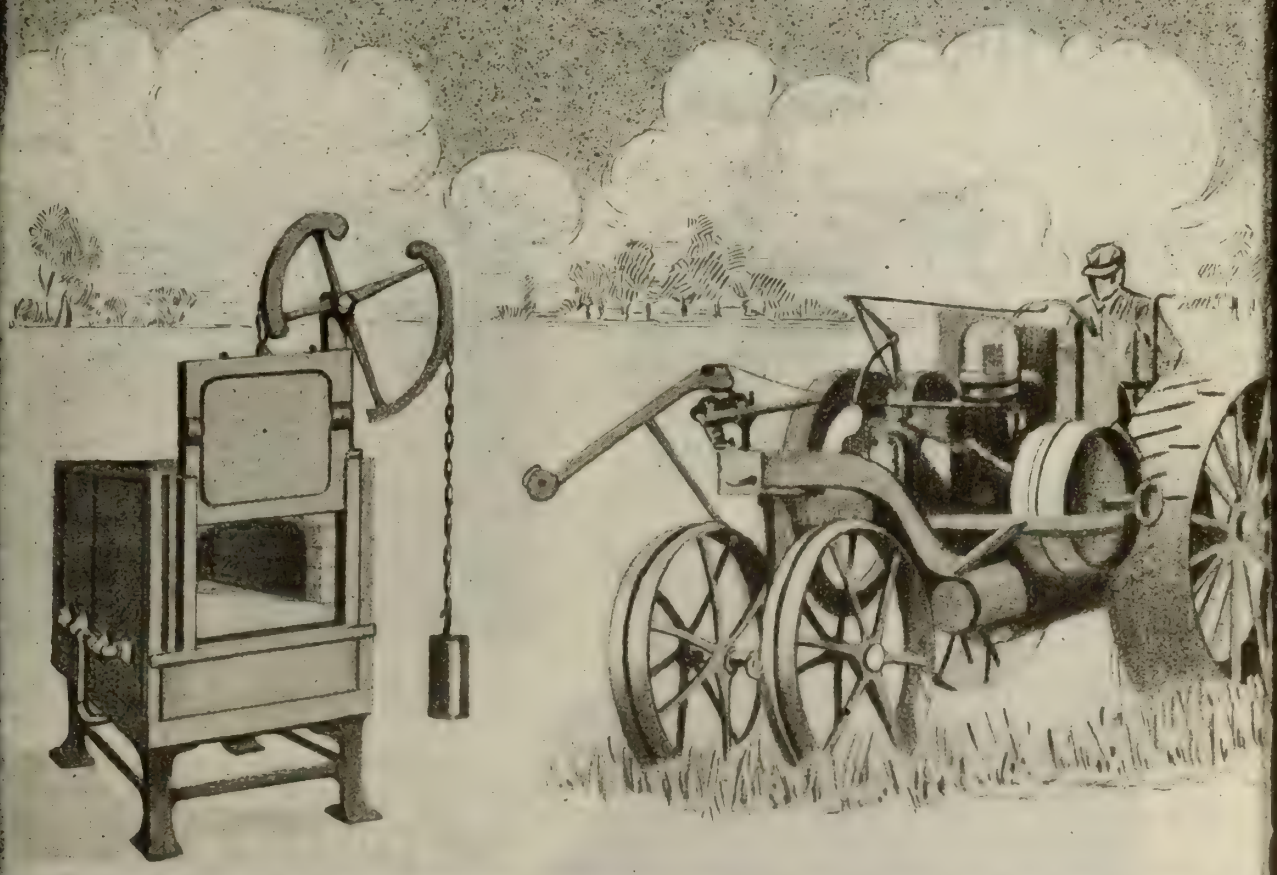
For 50 years the name of Gilbert & Barker has been the recognized standard in the burning of gaseous and liquid fuels.

Catalog No. 24 will tell you all about it. Send for it. To-day is a better day than to-morrow—write.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal, Que. Jas de Von, 227 Davenport Rd., Toronto, Ont.

GILBERT & BARKER MANUFACTURING CO.
WEST SPRINGFIELD MASS. U.S.A



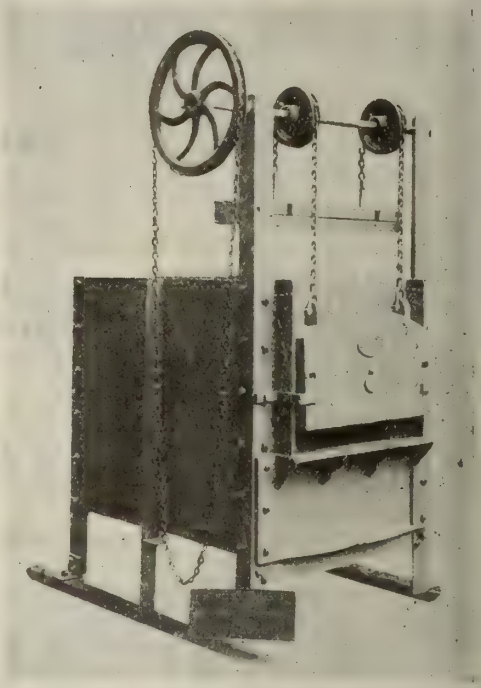
Do These Advantages Appeal

To Your Sense of Economy and Efficiency?

OIL FURNACE
VERSUS
COAL FURNACE

It's economy — requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. *Can you afford to lose the Advantages of this oil Furnace?*

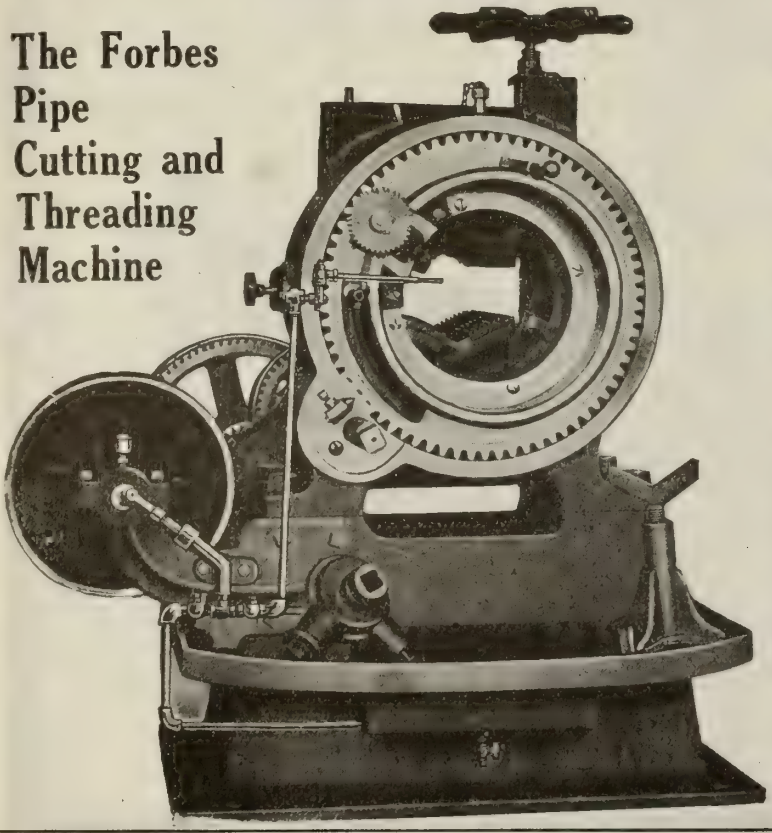
Write To-day for Full Particulars.



Mechanical Engineering Company, Limited
55 Cote Street Montreal Que., Canada
PHONE MAIN 3585 **Cable Address: *"Mecol"***

CUTS THREADS FAST, CLEAN and TRUE

The Forbes Pipe Cutting and Threading Machine



One man can do the work of six against old Stock and Die method of cutting

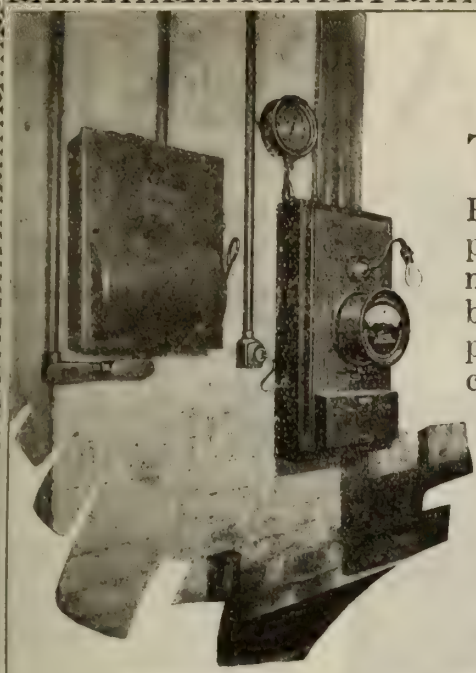
These are not exaggerated statements—they are facts that are being proven every day by Forbes' Users. Inquire for yourself. Investigate its performance closely and you can't help but admit its labor-saving, perfect-working value.

Inexpensive to Operate

It is simple, compact, self-contained, and all wearing parts are adjustable. One man can operate it and for heavy pipe work it can be taken right to the job. Fitted with self-centering vise that holds the heavy pipe stationary, while the dies turn around it. The latter are clamped and released by a throw of the lever.

Write for our latest bulletin giving full details

THE CURTIS & CURTIS CO.
Garden Street, Bridgeport, Connecticut, U.S.A.



Pyrometry

THE INDISPENSABLE!!

Pyrometry has safeguarded production in all great plants where high temperature is a vital factor. In metallurgical, ceramic and a host of other fields, by pyrometers, precision of results are rendered possible; absolute information available; the records of yesterday for to-day's guidance; standards of efficiency raised. Proud are we of the part *Tycos* Instruments have played in the upbuilding of great industries, and further to share with our worthy contemporaries the honor accompanying such pyrometer achievements.

Tycos Pyrometers

possess the many dependable qualities desired, meeting in abundant measure your expectations. In short the endorsement of *Tycos*; the preference expressed have built up our great factories, still growing—**overwhelming endorsement indeed.**

To those unacquainted with us we seek acquaintance, be it through our literature, our advisory service, or a personal call. Command us.

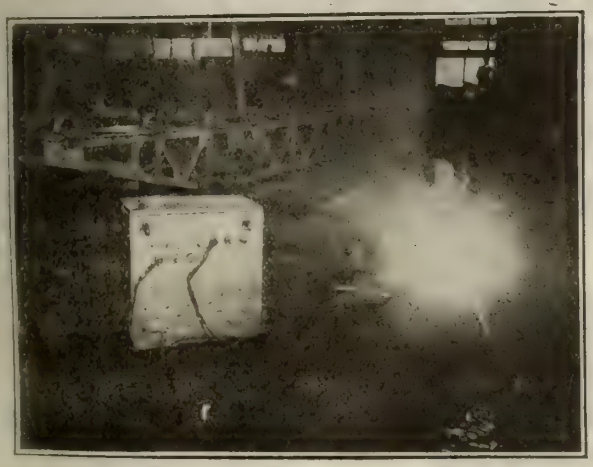
The Taylor-Cambridge Division

Taylor Instrument Companies

ROCHESTER, N.Y.
201 Royal Bank Building, Toronto

270

Electric Welding by Alternating Current



WELDING STEEL PLATE
HAMILTON BRIDGE WORKS, HAMILTON, ONT

The

"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

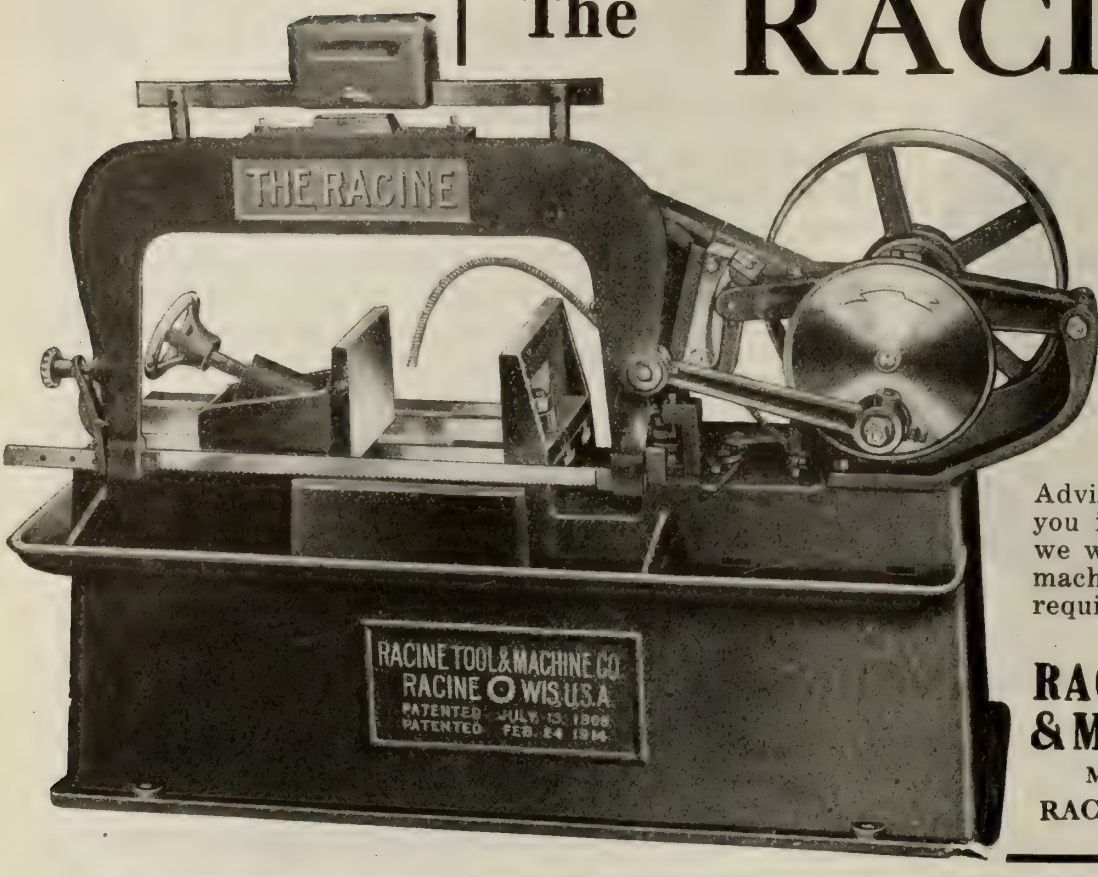
Reduces welding costs to minimum
Does not require expert to operate

The Arcwell Corporation of Canada, Ltd.

710 C.P.R. Building, Toronto

U.S. Office: 42 Broadway, New York City

The "RACINE"



For Speed

For Accuracy

For Quantity Production

For Saving in Blade Costs

For Saving in Material

Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

RACINE TOOL & MACHINE CO.

Melbourne Avenue

RACINE, WIS., U.S.A.

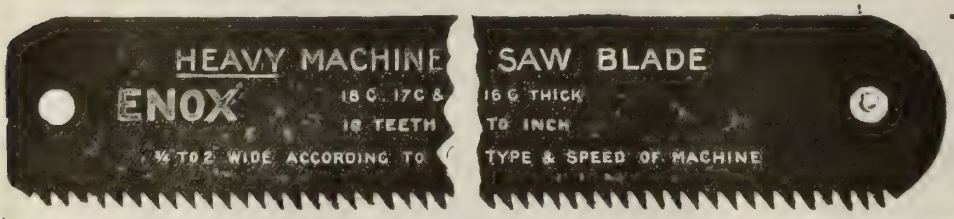
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

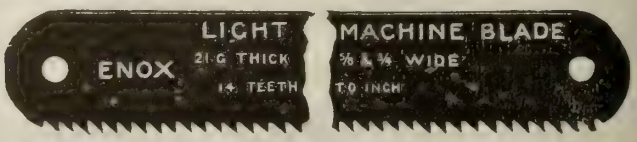
Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

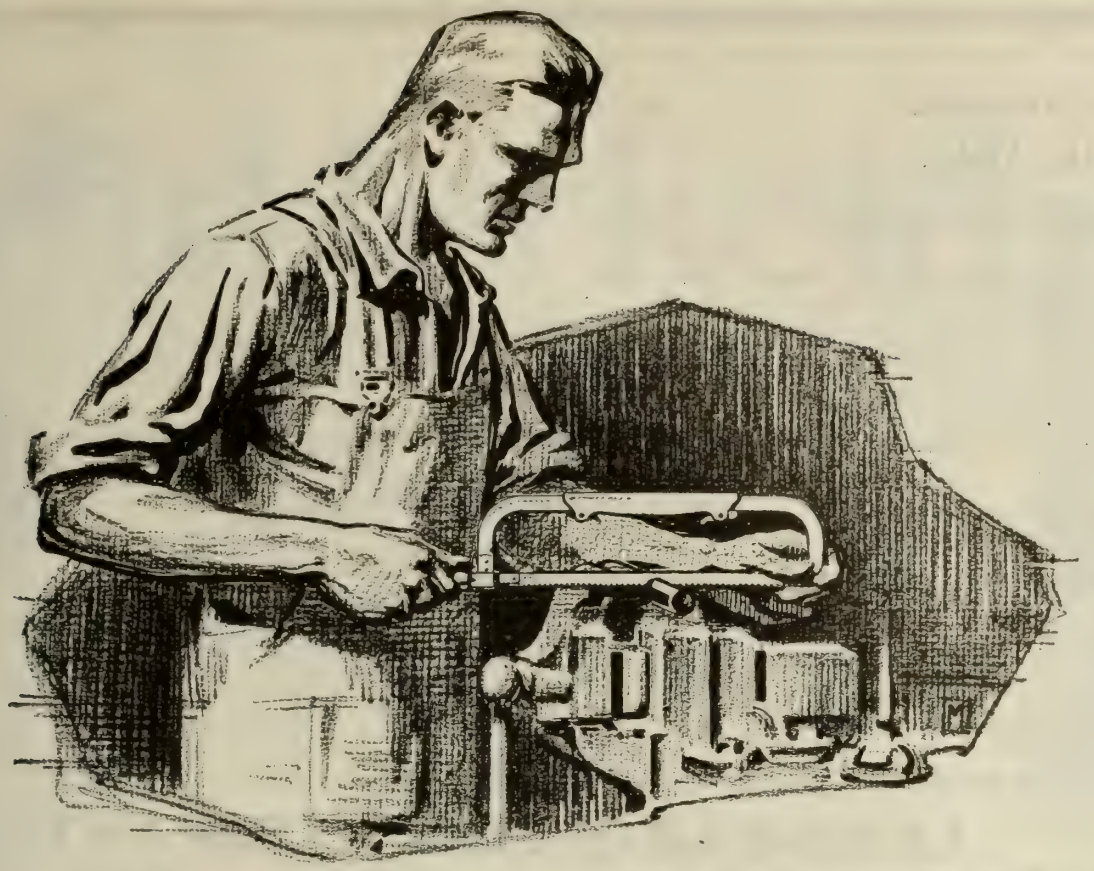
Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10





Now for Low Cutting Costs

Goodbye to hack saw troubles. No more lost time.
I've changed from *any* hack saws to the

Starrett Hack Saws

Just one trial proved to me that the Starretts are the real economy saws bcause they give the maximum of service at the minimum of cutting cost.

Use the Starrett Hack Saws and you'll understand and appreciate why they are recognized as the real economy saws.

Write for our Catalog No. 21 3

It shows Starrett hack saws and frames; also many styles and sizes of fine precision tools that are recognized the world over as standard for accuracy.

The L. S. Starrett Company, Athol, Mass.

The World's Greatest Toolmakers.
Mfrs. of Hack Saws Unexcelled.

NEW YORK LONDON CHICAGO

12-880

STARRETT HACK SAWS CUT QUICKER LAST LONGER

If any advertisement interests you, tear it out now and place with letters to be answered.

An Innovation In the Field of Wall Radial Drills

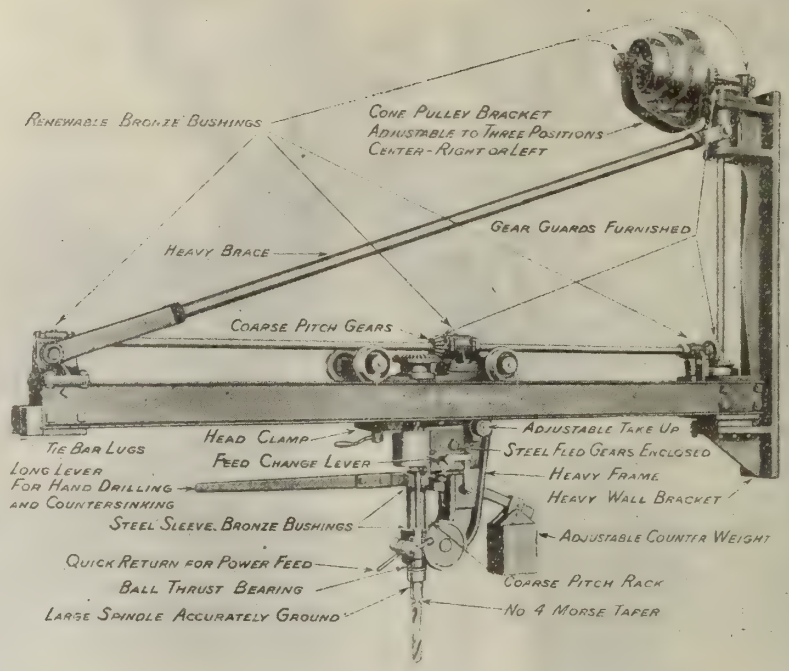
You really can't afford to be without this drill. It's a maximum producer, the entire control being placed within easy reach of the operator. Workmanship and material beyond criticism. Satisfied customers assure us the machine is a "dandy."

Better get our bulletin to-day, giving detailed description.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



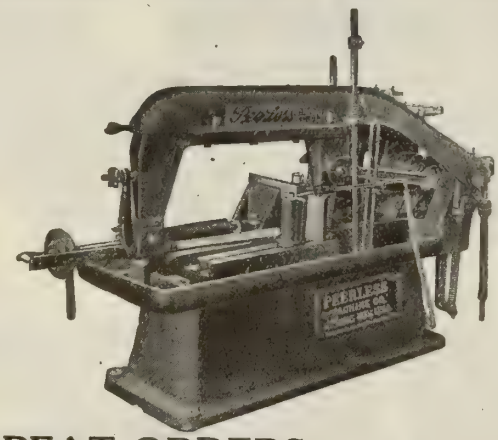
LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**

Peerless HIGH SPEED

THE NEW STANDARD

Increases Production—50 to 100%



REPEAT ORDERS—

Here we are talking about repeat orders again, but if you could see the way they come in you would pardon our dwelling on that subject.

The one striking feature about our repeat orders is that so many of them come from large concerns who had been reasonably satisfied with other standard makes before they put in their first PEERLESS High-Speed, and since then they have sent us order after order for more and more of our machines.

Surely there must be some good reason for this, which will be perfectly clear to you when you try out a Peerless for yourself.

Let us ship you one on thirty days' trial. If you don't keep it we pay freight both ways.

PEERLESS MACHINE CO.

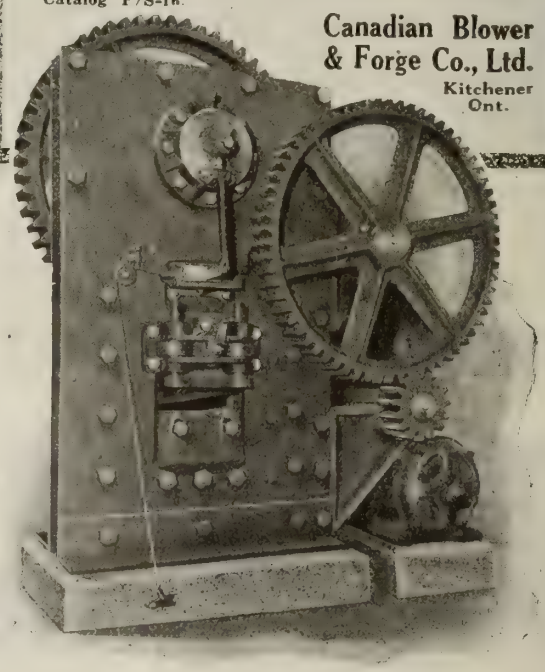
1607 RACINE STREET **RACINE, WISCONSIN**

CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

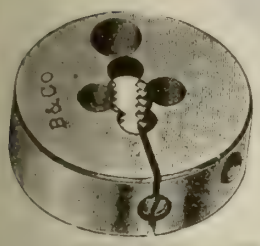
That means a lighter and stronger machine—a machine built to take a lot of punishment. **Write for Catalog P/S-16.**

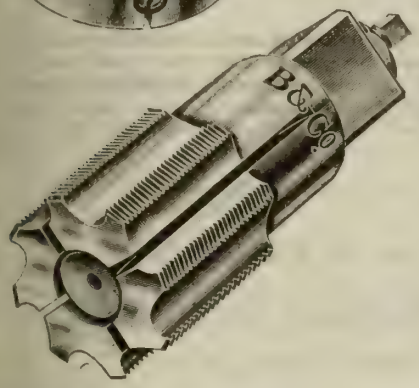
Canadian Blower & Forge Co., Ltd.
Kitchener Ont.



Butterfield

Taps, Dies and Reamers





The Deciding Factor in Tool Economy is Quality

Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

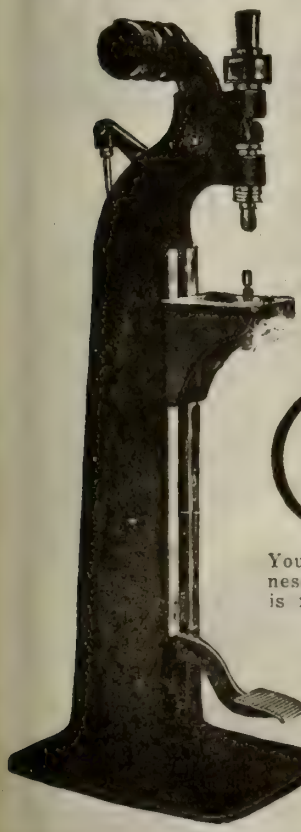
Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.

Send for Catalog No. 17. It's just out.

Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office: 220 King St. W.

No Skill Required



Anybody with ordinary intelligence can operate this Rotary Rivet Spinning Machine. No special skill is required. It is a tool that perfectly fits labor conditions as they exist to-day. A woman can operate as successfully as the skilled mechanic who has gone to the front.

The GRANT is Noiseless

You are assured of perfect quietness wherever the **Grant Rotary** is running. And it spins a perfect polished rivet head every second without breaking or marring the casting. Rivets tight or loose. Write for details.

GRANT Mfg. & Machine Co.

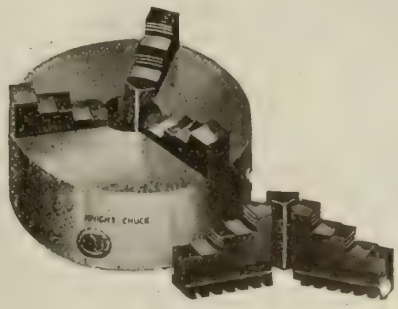
BRIDGEPORT, CONN., U.S.A.

"Knight" Scroll Chucks

The "Knight" Geared Scroll Chuck is substantially constructed by expert workmen, using high-grade materials, and is guaranteed to be commercially, mechanically perfect.

Sizes from 4 inch to 10½ inch.

Domestic and Export Trade Supplied.



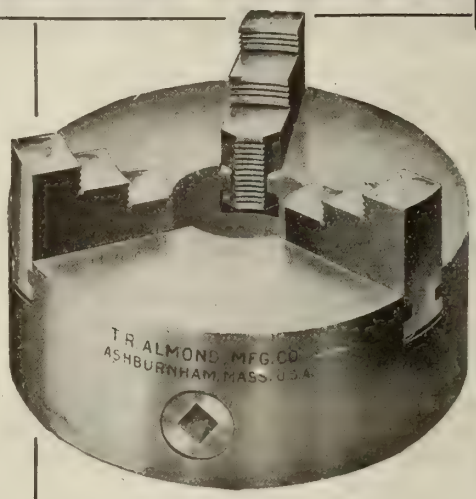
Knight Metal Products, Limited

119 Adelaide Street West - TORONTO, ONT.

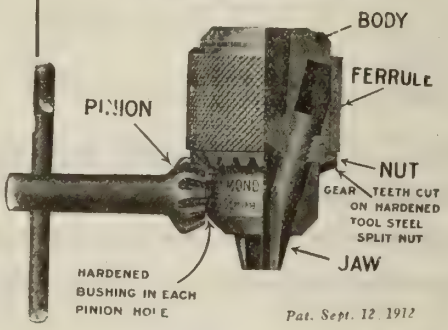
If any advertisement interests you, tear it out now and place with letters to be answered.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



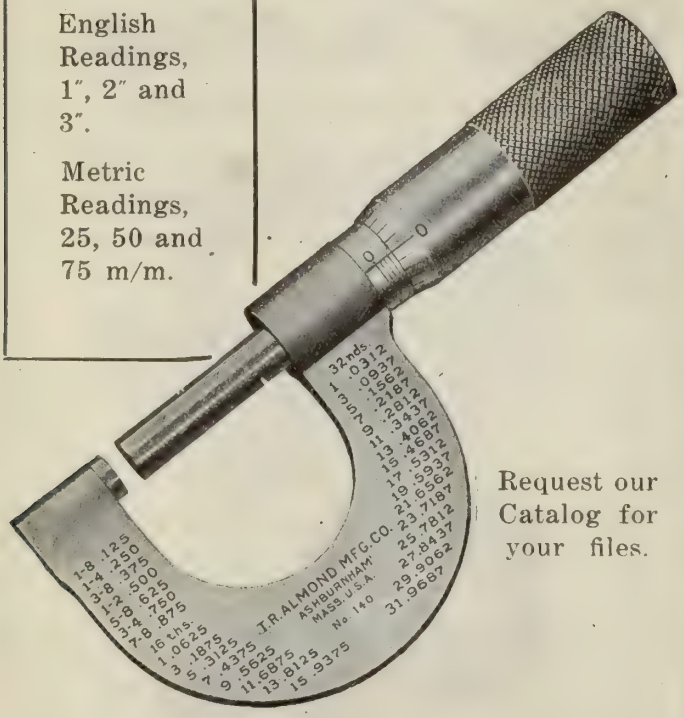
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

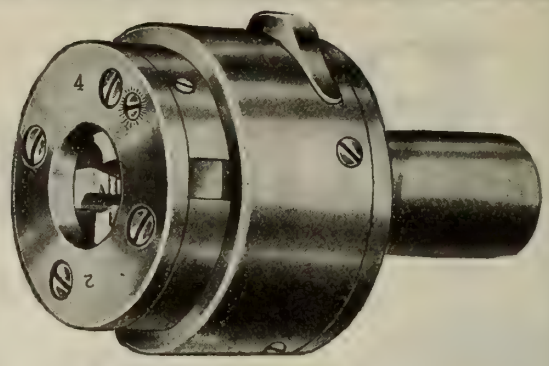
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

CUSHMAN

We've been Manufacturing

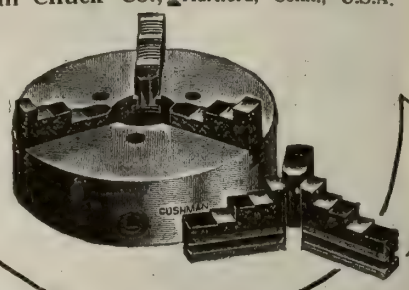
Nothing but Chucks and Their Accessories

FOR NEARLY 60 YEARS
AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

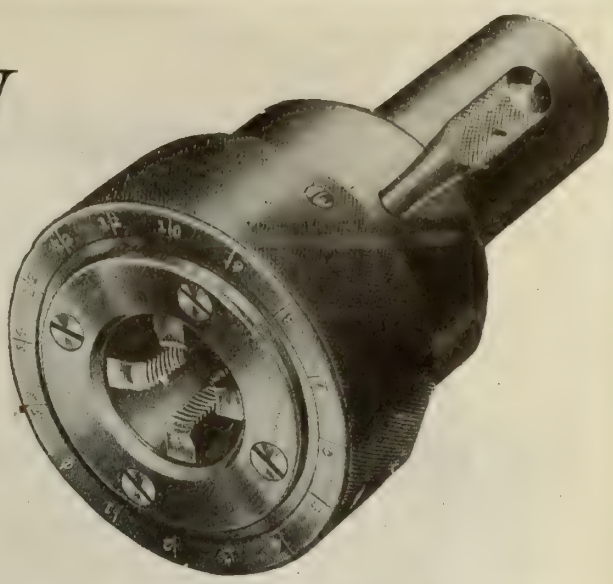
Let us send you our catalogue.

Cushman Chuck Co., Hartford, Conn., U.S.A.



Rapid Delivery

Users of Murchey Tools Get Chasers Without Delay



Lightning deliveries—that is a big advantage of using Murchey Tools. No work held up for chasers. We get your order, fill it, and it's on the way back to you just as quickly as the most rapid means of transportation can bring it to you.

There is no service like the Murchey service, and there are no tools like the Murchey Tools. Send blueprints for estimates.

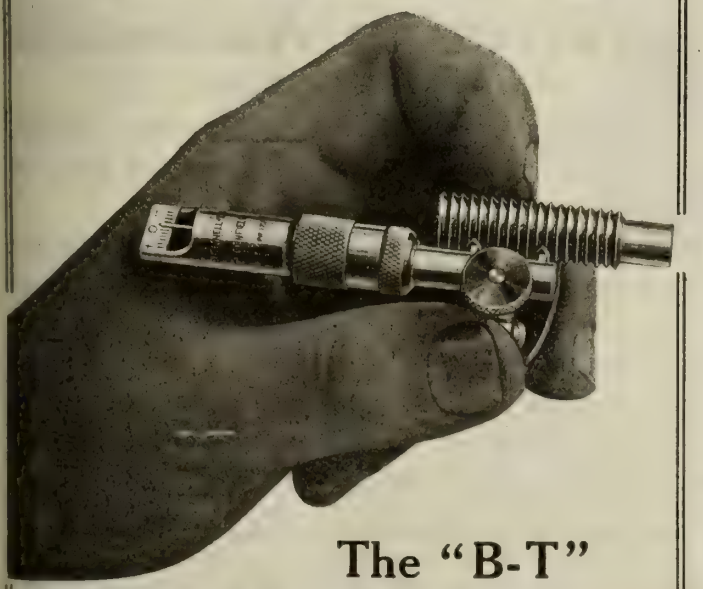
MURCHEY TAPS are accurate and simple and can be worked with great speed.

Murchey Machine & Tool Company

75 PORTER STREET - - DETROIT, MICHIGAN

The Coats Machine Tool Company, Ltd., Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick Freres & Company, 15 Rue Fenelon, Paris, France.

Simple—Anyone Can Use It



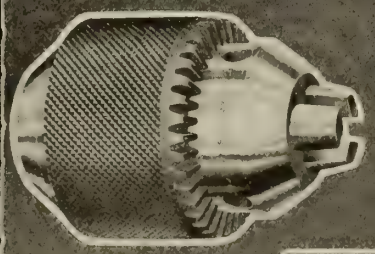
The "B-T" Thread Lead Indicator

A simple, practical and inexpensive appliance that indicates accuracy or inaccuracy of both internal and external threads. A check-up on set-up of machine, work, tap, etc.—a preventive against waste caused by non-fitting threaded pieces.

Get the details in the "B-T" Indicator Bulletin

Bicknell-Thomas Company, Greenfield, Mass.

Jacobs IMPROVED DRILL CHUCK

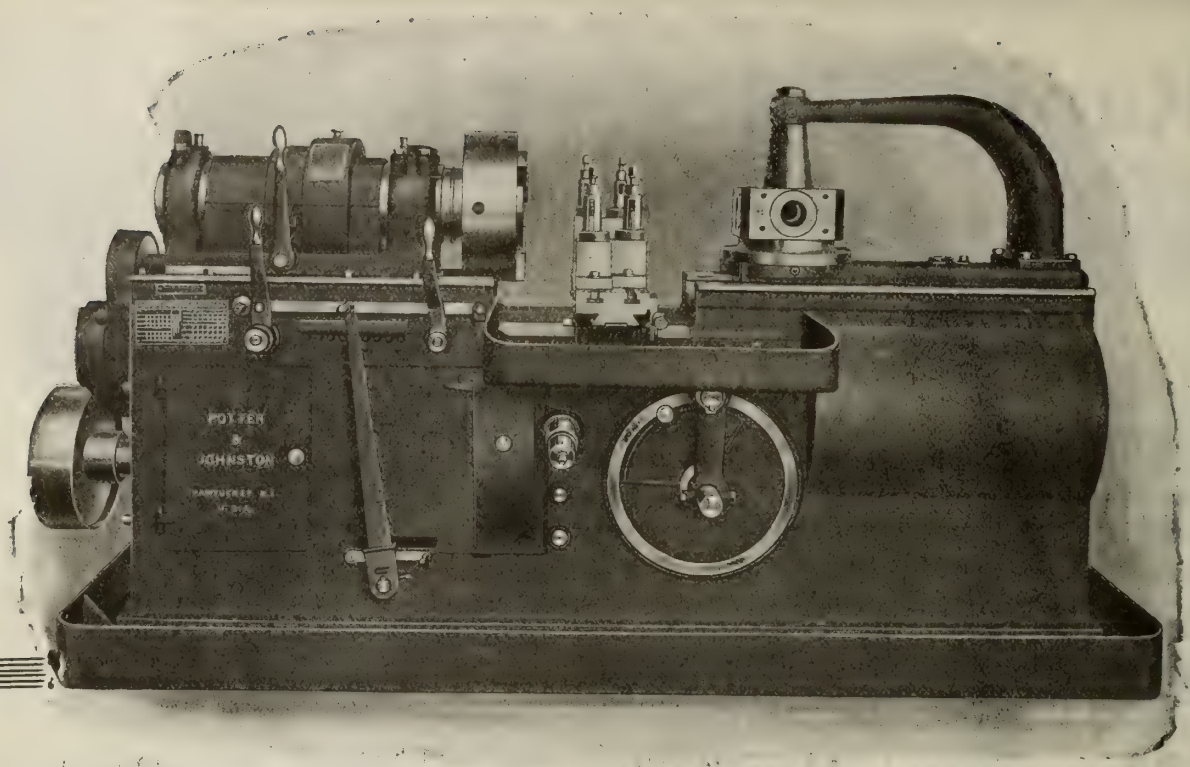


World Famous

The secret of their success is no secret at all, its merely their Superiority

JACOBS MFG. CO.
HARTFORD CONN.
U. S. A.

If any advertisement interests you, tear it out now and place with letters to be answered.



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cost *both* are readily obtained on

Potter & Johnston Manufacturing Automatic

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

Catalog gives full particulars. Drop a card for it.

Canadian Offices : POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD

Head Office : 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse : Galt, Ont., Canada

Smalley General Thread Milling Machines

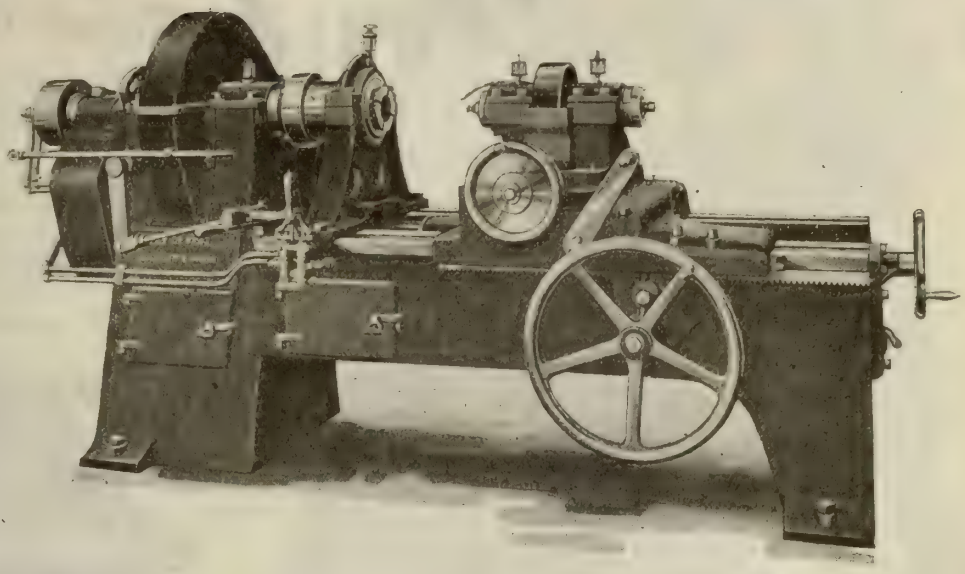
Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

Write for Bulletin.



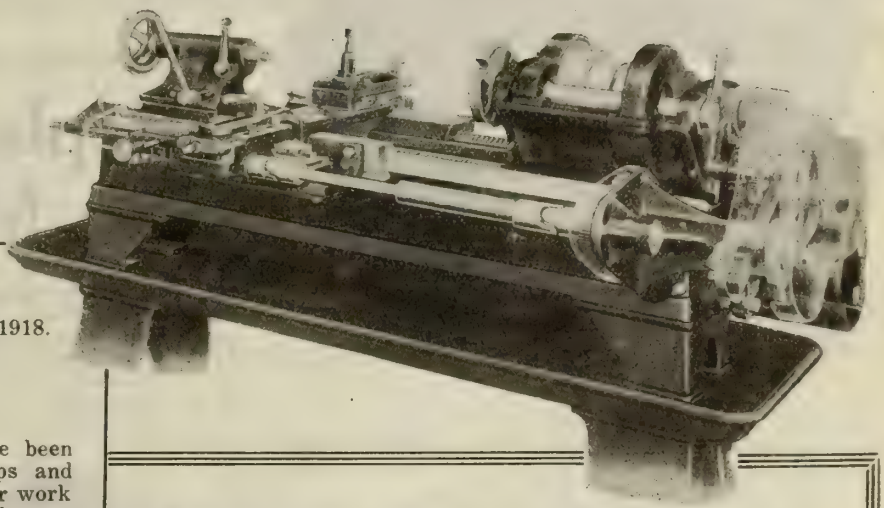
Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

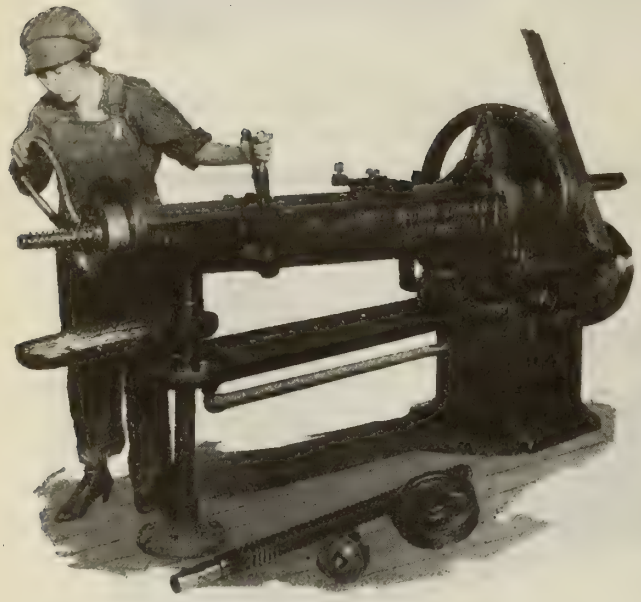
MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

There is Always One Best Way

And with our large and varied equipment we can place YOUR job on the VERY BEST machine for its PARTICULAR requirements.



Broaching Square Holes in Tractor Transmission Gears.

Get our quotations.

Hamilton Gear & Machine Co.

Van Horne Street - TORONTO

Machinery Maufacturers should equip their machines with

TRAHERN
Rotary Geared Pumps

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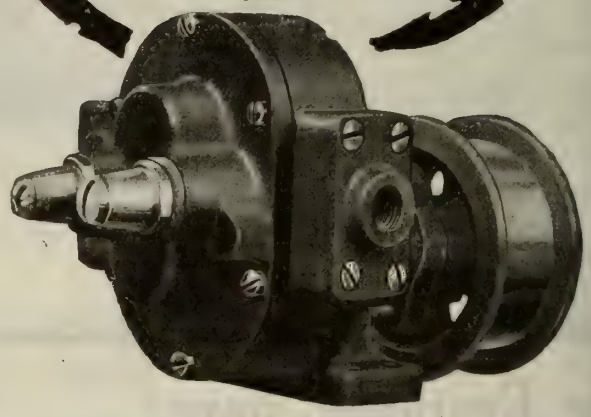

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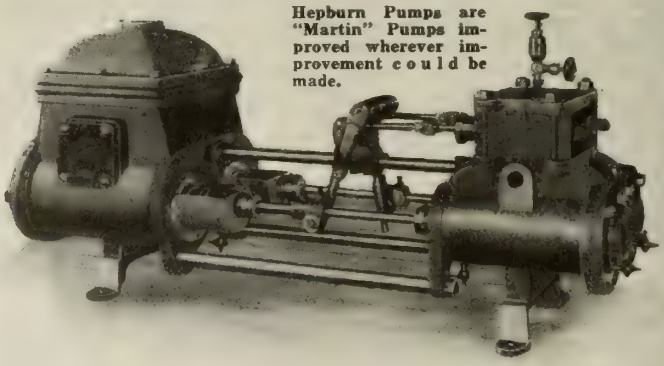

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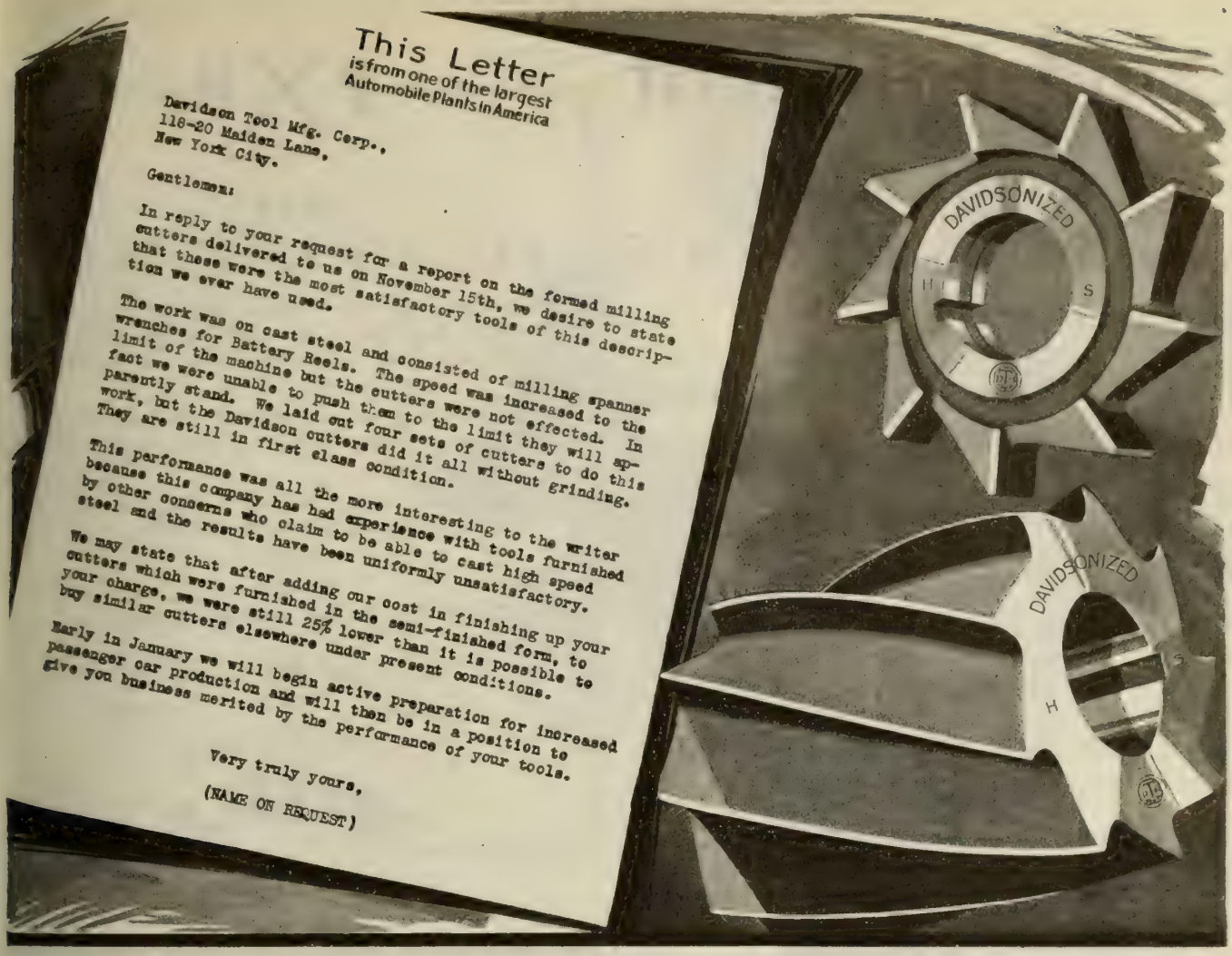

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High Speed Steel Tools

The biggest plants in the country are providing proof after proof of the increased production, longer service and tool-making economy which this remarkably advanced steel makes possible.

We guarantee any tool of Davidsonized High Speed Steel to give you at least 10% better service than any other tool you have been using on corresponding work. You will be the sole judge.

Such an increase, figuring factory overhead and labor, multiplies several times over the value of the tools.

Note our "Special Service" feature. It applies to standard tools, but is especially desirable for tools made to unusual shapes and other specifications.

Davidson "Special Service" costs you less than to bring your tools from the bar to the stage at which we furnish them. It eliminates loss by cracking in hardening. And it gives you **better** tools than you are now using, tools that increase production and last longer. Send us a trial order; you run no risk; our guarantee assures that. Correspondence invited.

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The right "cut" weight and shape of a file produces the best work and insures the longest efficient life for the file.

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Because they are made in Canada by Canadian Capital and Canadian Labor.

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Galt, Ontario

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 27A

The Importance of the Grinding Wheel in Knife Grinding

One of the most important factors in keeping the edges of high-speed steel knives in good condition and in preserving the life of the knives is the selection of grinding wheels of the correct grain and grade. Many of the common troubles, such as cracking and checking of the edges, may be avoided if the right wheel is properly used.

The grinding wheel should be of a grain and grade which will cut freely and rapidly with very little dressing and yet maintain its shape. The speed should not exceed 5,000 s.f.p.m. A wheel operated at too high a speed acts hard and develops the tendency toward glazing and dulling over.

On the modern knife grinding machines 2630 or 2636, grades J or K, Alundum vitrified wheels will be found almost universally satisfactory. Very little dressing is required, and a cool, rapid cutting action is given with a reasonable feed and traverse. Occasionally it is necessary to use wheels as soft as grade I or even H, but this is unusual.

On the old type of machine, where slower wheel speeds, and in most cases smaller wheels were used, 2646 J or K are successful. Here, too, softer wheels must sometimes be used, especially if the knives are particularly hard or the contact between the knife and the wheel is exceptionally broad because of a long bevel.

Moulding knives and others of a special design which are usually milled to original shape, are ground by hand to the required bevel on an ordinary bench grinding machine. For wheels ½" and thicker, 2636-M Alundun vitrified has been found successful. For wheels thinner than ½", 2646-M Alundun vitrified is most suitable. These moulding knives are afterwards jointed to the exact contour required by means of a master form which controls the movement of the jointing stone.

NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS
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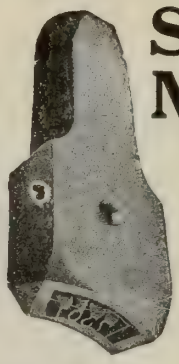
NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 111 NO JEFFERSON ST

TRADE NORTON MARK



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MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assure accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

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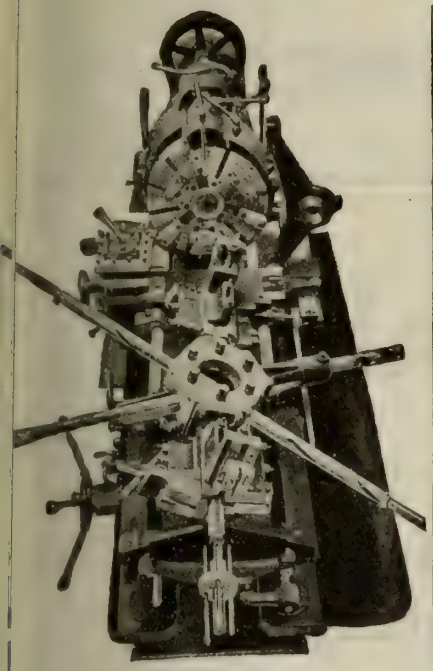
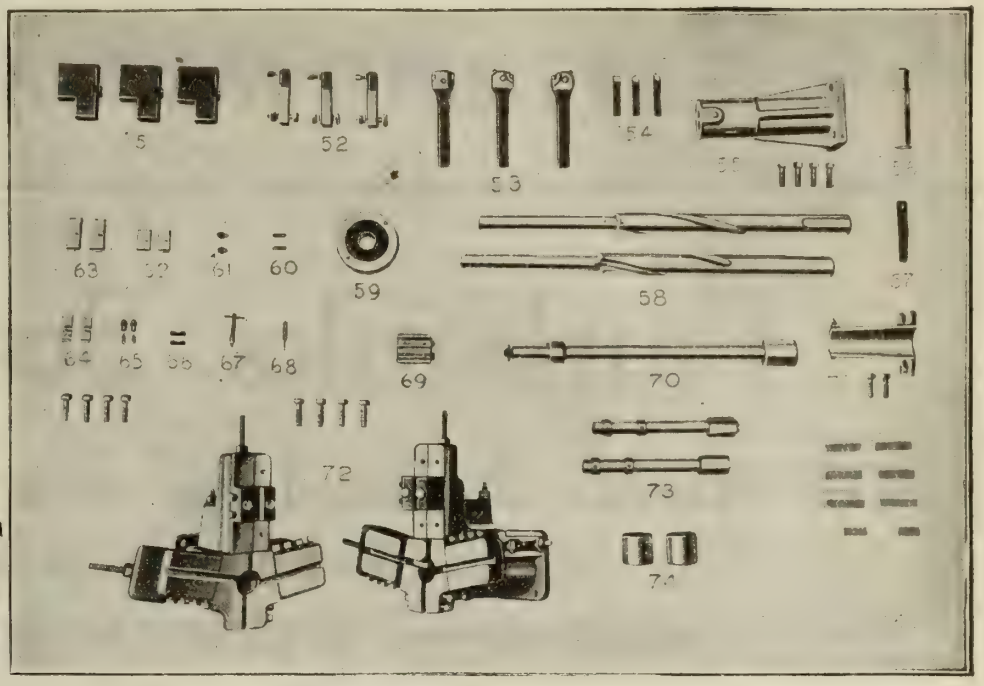
You wouldn't expect your auto to run without tires!





—Three Hard Chuck Jaws
—Three Chuck Jaws
—Three Tool Holders
—Three Tool Holder Tools
—One Drill Holder
—One Drill Socket
—One Drill Drift Pin
—Boring Bars Complete
—One Chuck Bushing
—Two Cutter Keys
—Two Centering Screws
—Two Solid Cutters
—Two Solid Cutters
—Two Expansion Cutters
—Two Adjusting Screws and Adjustment Lock Screws
—Expanding Cutter Shim
—One Screw Driver Wrench
—One Drift Pin
—One Reamer
—One Reamer Arbor
—One Reamer Arbor Support
—Two Facing Heads Complete
—Two Supporting Arbors with Collars
—Two Supporting Bushings
—Eight Facing Head Cutters—blanks

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Equip a Gisholt Standard Turret Lathe with the proper tool equipment, and you have taken a step in the proper organization of turret lathe which makes your money invested more productive.

The simplicity of the tool equipment, as featured in the Standard Chucking Tools, shown on this page, eliminates to a large extent the necessity of special tools.

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 7. February 13, 1919

What Germany Exported to Canada in 1914

Lines That Figured in the Building Up of a Trade That Was Increasing Every Year—List Shows the Number of Firms in This Country Now Engaged in Making These Lines

(By T. M. Fraser, Ottawa Representative MacLean Papers)

THE last year for which we have trade statistics involving Germany is the year 1913; but in the case of Canada, as our fiscal year ends in March, we have Canadian importations from Germany for the trade year 1914.

The total exports of Germany in 1913 were nearly two billions and a half. In the year ending March 31st, 1914, Canada imported from Germany more than she did from France; in fact, Germany ranked third on our trading list, though the balance was much in her favor, as we imported $14,686,069, and exported $4,433,736. From Austria-Hungary we imported $1,787,473, and exported to her $378,824. Our total import trade with both countries was between sixteen and seventeen million dollars. This was cut off at a stroke when the war began, and we either had to produce the goods ourselves, or import from some friendly country. The bulk of this business went to the United States; but in the case of a considerable amount of it, the supply was produced in Canada.

As a matter of fact, when the war came, Germany was making rapid strides in the Canadian market. The history of our trade with her in recent years is interesting, because it involves a typical attempt on her part to bully Canada into compliance with her wishes—an attempt which was a pronounced failure.

In 1903, Germany denied the right of Canada to give a trade preference to the Mother Country, and attempted to penalize us by imposing maximum duties. Mr. Fielding clapped on the surtax, and cut German trade with Canada in two. In 1910, Germany cried "Kamerad," after a seven years' fight, in which the loss was practically all on her side, as we were importing manufactured goods from her, and selling wheat mainly in return, which was good in any market.

As a perusal of the list given below will show, practically all our imports from Germany were manufactured goods.

There are comparatively few articles on the list which we could not make in Canada. What we can do is shown in the matter of toys and dolls. Before the war almost all this came from Germany. There are now thirty-five concerns engaged in the business in Canada, and their product last year was estimated at 800,000 dollars. More than one-third of our toys and dolls are now home-made, the chief competitors being the United States and Japan.

In the Metal Markets

Importations of iron and steel goods from Germany amounted to nearly three million dollars. This is all now either being purchased at home, or coming from the United States or Great Britain. There are certain lines of small hardware in the making of which Germany excels; and German cutlery had begun to get a big hold in Canada, importations from that country being second to those from Great Britain and ahead of those from the United States.

We imported over two and a quarter million dollars' worth of woollens and other textiles, including over half a million dollars' worth of hosiery. In cottons, the importations were small—we are "some" cotton manufacturers ourselves. We imported nearly a million dollars' worth of drugs, dyes, and paints. Some of this stuff—particularly in dyes and drugs—we had to go without, or accept substitutes which, if not yet, "just as good," are fast becoming so. Some of the substitutes came from the United States, and some we produced ourselves. It would seem like carrying coals to Newcastle to import furs to Canada, but it is a fact that the year 1914 saw well on to seven hundred thousands dollars' worth come here from Germany. This was a needless trade, and is probably gone for ever.

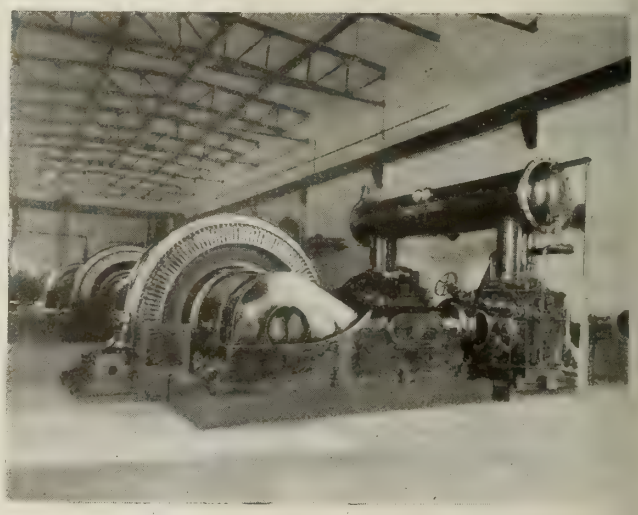
In 1914, our total importations of sugar and molasses amounted to over sixteen million dollars, including over one million dollars' worth of beet sugar from Germany. We got along without it, even if we did have to ration ourselves. Germany's loss will likely be the gain of the West Indies, or we shall get it from France if we must have beet sugar.

The following list covers the principal items imported from Germany and Austria in 1913-14, only those of which the gross importation exceeded ten thousand dollars being given. The number of firms engaged in the various lines is given in the belief that it is approximately correct, according to the best information we could secure:—

Canadian Importations From Germany

ARTICLE	Amt. imported in 1914		No. of firms mfg. in Canada now
Baskets, duty	$ 22,931		8
Books, etc.			
Calendars, show cards and other advertising matter	29,931		Very many
Labels, tags, etc., duty	35,884		Very many
Boots, shoes and slippers	25,658		About 120
Breadstuffs, duty	98,297		Very many
Brooms and brushes, duty	45,276		15 to 20
Buttons, duty	83,625		10
Clocks, movements, cases, time recorders, etc., duty	129,790		6 to 8
Cocoa and preparations, duty	80,675		8
Cotton—			
Clothing, etc., duty	400,740		18
Other clothing, duty	64,660		7 or 8
Printed, dyed or colored fabrics, duty,	88,987		
Velvets and plush, duty	33,073		1
Lace, duty	226,904	(1913	None
Sheets, quilts, tablecloths, napkins, etc., duty	31,717		1
Drugs—			
Acids, duty and free	25,152		
Alum, duty	22,001		None
Aniline and tar dyes, free	223,871		3
Glycerine, crude, free	59,577		6 or 7
Indigo, paste and ext., free	20,388		None
Medicinal preps., duty	59,512		12
*Potash, various forms, free	108,000		
*Sal ammoniac, free	14,834		
Tartaric and crystals, free	42,333		
Earthenware, duty	300,595		3
Electric apparatus, duty	204,388		About 30
Fancy goods—			
Embracing beads, boxes, braids, cases, feathers, toys, dolls, etc., duty	1,139,993		6 or 8
Flax, hemp, jute, etc., and mfrs. thereof, mainly, duty	70,385		20
Furs and mfrs. of, duty	441,123		40
Furs and mfrs. of, free	1,207,010	(1913)	40
Glass and mfrs., duty	276,221		
Gloves and mitts, duty	385,843		40
Glue, duty	38,380		8
Gunpowder, explosives, etc., duty	51,698		6
Gutta-percha, India rubber and mfrs. thereof, duty	96,895		
Gutta-percha, India rubber and mfrs. thereof, free	54,050		15
Hats, caps and bonnets, duty	72,173		20 or 30
Hats, caps and bonnets, free	48,057		20 or 30
Hides and skins, other than fur, free	176,641		Over 20
Hops, duty	63,413		1 or 2
Ivories, piano, free	93,553		None
Jewellery, duty	151,560		Over 30
Leather and mfrs. of, duty	60,691		Very many
Metals and minerals and mfrs. of—			
Brass, duty	71,336		Very many
Brass, free	59,053		Very many
Copper, duty	1,620		
Copper, free	50,586		10
Gold, silver, mfrs., duty	58,603		30
Iron, steel, mfrs. of, duty			Numerous
Angles, beams, axles and other shapes, duty	87,257		10
Bars, blanks, billets, etc., duty	85,991		10
Cutlery, duty	379,890		None except plated ware
Ferro-silicon, spiegeleisen, and ferro-mang., duty	194,999		3
Guns and other firearms, dty.	31,623		1
Machinery, cloth, duty	30,881		None
Machinery, printing, duty	22,700		None
Machinery, other, duty	241,193		30
Machinery, other, free	15,579		
Plate steel, duty	26,023		3
Pumps, duty	21,279		Very many
Skates, duty	42,886		3 or 4
Surgical instruments, free	42,981		None
Tires, steel, free	348,059		3
Tubing, wire, rods, etc., agate and other ware, free and duty	1,212,547		23
Tools and implements, duty	66,724		Many
Zinc and mfrs. of, free	108,417		1
Misc. metals and mfrs. of, including aluminium, lights and fixtures, umbrella parts, etc., free and duty	300,000		Many
Mineral and aerated waters, duty	38,122		Very many
Musical instruments, duty	177,991		30—chiefly pianos, organs
Musical instruments, free	12,485		
Optical instr., free and duty	200,000		None
Paints and colors, free and duty	200,000		25
Paper and mfrs. of, mainly, duty	350,000		Many
Pencils, duty	79,345		1
Perfumery, duty	28,445		10 or 12
Pocketbooks, purses, etc., dty	95,328		10
Silk and mfrs. of., duty	255,453		10
Sugar, molasses, etc., duty	1,001,716		8 or 9
Tobacco and mfrs. of, free	262,802		35
Pipes, etc., duty	24,120		1
Wood and mfrs. of, duty	51,558		Very many
Wool and mfrs. of—			
Carpets	69,827		5
Knitted goods	104,159		40
Clothing	150,000		Very many
Socks and stockings	55,000		20
Other clothing	155,949		Many
Fabrics, including various "fancy" cloths, mostly duty	425,000		20
Yarns, duty	57,646		6 or 8

*Firm entering this line now.



COMPRESSOR HOUSE, INTERNATIONAL NICKEL CO., COPPERCLIFFE, ONT.

Executive Common Sense in the Workshop

While Intended For the Plater the Following Article Contains Some Valuable Pointers Which Should be Carefully Considered in Other Departments as Well as the Plating and Polishing

By ABE WINTERS

STUDYING and working to increase our knowledge of the principles of electroplating, or striving to effect economies in the various operations necessary to the production of a finished product are very praiseworthy characteristics of the progressive foreman, but there are some other points which should receive attention, and at this time when the rush occasioned by the war has ceased and we can calmly devote more time and thought to the essentials of advancement the following compilation of common sense remarks may serve to help us greet the future with new ambitions and a keener realization of our respective duties toward reconstruction.

Before proceeding further, suppose we analyze the word progressive. Webster defines the word as "moving forward, advancing, improving; working for or endeavoring to secure advancement." A writer in "Forbes' Magazine" defines progressiveness as "looking forward intelligently, looking within critically, and moving on incessantly." In order to progress, the manager, superintendent or foreman of any industrial plant must give due consideration daily to these three essentials. Dr. H. A. Bruce says: "The most efficient manager is not the one who can drive men most vigorously. He is the one who can lead men most skillfully. Men are not cattle, though many managers handle them as if they were. They have rights which must be respected, and the best managers appreciate this. But if brutality is a serious defect in managers, egotism is a fatal one. The egotist never learns from his errors. Having marked out a course for himself, he persists in it, even though evidence rapidly masses to prove that he is on the way to disaster. Ability to keep on learning, ability to recognize mistakes and correct them, is assuredly magic in managerial efficiency. So is ability to select assistants wisely. This means that the manager must not only know talent when he sees it, but must be free from the defects of envy, which might prompt him to try to keep men of talent in obscurity. To know men, to respect the rights of men, to be able to develop in men the sentiment of loyalty, to keep in a learnable mood, to be willing and able to correct mistakes—such are a few of the attributes of the truly efficient manager."

This writer further refers to leadership as follows: "You must be an enthusiast, you must truly love your work, to become magnetic and to become a leader. Cultivate belief in yourself and cultivate intense interest in your work; energize yourself, energize your mind, and energize your body. How have the magnetic leaders of all generations energized themselves? By enthusiasm. They have set themselves certain tasks to accomplish, and have attacked enthusiastically. They have not gone at them in any half-hearted spirit. They have said to themselves, in effect: 'My work is the most important and the most delightful thing in the world. I want to do it just as well as I possibly can.' And because they have worked in this spirit they have found it possible not only to work well, but to do an amazing amount of work. Because they have been enthusiasts they have drawn others to them and have led others."

We are in possession of a circular letter which we understand was originally intended for the departmental heads of the Standard Oil Company. The ten rules therein presented will apply to the executives of practically all industrial plants, and form a very commendable list of common sense rules. The rules are given here with illustrative comments by present writer, and quotations from the works of H. A. Bruce and others.

"Rule 1.—Be fair, have no favorites and no scapegoats. A foreman has to act as judge many times every day; therefore he must be just."

Abraham Lincoln once remarked that "the length of a man's leg should be just long enough to reach from his body to the ground." Likewise the foreman's deductions after considering a problem or grievance should be just as concise and consistent as possible to make it. Teling a yarn to illustrate a verdict is not necessary. Be emphatic but courteous and unbiased by petty prejudices.

"Rule. 2.—Make few promises and keep them. A foreman must be exact in this particular. Sometimes a foreman forgets that his job requires a high standard of truth and honor."

"Rule 3.—Don't waste anger—use it. Anger is valuable and should not be used carelessly. Keep your most forceful language for special occasions."

A foreman who indulges in profanity or harsh words while reproving an employee does not always obtain greater efficiency from the employee by so doing. Be strict, but be reasonable, and above all be certain you are right before you speak. Then be a man and hold your proper position with reference to the matter, do not try to smooth the affair over by childish familiarity, or failure to enforce the correct performance of the duty in question. If you do you will spoil the effect of the lesson previously given.

"Rule 4.—Always hear the other side. Never blame a workman until he has been given a chance to give his point of view."

Possibly you have failed to properly instruct the workman, perhaps he has not grasped the true meaning of an order or request. His intention may have been of the very best, and it is possible that the mistake may be the source of an improvement, and it may mean a ray of light on an old cobweb-covered idea—if your frame of mind will permit the light to enter.

"Rule 5.—Don't hold spite—forgive. When you have had to scold a worker, go to him later and show him his faults in a friendly way."

Some men will take a "calling down" and profit by it, others resent a stern reprimand and nurse the recollection of a trifling grievance until it assumes, in their estimation, very hideous proportions. Study the temperament of the employee as you come in contact with him daily, and if he is really worth while, exercise tact and common sense in training them for the duties you find them best suited for. Do not, under any circumstances hold spite toward a worker, such actions will decrease your self-respect, lessen your personal magnetism, and eventually change your whole aspect of life and your attitude toward mankind in general.

"Rule 6.—Never show discouragement. Never let yourself be beaten. A foreman must have perseverance and the 'never say die' spirit.

If it be a new finish, or a difficult casting you wish to produce, and things go wrong, don't let the men see that you are annoyed. Don't start smashing the fixtures or filling the atmosphere with spontaneous oratory with reference to something in the form of hard luck. "There's a reason" why you failed. Get it and set about your task cheerfully but with determination to win, and soon you will find you have grown to be a master of your work and a genius in the eyes of your fellow-workers.

"Rule 7.—Notice good work as well as bad. Let the workers see that you can appreciate as well as condemn."

Possibly you owe your present position to the fact that someone noticed your ability to do good work—very well, give the fellow who is following you the same consideration you found to be gratifying during your earlier experience. If you are worthy the position you occupy, whether it be as manager, superintendent, or foreman, you will not ignore the honest efforts of those who look to you for guidance in their daily routine of toil. Thousands of men and women have been changed from willing, obedient workers to indifferent drones or troublesome agitators as the indirect result of continued neglect in this regard on the part of some foreman or executive of greater authority.

"Rule 8.—Watch for special ability. Take a keen human interest in your

workers. Put each one where he can do his best."

Some men imagine that merely looking wise, while receiving instructions, will convince the foreman that they are interested and alert for pointers, but the fellow who really proves his wisdom is the one who thinks and acts in accordance with a well-defined purpose. Ideas are of no avail unless you use them. Do your work well to-day and it will not cause you worry tomorrow—are comments you may well remember. Our observations cause us to believe that the man who never makes a mistake does little else. Some men are natural-born expert slackers on any job. 'Tis said that a man named Dodgin was appointed foreman in a foundry; his name was not known to all the employees. One day, while on his rounds, he came upon two men sitting in a corner smoking, and stopped near them. "Who are you?" asked one of the smokers. "I'm Dodgin, the new foreman," he answered. "So are we," replied the smokers, "sit down and have a smoke." Nearly every factory to-day harbors one or more such creatures. Frequently they are troublesome cowards; sometimes inoffensive as far as speech, but always a bad example for the conscientious worker. He occupies a position which could either be done away with or which could be filled by a man worth while. Put the drones on piecework and the most then make good or vacate the premises. Possibly you have a man sweeping up who would make an ideal plater or molder if you trained him properly, and it might be to your advantage to make the change now.

"Rule 9.—Take your full share of the blame. This is the most difficult of all. The foreman who can share both blame and praise with his workers has discovered the secret of managing men."

In commercial electro-plating or polishing, as well as in general foundry practice, there are innumerable opportunities for the foreman to place the blame on an innocent worker and save himself, but the man who is guilty of such meanness is, indeed, a mean man. If the copper solution is unbalanced, or blistered deposits are common because you neglect the solutions, do not blame the operator. No doubt he has some horse-sense and could tell you a thing or two about your share in the cause of the trouble. Have you ever approached a workman who has been the innocent producer of inferior work, and in a friendly manner told him not to worry, the blame was on yourself because of your neglect or thoughtlessness with regard to certain duties governing his output? If you have never had occasion to do this, you are fortunate. If, on the other hand, you have had the opportunity and failed to use it, you have missed something. You have side-stepped a chance to prove your manliness. Try it and note the change in your influence over the men. If you are really big enough to be a manager, superintendent, or foreman, get up and lead your men. spineless "snobs" were never popular in executive positions.

"Rule 10.—Prevent accidents. Educate or eliminate the careless man. The good foreman is known by his men."

Accidents usually occur quickly and are very often serious. New men should be carefully instructed as to the character of the dangers in their way. Women should receive special attention and repeated reminders in order to avoid violation of given rules governing the operation of mechanical or electro-mechanical apparatus. In the polishing department extra care should be given the use of emery wheels, a careless worker may endanger the lives of several by using an unsound wheel or a stone out of balance. The skilful handling of the various articles during the operation of grinding, polishing, and buffing is essential to personal safety. Don't omit emphatic reference to "safety first" when instructing a novice.

Initiative

"Have you a clear idea of what initiative means? Quick thinking, intelligent planning, decisive acting, constitute initiative. Confronted in your daily work by unexpected problems, how do you react to them? Do you give alert thought to the devising of methods to get more satisfactory results, or are you content with accurately following directions given you? To be able to follow directions accurately is itself a good thing, but it is far better to be able to originate improvements. Then you are an initiator, not merely an imitator. Growth in power of initiative is largely, though not wholly, a matter of practice in constructive thinking. Study the work you now are doing with reference both to methods and to results. Ask yourself if there is not some way in which of your own accord you can effect improvements. Do not try to achieve too much at once. Be satisfied at first with working out a betterment in some detail, however small, then promptly act to realize that betterment. The expected improvement may turn out to be no improvement at all. Do not let that discourage you." With reference to employers, Dr. Bruce continues: "You have fallen into an unfortunate habit of railing and sneering at your employer; you describe him as arrogant, selfish, indifferent to your welfare, graspingly intent on grinding you down. Possibly he is all of these things. In that case I advise you to find another employer as quickly as you can. But you say all employers are alike. They differ only in degrees of greed or inhumanity. If that really is your belief, brother, I urge you to settle down and do some hard thinking. You are blinded by prejudice and class hatred; you are in a dangerous frame of mind, dangerous particularly to yourself. Shift the centre of your attention from your employer to your work, and the chances are you will work so much better that the employer you now criticize will give you more responsible duties at better pay. Unless your employer is a knave or a fool—and the average employer is neither a knave or a fool—he is bound to treat you fairly, if only from self-seeking motives. And appreciating that it is to his interest to safeguard your efficiency by safeguar ing your health, he will see to it th your working place is sanitary, etc.

"Recent events with their insistence maximum production have compelled i creased attention to the subject of indu trial fatigue. Improvements in vent ating devices have been shown to greatly helpful in postponing industri fatigue. Given a continuous supply fresh air, workers have invariably i creased and bettered their output. E periments and observations have brougl out clearly the direct relation that exi between the workers' attitude towa his work and the rapidity or slowne with which that work fatigues hir When means are taken to get the wor er really interested in what he is doir even the hardest work becomes less ti ing. When he is allowed to fall into mood of indifference he tires mo rapidly, no matter what the character the work. The more that facts like the become generally known and applied tl better will it be for employers of lab and for those employed by him.

The Bully

"Some day business men generally wi awake to the fact that the bully is a unmitigated nuisance in industry—an more than a nuisance. He is a blight the efficiency of any establishment i which he works. The evil-tongued an mean minded factatum functions as human whif. He is never at a loss for word that stings. Verbally he lashe those under him to ceaseless activity. A of which the employer may not merel tolerate but actually approve. Delus ively he imagines that it is indispensibl to speeding up and maintaining discip line. Yet as a matter of fact analysi always would show that it does mor harm than good. Like worry—which i deed is often a direct product of bully ing, it affects unfavorably the fun tioning of every bodily organ and pro cess. It weakens the mental facultie necessary to good work. It hasten the coming of fatigue. Moreover, ther is this fact which all employers will d well to remember: A man who bullie is always an inferior man. He has ser ious defects of which he is more or les conscious, and which he instinctivel endeavors to cover up by lording it ove those subordinate to him. Properly un derstood, therefore, his bullying is confession of weakness. Of itself it i a danger signal to warn employers tha the quicker they get rid of the bully— or persuade him to ascertain and over come the cause of his bullying—the bet ter it will be for their business inter ests."

Lunch Hour Jottings

The following notes were selected from many contained in the notebook of a suc cessful foreman.

Gumption, grit and go are three goo elements that most any man can acquire if he will only strive hard enough an long enough.

Many a good sample of plating is spoiled by a poor job of buffing, occas-

ionally poor plating is saved by skilful buffing.

The amount of work you get through a plating bath is one thing, and the way it looks or wears when you get it through is another, and often a more important consideration than the first.

Sometimes a foreman plater gets bossy just to show that he can, and at other times because an incompetent helper makes it necessary. In the latter case it might be a good idea to change the tactics and get a new helper.

Nothing has ever been plated so well it could not be done better, nor so badly that it might not have been worse. A poor suction system is better than none, but a good one is the best investment.

It takes a good man to prepare a perfectly efficient solution from a new formula when orders are piling up.

Have you ever stopped to think that maybe you are losing electric current through unseen small leaks? An electric leak through a steam coil may not attract as much attention as an overheated cleaning solution but it generally wastes more money in the long run.

A single drop of oil may ruin a whole batch of work. Men who are not well balanced are like machines that are not in balance—they make a lot of noise.

Continually complaining about a poor solution does not improve the deposit, nor the helper's attitude toward the condition.

Maybe the foreman can think better by sitting down in the factory, but it is not a good example to set for the others with thinking tendencies. If your thoughts weigh too heavily for you to stand up, go to the office and sit down.

It doesn't take a weak cleaning solution long to eat up in time the price of enough compound to make it splendidly efficient.

The giving of information creates a vacuum which tends to suck in more—if the intake isn't clogged by too much conceit.

Grinding and polishing lathes put in dark corners furnish very good settings for the display of sparks but there is little else in favor of such a location, while much could be said against it.

The man who repeatedly asks his employer for an increase in pay may get ahead quickest, but the man who is advanced without asking for it generally rises highest and stays longer.

Thomas A. Edison is credited with saying that real genius is made up of three parts inspiration and ninety-seven parts perspiration.

Your success may not depend so much upon what you can do yourself as upon what you can get the employees to do for you.

Spoiled work and an exhausted nickel solution are often found in the same tank.

It's all right to ride a hobby if you know where to get off.

Even some lazy men may get busy, but the trouble is they don't keep busy.

If you gave a little more attention to preventing waste of time and material, there would not be the need of so much effort to save the results of carelessness.

Sometimes a foreman plater has the making of a good shop superintendent in him but he rarely gets made.

The good appearance of electro-plated products is essential and the good appearance of an electro-plating department should be equally as essential.

Putting an overload on a dynamo is a good way to start trouble.

Remember there are two ways of working "as if you owned the shop," and the difference between them marks the distinction between the "officious" and the "efficient" man.

Doing poor work because it does not pay much is just what keeps thousands of young workers from getting on in any position. Small pay is no excuse for doing half work or slovenly work. The pay one receives should have nothing to do with the quality of his work. The work should be a matter of conscience. It is a question of character, not of remuneration. A person has no right to demoralize his own character by doing slovenly or poorly finished work simply because it does not pay much. The way one does his work enters into the very fibre of his character. It is a matter of conscience and no man can afford to sell himself because his salary is meagre.

Manufacturing the Whitlock Pony Press

Special Jigs and Fixtures Are Used Which Greatly Simplify Machining Operations on Parts of This Printing Press—Interesting Methods of Performing Operations Are Herein Shown

By ROBERT MAWSON

IN this article is illustrated some of the special jigs and fixtures used when machining elements for a printing press.

It will be noticed that the excellent practice is followed by using a previously machined surface for a locating medium in the jigs, the same locating point being used for all operations on any certain piece.

By this procedure chances of error are reduced to a minimum.

The fixture used for shaping a nut is of particular interest and the method can be followed in many shops to advantage.

This machine is manufactured by the Whitlock Printing Press Manufacturing Co. of Derby, Conn., and is of the two cylinder, two roller design.

One of the many patented features is the fountain, this being the only fountain on any cylinder press not bolted firmly to the frames of the press.

It can be tipped and set at any angle so that the ink cannot work away from the fountain roller, thus permitting color to run light. By means of its tipped position all the ink is used and waste prevented.

In Fig. 1 is shown the jig used when drilling the fountain feed lever.

The interesting feature of this tool is the method of location.

At the rear of the casting at A projects a long boss or shank which is turned in the lathe. In order to machine this concentrically the casting is swung on centres in the usual manner.

For this purpose a hole is drilled for the lathe centre A, the face on which the jig rests being also machined square with the pin. When the part is set up for the drilling operation this centering hole is utilized to align the jig, the first hole A being placed in line with it.

The two set screws B are then tightened and 13 ⅜ in. holes are drilled in the lever casting.

Drilling Fountain Feed Disc

The jig used when drilling the fountain feed disc or fly crank is shown in Fig 2.

This is a plain disc machined all over with a hole boxed in the centre.

The jig is located by a plug which fits into this bored hole.

A ¾ in. hole is then spot drilled and reamed through the bushing A. In the piece however there is a set screw which must be at an angle of 90 deg. with this reamed hole.

An index finger B is therefore attached to the jig as shown.

After the operator has machined the reamed hole he scribes a line guided by this finger and as this is the required angle the correct location for the set screw is obtained.

The hole is then drilled and tapped in a later operation.

On the press there are two front brackets, one on the gear and the other on the feeder side.

The jig used for drilling these elements is shown in Fig 3.

The casting has been machined on the base and sides of the boss in a previous operation.

The casting is located against a pin

in contact with which the side of the base is pushed.

Three straps A and B then hold it securely in position.

The straps A and C are utilized when machining the opposite hand of casting. Two ½ in. holes are drilled and one ⅜ in. spot drilled and reamed are machined in each casting with this jig.

The two upper bushings are used for both hands, the boss being the part which is offset from the base.

Drilling the Gripper Stand

When drilling the gripper stand the jig shown in Fig. 4 is used.

The casting has had the various bosses and base machined in a previous operation.

The piece is located against the adjustable set screw A, the base resting on the jig at B.

The two straps shown being tightened holds the piece securely in the jig. The jig is then turned to rest with the face C on the machine table and the following holes machined:

Four ½ in. drilled, two ¾ in. spot drilled and reamed, one 1 in. spot drilled and reamed, two 15-16 in. spot drilled and reamed, two ½ in. spot drilled and reamed, and one ⅜ in. spot drilled and reamed.

The same jig is used to machine the Reel stand, but as this is the opposite hand the casting is located in a similar manner on the reverse side of the centre web of the tool, the same bushings however being utilized to guide the various drills and reamers.

In Fig. 5 is shown the jig used when drilling the air release valve body. The casting is placed on a turned register, which fits inside the bored hole of the piece.

It is located by pushing the arm A against the adjustable set screw B by means of the thumb screw C and is held with two straps. Three ⅜ in. holes are then drilled.

The purpose of the hole D is to enable the operator to place a pin through and by pushing against the valve body remove it from the jig should it be found that the registering projection fits tightly into the piece.

An Interesting Shaping Fixture.

The illustration Fig. 6 shows a special fixture designed for machining the vibrator bushing. This operation is performed on a shaper. The fixture is provided with tongues which fit into the machine table and a bolt at A holds it securely.

The casting, one of these being shown at B, is bored and the ends faced on a lathe in a previous operation.

The piece is then placed on the spindle C as shown, the fixture being in position on the shaper table.

The travel of the tool is adjusted so that it will travel past both edges of the piece in the usual manner.

The crank D, which turns a worm under the index worm wheel E, is then operated until the surface F is horizontal. The table travel is then thrown in and the shaper being started the operator machines the horizontal surface of the bushing.

As soon as the tool reaches the circular part the table travel is thrown out and the operator feeds the casting around by means of the crank, revolving the worm wheel until the index pin G reaches an index line marked on the dial which coincides with the arc of the radius to be machined.

The table travel is then again put in contact and the opposite horizontal surface is machined.

It can easily be seen that such a fixture and method could be used for machining other circular shapes than the one it was designed and used for.

In Fig. 7 is shown the jig used when machining the ductor cam lever.

The casting is located in the tool by being pushed back into the vee at A.

Owing to the peculiar shape of this piece the plate B must be swung out of line to permit the insertion of the casting in the jig.

The other end of the casting is located against an adjustable screw at C, being forced against it with the thumbscrew D.

The following holes are then machined: one ⅞ in. drilled, one ⅝ in. drilled, and one ¾ in. drilled.

Machining the Feed Guide Stands

The jig shown in Fig. 8 is used when machining the feed guide stands, one on the feeder and the other on the gear side. For this purpose the tool is made of a double angle section, one face of the centre web being used as a locating surface for one hand and the other face for the opposite hand.

The base of the casting and face of the various bosses have been machined

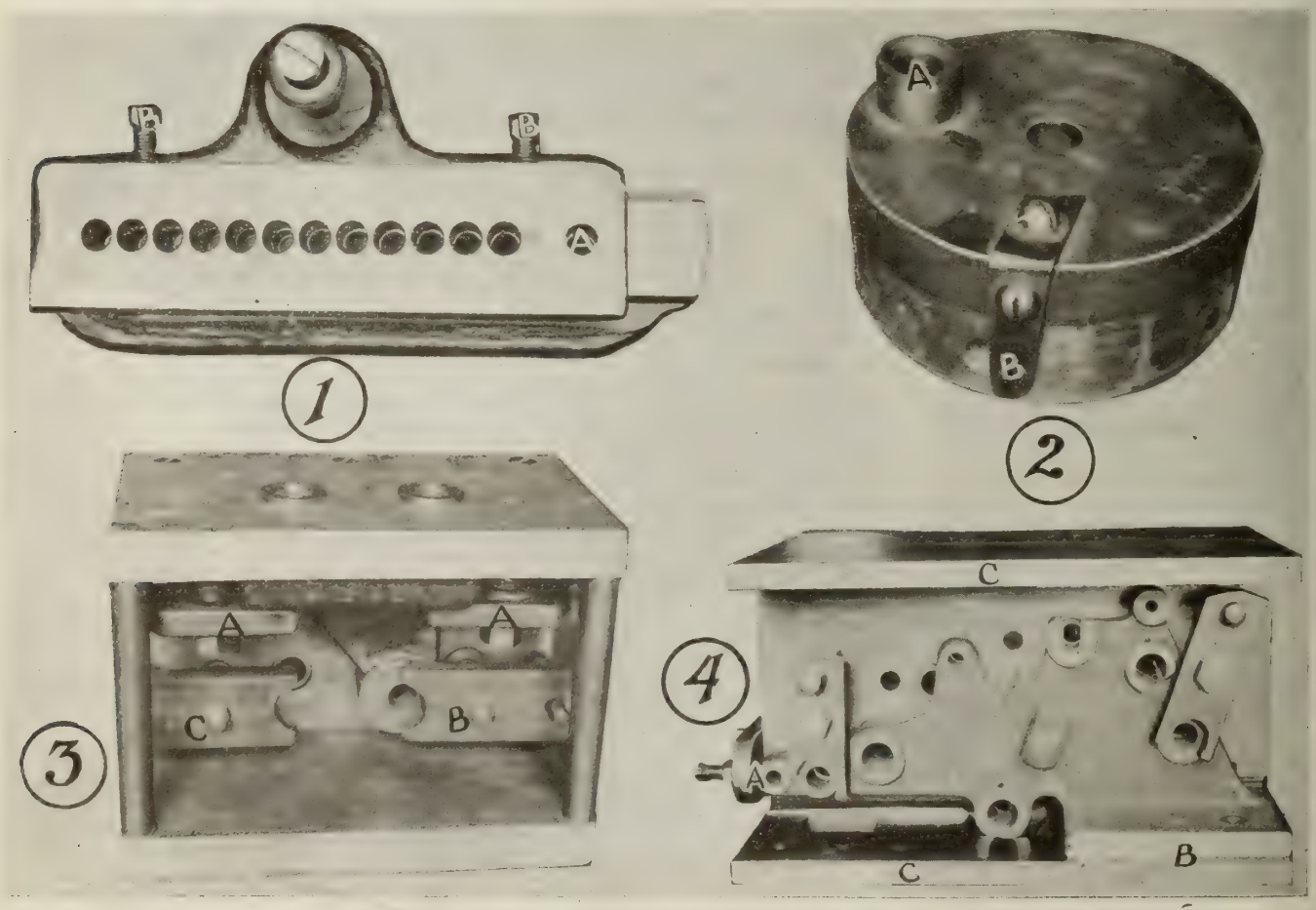


FIG. 1—JIG FOR FOUNTAIN PAD LEVER. FIG. 2—JIG FOR FOUNTAIN FEED DISC. FIG. 3—DRILLING THE FRONT BRACKET. FIG. 4—JIG FOR DRILLING GRIPPER STAND.

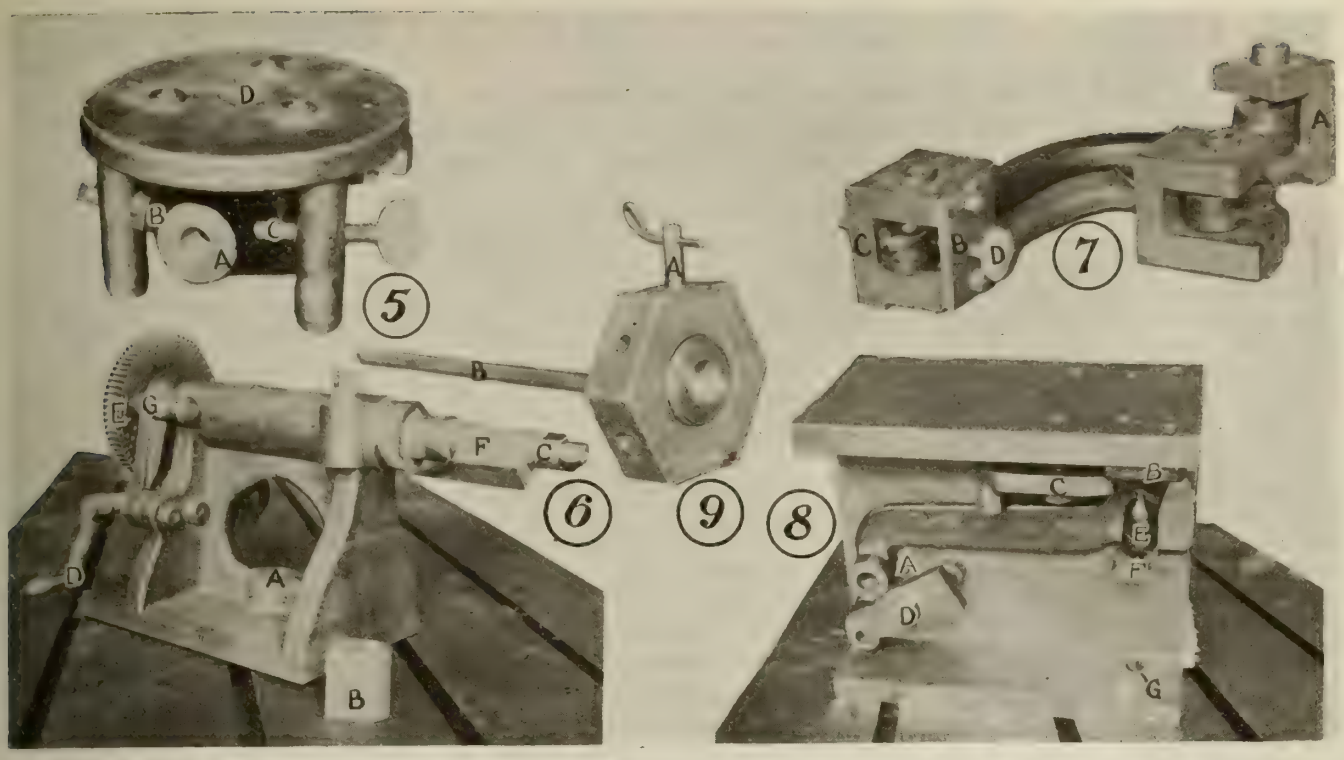


FIG. 5—DRILLING AIR RELEASE VALVE BODY. FIG. 6—SHAPING THE VIBRATOR BUSHING. FIG. 7—JIG FOR DIRECTOR CAM LEVER. FIG. 8—MACHINING THE FEED GUIDE. FIG. 9—JIG FOR LIFTER ROD NUT

in a previous operation. The casting is located by the pin A and held against the surface B with the strap C, the other end of the casting being held with the strap D.

Two ⅜ in. holes and one ¾ in. hole are drilled, and one, ⅞ in. hole spot drilled and reamed. A hole is also drilled in the boss E to suit a ½ in. x 13 in. thread, the drill being guided through a bushing in the plate F, but a special long drill must be used as it has to pass through the hole G in the wall of the jig.

A somewhat simple type of jig is used for drilling the lifter rod nut and is illustrated in Fig. 9.

The nut is machined all over before being drilled and is slid in from the end of the jig until its face comes flush with that of the tool as shown.

A ⅜ in. hole is then drilled in the piece, the drill being guided through any convenient bushing. The pin A is then placed through the bushing into the machined hole, thus holding the part in alignment and from moving; five other ⅜ in. holes are then drilled in the piece.

An interesting feature of the tool is the handle B, which enables the operator to manipulate the tool easily around on the various faces during the drilling operation.

Machining the Form Stand

When machining the form stand the casting is first faced on the base, and a rectangular slot machined at the upper end.

The casting is then placed in the jig Fig. 10 and is located by means of a block A, which fits into the machined slot.

The screw B is then tightened which forces the casting down until it rests on its base. The two straps C hold the part securely in the jig

The following holes are then spot drilled and reamed: one ⅝ in. at D, one 1¼ in. at E, one 15-16 in. at F, one ¾ in. at G and two ½ in. in the base H

The slip bushing used to guide the reamer is then removed and as the fixed bushing has been made sufficiently large for the diameter of the bosses, these are faced in the jig, one side with an ordinary facing tool and the rear face using a draw-back facing tool.

It will be seen that the jig must be turned over three different times when machining this piece, one of these being at an angle as shown.

However this jig as well as the other tools described are giving the best results in service and the design and methods can be followed to advantage by any shop desiring accurate and intensive production.

TUNGSTEN STEELS

By M. A.

In spite of all the work which has been done on the tungsten steels a considerable amount of divergence of opinion still exists regarding their constitution. A research recently made in certain special steels, in particular perhaps those containing tungsten of chromium, the temperature at which the carbon change occurs on cooling (A2, 1) is lowered to a very considerable extent when the temperature from which the steel was cooled exceeds a certain minimum. Further, such steels, when heated, pass more or less gradually into that condition which, after quenching, produces the greatest hardness. In plain carbon steels such changes occur sharply at a definite temperature of 730 deg. C. The changes of constitution which bring about these abnormalities are susceptible of a ready explanation in terms of this research, of which the following is an abstract:

The constituents which may be found in tungsten steels are iron, cementite, (Fe_3C), tungsten carbide (W.C.), iron tungstide (Fe_2W), and a double carbide whose formula is stated to be 4 Fe 3 C., W.C. Of these, tungsten carbide and iron tungstide are non-magnetic. This lowering of the recalescence point is a maximum, when 9 per cent. or more of tungsten is present and is independent of the carbon in the steel.

During cooling down it is very difficult to bring about the recombination of the carbide to form the double carbide, since tungsten carbide is only reformed slowly. If, however, the steel is reheated to 800 deg. C. and cooled normally, the initial structure is reproduced. It was noted that boiling sodium picrate blackens Fe_2W., as well as Fe_3C. The fact has probably produced much confusion hitherto when blackened material has been taken from cementite.

These changes in structure do produce marked changes in the properties of the steels, especially perhaps magnetically. It would appear that the special qualities of tungsten steel for magnets are to be attributed largely to the double carbide. If such a steel is quenched from too high a temperature—and it may be noted that the quenching temperature actually used is that which will give a maximum of the double carbide—the magnet is unsatisfactory. The fact may now be readily explained since the treatment tends to split up the double carbide, and by inter-action with iron to eliminate it, producing in its stead the ordinary carbide of plain steels and the non-magnetic carbide of tungsten.

Cast Iron in Bending; Variation in Beam Strength

In a Series of Tests on Cast Iron Shapes, the Author Brings to Light Some Interesting Facts Relating to the Effect of Varying Cross Section Upon the Strength of Beams in Bending

By J. HARLAND BILLINGS

MOST mechanical men will remember what a feeling of proud attainment was theirs when, in the progress of their acquaintance with mechanics, they became masters of the equation for the strength of a beam and were able to compute the bending load that a shaft or beam of any shape of cross-section could carry. With the faith that the youthful mind always has in mathematical results, the old equation connecting the bending moment with the moment of inertia of the section and the fibre strength of the material was taken as a statement of infallible truth, and little thought was given to the possibility of some unruly beams performing otherwise. Even amongst experienced designers the opinion seems to be general, that, while the above formula may not be exact for some materials, especially cast iron, it is near enough for practical purposes. They are surprised to learn that in certain cases it is as much as 100 per cent. in error.

The Beam Formula

The beam formula may be written—

$$Mb = \frac{I}{c} ft$$

where, if all units are pounds and inches, Mb is the bending moment caused by the load.

I = the moment of inertia of the section.

c = the distance from the neutral axis to the maximum stressed fibre in tension.

ft = the tensile fibre stress in such maximum stressed fibre.

For the beam of rectangular section (Fig. 1).

Mb would be $\frac{WS}{4}$ at the centre section,

I would be $\frac{bh^3}{12}$ and c $\frac{h}{2}$.

Now, suppose the beam in Fig. 1 were an ordinary gray iron casting. If we wished to obtain the ultimate strength in tension we would break the piece, or a specimen of similar material, in a tension testing machine, and the result would be about 24,000 lbs. per sq. in. If it were broken as a beam, however, and the ultimate fibre stress computed from the beam formula, ft would be about 37,000 lbs. per sq. in.

From this surprising result several facts become apparent. First, (ft) in the beam formula cannot be a fibre stress at all, for there can be no change in the actual fibre strength of the material, whether the piece is broken in tension or bending. Secondly, it is plain that there is some cause or causes tending in this case to strengthen the beam against bending that are not taken account of in the beam equation. If we change the beam equation to

$$Mb = \frac{I}{c} ft\ R$$

Calling R the "rupture factor," and if we define ft as the true unit tensile strength of the material, R then becomes a factor which represents the difference arising from any causes whatsoever, between the practical performance of a beam and what might be expected according to the original beam formula. For any particular case, that is a particular material and a particular shape and size of cross-section, the value of the rupture factor can be determined only by experiment, and its value must be known before a beam of such material and section can be intelligently designed.

Experimental Results

The determination of this rupture factor for cast iron beams of various cross-section was the object of a research in the Department of Mechanical Engineering, University of Toronto, recently, and the principal results are given in Table 1. Very little work has previously been done on this problem and the results which were available were unusually conflicting. Each result in the table represents the average of a number of results, derived from the breaking of test beams, which were cast especially for this research. Over 1,400 lbs. of castings, comprising about 90 specimens, were used.

Section No in Fig 2	1	2	3	4	5	6	7	8
Section	Square	Round	Narrow Plate	Wide Plate	Medium Rectang	High Rectang	Uniform I	Special I
Rupture Factor	1·64	2·10	1·55	1·46	1·43	1·42	1·22	1·03
Economy Factor Ft lbs. per Sq. in.	6·52	629	620	583	1140	1700	2230	2300
Pure tensile strength of metal used = 23000 lbs per sq. in.								

TABLE I

The Sections Investigated

The numbers in the first line of Table 1 refer to the sections used, which are shown dimensioned in Fig. 2. These are taken to be fairly representative of the sections most used in practice. Nos. 4, 6, 7 and 8 have the same area, so that comparison is simplified. All except the "I" sections have the same wall thickness, the object being to eliminate, as a factor in the results, the variations caused in cast iron by the difference in cooling rates between thick and thin sections. The 1¼-inch section used is the thickness of the "Arbitration Bar" of the Am. Soc. Testing Materials, which has come to be adopted as standard on this continent. No. 7 is the uniform "I" section commonly used, and No. 8 illustrates the section often seen, where an attempt is made to utilize the fact that cast iron is four times as strong in compression as in tension. The thick side should in all cases be the tension side.

The Quality of the Castings

It was of essential importance that the quality of metal in all specimens should be the same in order that the results should be independent of this variable. To ensure the required uniformity all the molds were poured from a single kettle of metal, and that run from a unit charge in the cupola.

The chemical analysis of samples showed a satisfactory uniformity. The average analysis gave:

C	Mn	S	Ph	Si
3.32	.49	.090	.687	.2.34

The Rupture Factor

In the expression $Mb = \frac{I}{c} ft\ R$, the values of I and c come directly from the dimensions of the specimen. The pure

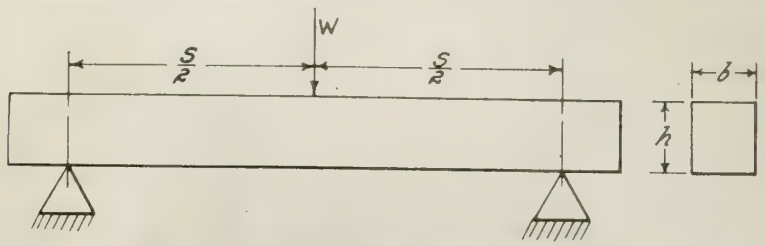


FIG. 1—ARRANGEMENT OF TEST APPARATUS.

tensile strength ft was carefully determined from tensile specimens poured from the same kettle as the bending specimens. The breaking load registered on the testing machine and the open span used give the value of Mb. The rupture factor could then be computed. From the results it will be seen that the values of rupture factor for all the rectangular sections group around 1.5, while for the others there is a wide variation.

The Economy Factor

The values given under "economy factor" in table 1 are got by dividing the maximum bending moment in ft. lbs. by the cross-sectional area in sq. in. It therefore expresses the relation between carrying capacity and weight of the specimen, and is a true measure of the efficiency of the beam.

It will be seen from the table that, although the "I" sections have the lowest rupture factor, they are still the most efficient beams by a large margin. Again, the special "I" has about the same efficiency as the uniform "I", although the latter has 22 per cent. larger rupture factor. This might be taken to indicate that there is little to be gained by thickening the compression side of such a section. In the writer's opinion, however, the only safe conclusion is that extremely non-uniform sections are not advisable. It would probably be found that a section somewhere between the two would be most efficient.

Possible Reasons for Results Obtained

The deviation of the rupture factor from unity is the measure of the deviation of the actual strength of a beam from the theoretical strength, as computed from the beam formula. What are the causes of this deviation?

First, the beam formula is based on the assumption that the stress increases uniformly from zero at the neutral axis to a maximum at the outside fibre. We know this is not exactly true, for the stress-strain curve for cast iron is never a straight line. It is concave to the axis of strain, which means that the fibres nearer the neutral axis take more than their proportional share of the stress. This fact, however, will not account for one-tenth of the variation in the case of the round section.

Another factor is the presence of inferior metal at the core of a casting and denser, stronger metal at the surface. This helps very little, however, in explaining the variation between the round and square sections.

The problem is a very interesting one, and it is evident, both from these results and from the conflicting opinions to be found in the literature on the subject, that much remains to be found out as to what actually takes place in a beam when it is bent. More research along this line is to be expected.

The following constants are recommended for use in design:—

Shape of Section	Rupture Factor
Rectangular	1.5
Round	2
Uniform I	1.2
Non-uniform I	1

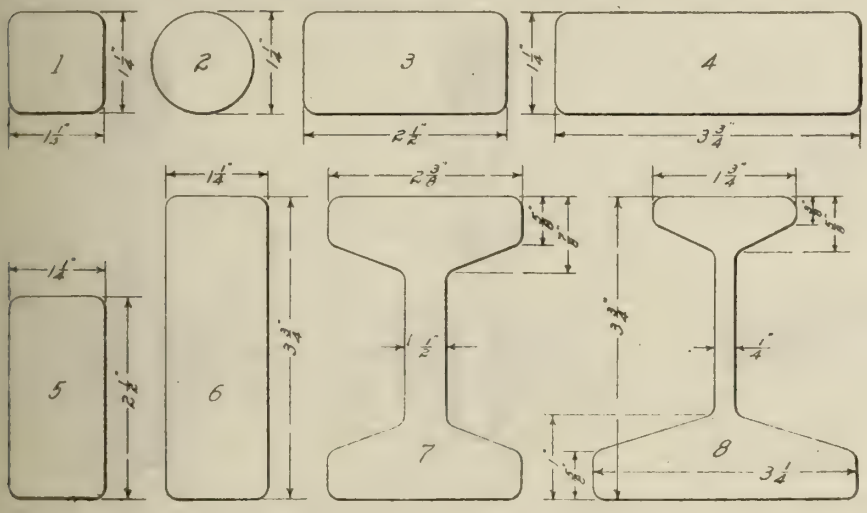


FIG. 2 CROSS-SECTIONS USED IN EXPERIMENTS.

ROPE AND TACKLE

Ropes are so frequently used that everyone should be thoroughly acquainted with their proper selection, care and employment. In using a single and double block or two double blocks taking a ¾ inch rope, the rope should be of good length, especially if the blocks are double and triple. Such a tackle may be used to lift timber to place or in putting up timber frames and trusses and in hauling up rafters. In hauling a heavy object on the ground the tackle should be so fitted up that the rope which is pulled runs from the object to be moved and not towards it. Ropes which have a woolly appearance, or where the ends of the fibre protrude, should not be used for important work. All ropes should be protected from dampness. Ropes are frequently allowed to unravel at the ends and thus become shorter. If a piece of twine is wrapped round it this might easily be avoided. When a rope runs over a pulley it is constantly bending and straightening, causing the fibres to chafe at the centres. The smaller the pulleys the worse it is. A pulley should not be less than eight times as large in diameter as the rope, and a larger one would be better. Ropes used in tackles or pulleys will give more service if they are reversed occasionally. For such important work as hoisting tackles it is better to use a four-strand woven around a cord. This costs more than than the three-strand, but is worth more.

Knots weaken a rope; the more bends there are, and the shorter they are, the worse.

One principle of a knot is that no two parts that would move in the same direction if the ropes were to slip should lie alongside each other. Another is that a knot must be so devised that the tight part of the rope will bear on the free end in such a manner as to pinch and hold it.

To untie a hard knot in a rope or strap, hammer it on all sides with a piece of wood, then dip it in boiling water for a moment or two. A little soap will help. With a sharp-pointed instrument the knot may then be picked loose.

To remove a snarl in a rope, draw out one end as far as possible, then open the centre of the snarl so it can form a hole round this free end, and seize the entire bundle, forcing it through this hole, putting the outside first; this will add to the free ropes, and if continued will unravel any tangle.

TURBINE FAILURES

The increasing dimensions of turbines in large generating stations is a feature of modern power development affecting a high thermal efficiency and a marked saving of fuel. One disadvantage, however, is the increased responsibility centred in a single machine, and this at once demands that special care should be given to every detail in its construction in order to avoid any possibility of breakdown. A notable mishap occurred recently to a 35,000 kw. horizontal single cylinder steam turbine at O Station of Boston Elevated Electric Railway, resulting in the complete wreck of the big machine. This appeared to be due to the fact that a machine at another station dropped a load of 27,500 kw. and in attempting to take the whole of this load, all the diaphragms and wheels, together with the blades from the 17th to the 20th stage (low pressure) were wrecked and carried away. The estimated direct loss is of the order of £40,000 and serves to emphasize the necessity for the utmost care in the design and construction of every detail of such large machines. Additional means of inspection, too, should be provided, in order to detect irregularities, as, in this case, evidence of irregular working was apparent at least six minutes before the destruction of the machine took place. Stops should also be taken to allow of the rapid stoppage of machines in which such irregularities are detected.—M. A.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

COLD DRAWN STEEL WORK

By M. H. POTTER

FIG. 1 shows the drawn casing after the threads have been machined and the casing trimmed to length, the operation being performed on a turret lathe on hand-screw machine.

Fig. 2 shows the blank, as produced by the blanking die shown in Fig. 3. The blanking die requires little explanation, A being the punch, B the material in strip form, and C the locating stop, D the two set screws for locating, E the guide.

Fig. 4 represents the first drawing operation, being performed as shown in Fig. 5. As is the blank, B the self-adjusting die, C the punch.

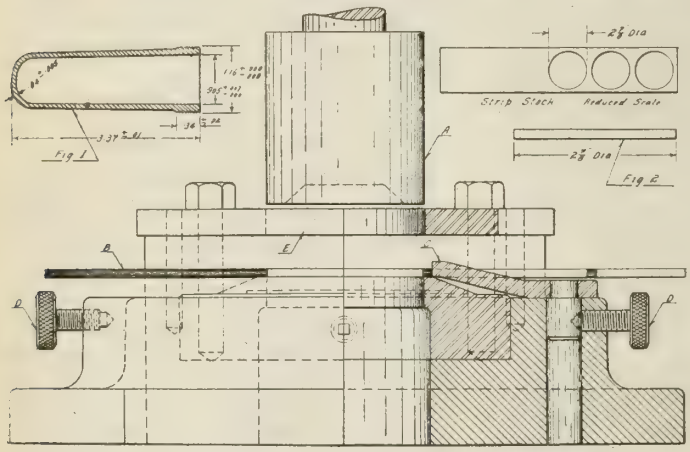
The casing after the second draw is shown in Fig. 6; the operation, which is the third, is represented by Fig. 7, the design being somewhat the same as that used for the first draw. The piece before the operation is shown by A. A similar self-adjusting die will also be noticed.

The third draw is shown in Fig. 9, and the piece, after this operation, in Fig. 8. A fixed die is used, as the piece has now been drawn to an even, concentric, wall thickness.

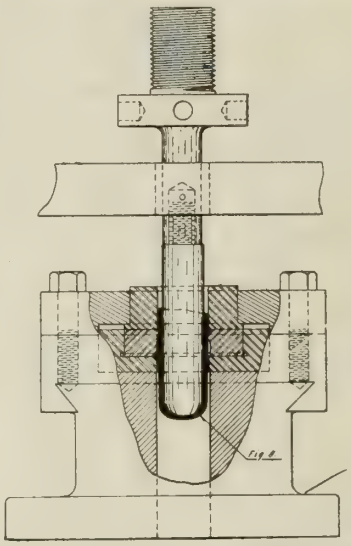
The fourth draw is carried out similar to the preceding one, for the same reason. The casing, after this draw, is represented in Fig. 9. The die used for this operation is shown in Fig. 10.

The sixth operation, that of tapering (external) the walls, is shown in Fig. 11, the punch being bottomed in the die to also insure the proper thickness of the base.

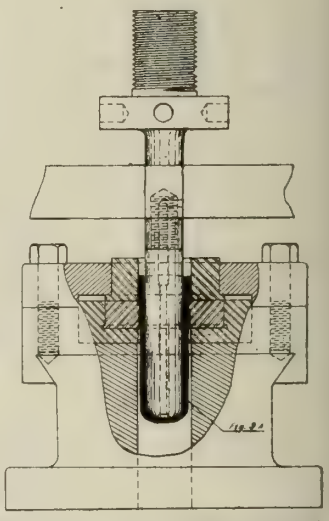
Lubricating holes in the plungers are provided for the use of a heavy graphite or plumbago to prevent sticking.



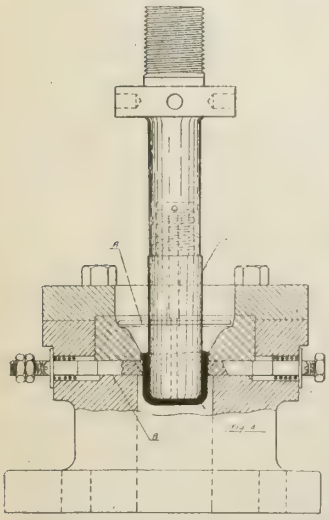
FIGS. 1, 2 AND 3—FIG. 3 SHOWS THE BLANKING DIE.



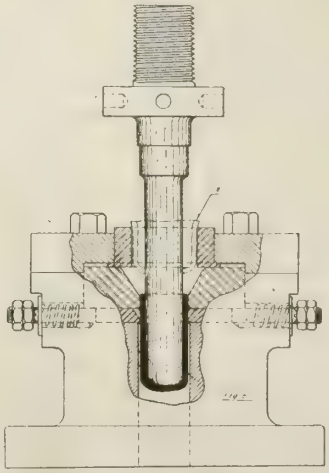
FIGS. 8 AND 9—FIG. 9 SHOWS THE THIRD DRAW.



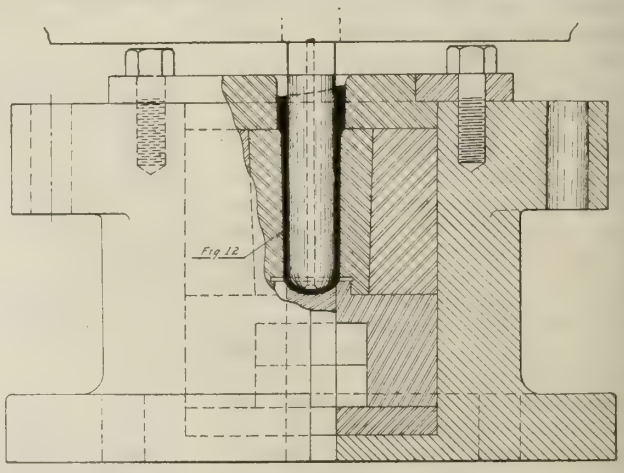
FIGS. 9A AND 10—THE FOURTH DRAW.



FIGS. 4 AND 5—FIG. 5 SHOWS FIRST DRAW.



FIGS. 6 AND 7.—FIG. 7 SHOWS SECOND DRAW.



FIGS. 11 AND 12—THE LAST OPERATION.

THREE ANGLE ROLL-OVER JIG

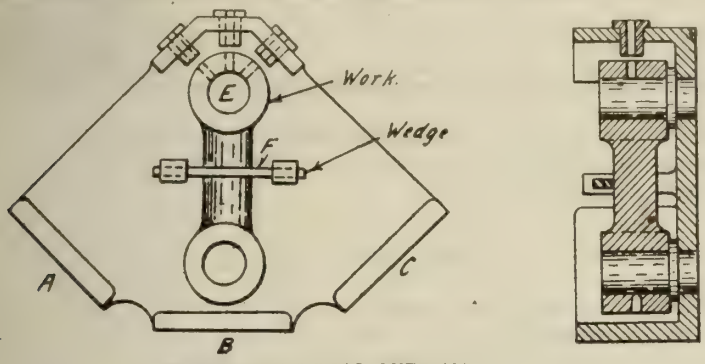
By A. E. Kipps

The roll-over jig, as illustrated, has proved well worth its cost, and its simplicity will no doubt appeal to readers who can adopt the same principle to other castings of similar nature.

The three holes are spaced forty-five degrees apart, and of course the bases A, B, and C of jig are planed at similar angles.

The pins D and E hold the work in position, while the wedge F keeps the work securely in position for drilling.

It is hardly necessary to further explain the jig, as it is practically self explanatory, except to say it saves considerable time and ensures accuracy and interchangeability.



THREE-ANGLE ROLL OVER JIG.

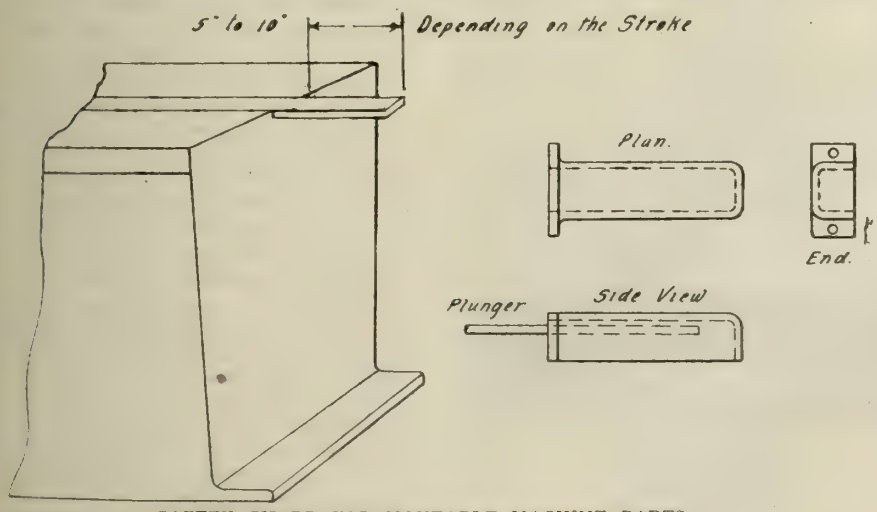
SAFETY GUARD

By J. H. Moore

It is sometimes surprisingly easy to install some little guard which will make for safety.

One case in point is shown in the accompanying sketch. The plunger A travelled in and out about 5 in., and quite often gave passers-by quite a bump, but its chief delight was to hit the operator a whack in the stomach, and in spite of all, the operator, though otherwise a careful worker, could never remember this moving part, and as it was made of 2 in. by ¾ in. machine steel, it could deliver quite a wallop.

We made a small grey iron guard as shown at B to go over the same at a cost of about $3, including pattern, and the trouble was removed. Is there some such problem in your shop?



SAFETY GUARD FOR MOVEABLE MACHINE PARTS.

A USEFUL DEVICE

Engineers who, in renewing a gauge glass under steam, have seen it crack on the introduction of hot water, will be interested to know how to avoid this accident, which may happen with the last glass in stock. Get a bit of 16 or 17 gauge copper wire, some inches longer than the glass tube, and coil the ends in spirals that will just enter the tube —about 4 turns at each end, leaving the last of the wire in the centre. The hot water may then be turned on with safety. The cooling effect of the copper on the water is sufficient to save the glass, and the experiment is compared with that of putting a silver spoon in a thin glass when filling it with hot water. —M. E.

Starting a New Railway.—A new line is to be built between Hespeler and Preston, and work will begin at once. This was given out by Matthew Kirkwood, general manager of the Grand River Railway Co. The line will run between the present one and the Grand Trunk line, and will be on higher land, so that it will not be in danger of flooding during the spring. The old line was tied up every spring through the floods.

Do You Know That

Coal, low in volatile matter, is the best for hand-fired power plants in the prevention of smoke.

* * *

Although the form of the U. S. standard thread on paper looks very much unlike the Whitworth form in practice there is very little difference. The square top and bottom of the U. S. Standard are hardly ever found in ordinary commercial screws made by taps and dies or rolled. The crests of the threads in a tap or in a cutting or rolling die soon become rounded by the corners overheating and wearing away—and thus a radius is arrived at which closely approaches that of the Whitworth thread.

* * *

Helium, only slightly heavier than hydrogen, has been successfully used for filling arships and balloons. Its scarcity formerly kept the price up to $1,700 per cu. ft., and its only known source was from radium bearing ores. Since the war started however it was found that helium was present in large amounts in the natural gas of Texas and by liquefying this gas it could be recovered in a very pure state. Its main advantage over hydrogen was in its non-inflammability and it thus removed the greatest objection to the airship.

* * *

While the onion is the last thing one would imagine to have a practical use in the machine shop, it has been successfully used as a tempering medium replacing oil. The smell, as may well be imagined, is rather pronounced, but the results secured are very good. The method employed is to place the article to be tempered in a metal basin filled with chopped onions until it is quite cold. The onions can be used repeatedly. Small articles may be inserted in onions large enough to hold them. Garlic might do in a pinch, eh? The Germans are responsible for this latest atrocity.

* * *

Since the outbreak of war many new uses have been found for the metal magnesium. In combination with aluminium and other metals, it produces an alloy with a specific gravity about half that of aluminium, which is largely used for aeroplane work. On the other hand, if the weight has only to approach that of aluminium, a considerable admixture of heavy metals is possible; an alloy containing only 10.30 per cent. of magnesium is stated to have great strength. The formulae of some compositions containing magnesium and aluminium recommended for use in automobile and aeroplane construction, are given in Metallurgical and Chemical Engineering. Reference is made to a recent patent claiming that 92 per cent. of magnesium and 8 per cent. of aluminium gives an alloy of specific gravity 1.75, with a strength equal to that of gunmetal.

DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

36 BY 60 GAP LATHE

The illustration shows a new gap lathe developed by the Canada Machinery Corporation, Galt. In many respects it is similar to the quick change gear lathe made by the same firm except in the driving mechanism of the feed screw where the quick change features have been eliminated and change gears substituted. By means of the feed box shown below the headstock, three changes may be instantly obtained. The design of the gap and gap plate is a decided improvement over former designs, the construction permitting the large face plate and thin work to swing without the removal of the plate. The bed, especially below the gap, is of unusual weight and strength to insure the maximum stiffness under the heaviest cuts. The saddle is substantial throughout, with great strength in the bridge, the bridge having a bearing on the flat surface inside the front V, in addition to the two V bearings. A bracket support, resting on the bed, for the saddle, is supplied to insure rigidity when turning large diameters.

The bed is unusually deep and rigid, and is thoroughly braced with cross ribs of box section. It is provided with three inverted V's of liberal proportions. The headstock and the tailstock each rest on one V and one flat surface, and the saddle bears on two V's and also on the flat surface. The brackets attached to the bed are made with a tongue fitting a groove in the bed, and the rack is of steel securely screwed and dowelled to the bed.

The headstock is massive and is equipped with split phosphor bronze bearings of large diameter provided with oil wells for lubrication. The spindle is of large diameter and is turned from high carbon steel.

Three changes of feed are obtainable through the feed box on the bed below the headstock. By changing the gears on the head and quadrant plate, any other desired feeds may be obtained. It is impossible to engage either the automatic cross or longitudinal feeds when the machine is set for screw cutting, or vice versa. The thread of the lead screw is used for screw cutting only. The feeds may be instantly reversed in the apron by a convenient lever. The saddle is securely clamped when using the cross feed. The lead screw is reversed for right and left hand threads by means of the reverse plate on the head.

A thread chasing dial, for indicating correct point for engaging nut for thread cutting, is provided on the carriage, obviating the necessity for stopping the lathe when screw cutting. A micrometer adjustment is provided on the handles of the cross screw and compound rest.

The tailstock is rigid and heavy, and is clamped to the bed by heavy bolts conveniently situated. It is so shaped as to permit compound rest to be set at right angles without interfering. The spindle is graduated in fractions of an inch for use in boring. The tailstock is adjustable across its base by means of a screw to permit of it being set over to turn tapers, the base being graduated for this purpose. The tailstock is provided with a traversing gear, operated by a handwheel working a pinion in the rack.

The lathe has the following dimensions:

Swing over shears	37"
Swing over gap	60"
Swing over saddle	24"
Width of gap clear of face plate	18½"
Distance between centres, 14' bed	6' 1"
Speed range of spindle	1.5 to 244
Diameter of spindle bearing front	6"
Length of spindle bearing front	10"
Diameter of spindle bearing rear	5⅛"
Length of spindle bearing, rear	7"
Diameter of hole through spindle	3⅛"
Taper of centres	No. 6 Morse
Diameter of tailstock spindle	4¾"
Size of steel for tools	1" x 2"
Thread range	1 to 18
Feed range	5 to 80
Weight of machine, 14' bed	19,000 lbs.
Weight of each extra two feet of bed	850 lbs.

MOTOR-DRIVEN 36-INCH GAP LATHE.

PROFILE GRINDING MACHINE

This machine made by the Fischer Machine Co., Philadelphia, has a maximum range of 8 inches in length. It is designed to grind irregular-formed turning tools such as are used in the machining of tire molds, shell tools, the flat tool for the relieving of formed milling cutters and irregular shapes designated for boring and turret machines. Heretofore the making of such a tool has proved itself an expensive operation, inasmuch as it requires a first-class tool maker from one to five days to shape any irregular form, no matter how skilled he may be in the art. With this profile grinding machine this time is reduced to a minimum.

The bed is made in the conventional box type, suitably ribbed for strength and solidity.

The spindle of the head is made of heat-treated and ground chrome nickel steel, which runs in special bronze tapered bearings to take up for wear, thrust bearings being also provided.

In handling the operation, a master form is fastened to the table. The piece to be ground is likewise clamped and both remain in a fixed position. As the grinding wheel is set in motion, the follower pin is kept in contact with the master form, the action of which is rack cross and longitudinal screw hand feeds.

The success of grinding a true shape hinges on the radius of the wheel corresponding with that of the former pin and this is well taken care of by means of a truing device set with a diamond point, cutting a perfect radius and made

PROFILE GRINDING MACHINE.

adjustable to conform with the two different radius wheels which are furnished with the machine, of ⅛ in. and ½ in. diameter of circle, and wherever possible, we recommend using the larger size wheel.

The Universal feature applies to both tables (the one holding the master form and the other the work to be ground), rotating in the same angle of direction with a fixed radius, permitting the tool to be ground on three sides, giving the right angle of clearance on the cutting tool.

LIFTING MAGNET

The Ohio Electric and Controller Mfg. Co. are making a lifting magneto in five sizes from 20 in. to 60 in. inclusive. The service rendered by the lifting magnet is indispensable and its breakdown takes on the nature of a calamity.

The principal causes of breakdown hitherto have been: First, Loosening of screw connections in terminal cavities, causing arcs, which soon burned out the open ends.

Second, Slow disintegration of the mica board insulation caused by the carbonization of the glue and the shellac binder, eventually resulting in a ground or short circuit.

Neither of these troubles usually come in the first year of operation but generally after 18 to 20 months' use, and as magnets are expensive, spares are seldom maintained; moreover, a spare purchased usually finds its way into regular use.

A third regular trouble has been the breakage of outer rings, though this is not so serious because new rings can be applied by the user, but it is very expensive.

These difficulties are all met and solved in the construction of the Ohio Mill Type Magnet as follows:

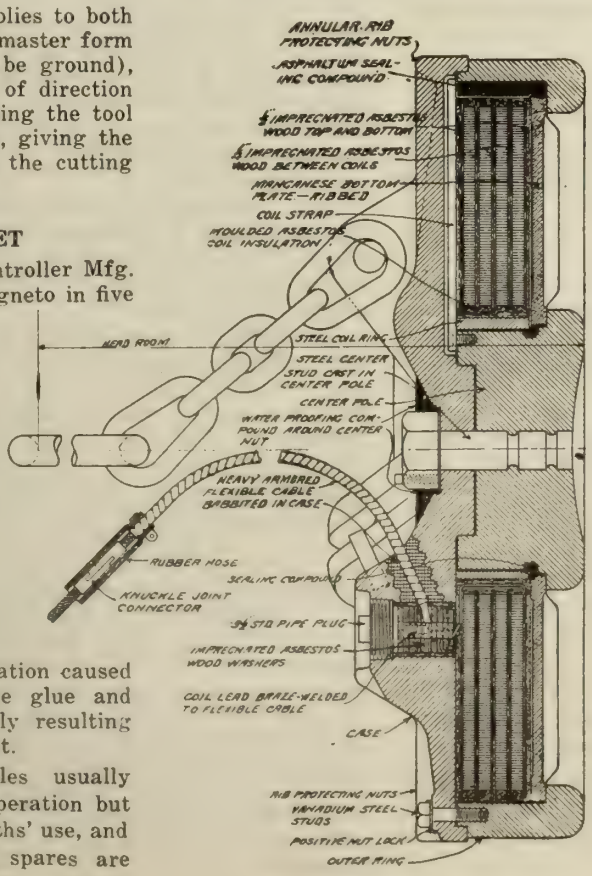
All electric circuit joints in the magnet are braze-welded. All coil insulation is asbestos with ¼ in. between layers, ½ in. top and bottom and ¾ in. around the centre.

Bakelite varnish is used to impregnate the asbestos ribbon between turns, and asphaltum to seal the magnet assembly against moisture.

The outer ring is over 8 in. high and of minimum cross section, over 16 square inches in the No. 5 and proportionately large in the other sizes. There are no through holes, the ring being supported by large chrome vanadium steel studs with nuts on top positively locked to studs and to case and thoroughly protected by a strong annular rib. The wearing section of the ring has over 8 square inches cross section, will wear indefinitely and will never break.

The coil strapped to the centre coil ring is a unit, and being clamped solid between case and bottom plate the heat of operation is rapidly radiated, hence the temperature rise for a two hour run, one minute on and one off, is not over 75 degrees centigrade.

The result is high operating current and splendid all day lifting capacity.



CROSS SECTION OF MAGNET.

SILICA BRICKS FROM OPEN-HEARTH FURNACES

By Mark Meredith

The results of an examination of bricks that have served in the arches of open-hearth furnaces is interesting, and the bricks examined had four distinct zones, viz.:

A.—The lower part, which had been in immediate contact with the flames, had a glazed surface with occasional protuberances or stalactites, indicating partial fusion. The fracture was light grey in color, and perfectly homogeneous in aspect though sometimes studded with bubbles.

B.—The adjacent zone, usually with a very clear line of demarcation, was black or very dark grey in color, equally homogeneous, and of considerable hardness.

C.—A transition zone, frequently appearing in the form of white spots in the middle of the black zone, and representing large initial grains of quartz which had not been completely absorbed. In other cases the black ground gave place to light brown, the original brick here appeared to have simply been impregnated with a fused brown substance.

D.—The topmost zone did not reveal any changes. Under the microscope and by polarized light, thin sections showed in zone B, large and very transparent tridymite crystals, the space between them being filled up with an opaque black matrix. In zone A the tridymite had fused, and the large crystals had been replaced by globules embedded in, but not intermixed with the opaque black constituent. In cooling, the fused tridymite was transformed into crystobalite, and in some places refrangible patches of ill-formed tridymite could be observed.

In the sections from zone C, large crystals of tridymite were also found, but gradually diminishing in size and number towards the less heated parts of the brick till in the D zone the structure was normal, as in the original bricks.

From analyses of the different zones it appears that zones A and B contain very varying and often considerable quantities of iron in various stages of oxidation, though approximating closely Fe_2O_3. The black ferruginous constituent, which does not mix with the silica in the fused portion of A, is drawn up by capillary attraction between the tridymite crystals of B. It is also probable that the lime in the brick ascends similarly in the form of a fusible silicate which impregnates zone C at the expense of the lower zones (in acid furnaces). The grey and black appearance of zone A and B has no connection with the iron content but is accounted for by the high transparency of the tridymite crystals, whilst the indefinite structure of the silicon A renders it translucent.

It is noteworthy that, as proved by direct experiment, the fusibility of the bricks is not appreciably modified by the very high proportions of iron oxide, hence the excellent behaviour of even the most strongly impregnated bricks at high temperatures.

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An Oliver Message of Optimism

THERE'S something in the attitude of the Oliver Machinery Co. of Grand Rapids, Mich., that is well worth noting just now. They state that business has been good with them and they are not afraid to stand up and say so.

Why not others? We have had a regular procession of reports about cancellations of contracts and the subsequent difficulty of readjustment. We have been getting yards of material about firms "waiting" to see if there is going to be any change in the price of raw material. But there are few—mighty few—who are coming right out into the open and owning up to the fact that business is good enough to earn them three meals a day.

Here is what the Oliver people have to say about it:

"The month of January, 1919, showed the biggest shipment the Oliver Machinery Company has made in their history. Part of this is due, without question, to the fact that our export business has replaced some of the domestic business of previous months. Old export orders were allowed to be filled because of shipping conditions improving.

"Orders received during the month of January were also very gratifying, being within 10 per cent. of our average monthly business for the past year, while a part of our business, and we might say a substantial part, is export. At the same time, every time we receive an order for a carload of machinery for export we must bear in mind that we have to purchase a certain amount of steel, which purchase is domestic business. We have to purchase almost a carload of cast iron, which is indeed domestic business, etc., until all of the parts that go into our machinery are ordered. We hope that other people who are actually enjoying a good volume of business will publish the fact in the hope that those who are putting off purchases unnecessarily will see the error of their ways."

That message ought to be passed on. There's nothing so bad for the dumps as to find out that some person else has 'em. There's nothing that will help along a feeling of doubt and pessimism like a sermon from a man who is a regular honest-to-goodness pessimist himself. And there's nothing that will cure this thing so effectually as a good dose of "business is good" talk from men who are honest enough to say so.

Put Germany in Her Place

THE Allied world should beware of any of the molasses-mouthed people who seek to create the impression that terms should be as easy as possible for Germany.

Some of the German publicists have put up the plea that if the peace terms are made too hard the German people may be forced to fight again.

The Allies should see to it, before they dismiss their armies that the German nation is put in such a position that it cannot fight again even should it so desire.

What is the position? The shell shops of this country are out of commission. They are dismantled and much of the equipment is passing away as scrap or becoming covered with rust. In Germany the manufacture of munitions, according to the best reports available, is proceeding. They are also turning out ordnance of all descriptions at the Krupp plant.

The statement is also made, and it has not been denied, that Germany could, in fifteen days, call up an army of three million of her best soldiers. It is the business of the Allies to see to it at once that Germany cannot call up an army of three hundred, let alone three million, and also that she has nothing with which to arm her assassins.

What is the use of going ahead with peace talk while Germany is still turning out munitions and keeping her army in such shape that it can be a body of three million in fifteen days.

The Allies want to make it very certain that they are not going ahead with their peace conferences seated on the edged of a volcano.

There's a Mutual Interest Here

THERE are a number of shops in Canada where there are adamant rules forbidding access to the works to canvassers of any sort.

It is probably necessary that there should be rules of this sort. It is necessary for the employer to protect himself. He is paying for the time of the men in his employ, and is entitled to all of it. On the other hand, men working in factories very often prefer to have some sort of protection that will insure them against being bombarded daily by agents and canvassers who may be smart and glib enough to talk them into purchases that they will regret shortly after.

In a great number of cases representatives of the technical press are granted open door to the shops in order to give the men a chance to secure reading matter that will make them capable of doing better work and keeping abreast of the times.

CANADIAN MACHINERY has never yet asked any shop to give it special treatment in this regard. But it does not take much reasoning to see that the more men there are reading such a publication—and kindred publications as well—the higher will be the standard of shop knowledge, and the greater the efficiency of the staff.

Right now when new methods of production are being brought out—when the lessons of production gained from war work are being applied to present-day industry—is the time when it is very much to the interests of manufacturers to have the men in their shops reading CANADIAN MACHINERY. The publishers of this paper do not mean by this that they expect shop executives to agree to have the time of their men wasted or fooled away, but we do mean that, in the interests of the men who are ambitious and anxious to go ahead, there should be a reasonable amount of co-operation in the work of getting a greater circulation for a paper the sole aim of which is to make the mechanic a better mechanic by giving him the advantage of what some of the best authorities have found out by years of experimenting and research.

A Real Lesson in Thrift

A COLORED gentleman went into a down-town store to buy a suit of clothes. He wanted to pay about $20. In fact he had that much set aside for the purpose.

The clerk, well schooled in the art of making people buy what they couldn't afford to pay for, had the customer prancing around in a $35 outfit, and was telling him that that was the sort of togs he should wear.

The colored man simply smiled, stuck out for a $20 outfit, and remarked "I never hang my hat no higher than I can reach."

And there's quite a heap of common sense and wisdom in the saying.

Is there anything more painful than witnessing a man with a $2,000 income trying to make a splash that looks like that of his neighbor who reaches through the cashier's wicket for $5,000 per annum?

And yet it's being done all the time. Two dollars can't go as far as five, and two thousand can't do what five thousand can. That looks simple enough, but the people who fail to realize that fact would make quite a heap were they all pitchforked up together.

That colored man preached a pretty fair sermon on "thrift" when he announced his text as "I never hang my hat no higher than I can reach."

This Ought to Cure Them

IT'S quite evident that this is a day of plain speech. Folks are acquiring the habit of calling a spade a spade. And perhaps it's well that such should be the case.

There's one writer on the Kitanning, Pa., "Exchange," who has quit pussy-footing. He's got his pile of bricks and half bricks drawed up close to the editorial chair, and he tosses them around with a freedom that is amazing and an accuracy that would cause a guilty conscience to run for cover.

For instance, on the very important matter of bringing up girls in the proper way, he sayeth:—

"The mother who allows a 16-year-old daughter to float around the township in a top buggy until 2 a.m. with a counterfeit sport of weak paws and weaker morals, merely opens the front door to grief and disgrace. If you don't know what company your daughter keeps, or what time of night she turns in, your roar when gossips get busy will sound about as pathetic as the wheeze of a Jew's-harp. The girl who insists on spooning with everybody in the corporation limits ought to be taken back to the wood shed and relieved of her overflow of affection with a No. 11 slipper, laid carelessly across the hiplets. We had sooner see a girl kiss a blind shoat through a barbed wire fence than have her change partners six nights a week in the front parlor with the light turned low. It is harder to marry off a girl who has been pawed over by every boy in the community than it is to fatten sheep on pineapple ice. You can't goldbrick a sharp-eyed suitor with second-hand goods any more than you can fit a bathing robe on a goat."

Report Seems Rather Unlikely

THE statement in the daily press that Yarrows Limited, of Govan, Scotland, would close their plant and remove to British Columbia, is hard to accept.

The reason given for removing is to escape the labor troubles on the Clyde. This would be analogous to leaving a sinking ship, and embarking on a leaking lifeboat. Labor is no more imbued with sweet content in British Columbia than Scotland.

J. J. Coughlan, head of the firm of John Coughlan and Sons, Vancouver, in a recent statement, said that the attitude of labor was such as to threaten the continued existence of the shipbuilding industry. The following extract from the Victoria "Colonist" seems to bear out his statement:

The Admiral Watson came over from Seattle a few days ago with a broken crank-shaft. The workman at Yarrows, under instruction from their union leaders in Seattle, have refused to repair the vessel, as it is claimed she came here because the strike prevented her getting the work done in the States. Labor officials here refuse to say how long this will continue, but hint that the sympathy strike here will last as long as the strike in Seattle.

Apart altogether from the labor aspect there does not seem to be any reasonable grounds to imagine that Yarrows Ltd. would undertake any great expansion on the Pacific Coast. They have at present a very adequate plant, and the only crying need at present is for a large drydock.

The building yards on the Coast are engaged for the immediate future on the Canadian Government ships, and wooden vessels for export. After the completion of their present contracts, the volume of business they handle will depend largely on their ability to compete with the rest of the world at producing tonnage at a price.

ONE of the publicity planks in the farmers' platform declares that "every claim for tariff protection should be heard publicly before a special committee of Parliament." Better than this, we believe, is the suggestion which has been frequently voiced by *The Financial Post* for a permanent tariff commission. However, the two suggestions would appear to be no more than different means to the same practical end.

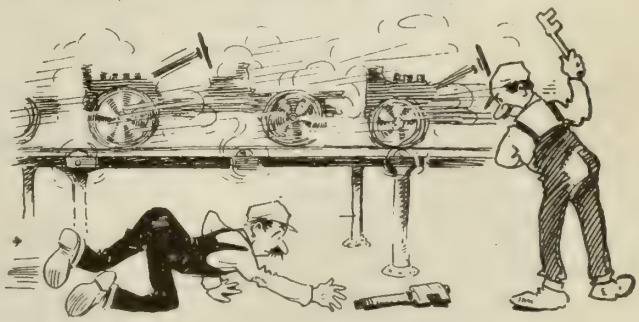
The tariff commission, *The Financial Post* believes, promises the best means of negotiating the "no man's land" between the opposing industrial and agricultural factions.—*The Financial Post.*

He Dropped the Monkey Wrench

HE sauntered into the office of the employment person. Lots of folks do the same thing. In fact the man in the employment office is some pumpkins these days. For the last three or four years folks haven't paid much attention to him, but things are a bit different just now.

However, this chap in question was looking for a job. He didn't have one—in fact that's the reason why he was lookin' for one.

Of course it's proper now to ask a few questions. For some time it's simply been a case of going in and having the employment person hug you and pass you on to the



boss. He, in turn, hugged you and advised you not to work too hard. But they're gettin' more particular now.

"Where've you been workin'?" was the first query.

"Ford's."

"How long?"

"Year."

"Quit or fired?"

"Canned."

"Why?"

"Dropped my wrench and seventeen machines went past before I could pick it up."

MARKET DEVELOPMENTS

A Fair Amount of Business in Some Lines Now

Reports From Several Sources Make it Certain That Machine Tool Trade is Far From Dead—Prices of Plate Cannot Apply Yet to Canadian Business on Account of Inability to Make Deliveries

ALTHOUGH reports have it that the mills of the United States Steel Corporation are still operating at 85 or 90 per cent. of their war-time capacity, it is not to be taken that they are selling at that rate. As a matter of fact sales have dropped materially, and the Corporation, which has an extensive system of storage, is making use of this section of its equipment. How long they can or will pursue this policy is problematical. It is interesting to note that the buyers seem willing to absorb high costs for automobiles, but when it comes to putting money into steel for industrial purposes they regard it as a very different matter, and fight shy of actual purchases.

Steel plate has not moved yet below the six cent price in Canadian warehouses. Dealers claim that they are not able to secure deliveries which will enable them to pass on the reduced price at once to the users here. As a matter of fact about one cent a pound is being paid by way of premium for quick delivery. Canadian warehouses for the most part are pretty well cleared out of war-price plate, and they should be able to quote prices based on the lower United States base price as soon as they can secure satisfactory deliveries.

On tubes, it may be said there are two prices now. If the buyer is urgent he is served from stock. If he can wait he places his order for delivery in about two weeks, and by the latter course he saves some ten per cent. on the transaction.

Some of the machine shops in the district are being kept fairly well supplied for the present on the work of rebuilding and changing machinery that has been taken by some of the dealers from the shell shop equipment that passed out of use the day the armistice was signed, or shortly after. There is a tendency, though, on the part of the dealers, to let this stuff slide. They do not want it unless they take it in at their own figure, and even then it must be in exceptional shape.

Several firms are at the point where they will shortly make announcements regarding their plans for the future. They are not likely to make any such announcements before they are ready to go ahead, feeling that were they to do this it would simply be inviting competition from others who might be figuring what to do with a very efficient plant and organization.

PAY HIGH FOR THE LUXURIES BUT HOLD BACK ON THE NECESSITIES

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Feb. 13.—Buying of steel products has failed to maintain the pace of slight increases set in January, but has rather shown a disposition to taper off in the past week or ten days. The sum total of buying is, as a matter of fact, extremely small, representing possibly only one-fourth of the productive capacity. Production, of course, is much heavier than that in the aggregate, partly because all mills have a considerable volume of old orders to work on, and partly because in addition the United States Steel Corporation subsidiaries are making considerable material for stock.

Operating Rates

Independent steel mills are operating at various rates, generally between 40 and 60 per cent. capacity. The eastern mills seem to be operating, generally speaking, at lower rates than the Pittsburgh district and more westerly mills, the average of all the independents being about 50 per cent. The Steel Corporation subsidiaries as a whole are understood to be operating at an average of between 85 and 90 per cent. of capacity. Possibly their shipments on orders are somewhat heavier than are those of the independents, but the chief cause of the divergence is that the Steel Corporation subsidiaries are putting material into stock, while the independents do not appear to be doing this, at least to any extent.

The Steel Corporation is stocking material for the purpose of keeping its working forces employed. There may be some loss in doing this, as costs of production may be lower when the stocked material is eventually shipped, and there is also the expense of extra handling, but one offset to this is that costs of production per ton is less when a mill runs full, or nearly full, than when it runs at 50 or 60 per cent. With its string of large and efficient warehouses established during the past few years, from Boston and New York through Pittsburgh to Chicago and New Orleans the Steel Corporation has good storage facilities. It is only in the case of wire products, tubular goods, sheets and tin plates that mills are customarily built with storage facilities of their own, and thus in the case of bars, shapes and plates the Steel Corporation can store to much better advantage than can the independents, though of course there is an expense attached.

Prospective Operations

As old orders are running out and new buying is not increasing, the mills face continually decreasing operating rates until a change for the better comes. Some improvement, of course, is to be expected by spring. Mills are looking to the farmers rather than to the building trades for an early increase in buying, farmers being normally large consumers of wire products and of sheets. There is a fair demand for steel from the agricultural implement makers, indicating that the implement in-

erests expect good buying of their wares.

Building Activity

The first activity in new construction will doubtless be in the building trades, in erecting dwelling houses, which are more or less scarce throughout the country. This may easily start much sooner than new construction along the line of large office buildings, hotels, bridges, factories, power stations, etc., and in that direction there is no sign whatever of any activity to come in the near future.

Everything is held back by high costs and by the indisposition of costs to come down at such a rate as would promise fair conditions in the near future. The situation is really an acute one. In the past few days representatives of sellers of building materials of various descriptions from all over the country have been in conference in Pittsburgh, their chief proposition being to consider whether it would be advisable to start, with funds contributed by all interested, a national campaign to encourage building, particularly of dwelling houses. This seemed to be a good idea, but the first thing that confronted the proposition was that men in the building trades in the Pittsburgh district, carpenters, bricklayers, plasterers, etc., have already formulated plans for demanding a 10 per cent. wage increase when the present agreement expires May 31. Most of them already are getting $8 a day or thereabouts. It was concluded that to start a publicity campaign for building at this time would simply encourage further increases in the cost of building, when it is unattractively high already, and there is now an effort on foot to secure the good offices of the Chamber of Commerce or some such authoritative representation, to take the matter up with the men and point out to them that the only way to make work is to reduce the cost so as to encourage those who have money to spend it.

Export Business

The United States Shipping Board has now reduced ocean freights to a parity with the reduced British rates, thus removing the great handicap under which steel makers of the United States had labored. when American rates were tens of dollars a ton above rates from British ports. Whether this equalization will result in much export business being booked by American mills ought to be developed within a couple of weeks. While the British mills had the start of the American mills, that is a small matter if the export trade is really to amount to anything, for the American industry is three times the size of the British and if there were enough export demand to make it an item for the American mills it would not set them back a great deal for the British mills first to fill up to a comfortable extent.

There is practically no demand for steel on the part of France, except that the American Sheet & Tin Plate Company has just booked an order from the French Government for about 25,000 tons of electrical sheets. While this is not a large order in point of tonnage it is a large quantity for the particular commodity involved, and the order means that the American Sheet & Tin Plate Company will be very busy in the departments involved to complete shipment in the time specified, 60 days. Demand for electrical sheets on the part of makers of electric machinery in the United States has been very slack the past two or three weeks, while just after the armistice was signed there was a very considerable demand. There has been very good buying of electrical sheets by makers of electrical equipment for automobiles, other lines being quiet. As electrical machinery is required when new projects are being undertaken, involving new construction of various classes, the outlook is not favorable. It is in new construction that the chief demand for steel normally comes.

Thus a scrutiny of the demand for steel products, in detail, indicates that the people have plenty of money to buy steel for ordinary everyday consumption and for luxuries, if automobiles are to be considered luxuries, but are unwilling to spend any money in investments. They regard costs as too high, and capital will lie idle or draw bond interest rates until the outlook changes. Meanwhile there can be no heavy demand for steel, commensurate with existing productive capacity. It cannot be said that high prices for steel products stand in the way. Steel prices will come down when steel producers see that it is worth while to reduce them. At present they get along better by maintaining them.

POINTS IN WEEK'S MARKETING NOTES

The Steel Corporation mills are still running about 85 or 90 per cent. They are storing material for stock as they have the storage facilities to do this. Old orders are running out and new buying is not taking its place on the books. This tends to increase rather than to lower the costs of operations. In turn it will probably delay the date on which the Corporation will be willing or able to move its prices to a lower level.

—

Reports from many sources say that buyers are willing to absorb high cost prices in the way of automobiles, but insist on a substantial reduction before they will think of buying steel to construct a building.

—

The U. S. Shipping Board has given a new rate which is destined to help American interests meet competition for European business. At one time British ports had an advantage of $10 per ton over United States.

—

Many U. S. firms are in a very embarrassing position because they—have not received settlements from the Government in regard to their war contracts. Much capital is tied up, and the firms cannot go ahead without it.

—

One of the largest firms of machine tool dealers in Toronto reports that business is much better. Sales made during the last week or so include a good assortment of lathes, millers, gear cutters, presses, etc.

—

There are practically two prices for boiler tube deliveries from a number of warehouses now. Out of stock for immediate delivery costs the buyer about ten per cent. more than if he places the order and waits for delivery from mills at the new prices.

—

There is nothing of note in the scrap metal business. Trading is limited to a few deals that amount to next to nothing. Sellers are anxious to shoulder their losses at once, but cannot get rid of material to do this. They feel the longer they hold their stocks the greater will be the losses.

BETTER SHOWING IN MACHINE TOOL SALES

Some Dealers Report That They Have Had a Good Week's Business

TORONTO—There are indications of a better trade in machine tools. Quite a few sales have been made during the past week. Some of the shops are becoming busy on rebuilding and overhauling equipment that has been taken from the shell shops.

The indications are that the scrap metal situation has gone to the limit in the matter of depression, and that with a few more concessions in price matters will come to the stage where business can be resumed.

Paying Premium

It is quite correct to say that what business is moving now in steel plate has a fairly large proportion of it that is being sold at a price which includes a premium for prompt delivery. As a matter of fact the three cent per pound price which was recently announced by the Steel Corporation is not being felt in this country, because the sales which are being put through now are for immediate delivery, and the mills able to give this can and are securing in the neighborhood of 3.75c and 4c per pound U. S points. The price very often depends on the urgency of the order.

Many of the warehouses in Canada are pretty low in stock, so that they should be in a position to give the users of plate in this country the advantage of the lower base price as soon as they begin to take this material into their stock. And here again the old question of the

next reduction—if it is to come—enters into the question. Many of the mill men declare that any further reduction in base prices can only be accomplished when there is a reduction in wages. The cut that was given out by Judge Gary, they hold, represented the concession that it was possible for the owners of the steel plants to make in order to start business moving again. Some of them state that they went as far as they could right at the start.

The Canadian trade is none too pleased with the new corporation that has been formed, taking in, as it does, nearly all the best mills from the independent group. Some of the Canadian sellers have had connections with some of the best U. S. mills that have lasted over a number of years. These connections have been valuable. It has meant that often it was possible to receive preferred treatment in the placing of orders, and large business was built up on this basis. In fact one of the large Canadian warehouse interests in 1917 did a business of over two million dollars with one American firm. That firm now is in the Consolidated Steel Corporation, and the Canadian firm feels already that they have lost a desirable connection.

The Tube Situation

The National Railways are buying quite heavily in tubes and plates, mostly for the shops at Moncton. The tube situation just now is one that comes under the two-price heading. This is not true in all cases, but in several it is. The warehouses have stocks in some cases that were taken in at war prices when skelp was scarce and costs very high. They have not enough of this to make them stampede the market, and they are able to get new steck at the lower prices, but it takes time. Buyers of tubes if they watch their needs ahead, can save a little money here. If they can so arrange matters that they can wait for a couple of weeks for delivery, they can buy tubes at ten per cent. below the price if they want them taken out of the stock that warehouses have on hand. There seems to be a tendency on the part of the Canadian trade in nearly every case to give the buyer the advantage as soon as it is possible to do so.

Have Had a Good Week

Some of the dealers in machine tools report that business is slack. Others fail to see the thing that way, and point quite readily to a good volume of business that has been actually booked during the past week. Apart from this there are a great many enquiries being sent out. It looks as though some of the prospective buyers of machine tools are feeling out the market before they decide to come out in the open and convert their queries into sales. Among equipment sold in one Toronto shop this week were presses, lathes, gear cutting machines, millers. A buyer from the Canadian Ford shops was in the city during the last few days, and secured some machine tools for his shops. The understanding, though we cannot state that it is official, is that the equipment now secured is for the making of starters for the Ford cars. It has been known for some time that it is the intention to make this change in the car, and it seems likely that the new equipment is for that purpose.

A report from the New York correspondent of CANADIAN MACHINERY states that it is the intention of the Willys-Overland Co. to turn out a car between $500 and $700, and the rumor on the street is that several of the plants connected with this same concern may be interested from the Canadian end of the business. Both the plant of the Russell Motor and the Willys-Overland are splendidly suited for this branch, both in tool room equipment, automatics, etc. Officials of the company here, though, are saying nothing about what they intend to do. One of them remarked to CANADIAN MACHINERY this morning, "How can we tell you what we don't know ourselves?" An announcement regarding their proposed operations may be expected before so very long.

Metals Are Easier

Slight reductions have been made in lake copper, and in electro copper. They are not deed cuts, and do not keep pace with the way in which copper scrap prices have been slashed. Tin is quoted locally at 65 cents per pound, and the market is fairly easy. Dealers report that it is comparatively easy to secure supplies of this metal now.

AMERICAN FIRMS HIT WHILE WAITING FOR THEIR ADJUSTMENTS

Special to CANADIAN MACHINERY

New York, Feb. 12.—American machinery trade has not recovered from the sudden ending of the war. Peace-time business is hesitant. January was a dull month, but the volume of sales in values was in many instances equal to that of January, 1917, when, however, prices were not more than half of those now prevailing.

Buyers have made a great many enquiries since the first of the year, but when quotations are furnished they decide, in a large majority of cases, to wait. There have no objections to paying what many characterize as "war-time prices," but another very important factor in holding back business is the slowness of the United States Government in settling claims of manufacturers who had war contracts cancelled. Some companies will not be financially able to go ahead full speed on peace business until after their claims have been paid.

Another market factor is the large quantities of new and used machine tools which the Government had on its hands at the conclusion of the war. At first the value of new tools, alone, was estimated at from $200,000,000 to $300,000,000, but recently this estimate has been revised to about $100,000,000. Second-hand tools are a drug on the market and dealers in most instances decline to handle them except on a strictly commission basis, wherein they assume no risks of financial loss. Many of the tools which were driven hard on war work will be fit only for scrap.

The arrangement made between the Government and the machine-tool industry, by which the latter will buy back many of the Government tools at an inventory valuation, will, it is believed, work out satisfactorily, provided the purchases are made at prices sufficiently reasonable to permit of a profit on their re-sale. Of course, machine-tool builders will have to reckon upon a declining market. Although prices on standard tools have thus far not declined much, if any, below war-time prices, it is admitted that lower prices must come as soon as the cost of raw materials and the labor wage situation will permit. There is talk of discounts of from 10 to 20 per cent. being granted on recent sales of new tools, but these concessions are mostly under cover, not being talked about openly.

The Government has on hand a considerable stock of locomotive and traveling cranes, hoists, etc., which probably will be disposed of through the builders of such equipment in a way similar to that agreed to by the machine-tool industry.

The outlook for the American machine trade, despite many handicaps, is not altogether discouraging. Export inquiry is slowly but steadily developing, and the lowering of ocean freight rates is expected to stimulate further demand from foreign fields. At present there are before the trade two French shipyard projects, for which a considerable quantity of fabricating machinery, forging equipment, cranes, etc., will be required, and it appears likely that the orders will soon be placed.

Great Britain's embargo on machine tools, effective March 1, has of course been somewhat disconcerting to the American machinery trade, but it is believed that this will not be of long duration. Great Britain's natural desire to protect her own finances and her labor in this crucial time is well understood here and there is no suggestion of any retaliatory measure at Washington. As regards machine tools there are barriers anyway which make it difficult, if not impossible, under present conditions for British tool builders to ship extensively to the United States. Foremost among these barriers is the high American tariff on foreign machine tools. Another is the

high production costs in England, but this latter, of course, will be overcome in time. One large British house (Alfred Herbert Ltd.) has been making plans to sell British tools in the American market, but it is considered doubtful here whether any such attempt will be made until conditions have returned more nearly to normal.

As indicated by the French inquiries for shipbuilding machinery mentioned above, there is a reviving interest in a merchant marine in that country. France's maritime position needs strengthening, as viewed by business interests in that country. This has been indicated by negotiations with the United States Shipping Board for the transfer of some American tonnage to French registry. In connection with these negotiations the Shipping Board is endeavoring to dispose of one large Pacific Coast shipbuilding plant to France. This yard was not completed, but all plans were decided upon and a good deal of the equipment was on the ground when the war ended. It is stated that the entire plant, so far as it has been built, could be readily transferred to French soil and completed there for construction of French ships.

Domestic machine-tool business is most promising now in automotive industry, automobile and tractor plants having come into the market in a fair way. The railroads, which were counted upon to supply a considerable volume of machinery business this year, are not buying and will not do so until the director-general of the United States Railroad Administration can obtain from Congress an appropriation of something over a half billion dollars, for which he is asking.

In the automobile field the largest single purchaser thus far is the General Motors Company, which now controls a half dozen or more of the leading plants. Expansion of facilities by this interest is in prospect and substantial orders were placed last week for equipment. The plans of the company, it is stated, include enlargement of the Chevrolet factory for the building of cars to sell at about $500. The Willys-Overland Company will also build a $500 car, reports being to the effect that the Curtiss aeroplane plant at Buffalo, which the Willys-Overland Company owns, will be utilized for that purpose.

A number of developments are under way in the farm tractor field, but the most promising is that of Henry Ford & Son, which, though not yet formally announced, is said to include a large plant on Green Island in the Hudson River, near Albany, New York, where tractors will be built largely for foreign trade. The plant will probably be very complete, including one or more blast furnaces. Iron ore will be brought from Lake Erie ports by barges through the New York State barge canal. The Hudson River will be dredged out at Green Island so that ocean-going vessels can load tractors at the Ford plant for foreign shipment.

In connection with the plans of the Navy Department for ten battleships and ten scout cruisers to be built within the next three years and the program of the United States Shipping Board for merchant ships of larger cargo-carrying capacity than are now being built, more dry docks will be needed, and a $7,500,000 project of this kind has just been begun by the Norfolk & Hampton Roads Dry Dock & Ship Repair Corporation, which has acquired a $600,000 site on Hampton Roads, near Norfolk, Virginia. Two of the largest floating dry docks in the world and two or three repair slips, with all necessary plate and angle shops, machine shops, forge shop, etc., will be provided.

A Shipping Board project, which was inaugurated during the war, but allowed to lapse when hostilities ended, is a large boiler plant to be built at Richmond, Virginia, by the Newport News Shipbuilding & Dry Dock Co., Newport News, Va. This plant will now be built at a cost of several hundred thousand dollars.

Such projects as these above mentioned, with others in the course of development, encourage the American machine-tool trade in the belief that, while business will not be far below last year's feverish pace, a normal demand will follow the present few months of uncertainty and readjustment.

MONTREAL MARKETS ARE STILL IN THE PERIOD OF UNCERTAINTY

Special to CANADIAN MACHINERY

MONTREAL, Quebec, Feb. 12.—Little has developed that would create more than a passing interest in the general industrial situation. The markets are virtually unchanged, the tendency being to await and see what the other fellow is doing, a feature of present activity that is not over-encouraging. The feeling is gathering headway that a steady decline will be marked in all commodities until a level has been reached where domestic buying can be renewed on a more extensive plan than at present. The curtailment of production of many lines is preventing an over-supply being accumulated, and this is aiding in maintaining a relatively high price on the different commodities. Buyers, however, are cautious, and little buying, other than for immediate needs is reported from dealers. The iron and steel section of the trade is on the downward trend and this is influencing all other branches. The machine tool business has had a quiet week with sales light. The metals are virtually unchanged and the demand is exceptionally light, no changes having taken place in price quotations. Scrap as usual is very dull.

Steel Prices Lowering

Optimism is still a feature of present market conditions but it is largely one of mind rather than of substance, as is clearly demonstrated in the waiting attitude that apparently dominates a large percentage of enterprises. In some quarters business is reported as good, but investigation brings out the fact that the greater volume of buying is for immediate needs only, very little interest being displayed in futures. When sellers of materials are asked regarding early possibilities they invariably answer that prices will not undergo any great change for some little time; on the other hand, the consumer, and sellers that are occasionally buyers, are evidently playing the waiting game in the prospect that the declining market will continue to go lower until a level has been reached where all-round confidence will open the way for a steady renewal of general activity. One of the greatest difficulties in reaching a low level in iron and steel quotations is the existing high costs of production of which labor is the outstanding factor. These conditions prohibit the over-production of material in face of a declining market, and the only alternative is the curtailment of steel output. Orders that were placed on the books during the heat of the war period, and not subject to cancellation, are nearing completion, so that many of the mills will shortly be faced with a situation in which competition will be a pronounced factor. It is not unlikely that within a few weeks the market will attain a position where domestic enterprise on a pre-war basis will be encouraged by the more reasonable level of price conditions. The local situation is comparatively unchanged, and dealers report a fair volume of business; not that activity is over-emphasized, but, considering the circumstances, the business passing is very encouraging.

The trend of the American market is reflected in the lower prices quoted here for different commodities. Plate demand is steady and quotations here are easier by 1c per pound, the price quoted being $6 per 100 pounds for ¼ inch up, and $6.50 for 3-16 inch. Sheet movement is lighter and mills are reported to be curtailing production. Black sheets No. 28 are quoted at $7, and No. 10 at $6.50 per 100 pounds. This represents a drop of 1c and 1½c per pound respectively. Canada plates are quoted at $8.50 for both dull and bright, the decline being ½c on the former and 1c on the latter. Boiler tubes are still in good demand, but with the exception of several sizes of lapwelded, prices are maintained. Quotations on 2¼ inch, 2½ inch, 3½ inch, and 4 inch, have been advanced, the respective prices being $37, $42, $55, and $70 per 100 feet.

Little Doing in Machine Tools

Circulated reports regarding the uncertain attitude of the Canadian Govern-

ment, as to their retrenching policy respecting shipbuilding, has injected some nervousness into machine tool circles. For some time activities in this branch of the country's industry has been a factor in machine tool demand and this latest rumor has not stimulated the market. The trade here does not look for a cessation in shipbuilding activity, and although the week has been quieter than usual, the volume of general business has been a fair average. A feature of present business that marks the post-war development is the change that is noted in the selling part of the trade. Whereas, a few months ago Canadian buyers were searching the entire field for machinery, we now have American representatives here soliciting business.

Second-hand trading is not as active as formerly, but sales are still being made of such munitions equipment as can be adapted to other uses. Special shell machines are receiving little attention, many firms having taken this and piled it in one section of the shop, drawing on it at intervals for special repair work. The stopping of war work has left all metal-working plants well stocked with transmission equipment much of which can be used for general purposes. As stated by one firm, "we have enough of this class of equipment to keep us going for a couple of years."

BRITISH MAKERS OF PIG IRON ARE GETTING THE BUSINESS NOW

THE reduced ocean freight rates have enabled American makers of pig iron to offer lower quotations on their product for export, but generally speaking they are still at a disadvantage as compared with English competitors. In the few instances where American furnaces have found themselves placed advantageously as compared with the English makers, it has been where the rate to the particular port favors American iron or where the desirability or otherwise of carrying pig iron as ballast figures in the making of the freight rate. There is a good deal of foreign enquiry in the market, but the domestic situation is without any life: Following are the leading features of the pig iron situation from various parts of the country.

NEW YORK—A fairly large order for Europe, which was offered at a price based on the new freight rate, was lost to an English competitor,the reason being a difference of several dollars per ton on the delivered price. About 1,000 to 2,000 tons American foundry and basic have been sold to Europe during the past week. There appears to be an almost entire lack of business in the domestic market, as inquiries reported in previous weeks have not been followed up, and new enquiries are lacking. The domestic business transacted has been less than 1,000 tons altogether. The $3 price reduction has been extended by some makers to cover all contracts on their books up to Dec. 31st but this course does not find favor with all of them.

PHILADELPHIA—The market is very weak here as far as any new business is concerned, and leaders believe that best way to meet the situation is to still further curtail production. There has been little enquiry, and sales have confined to carload lots.

BUFFALO—There has been quite a fair amount of business moving in carload lots, though there have been no large enquiries this past week. It is the opinion among producers that there will be a revival of business in the near future. They expect this to become apparent during the last week of February. In the case of unfilled contracts made before the first of the year,producers are accepting the $3 reduction, although one interest does this only in special cases. There is apparently no stocking of iron in this district.

CLEVELAND.—There is still a period of stagnation in the market here. There have been some enquiries for export, including one for 1,000 tons of foundry and one of 1,000 tons of bessemer for the far East, during the week. What sales there have been have been of carload lots, and very scattered. There is some piling of iron in this district.

CHICAGO.—About all the business there is in the Chicago market is the occasional buying of a carload lot needed to sweeten or change a mixture. There is no enquiry for iron, as melters have enough iron in their yards or on order to supply their requirements for some time to come.

CINCINNATI.—There are no enquiries from any source whatever. What new sales there are are confined to foundry grades for prompt shipment. There is no willingness on the part of buyers to make any commitments for the future.

ST. LOUIS.—Some small lots for prompt shipment cover the enquiries and actual sales during the past week. This district is too far from the seaboard to be affected by the reduction in freight rates. The tendency is for makers who are not covered for the future, to take a chance, and they are not buying to any extent for future needs.

BIRMINGHAM.—While some companies are maintaining the base price of $34, quotations of $31 for No. 2 foundry are more prominent than of yore. Very few sales are being reported.

PITTSBURGH.—There is a fairly rapid accumulation of iron going on in makers' yards, owing to customers holding up shipments. Consumers are not making any enquiries for supplies, and are not even trying to get full shipments on contracts they already have. Some iron producers have intimated their willingness to sell iron for the first quarter on a sliding scale, the price to be fixed the first of each month.

There is expectation that several of the merchant stacks will be blown out shortly for necessary repairs.

DECLINE APPROACHES ITS LIMIT AND SCRAP MAY TURN FOR BETTER

THE scrap market is still going through a period of depression, though there are some indications that the decline is approaching its limit. There are various shades of dullness in different districts, and in some cases there are other materials competing with the regular grade of scrap. Melting steel has sold as low as $15.50 and stove plate at $14. Following are reports from different districts in the country.

PHILADELPHIA. — A number of shells and other material are now on the market, and competing with the regular grades of scrap. A lot of 2,500 completed 6-inch shells were sold to a Pennsylvania consumer for use as heavy melting steel, the price reported being $21 delivered. A sale of 10,000 tons of beam ends from one eastern steelmaker to another was the largest transaction of the last two weeks.

PITTSBURGH.—The present attitude of consumers of scrap iron and steel is one of diffidence, and there is no business offering. The supplies in the hands of the consumers are sufficient to last for at least three months. Whatever bids are offering are usually two or three dollars lower than the dealers think the material is worth. There is a large quantity of heavy melting steel available and offering at $18 and if any business were being done it would be at about this level.

CHICAGO.—Prices generally on most grades are holding, and in very few cases have new or lower quotations been made. A little better volume of buying has been noted, and consumers seem a little more open to business than was the case in January. Dealers are professing to see signs of much better business during the next 30 or 60 days. A feature of the market is that stove plate and light cast are quoted at a higher price than railroad malleable and heavy melting steel. The Chicago and North Western has issued a list offering 3,850 tons of scrap including 750 tons of steel rail.

ST. LOUIS.—There is no market here at present. Consumers are as little willing to buy as at any time in recent years. There is no tendency on the part of buyers to make a bid, and in the rare cases when they do so, the bid is usually too low to make it worth considering from the dealer's standpoint. There has been no alteration in prices this week, the reason being that there has been no business to base a new price on. A small quantity of assorted scrap from the St. Louis Terminal Railway was the only railroad list before the market this week.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton	.....	.....
Victoria	.....	50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Steel bars	5 50
Small shapes	5 75
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$26 00	$ 24 00
Electro copper	26 00	23 00
Castings, copper	25 00	21 00
Tin	70 00	65 00
Spelter	9 50	8 50
Lead	8 50	7 00
Antimony	10 00	10 00
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 6 00	$ 6 00
Plates, 3-16 in.	6 50	6 25

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	19 50	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	18 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5½-6	5 00
Heavy lead	5½	8 00
Tea lead	4½	3 50
Aluminum	18 00	18 00
	Per Ton	
Heavy melting steel	15 00	15 00
Shell turnings	9 00	8 00
Boiler plate	16 00	15 00
Axles (wrought iron)	36 00	15 00
Rails	20 00	15 00
No. 1 machine cast iron	28 00	18 00
Malleable scrap	21 00	15 00
Pipe wrought	14 00	8 00
Car wheels	25-30	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove plate	16 00	14 00
Cast boring	11 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	**10**
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd. brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

Per gross ton

BILLETS	
Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, æ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 35
Solder, guaranteed	0 40
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks...list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse .....list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 7 00
Sheets, black, No. 10	6 50	6 90
Canada plates, dull, 52 sheets	8 50	8 10
Can. plates, all bright	8 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.			Cts. per lb.
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

THE A. R. WILLIAMS MACHINERY CO. LTD

64 FRONT ST., W. TORONTO, ONT.

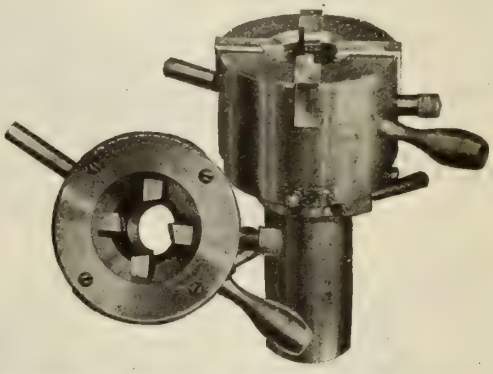
SALES SUPPLY DEPARTMENT SERVICE

MODERN EQUIPMENT

Success or failure marks its stamp on any manufacturer. They are the known quantities that reveal to the manufacturer himself and his competitors "The end thereof."

MODERN EQUIPMENT is the tried and proven Key to Success. Reputable tools means known success. Make them yours.

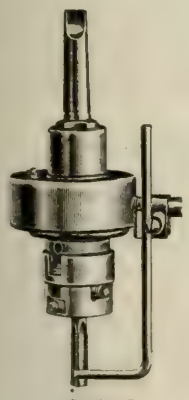
GEOMETRIC DIE HEADS



For rapid and economical production of threaded parts in quantities, GEOMETRIC Self-Opening and Adjustable Die Heads are a required necessity, all pitches and forms of thread being obtainable. They can be used for roughing and finishing work and for accuracy in performance have no rival. They are so designed that on Standard Turret Heads they can be readily and quickly attached. They are made in sizes suitable for all classes of threading, in that the chasers are interchangeable from the smallest to the largest capacity of head.

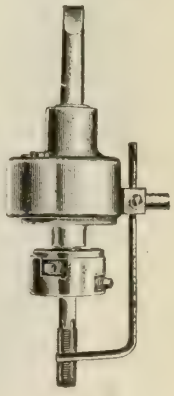
Put your threading production on the Modern basis by equipping with GEOMETRIC

ERRINGTON TAPPING CHUCKS



Style C

Automatic Reverse Tapping Chucks that require no reversing mechanism on the drill press, as it drives the tap in, stops automatically and backs the tap out with quick return by simply raising the drill spindle. Tap breakage is practically eliminated. These tapping chucks will fit any standard type of drill press. Are obtainable in the positive or friction drive type. Simplicity of operation makes the Errington a modern addition.



Style B

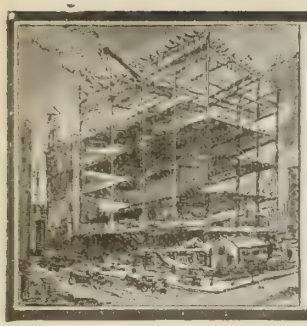
OTHER LINES

Wright High Speed Hoists, Johansson Snap and Limit Gauges, Brown and Sharpe High Speed and Carbon Milling Cutters, Yankee Breast and Hand Drills.

The A. R. Williams Machinery Co.

LIMITED

64 FRONT ST. W., TORONTO, ONTARIO



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Montreal.—Improvements to the Montreal aqueduct system, whereby the city water supply will be increased by 20,000,000 gallons per day, has been definitely decided on by the Administrative Commission. Tenders for the construction of the suction pipe, which will give an additional head of two feet, have already been received. The new conduit will be six feet wide by eight feet high, and will cost approximately $55,000; it is anticipated that it will be ready for use by June 1. It is estimated that the increased supply will suffice for three years.

MARINE

Gore Bay.—Capt. James Purvis, the owner of the steamer "Winona," which carries the mails between Gore Bay and Cutler, was in Gore Bay recently. The "Winona" is being lengthened and otherwise improved at the Wiarton Marine Railway, and Capt. Purvis is looking after the alterations.

LACK OF ODERS BRINGS SHIP YARDS FACE TO FACE WITH DIFFICULTY

THERE seems to be a very great probability of the shipbuilding industry in Toronto coming to a premature close, according to the statements of the men representing the two large companies, the Polson Iron Works, and the Dominion Shipbuilding Co. These companies have work in sight and now under way sufficient to keep them busy until the middle of summer, but after that there is the prospect only of curtailed activities and complete shutdown. This is at a time when unemployment is likely to be a serious problem, and when practically every other yard in the country will be busily employed building ships for the Canadian Government and for private purchasers.

The Canadian Government are building at present in Canadian yards a merchant fleet approximating 350,000 tons dead weight. The orders for these ships have been spread from coast to coast and every plant capable of handling a ship has received an order, with the exception of the Toronto yards. A short time ago a firm from the States leased a yard in British Columbia, and received an order for several ships. From a point of view of efficiency there are no better yards anywhere in the country than there are in Toronto, and there seems to be no good reason on the surface for passing them by. There should be a demand for tonnage in the next four of five years sufficient to keep all the yards of the Dominion comfortably employed.

Not only have the Government left out the Toronto yards when giving their contracts, but according to a statement by Mr. J. B. Miller it is through the action of the Government that the Polson Iron Works are without further contracts.

Mr. Miller states that he closed contracts in 1917 for ten vessels for Norwegian interests for delivery in 1919-20-21. Before making the contract the necessary permission was sought from Ottawa, and Mr. Miller was given to understand this would be granted. On this assumption the contract, amounting to $6,650,000, was closed, and the Polson Iron Works received a first payment from the purchasers of 10 per cent. of the contract price. Applying to the Government for a copy of the order-in-council, to give the purchasers, Mr. Miller was told it had not been signed, and furthermore would not be, the reason given being that the Government would need all the Canadian yards for the building of their own fleet. The Government stood fast to this decision, and protest was of no avail, the result being the contract had to be cancelled, and the payment already received returned. When the Government gave the contracts for the fleet, none came to Toronto.

This means that as far as can be seen the Polson Iron Works must close down as soon as present contracts are finished, which will be in the next few months.

It is planned now to send a committee of leading citizens to petition the Government, with a view to having some orders placed with the local firms. These yards give direct employment to 3,000 men, and many outside industries will be affected if these plants cease operations through lack of orders.

Victoria.—The Cholberg Ship Company, which is constructing nine wooden schooners for Norwegian interests, state that the first of these ships will be named the "Washington," and she will be barquentine rigged. The launch is expected to take place within the next two months.

Montreal.—A contract has just been closed between the Canadian Vickers Limited and an important French group for the construction of a steel steamer of 8,300 tons, for the coal and nitrate trade between France and Chili. It is expected that the vessel will be delivered ready for service before July this year.

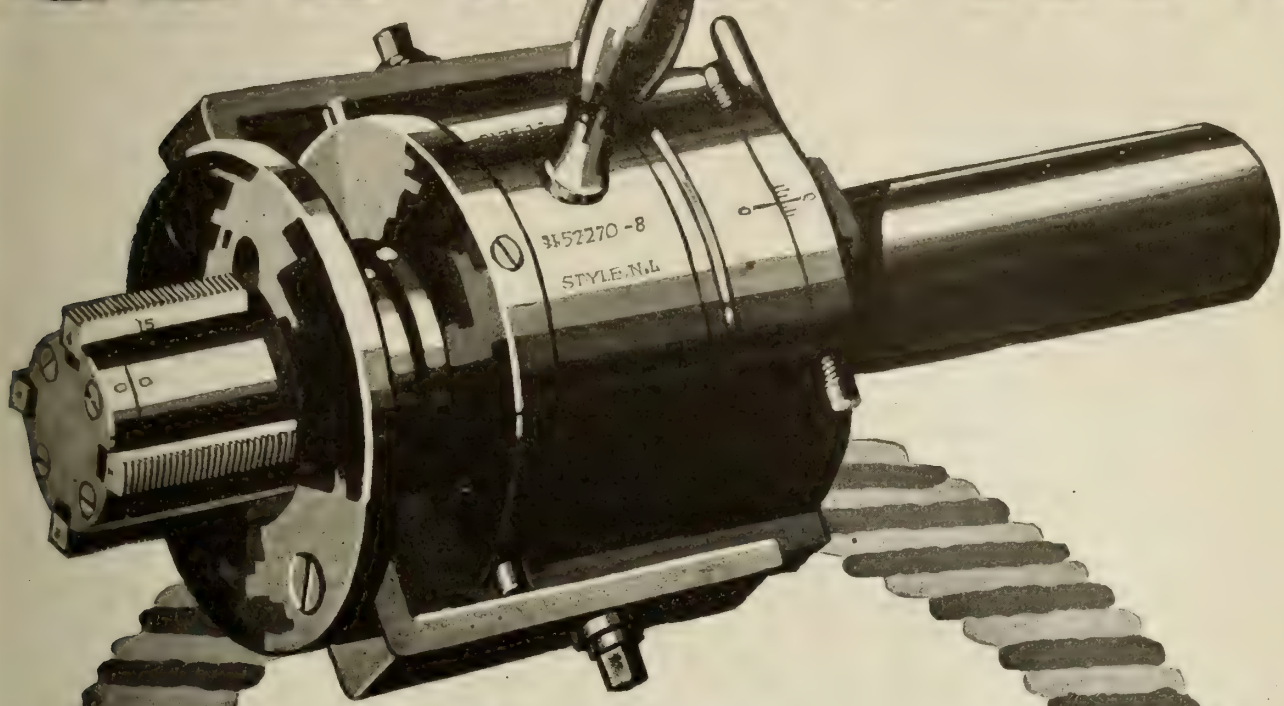
Halifax.—During the past week an inspection was made of the Halifax shipyards, dock terminals and reconstructed area by Grant Hall and W. R. MacInnes, vice-presidents of the C. P. R., and G. E. Graham, general manager of the Dominion Atlantic Railway, the inspection of the latter railroad being the primary object of the visit.

Ottawa.—The Government is not prepared to build any more ships after the present programme of fifty is completed, according to a statement in the "Ottawa Journal." Contracts for forty-six of these vessels have already been let. The Government never had any intention of building any more ships, so that there is not much chance of Toronto securing any.

Vancouver, B.C.—There has been another considerable drop in shipping rates set by the United States Shipping Board, but this has not yet extended to Canada. The drop this time has been from $30 per ton to $15 per ton, or $12 per ton measurement. Cargo space has been offering in Vancouver recently at $21.50, but the rate at Seattle being $6 50 less, shippers held back. Canadian steamship companies have no intention as yet to meet the cut.

Owen Sound.—Capt. Alexander McLeod one of the best known captains on the lakes died after a short illness at his home here. Capt. McLeod was for twenty years master in the fleet of the Pittsburgh Steamship Co., sailing some of their largest freighters. The whaleback steamer Rockefeller was his last command. He retired five years ago on a pension and since then has acted as pilot for American vessels entering Canadian waters. He is survived by his widow, one daughter and three sons.

GEOMETRIC



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Quebec.—The "Canadian Pioneer," launched in December last from the yard of the Canadian Vickers Co. at Montreal, has been fitting out for the last six weeks at Quebec. She is now ready to start on her run to Halifax, the boilers and engines having been fitted and tested. She is now coaling, and will leave immediately her coal is on board. The engineers who have had charge of the installation of the machinery express themselves as quite satisfied with the facilities provided and the labor available at Quebec.

Victoria.—Work on the contract for the French Government wooden ships is proceeding with a vim at the yards of the Foundation Co. here. There is a good chance that if the present rate of construction keeps up the first ship will be launched by the first week in March. The contract is for twenty ships, and eight of them are in various stages of construction. There are at present about 3,000 men on the payroll of the company, and this will be increased when the planking and caulking stages of construction are reached. Work is being carried on in three shifts so that it is practically continuous.

Montreal.—Economy in ocean transportation was the subject of a paper read by A. W. Robinson, M.I.C.E. at a recent meeting of the Montreal branch of the Engineering Institute of Canada. The speaker emphasized the necessity of adopting large vessels of a standard type as an important economic feature in transportation problems. Mr. Robinson considered the most simple and direct method of reducing operating costs was to increase the capacity of cargo ships so they could carry more tons of freight per unit of labor and material. Co-ordination, co-operation and standardization were the keynotes of the address.

Victoria.—At a meeting of Dominion Council of the Navy League in Victoria, B.C., last week, W. G. Ross of the Montreal Harbor Commissioners, who has been president of the League for the past four years, tendered his resignation. Commodore Aemilius Jarvis, of Toronto, was elected president of the League for the ensuing term. At the conclusion of this meeting, Mr. Ross was presented with a handsome loving cup in recognition of his services. A resolution was passed that the League strongly impress upon the Government the absolute necessity of permanently maintaining the naval colleges in Canada.

Liverpool.—A shipowner and shipbuilder of the United States, interviewed recently at this port, had some interesting things to say of the United States shipbuilding programme. The gentleman in question was Mr. Christopher Hannevig, and he characterized the United States programme as an orgy of extravagance and miscalculation. He says that the Shipping Board entering on the construction of so many ships at once, created a situation that was speedily exploited by labor, with the result that costs went soaring to a degree hitherto unknown, and beyond all hope of profitable operation.

Toronto.—An interesting double event took place at the Polson Iron Works, when the steamer "War Temiskaming" was launched, and the "War Aquila" had her name changed to "War Hamilton." These two ships were named in honor of the districts carrying off the highest scores in the Victory Loan Campaign. The "War Temiskaming" is the full canal size freighter, of 261 ft. by 43 ft. 6 ins. by 23 ft. 6 inches depth, of which so many have been built. She took the water promptly at the assigned time, and joined company with the "War Hydra" and "War Hamilton." The two latter will both be ready for sea at the opening of navigation.

PERSONAL

F. Perry has been appointed president of the Canada Foundries Company in place of Edgar McDougall, deceased. Mr. Perry is a native of Montreal, and was formerly a director of the company. The vice-president is Major V. J. Hughes.

TENDERS

OTTAWA.—The Department of Indian Affairs, Ottawa, are calling for tenders for the construction of two reinforced concrete culverts in the Caradoc I.R. All plans and specifications can be seen at the post office at London and St. Thomas, also at the office of the Indian agent at Muncey, and at Ottawa.

OTTAWA.—The department of the Naval Service are calling for tenders for the purchase of naval vessels lying at Halifax, Sydney and Liverpool. Tenders will be received up till noon on the 20th February, and full particulars and permission to view may be obtained on application to the Deputy Minister of Naval Service or the Admiral Superintendent H. M. C. Dockyard, Halifax, N.S.

OTTAWA.—The Department of Public Works of the Federal Government are calling for tenders for the construction of a steel highway bridge between the cities of Ottawa and Hull. Tenders will be received until noon April 16th, 1919. Particulars can be obtained at the Department of Public Works, Ottawa, and at the offices of the District Engineers, Shaughnessy Building, Montreal; Equity Building, Toronto, and at the Post Office, Hamilton.

TRADE GOSSIP

Take Agency.—The Yeates Machinery and Supply Co. have taken over the Canadian agency for the McCrosky Reamer Co., of Meadville, Pa.

India Wants Rails.—The Canadian Trade Commission in Ottawa has received a cablegram from the Canadian Mission in London stating that India is in the market for 800,000 tons of rails with angles, bolts, spikes, etc., for delivery in 1919, 1920, 1921.

Shipping Credit is Extended.—Instead of the 96 hours credit ordered on shipment by shippers providing satisfactory bonds, on Canadian railways and 48 hours on United States roads, the Canadian Government has extended the credit to one week. This was in response to appeals from a number of shippers.

Considering Express Charges.—The Railway Board is considering the application of the Express Traffic Association of Canada for increased rates. They are also considering the proposed increase by the railways in local switching tariffs, in regard to which there have been several conferences between the interests affected.

Coal Embargo Removed.—All restrictions upon the exports of anthracite coal from the United States to the Province of Ontario have been removed by order of Dr. Garfield, United States Fuel Controller. There were about 220 towns which were unable to secure coal on account of this embargo, and they will now be able to secure any fuel they require.

Permit System Ends.—The Belgian Consul General for Canada has received an official cable from Brussels, making the announcement that the permit system covering imports has been cancelled as far as the majority of imported articles are concerned. The import of sugar, breadstuffs, malt barley, oats, tobacco, raw and manufactured, wines and liquors is still subject to the permit system.

Two Hundred Men Affected.—After many years of continuous operation, the plant and elevator of the Montreal Transportation Co. at Kingston is closing down temporarily. The managing director, Mr. L. L. Henderson, vice-president and general manager of the company, says that they hope to resume operations in the near future. About 200 hundred men are affected as a result of the closing down.

Good Order for Locomotives.—The American Locomotive Co. have secured an order for 62 locomotives for foreign roads. Of these forty for the South African railways will be built in the Montreal plant of the company. The engines are to be of the large mountain type, and will weigh from 94 to 97 tons each. The other purchasers are the Provincial Railways of Sante Fe, Argentina and Portuguese East Africa.

Large Pulp Mill for Fort William.—It is reported that a large pulp mill, to cost $100,000, will be erected shortly in Fort William. It is said that Fort William took a large block of stock, and the principals in the undertaking decided to build their mill in Fort William. The proposed plant will, it is said, be built on Island No. 2, where the local man referred to acquired a large section of very valuable water front property not long ago.

A Correction.—An unfortunate error occurred in connection with the advertisement of the Montreal General Tool Co., which appeared in our Annual Review Number, page 356. Under the heading of "Shop Equipment" the words "10 Drill Presses Swing up to 60,"

should have read, "16 Engine Lathes swing up to 60." This firm is exceptionally well equipped to handle general machine shop repair work on very short notice.

To Build Large Warehouse.—The Government is going to build in the near future a new customs examining warehouse, which will extend from Bay to Yonge on Front street, Toronto. The building will be of the same general design as the Union Station, except that it will not be flush with the street, but set back a little way. For a time a part of the building will be used as a General Post Office, but next year the Government proposes to erect a new post office on the square bounded by Adelaide, Lombard, and Victoria streets.

New Industry for Walkerville.—Products derived from toluol are to be manufactured in a Walkerville chemical plant, which have never before been produced in Canada. One of the most important will be benzoate of soda, which is largely used in preservation of food, such as fruits, jams and preserves. Another product will be benzoldehyde, largely used in manufacturing dyes. There is no market for this in Canada, but it is expected to find a ready sale for it in England and Japan.

Quick Settlement Obtained.—Advice has been received from the Imperial Munitions Board, that all claims on finished contracts for British account will be settled within the next two weeks. The contracts for the United States Government cannot be settled as quickly as those for the British. The adjustments for the American business are being handled by the Imperial Munitions Board as representatives of the United States Government assisted by two American officers.

Big Business Booked.—British shipyards have recently booked orders for well over 100 vessels, representing a very large tonnage. This is probably a record. The Ellerman-Bucknall line alone ordered over 50 steamers on the north-east coast. The British India Company is building nine large liners; the Cunard eight, the Donaldson-Anchor and Donaldson Brothers six, Ellis and Fyfe four, Shaw-Savill-Albion three, Union Castle, Commonwealth and Dominion Companies two each.

Wants a Swing Bridge.—A deputation of the Elgin and Middlesex and St. Thomas County Councils were in Ottawa recently to see Hon. F. B. Carvell, Minister of Public Works. The object of the visitors was to petition the Minister on behalf of harbor extensions and the erection of a swing bridge at Port Stanley. The estimated cost of the alterations would be about $30,000. The Minister, while making no definite promise to the deputation, was impressed by the necessity and promised to take it before council.

New Industries for Mathieson.—Mathieson is shortly to have two new industries, one to be known as the Mathieson Lumber Co. The chief promoter is Mr. R. S. Porter, and the company proposes to build a mill having a capacity of 1,500 to 2,500 feet per day. The second company will be known as the Mathieson Products, Limited, the promoter being Mr. D. L. Stover. This company will operate a flour and feed mill, a grist mill, a bakery, and a creamery, and later will utilize the waters of the Black River for generating light and power.

Want Exemption.—At a recent sitting of the Private Bills Committee of the Province of Quebec, consideration was given to the request of the British-American Nickel Corporation, to the municipal council of the Township of Hull, for the privilege of being exempt from all municipal taxation for a period of twenty years. The plant, which is partly constructed, will cost about a million dollars, is to be utilized for nickel refining and will employ 150 men. Some slight objection was raised, but it was decided to approve of the measure and send the application back to the House for the third reading.

Marine Needed.—That Canada should have a merchant marine, is the opinion expressed by J. J. Walsh, secretary of the Toronto branch of the Canadian Manufacturers' Association. "We have taken an active part in making representations to the Government to that effect for quite a numbers of years," he said, "and it is absolutely necessary that

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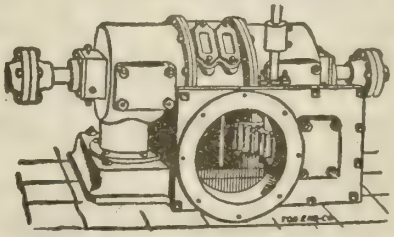

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the Government should continue its program." Mr. Walsh also stated that a representative of the C.M.A. would accompany the deputation to Ottawa on Thursday to lay Toronto's case, relative to the shipping situation faced as a result of the Government's failure to provide further orders, before the Cabinet.

Work Kept in Canada.—At a meeting of the District Trades and Labor Council the decision of the Government not to allow any further contracts for engines and boilers to be given out of Canada was made known. The Union of Machinists had requested the Minister of Labor's support to their demands for a thirty-three hour week, as a measure to relieve unemployment. Delegate John Munro said that as a result of their action, the Government intended to give the contracts for two ships to Toronto, stop any contracts for engines and boilers going out of Canada, and was going to give contracts immediately for a number of locomotives.

Lumber Men Not Jumping.—The lumber men of Ontario are sending a representative to Great Britain to look for lumber orders for reconstruction work. The lumber interests in Quebec are not following this course, but are taking the attitude that the Government can submit their requirements and then the lumber men will bid on them. They agree that there will be a lot of lumber required in Europe, and the question will be to secure sufficient lumber and ships to supply the demand. They all agree however that they cannot sell lumber to the British and French Governments at the last prices paid by those Governments, and they are inclined to sit tight and see in which way events will shape themselves.

Chemical Industries.—Arrangements have been made by the Council of Scientific and Industrial Research for a thorough census of the Canadian chemical industries. It is desired to gather complete data regarding new activities in Canada as a consequence of war requirements and the forced stoppage of chemical supplies from Germany and Austria. The opportunities and prospects for expansion will also be carefully considered. S. J. Cook has been transferred from the Dominion Analysis Branch to the Trade and Commerce Department, and will give all his time to the supervision of this new work. It is a notable fact that, both in Canada and the United States, there are hundreds of articles on exhibition that have been manufactured here for the first time, and the action of the Council

Want Charter Changed.—A. C. Flumerfelt, president of the International Coal and Coke Company, Ltd., with collieries at Coleman, Alberta, has issued a notice to shareholders requesting proxies for a change in corporation from the State of Washington to a corporation to be chartered under the laws of the Dominion of Canada. While the operations of the Company are in the Province of Alberta, the company, being a United States charter, has to pay taxes in the United States, which are now costing between $1,200 and $1,500 per month, and as well pay taxes under the Canadian laws. By operating under the Canadian law United States taxes will be eliminated. In view of the high prices the company is receiving for its product and development at the mine, together with the installation of by-product coke ovens, the company is enjoying considerable prosperity and is rapidly increasing its financial strength. Two dividends amounting to three per cent. have been paid to the shareholders during the year.

Advertise Bolshevism and You Destroy It

Why It Cannot Stand the Light

CONTINUED FROM PAGE TWO

crime may follow the war she loosed on the world. She need, therefore, be but little surprised if there is a lack of outside sympathy for her in the afflictions that beset her at home. But if Bolshevism, the doctrine of the Nihilist cutthroats and their feeble-minded followers, has brought to Germany a riddle to solve, it has brought a problem also for peoples who had been engaged in peaceful pursuits and who meditated no career of national crime.

How much of a problem is it going to be for America? Are our Socialists turning into Reds and our Reds into Bolsheviki, and if so, how far is American patience to be stretched? That there could be a broad seeding-ground for such doctrines in America, so that they could grow to be a menace to our free institutions, is something too preposterous to merit discussion or consideration.

Bolshevism is the foe primarily and essentially of business and of business men. It has been observed that the Reds disregard the two extremes in the social scale; that they make no quarrel with the very highly placed, or with the very lowly. Their war is against those in between. Capital—meaning those engaged in active, progressive, constructive work, in the utilizing of human energy in industry and trade and in the development of the civilized well-being of peoples is the avowed enemy. They affirm at times that they the part of a movement in which labor is an element. In reality, however, the Reds class skilled labor in the same category as capital. It also is the enemy. Indeed, their bitterest assaults have been made against trained workingmen, for they are fully conscious that their appeal can conceivably be hearkened to only by the untrained, the shiftless, theh unskilled, the ignorant, and the incompetent.

America's Workmen a Bulwark Against Bolshevism

Can anyone imagine the skilled American workingman, who bathes and shaves, wears clean linen, eats clean food, lives in clean surroundings, and has a high degree of education, accepting instruction on the vital things of life from the illiterate foreigner whose living conditions have been those of the dumb animals with whom he has lived in stables or pens, or those of the filthiest slums of the poorest cities of the world? The American workingman, to-day in the ranks of labor, tomorrow may be in the ranks of capital. Is he likely to listen to some mouthing criminal or maniac who asks him to help tear down the social fabric that permits his sons and daughters to participate in all the refinements of a cultured existence, to receive high school and university training, and to aspire to the most exalted position in a free community? It is an insult to the American workingman to have his name invoked by the Reds.

There is official authority for the statement that the Bolshevist workers, by claiming affinity with American organized labor, have been successfully creating enemies for the latter. The American workingman may stand this provocation up to a certain point, but he may be counted on to take characteristically vigorous action if it goes too far.

There is money in Bolshevism. Lenine and Trotzky have had millions at their disposal, and hundreds of thousands of dollars have been traced from European Russia across Siberia and the Pacific Ocean to New York and other American cities. And. besides, the disciples of Lenine in America practice systematically the levying of tolls on those who foregather with them. As long as this condition lasts there will always be leaders for the Reds, men crafty and clever, willing to take a risk where the stake seems worth while, men to whom America and American institutions mean nothing, if not something to make money by jousting at. Whatever the fool sheep may be induced to do, these wolves who herd the sheep are shrewd enough to keep within the letter of the American laws.

They take no chances of losing their fat living. American laws do not furnish sufficient protection against such treacherous enemies of the country as these. It has been suggested that the remedy is to alter the laws. For a long time past there has been a sentiment in judicial quarters that a way should be provided of getting after the perverted and unassimilable immigrant and the undesirable citizen.

No Hope of Relief by Revision of Immigrant Laws?

The Reds in our midst are in a well-defined class. Invariably the directing minds, the wise ones who control the stupid are foreigners—foreigners in heart, whatever may be their status of citizenship. Deportation has been suggested as a remedy for their case. Of course the ideal way to handle the undesirable immigrant is to deport him from Ellis Island before he has ever had a chance to put a foot on the continent.

To try to get him out once he has stepped ashore is quite another matter. Some of the ablest statesmen in America have expressed the conviction that our

Continued on page 63

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NITRO-STARCH

Nitro-starch, which in some of its properties is superior to nitro-cellulose (guncotton) and nitro-glycerine, seemed at one time likely to establish itself as a useful explosive, but as formerly manufactured it was wanting in stability. Perhaps its constitution was not fully understood. War requirements directed attention to this compound and a safe explosive was produced from tapioca starch. This starch has long been used in large quantities by the Post Office Department for the gum of postage stamps. The need for this substance in the form of an explosive led to a search for a substitute. This was soon discovered, and after rapid but intense research it was found that nitro-starch possessing the required stability can be made from corn-starch, the product being better in quality and cheaper than that obtained from tapioca.

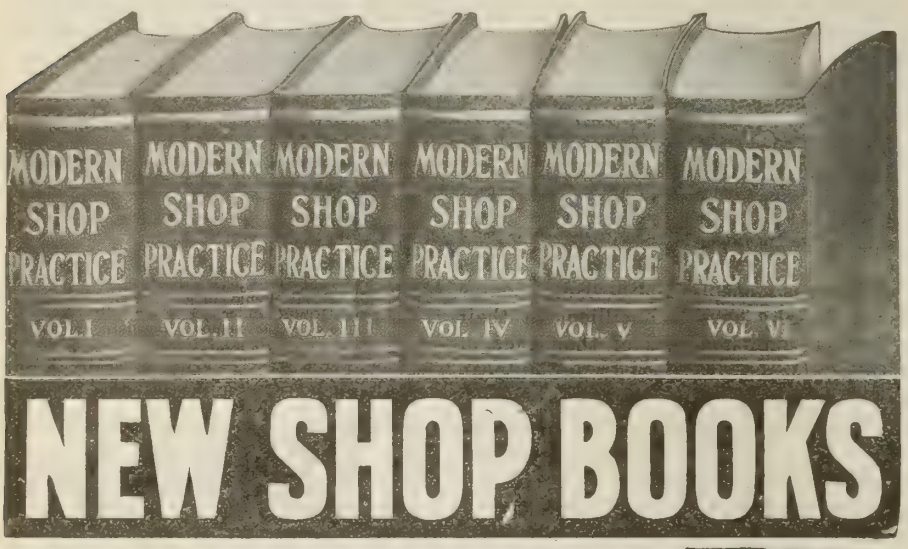
M. M.

SCRAP NEWS

NEW YORK.—While the market is still weak, reductions are not so general, and are smaller in amount. During the week there has been a decline in heavy and machinery cast, which are offering now at from $23 to $24 per ton. The lowest price noted so far was on a sale of five cars of heavy melting steel which sold at $13.65 f.o.b. New York. A better demand is anticipated, as the strike at the local foundries has been ended.

BUFFALO.—The decline in the local scrap market is showing signs of reaching its finish. No reductions in the nominal prices of various grades have been reported this week, and local dealers take this as an indication that the bottom has been reached. Mills are not much interested in the market, most of them having enough stock on hand to last them for the next three months.

CLEVELAND.—Notwithstanding the small volume of business that is being turned over, the prices still seem to be moving down. Melting steel has been purchased in small lots lately at $15.50, while some small sales are reported at $16. With stove plate at $14 and malleable at $19, pre-war prices have been reached. A buying market is not expected to develop before the second quarter begins.



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If you work in a machine shop or if you are a shop owner, you need these books. You will prize them for the new and up-to-date information they give you on every phase of shop work. We will ship the entire six volumes right to your own home upon your simple request. Don't send us a penny until after you have used the books for seven days. Then if you decide to keep them, send us only $2. Pay the balance at the rate of $2 a month—the payment is so small as to average only 50c a week or only 7c a day. Put your name and address on the coupon now, and send it to us at once. Act now before this special offer is withdrawn.

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Partial List of Contents

Shop Work—Shop Kinks—Gear Cutting—Turret Lathes—Screw Machines—Manufacturing—Shop Management—Metallurgy—Welding — Die Making — Metal Stamping—Tool Making—Punch and Die Work—Tool Design—Foundry Work — Malleable Practice—Forging — Pattern Making—Molding Practice—Mechanical Drawing — Machine Drawing and Design—Automobile Shop Work.

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Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

Advertise Bolshevism and You Destroy It

Why It Cannot Stand the Light

CONTINUED FROM PAGE 61

immigration laws, at least as they have been applied during the last ten or fifteen years, are utterly inadequate for the protection of the country. But powerful influences have steadily shown an ability to obstruct any serious attempt to bring about reform in the immigration laws, or in the method of supplying them, and it is no secret that there is a general belief among politicians that any legislator who undertook in a vigorous way to have such modifications effected in the immigration laws, would be likely soon to cease to be a figure in public life. So these remedies of deportation and of change in the national laws do not offer much prospect of being available at a sufficiently early date to allow them to be used with effect against the Reds.

But there is one excellent remedy which would surely and effectively suit the case. It is the simple one of publicity.

Bolshevism, the conception of ignorance and crime, may thrive on mystery and obscurantism, on foreign words and hocus-pocus. Shown up in its nakedness it would be grotesque and ridiculous.

Tell the American people all about the Reds and their "doctrines," and the abomination would perish from our country. A dose of advertising would shrivel it up.

American business men are interested in undertaking such a course of publicity. The weaker vessels in our midst are numerous. It would not merely be good business, it would be humanitarian work, to impress on the less tutored minds the viciousness and the danger of such un-American doctrines, and to direct them with precision as to the course they should follow if they found themselves face to face with the enemies of America and of its institutions.

Organized labor would seem to have a particular interest in promoting on its own account such a campaign of advertising. Samuel Gompers, president of the American Federation of Labor, recently declared that the Bolshevist movement is causing a direct injury to American organized labor. "Bolshevism," he said, "is as great an attempt to disrupt the trade unions as it is to overturn the Government of the United States." He added that the Reds had effectively been creating enemies for the labor unions.

What better remedy—indeed what other remedy—can organized labor find for the protection of its interests and of its reputation than frank advertising handled by experts, giving to the public the exact facts on its own principles and on its attitude and dealing a smashing blow to the foul fiend of treason and anarchism?

IMPERIAL MUNITIONS BOARD OFFER FOR SALE

PLANT AND EQUIPMENT (IN PART) OF

British Cordite Co., Ltd., Nobel, Ont.

TENDERS, accompanied by marked cheque for 5% of the amount of the bid, will be received by the undersigned up to and including February 20th, 1919, for the purchase of the following, located at Nobel, Ontario:—

ITEM NO. 1. POWER HOUSE.—Building of steel frame construction on concrete foundations.

Boiler-room Equipment.—10-400 H.-P. Wickes, vertical, water tube boilers, equipped with Murphy Automatic Stokers and 2-1 ton coal-weighing lorries.

Ash Handling System—American Steam Jet Ash Conveyor.

Power-House Equipment.—3 Turbo Generators, 3 phase, 2200 volt, 60 cycle; 1-750 K.W. Allis Chalmers; 1-500 K.W. General Electric; 1-1000 K.W. Westinghouse-Parsons, complete with Westinghouse LeBlanc Jet Condenser and 80 H.P. Sturtevant Turbine direct connected to Booster Pump; 1-25 K.W. Westinghouse-Turbo Exciter Set, 125 volt; 1-25 K.W. Canadian Fairbanks-Morse Motor Exciter Set, 550-volt motor, 125-volt generator; 1-30 K.V.A. constant current transformer.

Switchboard—11 panels fully equipped, 1-10 K.V.A., 2200-110 volts and 3-40 K.V.A., 2200-550 volts, Pittsburgh Transformers; 2-18 x 10 x 12 Worthington Fire Pumps; 2-14 x 22 x 14 x 16 Ingersoll-Rand Air Compressors; 2 No. 785 Cochrane feed water heaters; 4 Alberger heaters; 2-Frick Ammonia Compressors, 30 and 70-ton capacity; 2-4" Goulds Centrifugal Pumps, direct connected to 15 H.P. motors; 4-1¼ x 8 and 2-5½ x 8 Deane Single Acting Triplex Pumps, belt driven; 1-42 x 10½ x 48 Hydraulic Pnuematic Accumulator.

ITEM NO. 2. PUMPING STATION.—Equipment—6-9 x 12 Aldrich Triplex Pumps, directly connected to 40 H.P. Canadian Fairbanks-Morse, 550 volt, 40 amp., 60 cycle, 3 phase motor, with starting compensators and switch boxes; capacity 500 gallons per minute; 3-75 K.V.A., 2200-550 volts and 1-550-100 volts Pittsburgh Transformers.

ITEM NO. 3. MACHINE TOOLS.—18" Engine Lathe; 20" Drill Press; No. 4 Power Saw; Keyway Cutter; 16" Stroke Shaper; 10" Emery Wheel Stand; No. 34 Little Giant Screwing Machine with taps and dies.

ITEM NO. 4. TANKS.—Steel Horizontal—33—6' to 20' diameter. Steel Vertical—41—3' to 8' diameter.

ITEM NO. 5. STOVES.—7 Nos. 41 and 42 Quebec Heaters; 5 Oxford Ranges and 16 Oil Stoves.

ITEM NO. 6. STEEL CANS.—12,900 Steel Cans, with lugs and lids, 11½" x 12" x 3-32".

ITEM NO. 7. COTTAGES.—15 Cottages, frame construction, 20' x 34'.

ITEM NO. 8. PRESSES.—8 Dehydrating Presses (Hydraulic).

ITEM NO. 9. PUMPS.—8 Gardner Duplex Pumps, 7" x 3½" x 10".

ITEM NO. 10. WRINGERS.—20 Centrifugal Wringers 24".

ITEM NO. 11. STOCK DRYERS.—3 Sargent (Stock Dryers).

ITEM NO. 12. PICKER MACHINES.—3 Davis and Furber Picker Machines 36".

ITEM NO. 13. KNEADERS.—52 Kneader Machines.

ITEM NO. 14. PRESSES.—19 Darling Presses (Hydraulic). 22 Inglis Presses (Hydraulic).

ITEM NO. 15. PUMPS.—46 Hydraulic Triplex Worthington Pumps, 1 x 4 for 2,000 pounds pressure.

ITEM NO. 16. PUMPS.—10 Vertical Triplex Single Acting, belt driven Worthington Pumps, 3½" x 6" for 250 pounds Pressure.

ITEM NO. 17. PUMPS.—6 Aldrich Pumps, Vertical, Triplex, Back plunger of the solid water end type, double reduction, direct geared for 900 R.P.M. Motor, 9" x 12". Cap. 500 G.P.M., lift 150'.

ITEM NO. 18. BELTING.—A quantity of leather and rubber belting.

Tenders for these items in whole or in part will be considered. The owner will dismantle and load on cars; bids are to be made on this basis. Intending purchasers will be given every facility to inspect the buildings and equipment. Complete information may be obtained from the undersigned.

The highest or any tender not necessarily accepted.

Cheques from unsuccessful bidders will be promptly returned.

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Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

FOR SALE

ONE 3/16" ADT. MODEL AUTOMATIC WIRE straightener and cutting machine arranged to cut a maximum of 10 feet. E. M. Bride, 113 4th Ave. East, Calgary, Alberta. (c11m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

FOR SALE—1 SPINDLE, GRIDLEY, AUTOmatic, ⅞-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

TWO NEW STEAM TURBINE BLOWERS for blast or cupola use. Size and particulars on application or can be seen running. Apply to Box 141, Tilbury, Ont. (c7m)

ONE CLAYTON 6" x 8" x 6" AIR COMPRESsor in first-class condition. W. G. Utley, Machinist, Yarmouth, N.S. (c8m)

MACHINERY WANTED

SIX-FOOT RADIAL DRILL FOR BOILER shop; lathe to take in 12' between centers; air hoist, 10" cylinder, 4' lift with trolley; vertical air receiver, 44" inside dia., 14' high. The National Shipbuilding Co., Ltd., Goderich, Ont.

WANTED—BULLDOZER (USED), MEDIUM size. Drilling machine, 4-spindle, straightling, No. 4 Morse. 7' or 8' between outside spindles. Both must be good. Box 554, Canadian Machinery. (c8m)

WANTED TO PURCHASE. SMALL ELECTRIC spot welder, 550 or 110 volt, 60 cycle, 2 phase circuit. Renfrew Machinery Co., Ltd., Renfrew, Ont. (c7m)

COMPLETE WELDING OUTFIT, MUST BE IN first-class shape. Prest-O-Lite preferred. Send price and particulars to F. Clark, 95 Woodland Ave., St. Catharines. (c9m)

Leading English manufacturers require responsible Firm to act as sole selling agents in Canada for their Milling Cutters and Small Tools. Also for their Hardening and Heat-treatment Furnaces. Managing Director will be in New York end of February. Please send full communications to "Hardening," c/o "American Machinist," 10th Avenue, 36th Street, New York.

(c7m)

POSITIONS WANTED

FORGE AND DROP HAMMER SUPERINTENDent will be open for a position shortly. Experienced in drop hammer and machinery blacksmithing, upsetting, bulldozers. Long experience in all classes of forge work. Can design dies and harden them. Box 552, Canadian Machinery. (c9m)

FIRST-CLASS MECHANIC, EDUCATED. MARried. 15 years' experience in practice and technique, desires to connect in above capacity with firm manufacturing traction and other farm engines for South, Central America or West Indian trade, with view to travelling afterwards in their erection, demonstration or sales anywhere in above territory. Am native of West Indies and have travelled South America; know the language and people, hence possess an advantage. Highest references. Box 550, Canadian Machinery. (c7m)

HELP WANTED

WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

WANTED TO PURCHASE

SECOND-HAND FACE LATHE, in good condition, 84 inch Face-plate, with tail stock, and one or two rests. Give name of maker and all particulars. Swedish Steel & Importing Co., Ltd., 503 Canadian Express Building, Montreal, Que. (c8m)

FOR SALE

Two 3 x 36" geared feed Turret Chucking machines with 3" collet chucks, about 3½ years old. Price, each $700.00.

Three 3 x 36" Friction Feed Chucking machines without Collet Chucks, complete with Friction Counter Shafts, about 6 or 7 years old. Price, each $300.00.

The above are Jones & Lamson make.

Three 8 x 8" Open Type Single Horizontal Belt Driven Air Compressors, with unloaders. Capacity 75 cubic feet air per minute. Each $400.00. Extra for Air Tanks if required.

One No. 2A Warner & Swasey Collet Chucking Machine, complete with Oil Pan, Cross Feed and Counter Shaft. Price, $750.00.

One 26" Engine Lathe x 10', Flather. Price, $350.00.

DARLING BROTHERS, LIMITED
Engineers, Manufacturers and Founders
120 Prince Street, Montreal, P.Q.

(ctfm)

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TORONTO, CANADA

NOW!

You've been going to send in that ad for weeks, so why not mail it now for next week's issue.

Canadian Machinery
143-53 University Ave., Toronto

"One insertion of this ad will do"

We receive from three to four ads a month from the firm who told us this when sending in their last ad. So you see they **know** what the Classified Advertising Section can do for them.

There is no reason why it won't do the same for you if you're proposition is of interest to our readers.

Canadian Machinery
Classified Advertising Section
143 University Avenue, Toronto, Ont.

A MAN was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

USED MACHINERY

In stock at Moncton, N.B., and offered for sale:—

5—18" x 8' Mueller Engine Lathes.
6—26" x 10' Bertram Lathes.
2—22" x 10' Bertram Lathes.
1—16" x 6' American Toolroom Lathe.
4—3½" x 36" Acme Turret Lathes.
(All modern lathes)
1—No. 2 Kempsmith Universal Milling Machine.
4—6" Hall Cutting-off Machines.

Also

Belting, Shafting, Pulleys, Hangers, Pumps, Air Compressors, Grinders and Furnaces.

For particulars, write or apply at

RECORD FOUNDRY AND MACHINE CO.
Shell Dept.,
MONCTON N. B.

USED MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, Nova Scotia
tf

The Financial Post THIS WEEK

ON "OTTAWA'S DUTY TO BUSINESS"

"Let us emphasize the situation. Industry and business are in a good, sound position so far as the present is concerned. It is the future which causes apprehension. We believe that labor and price problems can be solved if other factors for uncertainty are removed and public opinion remains reasonably rational. But capital looks to the Government for some reasonable assurance of fair treatment and until that assurance is given there will be a tendency to mark time. While capital marks time there will not be any industrial progress or general development, because any such expansion requires money. The investor cannot expect to devote his funds to any enterprise which does not give reasonable guarantee as to security and a fair income."

ON THE TARIFF PROBLEMS

"We cannot but conclude that the farmers' great grievance is not the tariff but the combination of financiers and manufacturers; all through the speeches and all through the conversations, that thought continually cropped out. They frankly admitted that a tariff was necessary as a means of raising revenue, and that it might be necessary for the upbuilding of industries based upon Canada's natural resources, but if the tariff was to be used to enable a few groups of manufacturers to extort high prices, then they were prepared to smash the whole tariff.

"This antagonism is not confined to the farmers alone; it is the opinion of the country generally. And the public are not holding the Government blameless. Cabinet Ministers have winked at or frankly supported these supposedly powerful combinations."

Besides the important articles from which the above quotations are made, THE POST this week deals with the following amongst

OTHER SUBJECTS OF INTEREST

Canada Faces Shipbuilding Loss
Outlook for Flour Mills Grows Serious
Textile Mills Have Enlarged Field in Canada
Trade Combines and the Public
Think Profit of Manufacturers Too High
Fewer Changes in Montreal Leases to Take Place
The Mortgage Situation in the Northwest
Toronto Rails Earnings Went Largely to City
Attitude Towards Public Utilities is Bolshevism
Provincial Paper Mills Are Probed
St. Lawrence Mills Again Operating
Cobalt Mining Co. to Acquire a B.C. Property
Detroit United Up $1,500,000. Net Declines
B.C. Permanent Co. Reduced Expenses
Bond Market Was on the Quiet Side During Week
Business Men Settle Police and Fire Terms
Graduated Taxes Are Favored in City of London
Mutual Life Adds 65.5% of New Business
Manufacturers' Life Has Splendid Year
Ukrainians of Canada Want Say in Peace
Banks Discuss Reciprocity as Financial Factor
Reconstruction for Cripples on Economic Lines
Gold and Credit and Problems of Reconstruction

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Motors, 3 Phase, 60 Cycle

2 H.P., 550 V., 1700 R.P.M.—1
10 H.P., 550 V., 1200 R.P.M.—9
15 H.P., 550 V., 1200 R.P.M.—2
30 H.P., 550 V., 900 R.P.M.—2
40 H.P., 550 V., 1200 R.P.M.—1
50 H.P., 550 V., 900 R.P.M.—2
75 H.P., 2200 V., 850 R.P.M.—1
125 H.P., 550 V., 690 R.P.M.—1
150 H.P., 550 V., 600 R.P.M.—1
200 H.P., 2200 V., 514 R.P.M.—2
400 H.P., 2200 V., 160 R.P.M.—1

Transformers, Pole Type 2200—$\frac{220}{110}$ Volts

¾ K.W.—11 2¼ K.W.—19
1 K.W.—15 3 K.W.—12
1½ K.W.—26 3¾ K.W.— 6
1 K.W.—24 5 K.W.—55

Our stock changes constantly. If not listed above please enquire anyway.

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IMMEDIATE DELIVERY

MONTREAL STOCK

Motors 3-Phase 60-Cycle

75	H.P.,	550	VOLTS,	450	R.P.M.....2
60	H.P.,	550	VOLTS,	450	R.P.M.....1
15	H.P.,	550	VOLTS,	1,200	R.P.M.....1
10	H.P.,	550	VOLTS,	720	R.P.M.....1
7½	H.P.,	550	VOLTS,	720	R.P.M.....1
7½	H.P.,	550	VOLTS,	1,800	R.P.M.....1
5	H.P.,	550	VOLTS,	720	R.P.M.....1
5	H.P.,	550	VOLTS,	900	R.P.M.....1
5	H.P.,	550	VOLTS,	1,150	R.P.M.....1
5	H.P.,	550	VOLTS,	1,200	R.P.M.....3
3	H.P.,	550	VOLTS,	1,200	R.P.M.....2
2	H.P.,	550	VOLTS,	1,200	R.P.M.....2

TRANSFORMERS....3
200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

550 TRANSFORMERS, POLE TYPE—$\frac{220}{110}$ VOLTS
5 K.W.....2
10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

Prompt Delivery and Subject to Inspection.

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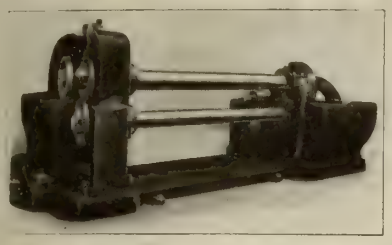
LIMITED

402 McGill Building Montreal

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

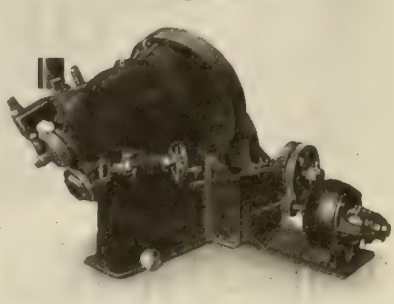
Some New Machines In Toronto Stocks

8 ft. Lennox Double Housing Type, Splitting Shear, capacity ¾-in. belt drive.



This machine is designed for straight shearing of sheets and plates and can be efficiently used for cutting round and square or flat bars.

No. 3 Lennox Rotary Bevel Shear, arranged for belt drive, capacity ¾-in.



The most efficient machine now on the market for beveling irregular and curved sheets, boiler heads, flanges, dome sheets, plates, angles, etc.

LATHES

1 16 x 7" South Bend Screw Cutting Engine Lathe.

1—18 x 8 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.

1 24 x 10 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.

1 18 x 8 Ryerson Cincinnati Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.

1—20 x 10 Ryerson Cincinnati Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.

1—24 x 12 Lodge & Shipley Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.

MILLING MACHINES

1—Ryerson-Owen No. 3 Universal, belt drive.
1—Ryerson-Conradson No. 3 plain, belt drive.

DRILLS

3—20" Ryerson Rockwell.
1—28" Ryerson Sibley Sliding Head.
1—4' Ryerson Radial Drill, Gear Box.
1—24" Ryerson Sibley Sliding Head.
1—30" Ryerson Sibley Sliding Head.

SHEARS AND PUNCHES

1—8' Lennox, Double Housing Type, Splitting Shear, capacity ¾" belt drive.

1—No. 3 Lennox Rotary Bevel Shear, arranged for belt drive, cap. ¾".

1—Ryerson Steel Frame No. 2 Hand Lever Shear, 6" blades, ¼" capacity.

1—Ryerson Steel Frame No. A-6 Hand Lever Punch, 6' throat, capacity ¼ x ¼.
1—Ryerson Steel Frame No. C-6 Hand Lever Punch, 6" throat, capacity ½ x ½.
1—Ryerson Steel Frame No. 5-A Hand Lever Punch, 3' throat, capacity ¼ x ¼.
1—Ryerson Steel Frame No. O-A Hand Lever Punch, 3" throat, capacity ¼ x ¼.

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Like all CISCOS, they are Simple in operation.
Like all CISCOS they are Accurate (.0005 in 18")
They are indeed THE LATHE WITH THE PULL.
The Lathe of Simplified Accuracy.
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12 foot, weighs net 8,500 lbs.

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Made in Cincinnati by
The CISCO MACHINE TOOL CO.
14", 16", 18", 24" Lathes

IMPERIAL MUNITIONS BOARD OFFER FOR SALE

MACHINERY AND EQUIPMENT of AIRCRAFT DIVISION of

Willys-Overland, Limited, West Toronto, Ontario

SEALED Tenders, accompanied by marked cheque for 5% of the amount of the bid will be received by the undersigned up to and including 12 o'clock Noon, February 22nd, 1919, for the purchase of the following groups of machinery and equipment located at West Toronto, Ontario.

This property consists of machinery, tools, equipment and supplies used in the manufacture, inspection, assembling and testing of the Sunbeam aeroplane engine for the British Government and is one of the best equipped plants in Canada for the production of the highest quality of work. Most of this machinery has only been in use for about a year and a large number of machines are new, some of which have not been removed from their original crates.

GROUP 1. MACHINERY consisting of Lathes, Drill Presses, Milling Machines, Boring Mills, Planers, Shapers, and Miscellaneous Tools.

GROUP 2. ELECTRIC MOTORS, ranging from 5 H.P. to 150 H.P., Induction Type, for 25 cycle current.

GROUP 3. STANDARD SMALL TOOLS, such as Drills, Reamers, Milling Cutters, Measuring Instruments, etc.

GROUP 4. SPECIAL SMALL TOOLS, such as Special Milling Cutters, Reamers, etc.

GROUP 5. COLD ROLLED, TOOL, ALLOY, AND HIGH SPEED STEELS.

GROUP 6. BELTING, new and used.

GROUP 7. PULLEYS, SHAFTING, HANGERS, etc.

GROUP 8. EMERY WHEELS, consisting of a large quantity of both large and small wheels.

GROUP 9. BLACKSMITH and **HARDENING ROOM EQUIPMENT.**

GROUP 10. ELECTRO-PLATING DEPARTMENT EQUIPMENT.

GROUP 11. LABORATORY EQUIPMENT suitable for Metallurgical determination and tests, including Brinell Machine, Izod Impact Machine, Chemicals and other laboratory apparatus.

GROUP 12. FOUNDRY EQUIPMENT.

GROUP 13. STANDARD SCREWS, Machine Bolts, Washers and other fastenings generally used in a manufacturing plant.

GROUP 14. PLUMBERS' AND STEAMFITTERS' SUPPLIES, suitable for plant maintenance.

GROUP 16. ELECTRICAL EQUIPMENT AND SUPPLIES, used for maintenance of power and lighting circuits.

GROUP 17. MISCELLANEOUS EQUIPMENT, divided into the following subdivisions:—

(a) Tables.
(b) Vises.
(c) Blocks, Cranes and Hoists.
(d) Gasoline and Oil Tanks.
(e) Cupboards for tools.
(f) Benches with cast iron bench legs.
(g) Metal Tote Pans.
(h) Wire grill work.
(i) Electric Drills and other special equipment such as National Counting Machines, Shaft Aligning and Levelling Outfit, etc.
(j) Transformers, Electric Trucks and other trucks.
(k) Time Clocks.
(l) Welding Outfit, Matthews Gravity Carrier, Battery Charging Set, Cloak Room Equipment, Fire Extinguishers.

GROUP 18. CAFE EQUIPMENT AND SUPPLIES.

GROUP 19. SHEET AND ROD BRASS.

GROUPS 20 to 28. Comprising **ZINC, TIN, LEAD, BABBITT AND BRONZE, IRON, STRUCTURAL STEEL, COPPER, NAILS, HINGES.**

GROUP 29. IRON CASTINGS and **ALUMINUM.**

GROUP 30. TUBING.

GROUP 31. FILES.

GROUP 32. GENERAL SHOP SUPPLIES, such as Hack Saws, Emery Cloth, Glass, etc.

GROUP 33. MISCELLANEOUS SUPPLIES, consisting of Brushes, Packing, Acids, Oils and Supplies for general plant use.

GROUP 34. WEIGHING SCALES.

GROUP 35. OFFICE FURNITURE and **EQUIPMENT,** such as Desks, Typewriters, Adding Machines and Hospital and Rest Room Furniture.

GROUP 36. DYNAMOMETER EQUIPMENT, consisting of eight 200 H.P. Sprague Electric Dynamometers with all necessary electrical apparatus and equipment for testing engines.

GROUP 37. DRAFTING ROOM and **ENGINEERING EQUIPMENT,** consisting of Drafting Tables, Blue Print Machine, Photostat Machine, etc.

Tenders for all groups except Nos. 1, 2, 3, 4, 17, 35, 36 and 37 will be received only for each group as a whole. In the case of Groups Nos. 1, 2, 3, 4, 17, 35, 36 and 37, tenders will be received either in whole or in part.

The buyers will dismantle and load on cars, and bids are to be made on this basis.

Intending purchasers will be given every facility to inspect the machinery and equipment. Complete information may be obtained from the Willys-Overland, Ltd., Aircraft Division, West Toronto, Ontario.

The highest or any tender not necessarily accepted. Cheques for unsuccessful bidders will be promptly returned.

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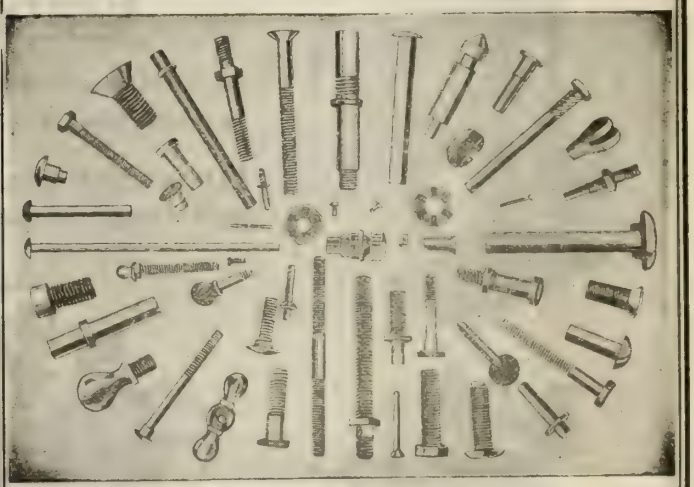

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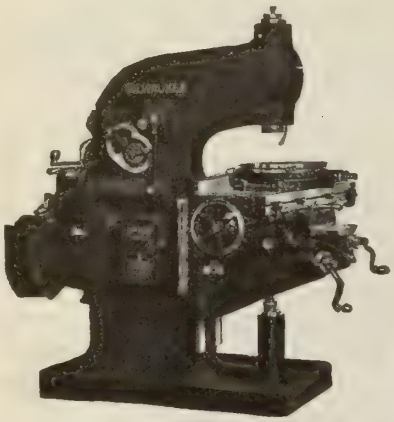
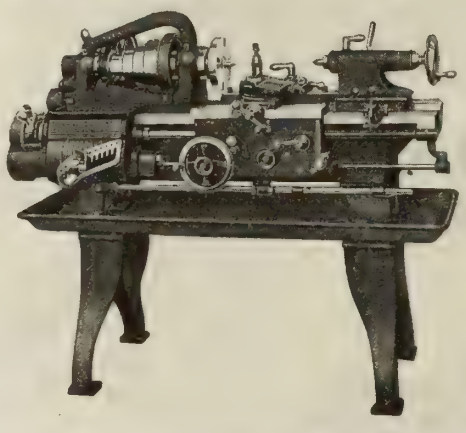
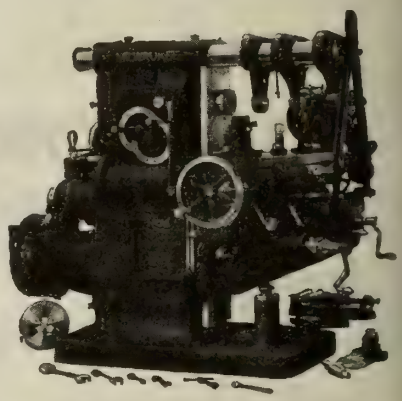

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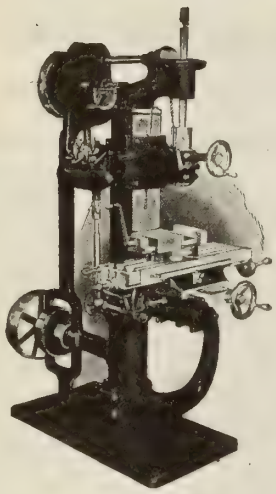
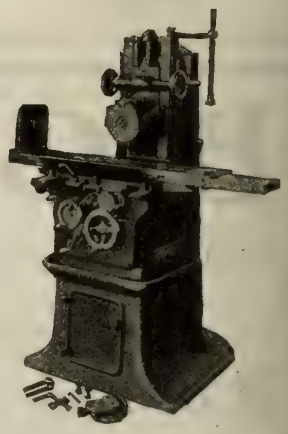
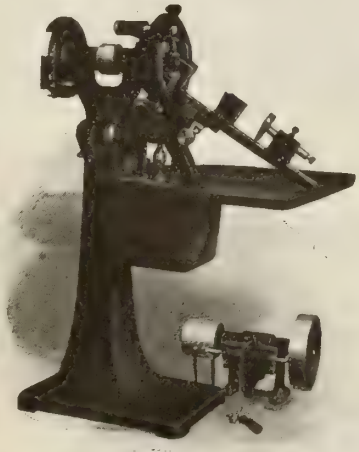
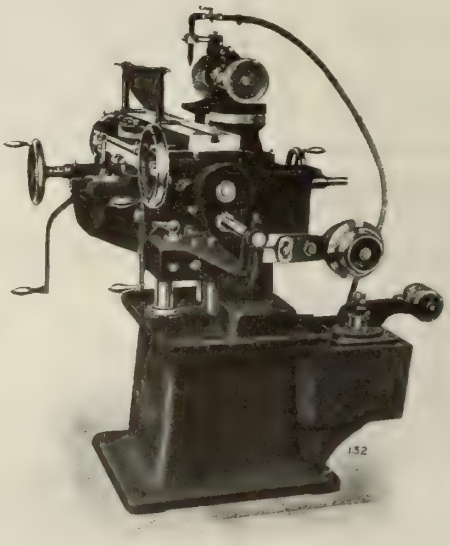
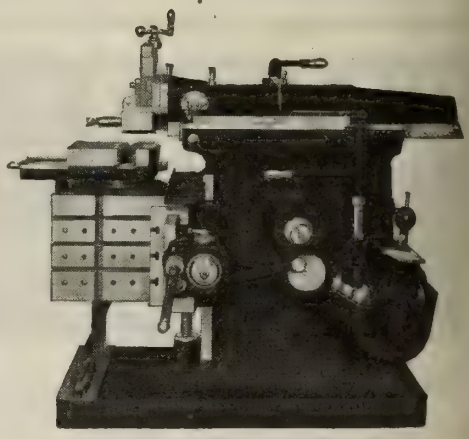

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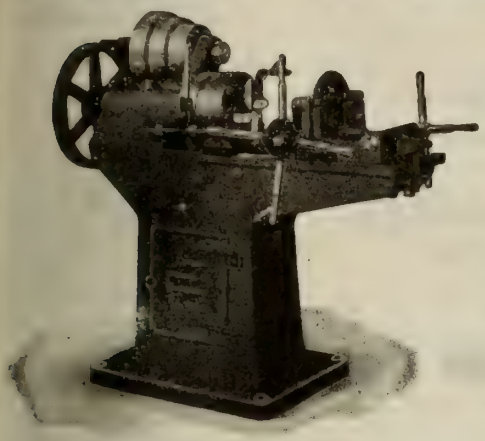

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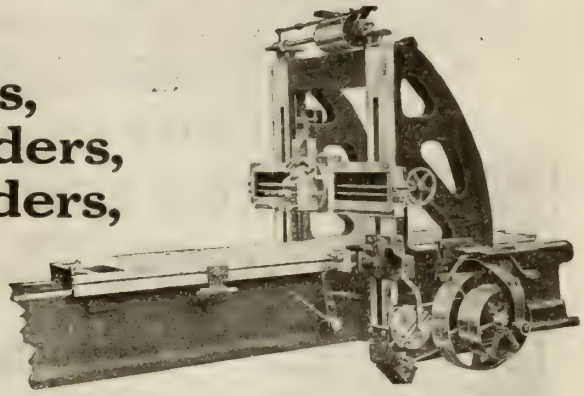

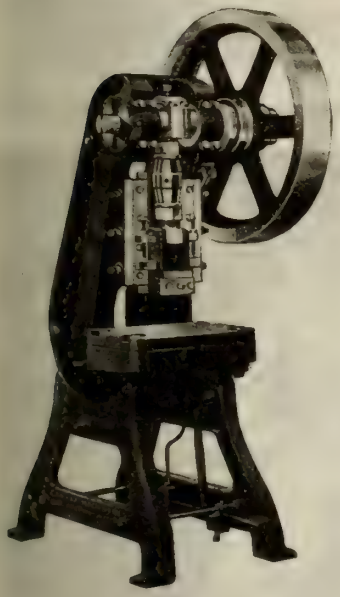

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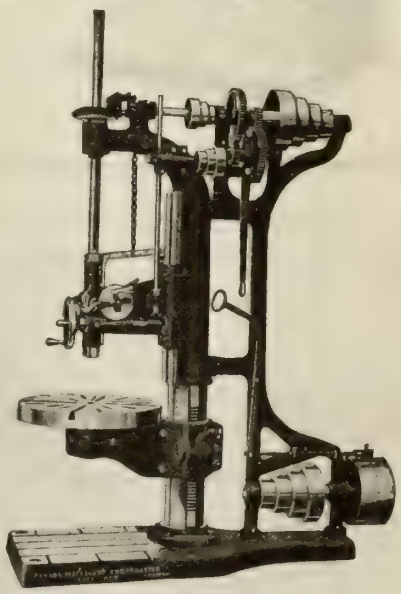
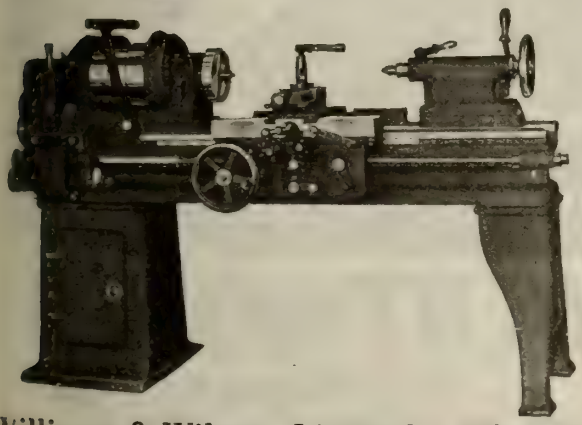
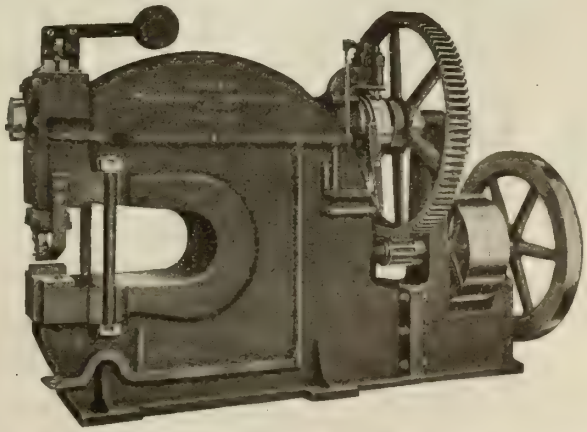
Lathes, Planers, Shapers, Milling Machines, Grinders, Radial Drills, Drill Presses, Boring Mills, Grinders, Turret Lathes, Keyseaters, Screw Machines, Bolt Cutters, Slotters, Pipe Machines, Punching and Shearing Machines, etc., etc.







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Machine Shop, Foundry and Construction Supplies

"Vulcan" Pipe Vises and Pipe Wrenches

B. & S. Micrometers

In addition to the tools shown, our line includes Set Screws, Cap Screws, Machine Screws, High Speed and Carbon Drills, Files (extra large stock) and a complete line of machinists' tools (Starrett, Brown & Sharpe, etc.).

We also carry a heavy stock of **Bar Iron, Sheet Iron (black and galvanized), Machine Steel, Cast Steel, High Speed Steel, Cold Rolled Steel, etc.**

Pleased to quote prices and time of delivery.

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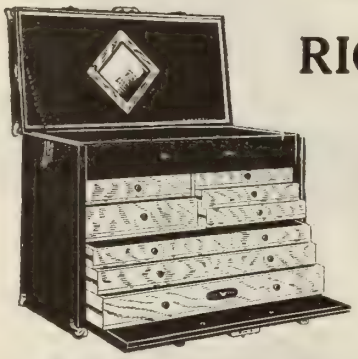

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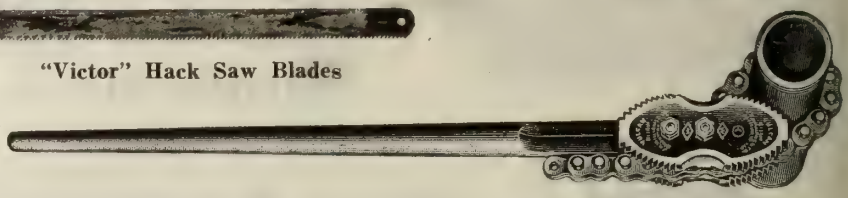

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"Wanted—A National Plan"

An article of unusual importance, by Sir George Bury, formerly vice-president of the C.P.R., appears in the February issue of MACLEAN'S. He points out that Canada must more definitely shape her destiny if that destiny is to be as glorious as all Canadians hope. It is a stirring demand for Canadians to get together in the formation of a national plan, accompanied by many practical suggestions from his experience in transcontinental railroad building. An article of national importance.

"Germany From Within To-day"

The funniest thing that he has perhaps written appears in February MACLEAN'S from the pen of Canada's great humorist, Stephen Leacock—an imaginary visit to Berlin under the Bolsheviks. He finds Von Tirpitz planning a new navy, an *inland fleet;* Frau Krupp, an apple woman; Von Bethmann-Hollweg, a cab driver; Bernstorff, a Bolshevik and president of the Scavengers Union. He finds a *Get From Under* committee planning a trade war on the world and half the population of Berlin in English clothing or Scotch kilts. He finds—

But read the article. There's a long laugh in every line. It is farce, however, built up on pretty shrewd truths.

You will find this a remarkably interesting number. The bold, fighting face of Admiral Beatty is on the cover and inside are the following big features:

The Campaign Against Britain, by Agnes C. Laut.

The Farmer in Politics, by J. K. Munro.

The Strange Adventure of the Thumb Tap Clue, by Arthur Stringer.

Old Times in Canada, by Walt Mason.

Lend Me Your Title, by Onoto Watanna.

The Three Sapphires, by W. A. Fraser.

Wild Miners I Have Met, by E. Ward Smith.

The Anglicization of Katrina, by Mary Josephine Benson.

Saturday's Child, by Mary E. Lowrey.

The Minx Goes to the Front, by C. N. and A. M. Williamson.

The Veins of the War God, by Corporal Herbert Forder.

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the analysis and physical test of metal in your castings? How they could be made cheaper? What properties of metal would facilitate your finishing operations or improve their quality?

We can furnish semi-finished Castings, being equipped to do lathe drilling and reaming work—also expert metal pattern work.

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Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

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Marshalltown Mfg. Co.

Marshalltown, Iowa
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Becker Belt-Driven Millers
The Machines that Give the Smooth Finish

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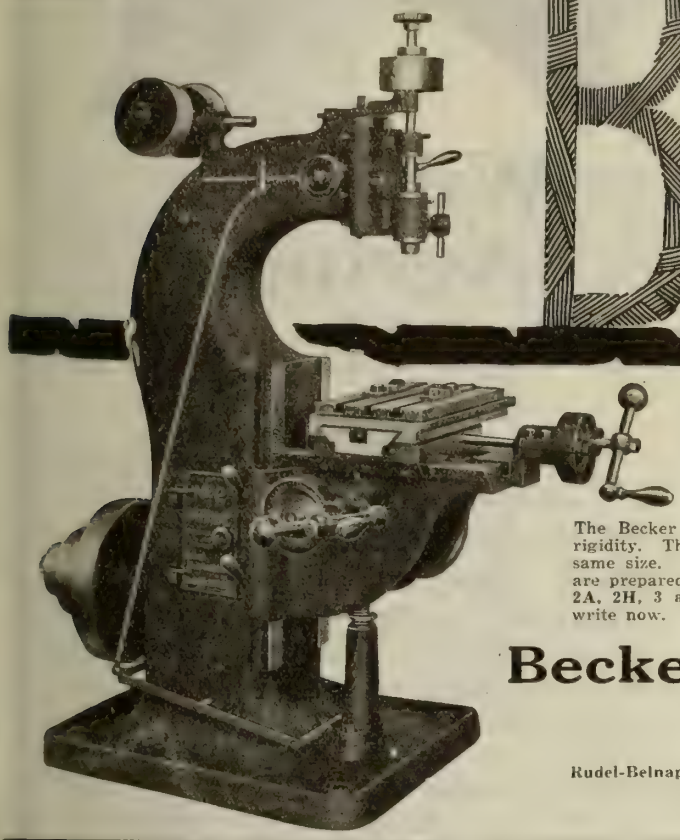

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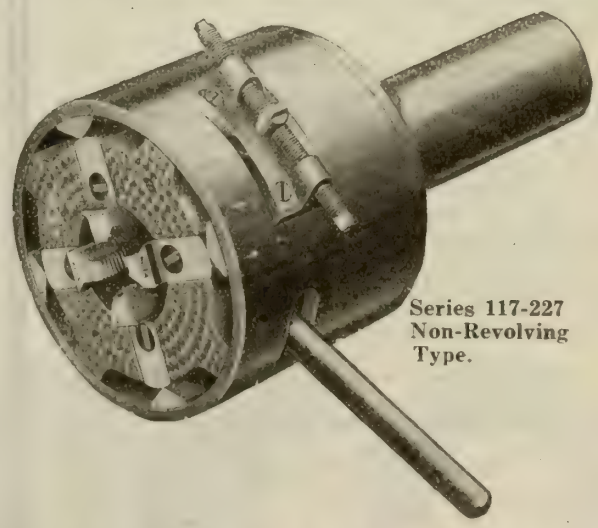

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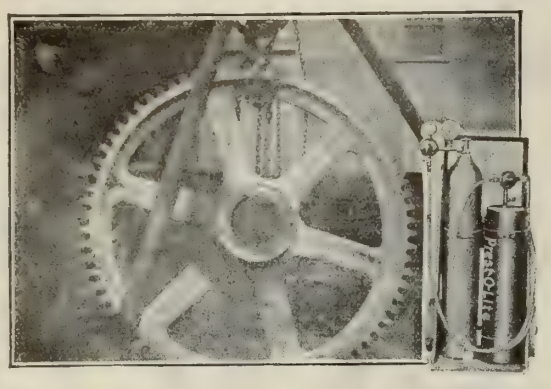

This Expensive Gear Wheel Reclaimed at Trifling Cost

This Gear Wheel, in a large plant at St. Catharines, was broken recently. To replace it would have taken much valuable time and represented quite a serious expense.

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The work was done by the job welding department of the International Garage, St. Catharines, Ont., and has given complete satisfaction.

Prest-O-Lite Oxy-Acetylene Welding is proving a great economic factor in the factories, mills, railroads, mines and machine shops of Canada.

Prest-O-Lite PROCESS

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite service, which insures prompt exchange of full cylinders for empty ones; provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

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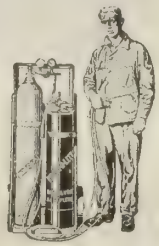

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"THE HOLDERS THAT HOLD"

FOR nearly half a century we have been designing and making drop-forgings and drop-forged tools. Our trade-marks, "Vulcan" and ⟨VAT⟩ and "Agrippa" are known throughout the world wherever machinery and tools are used; they represent our constant endeavor to maintain and improve quality—to put *Superior* into our product—to make it individual and worthy of the high standard long established for Williams' goods.

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Turning	**Boring**	**Threading**
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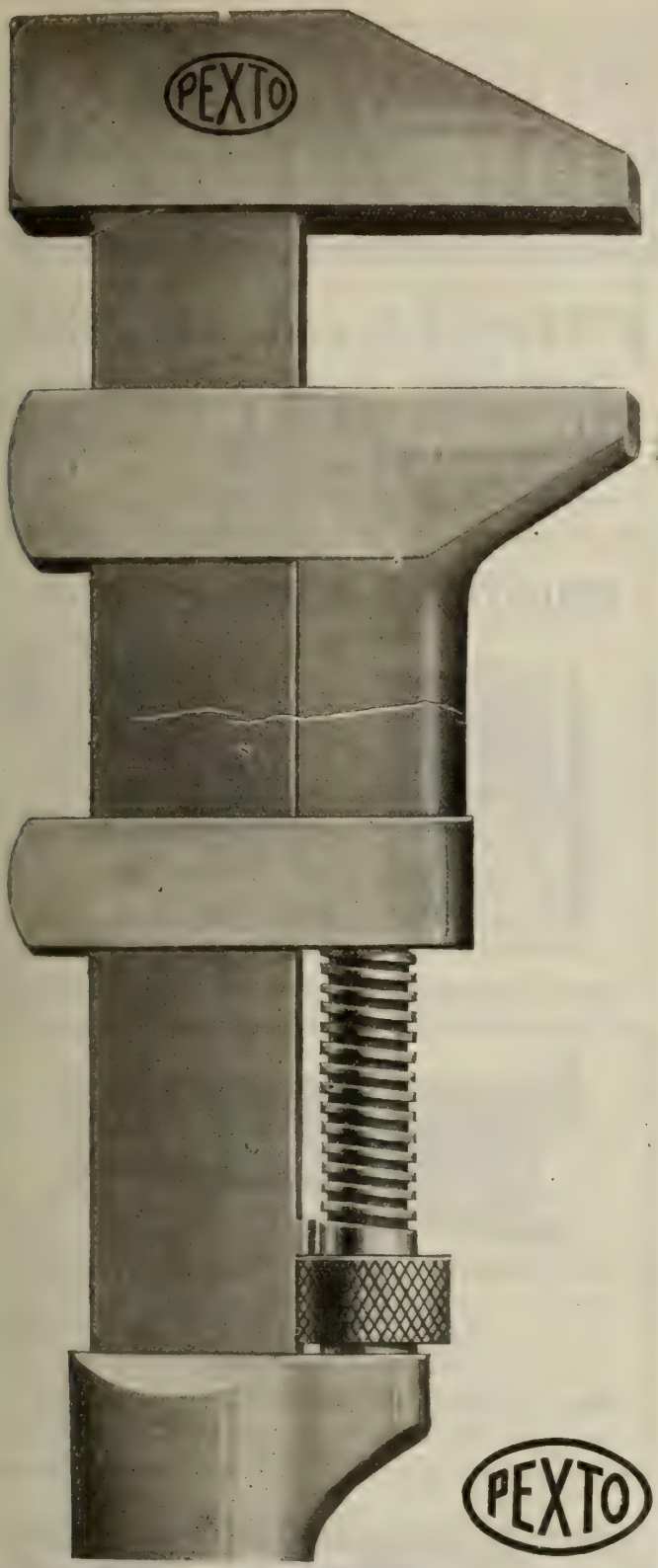

The Pexto Solid-Steel No. 300 Wrench

Pexto Catalog 1417 says:

"No monkey wrench ever made has the lasting qualities and durability of this Solid Steel Wrench."

Engineers and skilled mechanics by critical tests have proved the truth of this.

The reason is clear: *Only three parts* are used in its construction. These are first, the head, bar and handle forged solid from one piece of steel; second, the sliding jaw; and third, the screw which moves the jaw on the bar of the wrench.

This is why years of hardest usage on the heaviest of shop work finds the Pexto No. 300 ready as ever for the next big job.

Simple construction (fully protected by patents) is largely responsible, but the Pexto Quality that's built into this, and all other Pexto Tools explains the remarkable *lasting power.*

For the mechanic in every field there are Pexto Tools of quality and construction which cannot be surpassed.

If your dealer cannot supply you, write us direct.

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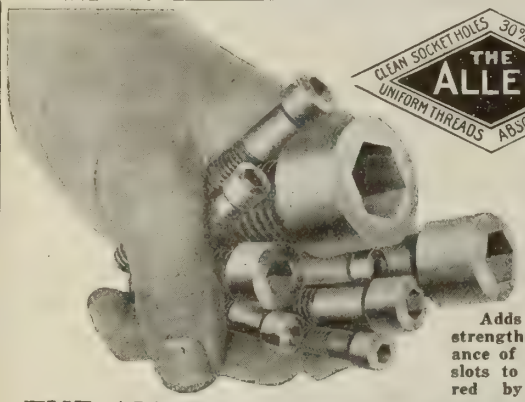

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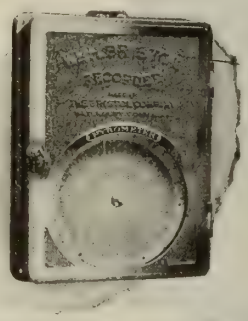
FOR EVERY SERVICE



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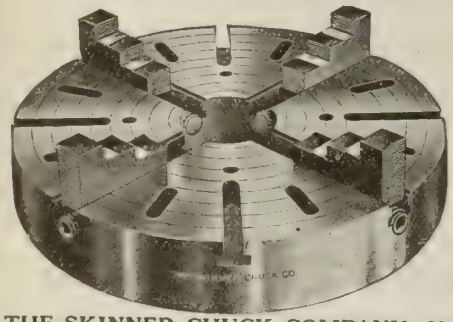

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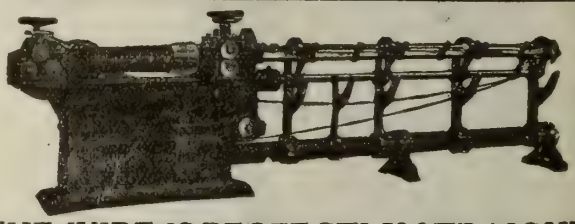

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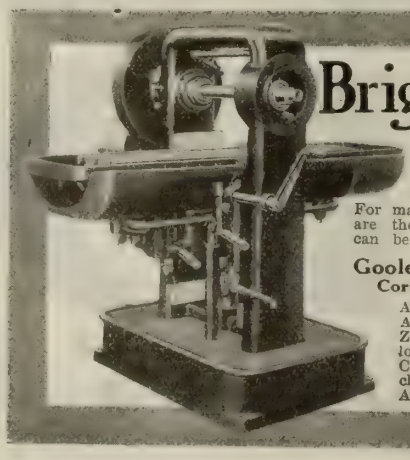

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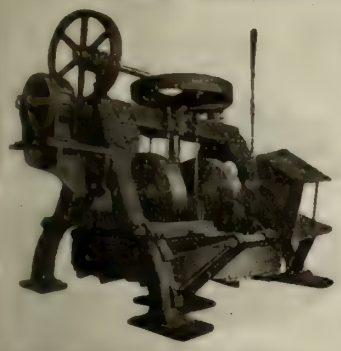

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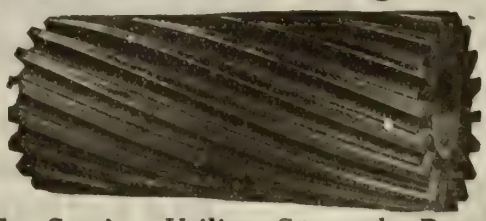

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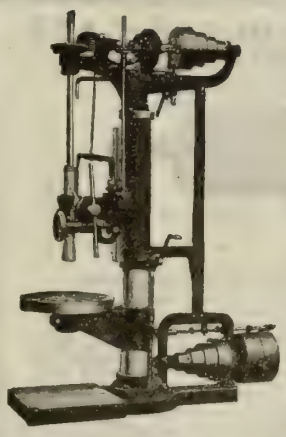

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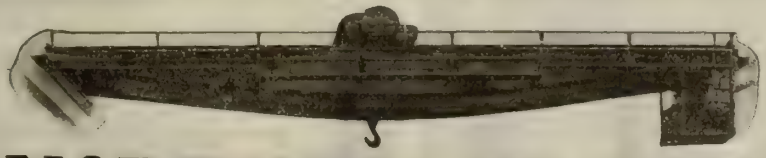

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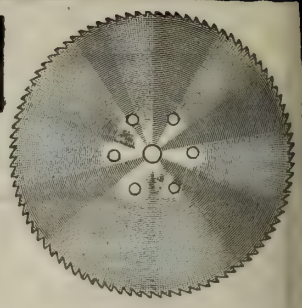

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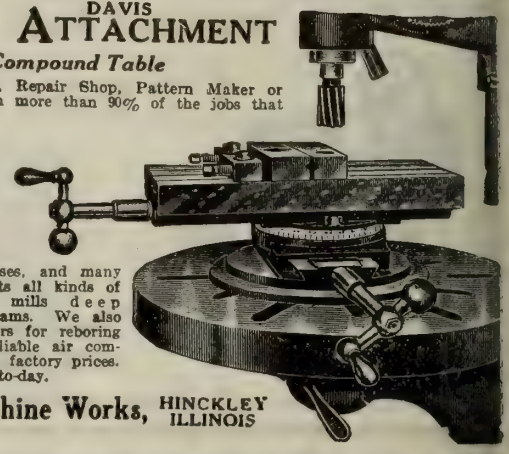

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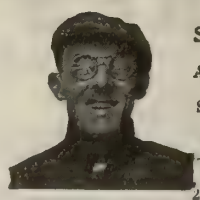

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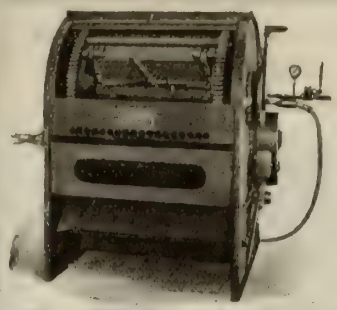

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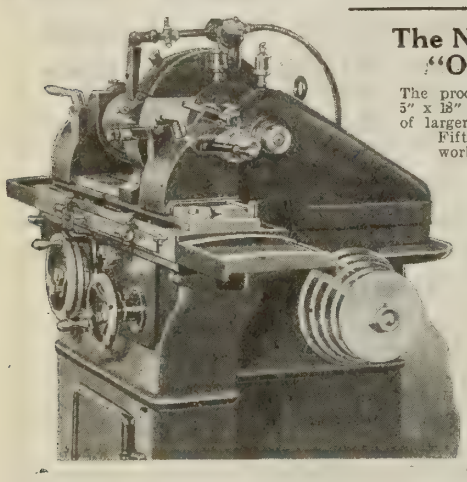

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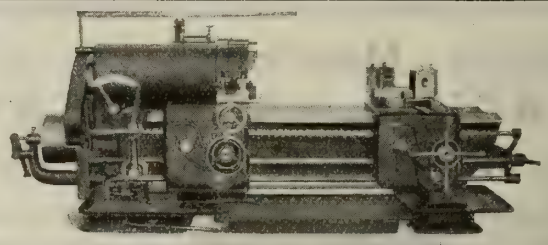

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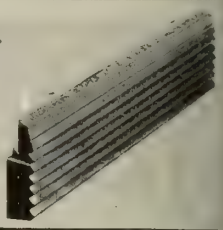

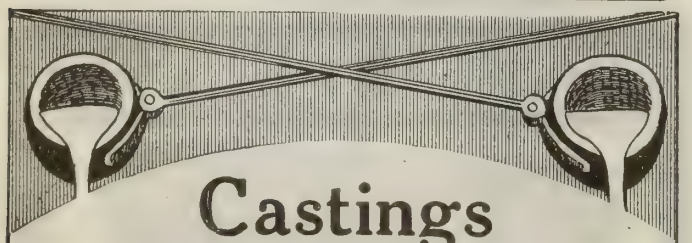

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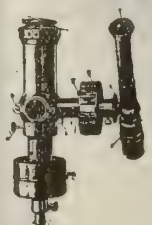

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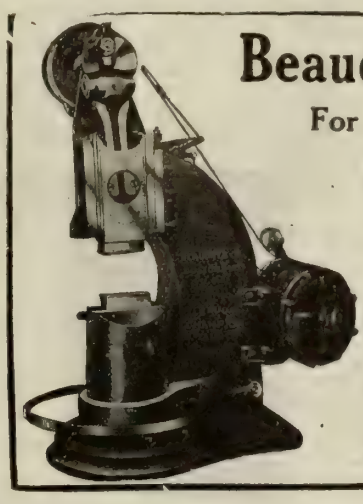

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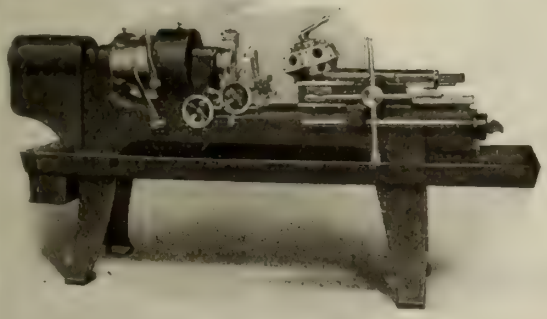

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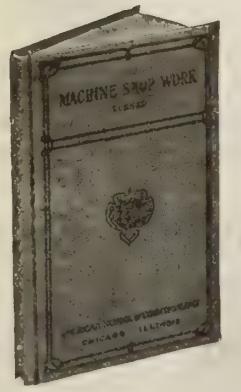

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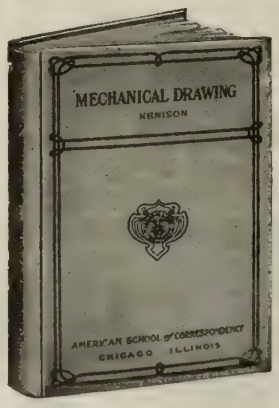

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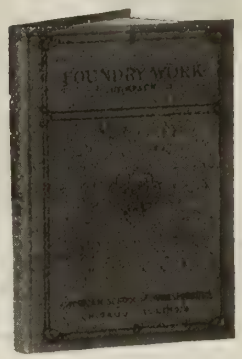

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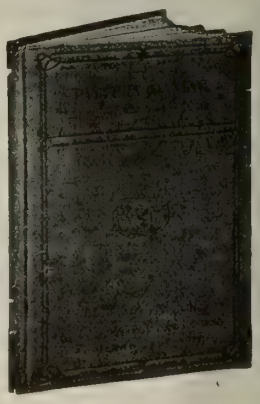

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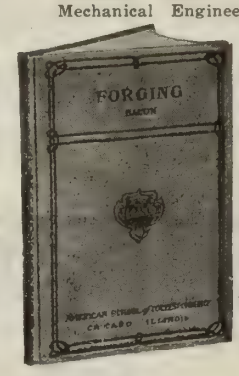

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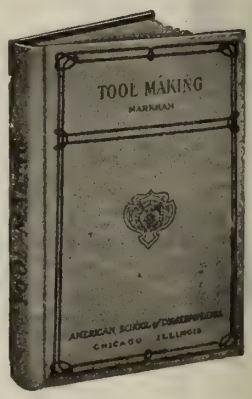

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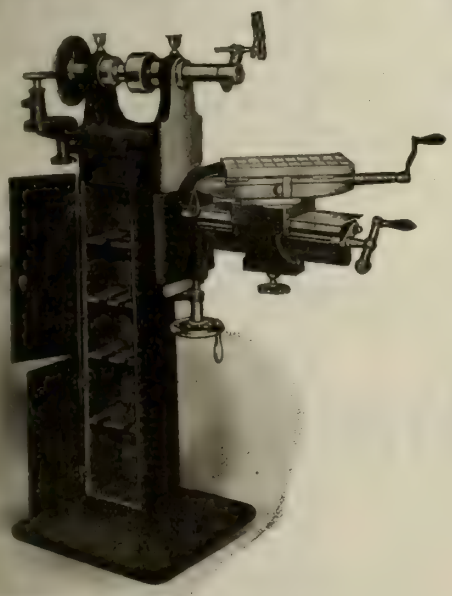

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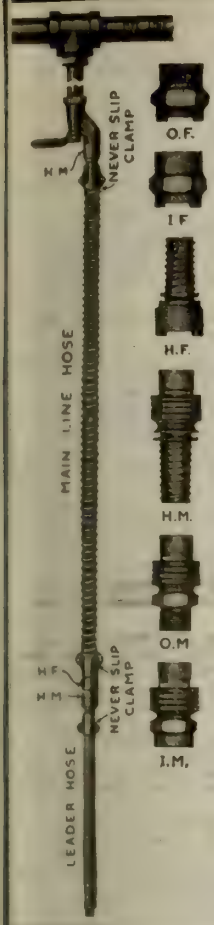

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STYLE H.F. is a Female Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes ¼-in. to 1½-in.
STYLE H.M. is a Male Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes ¼-in. to 1½-in.
STYLE O.M. is an Inside Thread Male Pipe End. Made in sizes ⅜-in. to 1½-in.
STYLE I.M. is an Inside Thread Male Pipe End. Made in sizes ¼-in. to 1½-in.
The Male and Female Ends of Bowes Couplings interchange in sizes, ¼-in. to ¾-in. Sizes 1-in. and 1¼-in. interchange. The 1½-in. ends interchange only with themselves.

BOWES COUPLINGS

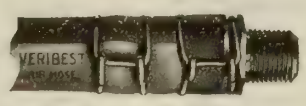
Are instanly connected or disconnected.
They are absolutely air-tight under all pressures.
They quickly pay for themselves by stopping costly leaks.
They interchange in sizes most commonly used.
They have no loose parts to be mislaid or lost.
They are made of brass and will not rust.
TheU-shaped Gasket interchanges in couplings ¼-in, to ¾-in.

The Cleco Never Slip Hose Clamp

Made in same sizes as Bowes Couplings

The adjoining cut of Cleco Never Slip Hose Clamp shows the "Flanges" which engage the groove provided in all hose ends of Bowes Couplings. The "Model Hose Line" illustrated shows correct styles of couplings and valve to use and proper way to attach the clamps.

CLECO GROOVED HOSE NIPPLE



Grooved Nipples when attached to hose with the wire clamp cannot "blow-out," as one-half of the Wire Clamp lies in Nipple Groove, and the other half on the hose, uniting nipple and hose permanently.

WIRE CLAMP TOOL

To apply Wire Clamps to Grooved Hose Nipples you need the Wire Clamp Tool illustrated, a small hand-operated tool at moderate cost which we carry in stock for immediate delivery. In Stock: Riveting and Chipping Hammers, Four-piston Air Drills, Corner Drills, Emery Grinders, Sand Rammers, Holder Ons, etc.

Use Annealed Wire No. 14

Write for Bulletin 38 illustrating Cleco Hose Fittings, Couplings, Valves, etc.

IMPORTANT:—The Small Leaks in your "AIR LINE" mean serious loss in DOLLARS. Have you any idea of the amount of "Air" wasted in small leaks at your connections? Air Leakage through 1-16 in. opening equals 5.32 cu. ft. per minute at 80 lbs. It will pay you to install Bowes Couplings and stop costly leaks.

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Length of Stroke of Piston	**48"**
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Fly Wheel	**18" x 12½" Face**
Weight	**40,000 lbs.**
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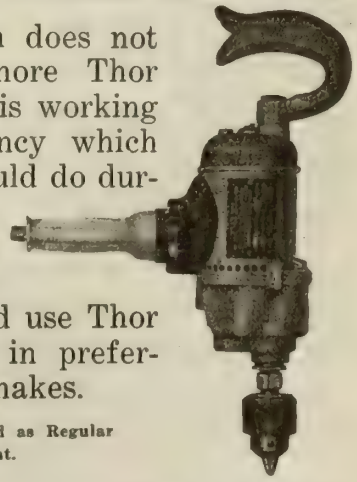

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Sleeper & Hartley, Inc., Worcester, Mass.

WIRE RAILS
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE CLOTH AND PERFORATED METALS
Canada Wire & Iron Goods Co., Hamilton.
Page Steel & Wire Co., New York, N.Y.

WIRE FORMING AND STAMPING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada
F. B. Shuster Co., New Haven, Conn.

WIRE NAILS
Page Steel & Wire Co., New York, N.Y.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE NAIL MACHINERY
National Machy. Co., Tiffin, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Page Steel & Wire Co., New York, N.Y.

WIRE SPRING
Page Steel & Wire Co., Adrian, Mich.

WIRE STEEL, BRASS, COPPER,
Page Steel & Wire Co., New York.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE, MUSIC
Boker & Co., Inc., H., Montreal, Que.

WORKS STANDS, PORTABLE
New Britain Mach. Co., New Britain, Conn.

WOOD BORING MACHINES
Canada Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

WIRE STRAIGHTENERS AND CUTTERS
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WOODWORKING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

WRENCHES
Williams & Co., J. H., Brooklyn, N.Y.
Armstrong Bros. Tool Co., Chicago, Ill.
Butterfield & Co., Rock Island, Que.
Canada Foundries & Forgings, Ltd., Welland, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Wells Bros. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WOVEN STEEL PARTITIONS
Page Steel & Wire Co., Adrian, Mich.

WRENCHES, AUTOMOBILE NARROW JAW AND MONKEY
Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WRENCHES, PIPE, MONKEY, TAP
Aikenhead Hardware Co., Toronto, Ont.
Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.
Wells Bros. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Keystone Mfg. Co., Buffalo, N.Y.

WRENCHES, SOCKET
Allen Mfg. Co., Hartford, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que

WRENCHES, SCREW
Fittings, Ltd., Oshawa, Ont.

Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

METAL STAMPINGS, SMALL
Can. Winkley Co., Ltd., Windsor, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

MILLING ATTACHMENTS
Becker Milling Machine Co., Boston, Mass.
Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Steptoe Co., The, John, Cincinnati, Ohio.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

MOULDS, RUBBER
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

MUNTZ METAL
Brown Copper & Brass Roller Mills, New Toronto, Ont.

NAILS
Page Steel & Wire Co., Adrian, Mich.

NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.

NICKEL
Boker & Co., Inc., H., Montreal, Que.

NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.

NUTS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Williams & Co., J. H., Brooklyn, N.Y.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, Ohio.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.

NUT TAPPERS
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.

OILS, MOTOR
Elm Cutting Oil Co., Toronto, Ont.

OILS, DRAWING
Elm Cutting Oil Co., Toronto, Ont.

OIL SEPARATORS
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Sheldon's, Ltd., Galt, Ont.

OIL STONES
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Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto.

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford, Ont.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
Brantford Oven & Rack Co., Brantford, Ont.

OXY-ACETYLENE WELDING AND CUTTING
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

OXY-ACETYLENE WELDING AND CUTTING PLANT
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Oxyweld Co., Ltd., Toronto, Ont.

PACKINGS, ASBESTOS
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PACKINGS, LEATHER, HYDRAULICS, ETC.
Baxter & Co., Ltd., J. R., Montreal, Que.
Graton & Knight Mfg. Co., Worcester, Mass.
Gutta Percha & Rubber, Ltd., Toronto, Can.
William R. Perrin, Ltd., Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

PAPER MILL CONVEYORS AND DRIVES
Can. Link-Belt Co., Toronto, Ont.

PAPER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.
MacKinnon Steel Co., Sherbrooke, Que.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.

PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

PECK CARRIERS FOR POWER PLANTS
Can. Link-Belt Co., Toronto, Ont.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph, Ont.

PIPE CUTTING AND THREADING MACHINES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PHOTOSTATS
Commercial Camera Co., Providence, R.I.

PIPE RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.

PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE REAMERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE STOCKS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE THREADERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PISTON RODS, ROUGH TURNED
General Steel Co., Milwaukee, Wis.

PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.

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Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
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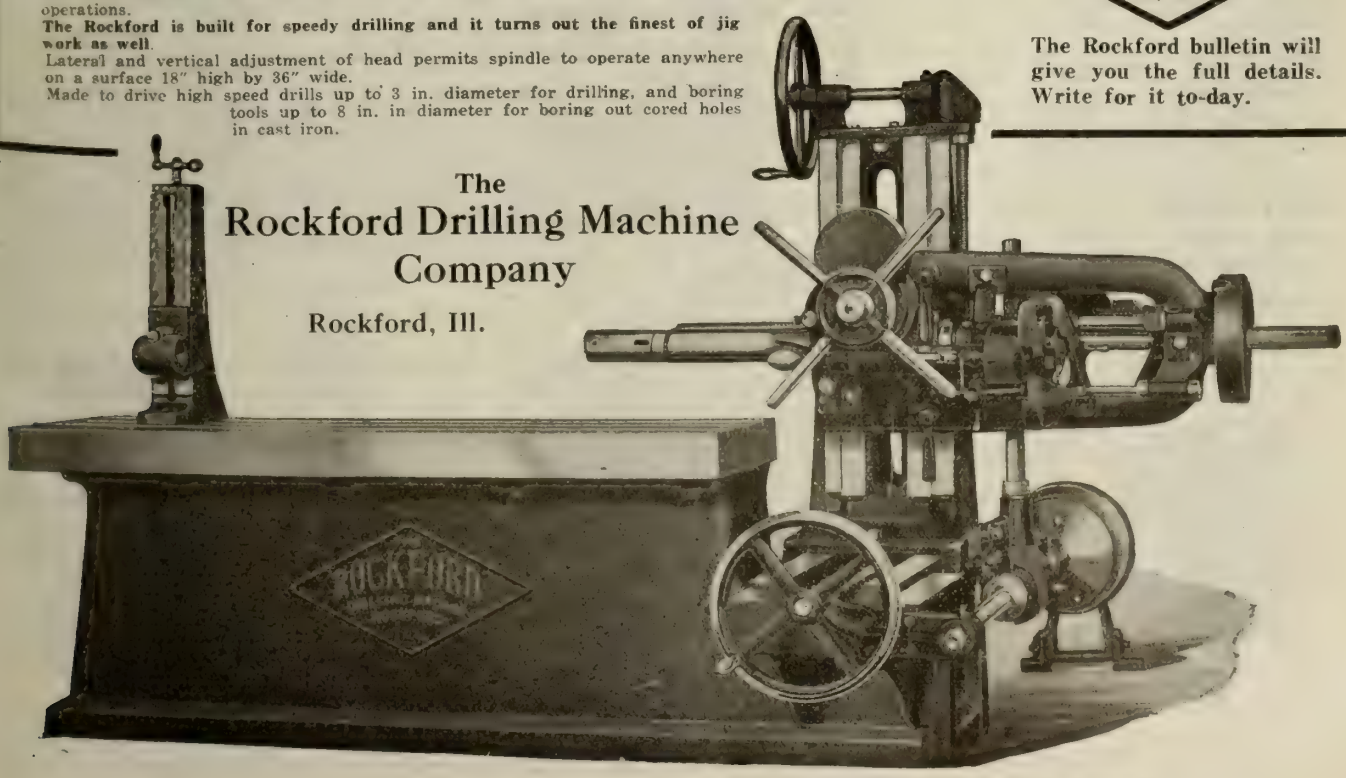

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Metalwood Mfg. Co., Detroit, Mich.

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E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.

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Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.

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Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
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Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
William R. Perrin, Ltd., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
John Bertram & Sons Co., Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Riverside Machinery Depot, Detroit, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, SCREW
Barnes, W. F., & John Co., Rockford, Ill.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.
William R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Erie Foundry Co., Erie, Pa.
Ferracute Mach. Co., Bridgeton, N.J.
Stoll Co., D. H., Buffalo, N.Y.

PRODUCTION WORK
Windsor Mach. & Tool Co., Windsor, Ont.

PROPELLERS
Kennedy & Sons, Wm., Owen Sound, Ont.

PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
Algoma Steel Corp., Sault Ste. Marie, Ont.
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Positive Clutch & Pulley Works., Ltd., Toronto.
J. C. Wilson & Co., Belleville, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, FRICTION CLUTCH
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn

PULP MILL MACHINERY
Hydraulic Machy. Co., Ltd., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, CENTRIFUGAL
Goldie & McCulloch Co., Galt, Ont.
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

PUMPS, FUEL OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec
Trahern Pump Co., Rockford, Ill.

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Darling Bros., Ltd., Montreal, Quebec
M. L. Oberdorfer Brass Co., Syracuse, N.Y

PUMPS, HIGH PRESSURE
William R. Perrin, Ltd., Toronto.

PUMPS, ALL KINDS
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M. L. Oberdorfer Brass Co., Syracuse, N.Y.
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Darling Bros., Ltd., Montreal, Quebec.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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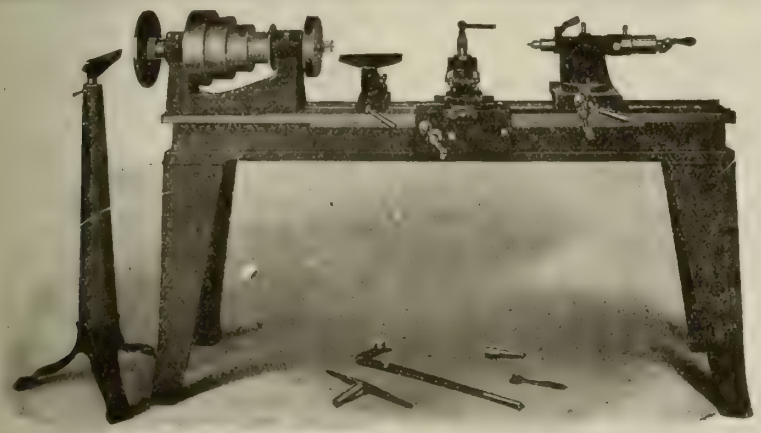

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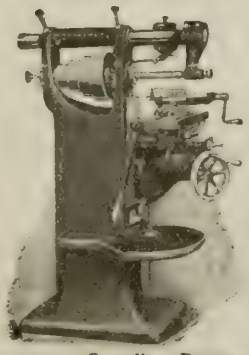

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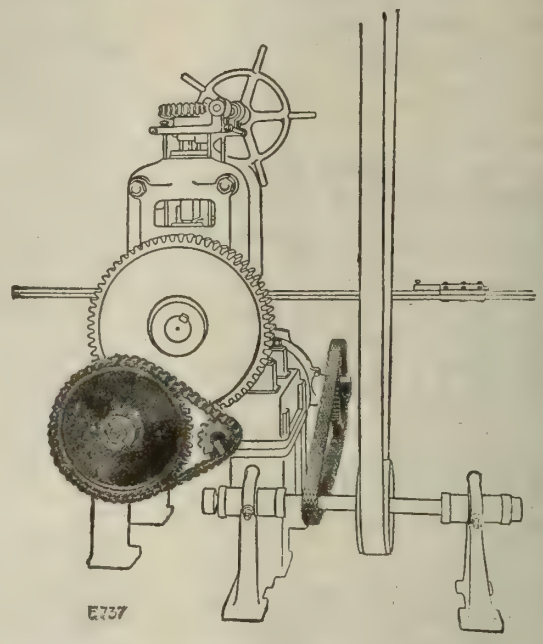

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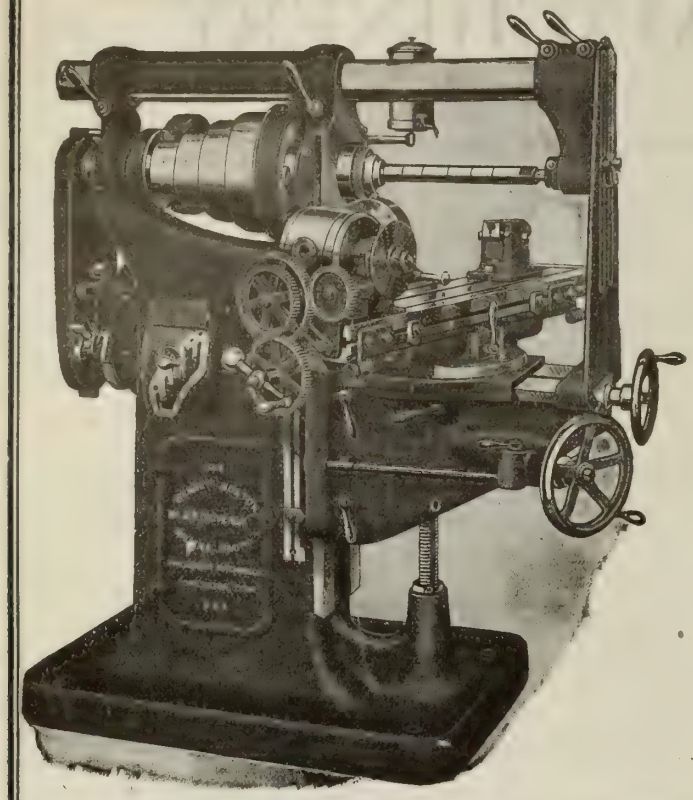

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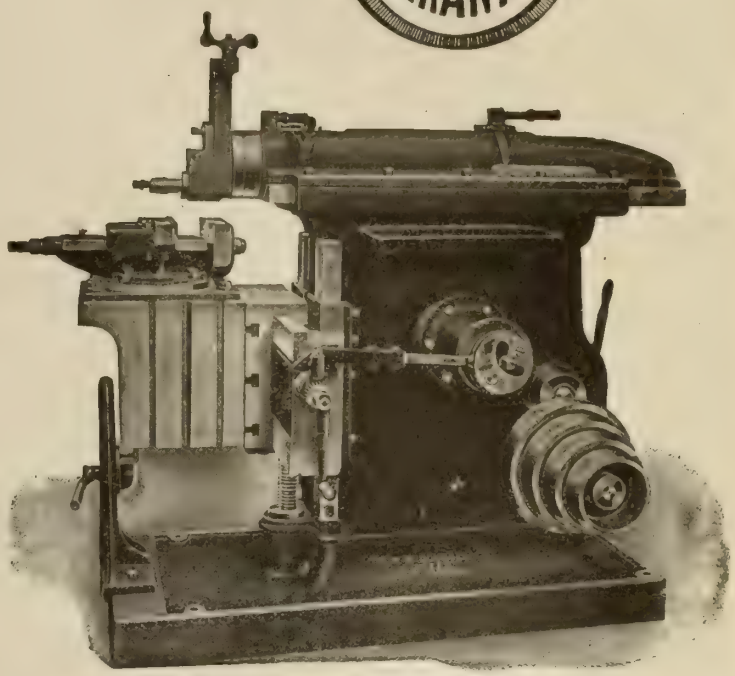

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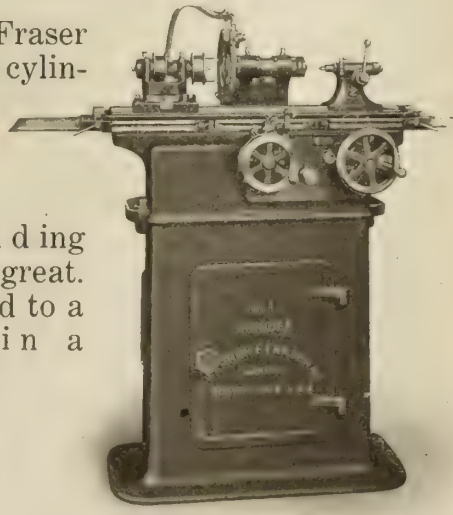

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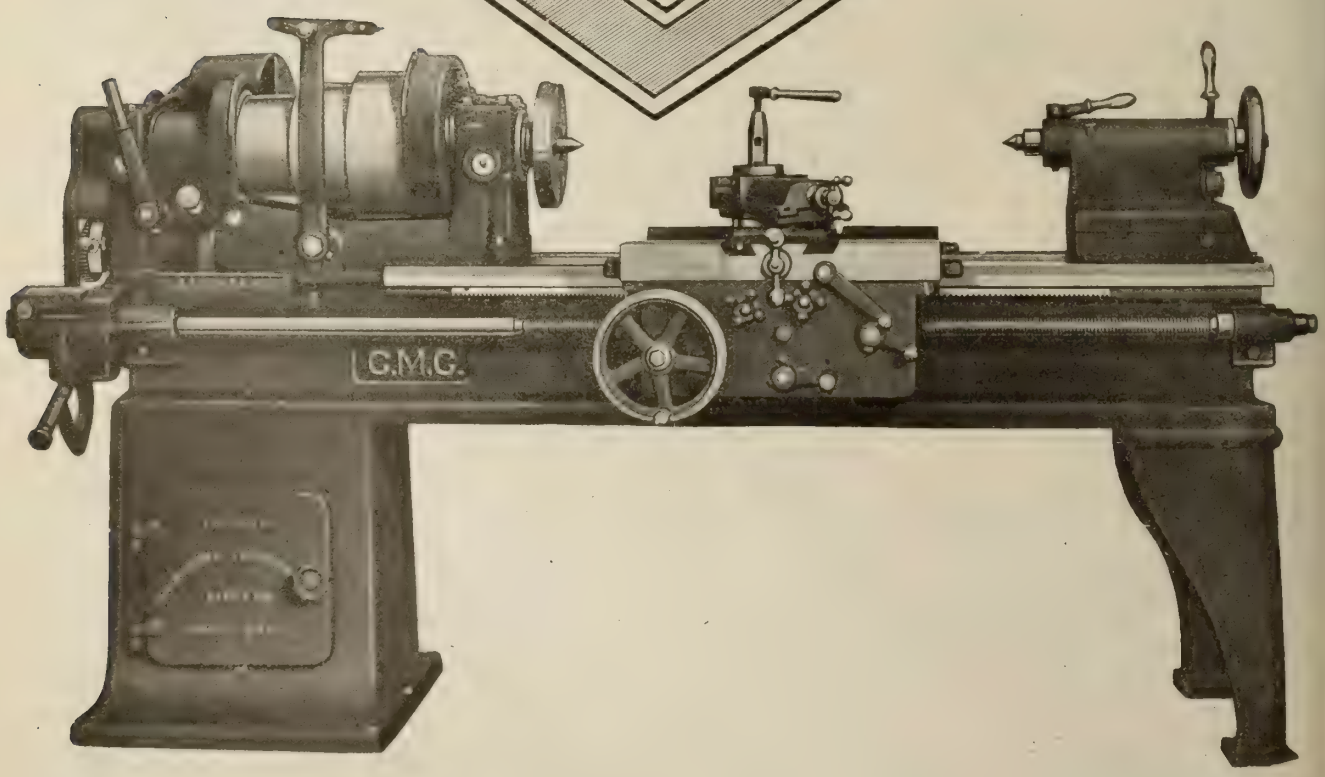
CANADA MACHINERY CORPORATION LIMITED

GALT :: ONTARIO

Toronto Office and Warerooms:
Brock Ave. Subway



EDITORIAL INDEX—PAGE 119 BUYERS' DIRECTORY—PAGE 99 ADVERTISING INDEX—PAGE 120

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 8. Publication Office: Toronto, February 20, 1919 Subscription Price $3.00 per Year

THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally Known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

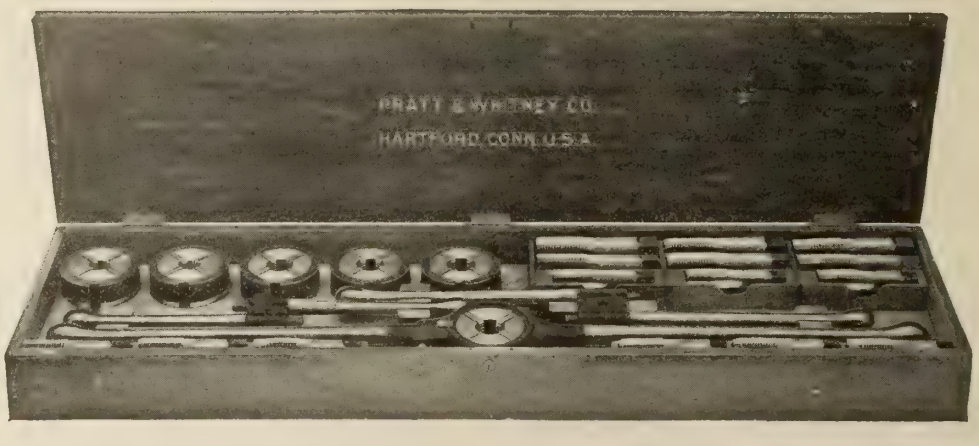
VANADIUM-ALLOYS STEEL COMPANY

Gen'l Sales Offices: Pittsburgh, Pa. Works: Latrobe, Pa.

BRANCH OFFICES:

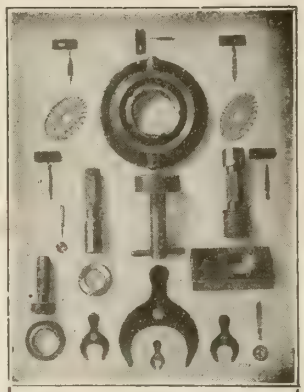
TORONTO, MONTREAL, NEW YORK, BUFFALO, BOSTON, PHILADELPHIA, CLEVELAND, CHICAGO, CINCINNATI, DETROIT, PITTSBURGH

SMALL TOOLS



P. & W. Die-Stock Set No. 4

These sets are furnished in various capacities for either U. S. Standard, S. A. E. Standard, Whitworth Standard or "V" Form. The Pratt & Whitney Policy of highest quality materials, together with the necessary refinement and accuracy, is maintained in all tools composing these sets.



PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS

42-inch Vertical Boring and Turning Mill

Motor driven through speed box. Built in sizes from 42-inch to 100-inch.

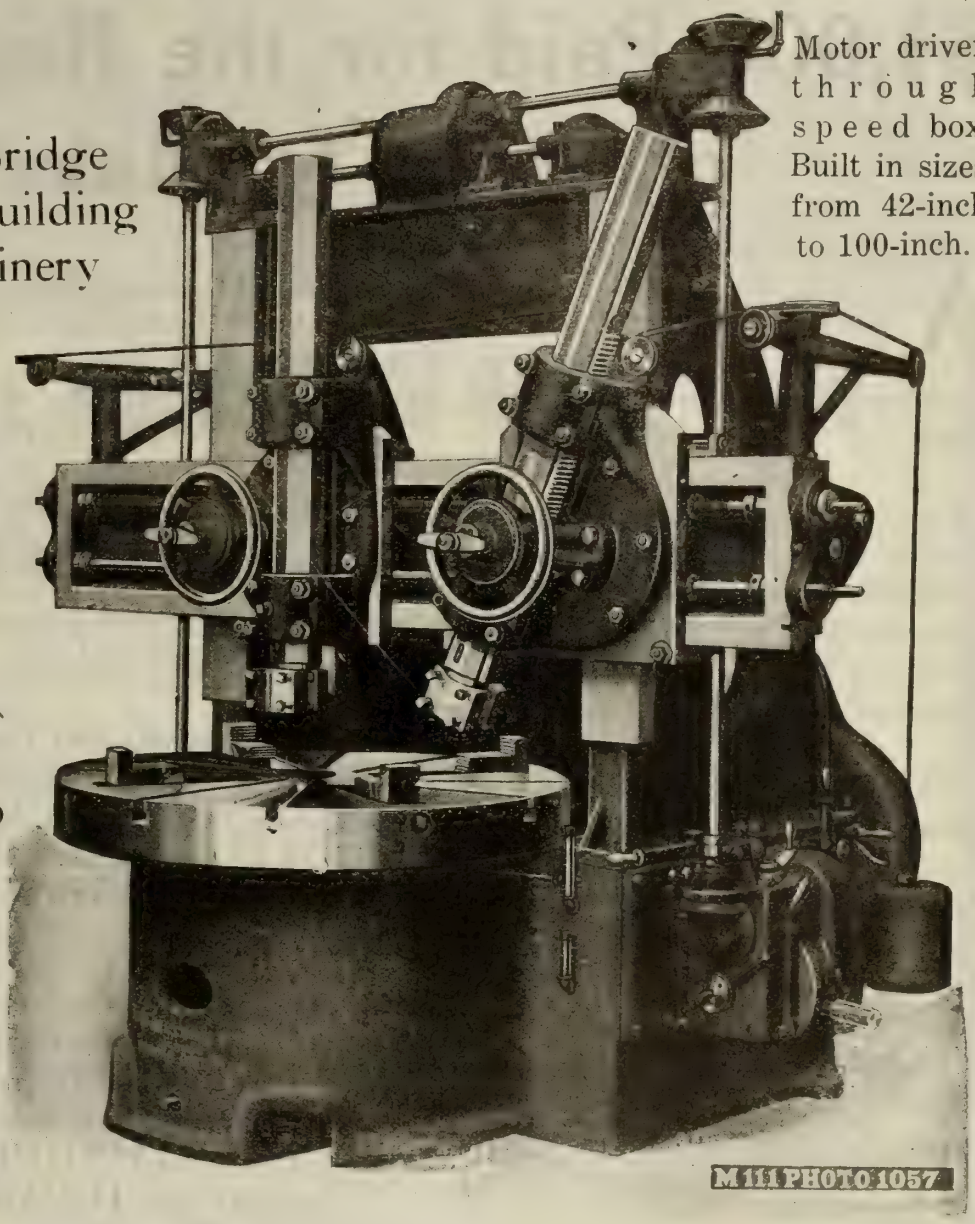
Structural Bridge Shop and Shipbuilding Plant Machinery

Locomotive and Car Shop Equipment

Repair Shop Machinery

General Machine Shop Equipment

Drop us a line for Photographs and full particulars.



The John Bertram & Sons Company Limited

DUNDAS, ONTARIO, CANADA

MONTREAL 723 Drummond Bldg. | TORONTO 1002 C.P.R. Bldg. | VANCOUVER 609 Bank of Ottawa Bldg. | WINNIPEG 1205 McArthur Bldg.

The Publisher's Page

TORONTO FEBRUARY 20, 1919

$1,000 Paid for the Best Idea of What to Make

AT our suggestion "An American Manufacturer" offered $1,000 for the suggestion of a product to make in its expanded war plant.

Over 150 suggestions were received. Nearly every one was a promising, profitable proposition, as were some 100 others coming direct and from *Scientific American* and from *Manufacturers' Record*.

The winning suggestion was to manufacture a *drive unit* for automotive vehicles, which will cushion shocks. The irregular traction of rear wheels shoots destructive force incessantly into the whole driving machinery of a car. Likewise careless driving does the same thing to the machinery from the front end of the car. By the Cushioning Drive Principle this "self-destruction of a car" is stopped.

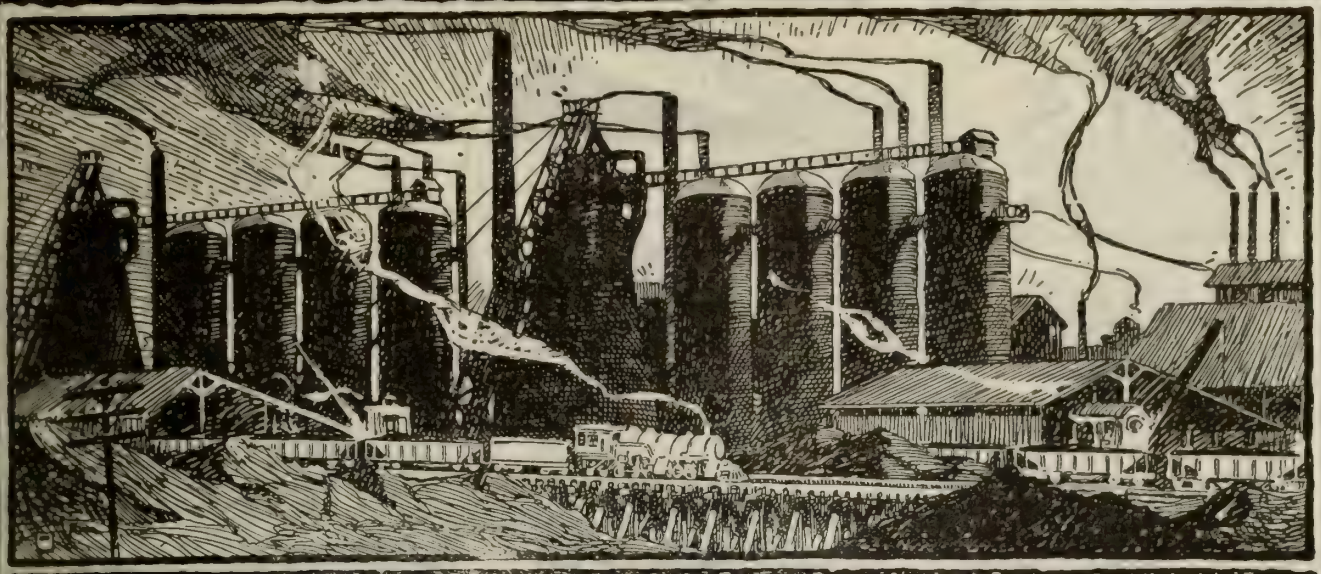
Strangely enough, perhaps, the cushioning disks employed on the drive shaft dispense with universal joints, so endlessly troublesome and expensive to car owners. These flexible disks make a metal joint seem to be a crude, go-round-the-corner-meet-yourself-coming-back means for getting flexibility.

The above—reproduced from an advertisement by the Erickson Advertising Agency (in *Printer's Ink*) is mighty interesting. Advertising has been used for a wide variety of purposes, but this seems to us rather startling in its originality.

But when you come to think of it, why shouldn't a firm advertise for ideas? Why should a manufacturer, up against it hard for a good idea, do anything else but advertise?

There is a suggestion in this for Canadian manufacturers who may be groping in the dark — feeling their way through the reconstruction tunnel. Why not advertise in CANADIAN MACHINERY and in other papers for IDEAS? An IDEA is many a firm's biggest asset.

Advertising has done far more wonderful things than uncovering workable ideas. Good practical ideas are worth a lot right now, however, and advertising is worth trying. Who'll try it?



LITTLE WORDS WITH BIG MEANING

Quality

According to "Webster," Quality is "an excellence of character; natural superiority."

Service

Webster's definition of "Service" is; "The performance of labor for the benefit of another."

We use these words advisedly—fully understanding their definitions—and realizing the obligation we place upon ourselves by their continued use in connection with our products of Iron and Steel, and our attitude to the people we serve.

THE

STEEL COMPANY

OF

CANADA

LIMITED

MONTREAL HAMILTON

Pig Iron,
Steel & Iron Bars,
Horse Shoes,
Steel and Iron Products.

Steel Billets,
Track Spikes &
Bolts, Forgings, Wire
of every description.

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

BLOOMS, BILLETS, SLABS,

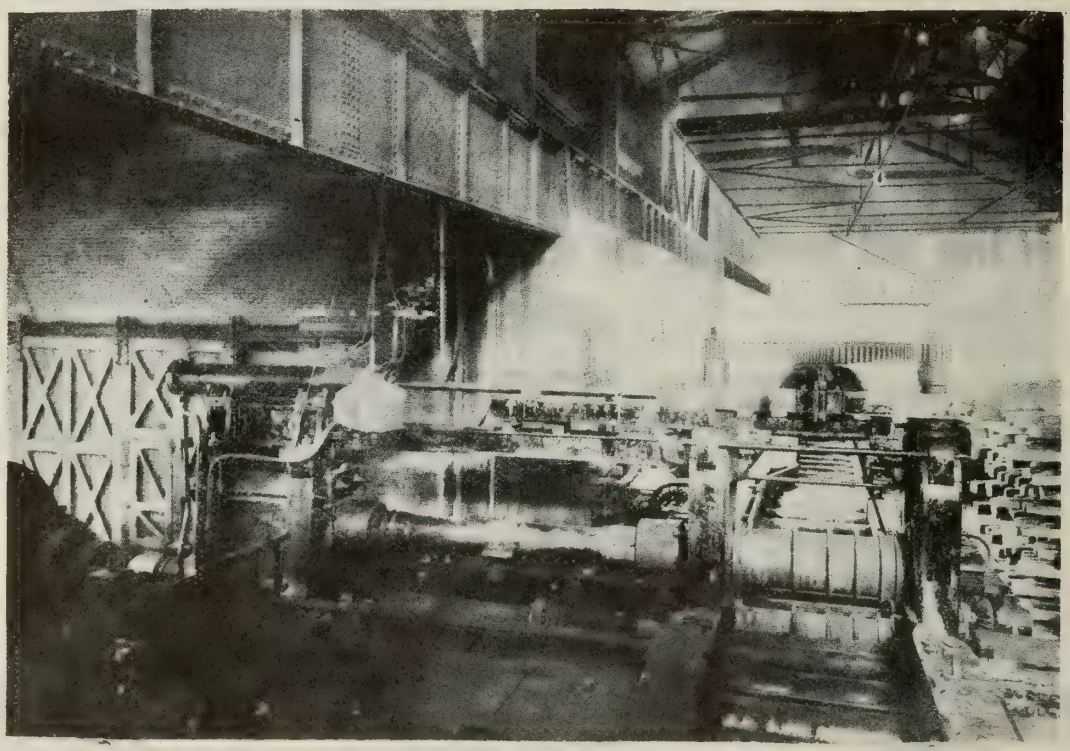
STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS

Sulphuric Acid. *Nitre Cake.*



ALGOMA STEEL CORPORATION, LIMITED
SAULT STE. MARIE, ONTARIO

Use Quality Drills!

It will pay you to investigate drills that are being used in your shop. Take your foreman into your confidence and let him make tests for you. Let him know that you are interested and desire that he should have the best tools to work with. Drills of quality are more economical because they will drill better and more holes, and last longer, thus increasing production and decreasing the drill cost.

Where there's a WILT-- There's the Way

WILT High Speed and Carbon Twist Drills are famous for their QUALITY

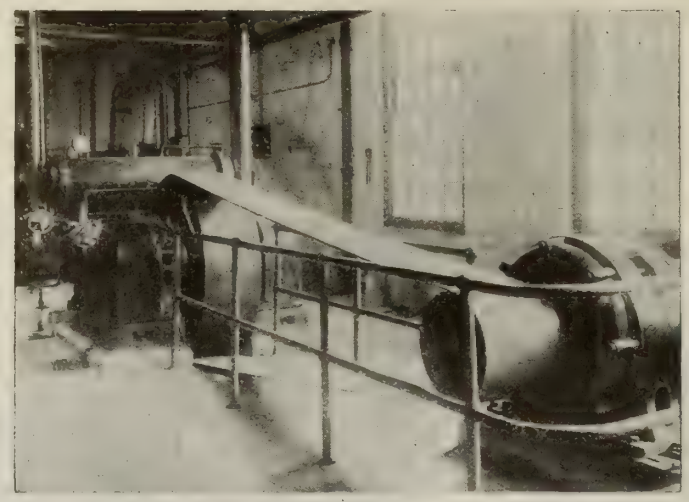
Wilt Twist Drills are produced by new and superior methods assuring accuracy, increased production and long life. Illustration shows head-on view of the drill. The dotted lines indicate three roughing cuts and the finishing cut which takes off the last fifteen-one-thousandths of an inch.

You can rely on WILT DRILLS giving you all the service that any drill can possibly give—a test will prove this.

WILT TWIST DRILL COMPANY
OF CANADA, LIMITED
Walkerville - Ontario

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. (2), England.

WILT HIGH SPEED AND CARBON TWIST DRILLS



Repeat Orders Talk---There is another of our "PLB-2" Air Compressors in this Montreal Plant

The "PLB-2" Air Compressor Bulletin is K-301-A

Canadian Ingersoll-Rand Company, Limited.

Sydney Sherbrooke Montreal Toronto Cobalt Winnipeg Nelson Vancouver

Electrite Uranium

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

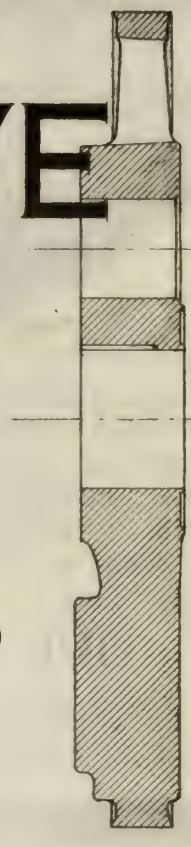
A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO.
ESTABLISHED 1900
Aliquippa Pa. U.S.A.
Represented in Canada by Messrs Norton Callard & Company
MONTREAL QUE.

Strong in the Neck

LOCOMOTIVE CASTINGS



CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL

URANIUM

HIGH SPEED STEEL

Just what causes hardness is a matter of theory, but the cold fact still remains that URANIUM gives a cutting tool that hardness and toughness so essential to cutting tools.

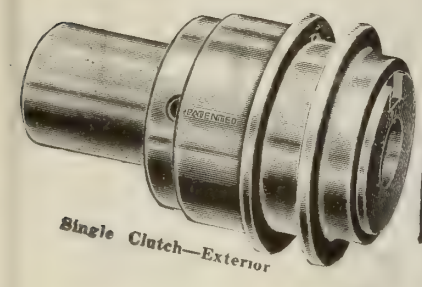
In many shops the use of URANIUM is the sole means of keeping up a large scale production.

Investigate the possibilities of URANIUM.

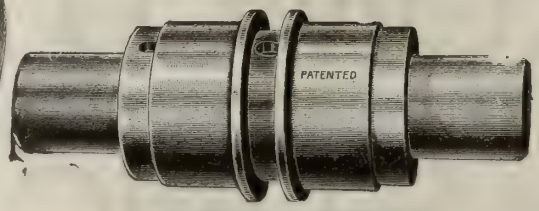
STANDARD ALLOYS COMPANY
FORBES AND MEYRAN AVES.
PITTSBURGH PENNA.

THE JOHNSON FRICTION CLUTCH

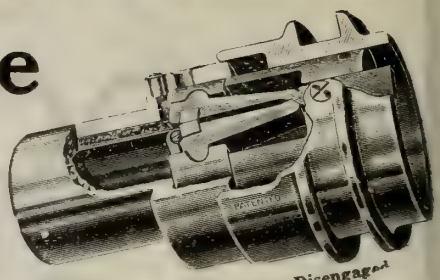
For Your Use



Single Clutch—Exterior



Double Clutch—Exterior



Showing Clutch Disengaged

No matter what your requirements may be, there is a JOHNSON FRICTION CLUTCH ready to give you unfailing service. JOHNSON FRICTION CLUTCHES are small, compact, powerful, easily adjusted with no projecting parts, links or arms to cause accidents. On the overhead shafting, line shafts or countershafts, JOHNSON FRICTION CLUTCHES work to advantage. As a part of machine tools of various kind the JOHNSON FRICTION CLUTCH is unbeatable. What are YOUR clutch requirements? Our booklet, "Clutches as Applied in Machine Building" and

OUR YELLOW DATA SHEETS ON REQUEST

AGENTS: CANADA—Williams & Wilson, 320 James St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe., Chambers. 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takezawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main St., Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Forging Billets and Bars

Electric Furnace

Alloy Steels

Die Blocks

Annealed

Piston Rods Rough Turned

Annealed

High Speed Steel

General Steel Company

Milwaukee, Wisconsin

DETROIT—823 Dime Bank Building

E S&M

ELECTRIC

Steel Castings

High Grade STEEL Castings

Of Every Description

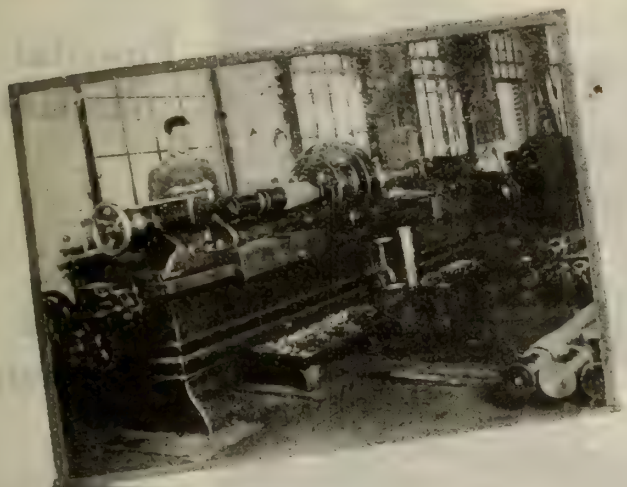
Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

BRIDGEFORD



Heavy Duty Axle Lathes

TO the mechanical official who judges a machine strictly on its merits — "Bridgeford" means a Heavy Duty Lathe which is relied upon to maintain high production and to keep costs uniformly low.

That applies to the Bridgeford line throughout — Engine Lathes — Axle Lathes — Journal Truing Lathes — so that in practically every railroad shop of importance "Bridgefords" handle the lion's share of the difficult heavy turning.

In big plants like the Cambria Steel Company, of Johnstown, Pa., where axle production is on a basis of efficient quantity production, batteries of Bridgefords are kept busy day and night. That these machines have not cost the Cambria Company a nickel for repairs in three years of forced production, is responsible for the recent installation of another large battery of "Bridgefords."

Your demands may be exacting, but Bridgeford Lathes will meet them —your work may be difficult, but Bridgeford Lathes will handle it with ease and economy. Ask us for definite proof of the cost-cutting possibilities of these machines. We can show you a worth-while saving.

Made in sizes ranging from 24" to 72" swing.

BRIDGEFORD MACHINE TOOL WORKS

161 WINTON ROAD, ROCHESTER, N. Y., U.S.A.

Manufacturers of Heavy Duty Lathes for More Than 20 Years

FORD-SMITH

MILLERS

PLAIN AND UNIVERSAL

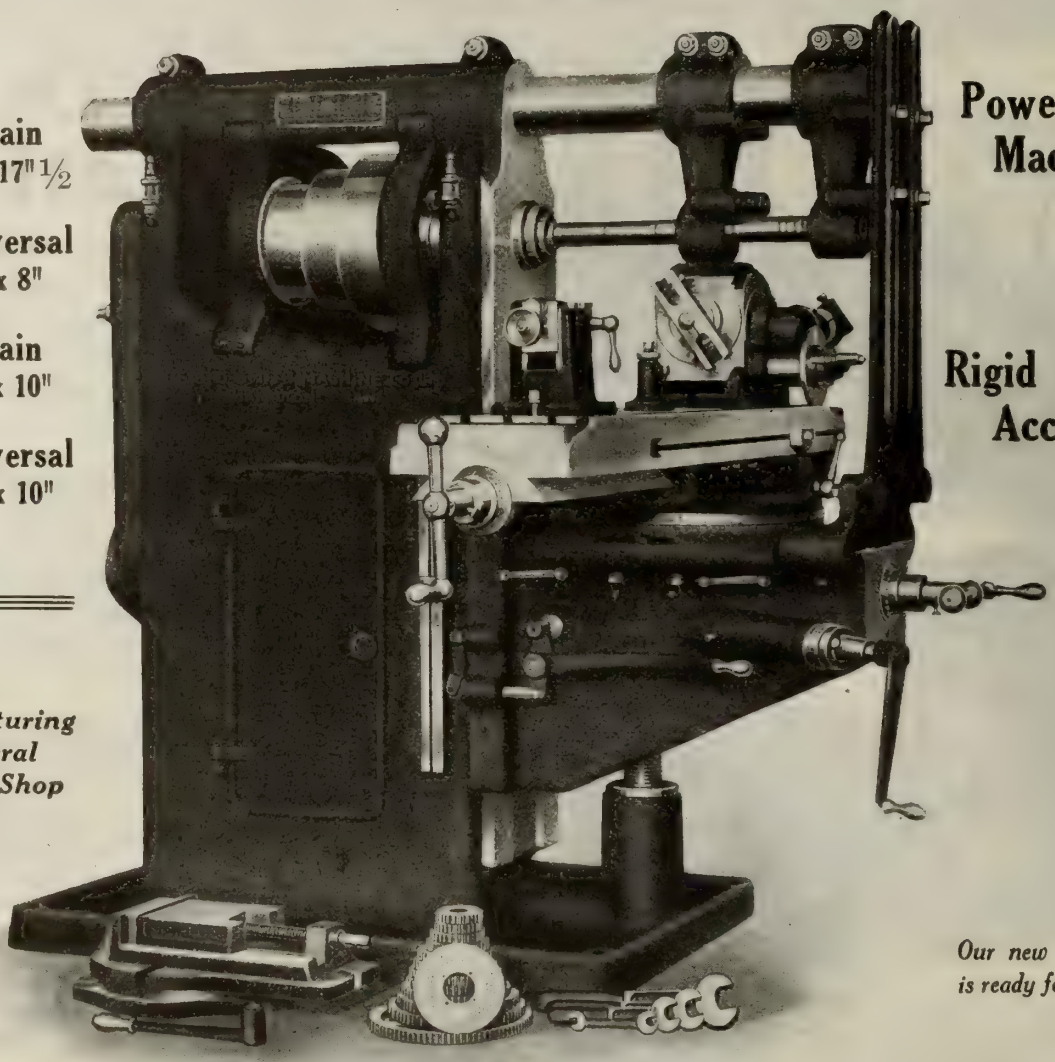
No. 2 Plain
24" x 19" x 17" 1/2

No. 2 Universal
25" x 17" x 8"

No. 3 Plain
34" x 20" x 10"

No. 3 Universal
30" x 19" x 10"

For Heavy Manufacturing and General Machine Shop Work.



Powerful Machines

Rigid and Accurate

Our new Catalogue is ready for mailing

An extract from a recent letter from one of our export agents, Alfred Herbert, Ltd., Yokohama, Japan.

You will be pleased to know that your Millers have been well received here, and we hope to dispose of quite a number more in the near future. We have placed four machines with one of the Japanese Government Arsenals, and they are so pleased with them they want us to let them have two or three more out of the next lot that is coming along.

Manufactured by

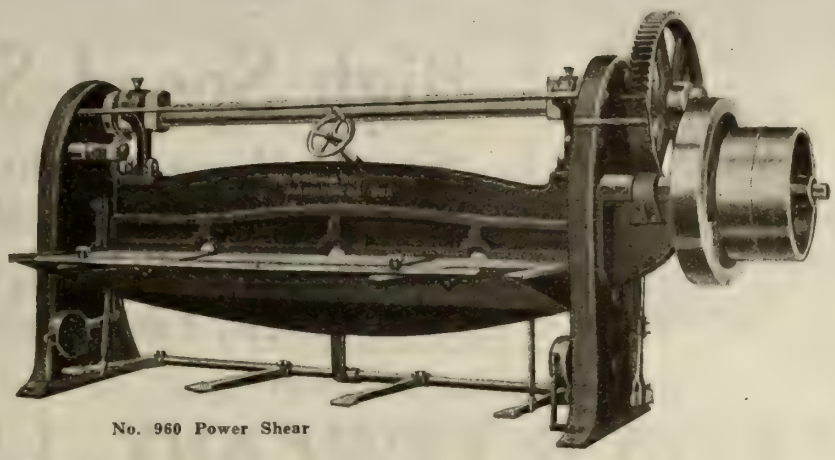
THE FORD-SMITH MACHINE CO., LTD.

HAMILTON, ONT., CANADA

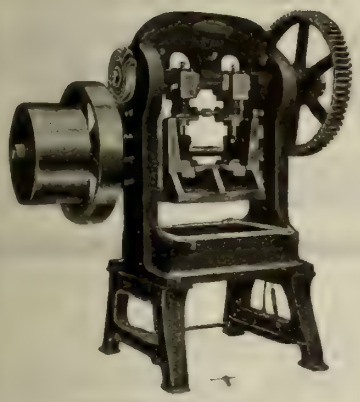
Agent for Great Britain : W. E. Storey, 3 Arundel St., London, England.

Agent for United States and Foreign Countries : Alf. Herbert Ltd. 54 Dey St., New York.

Stood The Test



No. 960 Power Shear



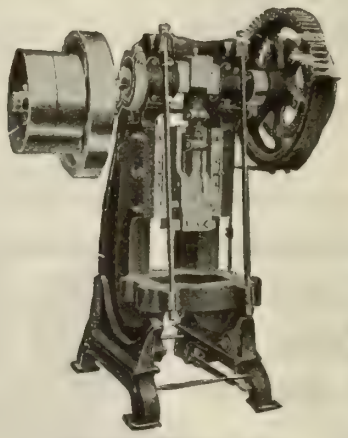
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

Inexperienced help and 24 hours' daily service will test the best machines.

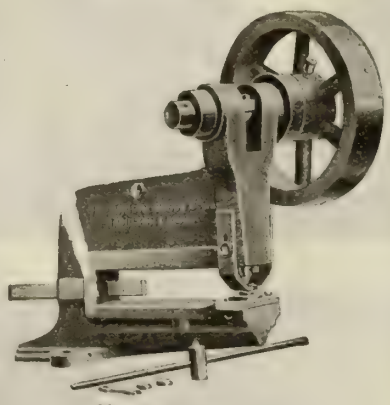
Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press

No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

If any advertisement interests you, tear it out now and place with letters to be answered.

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

GEO. A. MARSHALL & CO.

1118 Queen Street West, Toronto, Ontario

Phone Park. 250

Coal
Coke
Iron Ore

Pig Iron

Victoria

FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

CANADA
FOUNDRIES & FORGINGS
LIMITED

DROP FORGED STEEL

TURNBUCKLES
16 Sizes, with or without Stubs
Large Stock---Quick Action
Produced at
Canadian Billing & Spencer Plant
Welland

Crucible
AND
Open Hearth Steel

Tool Steel

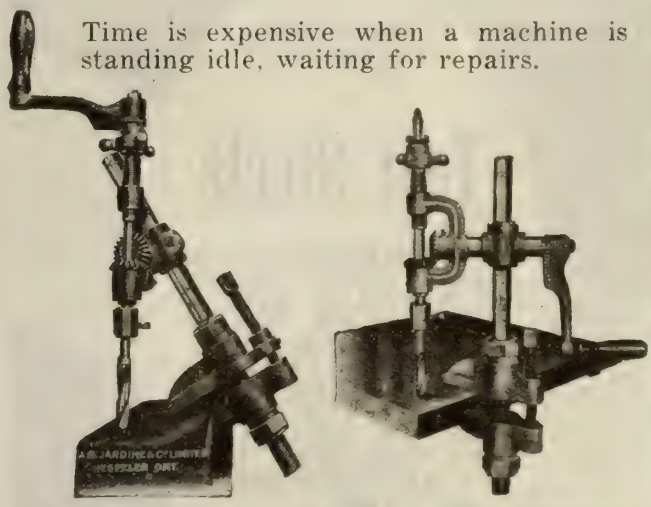
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856
Frankford, Phila.
New York Office 217 Broadway

RALPH B. NORTON, AGENT
Montreal, Canada

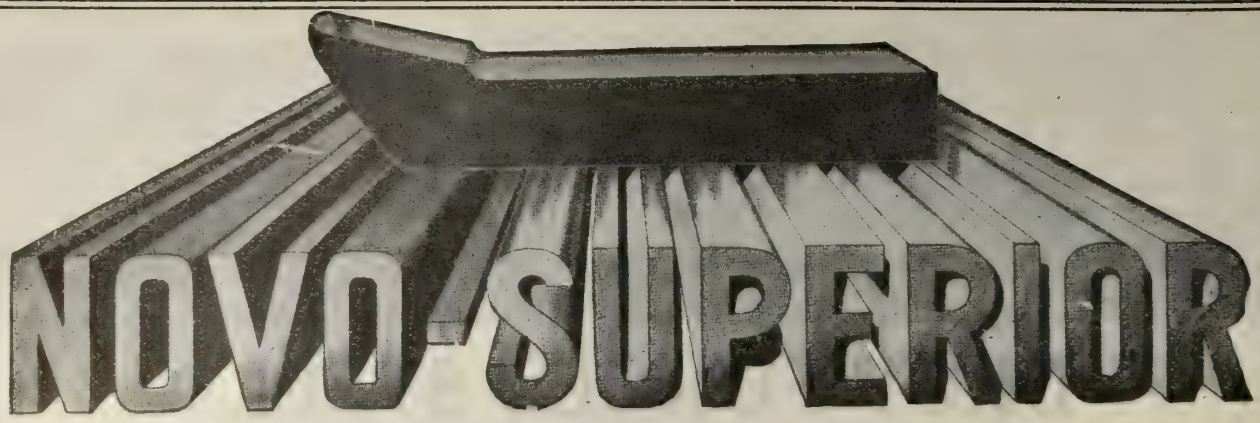
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.
Weight, 40 lbs. Price, $26.50 net.
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc., Music Wire for Springs, Steel Balls. Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws – for wood and for hot or cold metal cutting
Machine Knives – for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James St., Montreal, P.Q.

Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

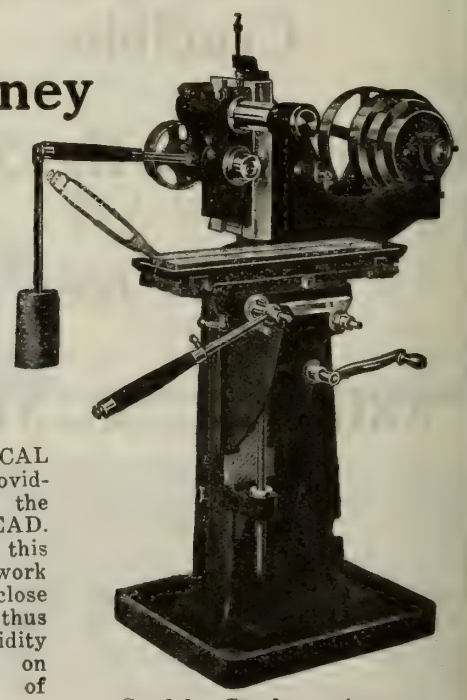
TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

THOUSANDS IN USE

The Whitney

Hand Milling Machine



The VERTICAL FEED is provided for by the SLIDING HEAD. On account of this feature the work can be held close to the table, thus giving a rigidity not possible on other types of Hand Millers.

Send for Catalogue A.

The Whitney Mfg. Co.

Hartford Conn. U.S.A.

Chains—Keys—Hand Milling Machines

STELLITE

"Not Steel but its Master"

Anecdotal

The superintendent in one of the largest machine shops on the continent recently tried an experiment with the idea of substituting High Speed Steel for STELLITE under the delusion that High Speed Steel would do as well and be cheaper.

He gave four tools tipped with High Speed Steel and instructions to do his best, to one of the operators. The production report was watched carefully for a week and it was noted that the man with the High Speed Steel tools was daily in advance of his fellows.

The superintendent then paid a visit to the operator to compliment him on his work when the following conversation ensued:—

Q—"Are you the chap I gave the High Speed Steel tools to ?"

A.—"Yes, sir."

Q.—"How do they work?"

A—"Fine, there they are on the bed of the lathe."

Q.—"What have you got in the lathe?"

A.—"STELLITE—how do you think I got my production?"

MORAL—If the operator wants STELLITE, get it for him—he knows, and the results show in added production.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada

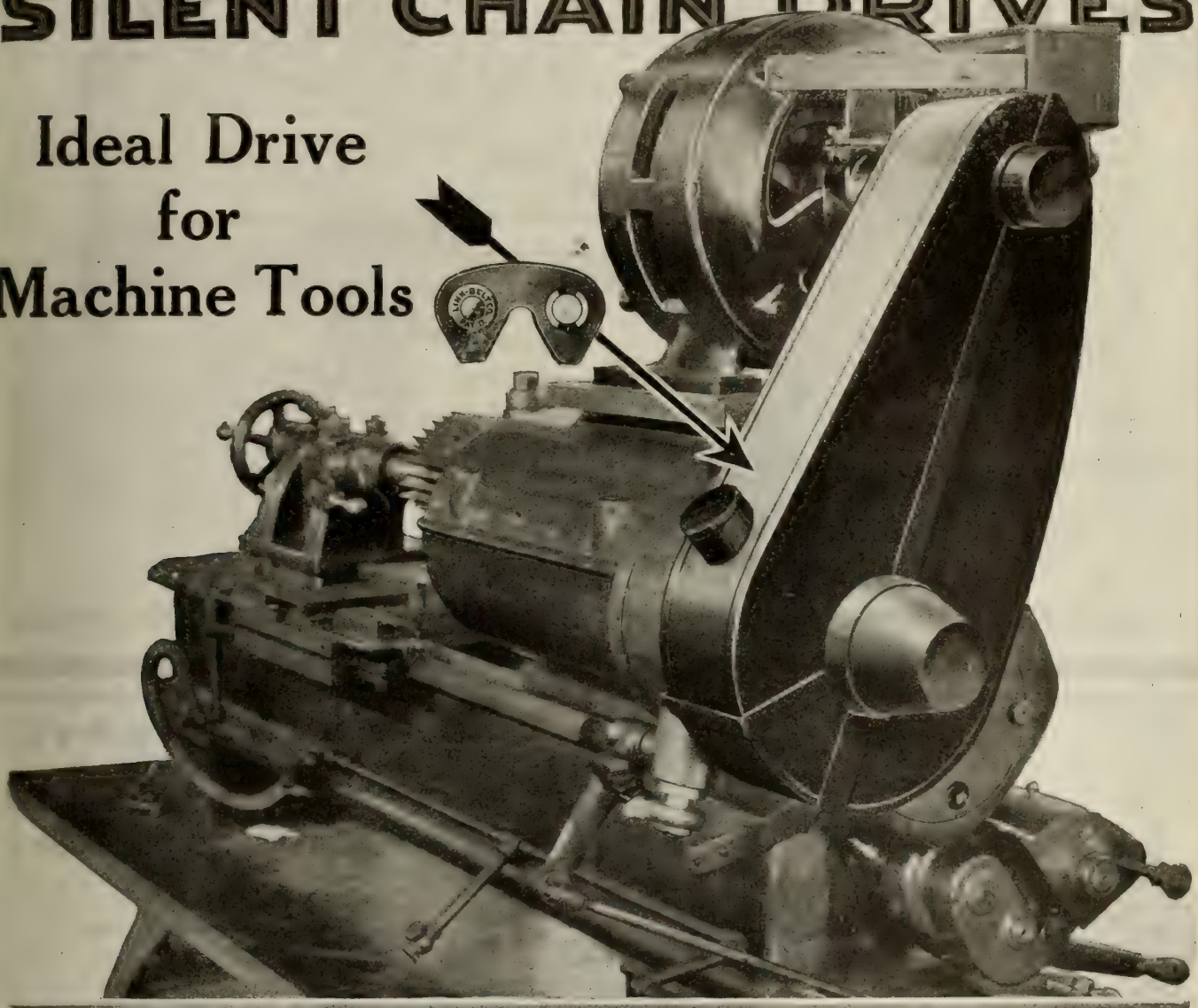
THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

LINK-BELT
SILENT CHAIN DRIVES



LINK-BELT Silent Chain Drives, for direct motor drives on machine tools, form a positive, flexible driving medium operating at 98.2% efficiency, no matter how short the centers.

Belts slip, waste power and cause tools to "chatter." Gears wear, become noisy and afford no "cushion" between motor and machine.

Link-Belt Silent Chain Drives absorb the shock when heavy loads are applied, thus lengthening the life of the machine. They never slip, never waste power, and improve the product. They are "Flexible as a Belt, Positive as a Gear, More Efficient than Either."

Our Machine Tool Drive Book No. 312 gives details. Let us send you a copy.

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Wellington and Peter Streets
TORONTO

An Innovation In the Field of Wall Radial Drills

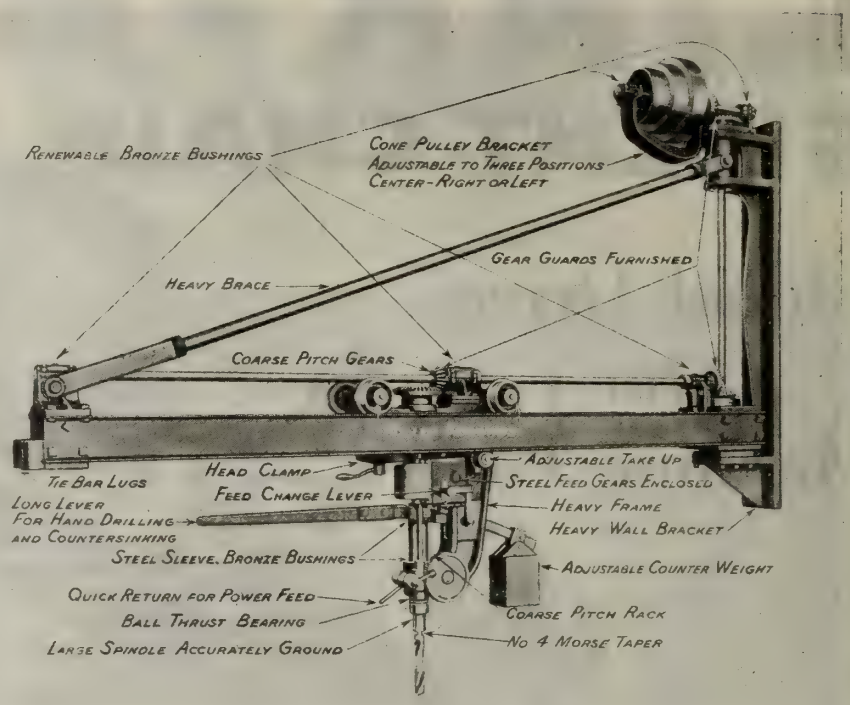
You really can't afford to be without this drill. It's a maximum producer, the entire control being placed within easy reach of the operator. Workmanship and material beyond criticism. Satisfied customers assure us the machine is a "dandy."

Better get our bulletin to-day, giving detailed description.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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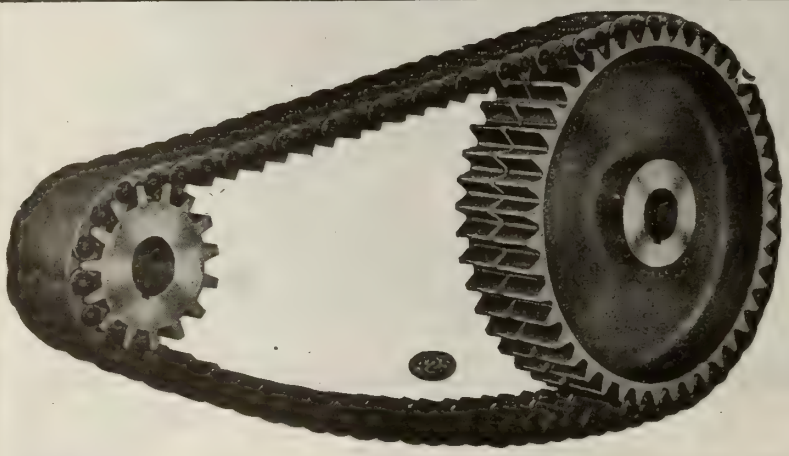

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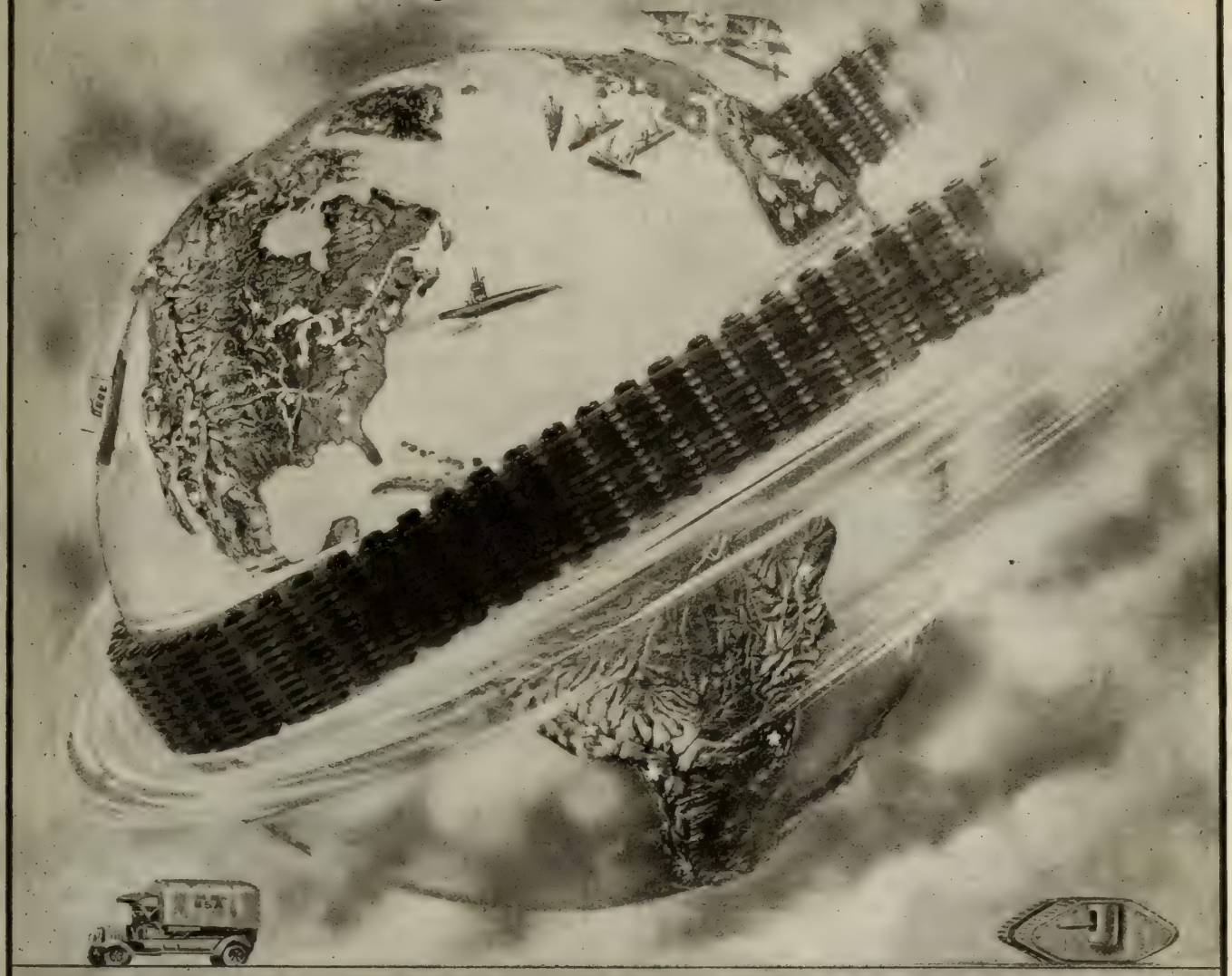

About 2½ MILLION HORSE POWER in WORLD-WIDE SERVICE

MORSE CHAIN CO. Largest Manufacturer of Silent Chains in the World **ITHACA, N. Y.**

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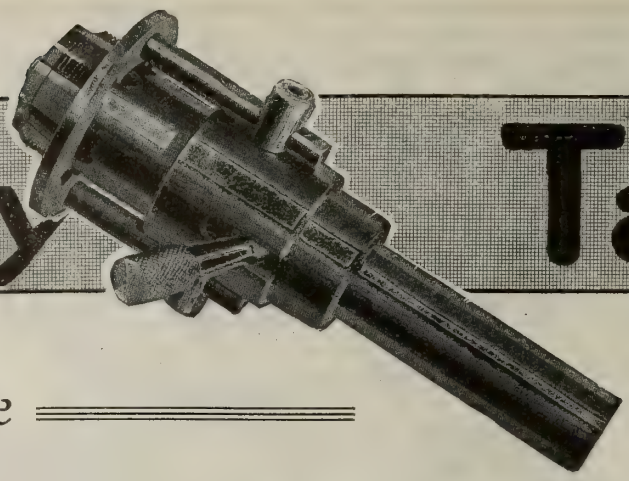
Murchey Taps



They are Collapsible

The only time they don't collapse or bend is under strain of heavy work and when in action. But for speedy adjustment, convenient, quick-acting operation, the collapsible and adjusting features stand prominently in the foreground.

The chasers are adjustable to compensate for any wear, and this feature enables the tap to maintain its minute accuracy, and adds to its general dependability.

The records performed by Murchey Taps on munitions work is equally prominent in general lines. They are built for service, and they give it.

We maintain a special chaser service for our clients that enable them to renew chasers at the minimum cost. Inquire immediately. Quick action means quick solution to your troubles.

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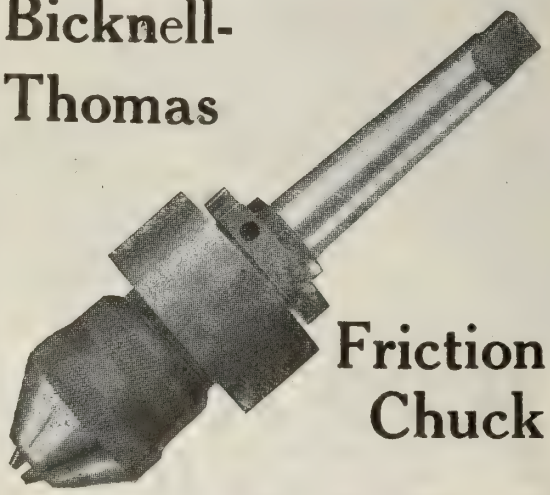
Bicknell-Thomas



Friction Chuck

not only prevents tap breakage but saves loss due to damaged parts and removing taps. It is the simplest Tapping Chuck made; it is the most efficient and fits any kind of machine. It can be used on multiple spindle drills or tapping machines, even when the spindles are close together.

Try one out on us. Write to-day for illustrated circular, describing same fully.

BICKNELL - THOMAS COMPANY
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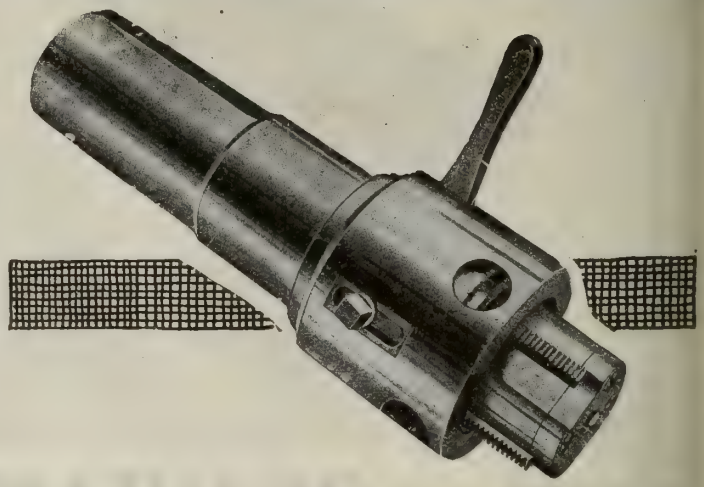


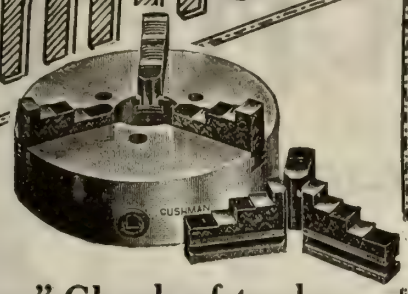
You have seen threads torn and roughed—the result of a tap clogging with chips when backing off. You have seen threads that no mechanic would call smooth and clean. But never have you seen anything but perfect threads in shops using Victor Collapsible Taps. Sizes 1¼" to 12". Moreover, Victor Collapsible Taps save fully half the time on threading operations.

Write for Time Estimates.

Victor Tool Company

Waynesboro, Pa., U.S.A.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

CHUCKS

H & G

Die Head Cuts

Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

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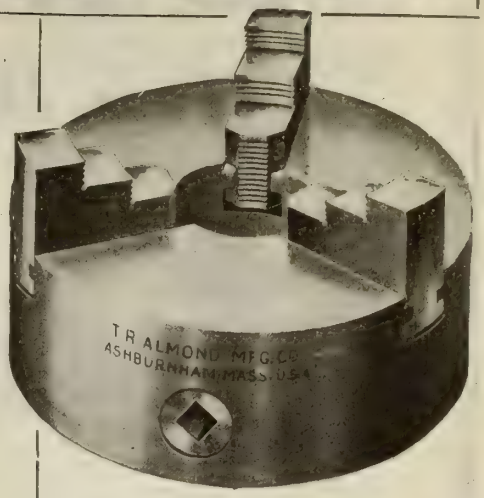
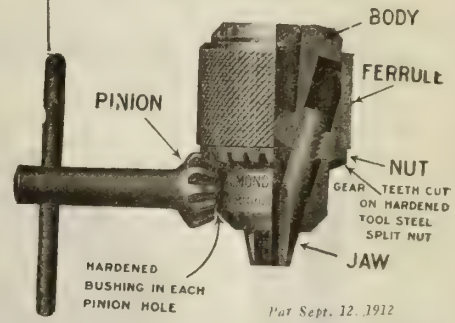


Geared Nut Drill Chucks, in various capacities, 0" to 1".



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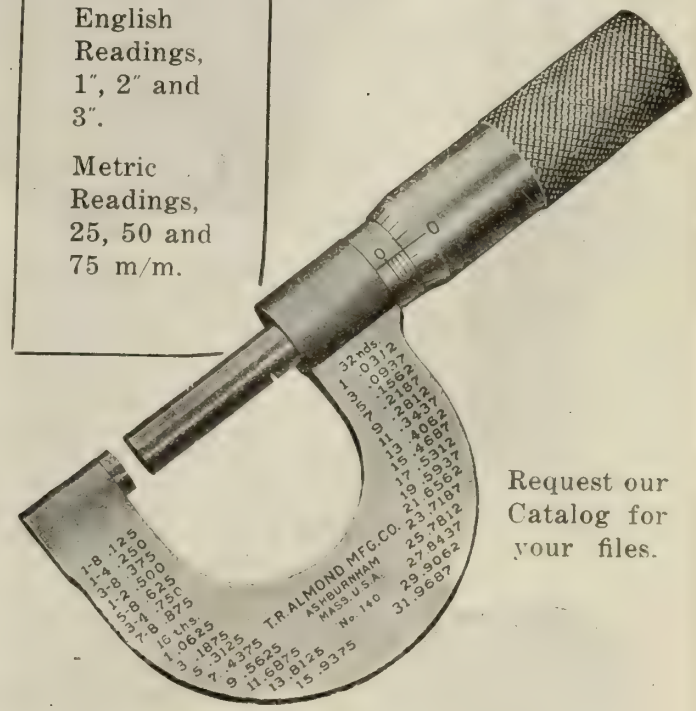
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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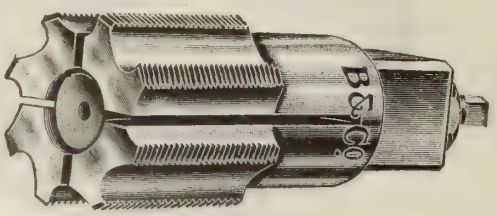
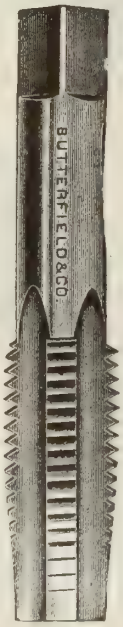
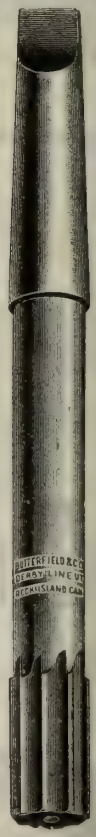




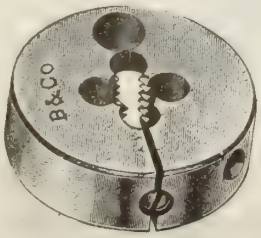


The Deciding Factor in Tool Economy is Quality

Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.



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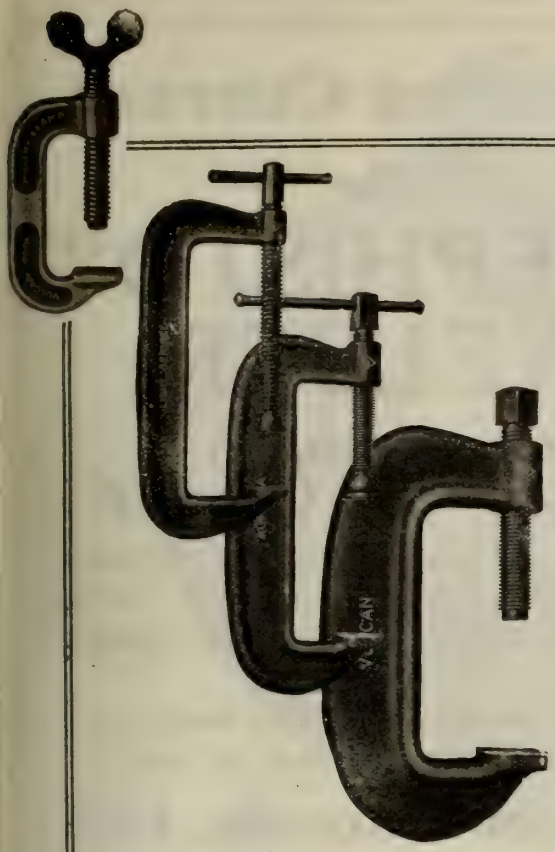
Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office : 220 King St., W.



Williams' Superior Drop-Forged "C" Clamps For Every Purpose

"They Stand the Strain"

Select the "C" Clamp best adapted to your needs. There's "A Williams' Clamp for every purpose."

For Tool Room work, requiring comparatively small opening of jaws, Williams' "Vulcan" Tool Makers' line should be chosen. 4 sizes, 1 to 4" capacities.

For stability and utility—medium service—Williams' "Agrippa" line offers the solution. 7 sizes, 4 to 18" capacities.

For extreme strength and heavy service Williams' "Vulcan" line provides abundantly for both. 11 sizes, ¾ to 12½" capacities.

All are made of a special, high grade steel, and after forging are "heat-treated" to increase their toughness and strength.

Superior Machinists' Tools Booklet on request.

J. H. Williams & Co.

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Agents for Manitoba, Saskatchewan, Alberta and British Columbia.

Any Cut a Machine Can Pull or a Tool Stand, the "Knight" Chuck Can Hold

The "Knight" Three-Jaw, Universal Geared Chuck is solidly constructed, its properly proportioned jaws are exceedingly powerful, and the scrolls are very strong.

Characteristics, ease of control, prompt adjustment, adaptability and great gripping power.

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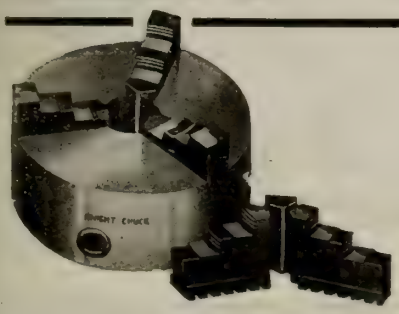

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For Welding Cutting and Lighting

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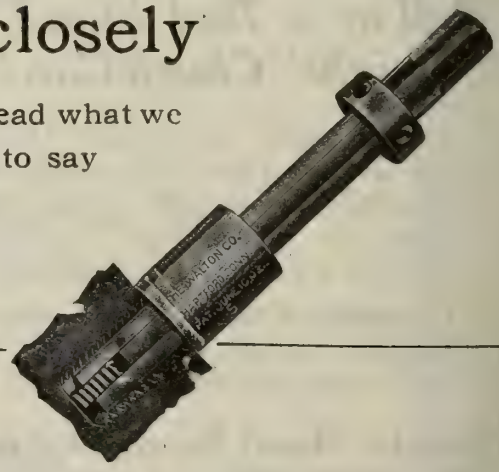
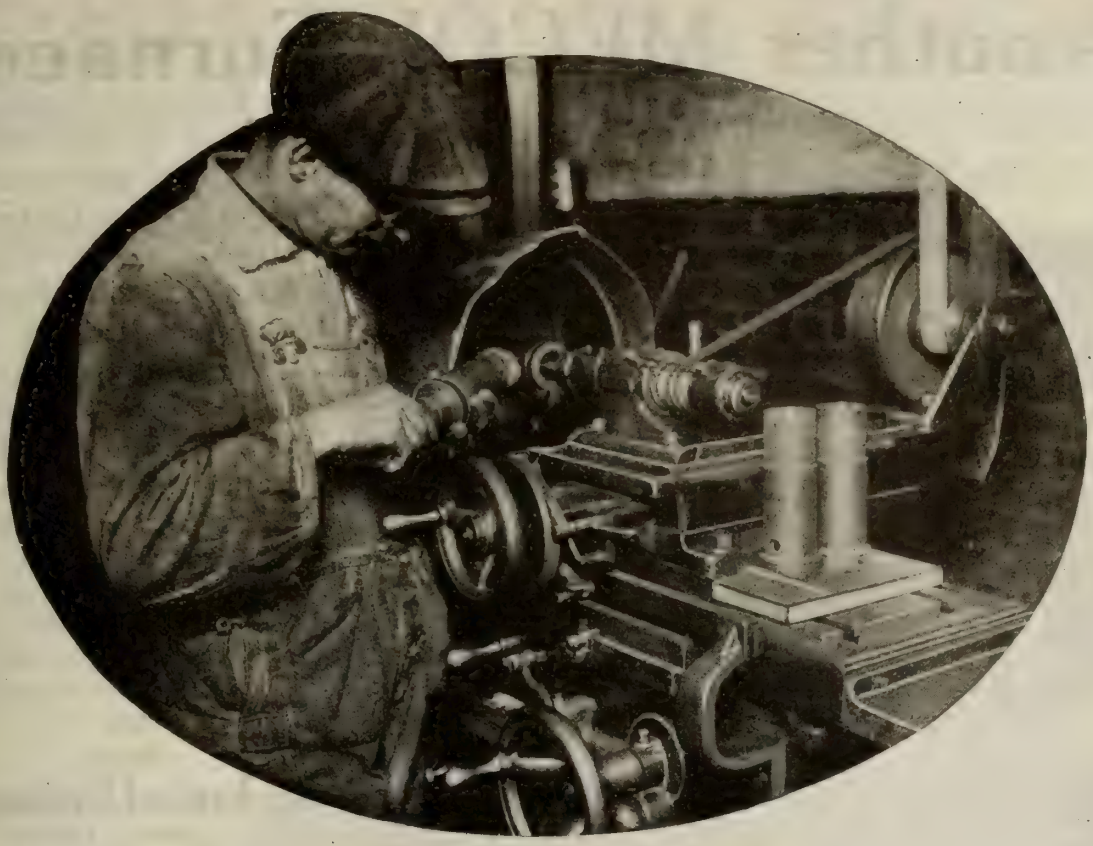
Look at this again —closely

and read what we have to say below



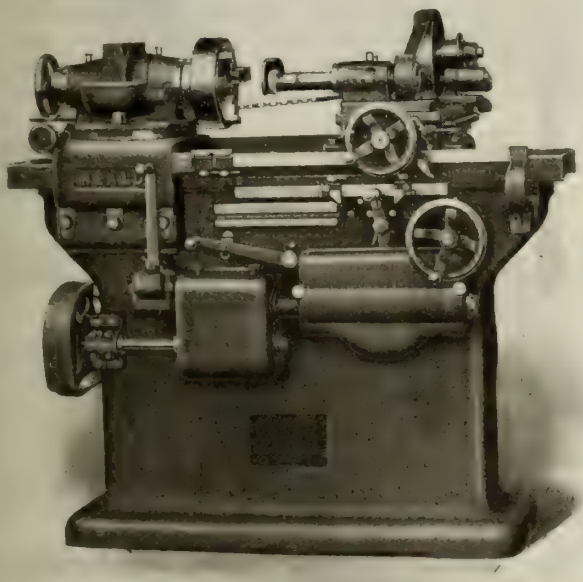
WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.



A Heald Internal Grinder Ten Years Old and Still on the Job

This internal grinding machine was installed at the Blanchard Machine Company's plant at Cambridge, Mass., ten years ago, and has been running continuously ever since on production and precision work.



In the above photograph this machine is grinding a steel sleeve from which it removes .025 inches of stock from a hole 1¾" diameter x 3¾" long to limits of plus or minus .0005 in 15 minutes.

Heald Internals are not limited to accuracy and production, but do angular and face grinding on all kinds of work. Different style heads, instantly interchangeable, make this machine practically a universal grinder.

Notice the lower cut and see if it is not a machine that you would be proud to have in your shop.

The Heald Machine Co.

Worcester Mass.

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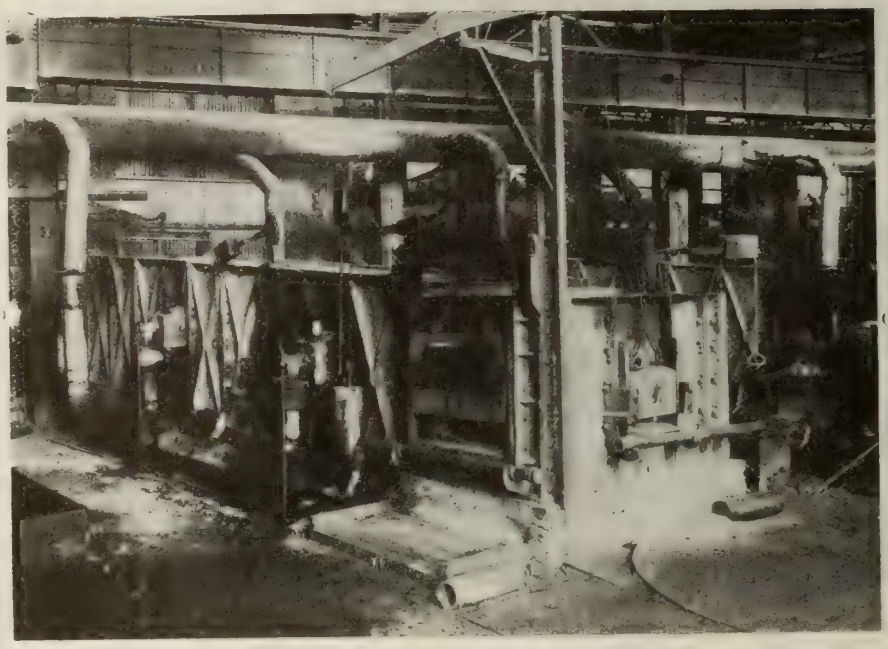
Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

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Mechanical Engineering
Company, Limited
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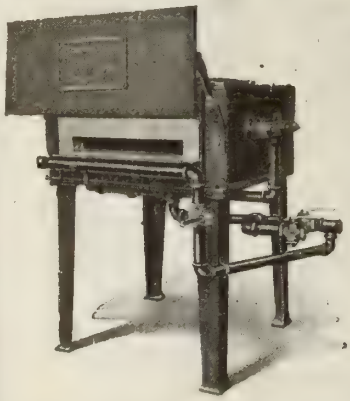
STANDARD FURNACES OIL or GAS

Immediate delivery on all tool room types.



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Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
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The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company
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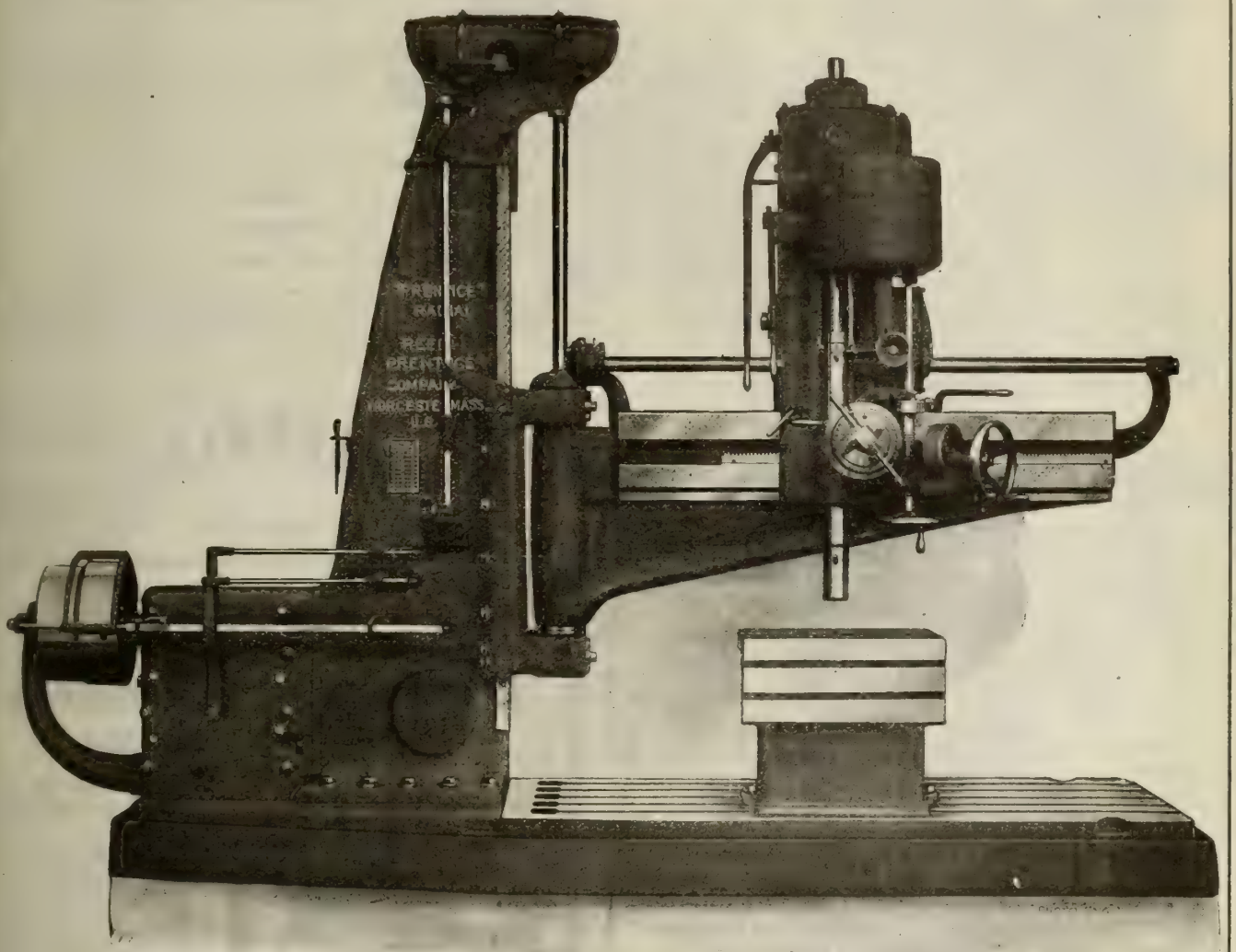
REED-PRENTICE COMPANY

R-P

WORCESTER MASS. U.S.A.



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WE WOULD BE PLEASED TO DEMONSTRATE THEM TO YOU. MAY WE HAVE THIS PRIVILEGE?

CANADIAN FAIRBANKS-MORSE CO., LIMITED
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 22A

Repairing Taps

On the Grinding Wheel

The old mechanic was right when he said: "With a little horse sense and a grinding wheel a broken tap can be made as good as new."

First, square up the end on the face of the handiest tool-room grinding wheel (preferably Alundum). Then grind the relief (the chamfer). That is not so easy as it looks—it requires a little skill to get a radial relief and keep the cutting edges of the lands even. The two principal things to look out for are radial relief and even height of the lands.

Bear lightly with the wheel turning toward the cutting edge of the tooth; it gives a slightly better edge, free from burrs. But the tap must be held firmly enough, so that it will not accidentally be turned, carrying the cutting edge against the wheel. Keep turning slightly to get a radial relief. Light pressure and a cool, free-cutting Alundum wheel practically eliminate the danger of burning or drawing the temper.

On the ordinary tap, the relief or chamfer should be ground back four or five threads, although, sometimes, depending on the work, a six-thread taper is preferable. A broken tooth should be ground entirely away, leaving no jagged edges to tear the thread. When grinding in the flutes to resharpen dull teeth, eliminate nicks, or to remove the burrs, it is preferable to use a free-cutting wheel faced to conform to the shape of the flute. A tap will do the work required of it as long as there are three good threads left.

Alundum wheels are the right tool-room wheels. Vulcanite wheels are largely used for grinding the flutes of taps, and in some cases Vitrified grain 60 to 70, grades O to S, depending upon the method.

NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

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P X H

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Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

Because they are processed entirely by the most expert workmen in this highly specialized trade.

Because they are made in Canada by Canadian Capital and Canadian Labor.

and

Because

"They Cut Faster and Wear Longer."

Ingersoll File Company, Limited

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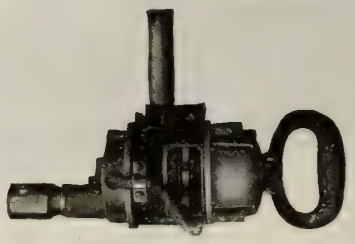
"ASK YOUR JOBBER"

IMPERIAL

TRADE MARK

U. S. Electric Drills and Grinders

Save Time, Labor and Money



3 SIZES

3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.

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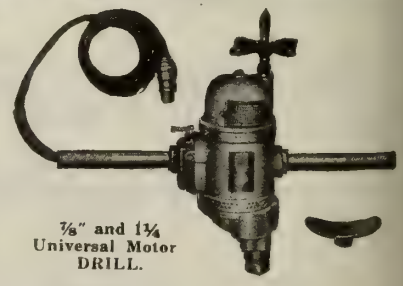

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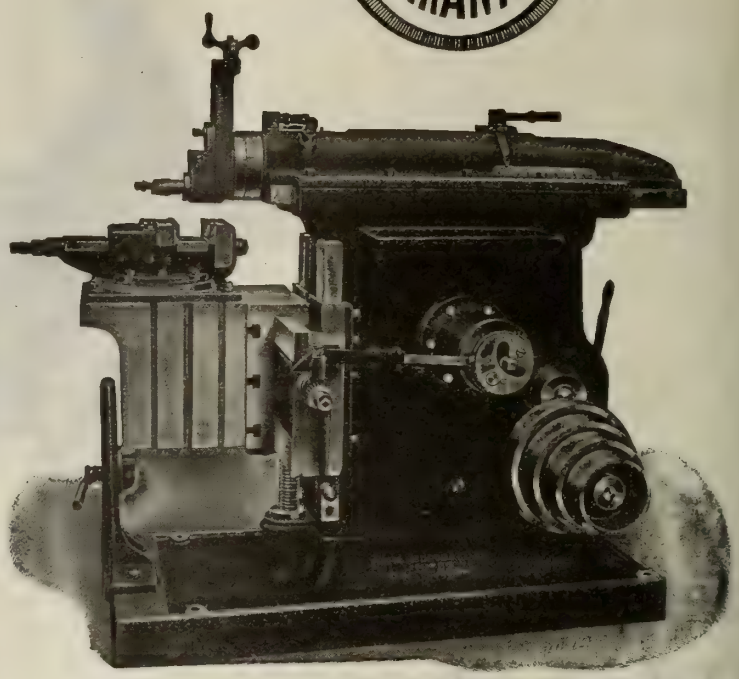

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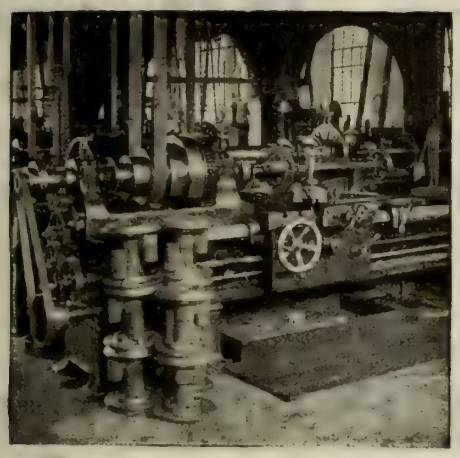

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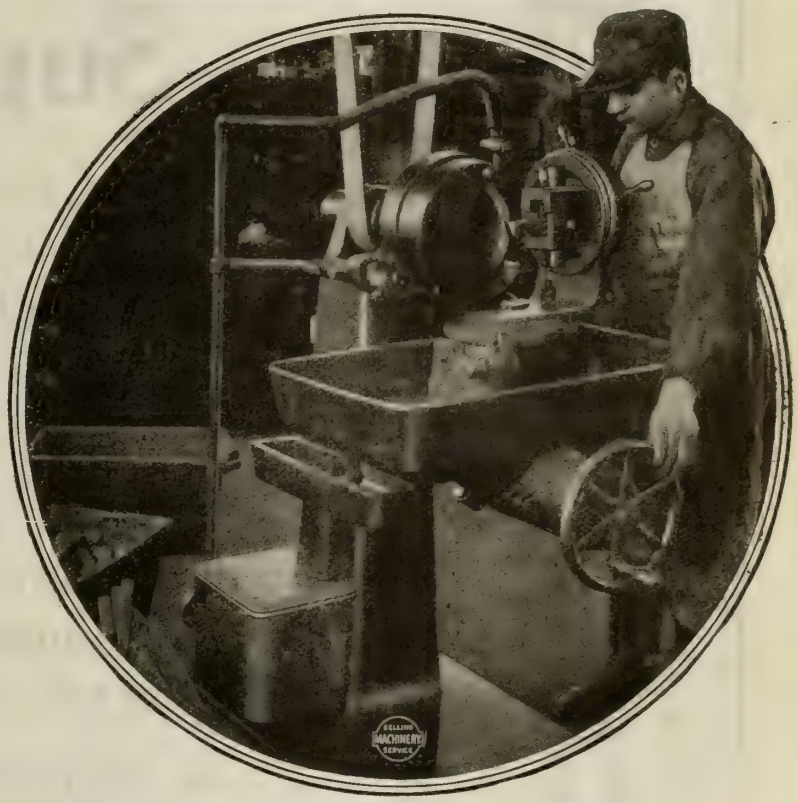

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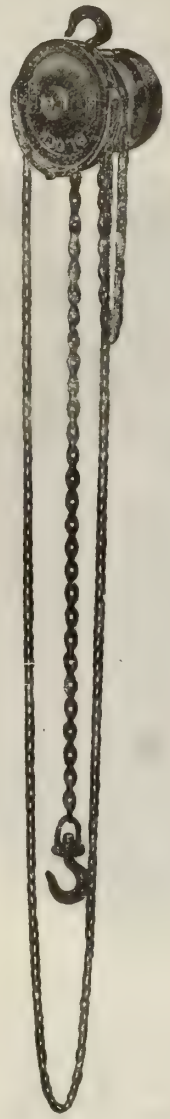

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Volume XX. No. 8 February 20, 1919

The Bessemer Process of Steel Manufacture

How the Impurities Are Burned Out of Iron by One of the Most Spectacular Performances Known to the Trade—Story Told in An Interesting and Plain Manner

THE "Bessemer Process of Steel Manufacture" is dealt with in a most interesting manner by P. N. Case, editor of *The Dragon*, a little booklet issued monthly by the Fafnir Bearing Co., of New Britain, Conn. In an explanatory note, Mr. Case states that the idea is to make the matter descriptive and interesting, rather than putting it in such purely technical shape that only a technical man could appreciate it.

The year 1856, when Sir Henry Bessemer read his paper, "The Production of Pure Iron Without Fuel," marks an epoch in the history of the steel industry; for previous to the invention of the Bessemer Process, steel could not be produced economically, and wrought iron was extensively employed for purposes for which "soft" steel—that is, steel containing relatively small percentages of carbon—is now used almost universally. Not only did the Bessemer Process make possible the production of steel at lower cost than wrought iron could be produced, but the former is far superior for many purposes to wrought iron, which is apt to be considerably weakened through mixture with slag.

DEFINITION OF STEEL

In order fully to comprehend the principles involved in the manufacture of Bessemer Steel, it is essential that the reader appreciate the fundamental distinction between the two broad terms, "iron" and "steel." Chemically pure iron does not exist commercially, but is invariably associated with other elements in varying proportions. In other words, iron as we know it in everyday life, is in reality an alloy consisting chiefly of iron and much smaller percentages of several other constituents, such as carbon, silicon, manganese, phosphorus, and sulphur. Of these elements found in combination with iron, carbon is the most important, since it is the most useful and because it exerts the most powerful influence on the physical character of the metal. Broadly speaking, steel is simply pig iron (which is iron in the molten state as it is reduced in the blast furnace) containing relatively small percentages of those secondary elements, especially carbon. While there is no sharp line of demarcation by means of which pig iron can be differentiated from steel, it will suffice for the purposes of this article to assume that pig iron which has been refined to the point where its carbon content is less than 1.5 per cent. becomes steel.

Therefore, the conversion of pig iron to steel is a process of refinement, consisting essentially in the removal of the excess of impurities. This is accomplished by oxidation, the volatile substances—such as the oxides of carbon—passing off as gas, while the solid oxides, being lighter than the metal, float on the surface of the bath from which they are easily separated. In all but the Bessemer Process this is a slow operation, and is accomplished in some sort of furnace with the addition of much heat from an external source. The Bessemer Process, however, makes use of a radically different principle, as we shall now see.

THE BESSEMER PROCESS

If we touch a lighted match to a scrap of paper, it burns quickly, accompanied by the liberation of considerable heat. Now when a piece of old iron rusts out in the dump, precisely the same thing happens—only more slowly. In both cases, oxidation takes place. Oxidation is the chemical reaction which occurs when some element, such as carbon or iron, combines with oxygen of the air, forming an oxide. The phenomenon of "burning" is merely very rapid oxidation. Moreover, when iron rusts, heat is generated, but is not noticeable because the process is so very gradual. However, if the iron or its impurities could be made to "burn," a vast amount of heat would be generated within a short space of time, and this is just what happens in the Bessemer Process.

Pig iron is tapped from the blast furnace at approximately 1,400 degress Centigrade (2,552 degrees Fahrenheit), at which high temperature its several constituents will "burn" much the same as

the piece of paper just mentioned by way of illustration. Here the reader may wonder why the iron does not burn as soon as it leaves the blast furnace. The answer is simple. The oxygen of the air does not penetrate throughout the molten mass, but merely comes in contact with the surface of the metal. A simple illustration will serve to make this point clear. The coal on the grate of a locomotive, for example, would not burn to any extent if the air merely passed over its surface. It is necessary that a strong current of air be forced up through the grate bars and the overlying layers of coal. In fact, in every boiler plant where coal must be burned rapidly, provision must be made to obtain a strong draft. In this way two things are accomplished: first, a large amount of air is provided, containing sufficient oxygen to facilitate rapid "burning" of the coal; second, the air is brought into intimate contact with every particle of coal. This last consideration is just as important as the first; for obviously, the coal cannot be oxidized (burned) if oxygen does not come in contact with it. The same principle holds good in the case of pig iron; it is only necessary to force a large enough quantity of air all through every particle of the hot, molten mass, in order to make it "burn."

However, there is another factor of fundamental importance in its influence on the Bessemer Process —indeed, the process could not possibly exist otherwise—which I shall now explain. At the particular temperature at which pig iron is tapped from the blast furnace, the impurities—such as silicon, manganese and carbon—have a greater affinity for oxygen than has the metallic iron itself. Consequently, if a strong blast of air is forced through a mass of pig iron, those impurities will "burn" before the iron does. Moreover, some of the oxides thus formed are volatile and vanish of their own accord, while the others which are liquid are lighter than the molten metal and, consequently, rise to the surface, forming a viscous layer of scum (slag) on top of the metal. This slag can then easily be separated from the metal.

It was these principles which inspired Sir Henry Bessemer to conceive the method which bears his name of converting pig iron into steel. As practised in America, 10 or 12 tons of pig iron are placed in an eggshaped converter, or vessel, of suitable size, and an air blast injected through the bottom. When the impurities have been oxidized or "burned" (which requires only about 15 minutes) and separated from the bath, the remaining metal is as nearly chemically pure iron as is ever attained, except, possibly, in the experimental laboratory. It remains only to calculate and add to the metal the proper proportions of carbon, silicon, manganese and any other elements desired, to give the steel the composition which has been definitely predetermined. This operation is known as "recarburization."

The "burning" of the impurities in the pig iron results in the generation of a vast amount of heat, some of which is lost in the surrounding atmosphere, while the balance serves to raise the temperature of the molten metal to a "white" heat. This is very fortunate, since when the impurities are "burned" out of the pig iron, the melting point of the metal becomes much higher, and it is essential that the steel be liquid when finished, in order that it will flow freely. The final step consists in pouring the liquid steel into molds, which are withdrawn as soon as the metal is sufficiently chilled. The steel ingots are then ready to be transferred to the rolling mill where they are rolled into sheets or billets for commercial use.

From the above outline, it will be evident that the outstanding features of the process are: the rapidity with which pig iron can be converted into steel: the fact that no fuel is required, other than that contained in the pig iron itself in the form of impurities: and that the pig iron thus refined does not have to be remelted.

PHOSPHORUS AND SULPHUR

Before concluding this introductory chapter, however, it will be well to note that there are two variations of the Bessemer Process. The one originally developed is known as the "Acid" Bessemer Process, and by this method, neither phosphorus nor sulphur can be eliminated from the pig iron and discarded in the slag with the other impurities. However, both phosphorus and sulphur greatly injure steel; the former makes the metal "cold short," or brittle when cold and, therefore, liable to fracture; the latter makes steel "red short," which means that it is brittle while hot and, consequently, cannot safely be forged. Therefore, it is of paramount importance that the pig iron used shall contain no larger percentages of those two elements than are allowable in the finished steel. For commercial purposes, the standard limits are 0.1 per cent. phosphorus and 0.8 per cent. sulphur. Pig iron which comes within those limits is known as "Bessemer Pig Iron."

A modification of the "Acid" Process, known as the "Basic" Bessemer Process, was subsequently developed, by means of which virtually all of the phosphorus and most of the sulphur can be removed from the pig iron. However, only pig iron which contains very little silicon and a relatively high percentage of phosphorus can advantageously be treated by this process. In Europe, where pig iron of this character is available at a low price, the Basic Process is extensively used. In fact, it is hardly an exaggeration to say that the Basic Bessemer Process has been one of the salient factors contributing to Germany's industrial development during the past generation. On the other hand, in the United States, where iron ore containing very little phosphorus is more abundant, the Acid Bessemer Process is exclusively employed.

Ball Bearings in Tractor Design

Arduous Nature of Work Necessitated by Rough Ground Makes Ball-Bearings Particularly Adaptable to Tractor Work — Reprinted From "Tractor and Trailer"

By H. M. TRUMBULL

As the tractor is one of the most expensive of agricultural machines, the farm operator has now learned to make a careful study of its mechanical features before purchasing. If he were buying a one-season machine, or if first cost were the only consideration, the selection of his tractor would be a comparatively simple matter, but as he is looking for permanent value he investigates the details which insure reliability and dependable service.

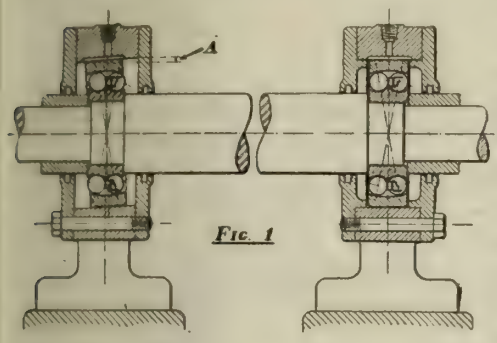


Fig. 1

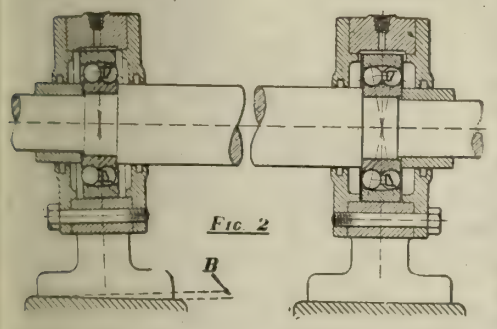


Fig. 2

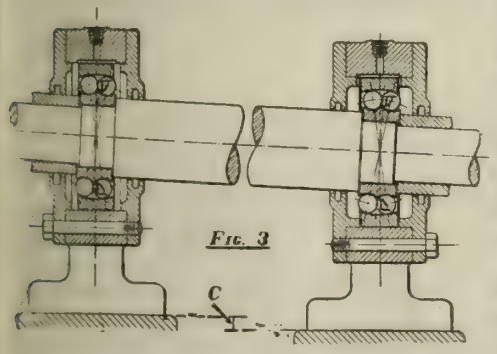


Fig. 3

In order to operate successfully, a tractor must be designed for durability and strength combined with flexibility. Reduction in operating and maintenance cost is also of vital consideration. The use of high grade ball bearings of the self-aligning type is a long step toward the fulfilment of these requirements.

The exacting conditions of rough, undeveloped country are a severe test for any machine. What happens when a tractor strikes a rock or stump or drops into a furrow? Are undue strains then placed upon the vital parts of the mechanism? Such loads, strains and vibrations are carried to a large extent by the bearings.

A farm tractor from the nature of its work receives much abuse. The ground upon which it travels necessitates a method of compensating for shaft distortions. When the wheels are in a furrow these shaft distortions are enormous and unless compensated for by self-aligning ball bearings, friction and binding strains will increase and the cost per tractor hour will rise. It is therefore folly to economize on bearings. Only the best should be used.

How about the cost of ball bearings? True, the initial price of these bearings is more. But in considering the factor of cost of bearings this item should include not only the first cost, but also the cost of replacements and repairs for the period of years that the tractor is in service; i. e., the value of a ball bearing is not in the price paid for it, but in the combination of price with service obtained.

Another angle on the cost question: If a $1,000 tractor will deliver 3,000 lbs. at the draw-bar the cost per lb. of draw-bar pull is $.333. If by equipping this tractor with ball bearings the draw-bar pull is increased 10 per cent. at a cost of $50, the additional 300 lbs. cost but $.166 per lb. The cost per lb. of draw-bar pull and the cost of operation are factors which are being weighed by the purchaser, and ball bearings give the maximum period of service and the minimum cost of operation.

Another important feature is the lubricant saving. Ball bearings are enclosed in tight housings, which keep the lubricant in and the dust and dirt out. These bearings need no other attention than a change of lubricant once a season.

The following engineering data and the accompanying illustrations will prove of interest to tractor designers:

The first six figures show how various inaccuracies in mounting may be overcome by the use of self-aligning ball bearings.

Figure 1 shows the result of inaccurate boring. The right-hand pillowblock is perfectly bored; the left-hand one is not, as shown at A. Note how the ball bearing compensates for this, due to the self-aligning feature. Any other bearing would bind under such conditions. But self-aligning ball bearings cannot bind.

These ball bearings operate in spite of such inaccuracies. They will operate without trouble of any kind under such conditions—conditions that would ruin any other bearing.

Figure 2. Again we have inaccurate machining. This time the base of the left-hand pillowblock is not machined correctly, as shown at B. This throws the pillowblock out of line. But due to the self-aligning construction, the bearing runs perfectly free under these conditions. Note that the shaft is perfectly horizontal.

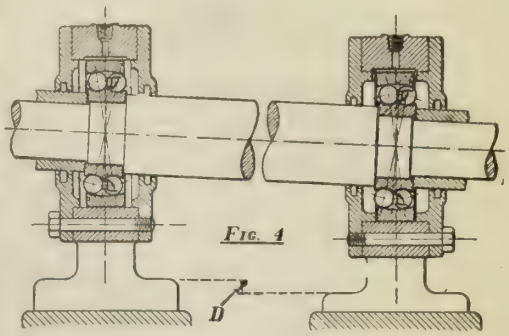


Fig. 4

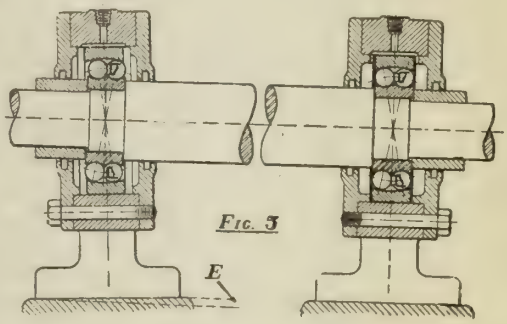


Fig. 5

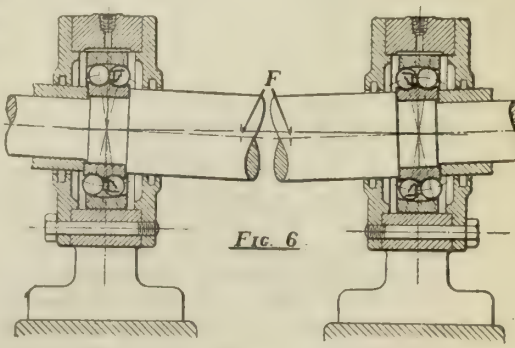


Fig. 6

Figure 3 shows what happens when the tractor frame weaves. The channel section carrying the right-hand pillowblock has dropped the distance shown by C. Any other bearing would bind and heat under this condition. But notice how both ball bearings have rotated in the spherically ground outer race to align themselves properly. As soon as

the frame returns to normal position the ball bearings will also turn to that position. This is the advantage of instantaneous, automatic self-alignment.

solutely horizontal, although the frame is twisted and the left pillowblock is not vertical. No other bearing made will compensate for twisting like this.

freedom, even though it is deflected or sprung.

Figure 7. Figure 1 of Figure 7 shows the standard shaft shoulder and housing

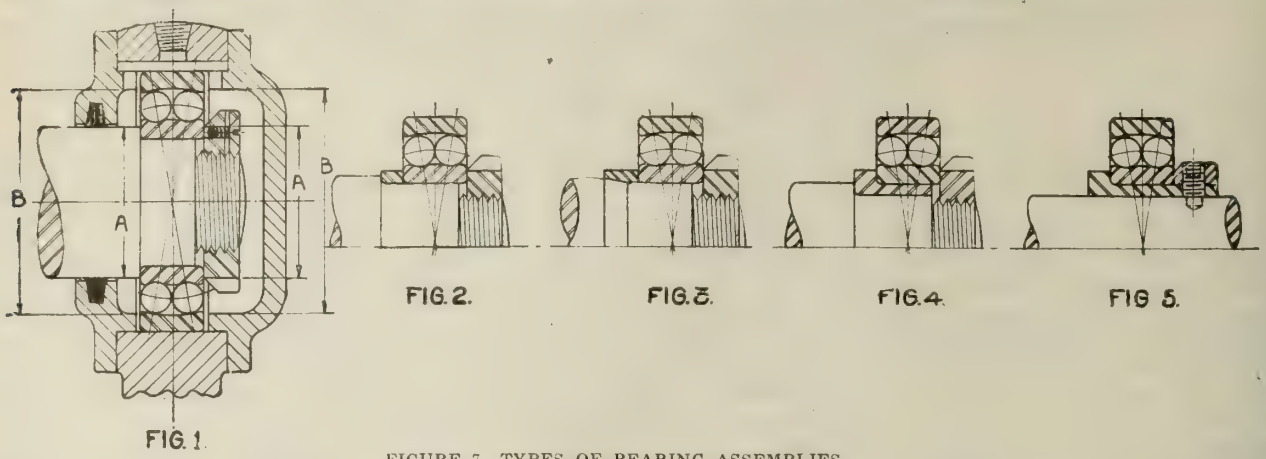


FIGURE 7—TYPES OF BEARING ASSEMBLIES

Figure 4 shows another example of improper machining. Too much metal has been removed from the base of the right-hand pillowblock. The amount is

Figure 6 shows deflection due to a heavy load on the shaft. Note that both pillowblocks are vertical, although the shaft is deflected. Note also that the

shoulder. A table of dimensions giving correct shoulder sizes for all bearing sizes is also given in Figure 8.

Where it is impossible to use a shaft

Bearing No.	1200—1500—2200				1300—1600—2300				400				1400			
	A		B		A		B		A		B		A		B	
	Max.	Min.	Min.	Max.	Max.	Min.	Min.	Max.	Max	Min.	Min.	Max	Max.	Min.	Min.	Max.
0	19/32	9/16	29/32	15/16	21/32	9/16	1 1/16	1 1/8								
1	11/16	21/32	1	1 1/32	23/32	21/32	1 5/32	1 7/32	23/32	21/32	1 15/32	1 19/32	23/32	21/32		
2	13/16	25/32	1 1/8	1 5/32	29/32	25/32	1 5/16	1 3/8	29/32	25/32	1 11/16	1 3/4	29/32	25/32	1 9/16	1 11/32
3	15/16	7/8	1 9/32	1 5/16	1 1/32	7/8	1 15/32	1 19/32	1 1/32	7/8	2	2 1/8	1 1/32	7/8	1 7/8	2 1/8
4	1 3/32	1 1/32	1 1/2	1 9/16	1 1/8	1 1/32	1 5/8	1 3/4	1 1/8	1 1/32	2 5/16	2 1/2	1 1/8	1 1/32	2 3/32	2 1/2
5	1 9/32	1 7/32	1 23/32	1 25/32	1 3/8	1 7/32	2	2 1/8	1 3/8	1 7/32	2 21/32	2 13/16	1 3/8	1 7/32	2 5/8	2 7/8
6	1 9/16	1 1/2	2 1/32	2 3/32	1 5/8	1 1/2	2 5/16	2 7/16	1 5/8	1 1/2	2 31/32	3 1/8	1 5/8	1 1/2	2 11/16	3 1/16
7	1 13/16	1 11/16	2 3/8	2 7/16	1 27/32	1 11/16	2 5/8	2 3/4	1 27/32	1 11/16	3 5/16	3 1/2	1 27/32	1 11/16	3 9/32	3 5/8
8	2 1/16	1 15/16	2 5/8	2 11/16	2 1/8	1 15/16	2 15/16	3 1/8	2 1/8	1 15/16	3 21/32	3 7/8	2 1/8	1 15/16	3 9/16	3 11/16
9	2 9/32	2 5/32	2 27/32	3	2 3/8	2 5/32	3 5/16	3 1/2	2 3/8	2 5/32	4	4 1/4	2 3/8	2 5/32	3 7/8	4 1/16
10	2 15/32	2 13/32	3 1/32	3 3/32	2 19/32	2 11/32	3 5/8	3 13/16	2 19/32	2 11/32	4 13/32	4 5/8	2 19/32	2 11/32	4 1/8	4 5/8
11	2 3/4	2 1/2	3 3/8	3 1/2	2 27/32	2 1/2	3 31/32	4 7/32	2 27/32	2 1/2	4 11/16	5	2 27/32	2 1/2	4 9/16	5
12	3	2 3/4	3 11/16	3 13/16	3 3/32	2 3/4	4 13/32	4 17/32	3 3/32	2 3/4	5	5 5/16	3 3/32	2 3/4	4 3/4	5 7/16
13	3 1/4	3	4 1/16	4 3/16	3 13/32	3	4 11/16	4 13/16	3 13/32	3	5 5/16	5 3/4	3 13/32	3	5 1/4	5 5/8
14	3 15/32	3 7/32	4 9/32	4 13/32	3 11/16	3 7/32	5 1/32	5 1/4	3 11/16	3 7/32	6	6 3/8	3 11/16	3 7/32	6	6 1/2
15	3 11/16	3 3/8	4 1/2	4 5/8	3 29/32	3 3/8	5 5/16	5 5/8	3 29/32	3 3/8	6 3/8	6 3/4	3 29/32	3 3/8	6 1/4	6 3/4
16	3 29/32	3 15/32	4 25/32	4 29/32	4 5/32	3 15/32	5 23/32	6	4 5/32	3 15/32	6 11/16	7 1/4	4 5/32	3 15/32	6 11/16	7 3/16
17	4 3/16	3 7/8	5 1/8	5 1/4	4 17/32	3 7/8	6 1/32	6 3/8	4 17/32	3 7/8	7 1/8	7 1/2	4 17/32	3 7/8	6 15/16	7 9/16
18	4 7/16	4 1/8	5 15/32	5 19/32	4 5/8	4 1/8	6 3/8	6 3/4	4 5/8	4 1/8	7 15/32	8 1/8	4 5/8	4 1/8	7 13/32	8 1/8
19	4	4 3/8	5 27/32	6	4 27/32	4 3/8	6 23/32	7 3/16	4 27/32	4 3/8	7 15/16	8 15/16	4 27/32	4 3/8	8 3/16	9
20	4 29/32	4 15/32	6 3/32	6 9/16	5 7/32	4 15/32	7 7/32	7 3/4	5 7/32	4 15/32	8 5/8	9 5/8	5 7/32	4 15/32	8 11/16	9 9/16

Table giving Proper Shaft and Housing Shoulders in inches.

FIGURE 8

shown at D. This is magnified above what it would be in practice to show what the result is. The centres of the two bearings do not lie on a horizontal line. The centre of one is below the centre of the other. In ordinary bearings this means binding and finally bearing failure. But with the shaft carried on self-aligning ball bearings the shaft turns perfectly. There can be no binding and no heating.

Figure 5 shows the left-hand section of the frame twisted slightly as at E. This is a condition every tractor must meet. In a tractor that uses self-aligning ball bearings there can be no trouble, since the bearing will align itself, as shown in the left-hand pillowblock. Note that the pillowblock and the outer race of the bearing have turned as the frame twisted; but the balls and inner race of the bearing have remained in their original position. The shaft is ab-

inner race and balls of the ball bearing have turned in the outer race. There is no strain on the bearings due to bending. The shaft will turn with absolute

large enough to provide the correct shoulder it becomes necessary to use the methods shown in Figures 2, 3, 4 and 5 Figure 2 shows the sleeve between bearing and shoulder. Figure 3 shows the type of sleeve to use when a sudden reduction in section would weaken the shaft. Figure 4 illustrates a sleeve that extends through the bearing and seats against a shoulder. Figure 5 shows a sleeve used without a shaft shoulder.

All these sleeves are pressed onto the shaft and then turned to size. The bearing is then given a light tapping fit on either shaft or sleeve, as the case may be.

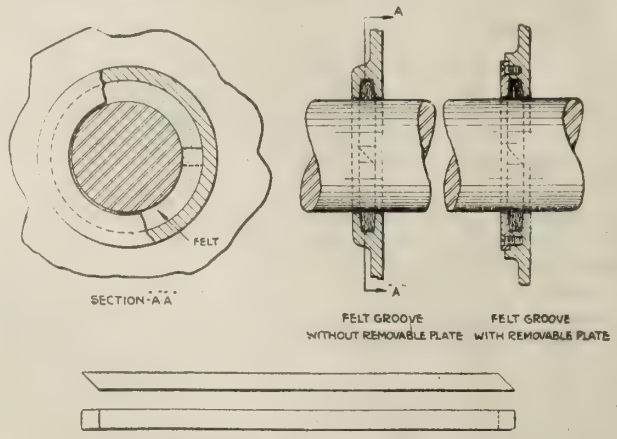


FIGURE 9—FELT GROOVE DETAILS

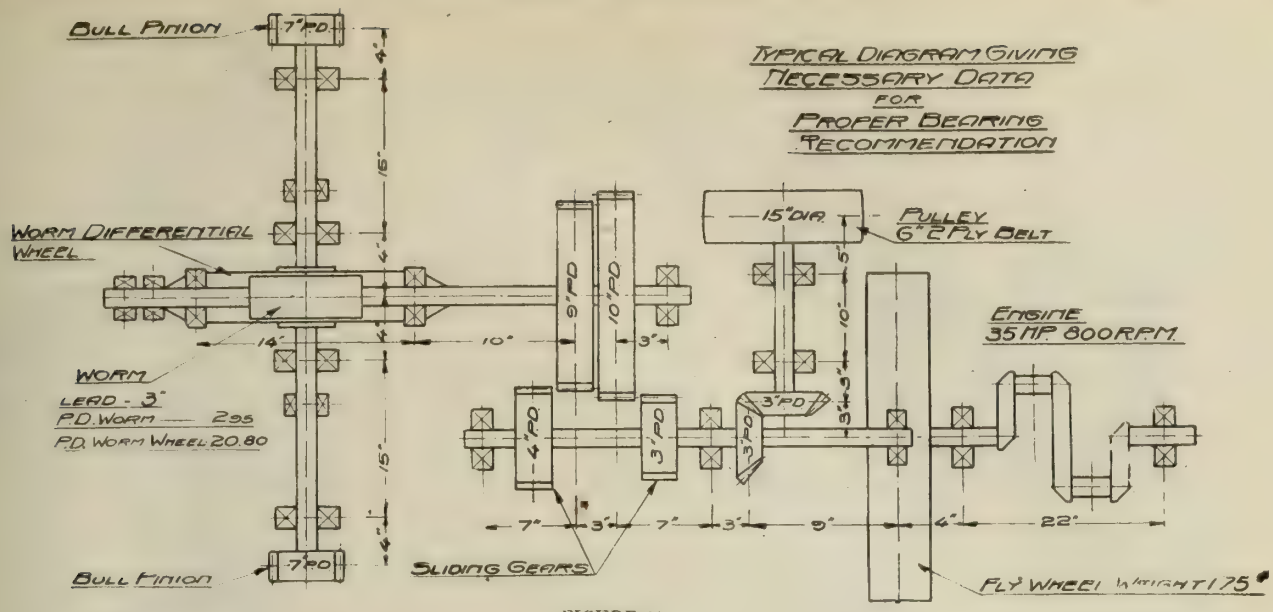
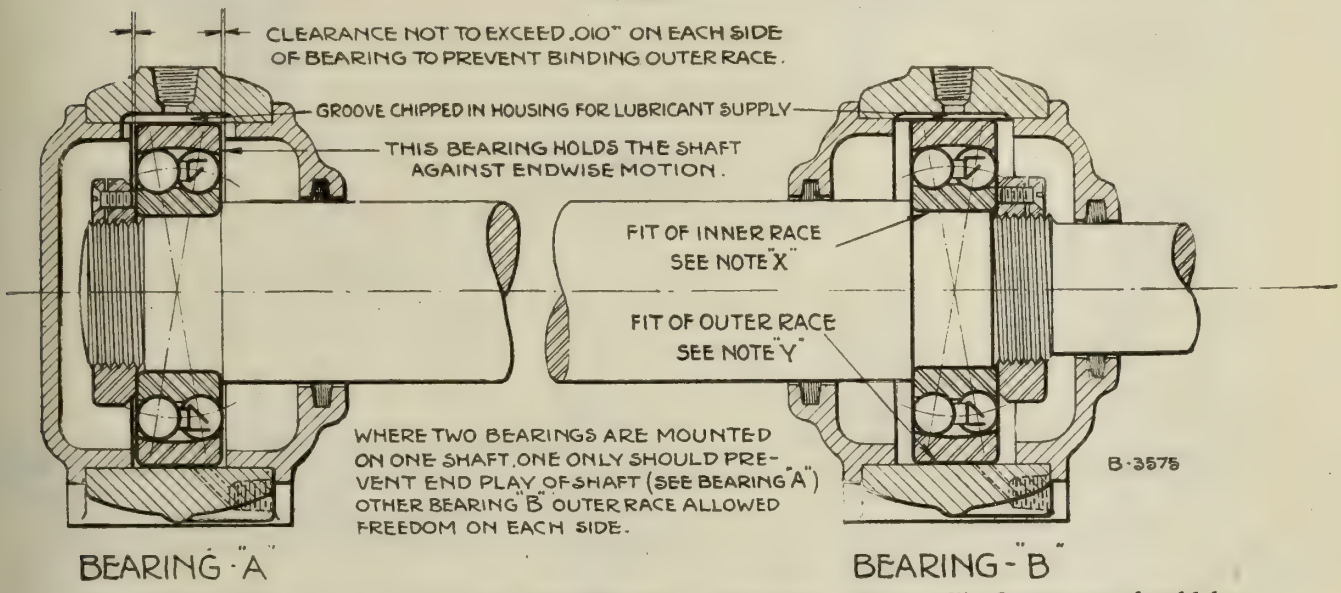


FIGURE 10



Note "X"—Inner race should be a light tapping fit on the shaft. **Note "Y"—Outer race should be a sucking fit in the housing.**

This figure shows the mounting details of a shaft carried by two bearings.

FIGURE 11

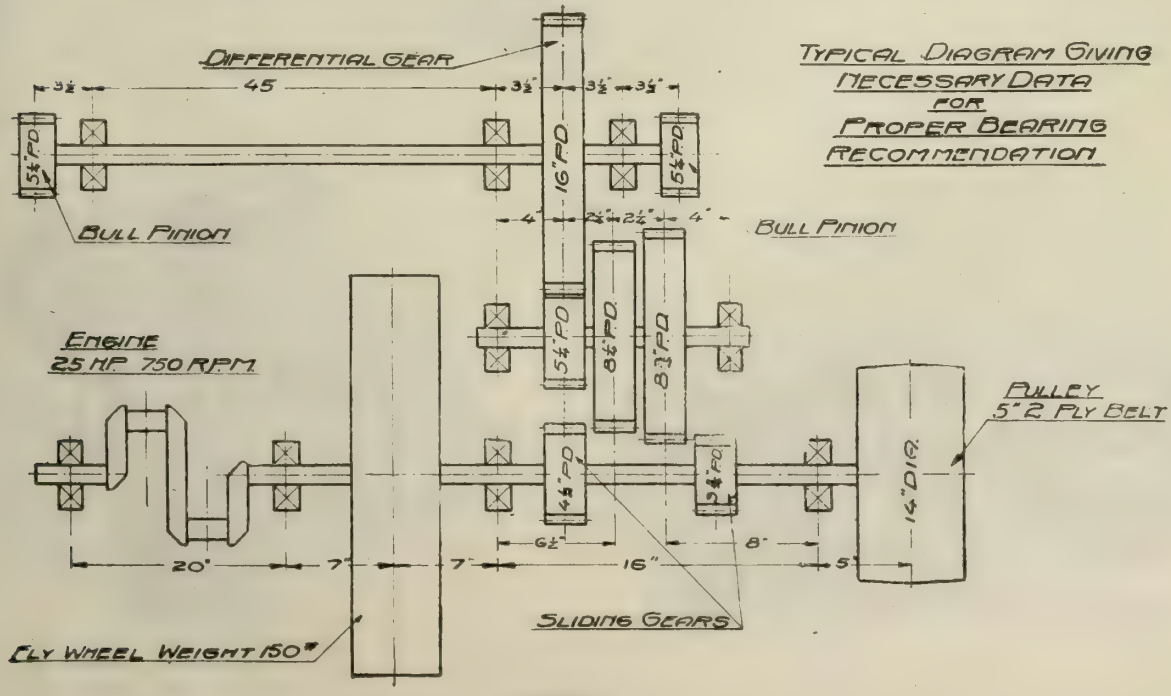


FIGURE 12

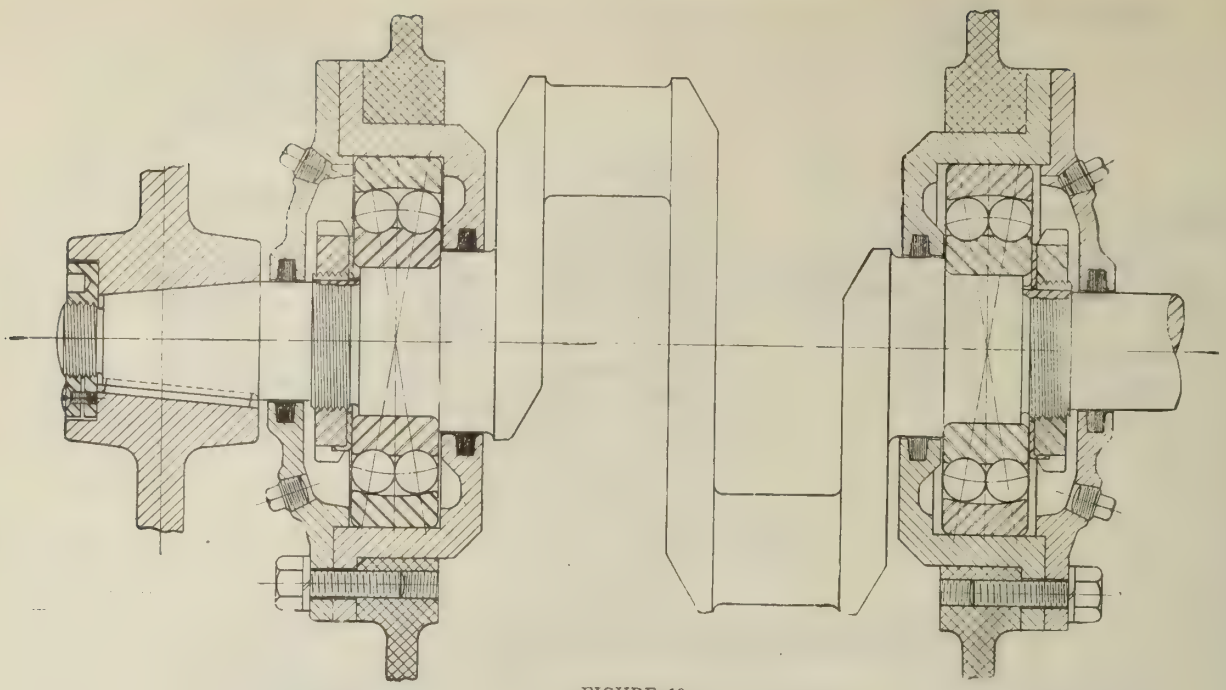


FIGURE 13

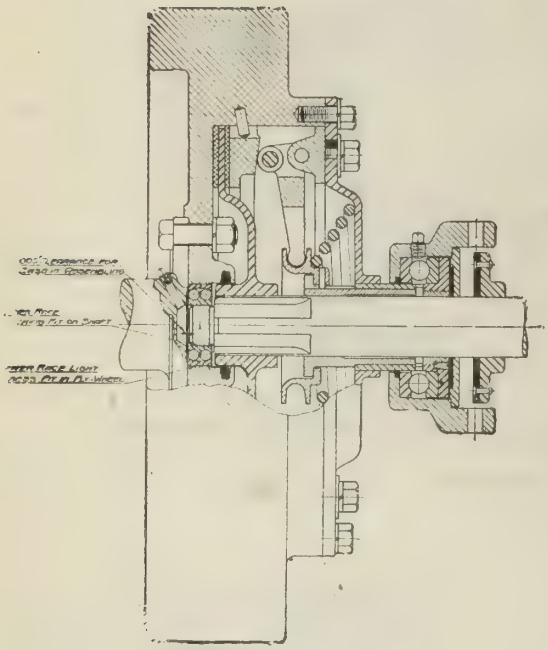


FIGURE 14

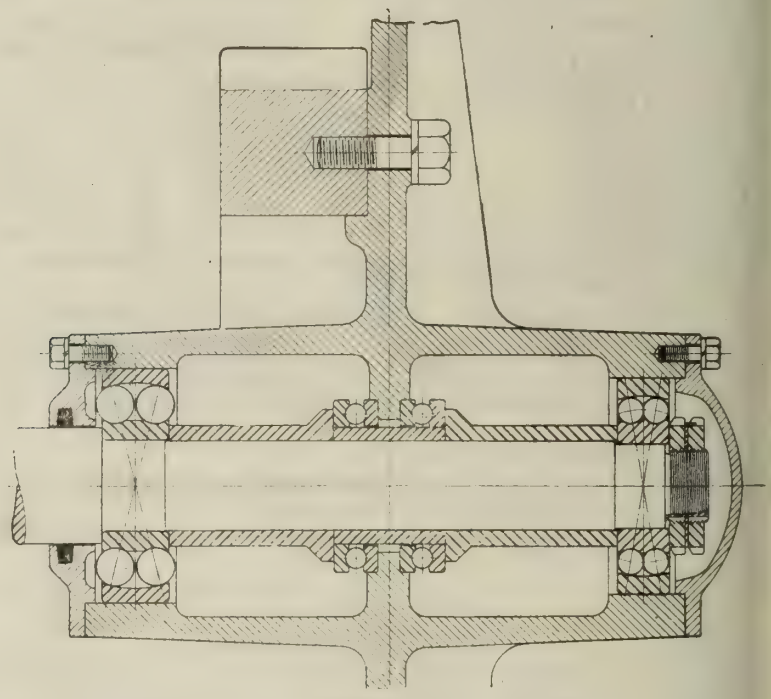


FIGURE 15

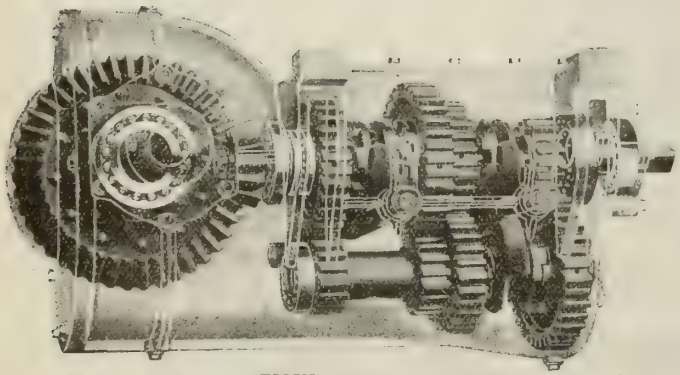


FIGURE 20

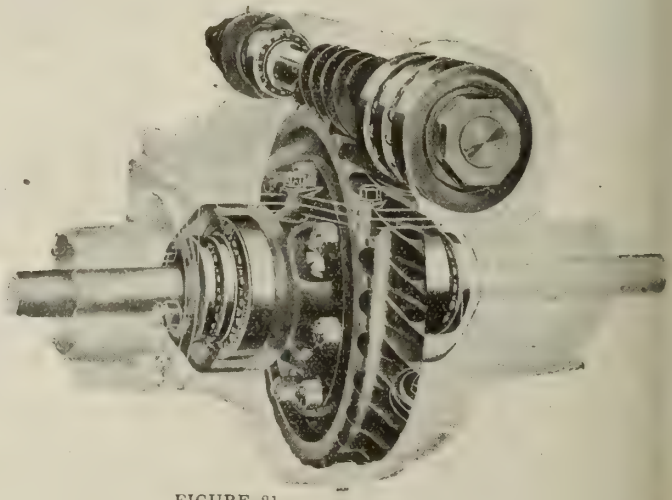


FIGURE 21

The construction shown in Figure 1 is, however, the simplest and best and should always be used if possible.

In Figure 9 are shown two types of felt grooves. One has a removable plate and one is solid. The advantage of the removable plate type is that the felt can be removed and renewed without removing the shaft. In the solid type this can not be done, but the solid groove does not need as much machining, and is, therefore, easier to make.

Notice in the mounting shown in Figure 11 the left-hand bearing is not held, but the right-hand bearing is held to stabilize the shaft against end-wise motion. The mounting is exceedingly simple, efficient and reliable.

Figure 14 shows a typical clutch mounting showing the location of the ball bearings. The self-aligning radial ball bearing is rapidly becoming the

Continued on page 187

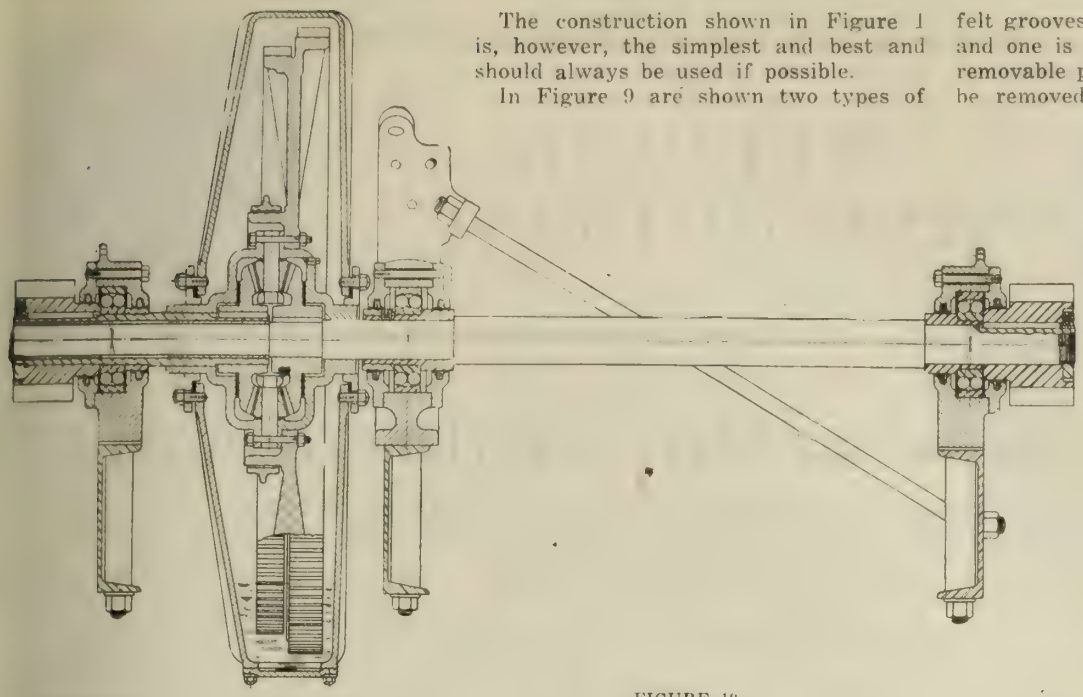


FIGURE 19

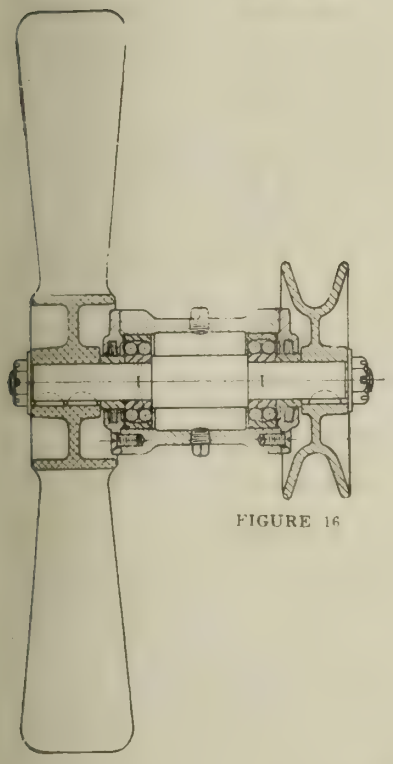


FIGURE 16

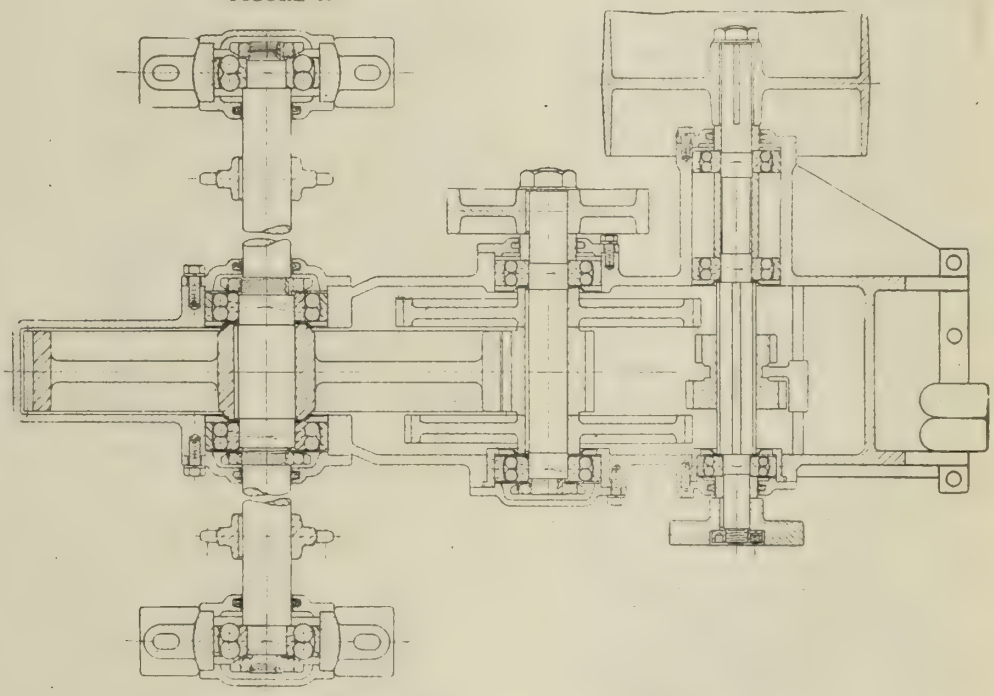


FIGURE 19

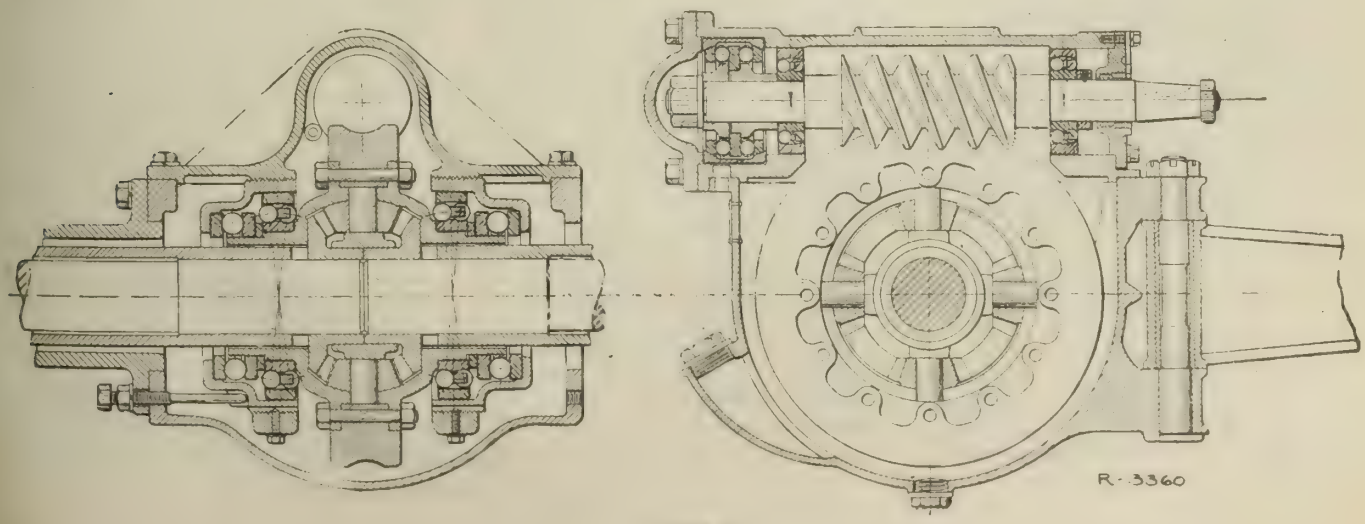


FIGURE 20

WELDING AND CUTTING

How to Choose an Oxy-Acetylene Blowpipe

The Proper Choice of Blowpipes is Not a Matter of Guess-work But Depends Upon the Character of the Work to be Done and Upon the Equipment on Hand

By C. ROYER, Consulting Welding Engineer

THE individual superintendent, purchasing agent or welder, when he has to buy an oxy-acetylene blowpipe (also called torch) is mostly influenced by the outside appearance of the different makes offered, by the demonstration, and also by the talk of the salesman.

Generally any blowpipe in demonstration will work well, especially if the demonstrator is experienced in the tricks of the trade. In fact we are reminded of a demonstrator who a few years ago was selling welding plants consisting of two fine adjustment valves without spring or diaphragm and of a very rudimentary blowpipe and who could make with such a plant a very satisfactory demonstration, but as soon as the outfit was sold and a regular welder put on the job, the blowpipe would back fire, spit, get extinguished, in fact the plant was useless and after several attempts had to be scrapped, giving a "black eye" to the oxy-acetylene process.

Nowadays few plants are sold as bad as that, but there are many differences in design and construction, and it is well to study the various characteristics so as to be able to make a choice after knowing what is what.

Generally the choice of blowpipe is left to the welder, and we are sorry to say that outside of a few exceptions the majority of welders are not always the best judges of the requisites of a blowpipe. They are much influenced by the outward appearance of the torch, by the finish, and often by a partiality to the make of a blowpipe which they are accustomed to use.

Before studying the points which should be taken into consideration in buying blowpipe, it might be well to give a general outline of them.

The oxy-acetylene torch is a delicate instrument in which the quantities of oxygen and acetylene should be mixed in the right proportion and should burn at the nozzle giving a stable flame which can be used for welding purposes.

This definition presupposes that a supply of oxygen and of acetylene is at hand. Oxygen is generally bought in the trade in a compressed form (1,800 to 2,200 lbs. per square in.) in seamless cylinders, and a pressure reducing valve is employed to reduce the tank pressure to the working pressure required.

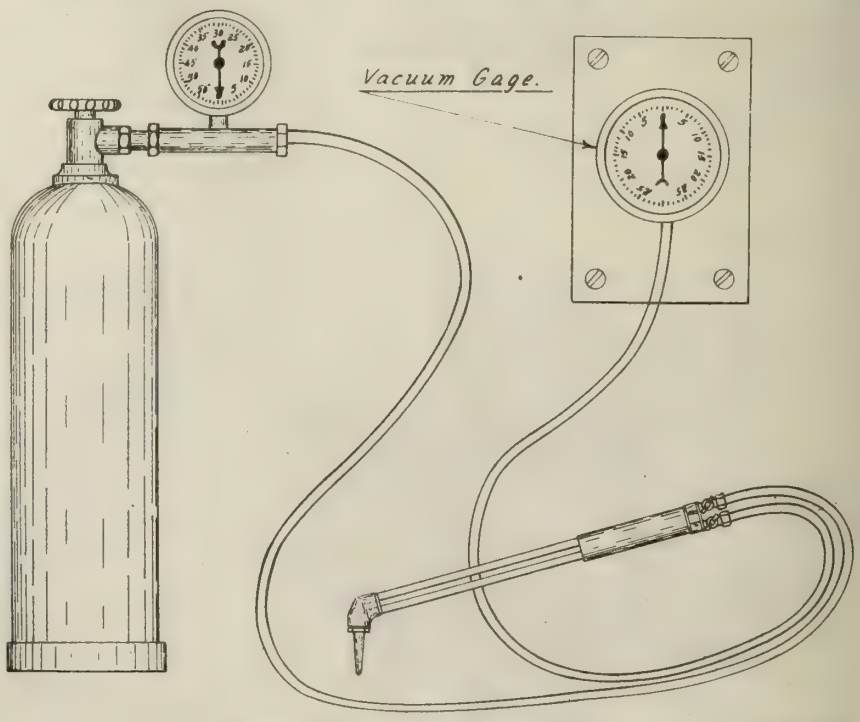
The acetylene can be bought in the trade in tanks where the acetylene is stored under 150 to 250 lbs. pressure and a reducing valve is required to bring the tank pressure to working pressure.

Acetylene may also be made on the premises by acetylene generators which generally work automatically, giving practically a constant pressure, either 6 to 12 inches of water pressure in low pressure generators or 6 to 15 lbs. in high pressure generators.

Blowpipes have two inlets which are connected to rubber tubings, one leading to the oxygen supply and the other to the acetylene supply.

The two gases which are mixed in the blowpipe should have a sufficient velocity at the nozzle so there will be no chance for the flame travelling back inside the blowpipe, which when it occurs is called backfiring or flashback.

The speed of propagation of the flame in the case of a mixture of oxygen and acetylene varies according to the proportion of the two gases, but it is generally admitted to be around 330 feet per second, consequently the velocity of the mixture at the nozzle should be above that figure to avoid the flashback. On the other hand, if too high a speed is used, we will have a very hard flame



METHOD OF TESTING BLOW PIPE

which will stir the molten metal and will have a tendency to blow it away, a condition which should be avoided.

The intimate mixture in the right proportion of the two gases, and the avoidance of flashback, are very important considerations which require serious study. The construction and ease of manipulation are other problems to be considered.

In the choice of a blowpipe the following points should be investigated: type of the blowpipe, power, design, reliability, efficiency, first cost.

Type of Blowpipes

Blowpipes can be divided into two general types. The pressure blowpipe requiring a medium pressure of acetylene supply varying between 1 and 15 lbs., and the low pressure blowpipe—also called injector blowpipe—which can work on acetylene of 4 to 10 inch water pressure, that is to say less than half pound.

The choice between these two types depends on the acetylene supply available. If the prospective buyer has already a low pressure generator, that is to say, producing acetylene under half pound pressure, generally with a gasholder, his only choice will be between the different makes of injector torches, unless he may be enticed to change his low pressure generator to a high pressure one.

In all the other cases the prospective buyer can choose either type of injector torch or of pressure torch and we hope that the present article will help him to select the best torch for his own particular interests.

Injector Torch

The low pressure blowpipe is characterized by a powerful injector actuated by oxygen pressure to draw the low pressure acetylene required to mix the two gases together and give to the mixture a sufficient velocity to enable it to burn at the tip without backfiring.

In such an injector torch, the oxygen has to be used at a rather high pressure, depending upon the efficiency of the injector and the size of the flame, and that pressure varies from 15 to 60 lbs. to the square inch.

The injector torch is generally used in Europe, where restrictions of the authorities do not permit the use of acetylene generators producing acetylene up to a pressure of 15 lbs. per square inch, as is permitted in North America. There the generators in use are generally producing acetylene gas under 6 to 12 inch water pressure, and consequently the use of injector torch is imperative.

In North America only a few manufacturers are constructing the injector type of torch, as there is a general tendency to instal system where acetylene is either generated in a medium pressure generator, that is to say up to 15 lbs., or to use acetylene dissolved in acetone in portable tanks.

The medium pressure acetylene supply has many advantages over the low pressure type, and the writer has not met any welders, who have worked with both systems, who do not prefer the high pressure one; and further in the writer's opinion, it is a paying proposition to replace the one by the other for the reasons which will be explained later on.

However, we have shown that with low pressure generator, the choice of a blowpipe is restricted to the so-called type of injector or torch.

On the other hand, the injector torch can be used on high pressure system of acetylene supply; many are used and seem to give satisfaction to the users. In such cases however, this application seems to be illogical and not economical, as the acetylene pressure has to be throttled down at the blowpipe, and high pressure oxygen has to be used to raise it up again by the use of the injector. Moreover, the majority of the devices which they contain become absolutely useless.

Injector torches are very delicate instruments, of which the injector is the most important part. Should the injector get dirty, or the mixing chamber get lined with soot, the working of the blowpipe is affected. The construction and design of an injector torch should be undertaken only by specialists and technical men, and not by ordinary brass finishers, as the least change in the construction may impair considerably its working and efficiency.

High Pressure Torches

The high pressure torches using more equal pressure of oxygen and acetylene have no injector, or if so, only of a rudimentary character, and all the conditions liable to affect considerably the working of a highly efficient injector, have less influence, and also the construction is simpler and less delicate.

Power of a Torch

The power of a torch is determined by the quantity of acetylene it consumes per hour; a small torch may burn only one cubic foot per hour, while the largest torch made will burn up to 160 cubic feet per hour. In the choice of the size of a blowpipe care should be taken that it corresponds to the work to be done. For small welding only it would not be satisfactory to use a large and heavy torch, and vice versa.

Generally manufacturers make three sizes of blowpipes, each with interchangeable tips, one for light work only, one of medium size for every day work that should burn up to 90 or 100 cu. ft. per hour, and one for large welding only, ranging from 60 to 160 cu. ft. per hour.

It should be ascertained in comparing different makes that the torch to be chosen covers a sufficient range of work, as it may be found afterwards that instead of one size of torch required, two will be needed to do the work on hand.

Manufacturers, as a rule, use an arbitrary number on their tips, which do not correspond to those on the different makes, and it will be well to ascertain from the manufacturer the burning capacity of the different tips in cu. ft. of acetylene per hour.

It is generally admitted that on plate work a tip of a burning capacity of 4½ to 5½ cu. ft. per hour, per 1-16 in. of thickness, should be required; for instance, to weld ½ inch plate would require a tip burning from 35 to 45 cu. ft. per hour.

On round or square pieces the consumption of the tip suitable should be from one-third or half the above figure.

As a rule welders can judge pretty accurately the power of the tip by only looking at the size of the drilled hole.

Design of Blowpipe

In both injector and pressure torches some manufacturers have adopted a very long mixing chamber starting from the handle to the tip, contending that it is necessary for getting a good mixture of the two gases.

On the other hand some manufacturers claim that the mixing of the gases should take place in the tip, as it is the only way of getting the right size of passage for the different size of flame while with a long mixing chamber the diameter of the passage cannot be suitable for the different sizes of flame unless the mixing chamber is changed with every two or three sizes of tips.

The manufacturers mixing the gases in the tips are more numerous, and their blowpipes have a larger range, and the same time are less exposed to backfiring than blowpipes with the use of only one long mixing chamber for the different sizes of tips.

It is a fact that the length of the mixing chamber should be sufficient to insure a thorough mixture, but practice shows that sufficient length can be obtained in using long tips for large size flames, when the mixing takes place in the tips.

The design of the method of joining the tips to the head is very important. In most of the torches the tips are threaded on the head; this method has many disadvantages, as after a little use the threads get loose by being subjected to a very high heat and they will leak, which is a cause of backfiring.

Some torches have the joint removed further from the heat and do not have this fault.

When threads are used on the tips they should be male, as the expansion of the tip is greater than the expansion of the tip holder, while on the contrary, when the threads are female on the tip, the expansion tends to loosen the joints.

One of the best designs is the threadless tip which has a cone seat with a rather broad angle so as to avoid sticking or cracking the head when tightening the nut making the joint.

Attention should be given to the oxygen and acetylene inlet valves, which should be easy to manipulate and should not leak. The design of a single valve operating both the oxygen and acetylene supply is not to be recommended, as it is very hard to keep it in good order, and when starting to leak it is almost impossible to repair it and it becomes dangerous for the welder.

Much attention should be given to the metal in the tips. It should not be made of brass or soft metal, as they will melt easily, thus increasing the cost of main-

tenance. The tips should be made of copper or an alloy of the same high melting point, and no torch should be bought having soft melting tips.

Reliability From Backfiring

We should call reliability the quality of a torch to keep on giving good service without interruption of the welding operation, that is to say, without requiring constant readjustment of the flame and without constant backfiring.

Backfiring is the burning inside of the torch, of the mixture of the two gases, which requires the immediate closing of the supply of oxygen and acetylene, as if it is prolonged unduly the blowpipe is liable to be permanently injured.

Backfiring is the bugaboo of welders. When it takes place the welder has to stop welding, to cool the torch in water, to re-light and readjust it, and reheat the place to be welded before he can start welding again, thus wasting much valuable time, and especially the costly gases required to bring back the job to the required temperature.

Backfiring may be due to many causes; if at any time the speed of the gases escaping from the tip becomes lower than the speed of the flame propagation of the mixture, the flame will travel back inside the blowpipes and will cause backfire.

A hot job, welding in a corner which produces resistance to the escape of the gases issuing from the tip, may produce this condition.

In a general way backfiring is more prevalent in a low pressure acetylene system than where acetylene is used under higher pressure. In such case, a leak in the acetylene line or the blowpipe, permitting air to be drawn inside the torch by the vacuum created by the injector will cause a backfiring which is very annoying and even dangerous.

Speed of The Flame

The speed propagation of the flame of a mixture of oxygen and acetylene gases is dependent on the proportion of the two gases. A lean mixture, one containing a small proportion of acetylene, will have a flame travelling faster than a neutral mixture. This can be explained by comparing same to the carburetor of an automobile engine. Everybody is familiar with the fact that a lean mixture will burn inside the carburetor under some conditions, whereas a very rich mixture will pass through the exhaust manifold into the muffler before exploding.

In the blowpipe, any excess of oxygen will have a tendency to increase the speed of flame propagation and consequently the backfiring, and can be counterbalanced only by a terrific speed of the mixture escaping from the tip.

When a blowpipe is lighted and regulated and used in a corner a resistance is offered to the flow of the burned gases. This introduces a back pressure which checks the speed of the gases inside the blowpipe and checks mostly the gas which is under the lowest pressure. As in most blowpipes the oxygen is under a pressure superior to the acetylene, under such conditions the proportion of the oxygen in the flame will increase and so will the tendency to backfiring, due to that cause and also to the fact that the speed of the mixture escaping from the tip has been reduced.

When a blowpipe starts backfiring, it is generally the practice of experienced welders to give more pressure to their blowpipe by opening slightly the oxygen and acetylene valves or by putting more pressure on their regulators, so as to balance the introduced resistance. In low pressure acetylene system this action will have the effect of increasing the proportion of oxygen in the flame and to give an oxidizing flame. In torches using medium acetylene pressure, the increase of oxygen in the flame will be less, and should the torch use equal pressure of both gases, the effect should be nil.

Though these explanations may seem unimportant to the lay mind it will show that a low pressure acetylene system is more liable to backfiring and that under certain conditions the oxygen proportion of the flame will automatically increase.

A certain authority claims that the excess of oxygen in the flame is the only cause of backfiring and by suppressing it, and keeping the velocity of the escaping gases above the minimum limit, no backfire should occur.

To the practical operator the backfiring is the greatest waster of time and of gas, so to him the ideal torch is the one which will not backfire under normal conditions.

The prospective buyer of a torch should pay much attention to the non-backfiring features of the torches offered to him, and should ascertain the facts, and also that the torches do not reduce the backfiring by using too strong pressure of gases, which would give too hard a flame for good work as it would blow the fused metal away.

Efficiency of Torches

Each manufacturer of torches claims that his torches are efficient, but very few substantiate their statement by giving figures of consumption.

We will try to explain what may be called the efficiency of a blowpipe.

One cubic foot of acetylene requires 2½ cu. ft. of oxygen to produce complete combustion. In the oxy-acetylene blowpipe, the combustion is made in two stages. In the first stage acetylene should combine with oxygen volume per volume, to produce carbon monoxide and free hydrogen, in the second stage these gases should combine with oxygen to produce carbon dioxide and water vapor.

The oxygen necessary for the first stage should be supplied from the cylinder of oxygen, while the oxygen necessary for the second stage should be supplied by the atmosphere, and is equal to 1½ times the volume of acetylene.

Consequently, according to theory, for one cubic foot of acetylene burned, one cubic foot of oxygen should be supplied from the cylinder (which costs money) and 1½ cu. ft. from the atmosphere (which costs nothing).

In practice it is found that with the majority of blowpipes the quantity of oxygen used is more than it should be, and the nearer this ratio is obtained, the more efficient the torch will be.

The efficiency of a blowpipe can be expressed as the ratio in cu. ft. of the acetylene used to the oxygen multiplied by 100.

For example, if a torch burns 100 cu. ft. of acetylene per hour it should use, according to theory, 100 cu. ft. of oxygen and the efficiency should be $\frac{100}{100} \times 100$, equals 100 per cent.

In practice this efficiency is seldom obtained and it is generally admitted that 125 cu. ft. of oxygen is required for 100 cu. ft. of acetylene; in such cases the efficiency is $\frac{100}{125} \times 100$, equals 80 per cent.

The efficiency of a blowpipe is mostly dependent on its design.

With injector torches, it is found that the efficiency varies from 55 per cent. to 83.3 per cent., depending on the design of the injector, the pressure used, etc. The injector of such a blowpipe is a very delicate part; if it becomes partially clogged, or if the mixing chamber is covered with a deposit of soot, the efficiency of the torch will vary.

The efficiency of an injector depends largely on the design of the cone in front of the injector, and also how it is centered; the slightest deviation from the axle of the cone will reduce considerably the suction action.

Testing the Torch Action

It is very important to be able to verify the action of the injector of a blowpipe, and it is easily done by connecting the oxygen inlet with the oxygen supply, and the acetylene inlet with a vacuum gauge by means of a stiff rubber tubing. The oxygen supply is opened the same as on working conditions. The suction of the injector should create a vacuum on the gauge from 7½ to 10 lbs. below atmospheric pressure. In varying the oxygen pressure, the variation on the vacuum gauge will show the best working pressure.

It is known that a given injector blowpipe in the hand of an experienced welder may give an efficiency of 83 per cent., while in the hands of another only 55 per cent. This difference is accounted for by the fact that one was using a low pressure of oxygen while the other a too high pressure.

To sum up, we may say that in injector torches, the efficiency depends on the design, on the state of the blowpipe, and on the skill of the welder. In the best designed injector torches the efficiency is never more than 85 per cent., while in actual practice it is nearer 70 per cent. than otherwise.

It is apparent even to the lay mind that a torch using oxygen under high pressure and acetylene under low pressure, is bound to use more oxygen than a torch where the two gases are under almost an equal pressure, and the greater the difference between the pressure of the two gases the less the efficiency is liable to be.

By the above it can be ascertained that the efficiency of a blowpipe has a

very important bearing on the cost of welding. In the inefficient blowpipe some oxygen which costs money is wasted through the flame, while it should be supplied by the atmosphere.

If we take for instance a blowpipe using 100 cu. ft. of acetylene per hour, if this blowpipe is efficient it will use only 100 cu. ft. of oxygen per hour, while in another blowpipe of the same power having only 80 per cent. efficiency the oxygen used will be 125 cu. ft., and the excess of oxygen used 25 cu. ft. per hour at 2c per cu. ft., will cost 50c per hour; for six hours per day, $3.00; and for 25 days per month $75.00, that is to say more than the value of a blowpipe.

This example is for rather a large tip, but the same ratio holds good for smaller or larger consumption. In the above example we have taken the efficiency of a good blowpipe but should the efficiency be only 55 per cent. the amount of money wasted will be much larger.

Another advantage of an efficient blowpipe is that the less the excess of oxygen in the flame, the more neutral the flame will be, and the better chance the welder has to make a good weld.

If the prospective buyer has to rely on the statement of a salesman to know the efficiency of a blowpipe, he may be sure that any torch offered to him is the most efficient one on the market.

A simple way to test out the efficiency is to weigh each cylinder of oxygen and acteylene to be used in the test before and after using the blowpipe for a certain length of time. An hour's use should be sufficient for a large tip and several hours for a small tip. The decrease of weight in pounds of the oxygen cylinders used multiplied by 11.20 will give the number of cubic feet of oxygen used.

For acetylene the decreases in weight of the corresponding cylinders multiplied by 13.65 will give the number of cubic feet used.

The number of cubic feet obtained for the acetylene consumption multiplied by 100 and divided by the number of cubic feet of oxygen will give the efficiency of the blowpipe tested.

Such test can be carried on during actual welding and will show the efficiency under working conditions.

In low pressure systems of acetylene supply, test cannot be made in using the generator unless a meter is available, which is not ordinarily the case. It is possible in such circumstances to procure some acetylene cylinders for testing purposes and the acetylene pressure regulator can be set so as to obtain the pressure given the generator. Should the regulator be set for a higher pressure the test will not give the efficiency of the blowpipe under ordinary working condition, but will give a higher efficiency as it has been shown that the less the difference in pressure between two gases, the higher the efficiency will be.

Logical conclusions would indicate that the best efficiency should be obtained by blowpipes, using almost equal pressure of both gases, if the torches are well designed.

A well known make of blowpipe using acetylene under 6 lbs. pressure is claimed to have an efficiency of 87.6 per cent., that is to say uses 1.14 cu. ft. of oxygen for 1 cu. ft. of acetylene.

A new torch which has been lately put on the market is claimed to show 100 per cent. efficiency due to a new principle used in designing this blowpipe. A slightly higher pressure of acetylene than oxygen is used, though not above 10 to 12 lbs. of acetylene for the largest tip. It is claimed that by the application of this new principle, the backfiring is also completely eliminated. If this claim is substantiated the economy realized would be very great, as it has been shown in the above example..

First Cost of a Blowpipe

It is hoped that it has been shown that the efficiency which is generally a neglected factor in the choice of a blowpipe should be almost the deciding factor, specially as a better efficiency decreases the chances of backfiring and increases the quality of the welding flame and permits the making of better welds, almost free from oxides.

It has been shown also that the injector torch, which is most valuable in Europe where they cannot use high pressure generators, is not the logical torch to use in North America to obtain the best results. The low efficiency of the injector type of torch, its delicate construction and the fact of it requiring a better class of welder, are the chief reasons for the more general use of the high pressure blowpipe.

It is hoped also that it has been shown that to the writer's point of view the changing of low pressure acetylene system to medium pressure system should be a paying proposition, though the first cost might appear uncalled for. Any firm doing quite a quantity of welding would quickly save the first cost by reduction of their oxygen consumption and would obtain a better class of welding by obtaining a less oxidizing flame.

After these explanations, which could be much extended, the writer hopes to have shown the characteristics which should be looked for in the choice of a blowpipe and hopes that the reader will come to the conclusion that the first cost should be the last consideration and that service and efficiency are the most important factors.

BALL BEARINGS IN TRACTOR DESIGN

Continued from page 183

standard ball bearing for use on tractor clutches.

It is evident that when a rigid bearing is used in the clutch even slight misalignment will cause the bearing to bind and ultimately fail. The self-aligning ball bearing—due to its special design—compensates for such misalignment and operates without binding at angles that would destroy any other bearing.

Figure 15 shows a tractor drive-wheel mounted on ball bearings. Note the clean-cut, simple mounting. Also note the extremely large lubricant space: such a reservoir will hold enough lubricant for months of service. The housing used here is both dustproof and oiltight.

Figure 16 shows a typical fan mounted on ball bearings, which eliminates all lubrication troubles. Note the large oil chamber, which holds enough lubricant for months of service.

The bull pinion of a tractor is the place where ball bearings are most needed. At the bull pinion the loads are heaviest.

The ball bearing is the most efficient bearing made. It wastes less power than any other type of bearing. The ball bearing is also the best load carrier. To carry a given load the ball bearing can be shorter than any other.

Figure 18 is a tractor worm-drive, showing ball bearings used and the method of mounting and housing them. Note the self-contained, self-aligning double thrust bearing which takes thrust in either direction. This bearing is exceedingly simple to mount, since very little machining is necessary.

The worm-wheel is mounted on two radial bearings and the two single thrust bearings take care of all thrust loads. Figure 19 shows a ball bearing equipped transmission designed for one of the leading tractor builders. Simple design, compact construction and easy assembly are some of its features.

Figure 20 is a phantom view of the worm drive of the Sandusky Tractor, manufactured by the Dauch Manufacturing Company, showing the radial and thrust ball bearings.

Figure 21 is a similar view of a Cotta transmission, which is being used in a large number of tractors.

The application of the brinell ball test to the measurement of the hardness of ceramic products has hitherto been hindered by the irregularity of the impression produced. This difficulty has been overcome, according to MM. H. le Chatelier and B. Bogitch in "Comptes Rendus," by placing upon the sample a piece of foil 1-20 mm. thick and 30 mm. square which has been blackened with sulphuretted hydrogen. The impression of the ball is very clearly left on the foil and can be accurately measured. The ball used was 17.5 mm. in diameter under a pressure of 500 kilos. left on for one minute.

Washington.—Ocean freight rates for general cargo moving from Pacific ports to Japan and China have been fixed at $12 per short ton by the United States Shipping Board from March 1st. This makes a reduction since January 1st of $56 per short ton. The rates to Vladivostok were announced at $25 per short ton. General cargo rates to English ports from American South Atlantic ports were fixed at $1.07½ per hundred pounds, and increasing in other directions to a maximum of $1.93 per hundred pounds for cargo to Barcelona.

WHAT OUR READERS THINK AND DO

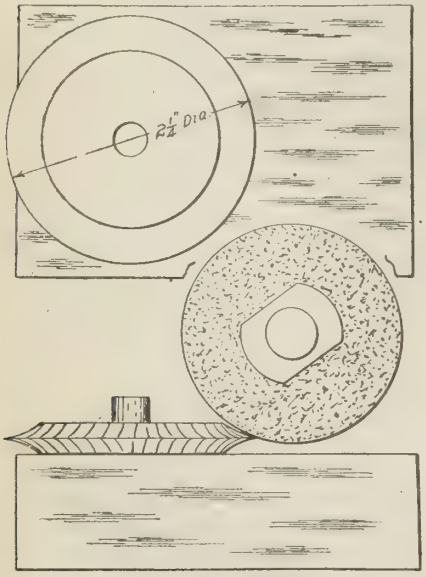
Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

SHARPENING SLITTERS ON A CUTTER GRINDER

By D. A. H.

PAPER working machinery, such as found in newspaper offices, printing and publishing establishments generally, and paper box and novelty factories, is frequently supplied with some means of cutting the paper or heavier stock that is handled. This may be the regular knife of the paper cutter, dies, shear blades, slitters, or perforators. The straight blades are regularly sharpened in knife grinding machines, or they may be sharpened tolerably well in any machine shop by hand-grinding on the shop tool grinders.

One type of cutter is the slitting wheel, shown in the drawing. This is extensively used in newspaper folders for trimming off the fold and for cutting the various facings used in paper boxes. On all of this work the machines are automatic and the paper drawn under the wheel, which is thus given the motion that causes it to roll and cut at the same



SHARPENING A SLITTING KNIFE

time. The size given is a fair average: the wheel is very hard and is shaped to an almost razor thinness, this edge cutting against copper or wood.

One machine shop sharpens a great many of these slitters, but does not do it on a cylindrical grinder, as would be supposed, because it has none. They do have a Garvin cutter grinder, and this is used very successfully, as shown in the drawing. A block of cast iron that is clamped to the table forms the base. In it is the centre plug, which is a close running fit in the slitter hole. The latter is placed in position and the table raised until the emery wheel contacts with the slitter, but very slightly. The slitter is revolved by the fingers—a very easy process, for the cut is necessarily light. Further cuts bring one edge down to form and then the wheel is turned over and the other side dressed. This makes a good job, and a quicker one than if done on an arbor in a cylindrical grinder—in fact, is a little better as the work is located from its face and from the hole with no chance of an inaccurate arbor spoiling the job. A smoothing down with an India oil stone produces an edge that will cut the thinnest paper.

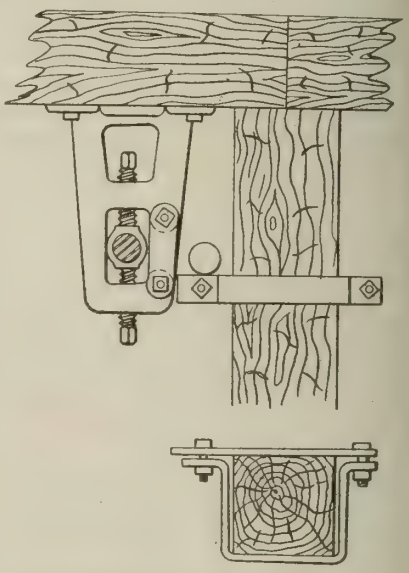
Other round knives are sharpened in a similar manner. Face slitters, which run in pairs like those used by tinners, and which are sharpened on the periphery, are ground with simple fixtures. This job requires the cutter to be turned at right angles to the one in the drawing. The table stops are, of course, set to prevent digging in. The same Norton wheels used for cutter grinding are employed.

INSTALLING BALL BEARINGS IN SHAFT HANGERS

By DONALD A. HAMPSON

Our line shafting in the machine shop was carried by thirty-seven Dodge hangers with plain babbitted bearings. After considering the change to some form of anti-friction bearing, an order was placed for a well-known make of ball bearing, which was to be installed with the written guarantee of saving its cost in power in two years. There was to be no charge for putting the bearings in, except that we were to furnish the labor, while the bearing company sent its own man to direct the work and see that everything was properly done.

The representative—salesman and engineer, he was—asked for four men to do the work, stating after he had looked over the layout that it could all be done on a Sunday. The Sunday was appointed some time after the bearings had arrived, and the bearing company was notified that we would give them the Saturday afternoon preceding as a few



INSTALLING BALL BEARINGS IN SHAFT HANGERS

hours of grace to provide for contingencies. Also, we provided six men instead of four. Well, the Saturday afternoon arrived and so did the representative, and we went home to rest with the comfortable feeling that an awkward job was placed in safe and capable hands, and we could come around Monday morning to see the shafting running away from itself on the new bearings.

Imagine our surprise on arriving Monday morning to find no representative, no shafting running, no men at work, and belts, dirt, pulleys, and confusion everywhere. The six who had worked Sunday had struggled manfully and were tired out. By putting the whole gang on the job we managed to get the section back together, belts and pulley on, and shaft running by eleven o'clock. Fifteen hangers were equipped with the new bearings,—but by six men in two days—quite a difference from the expert's estimate. Later in the week we heard from the representative that he was occupied

for the next four Sundays, but would return after that to clean up the job, or, if we chose to pay another millwright for supervising the work, his company would pay the charge.

To put in the new bearings it was necessary to uncouple the shaft lengths, take the lengths out of the hangers, and strip the shafts of pulleys up to the journals. The company man had gone at this very heroically—had lifted the lengths out of the hangers and lowered them to the floor, then set as many to stripping of pulleys as could be worked on the piece. The pulleys were Dodge wood split, and he had the finest array of bolts and nuts, unattached, that one could wish to see. The representative had been furnished with all that he had asked for in the way of apparatus.

We decided that we would finish the job ourselves on the following Sunday, doing it the best we could in our ignorance and inexperience. The building construction is as shown by Fig. 1. The hangers were bolted to beams and lined up about a foot from 8 in. x 8 in. posts or columns, that supported the beams. Dodge hangers of the type shown have a pair of links spanning an opening in one side, the opening permitting removal of the bearings at the side. In the original erecting, the open side of the hangers had been set toward the posts. The layout seemed just made for easy changes, and we planned accordingly.

Three clamps of ½ in. x 2 in. iron were made up to encircle the posts in the manner shown by Fig. 2. These were to be fastened in the position shown in Fig. 1 with their upper surface on a level with the opening in the hanger, and with one end within half an inch of the hanger. Our intention was to roll the shaft right out on this "floor," instead of taking it twelve feet down. With 2 7-16 in. shaft, the avoidance of this lift is a time and labor saver.

It was all extremely simple and easy, and we put through the installation of twenty-two bearings in the one day and with the gang of six. Each length of shaft was considered on the day previous and the work planned so that the fewest number of pulleys would have to be disturbed. Each length was sketched on paper, and the position of those pulleys put down, so that they could be reassembled without guesswork. The pulleys were removed before the shaft was shifted, which saved labor. The three clamps were sufficient for each length of shaft and more were not required, as the entire gang on a length made short work of it. The time saved and the risk avoided by not lowering the lengths is a big item, and a similar method could be applied to many of the installations on shafting that is already in place.

AN EFFICIENT BOLT

By G. D. McCarrell

It is often desirable to make a small bolt when the necessary size of stock is not available. A convenient method of accomplishing this, and one that is very efficient, is shown in the accompanying sketch. Obtain a piece of round stock of the required size of bolt and thread each end as shown, the short end to take a standard nut and the long thread made to suit the desired conditions. When the nut that serves for the head has been screwed on the end is welded with an oxy-acetylene torch, the result being a very satisfactory bolt.

METHOD OF MAKING EMERGENCY BOLT

BOOK REVIEW

"Mechanical Drawing" by Ervin Kenison and Edward D. Waite, the American Technical Society, Chicago

The work of the accomplished engineer or designing draftsman is something which demands broad acquaintance with engineering and necessitates considerable ability and inventive skill. The same men who show such skill have had to acquire it through careful and painstaking study and practice of the rudiments of mechanical drawing. They had first to lay their foundation for the more advanced work along this line of equipment necessary for drawing of various kinds and how to use it. All of these important features are carefully treated of in this work. The studies are illustrated by diagrams and plates, and describe for students the simplest drawing problems to those which in difficulty approach more on the architectural and engineering fields. A portion of the book is given over to the description of necessary tools and their proper use. The method of the actual making of mechanical drawings is taken up in detail. In this part of the book much attention is given to geometrical definitions and constructions, as it is recognized that they are the foundation for much engineering work which finds its way to the drafting board. Altogether this book should prove to be a welcome aid to those who are beginning the study of engineering or architectural drafting.

Orders Are Wanted.—It is feared by the lumber interests that if additional orders are not secured in the immediate future the lumber mills of British Columbia will have to close down. They say that the British timber controller is calling for tenders from American brokers on the Pacific Coast. The Premier of British Columbia has wired to Sir Thomas White, urging him to take some action to prevent this state of affairs.

Do You Know That

The proper blank dimension for cup work on stamping and drawing presses is determined either by multiplying the circumference of the shell by its height, adding the area of the bottom, and then determining the diameter of a circle of equal area, or by cutting out a blank and reducing its diameter until it weighs the same as the article desired.

In the early days of the oil-immersed transformer, attempts were made to use some of the fixed oils, such as resin oil, linseed oil, cotton-seed oil; because it was found that these oils had a higher dielectric strength than the straight oils at that time on the market. It was soon found, however, says Mr. W. S. Flight, in the "Electrician," that the fixed oils gave trouble in the transformers due to the formation of carbonaceous deposits, and about the same time it was found that straight oils, free from impurities and all traces of moisture, had as high dielectric strength as the fixed oils. As the latter are not so liable to form deposits and are cheaper, their use has continued ever since. It has been found that the voltage at which a definite thickness of oil will break down depends more upon the amount of moisture and other impurities in the oil than upon the type or nature of the oil. When tests are carried out on clean moisture-free oils it is found that those having a low viscosity have a higher dielectric strength than those of higher viscosity.

THE THOUSANDTH OF AN INCH

J. N. R.

At night I sit and ponder
On the thousandth of an inch;
I knit my brow, and scratch my head,
And then my fists I clinch.
O, show to me the man, says I—
If Irish, Dutch, or Frinch—
The man who first invented
The thousandth of an inch.

When finally I crawl in bed,
So thankful for a snooze,
I drive my sorrows all away
Without the aid of booze—
I dream that they have caught the man,
And him they now will lynch,
By jinks! The man who did invent
The thousandth of an inch.

DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

KEYSEAT MILLING MACHINE

THE new type heavy duty horizontal keyseat milling machine manufactured by the Newton Machine Tool Works, Inc., Philadelphia, U.S.A., is very flexible in control, and has a number of interesting points.

This machine is frequently supplied with a newly designed set of centres with quartering devices for accurately milling on the quarter the keyseats of locomotive axles, and when the special quartering fixtures are used the keyseats in both ends may be finished with the original setting, when desired. The vertical spindle is used to end keyseats when necessary, such as those in the eccentric strap bearings. Another advantage in that it can be mounted on the horizontal spindle to allow milling keyseats in shafts in multiple.

The particular machine shown by the illustrations, was manufactured for keyseating shafts for large rotors.

The general dimensions of the machine are as follows:

Diameter of horizontal spindle in bearing, 4⅜ in.

Diameter of horizontal spindle through driving gear, 4 in.

Side adjustment of horizontal spindle by hand, 4 in.

Distance centre of horizontal spindle to under side of cross rail, 2½ in.

Maximum cutter swing on horizontal spindle, where vertical spindle saddle does not interfere, 10 in.

Maximum cutter swing under vertical spindle saddle, 6 in.

Width of work table over working surface, 20 in.

Length of table to mill, 10 ft.

Width between uprights, 26 in.

Maximum height centre of horizontal spindle to top of work table, 33 in.

Maximum height end of vertical spindle to top of work table, 35 in.

Diameter of vertical spindle, 2 in.

Independent hand vertical elevation to vertical spindle sleeve, 6 in.

Vertical spindle is located so that it can be adjusted to a maximum height of 2 in. above the centre of the horizontal spindle.

The weight of the machine, complete, is 22,000 lbs. when length of table to mill is 10 ft.

A vertical spindle saddle, mounted on the flat cross rail, has a hand cross adjustment on the rail by means of a rack and pinion.

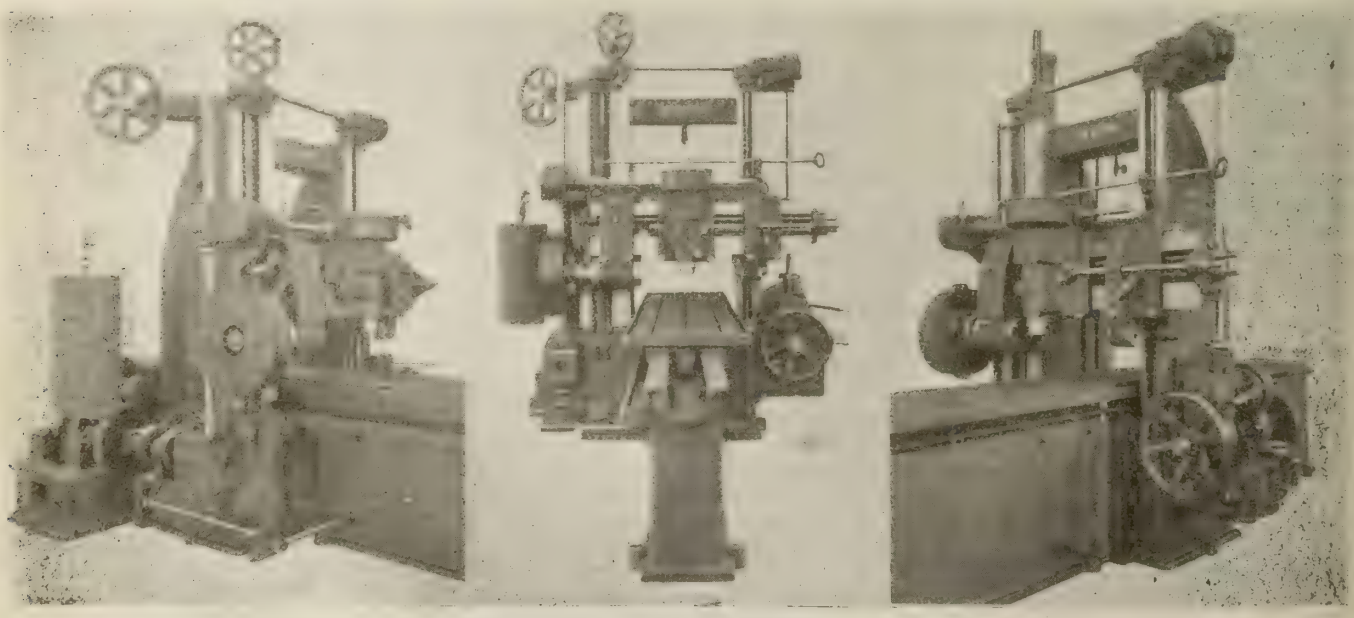
The independent hand vertical adjustment of the vertical spindle sleeve is controlled by a worm and worm wheel connected to the spindle rack pinion, and the control is actuated by a spline shaft carried to the right-hand end of the cross rail as shown.

The horizontal spindle head is also adjustable by hand within its range across the rail by screw controlled from the right-hand side of the cross rail.

The table of the machine has nine changes of gear feed from a box, in which are mounted adjustable sleeves, giving changes without removal of gears. The table also has reversing fast power traverse. The cross rail is counterweighted, and has reversing vertical fast power traverse in addition to hand adjustment.

The shaft transmitting motion for the vertical adjustment of the cross rail is fitted with a micrometer collar for adjusting the cutter on the horizontal spindle to the required depth. The horizontal spindle is driven by a bronze worm wheel and hardened steel worm, fitted with roller thrust bearings. Vertical spindle is driven by a worm wheel and spiral bronze gear, and the drive for both spindles is encased to permit of continuous lubrication.

The horizontal spindle is fitted with a Morse taper, holder, face keyway, and through retaining bolt, as is also the



NEW KEYSEAT MILLING MACHINE

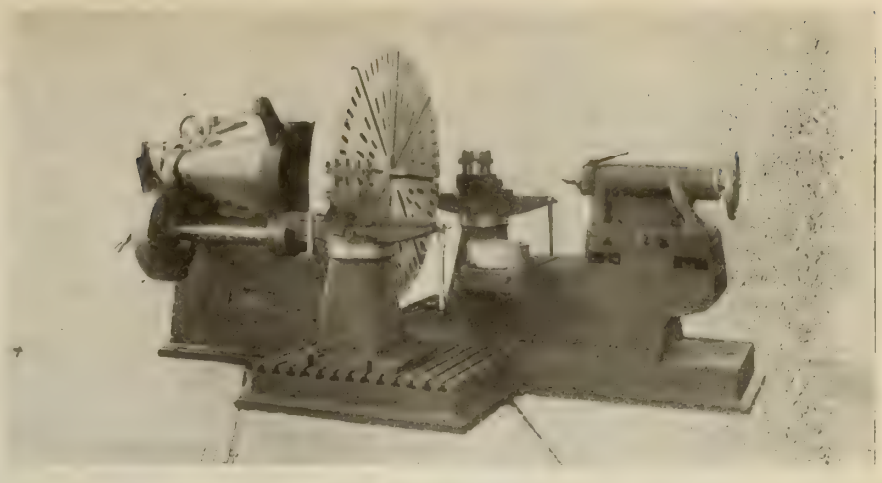
vertical spindle. The vertical spindle is fitted with a No. 4 Morse taper.

The outer support on the cross rail is adjustable on the rail by means of a rack and pinion. The cross rail elevating screws have a top and bottom gearing to insure their operation in tension.

The work table has three finished tee slots, drilled stop pin holes at each end and is surrounded by a pan for draining off the lubricant to a tank in the base. It is operated by a spiral pinion and angular rack.

Practically every bearing, except those for the lifting screws, is bushed.

All gears in the driving train are steel or bronze, and in the feed train all gears, except the large substantial spur gear, are steel or bronze.



NEW 72-INCH FACE LATHE

THE FORTIN 5-SPINDLE TURRET DRILL HEAD

The accompanying illustration shows the latest production of the Fortin 5-spindle turret drill head as attached to large size drilling machines.

The constant demand for a small size turret drill head to be used on a large size drilling machine has led to the development of this product. This head is built in various sizes of both styles.

As designed for smaller machines the head clamps directly to the sleeve. This new method of attaching allows the head to be used on drilling machines of any size or make. As shown attached to the larger machine, the driving arbor fits into the spindle of the drilling machine while a separate piece is clamped to the sleeve with an adjustable rod connecting it to the head; this prevents the head from revolving and also from falling out of the spindle in case vibration should loosen it.

These heads operate by pressing the lever in front and revolving the turret either way while the machine is in operation, thus bringing the tool to be used into the working position, the other spindles remaining idle.

These heads have been tried out in many of the largest factories throughout the country with very satisfactory results.

They are manufactured by the Spafford Tool Works, of Hartford, Conn.

FIVE-SPINDLE DRILL HEAD

NEW FACE LATHE

THE Canada Machinery Corporation, Galt, have recently brought out the new 72in. face lathe shown in the accompanying illustration. The lathe has many features which commend it to prospective users. The headstock is long and rigid and is equipped with phosphor bronze bearings. The driving cone has five wide steps and is geared as well as triple geared to the face plate, giving a wide range of speeds combined with great power.

Two pillar rests are supplied. These are arranged to swivel in any direction and are graduated in degrees. The cross slides which are mounted thereon are operated by a ratchet feed through an overhead rock shaft.

The tailstock is adjustable upon the housing, which is also adjustable along the bed. The housing is provided with a wing upon which one of the slide rests may be clamped for turning hubs or small work.

A countershaft is provided with two pairs of fast and loose pulleys, which arrangement gives, in all, twenty spindle speeds. The manufacturers call special attention to the new and original belt shifter, which not only makes easy the shifting of heavy belts but also forms a safety device by preventing injury to the operator. This machine has the following dimensions:

Dia. of face plate	64"
Swing over bed	73"
Swing over sliding bed	37"
Maximum distance between centres	4' 6"
Maximum distance between tool posts	74"
Minimum distance between tool posts	35"
Travel of tool post upon rest	8"
Travel of cross slide upon pedestal	24"
Available travel of tailstock spindle	18"
Ratio of back gearing	7.8:1, 87:1
Floor space	13' 2" x 8' 10"
Weight	16,000 lbs

Ottawa.—Further study of the shipbuilding cost figures made available by the Marine Dept. show that the cost of building in Canada is still much above that of other countries. The Government's agreement with the Dominion Steel and Iron Co. for ship plate at $85 per ton, compares with plate in the United States at $60 per ton, while the British price is lower than the American

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The Shell Shop Machine

YES, I was a dandy in my day. When the war started I was rushed out, and until the war was finished I was still rushed. Men worked day and night making and shipping me. There was a feverish excitement all through. I heard them say a good many times that I was a single-purpose machine tool. Making shells, or helping to make them, was to be all that I was for. But at that time that was all that mattered. Things were looking black as night in Europe, and I was moulded, machined and rushed to the shippers with a good many rough corners. I never would have passed inspection for my beauty. But for all that I was strong and big and was well able to stand up under all sorts of heavy work.

And so I got a job rough turning big shells, six-inch ones. I held a cutting tool that bit off great rings of steel. And there, for 24 hours a day I stood and held that shell and held on to that tool, and kept on doing that first operation. There was a regular army of folks came to run me for a while. Good land, but they were green! There were barbers, jewelers, laborers, clerks, bricklayers, and all sorts of people who had worked at all sorts of things. And all they knew was to put in a new shell for me to work on. I did the work and most of the time did it in spite of those who were supposed to be bossing and running me. They'd never seen the inside of a machine shop before. Lots of times they weren't even on speaking terms with a monkey wrench, and they knew about as much regarding a cutting tool as a cigar store Indian does about running a lawn mower.

Well, that was three years ago now. It was the longest three years any person ever lived. Men who were working around me were making big money, more money than they ever thought of making, and the harder they worked me the more money they made. Yes, when I look back over it all I put a lot of people in pretty fair shape to stand some slack times, but, of course, whether they knew enough to save their money was none of my business.

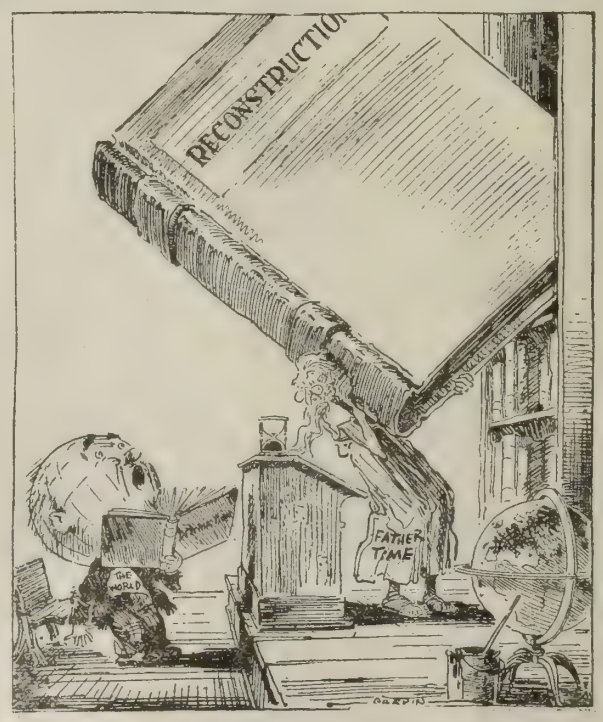
Folks called me a single-purpose tool. I didn't know exactly what that meant. Neither did a lot of folks who worked around me. Why, one chap let me get so hot one night that I was squeaking like the boots of an elder taking up collection on Sunday morning.

However, that was some time ago. The war quit, and I had a rest. The man who bought me said that I didn't owe him anything. I had done a lot of work, but he didn't know what he'd do with me now. I was in the road. They took me out of the old place where I'd stood for three years, put a roller under me and away I went out into the shed. There were no shaftings, no motors, no shells, nothing but old truck, and I knew very well that it was good-day to me. And I had turned thousands of shells, and had stood up under all sorts of treatment, but here I was stored away. It wasn't long before I had a patch of rust on the end of my nose, and another on my ear. Spiders came along and put their criss-cross marks all over me, and the dust blew in from the road and made me look like a hobo on a hot day in August.

Well, it's all settled now. A scrap metal dealer came along with the boss and looked me over. He had a flash-light in his hand and he turned it on me. I blinked. Just as they were going out I heard the junk dealer say, "I'll give you $18 a ton for it." I knew that "it" was "me." And so to-morrow I'm going to get on the junk dealer's truck and be cashed in at $18 per ton.

But I've no grouch. They're not using me a bit worse than this old world uses lots of other people. You may be a dandy in your day, and perhaps you scramble up into a position where folks will think you're filling up quite a big gap in the universe. But say, don't fool yourself. Some day you'll get yours. The old junk dealer will come along and he'll give you the once over. You may think you've got quite a lot of kick and use in your old hide yet, but hold on. You may argue that you were a dandy in your day and that you were courted and much sought after, but don't fool yourself. The junk dealer—and old Father Time is the greatest of them all—will make his bid. You may go in at $18 per ton, perhaps more.

This world has got a great habit of tossing a lot of people into the discard every year, and the single-purpose machine is simply having a taste of human life when it goes under the junk hammer at $18 per ton.



"AND THE NEXT LESSON WILL BE—"
—Chapin, in St. Louis "Republic"

WILLIAM BAIRD HAS PASSED AWAY AT GALT

Leading Citizen in That City—Sales Manager for the Canada Machinery Corporation.

WILLIAM BAIRD, sales manager of the Canada Machinery Corporation, Galt, died at the General Hospital, Toronto, on Wednesday, February 12. Referring to the demise, a Galt despatch says:—

The sad news of the death of William Baird, which occurred at 2.30 o'clock this morning in the Toronto General Hospital, will be received with the greatest regret by his wide circle of friends and business associates throughout the city. The deceased, who was in his 59th year, had been ill for the past two months and it was only on Thursday last that he went to the General Hospital in Toronto. He was born in Kilmarnock, Scotland, and came to Canada 30 years ago and had made his home in Galt

The Late WILLIAM BAIRD.

Deceased was an ex-member for the Galt City Council and took a keen interest in educational matters, for the past two years being a member of the School Board for Ward 3. He was a member of the Masonic order, also of the Galt Club.

Active Church Worker

In religion an Anglican, he was one of the leading members of Trinity Church and active in many of its organizations. He occupied a position of honor and responsibility in connection with the Diocese of Huron, being at the time of his death Honorary Lay Secretary of the Synod of Huron, a position he had held for the past three years. He had served as a church warden and a lay reader and was a member of the select vestry. It was in the Sunday school and Bible class that his greatest influence was felt. He was Superintendent of both Trinity and St. David's Sunday schools, and for many years had taught a large adult Bible class. St. David's Sunday school in the east part of the city owes its continued existence to Mr. Baird's loving labors and energy.

He is survived by his widow and four daughters, Mrs. Wm. Alison, Mrs. Gordon White, Mrs. Nellie Misener and Miss Helen, all of Galt. Six brothers and one sister, also survive, as follows: James and Robert, of Galt; Alec and John, Hespeler; Richard, London; Crawford, Lansing, Mich., and Miss Maggie Baird, Cambridge Street; W. J. Baird, of the W. J. Baird Machinery Co., Detroit, is a nephew of deceased.

What Does Bolshevism Accomplish?

A GERMAN spy, jail-bird and robber; a deserter from the Russian army; a convicted counterfeiter. Such are a few of the types which the Bolshevists have selected for some of their Soviets.

We speak many times of Bolshevism, but how little we understand its meaning! It means something or other, and that's about as close as we can come to it.

General A. Dobranjanksky, who recently arrived in New York as the representative of a group of united Russians, has this to say:

"As an instance of the calibre of men composing the various Soviets (self-elected representatives of the Workmen's and Soldiers' Committee), let me cite a few names of the members of the Soviet of Blagowestchensk. We have the president, Tobelson, a German spy, ex-jailbird and robber; Mochin of the executive committee, a deserter from the Russian army, a counterfeiter and ex-jailbird; his assistant, Tehatkovsky, also an ex-jailbird; Commissioner of Prisons Emilianoff, a jailbird and robber; his assistant, Nakileff, previously condemned to jail for robbery; the commissioner of food, who was convicted for misappropriation of funds; Korovin, commissioner of schools, an ex-jailbird; Tillick, convicted for robbery, now commissioner of finance; Mithin, commissioner of militia, an ex-jailbird, and finally, we have as commissioner of health an illiterate peasant. And these are the men who are at the head of affairs in Russia to-day!"

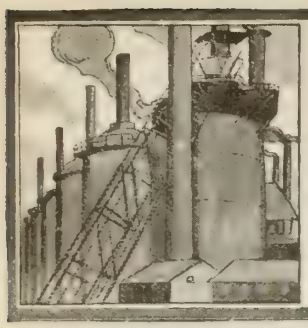
Prof. Ludovic H. Grandys, who at the outbreak of hostilities was a professor in a Holland school, himself a pronounced Socialist, says:—

"I personally saw the application of the theory to many factories. For example, Koopp's agricultural machine factory, employing 500 men, at Alexandroffsky, near Rostoff. The council of workmen in this factory voted to make Koopp an employee at 500 roubles a month, and made one of the loudest-talking workmen (who was also president of the Soviet) director of the factory. They voted themselves salary increases from 800 to 1,000 per cent. Every day the workmen held meetings, sometimes lasting several hours, in the factory. There they discussed rights and privileges, but the words duties and obligations were unknown to them. They also voted themselves the right 'as an intellectual necessity' to read newspapers during supposed working hours. Nominally they 'worked' eight hours, but literally not more than four and a half a day. But they paid themselves for all time spent in meetings, reading newspapers, and loafing. The funds they obtained by rifling the factory vaults, and when they were empty they went to Koopp's house and to the banks where he kept his private account and, under threat of using arms, took away what money remained. In all, they seized about 1,000,000 roubles."

For over a year after the revolution in Russia Sir George Buchanan was British Ambassador in Petrograd. He was in a position to note what the revolution did toward the debauchery that seized upon Russia. In a recent issue of the *Fortnightly Review* he gives his views. In part they are as follows:—

"Nobody's life is safe—all their political opponents, whether belonging to the Socialist or non-Socialist parties, to the working class or to the aristocracy, are styled counter-revolutionaries, and as such are judged guilty and condemned to death. The process of passing sentence on individuals is even found too slow, and they are massacred in batches, the Red Guard or the Chinese mercenaries employed as executioners being free to choose their victims from the lists of the proscribed. Such are the methods by which those pseudo-democrats, Lenine and Trotzky, have attempted to found their Socialistic State, and such are the precepts of the Bolshevik gospel which they fain would see preached in this and other countries. The sympathy felt in certain quarters for Bolshevism is due entirely to ignorance of what Bolshevists really are. They are not democrats as we understand the meaning of that word. They are anarchists, and I am convinced that were any of our so-called Bolsheviks to go to Russia and see with their own eyes the crimes that are being committed there in the name of liberty, they would never call themselves Bolsheviks again."

Bolshevism is not socialism; it is not state ownership. It is the brigand run wild, the anarchist cut loose from all moorings. Murder is its weapon, and looting a popular pastime. It is not a thing to be played with, tolerated or argued about. The best way to combat it is to see that the conditions of poverty and unrest under which it thrives are removed from our national fabric.



MARKET DEVELOPMENTS

Too Much War Machinery in the U.S. Market

The Automobile Industry is Buying Enough to Help Out the Situation to a Very Great Extent—Scrap Metal Prices Are Battered Down to Levels Not Half of Their Former Greatness

MACHINE tool dealers express no pleasure in the way in which the market is being glutted with war material in United States. The same thing holds good in Canada, but not to such an extent. If the thing were all averaged up it would be found that of the war machinery brought out in Canada and United States this country had much more of it in actual operation at the signing of the armistice. Buyers make inquiries for this sort of material, although dealers are not assisting or encouraging the development of this class of trade.

Warehouses are doing a good business now, but it is not always a good sign to see the warehouse interests too busy. It is well to look back of it and see what it means. It often points to the fact that the large users of materials are not placing stuff in their own sheds. They are out of the market as large purchasers for future operations. They draw on the warehouse interests on a hand-to-mouth plan rather than buy as though the market had settled. They apparently do not consider that prices are yet at the point where they are attractive enough to make them stock up with raw materials.

The steel trade is keenly interested in prices now. The prevailing price on steel plate of six cents per pound is felt to be too high to allow of anything but the most urgent buying. Deliveries can now be secured on the lower U. S. prices, and it would cause no surprise were a reduction to 5½ or 5c be made very shortly. Such a course would have the effect of making the possible buyer feel that he was not taking any chance of losing if he were to do his buying now instead of pursuing the policy of waiting, which threatens to bring the market to a period not far removed from stagnation.

The only thing that happened to the scrap metal prices this week is that the dealers went at them and battered them down still farther. They are in many cases just half the inflated values that were being secured during the period of the war. There is no trade moving. Those with material on their hands are anxious to sell, but buyers are not open to stock up. Dealers reckon now that there are 400,000 tons of scrap steel in the country in the shape of shell blanks, 250,000 tons of which belong to the I.M.B., and 150,000 to the U.S. Ordnance Department.

LITTLE PROGRESS IN MONTREAL TOWARD MAKING SHOP ADJUSTMENTS

Special to CANADIAN MACHINERY

MONTREAL, Feb. 20.—The gradual return to a domestic working basis is evident in the steady declines that are taking place in the markets. This is essential to develop the interest of the general consumers, as it will enable them to undertake reconstruction problems with some degree of assurance. Uncertainty has been the chief reason for the delay in the renewal of nominal activity, but it is anticipated that conditions are nearing the point where confidence will be restored, and pave the way for general activity on a greater scale.

Developments Progress Slowly

Little can be gleaned from the statements made regarding the general steel conditions. Dealers are reluctant to predict, in any way, what the future may have in store, and current operations are no fair indication of early developments. Every sale or transaction only emphasizes the uncertainty that predominates throughout the trade, and virtually no purchases are made for materials other than those required for immediate or very early consumption. This applies mostly to such commodities as are of a domestic nature; the demands for marine and locomotive requirements being steady and sufficiently large to insure continual operations. A feature that begins to affect the industry is the gradual accumulation of stock being produced at those mills working at or near capacity. Unless a heavier buying market develops it may be necessary to further curtail production of some of the mills, which in some cases would mean the closing down of the plant, owing to the high operating cost of the furnaces. In the opinion of the producers there is little possibility of a material wage reduction for a year at least, and for this reason cannot see how steel prices can go much lower than the present level. Owing to the world food supply being low and the fact that a season or two will be required to again return to normal, the high cost of living will continue, and therefore little chance is offered for easier labor conditions, even in face of considerable unemployment. General steel activity is steady, but actual business is not brisk. Demand is largely regulated by the prices ruling, and when it is understood that quotations cannot be severely cut under existing conditions, confidence may return and more activity develop. In many lines the dealers here are not overstocked, and would be in a good position to meet any reduction of prices, originating at the mills. One phase of present operations is the fact that many plants are piling up stocks as a means of keeping men employed, and with such stocks on hand it will be expected that selling prices on such material must be in accord with the cost of production. Local dealers report unchanged conditions with volume of business fair and steady; price quotations here are firm and unchanged, with a weak tendency.

Easier Tone in Metals

Activity in metals is confined to the

sale of small lots for present needs, little interest being shown in futures. Dealers are not anxious to stock up at present prices and are only satisfying the requirements of customers. Quotations continue to decline to lower levels, largely due to the light demand and the fact that production exceeds the trade requirements. A general decline is noted here in all but spelter and aluminum, which are firm at 9½ and 40 cents respectively. A drop of 3 cents is noted in copper, the current quotations being 23 cents for lake, and 22 cents for electro and castings. Demand for tin is light and supplies are coming through better, this week's price of 62 cents representing a drop of 8 cents per lb. Lead is slightly weaker at 8 cents. Antimony is one cent lower, the quotation being 9 cents per lb.

Quiet in Machine Circles

Conflicting reports are given by different machinery dealers as to the volume of business that is being carried on. Some state that the demand for general equipment is of fair proportion, while others report few sales for the week. Some interest is displayed as to what the U. S. Government will do with the machinery now installed in those Canadian plants that were engaged in the making or had contracts for American shells. At present the equipment is being appraised by U. S. valuators, but in few cases has a settlement been definitely made. The bulk of these tools are of a special character, and it is doubtful if they can be adapted economically to general industrial practice, but much standard equipment in these plants will be released when the Government states their intention regarding such equipment. There are two facts that prevent a more general return to pre-war activity: the relative high price of machine-tools and the uncertain labor situation, features that are of considerable weight in the stabilization of post-war conditions. Supply demand is steady, but volume is light.

Scrap Prices Falling

The old material situation might well be defined in the two words—nothing doing. Little definite information can be gained as to the actual price the dealers are paying, owing to the light trading at the present time. Some business is passing, sufficient to warrant dealers from closing their doors, but the volume is not enough to permit a definitely fixed price on any commodity. The accumulation of war scrap is very large and the movement of this is practically nil, so that the unsettled condition is likely to remain a feature for some time The market is quiet and quotations have declined, old metals have been lowered from one to four cents per lb. Coppers are easier by about three cents per lb. Iron and steel scraps are weaker with sales light. Declines range from one to twelve dollars per ton. Axles show a sharp drop, wrought iron being quoted at $20, and steel axles at $22, a decline of $16 and $12 per ton respectively. Present nominal prices are given in the selected market quotations.

POINTS IN WEEK'S MARKETING NOTES

The automobile industry is helping to save the situation at present for the machine tool dealers of United States. Their buying is liberal and covers a wide range.

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Canadian dealers feel that the six cent price for plate is too high. It is now possible to take advantage of the lower U. S. prices, which make it 3.75 at many Canadian points on mill shipments, and for more direct delivery 4.27 at Chicago warehouses, or about 5.05 at Toronto.

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Sheet prices are being shaved pretty close, although no reduction is announced in market quotations. One order that called for sheets for an automobile firm was priced on several times by various firms, and considerable concessions were obtained by the operation.

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Dealers in machinery report that there is a decided leaning on the part of purchasers of equipment to pick up shell shop equipment of the general purpose type. It is hindering the sale of new machines, and dealers are not encouraging the movement.

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The only change in the scrap metal situation this week is that the dealers have again cut the prices at which they will consider purchases. A good many lines are now at 50 per cent. of the inflated values that were ruling in war days.

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Warehouses handling steel products report that February is a much better month than January. This may or may not be a good sign. When warehouses are very busy it may be taken for granted that the large manufacturers are not stocking up, but drawing on the warehouse interests instead, on a hand-to-mouth plan.

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Steel interests trying to control the situation state that they want to have prices fixed by quarters, the same as during the war. But it looks as though the first quarter may see two reductions instead of one.

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Some of the steel mills want to reduce labor costs, but they are speaking very gingerly on the subject, and do not want to make a move until they are forced to do so.

SCRAP MATERIAL LIST BATTERED DOWN AGAIN

Business is Not Brisk—Some Small Sales—Demand Strong for Used Machinery

MACHINE tool dealers report that there are frequent sales being made to smaller concerns, and that they are estimating on machines for a number of large equipments. But for actual selling right now, it is in a rather limited scale, especially when compared with the tremendous volume of business that moved during the war.

Estimates have been submitted quite freely on the list of tools asked for by the National Railways. There are some 27 machines in the list issued about two weeks ago, and the chances are, with the present anxiety on the part of dealers to keep things going, that some pretty close prices will be submitted.

Although dealers for the most part frown on the trading of shell shop equipment, it cannot be denied that there is a fairly large demand for machine tools that come under the heading of general purpose machines, taken from shell shops. In some cases there are machines of this sort, purchased to work on orders that were cancelled before operations proceeded very far. Some purchasing is being done of this material at prices that will make the investment an extremely light one.

The Warehouse Business

Some of the warehouses in the city are busy, especially those handling steel plate, sheets, shapes, bars, beams, etc. It is not always a good sign to see warehouses busy. It means—and the present is no exception—that the big users of material are drawing from the stocks of the warehouses instead of buying direct from the mills for their own use. Users of material in a big way are anticipating better prices later on and they hesitate to buy for their own warehouses. They seem to prefer a hand to mouth business, and pay a higher warehouse price rather than run the danger of stocking themselves in a market that is, to say the least, weak.

One of the leading warehouses in Toronto stated to CANADIAN MACHINERY to-day that by the 15th of February they had more business on their books than they had done during the entire month of January.

While this may be so, there is a growing feeling that the Canadian trade must move toward lower prices. In plate, for instance, the price is still placed at six cents. Although this is somewhat of a concession from the heights that were attained during the war, it is so high that business done under it is confined to necessary purchases only.

The man who is buying plate wonders at the price. He starts with the three cent price at American mills, adds freight, duty, war tax and brings the price up to about 3.75. It is to be expected that a warehouse price at any time will be in advance of the figure

quoted at the mill, as delivery is quicker, and prompt shipment is often worth paying for. Chicago warehouses are quoting plate at 4.27, which would make the price laid down here 5.05. Some Montreal houses make 5.50 their price, and it would cause no surprise to find that a five cent price had been declared shortly.

The way prices are being shaved for business seems to indicate that it will not be long before there will have to be closer recognized values. For instance there is an order up this week with a firm of auto makers. It is for sheets, and is not a large mill order, but a nice little business for a warehouse to handle. A Toronto dealer put in a price that seemed certain to him good enough to land the business, but he got word that he was high. Market prices had been shaved off and in turn the first dealer mentioned sent in a second price. It is instances of this nature that make it certain that lower prices are not far off.

Scrap Cut Again

The only thing the scrap metal dealers have done this week is to proceed with the assassination of the price list in several of the leading lines. They have succeeded in removing prices a very respectable distance from the points reached during the war period. They have also put up a schedule that will not encourage offerings to come into the market. Below are given a few items and the figures that show the manner in which the offerings for them are receding:

Heavy melting has been $15, to-day $14, in September of 1918, $22.

Shell turnings, in war days brought about $12 per ton; after the war ended the price stayed around $8, while to-day dealers are offering $6 and they are not anxious for deals.

Boiler plate is quoted as low as $11 to-day. For a few weeks it has been at $15, against a war time quotation of $22.

Rails have slumped to half their war value. To-day's quotation is $11, against $15 of a few weeks ago. September of last year saw them bringing $23.

No. 1 machine cast scrap was as high as $33 per ton in war time. Following the stoppage of war it fell off to $18 while to-day dealers might pay $14 for offerings, but it is doubtful if they would go higher than that price.

Malleable scrap is marked at $13 to-day, against last week's $15, while the war price would run close to $20.

Wrought pipe was lowered $1 to-day, to $7 against the previous price of $8. Last September $17 was the prevailing price.

One of the largest scrap metal dealers in the city estimated in conversation with CANADIAN MACHINERY to-day, that there are 40,000 tons of shell turnings and about 400,000 tons of billets in the country at the present time. The estimate placed 250,000 tons as the property of the Imperial Munitions Board, and 150,000 tons as belonging to the U. S. Ordnance department. The average consumption of this country in heavy melting steel, in which class the billets come, is about 100,000 tons, so it does not seem likely that there will be much demand for some time. The shell material is a desirable form of scrap for the melters. It is easily handled. Some of it has been sold and the value of it is about $12 per gross ton.

A certain amount of shell shop equipment has already gone under the drop hammer for reduction to cupola sizes. As a general thing it is desirable material, most of it being only from eight to ten per cent. steel, which has to be separated.

AUTOMOBILE INDUSTRY IS SAVING THE DAY FOR AMERICAN DEALERS

Special to CANADIAN MACHINERY

NEW YORK, Feb. 20.—Expansion of the American automobile manufacturing industry is the most conspicuous feature of demand for machine tools. The purchases of the Ford Motor Company, Detroit, have reached $1,000,000 or more, and include 60 Bullard multiple vertical turret lathes, reported in a previous letter, and 100 Fellows gear shapers. The General Motors Corporation has been buying extensively for its Chevrolet factory at Toledo, Ohio, and the Willys-Overland Company, also at Toledo, has added considerable new equipment. The H. H. Franklin Mfg. Co., Syracuse, N.Y., bought about $300,000 worth of new tools from the United States Government at 60 per cent. of their "war-time prices." The New Process Gear Corporation, at Syracuse, has issued a list of about 50 miscellaneous tools wanted for the manufacture of automobile gears. A new automobile company, to make a small, low-priced car has been organized, with $1,400,000 preferred stock, by F. C. Chandler and Samuel Regar of the Chandler Motor Car Co., Cleveland, Ohio. A new plant will be built and equipped. Other automobile companies in the Detroit, Mich., and Cleveland, Ohio, districts have also been buying to round out their equipment and replace tools worn out by war work.

Development of the tractor manufacturing industry has also produced some new business in machine tools. The General Ordnance Co., Derby, Conn., has purchased the National Tractor Co., Cedar Rapids, Iowa, and has turned over its Derby plant, used during the war entirely for the manufacture of ordnance, for tractors. The Nelson Blower Co., South Boston, Mass., which was making parts of machine guns, is also engaging in the manufacture of tractors. Both of these companies have bought new equipment.

Otherwise there is not a great deal of business being done by the machine-tool builders. Many inquiries are being received, but it is evident that some of the quotations wanted by manufacturers are for appraisal purposes in settling claims against the Government for war work. Some manufacturers undoubtedly need the equipment for which they are inquiring, but after receiving prices they decide to wait for expected reductions.

The United States Shipping Board is promoting the organization of private companies for the construction of dry-docks and ship repair plant along the Atlantic Coast. Two companies have virtually completed their organization and will inquire soon for equipment. Others are in the formative state. The Shipping Board will furnish a part of the required capital if reliable private interests will furnish the remainder and build the plants. About 20 dry docks at New York, Boston, Philadelphia, Baltimore, Norfolk, and other parts in contemplation.

The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., is placing orders for equipment for a large boiler plant to be built at Richmond, Va. This project was approved early last fall, and then was cancelled when the armistice was signed. Some of the orders placed at that time are being reinstated, notably one for eleven overhead electric cranes with the Cleveland Crane & Engineering Co., Cleveland, Ohio. Considerable plate-working machinery will be required.

An inquiry from the Navy Department, which will soon come before the crane builders, is one for about 20 cranes for the Government armor plate plant to be built at Charleston, West Virginia. Most of these will be large cranes, some up to 250 tons capacity.

American machine-tool builders are greatly concerned over the export situation. There are many unfavorable features, which pessimists construe as being discouraging to the hopes which had been entertained that France, Belgium and also England would buy quite extensively in the United States. The British embargo is a most discouraging feature, and reports that this embargo may last a year have added to the gloomy feeling. Furthermore, the reported action of a selling oganization of British machine-tool builders in seeking agency connections in Holland and European countries by offering exclusive rights on the British tools if no American tools are handled has created a feeling that British competition is adopting some of the German methods of before the war. Of course, such reports are fragmentary and the worst possible construction is apt to be placed upon them by those who already feel somewhat resentful over the British embargo. As to the embargo, there is a disposition in

most quarters to admit that England is justified in protecting her own industries and labor. Those in this country who are protectionists, and that includes a majority of the manufacturers, can scarcely be so inconsistent as to deny to England that protection which she is taking by means of an embargo, which finds expression in this country in advocacy of protective tariffs.

French officials in the United States have stated repeatedly, publicly and privately, that France will buy very little machine-tool equipment here, at least not for some time to come, but there are reports that a syndicate of French manufacturers is contemplating buying several million dollars' worth of tools here. Financial arrangements will probably have to be made first, if the latter report is true. Belgium has already arranged with New York bankers for a $50,000,000 loan, which is said to be only a beginning. Some of this money will undoubtedly be spent for equipment that will enable Belgian industries to resume operations.

The American Government will doubtless offer for sale in France, at greatly reduced prices, the many millions of dollars' worth of machine-tool equipment, which was shipped over there for ordnance and airplane work, railroad shops, etc. Negotiations to this end are understood to be now under way.

Overhanging the domestic machine-tool market like a dark cloud is the immense quantity of machine tools which the Government will dispose of. American machine-tool builders have shown opposition to the plan proposed by the director of sales for the Government of buying back these tools at fixed valuations, which would be about 25 per cent. less than their present invoice prices. In the event that the machine-tool builders do not take the tools back, the Government will offer them for sale. Such action is even now in prospect, and as a majority of the tools are as good as new, they, no doubt, will be eagerly bid for, and the prices paid will undoubtedly be much lower than the machine-tool builders are asking for the same tools. This will probably have a demoralizing effect upon business. A project to distribute a large part of the tools among trade educational institutions is being considered by Congress, a bill authorizing such action having been introduced. This, it is felt, would put the tools to good use and remove them as a market factor.

THE SEE-SAW OF WAGES AND COSTS IS COMING TO AN ACUTE STAGE

Special to CANADIAN MACHINERY

PITTSBURGH, Feb. 20.—The steel market has been going from bad to worse as regards demand. Thus far this month demand has been distinctly lighter than at any time in January and the past few days have shown still lighter demand than was seen early in February. Meanwhile old orders are running out at the same time so that the mills are trending to a position of having hardly any shipping orders at all to run on, while the producers who have been putting material into stock will soon find their storage facilities exhausted.

Heavy January Production

The monthly report of steel ingot production is out, and shows heavier production in January than was currently estimated. Allowing for the companies not reporting, the monthly statement being based on returns for 29 companies and showing 3,082,427 gross tons of steel ingots produced in January by the 29, the country's rate of ingot production in January was 41,700,000 gross tons a year. This is 3.8 per cent. below the average rate in November and December and 11 per cent. below the rate last September, which was the heaviest rate in the history of the industry. Production in 1918 as a whole was about 40,400,000 tons.

The official statistics showing precisely the production in 1917 have just been made public, the collection of the figures having been delayed by the war. The production of ingots in 1917 was 43,619,200 gross tons, against 41,401,917 tons in 1916, previously the record year. In our report published in CANADIAN MACHINERY, October 17 last, we estimated the 1917 production at 43,700,000 tons.

As the January output was 85 per cent. of the estimated capacity, 49,000,000 tons a year, it was a remarkable heavy output, and one that was not supported by the current demand. If in this transitionary and unsettled period, with everyone complaining that there is practically no demand, tonnage equal to 85 per cent. of capacity could actually be absorbed, it would mean that the steel famine coming would transcend the apparent famine there was during the war. In other words more steel was made in January than was needed and this month while production is at a lower rate, there is still too much. Some time there will have to be an equalization.

The Stocking of Steel

Precisely to what extent the United States Steel Corporation subsidiaries are stocking steel is not known, but it is generally known that the process is going on and covers an important tonnage, perhaps one-third of the corporation output, which is now at the rate of about 85 per cent. of capacity. Independents are operating at an average of about 50 per cent. of capacity and it is not likely that the Steel Corporation's actual orders call for shipments at much heavier rates than do the orders on which the independents are working. A few weeks, perhaps two months, would mark the limit of storage capacity.

Price Prospects

Demand for steel having decreased of late rather than increased, producers are giving more thought to the matter of making another price reduction in order to stimulate demand. It is hardly likely that much business would be brought out by a reduction, but something would of course come. All buyers have been in expectation of successive declines, and the longer the period stretches from the last decline, which occurred the middle of December, the more the buyers feel that a fresh decline is imminent and the more disposed they are to postpone buying in order to get the benefit. For several weeks there have been persistent rumors that there would shortly be a batch of price reduction, this not to interfere with reductions April 1, the date long ago mentioned as one upon which reductions would likely be made when the war ended and the War Industries Board refused to have anything more to do with price fixing the steel trade took up with the idea that if there were to be price reductions it would be well to have them come on the quarterly dates, in continuance of the practice established by the War Industries Board of setting prices for a quarter at a time. Now it looks as though there might be two reductions per quarter instead of one. Producers are anxious to do something to stimulate demand and at the same time they do not want to overstay their welcome on present prices, for fear indiscriminate cutting might be started, and once started there would hardly be any end to this process. The current rumor is that the reduction will be $4 a ton and will apply to bars, shapes and plates, possibly to other commodities, such as pipe. Wire and tin plate might possibly escape reductions, not only at this time but also April 1.

Building Prospects

At last it has become generally realized that there cannot be much general activity unless there is building of various sorts, the ordinary everyday needs of the people not being sufficient to keep plants busy and furnish employment to all men. Private investors shrink from going ahead at the present time on account of costs being so high, as they feel they can make more money by waiting. Plans are now on foot by the federal Government and by states and municipalities for construction work of various sorts, particularly the erection of public buildings and construction of roads. It is recognized that there is a loss in doing such work at this time, but it is considered a public benefit to have the work done now and furnish the employment, hence the general public should foot the bill rather than the private investor. The federal Government is going in for many public buildings, the state of Pennsylvania has a large road building program under consideration and New York, Pittsburgh and other cities have extensive plans under advisement. These various projects will make a great deal of employment but they do not involve much iron and steel.

Steel and Labor

The steel producers are not particularly anxious to reduce the wages they pay. They realize that no attempt could be made without running the risk of starting a great deal of trouble, but even if a 10 or 20 per cent. wage reduction were made, simply in the steel industry proper, it would not greatly decrease the cost of making a ton of steel. The steel producers do feel it quite advantageous, however, to argue that as long as they cannot reduce wages they should not be expected to reduce selling prices of steel. What concerns the steel producers much more than wages they pay is the wages their customers have to pay. There is altogether too much labor cost in erecting a bridge or a building, for instance, and that is more of a deterrent influence than the high wages paid in making the steel.

FURTHER DECLINES REGISTERED IN THE U.S. SCAP MARKETS

THE scrap market has not yet finished descending. In some parts of the country prices are remaining stationary, while in others further declines are taking place. There is a little demand, and scrap dealers are losing money fairly regularly. Following are reports from principal centres:

CHICAGO.—The market is quiet in every department, and very little buying is taking place. There does not seem to be any accumulation, in spite of the small amount of tonnage being moved, and it is thought that any revival of buying would result in a sharp advance in price. The Northern Pacific offers 1,700 tons, Chicago, Milwaukee and St. Paul 1,200 tons and the Chicago Great Western 500 tons.

NEW YORK.—A further decline is in evidence here. Heavy melting steel has sold at $11 f.o.b. New York. Some grades remain steady, notably clean cast borings, which are holding at $10 and stove and grate bars at $16 to $17 f.o.b. New York.

PHILADELPHIA.—There is only a small demand for scrap. Rerolling rails have been established at $17 to $18 delivered, and old car wheels are now $22 to $24 delivered, based on actual transactions. Heavy melting steel is at $15 to $16 delivered, low phosphorus is at the nominal price of $20 delivered, for guaranteed material.

PITTSBURGH—There is hardly enough business moving to base quotations on. During the week a sale of 1,000 tons heavy melting steel at $17 delivered took place. One company has been buying freely of machine turnings at $9 per ton delivered, and cast borings at $12.50. The production of scrap is far ahead of consumption, and while this lasts there is not much hope for improvement.

BUFFALO.—Prices have been remaining at the same level here for the last two weeks, and hopes are entertained that the end of the decline has been reached. The stocks are diminishing and it is hoped that if mills keep on at their present rate of operations that they will have to come into the market for further supplies. Some small sales were recorded during the week.

CLEVELAND.—A resting place has been reached in the steady descent of prices, but dealers generally do not look for any improvement in prices until late next month. Heavy melting steel is selling at just half the last Government fixed price, which was $29 delivered. What scrap is now changing hands is limited to carload lots, and yard men are picking up some choice bargains.

CINCINNATI.—Foundries and steel mills have more scrap than they can take care of, and what scrap is offering can find no buyers. Last week was thought to be the end of the decline, but it is still going on.

ST. LOUIS.—The same story applies here as in most other parts of the country. The end of the decline is not yet in sight. Heavy melting steel was sold at $16, and every other grade was marked down. The three largest consumers in the district have announced that they are out of the market. A feature is that there is an abundance of pig iron available, and many mills that were using scrap largely as a substitute, can now get all the pig they require.

SOME SALES OF PIG IRON ARE BEING MADE TO FOREIGN BUYER

THE market for pig iron continues generally speaking to be dull. In Virginia pig iron prices have been established at $31 furnace, for foundry iron, No. 2 plain or $1.75 to $2.25 silicon, and at $34 for No. 1 or $2.75 silicon and up. Some sales have been made at these prices. In the eastern market a better demand is in evidence, enquiries from domestic buyers showing a greater interest than for some time past.

NEW YORK.—The outstanding feature of the past week was a sale of 4,000 tons for export. The buyer is not known, but it is understood that the same interests bought largely from the seller before the signing of the armistice. Enquiries for 3,000 tons low phosphorus for China, are among the many foreign enquiries, but there are many more enquiries than sales. One eastern furnace has made some small sales on the basis of $32.50 at the furnace, and this price represents concessions of from $1.50 to $2 per ton on two plain iron delivered at Newark, Jersey City and New York as compared with prices based on delivery at these points or a Pittsburgh base.

PITTSBURGH.—Although there is visibly no business going on, there are quite a few lots changing hands in a quiet way. Two or three lots of re-sale basic has been sold on a basis of $29.50 f.o.b. valley furnace. The market may be generally said to be firm, merchant producers being content to hold their iron, believing that a reduction in prices now would not help sales.

BUFFALO.—Plenty of enquiries with an infinitesimal amount of business seems to be the situation in this district. Buyers are of the opinion that prices are due to drop, and are using enquiries as a means of feeling out the market. Makers on the other hand are more inclined to shut down their furnaces than to make any price concessions. One maker says he does not expect a return to the normal before 1920.

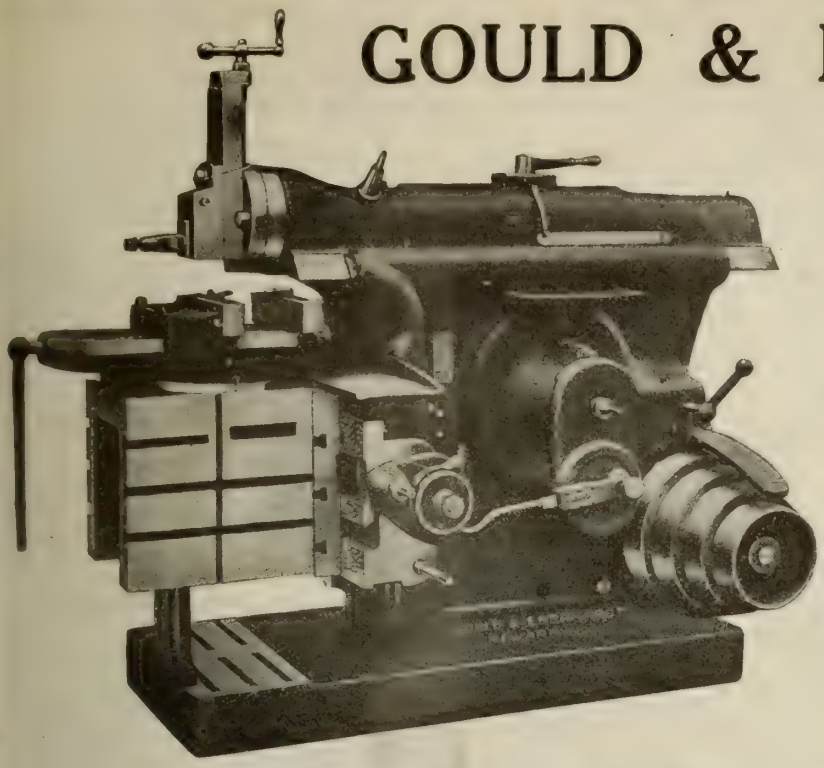
CHICAGO.—No interest is being displayed here in buying pig iron. The buying for first half of 1919 evidently covered the needs and in some cases more than covered them. Small lots daily have aggregated up to 300 to 400 tons per week, made up of irregular varieties. Whatever enquiries there are are for small quantities for mixing.

ST. LOUIS.—Believing that further concessions are coming, buyers are sitting back to wait. Even those who need iron seem unwilling to enter the market. Actual sales have not amounted to 1,000 tons during the week. Some of the southern furnaces have announced a reduction to the $31 base, while others, though not announcing any reduction, have let it be known that they will consider offers at the lower rate.

CINCINNATI.—The price of iron already shipped, which was ordered before Government regulation ceased, is giving rise to numerous disputes, the settling of which seems to be taking up all the energies of the furnace representatives. Some of the contracts contained a clause that the last Government prevailing price was to rule, and these will not be changed. There is no other business moving.

BIRMINGHAM.—Filling old contracts seems to be the only activity here, and this does not require the full output. Production of pig iron is at a very low ebb, the production for Alabama during January being less than 181,000 tons. Practically all furnaces in the Birmingham district are offering No. 2 foundry at $31.

CLEVELAND.—Domestic enquiry is almost non-existent, but there have been some enquiries for iron for export. From New York comes a request for 3,000 tons low phosphorus and 3,000 tons No. 1 foundry for delivery to China. Though rate of production is not changing, there is considerable accumulation of iron. Customers are taking their iron ore on contract in rather slow fashion, and some extensions are being granted.



GOULD & EBERHARDT SHAPERS in Stock

20", 24" and 28" Sizes

Write for literature describing the Double Triple Quick Stroke and other original features.

IMMEDIATE SHIPMENT.

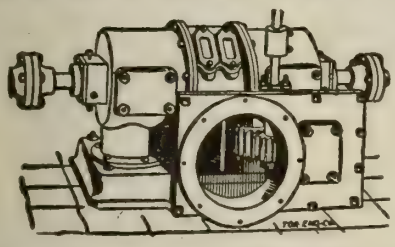
The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

64 Front Street West,
TORONTO

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	....
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton	.....	.....
Victoria	.....	.....

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Steel bars	5 50
Small shapes	5 75
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$23 00	$ 24 00
Electro copper	22 00	23 00
Castings, copper	22 00	21 00
Tin	62 00	65 00
Spelter	9 50	8 50
Lead	8 00	7 00
Antimony	9 00	10 00
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 6 00	$ 6 00
Plates, 3-16 in.	6 50	6 25

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$13 00	$13 00
Copper, crucible	16 50	15 00
Copper, heavy	15 00	15 00
Copper wire	15 00	15 00
No. 1 machine composition	14 50	14 00
New brass cuttings	10 00	10 00
Red brass turnings	11 00	10 00
Yellow brass turnings	8 00	8 00
Light brass	6 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5 50	5 00
Heavy lead	3-4	5 00
Tea lead	2-3	3 50
Aluminum	18 00	12 00
	Per Ton	
Heavy melting steel	15 00	14 00
Shell turnings	8 00	6 00
Boiler plate	16 00	11 00
Axles (wrought iron)	20 00	15 00
Rails	20 00	11 00
No. 1 machine cast iron	20 00	14 00
Malleable scrap	15 00	13 00
Pipe wrought	10 00	7 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	14 00	14 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

Per gross ton

BILLETS

Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, æ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 14

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

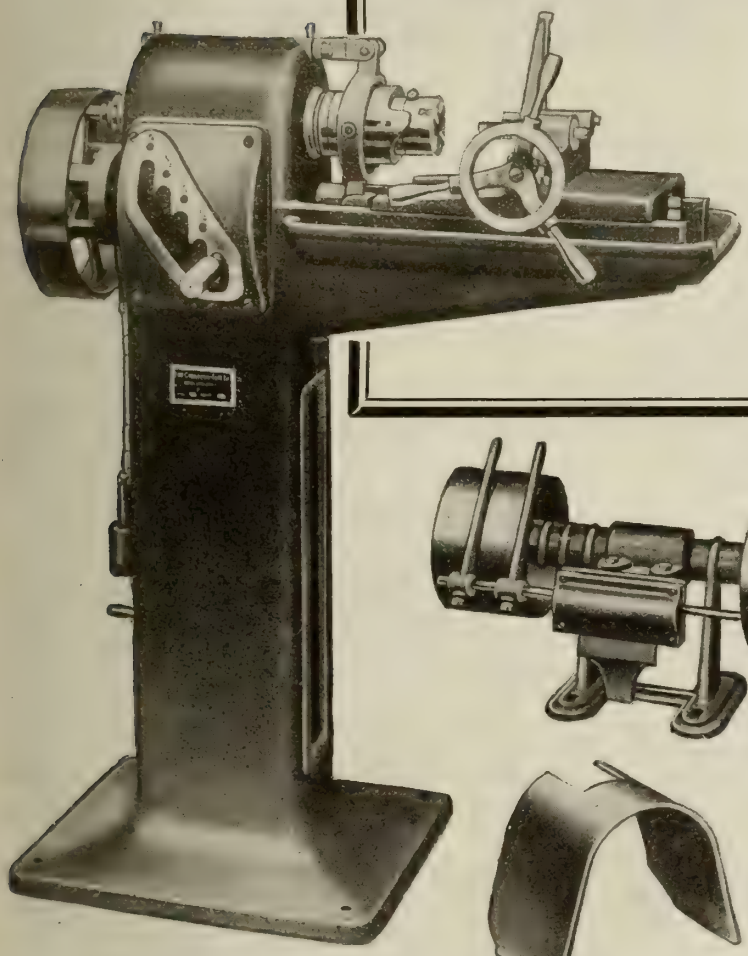
THE BETTER WAY

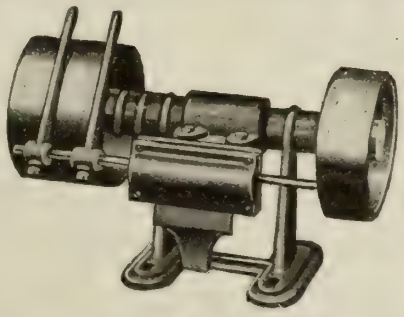
Just the way that suits. Small parts are most economically threaded with the Geometric Threading Machine. Busy automatic screw machines cannot profitably be slowed down to cut threads when there is a Geometric Threading Machine at hand. Especially since a Geometric Threading Machine costs one-tenth the price of automatics.

Geometric Threading Machines are employed on a large class of small threaded parts that cannot be produced economically on the ordinary screw machine.

Made in three sizes—to cut 1/8 to 1/2 inch, 1/4 to 3/4 inch, and 3/4 to 1 1/2 inch diameter threads. The carriage is mounted on slides and on the largest size machine is moved back and forth by rack and pinion, and in the smaller sizes by hand.

Spindle speed changes readily made, adapting the machine to the diameter and material of the work. An adjustable stop assures accurate length of thread, and automatically opens the die head, permitting of drawing the work straight back.





A line from you brings full details regarding this machine. Tell us your threading requirements — let us recommend the proper Geometric Collapsing Tap or Self-opening die.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg. St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 35
Solder, guaranteed	0 40
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks...list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings: class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 7 00
Sheets, black, No. 10	6 50	6 90
Canada plates, dull, 52 sheets	8 50	8 10
Can. plates, all bright	8 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head.28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.		Cts. per lb.	
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White.	11	Dark colored.	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

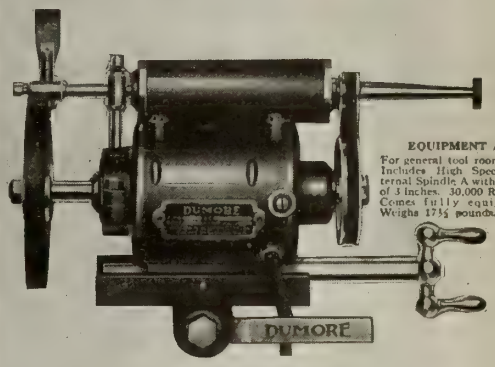
The Specifications Call For .0001±

SUPPOSE you were studying the specifications for a big job—one that called for making new and expensive tools—would your present tool-room equipment let you handle it? There are only two kinds of tools—the good and the poor—there's no half-way mark. And the quality of your output is fixed by the degree of accuracy you can obtain in your tool-room.

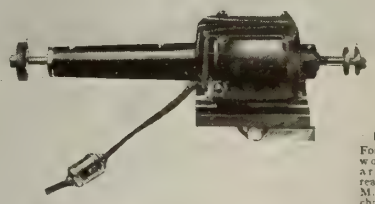
Accuracy in grinding depends upon correct cutting speed and perfect running balance. That is why the **DUMORE** grinder has been given speeds ranging from 10,000 to 50,000 R. P. M., along with a dynamically balanced armature. With this tool in your shops you can eliminate chatter, taper or bell-mouthed grinding. Then, too, the **DUMORE** is portable, easily carried to all parts of the shop and quickly set up in any machine ready for use.

If you are interested in obtaining only the best tools, ask your dealer about the **DUMORE** grinder. If he doesn't carry it, write us for literature and prices.

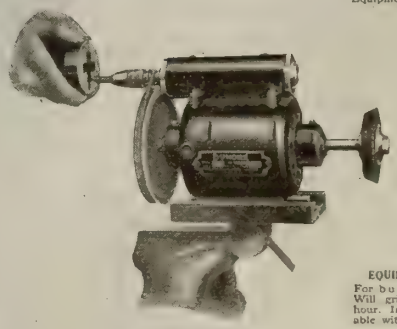
WISCONSIN ELECTRIC CO.
2908 16th St. RACINE, WIS.



EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches. 30,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.



EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS

GEORGE E. DRUMMOND PASSED AWAY WHILE ON TRIP TO ENGLAND

Just as CANADIAN MACHINERY goes to press news was received of the death in England of George E. Drummond, of the firm of Drummond, McCall & Co., steel and metal merchants and manufacturers, Montreal and Toronto. Deceased was born at Tawley, Ireland, October 21, 1858. He came to Canada in 1865. He was largely interested in the iron and steel business and established an iron mining business. He established the present business, whose interests in Canadian iron and steel properties have since become merged in the Canada Iron Corporation, Ltd. He took a keen interest in civic affairs and in matters of national interest. In 1909 he was appointed consul-general for Denmark, and was also president of the Montreal Board of Trade in 1904-5, and in the same years was president of the Canadian Manufacturers' Association. Other activities that took up his attention brought him to the position of member of the managing board of the Montreal General Hospital, and also as governor, McGill University. He wrote several books and papers that were followed with very wide interest. Among these were "The Iron Industry in Canada," "Fiscal and Imperial Defence Questions." In 1910 he was elected Knight of Grace of St. John of Jerusalem. He was married to Elizabeth Foster Cockshutt, daughter of the late Ignatius Cockshutt, of Brantford. He had long been connected with the firm of Drummond, McCall & Co., and all his dealings with the business world were marked by a fairness and honesty that became characteristic of the entire policy of the company.

The Late GEORGE E. DRUMMOND.

SOME DOUBT ABOUT BUILDING OF SHIPS

Senator Robertson Drops a Hint Regarding More Wages for This Work

Vancouver.—A warning that, "it will be difficult, if not impossible—" to maintain the shipbuilding in Canada, because of the high cost of producing ships as compared with cost in Britain, especially if it is to be interrupted by labor disputes, was conveyed by Hon. G. D. Robertson, Minister of Labor, in a telegram to Mr. Justice Murphy, who is investigating wages difficulties in the Coughlan yards.

Confirming this information, Hon. Mr. Robertson stated that any attempt to further increase employees wages in shipbuilding concerns in this country will jeopardize the future of the shipbuilding industry in this country. There is a danger already, he said, of it not becoming a permanent industry in Canada.

Now that the war is over, conditions are approaching their pre-war state, and Great Britain will be able, on account of her supply of iron and coal, and cheap labor, to underbid Canada in the making of ships.

IMPORTANT POST FOR HAMILTON MAN

Henry H. Biggert, of International Harvester, Has Successful Career

Special to CANADIAN MACHINERY

Hamilton, Ont.—Henry H. Biggert, for the past seven years general superintendent of the International Harvester Company of Canada, Hamilton Works, has resigned that important position, and will leave Hamilton to assume the position of general manager of one of the largest industrial manufacturing concerns in the United States, with their works in Bridgeport, Conn., and branch factories in Canada and England.

Mr. Biggert's appointment to a very important industrial position in the United States is very flattering to himself and associates.

The Chicago executive of the International Harvesters made the announcement of his resignation and expressed their regret at losing his valuable services.

Mr. Biggert is of Canadian ancestry, his grandfather moving from Connecticut to Hamilton many years ago, and Mr. Biggert's father was born in this city, the family in turn leaving here in 1849 for Wisconsin, where Mr. Biggert was born and spent his early boyhood.

HENRY H. BIGGERT.

for seven years general superintendent of the Hamilton works of the International Harvester Company, who has resigned that position to become general manager of an American firm.

HOW OLD COUNTRY FIRMS ARE TURNING FROM WAR TO PEACE LINES

Special to CANADIAN MACHINERY

Hamilton, Ont.—"My visit to this district is chiefly to get in touch with manufacturers, agents, and importers; to obtain an adequate idea of the importance of the city and surrounding districts in an industrial, agricultural and business way; to obtain information regarding the district which will be of value to British firms who may propose to locate branch factories in Ontario after the war, and to discuss the encouragement of British trade in Ontario with importers and others who are desirous of doing so.

"It is generally known that Great Britain, despite its tremendous war burden for over four years, has made extensive preparation for what is known as the reconstruction period," said Mr. F. W. Field, British Trade Commissioner in Ontario, in an interview with CANADIAN MACHINERY. "The work has proceeded steadily and in a great number of directions. A federation of British industries, representing over $12,000,000 of capital, and likely to represent several times that amount, has been created to stimulate exports. On its executive council are representatives of many important firms and trade associations, such as the British Engineers' Association, the British Electrical and Allied Manufacturing Association, and the Association of British Motor and Allied Manufacturers. The British Manufacturers' Corporation, with a capital of $1,000,000 and a large membership, will be represented in most foreign markets. A metal bank has been authorized to assist the metal and chemical industries. The Government's Board of Trade has given important assistance to the dye industry. An extensive organization, including over 80 committees, has been created under the Minister of Reconstruction. Great attention is being given to scientific research.

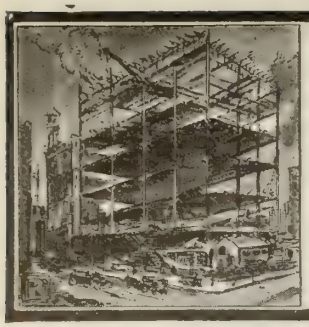
"What is being actually done in the United Kingdom in the turnover of factories from war to peace purposes was recently outlined by Mr. F. G. Kell, parliamentary secretary to the Minister of Munitions. For example, in the munitions area of Hebburn-on-Tyne, a firm, previously engaged on the manufacture of aeroplanes, is turning over to the manufacture of heavy toys and furniture, giving employment to 500 people. A Newcastle-on-Tyne firm, from producing aeroplanes, is turning over to household furniture making, and will give work to 500 people. A firm at Burnley, which was manufacturing fuses, is turning over to the manufacture of electrical fittings. At Leigh, in Lancashire, a firm is going to produce presses for brick-making, and it is estimated that they will employ about 1,000 persons. A Sheffield firm is turning over from the manufacture of shells to files and springs, and expect to employ 1,000 hands. At Leeds, one firm will cease to make steel pressings for mines and copper bands for shells, and make dairy utensils, while another, which was engaged in assembling aeroplanes will devote its buildings to the making of iron valves as an adjunct to their brass valves department. One Birmingham firm is changing from the production of fuse components and aeroplane parts to the manufacture of motor accessories, and another firm from aeroplane parts to capstan lathes. At Matlock a firm is arranging to manufacture cream separators, which are now largely imported from Sweden and America.

"Three munition firms at Leicester, Ilkeston, and Nottingham are taking up the manufacture of hosiery needles, which in pre-war days were practically entirely imported from Germany, and they hope to turn out a million, and later on two millions a week. Three Loughborough firms are devoting themselves entirely to the manufacture of hosiery needles, heretofore imported from Germany. A Leicester firm, which before the war was engaged in importing typewriters and selling and repairing them, now propose to manufacture them. Another firm in the same town which formerly made vulcanite pressings for magnetos will now make fountain pens, which were imported from America before the war. A third Leicester munition concern is laying out a plant for producing hose-suspender fittings, which also in pre-war days were almost wholly imported from Germany.

"Two other firms in the same town are going to manufacture corset steel and wood wool from old pit props. The latter occupation will be conducted in the foundry where iron shells were cased for the war. Then there are several cases where manufacturers who were producing aero engines are going to make engines for motor cars, and another firm of a similar character is going to turn out motors for small launches. In another case a firm is changing from tank and shell making to making boot machinery, and in South Wales, tin can firms are in a position to begin civil

Continued on page 65

J. Melville Alison, London manager for the well-known firm of Cotton Transmission Rope Manufacturers, William Kenyon & Sons, Ltd., Manchester, England, is again due in Canada to interview business friends in the Cotton, Flour, Paper and Steel Mills. It is many years since Messrs. Kenyon commenced doing business in Canada. Mr. Alison, we understand, will stay at the Windsor Hotel, Montreal, and Chateau Frontenac, Quebec.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

ENGINEERING

London.—The formation here of one of the greatest electrical combines in the world, to be known as the English Electric Company, with a capital of $25,000,000, and employing 25,000 persons, is viewed as a British effort to obtain ascendency in a market in which the Germans, as well as the Americans, have hitherto offered the most serious competition. One of the largest manufacturing concerns in this country, which has been one of the greatest producers of war materials, contemplates the manufacture of typewriters on a scale sufficient to be a serious competitor in the world market, where American manufacturers have had the monopoly.

Ottawa.—The annual general meeting of the Engineering Institute of Canada opened at Ottawa on February 10th, attended by engineers from all parts of the Dominion. The professional meeting followed the general, at which a number of engineering and national topics were discussed. A number of the leading engineering bodies of the United States were represented, and addresses were delivered by these representatives: Comfort A. Adams, president of the American Institute of Electrical Engineers; A. D. Flynn, secretary of the United Engineering Council of New York; and Doctor Ira Hollis, past president of the American Society of Mechanical Engineers.

MARINE

Collingwood.—The steamship "Atikoken," now lying at the yard of the Collingwood Shipbuilding Co. at Kingston, has been sold for trade on the Atlantic coast, and will be taken from Kingston down the St. Lawrence as soon as navigation opens. The "Atikoken" is owned by the Montreal Transportation Company.

Vancouver, B.C.—The New Westminster Construction Co. expect to launch the first of their 1,500-ton wooden steamers, built to the order of the French Government very shortly. The hull of this vessel is well advanced, but she is waiting for the tail shaft to arrive. Some delay has been caused on these vessels by the change in engine design made by the French Government since the contract was let. The fifth vessel will be laid down on the berth vacated by the first as soon as she is launched, while the other three are well advanced.

Ottawa.—The four wireless finding stations installed by the Department of Naval Service during the war at Cape Sable, Halifax, Cape Canso and Cape Race, have been placed at the disposal of merchant shipping since the signing of the armistice. They are originally installed with their special finding apparatus for the purpose of locating enemy craft fitted with wireless. Now their usefulness will be in giving a bearing to vessels caught in fog in the vicinity of the coast, within a radius of several hundred miles; thus lessening the anxiety of those in charge, and probably preventing many casualties.

Vancouver.—The president of the Montreal Harbor Commission, speaking at Vancouver recently, emphasized the natural advantages enjoyed by the port. He told a joint meeting of the Board of Trade and the British Columbia Manufacturers' Association that if they went down East and saw what had been developed from the natural advantages there, they would come back to Vancouver and go crazy with enthusiasm when they realized the advantages that they possessed. As a result the meeting passed a resolution to be forwarded to Ottawa, urging the immediate development of Vancouver harbor.

Ottawa.—A deputation from Toronto waited on Sir Thomas White for the purpose of urging the Government to place some of their contracts for ships with Toronto firms. The deputation was representative of many interests, including the City of Toronto, Toronto Harbor Board, Board of Trade, the shipbuilding plants, Machinists' Union, G.W.V.A., and the Toronto Trades and Labor Council. Sir Thomas White took the position that there were two aspects of the question to consider, namely, whether the Government, as a matter of policy, should extend its programme, and whether the cost would be such as to justify giving further contracts. He claimed that there had been no discrimination in giving contracts, and made the point that the ships built for the Imperial Munitions Board were financed by the Canadian Government.

Goderich.—Speaking of business conditions at Goderich, a recent despatch from that place says: "The National Shipbuilding firm is running at top speed turning out marine engines and boilers for the American and French Governments, and has many positions open for mechanics. It is also receiving many enquiries for repair parts of the engine which it manufactures, but has been compelled to refuse orders because of the shortage of mechanical workers. 'We are carrying night and day shifts,' said Mr. Peter Gorrie, the secretary-treasurer, 'and have enough work to keep us going for a year at least. Just now we are engaged on fourteen marine engines for the French Government and the Emergency Fleet Corporation, and have many more orders on hand. We are very optimistic, and have a big field for our products.' Regarding the employment of returned soldiers, Mr. Gorrie stated that the firm would be very pleased to give them preference. There are a number of veterans working in the plant at present, and they are giving the utmost satisfaction."

MUNICIPAL

Toronto.—The chief of the Fire Department is asking for three motor combination hose, chemical and pump trucks, one motor 75-foot aerial ladder truck, and one 55-foot aerial ladder truck, which are estimated to cost $76,600.

PERSONAL

G. Harris has been appointed sales manager of the Chapman Double Ball Bearing Co., Ltd., Sorauren Ave., Toronto, in place of John Reekie, who has resigned to take up other duties.

W. D. Anderson, engineering and efficiency expert, has opened an office at 380 Queen St. W., Toronto. He makes a specialty of installing efficiency methods in industrial plants, the work being done by practical men who thoroughly understand the subject. Some lines taken up are scientific management, organization, time study, bonus, time, cost and stores systems, routing of work, etc.

TENDERS

Welland.—The Public School Board of the City of Welland are asking for plans for a proposed new school building to contain eight rooms. Plans and estimates will be received up to March 17th by J. McGaw, secretary of the Public School Board, Welland.

Toronto.—Sealed tenders will be received until noon on Friday, the 28th of February, for taking down the old Court House, Gaol, etc., at Sault Ste. Marie, and for the excavations and the erection of foundation walls of new Court House at Sault Ste. Marie, Ontario. Plans and specifications can be seen at the Sheriff's Office, Sault Ste. Marie, and at the office of H. F. McNaughten, Secretary of Public Works, Toronto.

Toronto.—Tenders will be received up to noon on February 24th for the building of a substructure of a bridge over the River Mattagami, near Timmins, Ont. Plans, specifications and general conditions of the contract may be seen at the office of C. H. Fullerton, superintendent of Colonization Roads, Parliament Buildings, Toronto. A marked cheque for $1,000 must accompany the tender. Tenders to be addressed to Hon. G. H. Ferguson, Minister of Lands, Forests and Mines, Ontario.

TRADE GOSSIP

January's building permits in Kitchener were $99,000.

Kemptville, Ont., may put in waterworks this year.

Hamilton's garbage collection system may be motorized.

Brantford bricklayers are going to get 70 cents per hour.

The County Council of Gray will spend a large sum for road machinery.

Central heating plant may be built with a housing scheme in Winnipeg.

Canadian Steel Foundries at Welland, owing to the present market, has closed the rolling mill.

Ottawa has deputations almost every day from all over the country asking that public works be taken up.

To Build Bridge.—A bill has been introduced into the New York Legislature in connection with the building of a new bridge between Bridgeburg and Buffalo. The American and Canadian Federal Governments will be asked to co-operate in this, and if this fails, an effort will be made to get the Ontario and New York State Governments to take the matter up.

Toronto.—The site of the new Anatomy Building and the Electrical Engineering Building is being cleared, and the buildings themselves, which were recently authorized by the Provincial Government, will be started immediately. The Government has made a grant of $350,000 for the Electrical Engineering Building, and $200,000 for the Anatomy Building, which is being built as an addition to the present Medical Building.

Going to Europe.—The Hydro-Electric Power Commission's mission to Europe to investigate the advancement of electric science left London for New York last week. The mission will be headed by General Manager E. V. Buchanan of the City of London Public Utilities Department. The mission will sail from New York on the "Baltic," and during their trip they will visit Great Britain, Sweden, France, Switzerland, and probably Italy.

Larger Export Possible. — Articles which Japan imports in large quantities and which could be advantageously supplied by Canada are suggested by Canadian Trade Commissioner A. E. Bryan as follows: Malt, confectionery, wine and liquors, condensed milk, sole leather belting, animal bones, carbolic acid, caustic soda, soda ash, dynamite, printing paper and good writing papers, asbestos, gypsum, pig iron and steel manufactures of all kinds, iron nails, rails, machinery of all kinds, tarred papers.

At Lyons Fair.—Canada is to be well represented at the great industrial fair at Lyons, which opens on March 1st and lasts for fifteen days. The Canadian Government, through the Department of Trade and Commerce, has made extensive arrangements for the Canadian exhibits. All Dominion exhibits will be shown in one group, thus making a large and impressive show. The Government itself is making a small exhibit of agricultural, mining, fishery and forestry subjects. The exhibits will be removed to Italy after the Lyons fair.

Sold the Plant.—The Imperial Munitions Board, following their policy of selling their plants, announce the sale of Camp Mohawk, Deseronto, to Frank Anglin, W. S. Anglin, and Frank and Charles Anglin, of the firm of S. Anglin and Co., of Kingston. There are two and a quarter million feet of lumber in the

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

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camp, which the purchasers acquire, as well as the heating plant. The Board has also announced the sale of the summer camp at Deseronto to W. S. Anglin, which includes about three-quarters of a million feet of lumber, as well as heating plants, etc.

Amherstburg Plant.—The plant of the Brunner Mond Co. at Amherstburg is almost completed, and some of the departments are already finished and ready to begin operations. The plant has been built at a cost of nearly $15,000,000, but operations are being held up owing to the unsettled business situation. The money invested in the company is largely American, and the double income tax is probably one of the unfavorable conditions, while the fear of drastic revision of the Canadian tariff is also acting as a hold-back.

CATALOGUES

The Gisholt Machine Company, Madison, Wis., have recently issued a circular descriptive of the Periomograph time and labor saving device for the obtaining of accurate factory costs.

The Lansing Stamping & Tool Co., Lansing, Mich., has sent out trade literature telling of the value of the Internal grinder in fast munition work, and showing in a realistic manner just how important these machines have been.

The H. Mueller Mfg. Co., Sarnia, Ont., have in the course of preparation a 300-page catalogue on water, gas and steam brass plumbing goods. This catalogue is at present in the printer's hands and will be ready for distribution within a few weeks.

The Howard Iron Works, Buffalo, N.Y., has issued a catalogue on their Howard expansion joint. The catalogue is descriptive of the various types of expansion joints made by this firm, and illustrations show the features of each type.

The Swedish Gauge Co., 10 Cathcart St., Montreal, have issued an attractive calendar for 1919, indicative of the Johannsson method of gauging. The illustration features an excellent halftone engraving showing a typical set-up in the tool room.

The Webster & Perks Tool Company, Springfield, Ohio, have issued a very attractive catalogue on the pointing, thread cutting and special tapping machinery which they manufacture. This catalogue features the various types of tapping machinery manufactured, and also a number of other products.

The Canadian S.K.F. Co. have recently issued two pamphlets descriptive of the quick acting automatic drill chuck which they manufacture. The unlimited holding power and the perfect centering features of the S.K.F. drill chuck make its use most desirable with high speed drills, and the ease with which drills can be changed adds to its value in the machine shop.

The T. R. Almond Mfg. Co., Ashburnham, are sending out a catalogue descriptive of their line of drill chucks, scroll chucks for lathe use, and other equipment which they manufacture. This catalogue is put out in such a manner that the loose leaves of which it is composed may be incorporated into a standard price book.

The Ohio Blower Co., Cleveland, Ohio, have issued a small pamphlet on their Swartwout vacuum traps, which gives considerable detail regarding the operation of its mechanism. The trap is described and the method by which a number of loose parts are eliminated is shown very clearly by means of a cross-section. The principle on which the trap works is also very clearly explained.

The Tallman Brass and Metal Company, Limited, Hamilton, Ontario, have issued their new stock list, dated February 1st, of brass and copper rod, tobin bronze rod, phosphor bronze rod, bass and copper sheet, tubing, etc. This stock-list is unusually complete and lists a great variety of sizes in the articles mentioned above and a number of other products of the Tallman Brass and Metal Company such as sheet copper, finished brass goods, automobile trunks, and electric fixtures.

The Goldie & McCulloch Co., Galt, Ont., have recently issued a catalogue on rotary jet condensers and vacuum pumps. This firm have obtained the rights to the Rees-Roturbo pumps and condensing equipment, and this catalogue deals with the various types of condensing equipment, which they are prepared to supply. Condensers in general are treated of. Condenser plant economies and the economy of high vacuum are shown. The Rees-Roturb jet condenser is treated of in detail, its design being gone into thoroughly, and features of installation being dealt with in very thorough manner.

The Heine Safety Boiler Company, St. Louis, Mo., have issued a new pamphlet called "Boiler Logic." As its name indicates this pamphlet of 86 pages is devoted to practical considerations arising out of boiler and boiler setting design. Part 1 is devoted to some fundamental considerations of boiler designs, such as furnace requirements and heat transmissions. Part 2 is devoted to practical baffling of waterproof boilers and various types of baffles, and their merits are fairly described. Part 3 takes up the Heine boiler and describes its operation for different fuels, firing, methods and practice of service. Part 4 deals with overload conditions.

The Goldie and McCulloch Co., Galt, Ontario, have issued a very attractive catalogue on the Rees Roturbo pump, for which they have secured the manufacturing rights for Canada. The Rees-Roturbo pump has proven highly efficient and is widely used in Great Britain, Canada, and the United States, and the high efficiency and self-regulating features proving particularly attractive. The literature, which has recently been published by the above mentioned firm, goes into the design of this pump very fully, and makes very interesting read-

ing, the fundamental principle of the pump itself is very clearly explained and the manner in which the problems connected with variation of head in either the suction or delivery are dealt with is clearly shown. The various types of single and multi-stage pumps are featured and dimensions and other information given concerning their design.

HOW OLD COUNTDY FIRMS ARE TURNING FROM WAR TO PEACE.

Continued from page 61

work immediately, but are prevented from doing so at present owing to the difficulty of obtaining supplies of tinplates.

"As an important factor in British trade and commerce, now that normal times are returning, is the Imperial Government's department from whom I receive my instructions, namely, the Department of Overseas Trade (Development and Intelligence). This department combines the commercial activities of the Foreign Office and the work of the former commercial intelligence branch of the British Board of trade. Under this department will soon be working sixteen trade commissioners in the British Empire. They are the commercial representatives of the Motherland in the overseas Dominions, etc. In Canada, three, and probably four, will be stationed, two already having taken up their posts.

"The supply of materials to manufacture in the United Kingdom is such that domestic control can now be considerably relaxed, and it is anticipated that British manufacturers will immediately commence to build up again their vast export trade with markets abroad.

"The general sentiment, as you know, is strongly in favor of closer commercial ties between the various units of the British Empire. In Ontario, where I represent the British Government's Department of Overseas Trade, there are substantial signs that when the people of Ontario propose to purchase goods outside their own country they will endeavor to learn first with what Great Britain and other parts of the Empire can furnish them, and the manufacturers of the Empire generally are expected to take similar interest in other sections of that Empire," concluded Mr. Field.

PHILADELPHIA.—With the establishment of prices for Virginia iron, it is only 20 cents higher at Philadelphia than eastern Pennsylvania iron when quoted on a Pittsburgh basis. The meeting of the Eastern and Virginia pig iron associations here last week studied the situation thoroughly, and it was found that all eastern Pennsylvania furnaces are adhering to $31 Pittsburgh base. Sales of foundry iron have amounted to roughly 2,000 tons during the week, including one transaction of 300 tons for second half delivery. Inquiries for export include 3 000 tons for China, several thousand tons basic, 5,000 tons bessemer and considerable foundry, but the indications are that these will remain just enquiries for some time yet.

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The Financial Post
THIS WEEK ON STEEL MARKET CONDITIONS

SOME of those who are very close to the market claim that the present situation at the peace conference is a factor that keeps buyers from coming into the market. It does not require a very great amount of reasoning to see that there is a lot of steel needed in every country that has been at war. The disturbing reports that are coming out regarding the feeling in Germany, the planning of a new conscript army there, the attitude of some of the Allies, and the new armistice arrangements all tend to keep an element of uncertainty and doubt in the mind of the people that hinders planning and buying for anything except immediate wants.

LABOR

The suggestion is being made more in the open now than ever before that wages on their present level are doing much to keep business from moving. As has been stated before, the Steel Corporation, when they made their reduction which averaged $4 per ton, stated that it was their concession, regardless of labor costs. Now the claim is that any other reduction will come only when labor costs are cut. Naturally those who hold these views, and they are many, speak rather gingerly on the subject, fearing that anything they may say will cause unrest or open trouble in the dealings between the mills and the men.

Besides the important article from which the above quotations are made, THE POST this week deals with the following amongst

OTHER SUBJECTS OF INTEREST

Expenses Cut Into Profit of London Rails.
Asbestos Corporation at $1,253,813 Gains 123 Per Cent.
Hollinger Mines Have Built Up Strong Reserve.
United Company Plans to Purchase Railway Hotels.
Taking Steps to Provide Against Smooth Crooks.
England Looks to Canada For Ore.
British Banks Are Increasing Their Capital.
National Trust Company Shows New High Record.
The Tariff—R. MacKenzie Replies for Farmers to Manufacturers.
Business in Bond Market is Favorable.
Northern Life Passes Through a Trying Year.
New Municipal Act Before B. C. Legislature.
Saskatoon Has Raised Its Rate on Improvements.
Building During January Proved Disappointing.
Provincial Paper Mills Profits Less.
Employers Try to Maintain Wage Standards.
London Life Has $60,000,000 on its Books.
Great West Life Wrote Thirty Millions.
Government Paid Damage of Explosion.
Declining Days of Canada's Food Board Regime.

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FOR SALE

ONE 3/16" ADT. MODEL AUTOMATIC WIRE straightener and cutting machine arranged to cut a maximum of 10 feet. E. M. Bride, 113 4th Ave. East, Calgary, Alberta. (c11m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

ONE SPINDLE, GRIDLEY, AUTOMATIC, ⅞-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

ONE CLAYTON 6" x 8" x 6" AIR COMPRESsor in first-class condition. W. G. Utley, Machinist, Yarmouth, N.S. (c8m)

MACHINERY WANTED

SIX-FOOT RADIAL DRILL FOR BOILER shop; lathe to take in 12' between centers; air hoist, 10" cylinder, 4' lift with trolley; vertical air receiver, 44" inside dia., 14' high. The National Shipbuilding Co., Ltd., Goderich, Ont.

WANTED BULLDOZER (USED), MEDIUM size. Drilling machine, 4-spindle, straightiing, No. 4 Morse. 7' or 8' between outside spindles. Both must be good. Box 554, Canadian Machinery. (c8m)

COMPLETE WELDING OUTFIT, MUST BE IN first-class shape. Prest-O-Lite preferred. Send price and particulars to F. Clark, 95 Woodland Ave., St. Catharines. (c9m)

POSITION WANTED

Practical Mechanic having successfully held positions as foreman pattern maker and general foreman all depts., thoroughly familiar with foundry practice, molding machines and latest labor-saving devices, desires position as Superintendent with firm manufacturing agricultural implements or general contract shop, that offers greater opportunities for advancement than present position offers. Salary desired, $3,000 per year and percentage on turnover.

Can organize new shop or doctor sick one; able to design jigs and dies to speed up production. Box 555, Canadian Machinery. c8m

POSITIONS WANTED

FORGE AND DROP HAMMER SUPERINTENDent will be open for a position shortly. Experienced in drop hammer and machinery blacksmithing, upsetting, bulldozers. Long experience in all classes of forge work. Can design dies and harden them. Box 552, Canadian Machinery. (c9m)

FIRST-CLASS STEAM, ELECTRICAL ENGINeer open for position. Thoroughly experienced with various types of engines, boilers, pumps, air compressors and electrical machinery. Address, Box 556, Canadian Machinery. (c8m)

HELP WANTED

WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

WANTED

WANTED—FENCE FOR INDUSTRIAL PLANT, approximately eight feet high and nine hundred yards long. Send full particulars, and where can be seen, to Box 557, Canadian Machinery. (c9m)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 783. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

FOR SALE

Two 3 x 36" geared feed Turret Chucking machines with 3" collet chucks, about 3½ years old. Price, each $700.00.

Three 3 x 36" Friction Feed Chucking machines without Collet Chucks, complete with Friction Counter Shafts, about 6 or 7 years old. Price, each $360.00.

The above are Jones & Lamson make.

Three 8 x 8" Open Type Single Horizontal Belt Driven Air Compressors, with unloaders. Capacity 75 cubic feet air per minute. Each $400.00. Extra for Air Tanks if required.

One No. 2A Warner & Swasey Collet Chucking Machine, complete with Oil Pan, Cross Feed and Counter Shaft. Price, $750.00.

One 26" Engine Lathe x 10', Flather. Price, $350.00.

DARLING BROTHERS, LIMITED
Engineers, Manufacturers and Founders
120 Prince Street, Montreal, P.Q.
(ctfm)

Wanted immediately, **Heavy Duty Lathe**, new or used, good condition, ranging from 40" to 48". Swing, about 25 ft. between centers. Arranged for Motor Drive.

CANADA FORGE CO.'S PLANT, Welland, Ont.
(ctfm)

MACHINERY

NEW AND SLIGHTLY USED

14—16" x 6' South Bend double back geared lathes.
5—16" x 6' South Bend single back geared lathes.
1—10" x 36" Norton grinder.
1—No. 2 Ford-Smith plain miller.
1—16" x 22" x 8' Sebastian gap lathe.
50 and 75 H.P. Motors.
1—340 cubic ft. Rand Compressor, Aftercooler and Receiver, belt, and 5" pipe.
New Transmission material of all kinds.
12—Racine hack saws.

Cuts, detailed descriptions and prices on application.

ELGIN MANUFACTURING CO., LTD., St. Thomas, Ont.
(c11m)

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

FOR SALE

In good condition, High-Speed Ball-Bearing Drill Presses, Floor and Bench type, 1, 2 and 3 spindles; Garvin and Rickert Shafer, Tapping Machines; 6 1½" Model A Cleveland Automatics. Attractive prices.

P. W. Ellis & Co., Ltd.
St. Clair Works:
St. Clair Ave. and Prescott St., Toronto
c8m

IMMEDIATE SHIPMENT

LATHES.

12" x 5' LEBLOND, standard.
14" x 6' McKENZIE, standard.
14" x 8' LEBLOND Toolroom Equipment.
14" x 7' HENDEY Toolroom Equipment.
6—16" x 6' C.M.C. double back gear, quick change gear.
18" x 6' CISCO, double back gear.
19" x 10' LEBLOND heavy duty.
22" x 10' REED PRENTICE, geared head.
12—26" x 12' C.M.C. double back gear, quick change.
28" x 10' CONRADSON geared head.
36" x 14' NEW HAVEN triple geared.
24"—40" x 20' McCABE, double spindle.
28"—44" x 14' BERTRAM gap lathe.
20" x 36" x 14' CMC gap lathe, double back gear, quick change gear.

SHAPERS.

15" McKENZIE B.G. crank.
16" RAE B.G. crank.
16" STEPTOE crank.
20" GOULD & EBERHARDT high duty.
24" and 28" GOULD & EBERHARDT high duty.

MILLERS.

No. 1½ and 2½ LEBLOND Universal.
No. 3H and 4 LEBLOND Universal.
No. 3 FORD-SMITH Universal.
BECKER vertical single pulley drive.
BECKER No. 7HS Lincoln type.
No. 1½ AMERICAN plain.

GRINDERS.

No. 3 LANDIS Universal.
No. 1 LEBLOND Universal Tool.
No. 2 OAKLEY Universal Tool, power feed and wet attachment.
GISHOLT Tool Grinder.
BAY STATE vertical surface.

DRILLS.

10" MYERS bench sensitive.
10" McKENZIE sensitive.
14" MYERS column sensitive.
14" PERFECT column sensitive.
15" BARNES lever feed.
20" BARNES back geared.
22" BARNES sliding head.
26", 28" and 34" BARNES sliding head.
26" and 28" BARNES with tapper.

RADIALS.

2' FOSDICK National pattern.
3' NILES box table.
4' CINCINNATI-BICKFORD, speed box drive.
5' BICKFORD variable speed motor drive.
5' LONDON box table.
5' FOSDICK heavy duty speed box and tapping attachment (new).

PLANERS

24" x 24" x 7' LONDON heavy pattern.
30" x 30" x 8' BERTRAM, one head.
36" x 36" x 12' BERTRAM, one head.
42" x 42" x 10' McGREGOR GOURLAY, heavy pattern, 2 heads.

MISCELLANEOUS.

No. 2 BAKER Keyseating machine.
No. 2 MITTS & MERRILL Keyseating machine.
8" JARECKI pipe threading machine.
4" MERRILL pipe threading machine.
1½" WELLS bolt cutter.

The above list merely gives part of our stock, which is ready for immediate shipment from Toronto.

Write our Service Department and put your proposition up to them.

THE A. R. WILLIAMS MACHINERY CO., LIMITED
64 FRONT ST. W. - - TORONTO

WANTED TO PURCHASE

SECOND-HAND FACE LATHE, in good condition, 84 inch Face-plate, with tail stock, and one or two rests. Give name of maker and all particulars. Swedish Steel & Importing Co., Ltd., 503 Canadian Express Building, Montreal, Que. (c8m)

USED MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, Nova Scotia
tf

Below is a list of valves and fittings used in connection with pumps, accumulators and shell presses, all of which are in first-class working order:

The following suitable for 1,500 lbs. working hydraulic pressure:—

3—4" flanged, By-pass Valves, steel body (R.D. wood).
7—3" flanged, By-pass Valves, steel body (R.D. wood).
5—3½" flanged, By-pass Valves, steel body (Dean and Steam Pump Co.).
3—3" screwed ends, By-pass Valves, brass body (R.D. wood).
7—3½" flanged ends, Shock Relief Valves, steel body (R.D. wood).
5—3½" screwed ends, Check Valves, steel body (R.D. wood).
8—3" screwed ends, Check Valves, steel body (R.D. wood).
4—4" flanged ends, Check Valves, steel body (R.D. wood).
3—3" screwed ends, Check Valves, brass body (R.D. wood).
12—4" flanged ends, Balance Stop Valves, steel body (R.D. wood).
2—6" flanged ends, Balance Stop Valves, steel body (R.D. wood).
6—3½" flanged ends, Balance Stop Valves, steel body (R.D. wood).
20—3" screwed ends, Balance Stop Valves, brass body (R.D. wood).
2—3½" screwed ends, Balance Stop Valves, brass body (R.D. wood).
5—2" screwed ends, Balance Stop Valves, brass body (R.D. wood).
1—6" flanged ends, Balance Stop Valves, steel body, NEW (R.D. wood).

The following suitable for 250 lbs. working water pressure:—

6—4" Pratt & Cady, screwed ends, Horizontal Flapper Check Valves, iron body.
2—4" Pratt & Cady, flanged ends, Horizontal Flapper Check Valves, iron body.
3—5" Jenkins, flanged ends, inside screw, Gate Valves, iron body.
3—4" Jenkins, flanged ends, inside screw, Gate Valves, iron body.
2—5" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
4—4" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
7—3½" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
3—3½" Jenkins, flanged ends, inside screw, Gate Valves, iron body.

The following suitable for 125 lbs. working water pressure:—

6—5" Pratt & Cady, screwed ends, inside screw Gate Valve, iron body.
1—5" Pratt & Cady, flanged ends, inside screw, Gate Valve, iron body.
2—5" Jenkins, screwed ends, outside screw, Gate Valves, iron body.
5—4" Crane Co., screwed ends, outside screw, Globe Valves, iron body.
8—4" Kennedy, screwed ends, inside screw, Gate Valve, iron body.

Cast Iron, Cast Steel and Steel Forging Elbows, Tees and Flanges, suitable for water pressures 125, 250 and 1,500 lbs.

Canada Foundries and Forgings, Limited (Canada Forge Plant)
WELLAND, ONTARIO

If any advertisement interests you, tear it out now and place with letters to be answered.

NOTICE

New and Slightly Used Equipment Must be Sold Immediately

MOTORS

25 CYCLE, 3 PHASE

No.	H.P.	VOLT.	R.P.M.	MAKE
4	250	2200	480	Westinghouse
1	200	2200	480	C.G.E.
1	150	2200	750	"
1	250	550	480	Westinghouse
2	200	550	480	"
3	200	550	480	"
1	150	550	480	" Slip-Ring
1	100	550	480	C.G.E.
1	75	550	480	Westinghouse
4	50	550	720	"
3	40	550	720	"
1	30	550	720	"
1	20	550	720	"
2	15	550	720	"
3	10	550	720	"
2	5	550	720	"
5	125	220	720	Cr. Whl.
2	30	220	720	Westinghouse

60 CYCLE, 3 PHASE

No.	H.P.	VOLT.	R.P.M.	MAKE
1	150	2200	600	C.G.E., Slip-Ring
2	75	2200	690	Westinghouse
1	150	550	600	C.G.E., Slip-Ring
1	75	550	690	Westinghouse
1	75	550	850	"
1	50	550	690	"
1	50	550	850	"
1	50	550	1200	C.G.E.
2	35	550	900	" Slip-Ring
1	35	550	1200	" Slip-Ring
1	30	550	1140	Wagner
1	20	550	1200	C.G.E.
1	10	550	1800	C.G.E.
2	5	550	1140	C.G.E.
1	40	220	1140	Westinghouse
1	30	220	1140	"
1	20	220	1140	A.C.B.
1	10	220	1140	Westinghouse

CAN SUPPLY TRANSFORMERS FOR THESE MOTORS

Lathes, Milling Machines, Air Compressors, Receivers, Shapers, Drill Presses, Etc.

Write or wire for prices

Send us your list of equipment for sale

E. A. LOWRY POWER EQUIPMENT CO.

GUELPH - - - - - CANADA

IMMEDIATE DELIVERY

MONTREAL STOCK

Motors 3-Phase 60-Cycle

75	H.P.,	550	VOLTS,	450	R.P.M.....2
60	H.P.,	550	VOLTS,	450	R.P.M.....1
15	H.P.,	550	VOLTS,	1,200	R.P.M.....1
10	H.P.,	550	VOLTS,	720	R.P.M.....1
7½	H.P.,	550	VOLTS,	720	R.P.M.....1
7½	H.P.,	550	VOLTS,	1,800	R.P.M.....1
5	H.P.,	550	VOLTS,	720	R.P.M.....1
5	H.P.,	550	VOLTS,	900	R.P.M.....1
5	H.P.,	550	VOLTS,	1,150	R.P.M.....1
5	H.P.,	550	VOLTS,	1,200	R.P.M.....3
3	H.P.,	550	VOLTS,	1,200	R.P.M.....2
2	H.P.,	550	VOLTS,	1,200	R.P.M.....2

TRANSFORMERS....3

200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

550 TRANSFORMERS, POLE TYPE $\frac{220}{110}$ VOLTS

5 K.W.....2
10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

Prompt Delivery and Subject to Inspection.

Zenith Coal and Steel Products
LIMITED
402 McGill Building Montreal

PARTIAL LIST OF TOOLS

10' Bement Vertical Boring Mill, two heads.
36" Bausch Vertical Boring Mill, two heads.
48" x 48" x 12' D. & H. Open-side Planer, one head on rail, one on side.
36" x 36" x 10' Gray Planer, two heads.
3—36" x 36" x 8' Gray Planers, two heads.
36" x 36" x 8' Hamilton Planers, two heads.
30" x 30" x 10' Bement Planer, two heads.
1—No. 2 Kempsmith New Universal Miller.
5—No. 0 Steptoe Hand Millers.
2—3" x 36" Jones & Lamson, geared head.
13" x 5' 6" New Carroll-Jamieson Quick-change Lathe
14" x 6' New Carroll-Jamieson Quick-change Lathe.
15" x 6' New Sidney D.B.G. Quick-change Lathe, swing 17"
12—17" x 8' New National Quick-change Lathe.
3—17" x 8' New Sidney D.B.G. Quick-change Lathe, swing 19".
18" x 24" New Rahn Larmon Lathe, D.B.G., quick change.
9—19" x 8' New Sidney D.B.G. Quick-change Lathes, swings 21".
24" x 20' Reed Lathe.
32" x 24' Fay & Scott Lathe, raising blocks to swing 58".
5' Bickford Single Pulley Drive Radial.
4' Mueller Single Pulley Drive Radial.
2—20" Rockford High Duty Drills.
250-lb. New Little Giant Belt Hammer.
100-lb. New Little Giant Belt Hammer.
80-ton Watson & Stillman Hydraulic Press.

FRANK TOOMEY, INC.
127-131 North Third St., PHILADELPHIA, PA., U.S.A.

Grey Iron Castings

We are in an excellent position to give quick delivery on high grade castings up to 10,000 lbs. in weight. Send your Blue Prints for quotations.

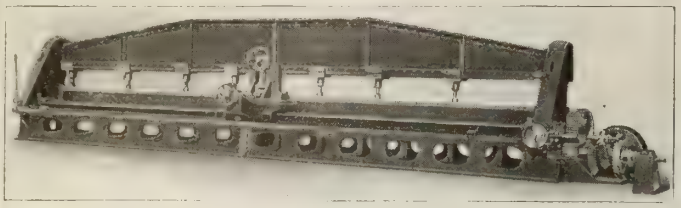
Our up-to-date Pattern Shop can handle your Pattern Work expeditiously and well

Welland Machine & Foundries, Ltd., Welland, Ontario

When Writing Advertisers Please Mention Canadian Machinery

Metal Working Machinery

For Structural and Bridge Works, Tank and Boiler Works, Shipyards, Car and Locomotive Works and Railway Repair Shops



We build Plate Planers of any required size, arranged for belt or motor drive and equipped with pneumatic, hydraulic or screw jacks.

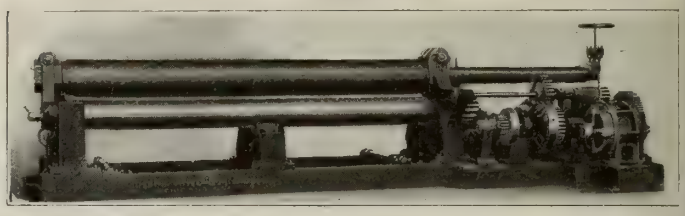
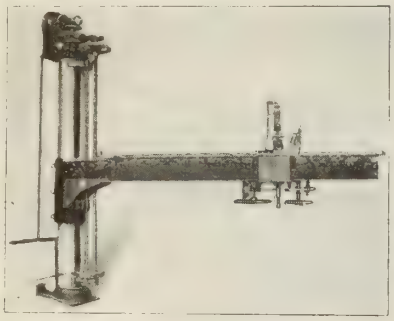
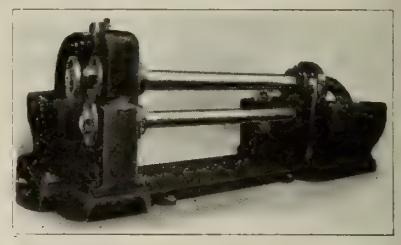


Plate Bending Rolls of any capacity and distance between housings and arranged for belt or motor drive can be furnished upon request.



Ryerson Boiler Shop Radial Drill is designed principally for the use of boiler makers, bridge and shipbuilders.



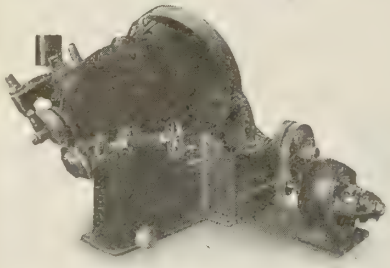
This machine is designed for straight shearing of sheets and plates and can be efficiently used for cutting round and square or flat bars.

IF YOU WANT
Machine Tools
NEW OR USED

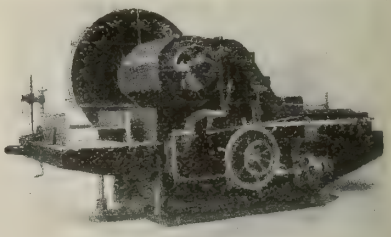
Complete equipment for Railroad Spring Shops, Flue Shop Equipment or Machinery for any other purpose, or Woodworking Machinery of any kind

Write or Call on Us

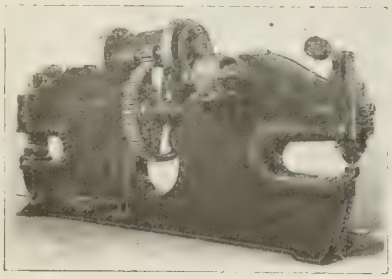
Many of these machines in Toronto Stock



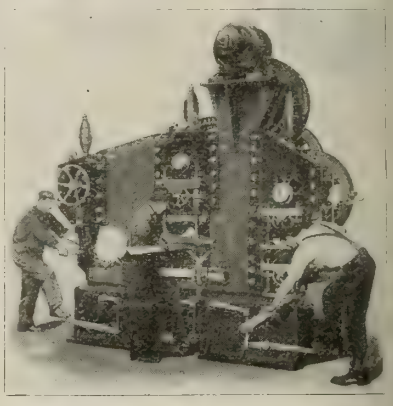
The most efficient machine now on the market for beveling irregular and curved sheets, boiler heads, flanges, dome sheets, plates, angles, etc.



No. 4 Ryerson High Speed Friction Saw for cutting Structurals, round and square bars.



We can furnish Cored Frame or Solid Frame, Single or Double End Punches and Shears of various capacities and depths of throats.



Ryerson Steel Frame High Power Quintuple Punching and Shearing Machine, built in different sizes and with various combinations.

Garlock-Walker Machinery Company, Limited

32 Front Street West, Toronto, Canada

TORONTO MONTREAL WINNIPEG

"Everything in Woodworking and Metal Working Machinery"

FOR SALE

All in Excellent Condition and at greatly reduced prices. Write TO-DAY.

100 "Avey" No. 1/2 Single Spindle Ball Bearing Drilling Machines

Bench Type, for speeds up to 12,000 R.P.M., also 30 Double Spindle of the same Machines

30 Henry & Wright No. A, Class B Column Type SENSITIVE Drilling Machines

15" Swing, Capacity up to 3/4" holes

The above are part of the Equipment of the British Munitions Company plant, which also includes:

Lathes, Drills, Grinders, Furnaces, Punch and Shears, Milling Machines, Twist Drill Grinders, High Speed Hack Saws, Blowers, Compressors, Hydraulic Pumps, Motors, Arbor Presses, Bliss Presses, Oil Tanks, Electric Drills, and a very large number of Machine Tools.

Also supplies of all kinds, including Shafting, Hangers and Pulleys, Belting, Steel Lockers, Time Clocks, Trucks, Standard and Hydraulic Valves, Pipe Fittings and Packings, Tool Steel, Twist Drills, Milling Cutters, Taps, Files, and complete machine shop equipment.

Write NOW for further information and quotations

Williams & Wilson, Limited

320 St. James Street, MONTREAL, QUE.

National High Speed Cutters

(The Cutter that gives service)

Let me quote you on your next requisition

Drills

High Speed and Carbon

Immediate shipment and right price.

J. A. M. TAYLOR

Machine Shop Supplies

Main 786 318 Stair Bldg., Toronto

MACHINE TOOLS
FOR SALE

The equipment listed below contains several items that are new. All are available for immediate delivery.

LATHES

1 **New Sidney Lathe**—Double back gears; quick change gears; max. distance between centers 11′; max. swing over shears 27½″; taper attachment.

2 **Hamilton, O., Lathes**—Swing over shears, 20″ and 21″; max. distance between centers 4′ 4″; opened gears; double back gears; one has Independent chuck and one has one Independent and one Universal chuck; good condition.

1 **Sebastian Lathe**—Swing over shears, 15″; max. distance between centers, 5′ 6″; opened gear; single back gear; one Universal chuck; fair condition.

1 **Sebastian Lathe**—Swing over shears, 15″; gap 2″; max. distance between centers, 3′; opened gear; single back gear; one Universal chuck; fair condition.

1 **LeBlonde, H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 11′; opened gear; single back gear; fair condition.

1 **C.M.C. Lathe**—Swing over shears, 20″; max. distance between centers, 9′ 6″; taper turning attachment; quick change gear; double back gear; one Independent chuck; good condition.

1 **C.M.C. Lathe**—Swing over shears, 18″; max. distance between centers, 3′ 6″; taper turning attachment; double back gear; good condition.

4 **C.M.C., H.D. Lathes**—Swing over shears, 26″; max. distance between centers, 6′; two with and two without taper turning attachment; quick change gears; three with Independent chuck and one with Universal chuck. These lathes are new.

1 **Gleason Lathe**—Swing over shears, 24″; max. distance between centers, 3′; open geared; single back gear; fair condition.

1 **Cisco Lathe**—Swing over shears, 15″; max. distance between centers, 3′; quick change gear; single back gear; one Universal chuck; fair condition.

1 **Barnes Lathe**—Swing over shears, 18″; max. distance between centers, 5′; eight feed changes in apron of carriage; single back gear; one Universal chuck; good condition.

1 **Hepburn Lathe**—Swing over shears, 20″; max. distance between centers, 26″; good condition.

1 **Bertram Lathe**—Swing over shears, 26″; max. distance between centers, 8′; taper turning attachment; quick change gears; double back gears; one Independent chuck; good condition.

1 **Pond Lathe**—Swing over shears, 38″; max. distance between centers, 9′; taper turning attachment; quick change gears; triple back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 30″; max. distance between centers, 16′; quick change gears; double back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 12′; quick change gears; double back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 4′; taper turning attachment; quick change gears; double back gears; one Universal and one Independent chuck; very good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 20″; max. distance between centers, 3′; taper turning attachment; quick change gears; double back gears; one Universal chuck; very good condition.

1 **Hepburn Lathe**—Swing over shears, 20″; 3′ between chuck and carriage; one set drawn in collar near chuck; good condition.

POWER SAWS

5—Atkins power saws, each 14″ capacity; complete with pumps; fair condition.

DRILL PRESSES (Vertical)

1—Barnes, 18″; fair condition.
1—Bertram, 42″; fair condition. Adjustable table and vertical movement on drill carriage.

PLANER

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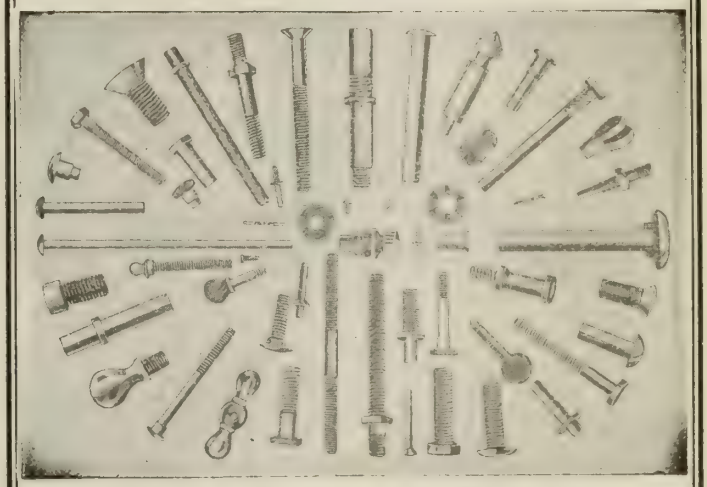

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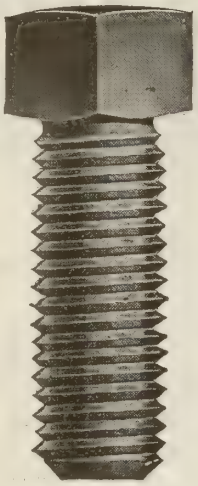

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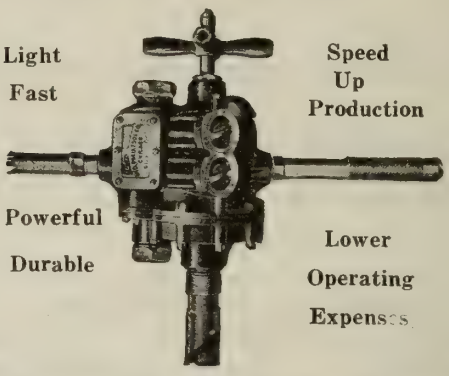

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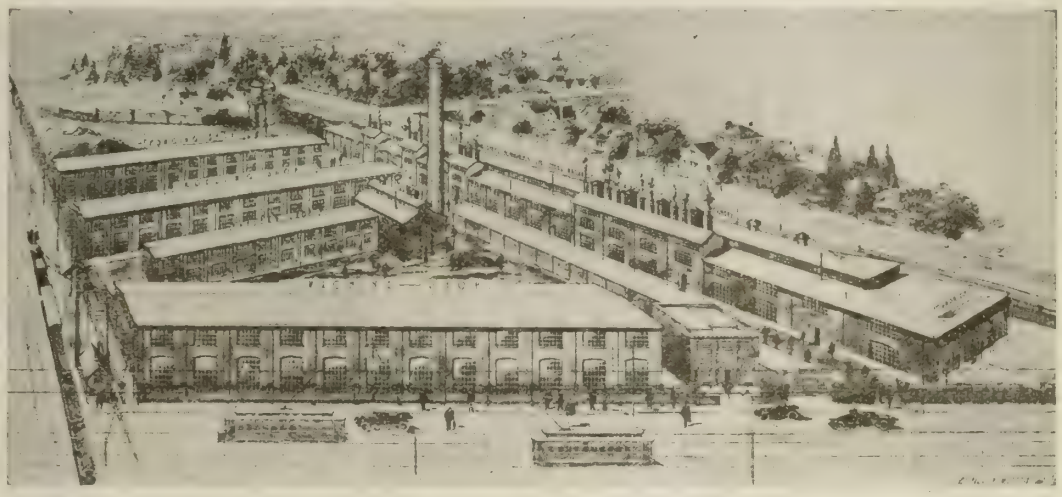

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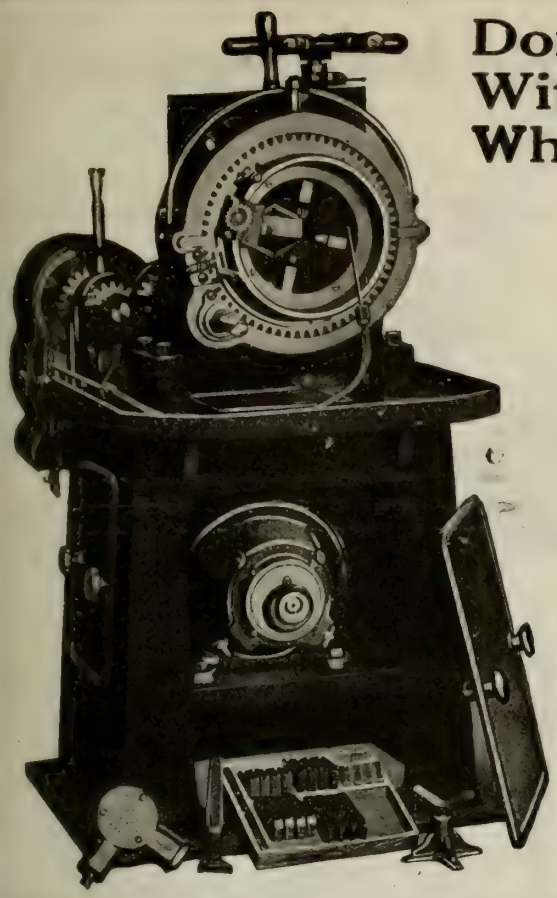

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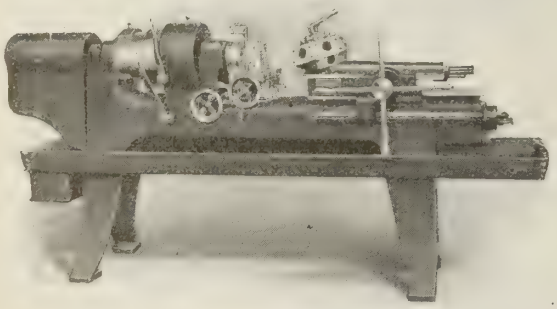

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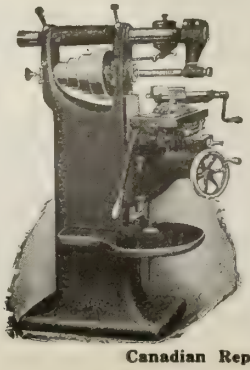

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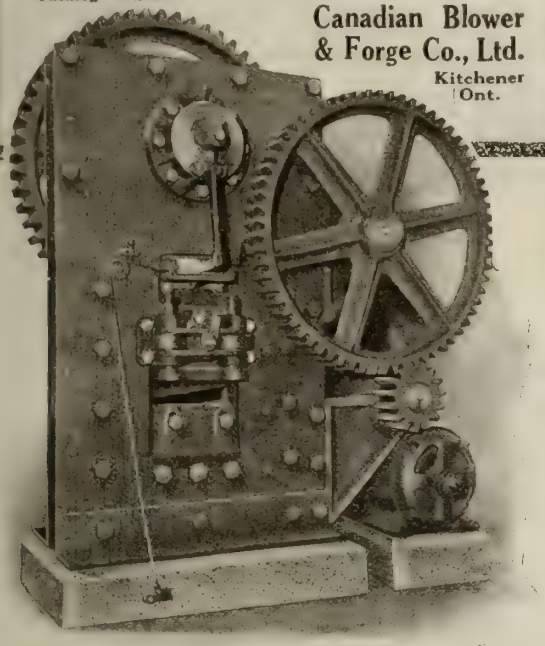

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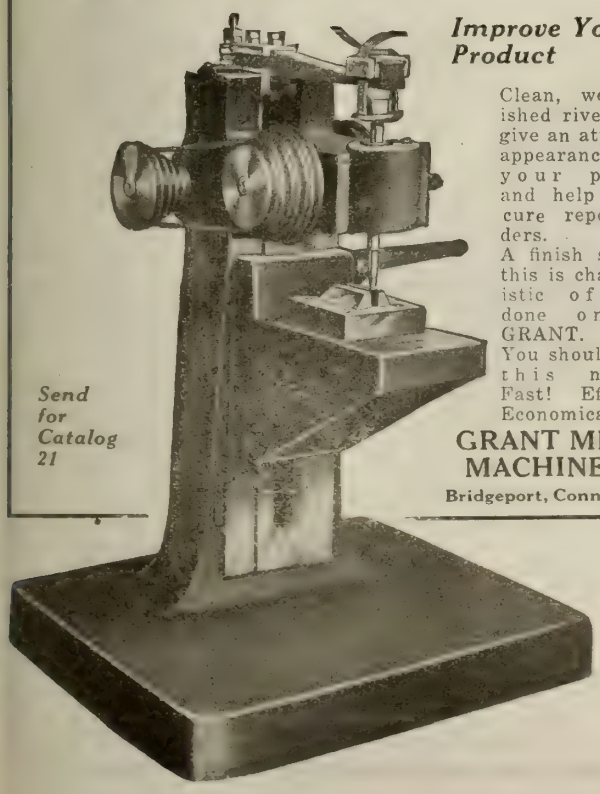

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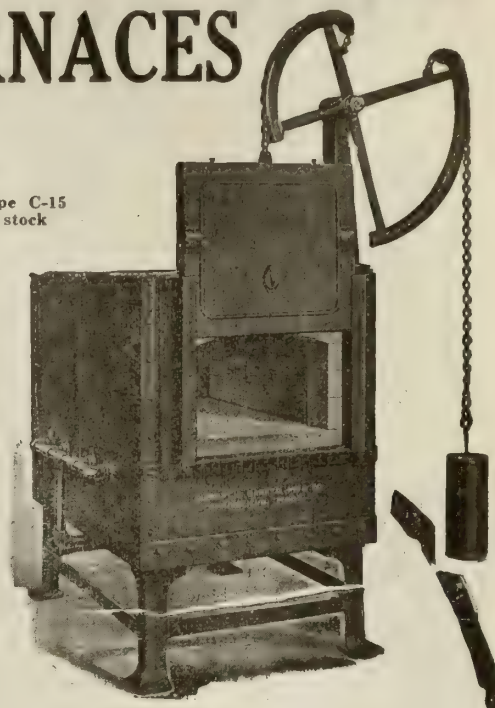

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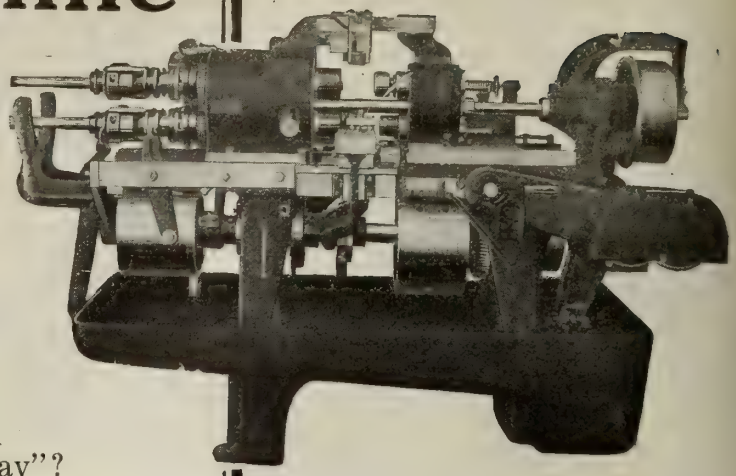

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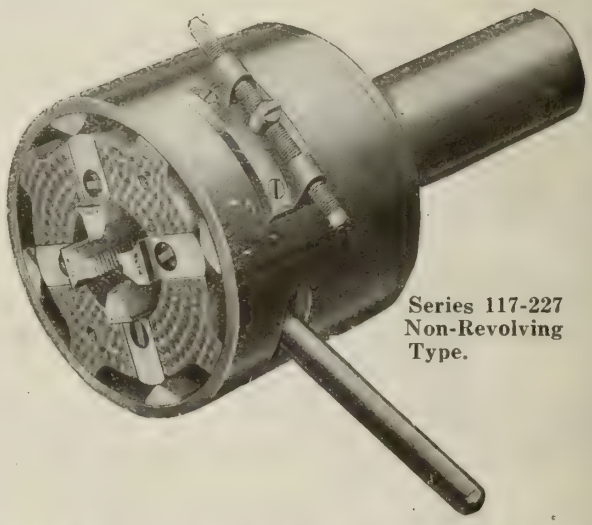

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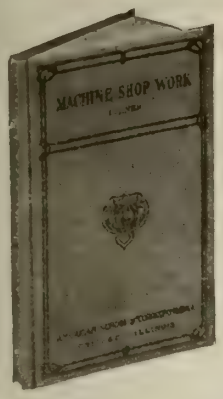

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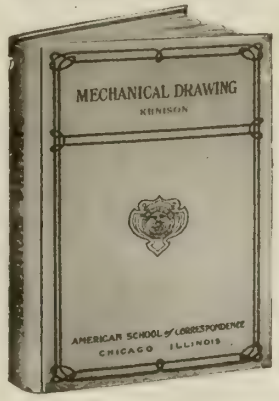

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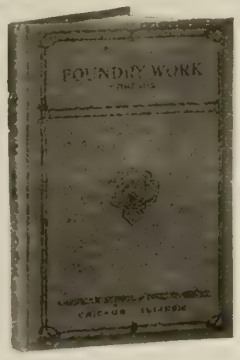

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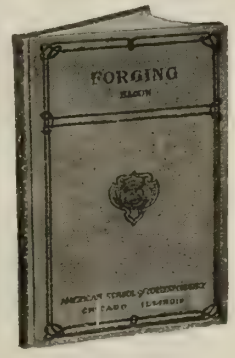

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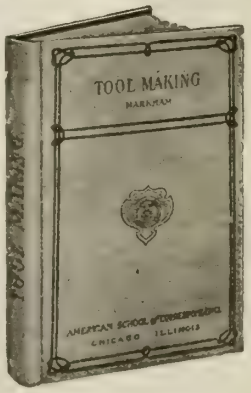

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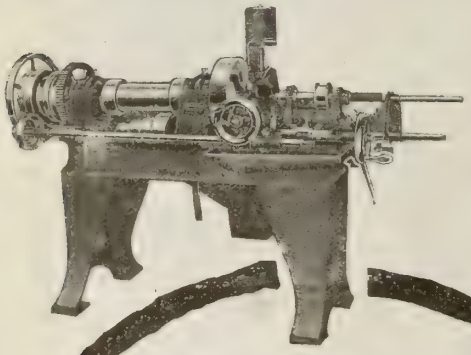

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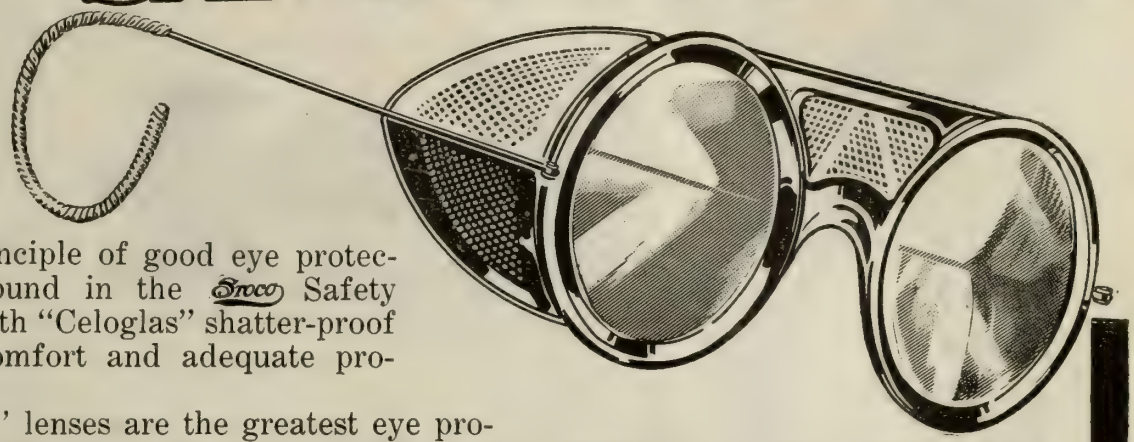

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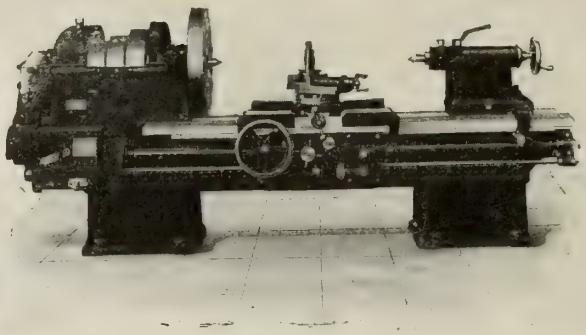
Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

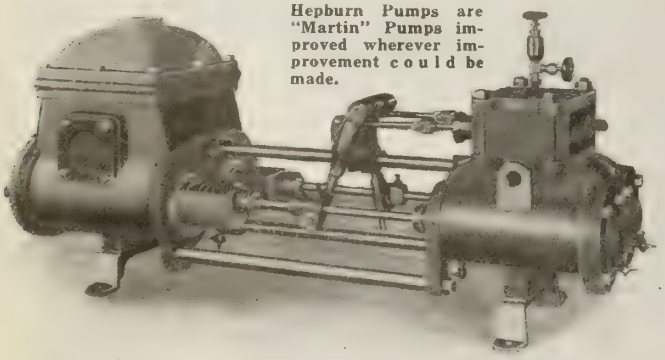
Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohio

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

Hepburn Pumping Machinery

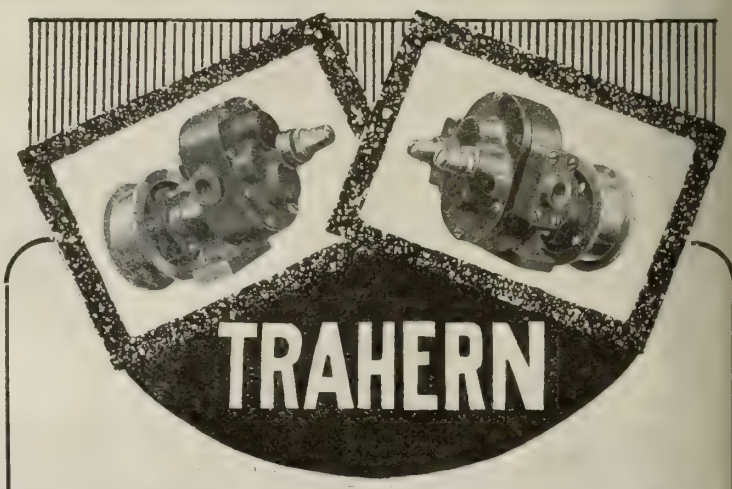
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario



ROTARY GEARED PUMPS

The Utmost in Efficiency and Durability

Trahern Positive-drive Rotary-geared Pumps shoot the lubricant into deep bores or other work difficult to cool. Never need to lessen the speed of the cutting tools for the reason that Trahern Pumps, even at slow speed, flood the cutting tool with abundant coolant.

Let us send a sample pump free of charge—to prove that Trahern Geared Pumps are preferable.

Trahern Pump Company

ROCKFORD, ILLINOIS

Canadian Agents:

A. R Williams Machinery Co., Toronto

A DOLLAR

That's What We All Want, All Are Looking For

HOW? WHEN? WHERE?

Buy a Cisco Lathe. Buy it now. See below where you will get a machine that in construction, in simplicity of operation, in accuracy, in efficient economy, and in lasting powers, will prove to you that the Lathe with the Pull—the Lathe of Simplified Accuracy has no equal.

Sold in Canada by
The A. R. Williams Mchy. Co. Ltd.
Home Office, Toronto

Made in Cincinnati by
The Cisco Machine Tool Co.
14" 16" 18" 24"

SPECIAL TOOLS

Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems
Toronto Tool Company
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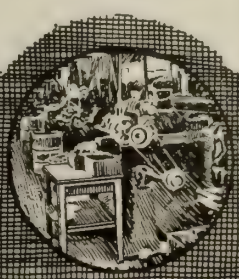


W. D. Anderson's Engineering Efficiency Service

Efficiency methods installed in industrial plants by **practical men** who thoroughly understand the subject.

GRAPHIC PRODUCTION CONTROL puts every man and machine on **schedule** and eliminates lost time entirely. It puts **vim** into the factory. It will completely revolutionize **your production problems.**

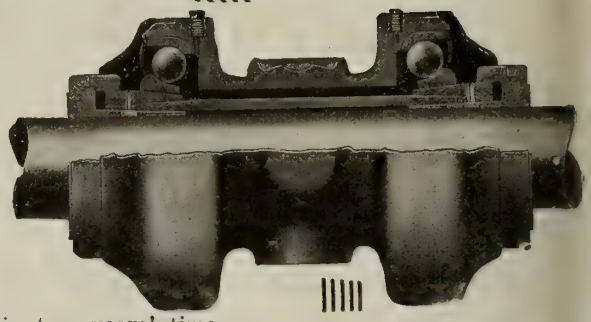
Our system is in practical operation in Glasgow shipbuilding plants, and New York, also in the Middle West, and London, Great Britain.

Sound, Practical, Absolute.

Let us write you about it.

Ring up Anderson's Efficiency Service
PHONE 221 ADELAIDE
380 Queen West Toronto, Canada

Chapman Double Ball Bearings

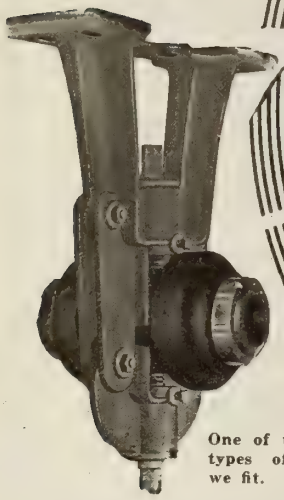


Sectional view of Chapman Double row ball bearings.

Pay You to Adopt Them

Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.

Chapman Double Ball Bearings practically eliminate friction, and they require lubrication only once or twice a year—therein lies the secret of their economy.



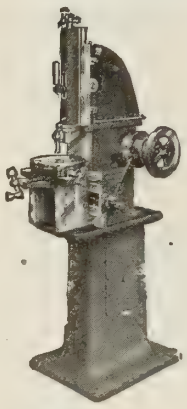
One of the many types of frames we fit.

Chapman Double Ball Bearing Company of Canada, Ltd.

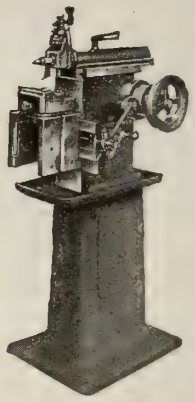
339-351 SORAUREN AVE., TORONTO

Room 408 Shaughnessy Bldg., Montreal; Transmission Ball Bearing Co., Inc., 1050 Military Rd., Buffalo, N.Y.

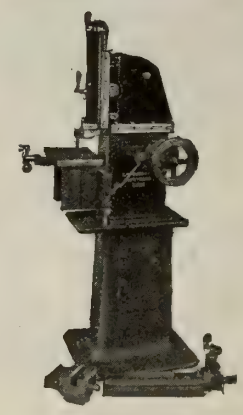
Have you received a copy of Catalog 3-G? Pay to send for one if you haven't.



3½-inch Slotter



7-inch Shaper



Combination

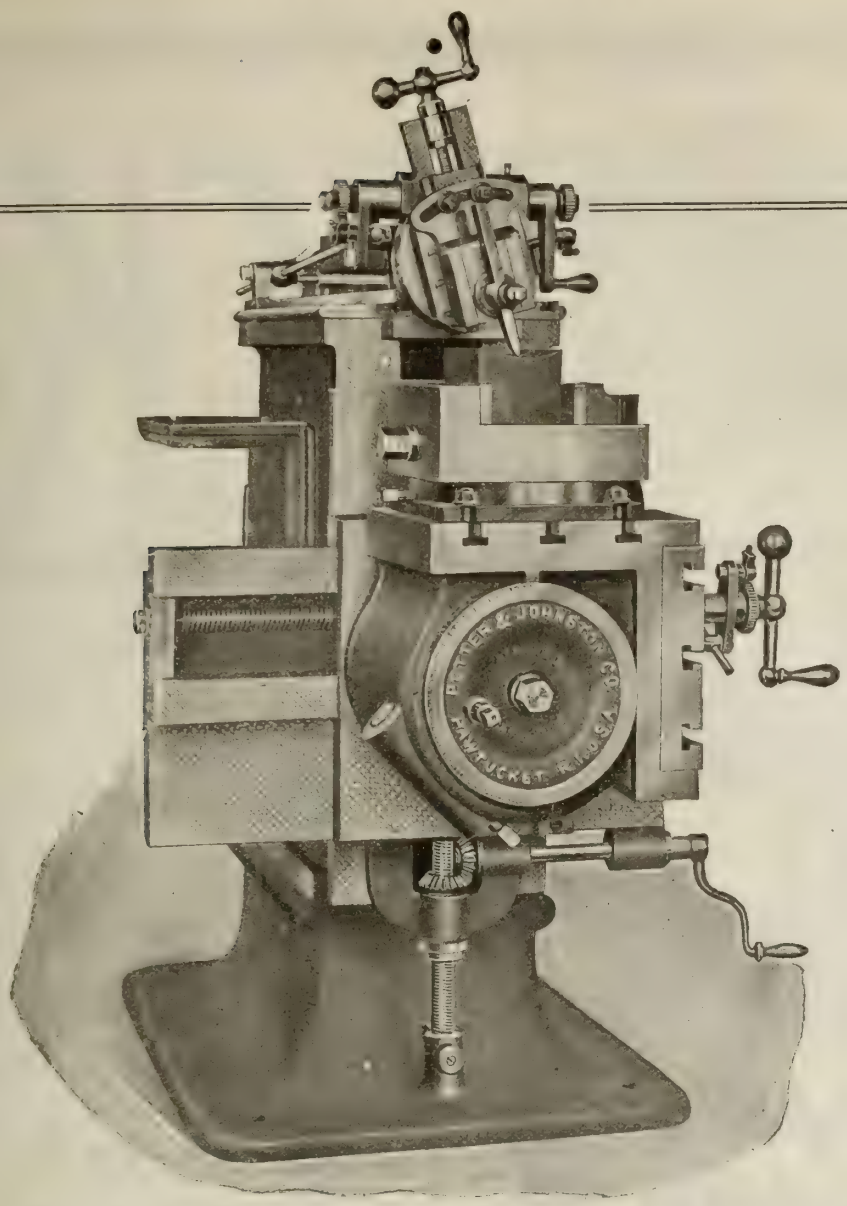
Three of the machines that by their cost-reducing features have established themselves "solid" with the home users and by these same merits are reaching out in foreign countries. A silent, but powerful message of the Rhodes efficiency.

Their capacity is greatly promoted by the adjustments which may easily and quickly be attached. For shaping, slotting, die making, tool making, etc., these machines stand paramount. An inquiry on your stationery will receive prompt attention.

The Rhodes Mfg. Company

Owned and Operated by the Jacobs Mfg. Co.

Hartford, Conn., U.S.A.



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design. convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15″ Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

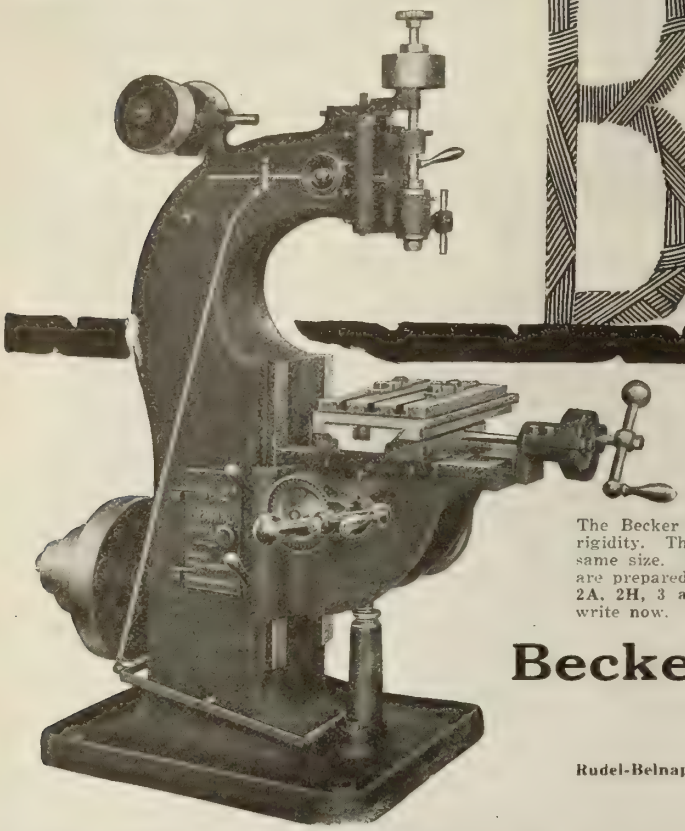
ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA

Becker Belt-Driven Millers
—The Machines that Give the Smooth Finish

BECKER



Why You Should Select This Milling Machine

The Becker Miller has many exclusive features which give it matchless speed and rigidity. Then it requires one-third to one-half less power than other millers of the same size. QUICK DELIVERIES—another feature of Becker Machines; in fact we are prepared to ship upon receipt of your order any of the following sizes: **No. 1, 2, 2A, 2H, 3 and 4B.** Any information you may require will be gladly furnished—write now.

Becker Milling Machine Co.
Hyde Park, Boston, Mass.

Canadian Agents:
Rudel-Belnap Machinery Company, Ltd., 137 McGill St., Montreal; A. R. Williams Machinery Company, Ltd., 64 Front St. West, Toronto.

Wire Cloth

of every description

We make **Machinery Guards** of all kinds.

Metal Lockers for Clothes.

Steel Shelving for all purposes.

Drop a line for full details

Canada Wire & Iron Goods Company
Hamilton, Ontario
Eastern Representative:
H. E. O. Bull, 184 Mance St., Montreal, Que.

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

Don't Let Your Men Work with Dull Files

Tell them to turn them in when they have passed their "efficient point."

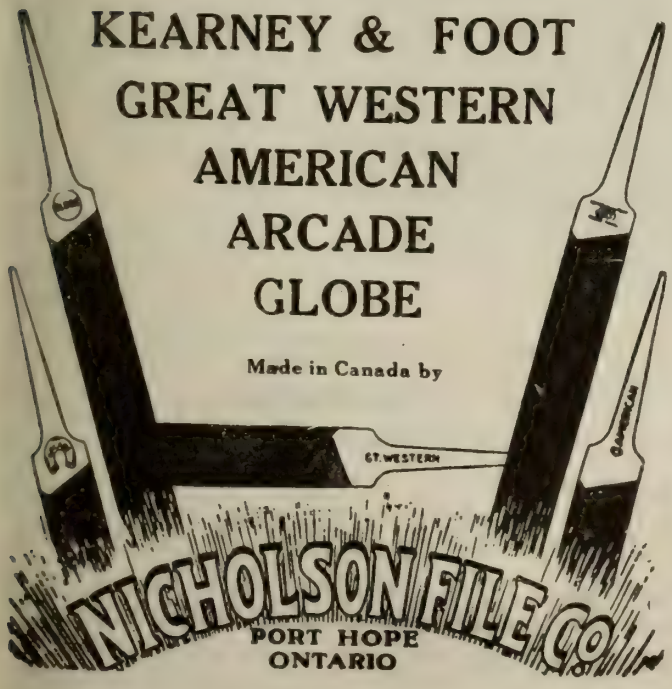
By doing so you will get more and better work from the men. You will save money because labor is more costly than material and your men will be better satisfied because no man likes to work with poor tools.

The files that give the longest efficiency are the "Famous Five."

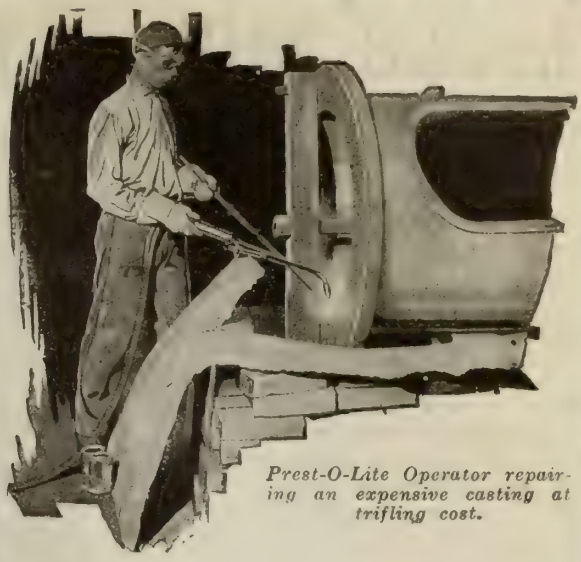
Specify Them When Ordering.
They Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by



Oxy-Acetylene Welding and Cutting



Prest-O-Lite Operator repairing an expensive casting at trifling cost.

Prest-O-Lite Welding Saves Replacements

The Prest-O-Lite Process of Oxy-Acetylene welding is daily opening up new possibilities for economy and efficiency in the factories, mills, railroads, mines and machine shops of Canada.

For repair work, as well as for manufacturing, it is saving time and money in thousands of plants. Valuable time is saved through one Prest-O-Lite repair. Important machinery, machine parts and tools are saved from the scrap pile, and expensive replacements are frequently avoided.

Prest-O-Lite PROCESS

employs both Gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones; provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment. Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene. Any average workman who understands metals can learn the welding process quickly and easily.

We will gladly send illustrated literature and interesting data showing actual instances of savings made by others. It may suggest valuable ideas to you. Write for it.

Address Department C-107

Prest-O-Lite Company of Canada, Limited
PREST-O-LITE BUILDING
Corner Elm St. and Centre Ave.
TORONTO
Plants at: Toronto, Ont. Merritton, Ont.
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World's Largest Makers of Dissolved Acetylene

If any advertisement interests you, tear it out now and place with letters to be answered.

Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

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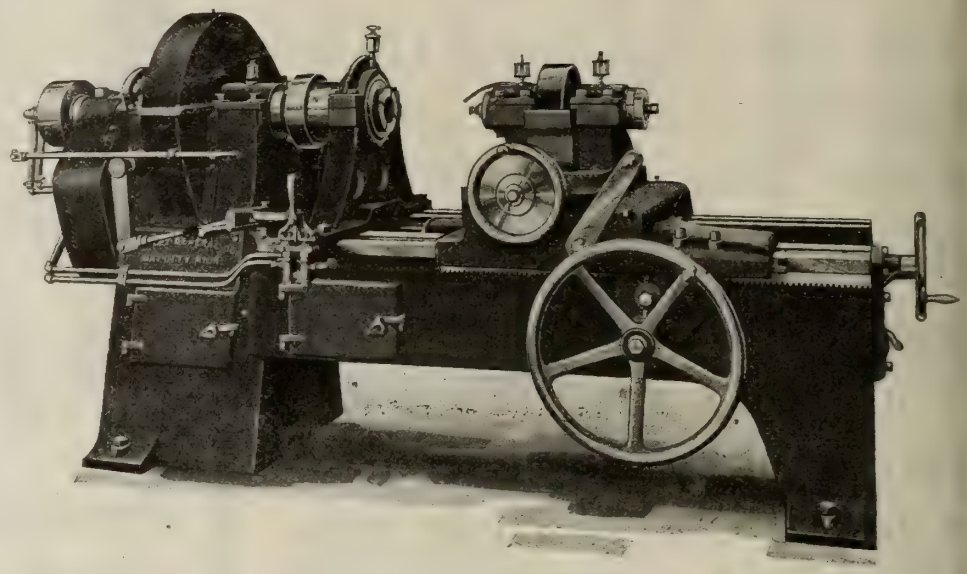
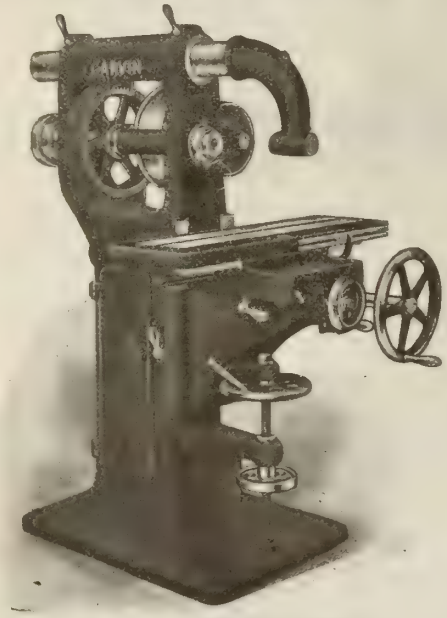


Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

GARVIN No. 11 Plain Milling Machine



No. 11 Plain Milling Machine
Use Code . . . . Abode

Adapted to the lightest kinds of small milling and light manufacturing and suitable for jewelers, makers of electrical goods, brass workers, sewing-machine manufacturers and others.

The Features of the Machine Are:

Telescope Arm.
Hardened and ground Tool-steel Bearing for arbor in arm.
Spindle Bearing Taper, with adjustment.
Power Feed driven by vertical worm shaft inside of column, which drives a worm gear clutched to the pinion shaft in the knee.
Feed Works located and protected inside of column.
Quick and sensitive movement of Table by Adjustable Lever and Rack Pinion.
Micrometer adjustments of Knee and Saddle.
Oil Pan around table.
Elevating Screw does not pass through the floor.

Power Feed of Table	12½ in.
In and Out Adjustment	4½ in.
Vertical Adjustment	10 in.
Net Weight, Skidded	600 lbs.

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

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Send for Complete Catalog

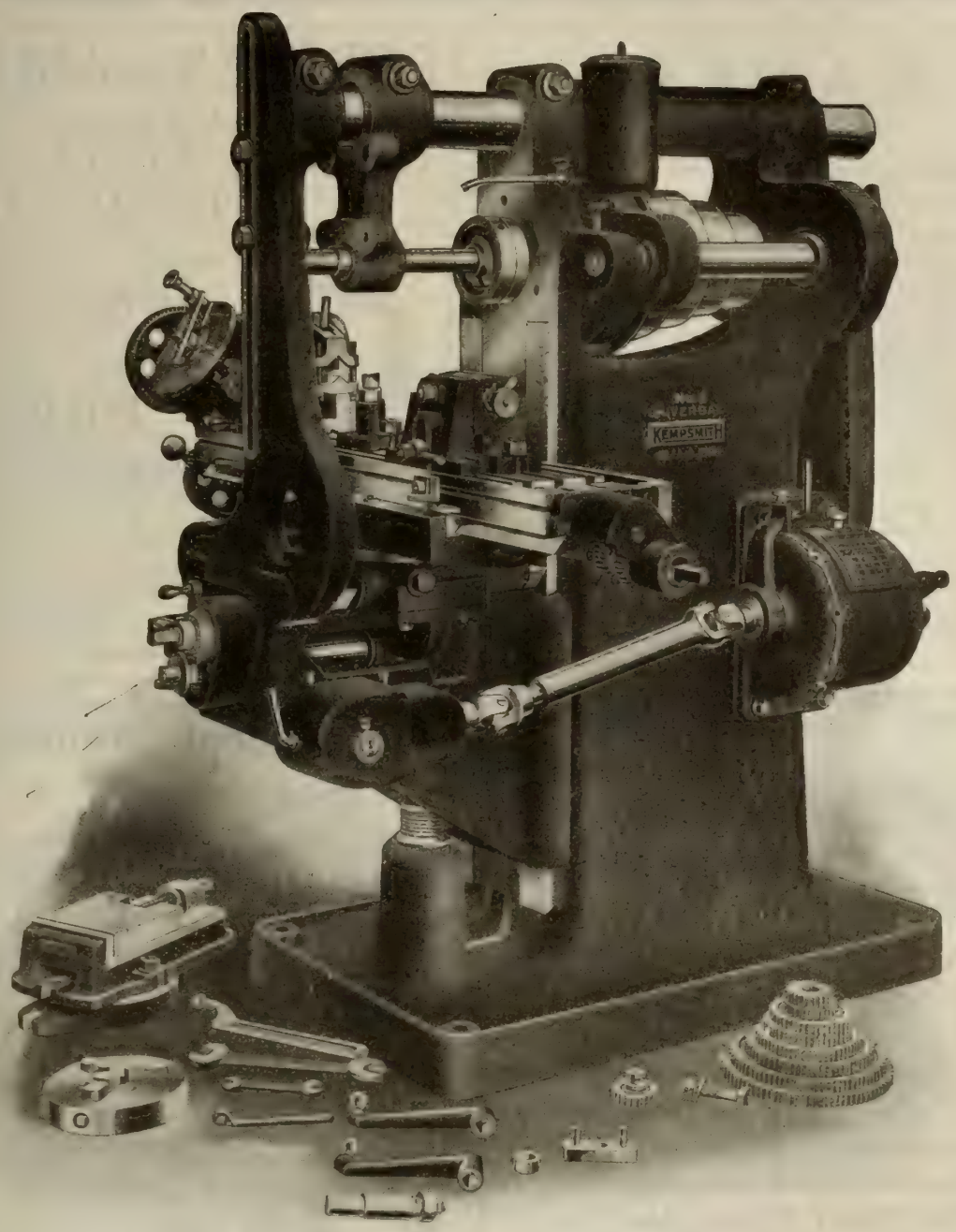
MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets *(Visitors Welcome)* **50 Years New York City**

KEMPSMITH

MILLING MACHINES



KEMPSMITH No. 2 Universal Milling Machine

Equipment—Double friction countershaft, 10½ inch Universal Dividing Head complete with tailstock, centering rest, Hill patent dog and driver, two index dials, set of change gears for spiral milling and index charts for operating; 6 inch Universal Chuck, 1 inch arbor, two arbor supports, brace, No. 3 Swivel Vise, outside tool shelf and all necessary crank handles, wrenches and accessories as shown.

THE KEMPSMITH MANUFACTURING CO.

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HINTS TO BUYERS

CRANES
All Kinds

GEO. ANDERSON & CO. of CANADA, Ltd.
157 Craig St. W., MONTREAL, Que.

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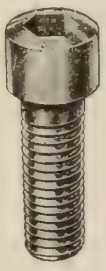
Sheet Metal Working Machinery

THE D. H. STOLL CO., INC.
BUFFALO, N.Y.



CLEAN SOCKET HOLES 30% STRONGER THE ALLEN UNIFORM THREADS ABSOLUTE SAFETY

Socket Head Cap Screws

Clean cut socket holes, free from chips. Accurately threaded to standard gauges. Test them where great strength is desirable.

THE ALLEN MFG. COMPANY
HARTFORD, CONN., U.S.A.

Eliminate Danger

Accidents break down the efficiency of your organization, lead to legal troubles, loss of time and money.

TRADE MARK
BRISTO
REG. U. S. PAT. OFFICE

SAFETY SET SCREWS

insure safety. They also protect themselves because of their patented construction. The dove-tailed design of wrench and screw contracts the metal under pressure. The harder you twist the wrench the more the metal of the screw is compressed.

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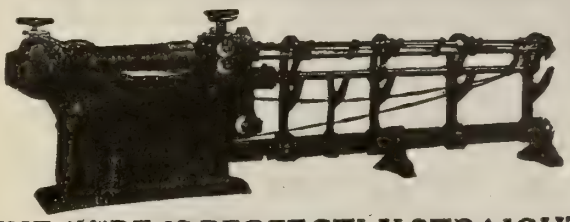
THE BRISTOL COMPANY
Waterbury, Conn., U.S.A.



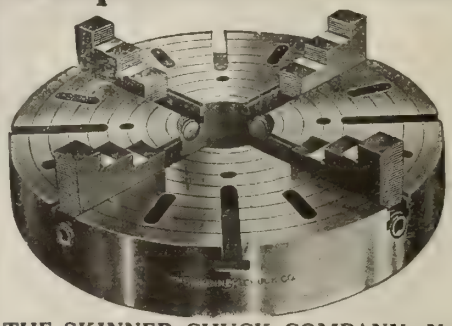
THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

May we send you catalogue C?

The F. B. SHUSTER COMPANY, New Haven, Conn.
Formerly John Adt & Son. Established 1866.
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

Independent Skinner Chucks



FOR HIGH SPEED WORK
IRON OR STEEL BODY

The last word in chuck construction.

Wide jaws; hardened steel thrust bearings; adjusting screws of large diameter, threaded full length; jaws ground after hardening, etc.

Write us to-day for prices.

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Factory and Main Office: New Britain, Conn.
London Office: 149 Queen Victoria Street
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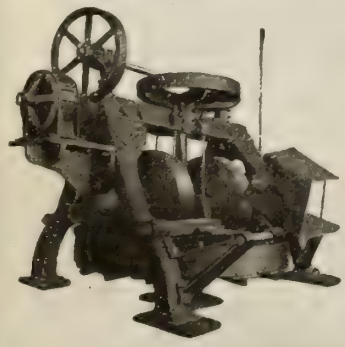
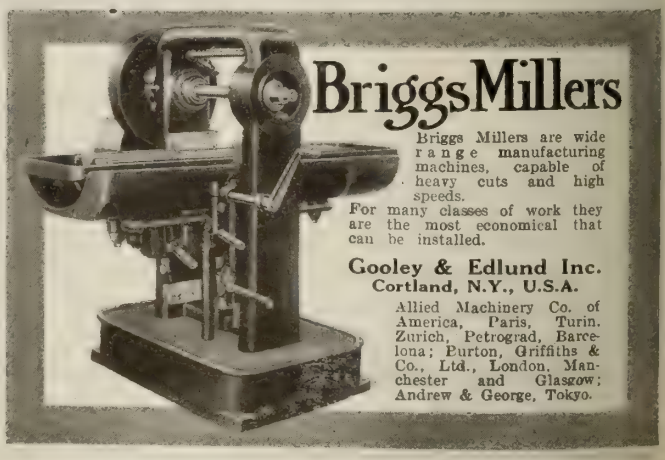
Canadian Steel Foundries Need Frost Improved Sand Mills



WINNING FEATURES:

Heavy Mullers
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago



Briggs Millers

Briggs Millers are wide range manufacturing machines, capable of heavy cuts and high speeds.

For many classes of work they are the most economical that can be installed.

Gooley & Edlund Inc.
Cortland, N.Y., U.S.A.

Allied Machinery Co. of America, Paris, Turin, Zurich, Petrograd, Barcelona; Burton, Griffiths & Co., Ltd., London, Manchester and Glasgow; Andrew & George, Tokyo.

DIAMOND POINTED TOOLS

Our line comprises Diamond Pointed Tools for every industrial purpose. We are also equipped to furnish promptly special Diamond Pointed Tools of every variety. Quality products.

ORDER FROM ST. CATHARINES if more convenient. Complete stock — quick service. Goods submitted on memorandum to responsible firms.

Wheel Trueing Tool Company, 88 West Pitt Street, Windsor, Ontario

John W. Gordon, Manager, 5 James St., St. Catharines.

WE SELL METALS OF ALL KINDS

SCRAP
Copper, Brass
Lead, Babbit, Etc.
INGOT
Copper, Lead
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STEEL
RAILROAD CAP AXLES.
BARS
BILLETS
ETC.

B. ENUSHEVSKY & SON, Toronto, Can.

DARLING BROTHERS, LIMITED

Engineers, Manufacturers and Founders
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Pumps for any Service—Steam Appliances—Freight Elevators—Webster Vacuum Heating System.

You want Tool Holders that have made good

ARMSTRONG TOOL HOLDERS

Won The

GRAND PRIZE

THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

THEY ALWAYS MAKE GOOD

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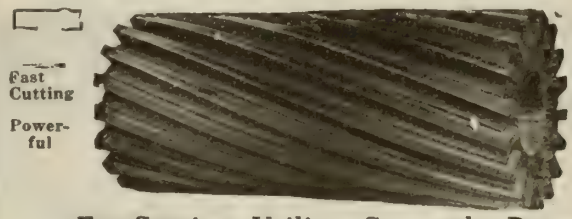
Armstrong Bros. Tool Co.

"The Tool Holder People"
306 N. Francisco Ave., CHICAGO, U.S.A

Taylor-Newbold Milling Cutters



Fast Cutting
Powerful

Inserted Helical Blades of High-Speed Steel

For Service—Utility—Strength—Power
4-in. Diameter for General Use.

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PHILADELPHIA, PA., U.S.A.

Greenfield

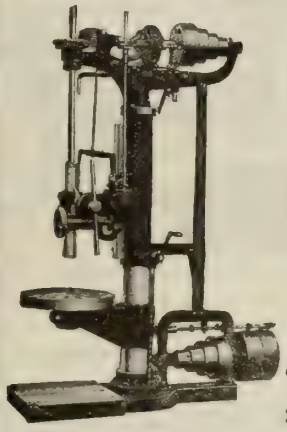
Trade Mark Reg. U. S. Pat. Office

A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.

Catalog No. 6.

Greenfield Machine Co.

Greenfield, Mass., U.S.A.



6 Positive Geared Feeds

instantly obtained, are but one of many advantages provided by

SILVER DRILLS

For 64 years these upright Drilling Machines have served well in the States and Canada.

Write for full description of our 20" and 25" sizes.

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CLUTCHES

Combined Jaw and Friction. Friction only.
Gas Engine Clutches. Jaw Clutches.

Write for interesting printed matter.

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In stock and to order, any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

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G. B. GRANT

Northern Crane Works

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WALKERVILLE
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Electric Cranes
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Foundry Equipment

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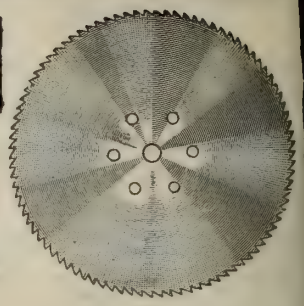

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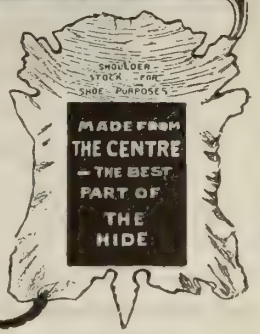

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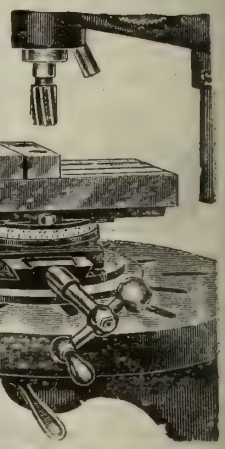

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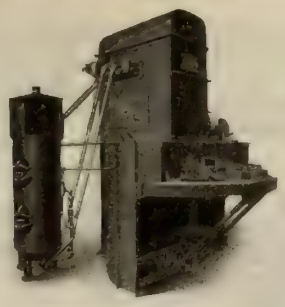

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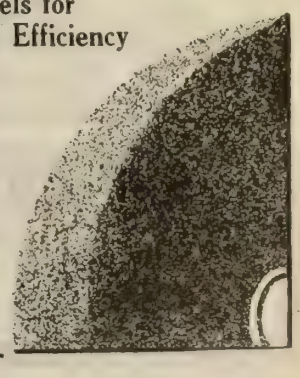

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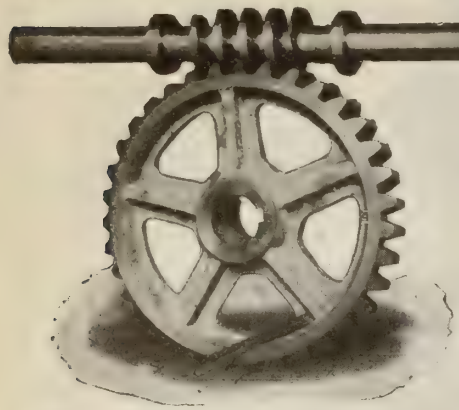

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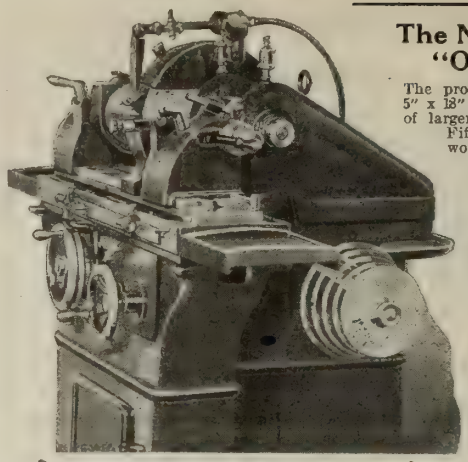

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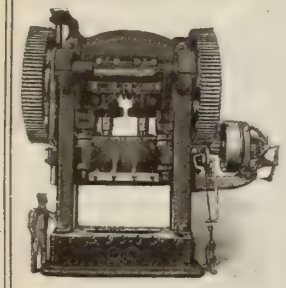

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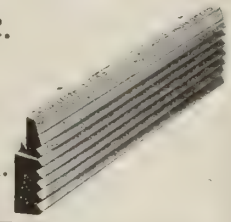

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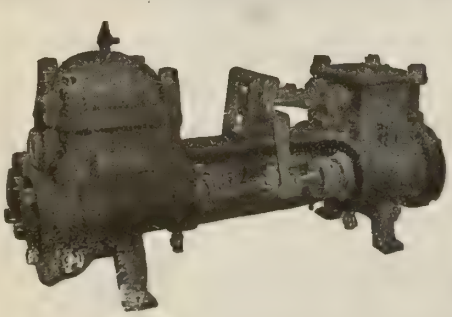

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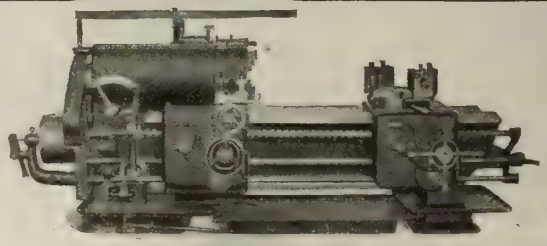

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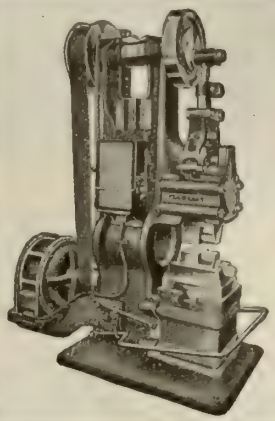

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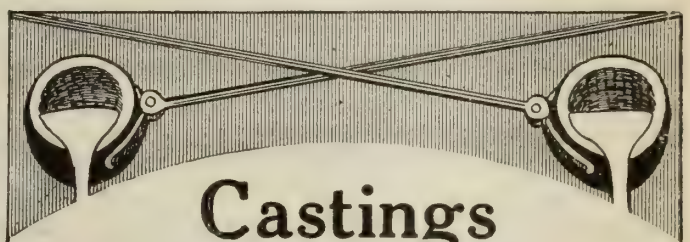

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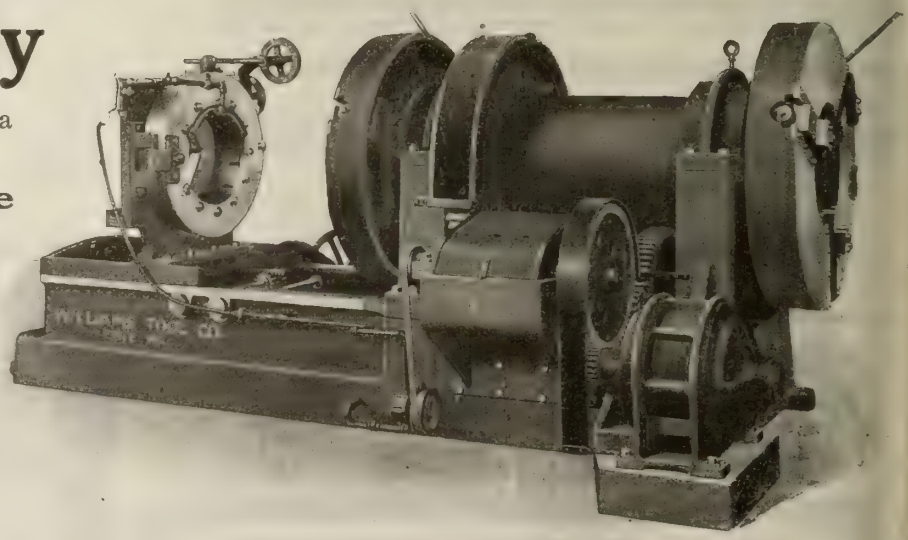

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Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que
Williams & Wilson, Limited, Montreal, Que.

BLOW PIPES AND REGULATORS
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Prest-O-Lite Co., Inc., Toronto, Ont.

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Mulliner-Edlund Tool Co., Syracuse, N.Y.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que.
Joyce, Koebel & Co., Inc., New York.

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Williams & Wilson, Limited, Montreal, Que.

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MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
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Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
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Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont.
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
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United Brass & Lead, Ltd., Toronto.
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Can. Winkley Co., Ltd., Windsor, Ont.

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Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
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National Machinery Co., Tiffin, Ohio.
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Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
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Hull Iron & Steel Foundries, Ltd., Hull, Que.
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Kennedy & Sons, Ltd., Wm., Owen Sound.
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Plessisville Foundry Co., Plessisville, Que.
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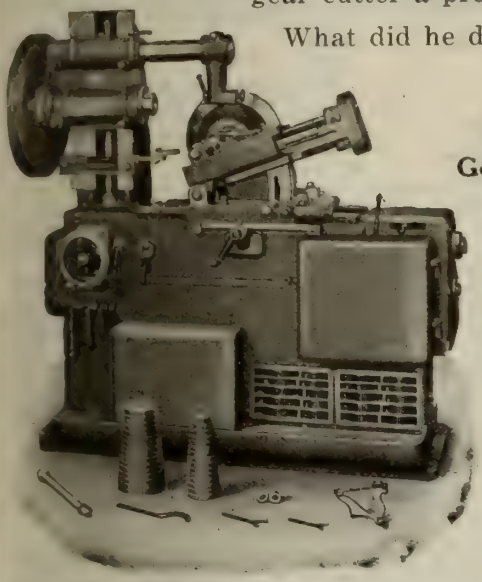

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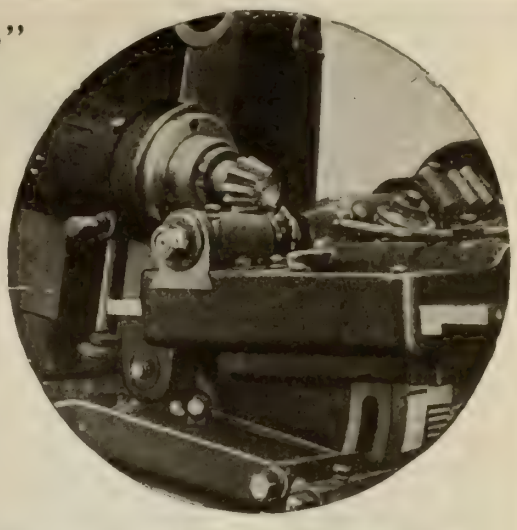

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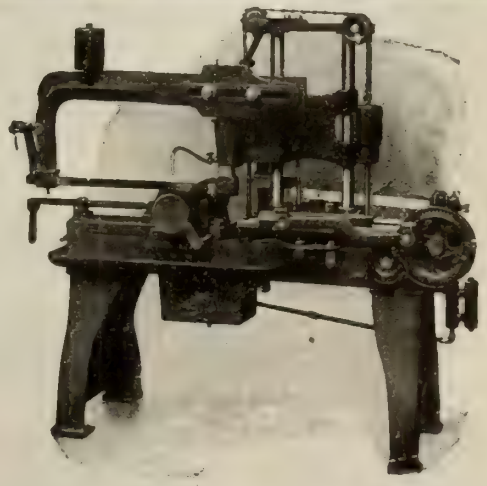

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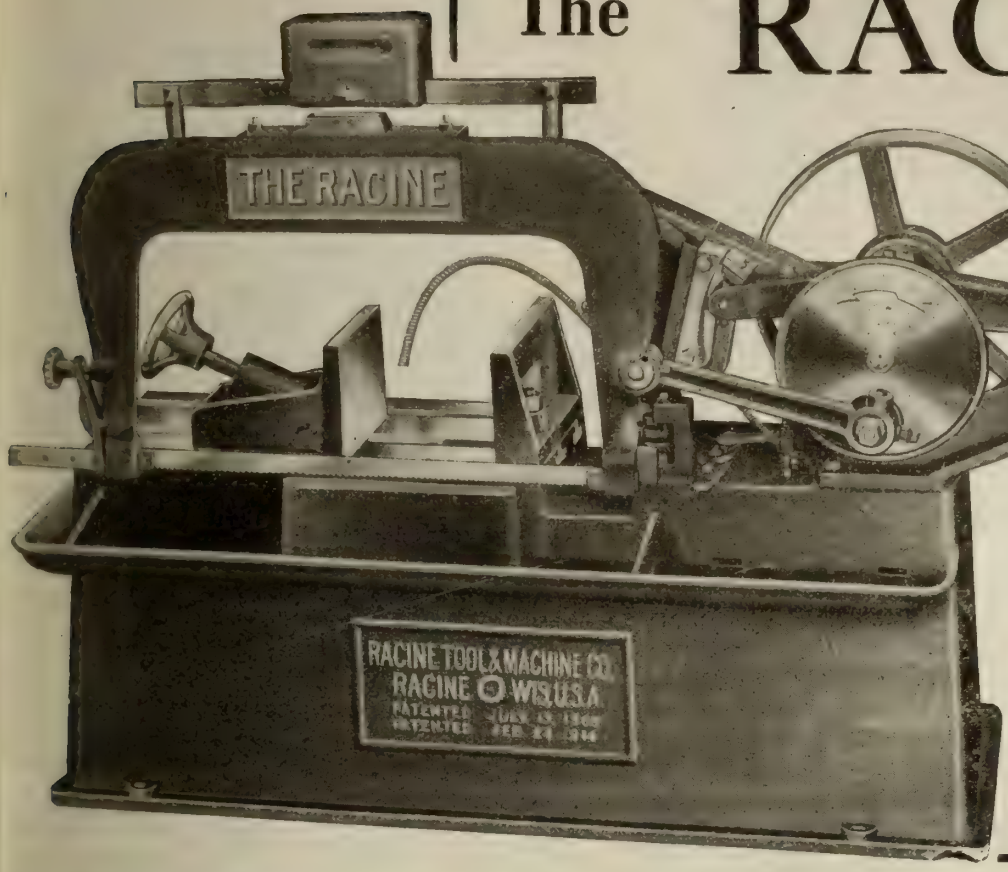

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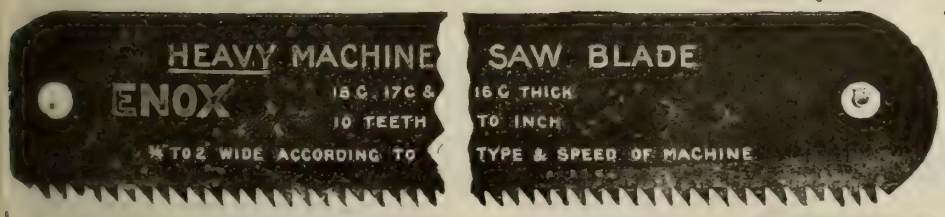

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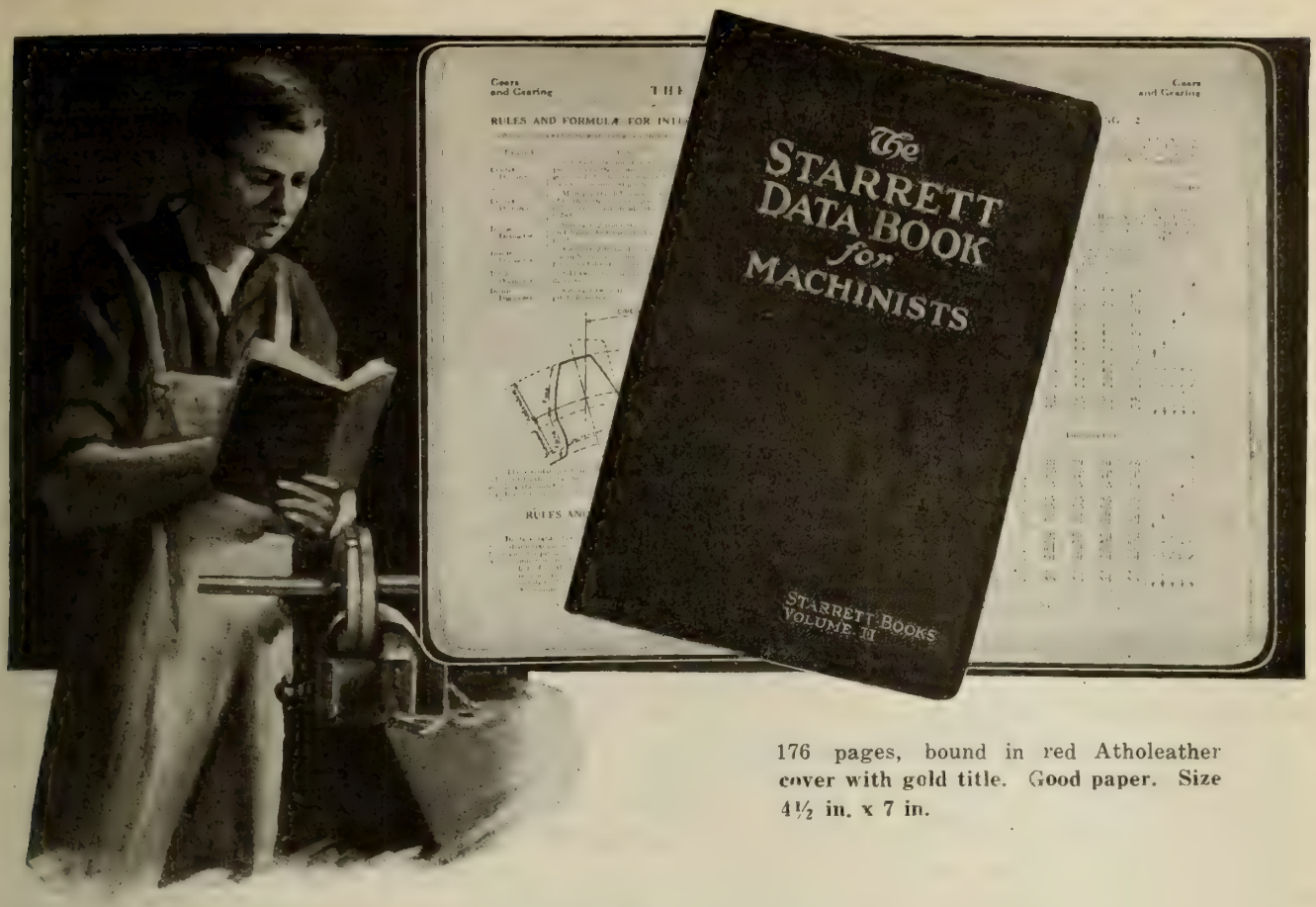

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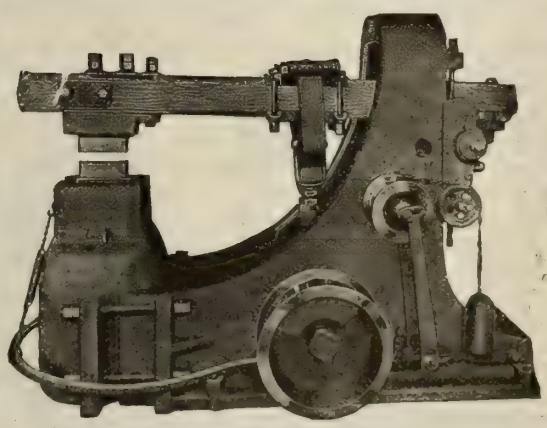

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Canada Machinery Corp., Galt, Ont.
Wood Turret Machine Co., Brazil, Ind.
Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, POLISHING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Bertram, John, & Sons Co., Dundas Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Plessisville Foundry, Plessisville, Que.
Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SCREW CUTTING
Bertram, John, & Sons Co., Dundas, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
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Canada Machinery Corp., Galt, Ont.
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Ford-Smith Machine Co., Hamilton, Ont.
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Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
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New Britain Machine Co., New Britain, Conn.
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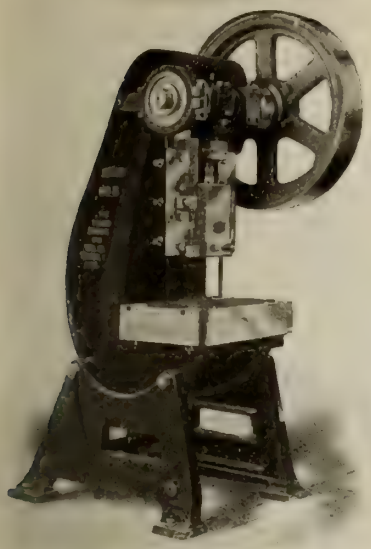

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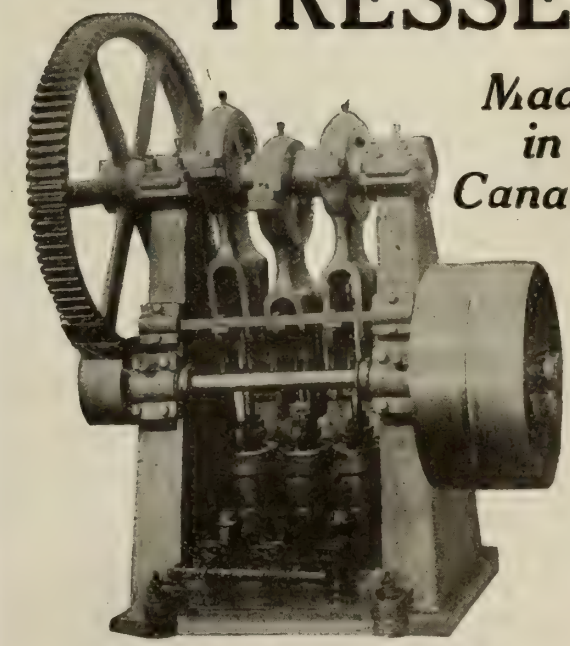

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Garlock-Walker Machinery Co., Toronto, Ont.
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Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio
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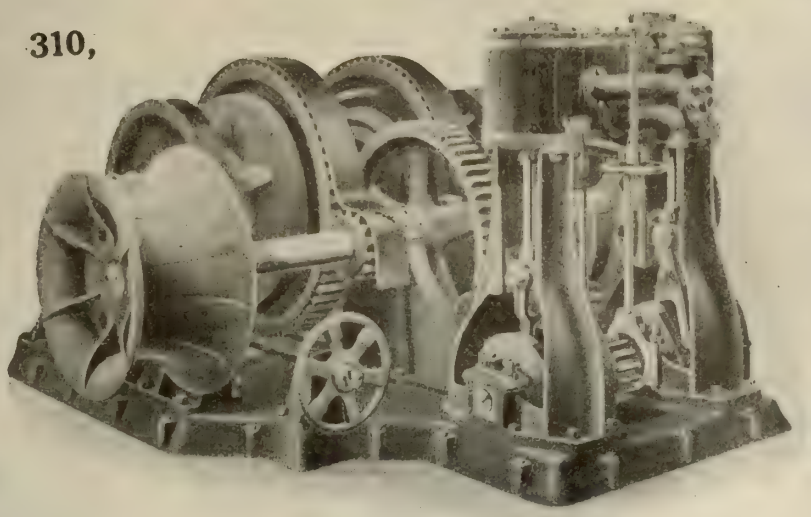

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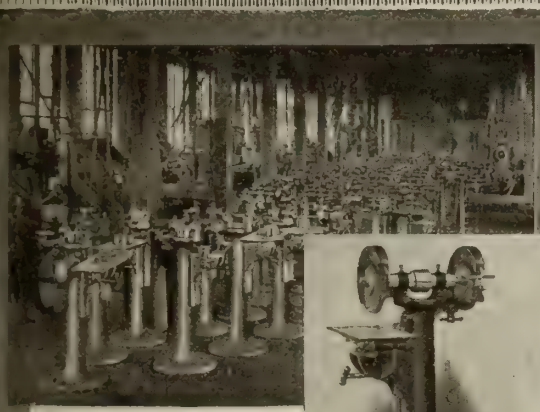

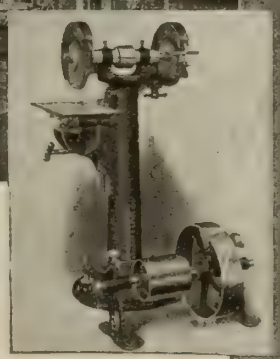

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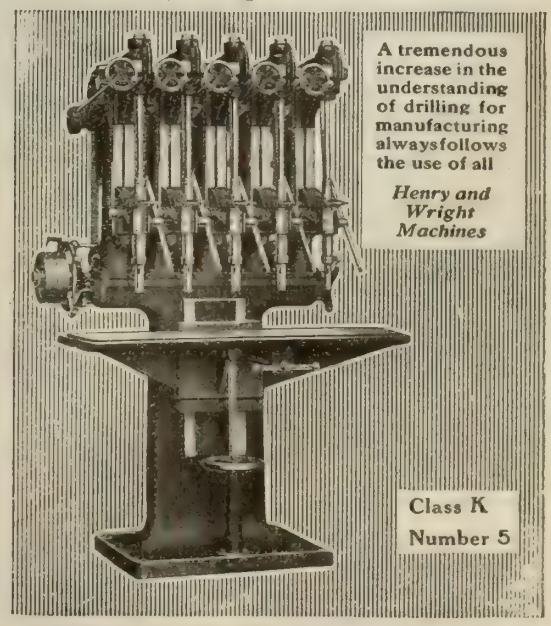

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PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PISTON RODS, ROUGH TURNED
General Steel Co., Milwaukee, Wis.

PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

PLANER-SHAPER, COMBINED OPEN SIDE
Lund-Farquhar Co., Boston.
Williams & Wilson, Limited, Montreal, Que.

POWER TRANSMISSION MACHINERY
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Williams & Wilson, Limited, Montreal, Que.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

POLE SAW FRAMES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

PLIERS
Aikenhead Hardware Co., Toronto.
Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.

POLE LINE HARDWARE
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Quebec.

PLATE AND TANK CONSTRUCTION
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

POLISHING MACHINES
Ford-Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

POLISHING PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

POWER HOUSE CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

PRESSERS, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
William R. Perrin, Ltd., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, HYDRAULIC
John Bertram & Sons Co., Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Riverside Machinery Depot, Detroit, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, SCREW
Barnes, W. F., & John Co., Rockford, Ill.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.
William R. Perrin, Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Erie Foundry Co., Erie, Pa.
Ferracute Mach. Co., Bridgeton, N.J.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRODUCTION WORK
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PROPELLERS
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PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
Algoma Steel Corp., Sault Ste. Marie, Ont.
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Positive Clutch & Pulley Works., Ltd., Toronto.
J. C. Wilson & Co., Belleville, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, FRICTION CLUTCH
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto.
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn.
Williams & Wilson, Limited, Montreal, Que.

PULP MILL MACHINERY
Hydraulic Machy. Co., Ltd., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, CENTRIFUGAL
Goldie & McCulloch Co., Galt, Ont.
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

PUMPS, FUEL OIL
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Darling Bros., Ltd., Montreal, Quebec.
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, HIGH PRESSURE
William R. Perrin, Ltd., Toronto.

PUMPS, ALL KINDS
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
William R. Perrin, Ltd., Toronto.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, HYDRAULIC
Garlock-Walker Machinery Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

PUMPS, LUBRICATING, OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, HAND, FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, POWER FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, KEROSENE, OIL, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, ROTARY, POWER DRIVEN
Bowser & Co., Inc., S. F., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Trahern Pump Co., Rockford, Ill.
Williams & Wilson, Limited, Montreal, Que.

PUMPS, LUBRICANT, OIL, WATER
Darling Bros., Ltd., Montreal, Quebec.
Fry's (London), Ltd., London, England.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Trahern Pump Co., Rockford, Ill.

PUMPS, MOTOR AND BELT DRIVEN
Darling Bros., Ltd., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, SUD
Fry's (London), Ltd., London, England.

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Baker & Co., Inc., H., Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Mulliner-Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Limited, Montreal, Que.

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E. W. Bliss Co., Brooklyn, N.Y.
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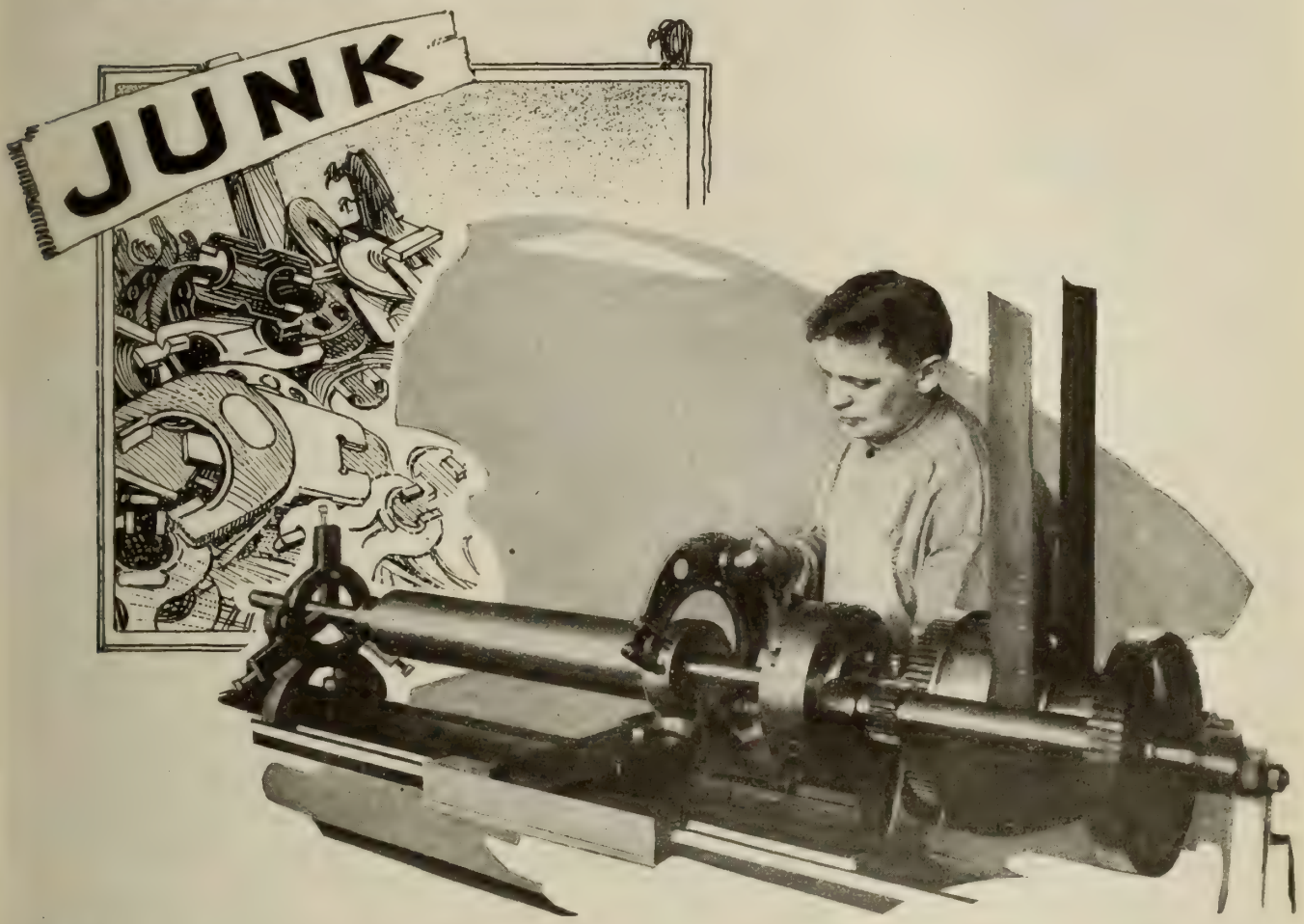
When the War Stopped

thousands of Solid Snaps

became



—But Every

Johansson Snap Gage

remains useful

The recent wholesale cancelling of war contracts made obsolete thousands and thousands of solid limit snap gages.

Of course these gages might be rebuilt to the sizes and limits of some other work, but it would cost almost as much in money and time as to make entirely new ones. Only the material would be saved—the smallest item.

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Farsighted manufacturers will never again tool up with non-adjustable snap gages—they will use ADJUSTABLE gages, the Johansson, and be above the waste brought about by size changes, limit changes and wear.

Let us quote you on 21 snaps a complete snap gage SYSTEM which will give all sizes up to 12 inches.

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Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
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Niles-Bement-Pond Co., New York.
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RAILING, IRON AND BRASS
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RAW HIDE PINIONS (SEE GEARS)

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Can. Fairbanks-Morse Co., Montreal.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Standard Machy. & Supplies, Ltd., Montreal, Que.
The McCrosky Reamer Co., Meadville, Pa.
The Kelly Reamer Co., Cleveland, O.
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Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

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Kelly Reamer Co., Cleveland, O.
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Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, TAPER, BRIDGE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIPE, SHELL
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.

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Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

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REGULATORS, PRESSURE TEMPERATURE
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RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Steel Co. of Canada, Ltd., Hamilton, Ont.

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Can. Ingersoll-Rand Co., Montreal.
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Williams & Wilson, Limited, Montreal, Que.
F. B. Shuster Co., New Haven, Conn.

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Page Steel & Wire Co., Adrian, Mich.

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John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Limited, Montreal, Que.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont.

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

RULES, STEEL, STRAIGHT AND FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOXWOOD, FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOARD AND LONG
Lufkin Rule Co. of Can., Windsor, Ont.

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Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

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SAND BLAST MACHINES
Pangborn Corporation, Hagerstown, Md.

SAND BLAST SUPPLIES AND ACCESSORIES
Pangborn Corporation, Hagerstown, Md.

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Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
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Pittsburgh Crushed Steel Co., Pittsburgh, Pa

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Fittings, Ltd., Oshawa, Ont.

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Tabor Mfg. Co., Philadelphia, Pa.

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Taylor, J. A. M., Stair Bldg., Toronto, Ont.

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SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

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SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

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Knight Metal Products, Ltd., Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que.

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New Britain Machine Co., New Britain, Conn.

SCREWS
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Galt Machine Screw Co., Galt, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

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Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

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Williams & Wilson, Limited, Montreal, Que.

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Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Pangborn Corporation, Hagerstown, Md.

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Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn., U.S.A.
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
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"Wanted—A National Plan"

An article of unusual importance, by Sir George Bury, formerly vice-president of the C.P.R., appears in the February issue of MACLEAN'S. He points out that Canada must more definitely shape her destiny if that destiny is to be as glorious as all Canadians hope. It is a stirring demand for Canadians to get together in the formation of a national plan, accompanied by many practical suggestions from his experience in transcontinental railroad building. An article of national importance.

"Germany From Within To-day"

The funniest thing that he has perhaps written appears in February MACLEAN'S from the pen of Canada's great humorist, Stephen Leacock—an imaginary visit to Berlin under the Bolsheviks. He finds Von Tirpitz planning a new navy, an *inland fleet;* Frau Krupp, an apple woman; Von Bethmann-Hollweg, a cab driver; Bernstorff, a Bolshevik and president of the Scavengers Union. He finds a *Get From Under* committee planning a trade war on the world and half the population of Berlin in English clothing or Scotch kilts. He finds—

But read the article. There's a long laugh in every line. It is farce, however, built up on pretty shrewd truths.

You will find this a remarkably interesting number. The bold, fighting face of Admiral Beatty is on the cover and inside are the following big features:

The Campaign Against Britain, by Agnes C. Laut.

The Farmer in Politics, by J. K. Munro.

The Strange Adventure of the Thumb Tap Clue, by Arthur Stringer.

Old Times in Canada, by Walt Mason.

Lend Me Your Title, by Onoto Watanna.

The Three Sapphires, by W. A. Fraser.

Wild Miners I Have Met, by E. Ward Smith.

The Anglicization of Katrina, by Mary Josephine Benson.

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MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton.

TRANSVEYORS
Cowan Truck Co., Holyoke, Mass.

TROLLEYS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

TRUCKS, FACTORY, FREIGHT, ETC.
Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing Co., Toronto.
Cowan Truck Co., Holyoke, Mass.
MacKinnon Steel Co., Sherbrooke, Quebec.
Rice, Lewis & Son, Toronto, Ont.

TRUCKS, LUMBER AND KILN
Sheldons, Ltd., Galt, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS & COPPER
Standard Tube & Fence Co., Woodstock, Ont.
Tallman Brass and Metal Co., Hamilton, Ont.

TUBING COILERS, FLEXIBLE METAL
Almond Mfg. Co., T. R., Ashburnham, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.

TURRET MACHINES, LATHES
Brown & Sharpe Mfg. Co., Providence
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Tap & Die Corp., Greenfield, Mass.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

TUNGSTEN FILAMENT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.

TURBO GENERATOR UNITS
MacGovern & Co., Montreal, Que.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.

TURNBUCKLES
Canada Foundries & Forgings, Ltd., Welland, Ont.
Rice, Lewis & Son, Toronto, Ont.

TURNTABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

UPSETTING AND BENDING MACHINERY
Conn Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.

VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.

VENTILATING APPARATUS
Brantford Oven & Rack Co., Brantford, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

VISE STANDS, PORTABLE
New Britain Machine Co., New Britain, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

VISES, BENCH
Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal
New Britain Machine Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

VISES, PIPE
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

VISES, PLANER AND SHAPER
Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

WASHER MACHINES
National Machy. Co., Tiffin, Ohio.

WASHERS
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Graton & Knight Mfg. Co., Worcester, Mass.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WASTE
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wood Turret Machine Co., Brazil, Ind.

WATER-INTAKE SCREENS
Can. Link-Belt Co., Toronto, Ont.

WATER TOWERS
Toronto Iron Works, Ltd., Toronto.

WELDING, ELECTRIC, SPOT, BUTT, ETC.
St. Lawrence Welding Co., Montreal, Que.

WELDING MASKS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

WELDERS, ELECTRIC, SPOT, BUTT, ETC.
Tabor Mfg. Co., Philadelphia, Pa.

WELDING RODS AND WIRE
Page Steel & Wire Co., Adrian, Mich.

WELDING, WORK AND SUPPLIES (Autogenous and Oxy-Acetylene) see OXY-ACETYLENE

WHEELS, SPROCKET AND TRACTION
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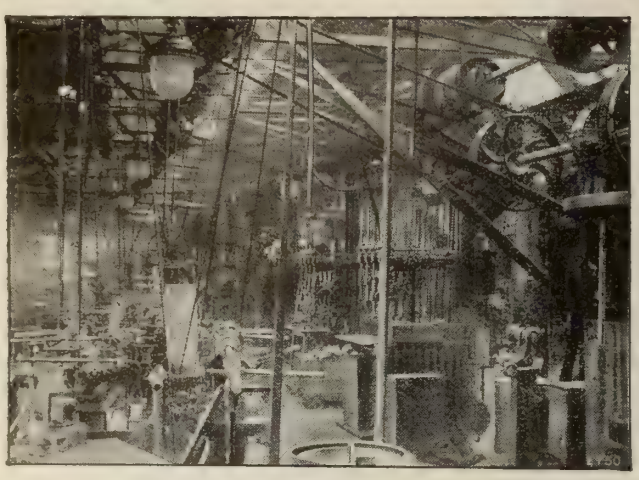
Williams & Wilson, Limited, Montreal, Que.

WHEEL TRUEING TOOLS
Anderson & Co., of Canada, Geo., Montreal, Que.
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal, Que.

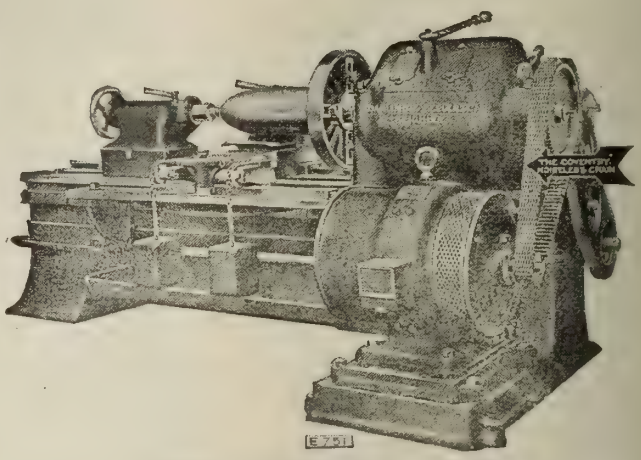
WINCHES
John H. Hall & Sons, Brantford.
Kennedy & Son, Wm., Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

WIRE COILING AND POINTING MACHINERY
Baird Machine Co., Bridgeport, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.



THE OLD WAY

Notice the space occupied by belts, pulleys and shafting, which darken the workshop and throw shadows on the work.



"THE COVENTRY" WAY

A bright factory means improved work and larger output, less likelihood of accidents. (Note compact arrangement of drive).

THE COVENTRY CHAIN CO., LTD.
COVENTRY, ENGLAND

Cables "CHAINS COVENTRY," Codes A.B.C., 4th and 5th Editions, and Western Union.

PLUMBING, BUILDERS and HARDWARE

GREY The Galt Trade Mark K-T Foundry Ont. IRON

CASTINGS

These are our SPECIAL LINES. But at this time we are prepared to handle contract work up to 15 tons per day. For gated pattern, match plate, stripping plate, machine and repetition work of any kind we are prepared to quote you most attractive prices and prompt delivery.

Would You Like to Know

the analysis and physical test of metal in your castings? How they could be made cheaper? What properties of metal would facilitate your finishing operations or improve their quality?

We can furnish semi-finished Castings, being equipped to do lathe drilling and reaming work—also expert metal pattern work.

Ask Us

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI. TORONTO, FEBRUARY 20, 1919 No. 8

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Publishers of Hardware and Metal, The Financial Post, MacLean's Magazine, Farmers' Magazine, Canadian Grocer, Dry Goods Review, Men's Wear Review, Printer and Publisher, Bookseller and Stationer, Canadian Machinery and Manufacturing News, Power House, Sanitary Engineer, Canadian Foundryman, Marine Engineering of Canada.

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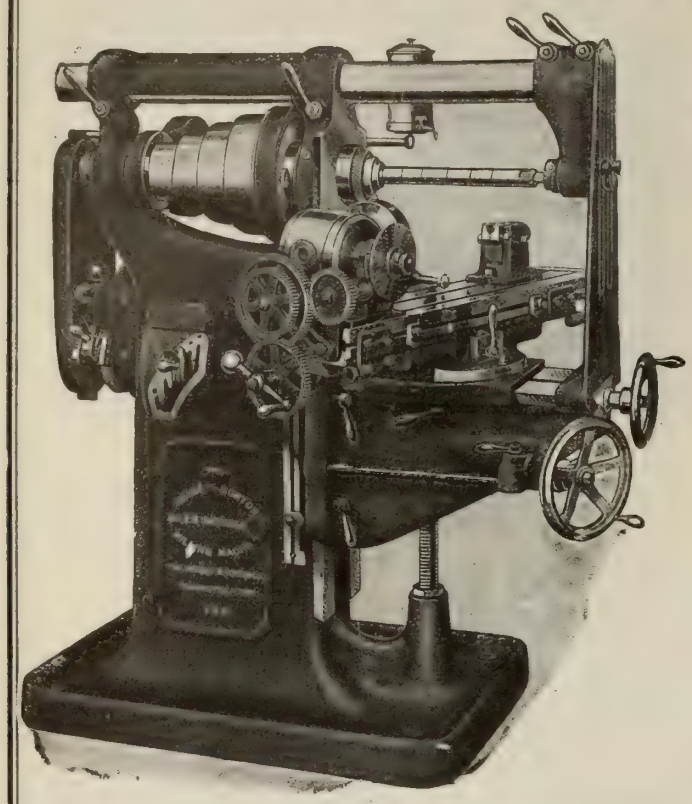
Anybody Can Operate This Miller



and Turn Out a Pile of Work so Simple to Operate is the

"HENDEY"

Skilled mechanics are scarce these days—but anyone can run a machine of its simplicity and turn out work accurately and fast without trouble.

All Feeds positive driven through gearings giving 18 changes.

This is the universal type—designed to handle all milling operations performed on machines of this character, either with regular equipment or by aid of attachments, which can be supplied for increasing efficiency and scope of machine.

Write for full description

The Hendey Machine Co.

Torrington, Conn., U.S.A.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

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QUALITY AND SERVICE

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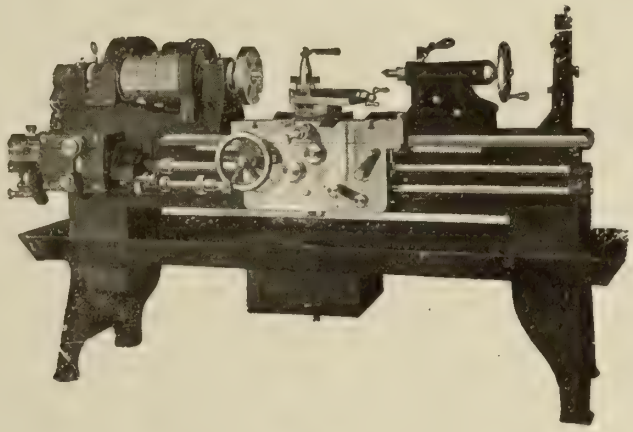

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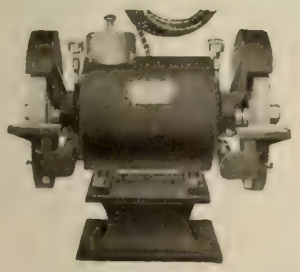
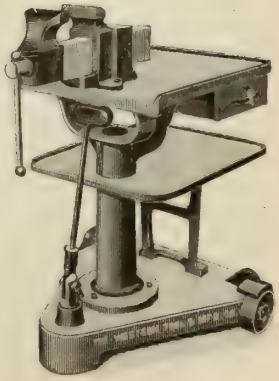


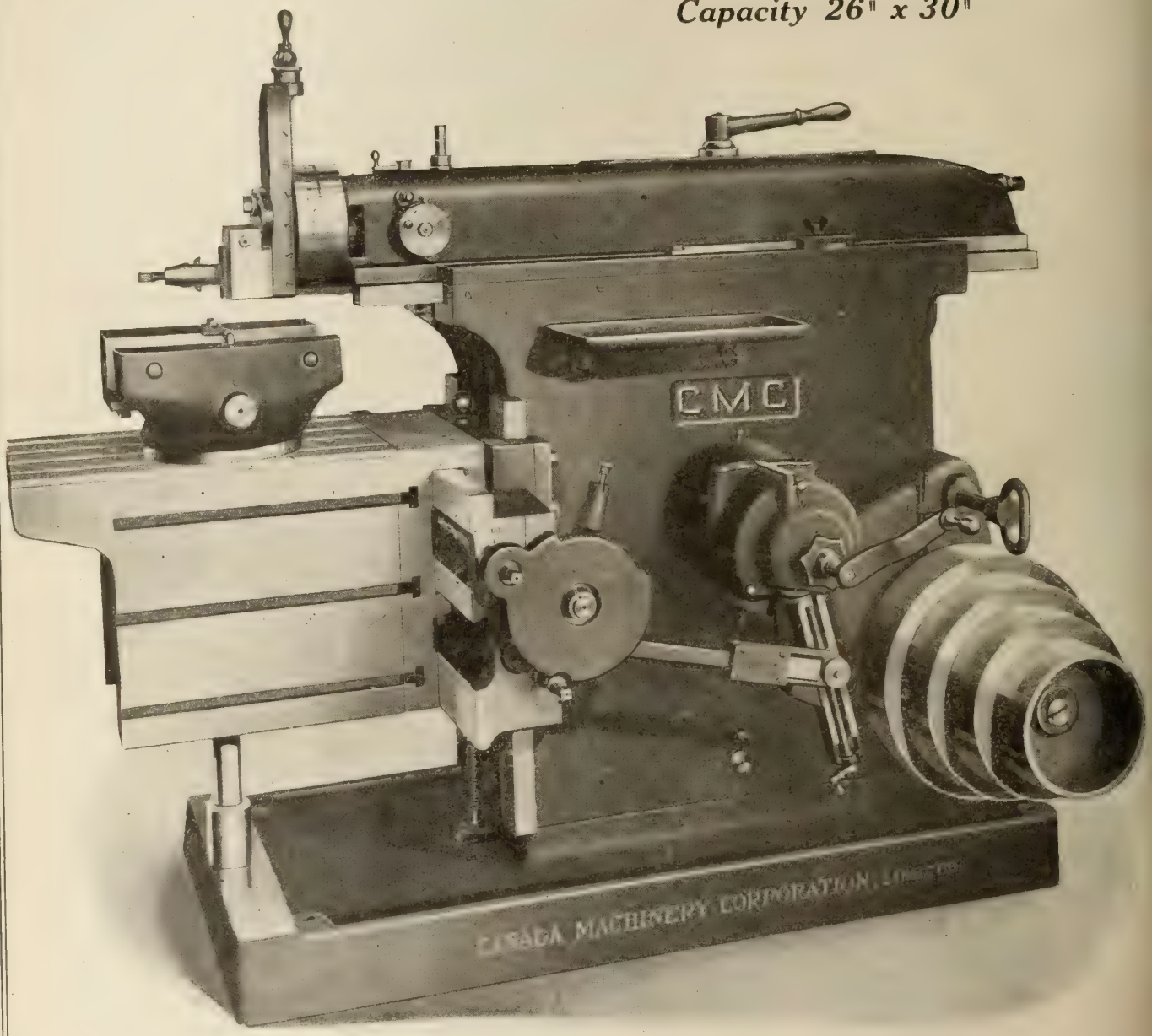
MACHINE TOOLS
SMALL TOOLS
MILL SUPPLIES



The Geo. F. Foss Machinery & Supply Co.
305 St. James St. MONTREAL

CRANK C.M.C. SHAPER

Capacity 26" x 30"



A very heavy and accurate machine for exacting service.

Inquiries solicited. **Details on request.**

Prompt Delivery.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: BROCK AVENUE SUBWAY

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 9. Publication Office: Toronto, February 27, 1919 Subscription Price $3.00 per Year

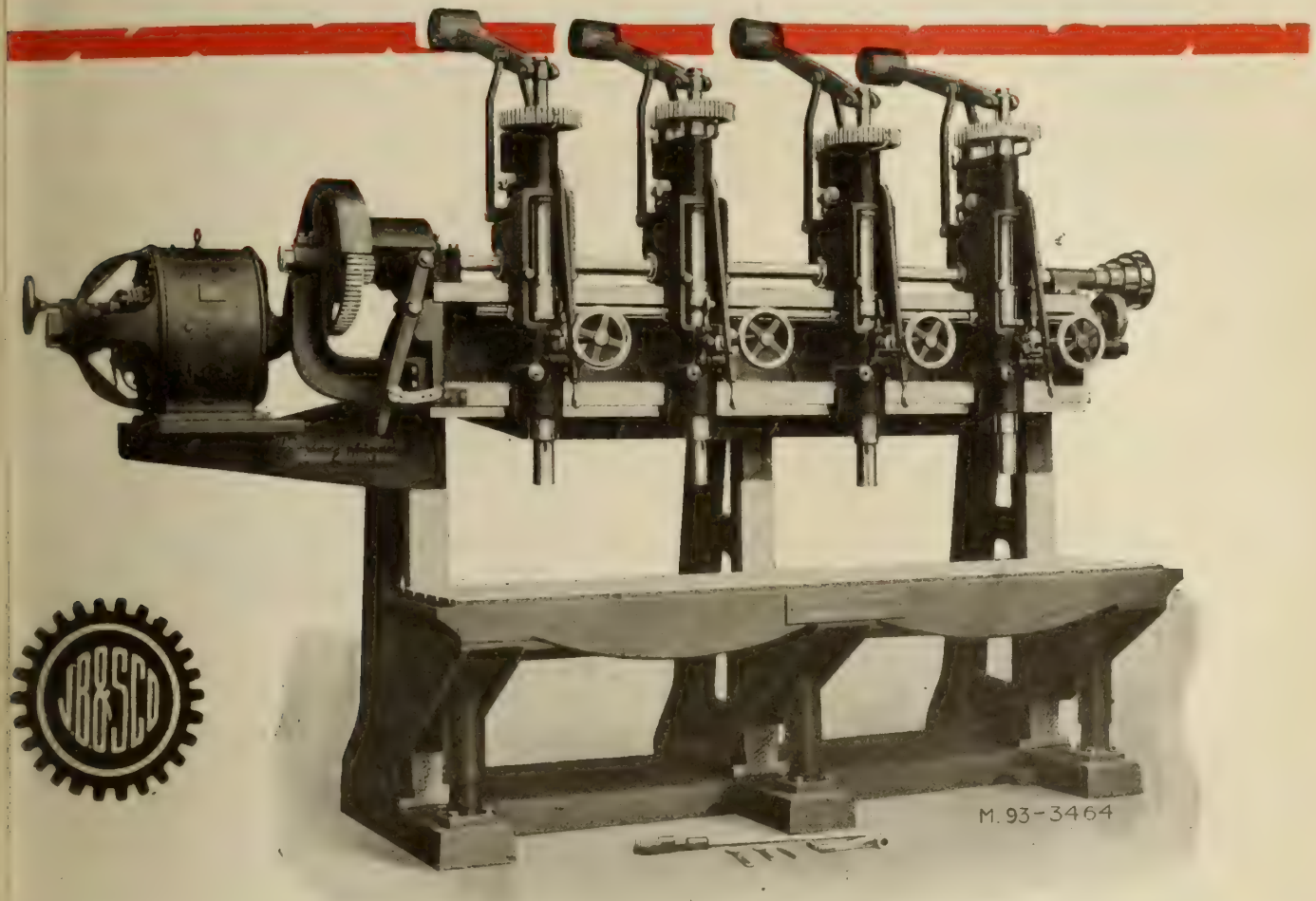


Illustration shows our 4-spindle multiple drilling machine for locomotive and other work. Capacity, four 2-inch holes in steel.

Drop us a line for photographs and full particulars.

BERTRAM MACHINE TOOLS

John Bertram & Sons Company Limited
Dundas Ontario

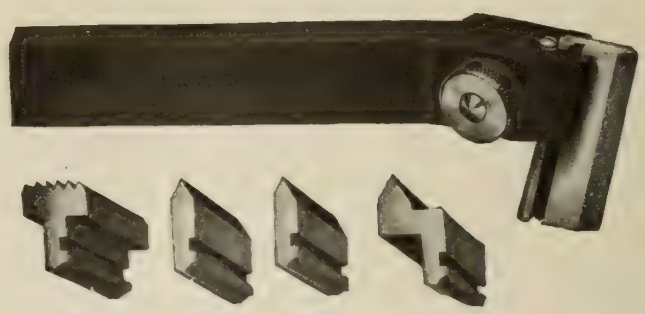
MONTREAL 723 Drummond Building
TORONTO 1002 C.P.R. Building
VANCOUVER 609 Bank of Ottawa Building
WINNIPEG 1205 McArthur Building

Locomotive and car shop equipment, structural and bridge shop machinery, repair shop machinery, general machine shop equipment.

Photographs and full particulars gladly mailed upon request.

SMALL TOOLS

P. & W. Threading Tools



Chaser | Single Point | Offset | Double Onset

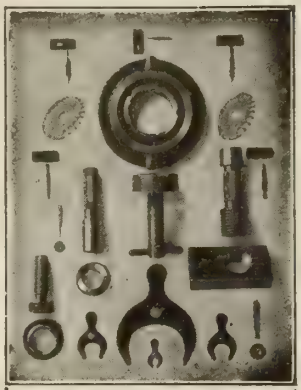
PROMPT SERVICE

is assured at our nearest office. Place your order there to-day.

Uses the same holder for chasers and single point cutters. The change can be made in a jiffy.

A few of its advantages:

- Threads can be cut very close to shoulder.
- Tools are sharpened by simply grinding off top of cutter.
- Combines economy with all features essential in a threading and forming tool.
- Cutters have 15 deg. clearance, which experience has taught gives the longest wear in various metals.



PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

Precision Machine Tools

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg	1205 McArthur Bldg.	B.C. Equipment Co.

Bertram MACHINE TOOLS

Locomotive and Car Shop Equipment

Structural and Bridge Shop Machinery

Repair Shop Machinery

General Machine Shop Equipment

30-Inch Vertical Drilling Machine

Photographs and full particulars gladly mailed upon request.

WRITE US NOW

We'll be pleased to submit photographs and full details on any line or lines in which you are interested.

The John Bertram & Sons Co., Limited

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO FEBRUARY 27, 1919

Old Man Specific

Physician Extraordinary to Nerveless, Enfeebled Copy

By P. K. Marsh

THE following article by P. K. Marsh in *Printers' Ink*, is one of the best things we have read in recent years on the subject of being specific in writing advertisements. We have often thought that "technical" advertisement could be made far more interesting, and a great deal more profitable if the advertiser would only be specific. Generalities won't do in personal selling—why should they be employed in advertising?

We venture to say a good many of our readers have opinions along just this particular line and we would like to hear from them expressing their ideas as to what constitutes good advertising of—say—mental working equipment.

Grover Cleveland once evolved a phrase which should be framed in 72-point bold brutal Gothic over every copy writer's desk, to hang there as an ever present caution.

In two words he crystallized the criticism merited by over 50 per cent. of advertising copy.

"Glittering Generalities."

From the copy-cub who writes glittering generalities to conceal his lack of information on his sales problem up to the seasoned veteran who befools himself that his flowery verbiage is "broad gauge," "institutional" copy, "generalitis" is an insidious bacillus which is no respecter of persons.

It is nothing new. In various years it has masqueraded under such varied noms-de-plume as "platitudes," "bromides," "hot air," "fluff," and the cruder, more modern "bull."

It not only minimizes results for the advertiser who pays for space in which to print it, but it hampers all advertising because it wastes the reader's time and makes him regard advertising as largely flapdoodle—(and you can't blame him.)

Now let's classify glittering generalities so that we will understand each other right from the start.

Here are the more common forms:

1. Spread-eagle flub-dub.
2. Claims unsupported by proofs.
3. Ads which can be made to fit a competitor's line merely by transposing names.
4. The glorification of trivialities.
5. 90 per cent. of "revolutionizing-an-industry" copy.

It is a sickening list, yet I challenge any copy writer to prove himself guiltless of contributory negligence. The sad part of it is that the more enthusiastic we wax over our product the more apt we are to be accessory to the crime. Laziness, ignorance and enthusiasm—these three are the chief causes, but the greatest of these is enthusiasm.

What's the cure?

Boy!—page old man Specific.

Who is old man Specific?

He's the man who sat by John Masefield when Masefield pictured the romance of ancient, mediœval and modern commerce completely, graphically and unforgettably in 15 brief lines. You copy men who take your professions seriously, read "Cargoes" and find how commonplace words can be made to glow with color and appeal.

Also he's the man who induced William Shakespeare to describe winter without once using the phrases "snowy mantle," "bleak landscape," or "glistening whiteness," but in the far frostier lines—

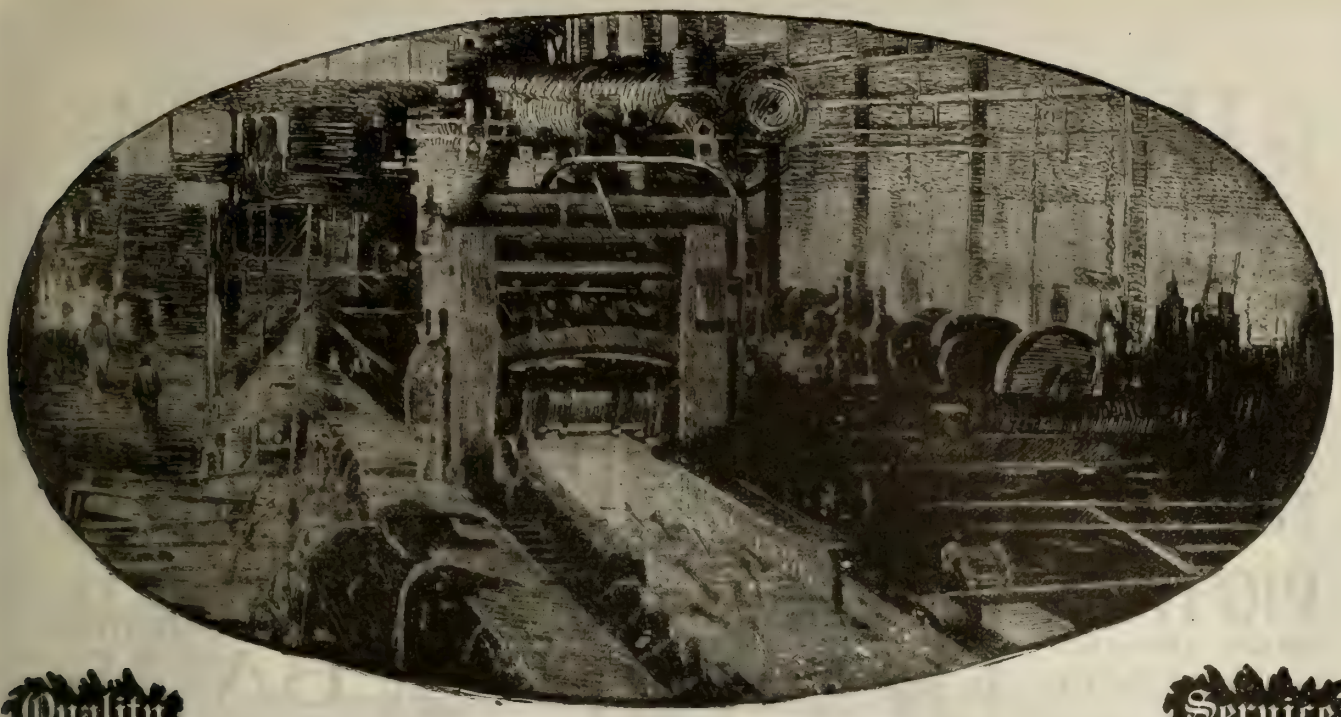
"When icicles hang by the wall,
And Dick the Shepherd blows his nail,
And Tom bears logs into the hall,
And milk comes frozen home in pail"—

There's only one three-syllable word in the four lines, but no one will argue that William was not thoroughly acquainted with his subject. Call in the average copy writer and ask him to write a twenty-seven-word description of winter—and see the contrast.

O. Henry was well acquainted with o. m. S. too. Witness the way he coaxed you into his stories without delay—

"At 10 o'clock p.m., Felicia, the maid, left by the basement door with the policeman to get a raspberry phosphate around the corner."

CONTINUED ON PAGE 6)



Quality Service

REASON IT OUT

Demand full value for every dollar by spending it where you earn it

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar is Worth One Hundred Cents in Canada

THE STEEL COMPANY OF CANADA LIMITED

HAMILTON MONTREAL

If any advertisement interests you, tear it out now and place with letters to be answered.

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

BLOOMS, BILLETS, SLABS,

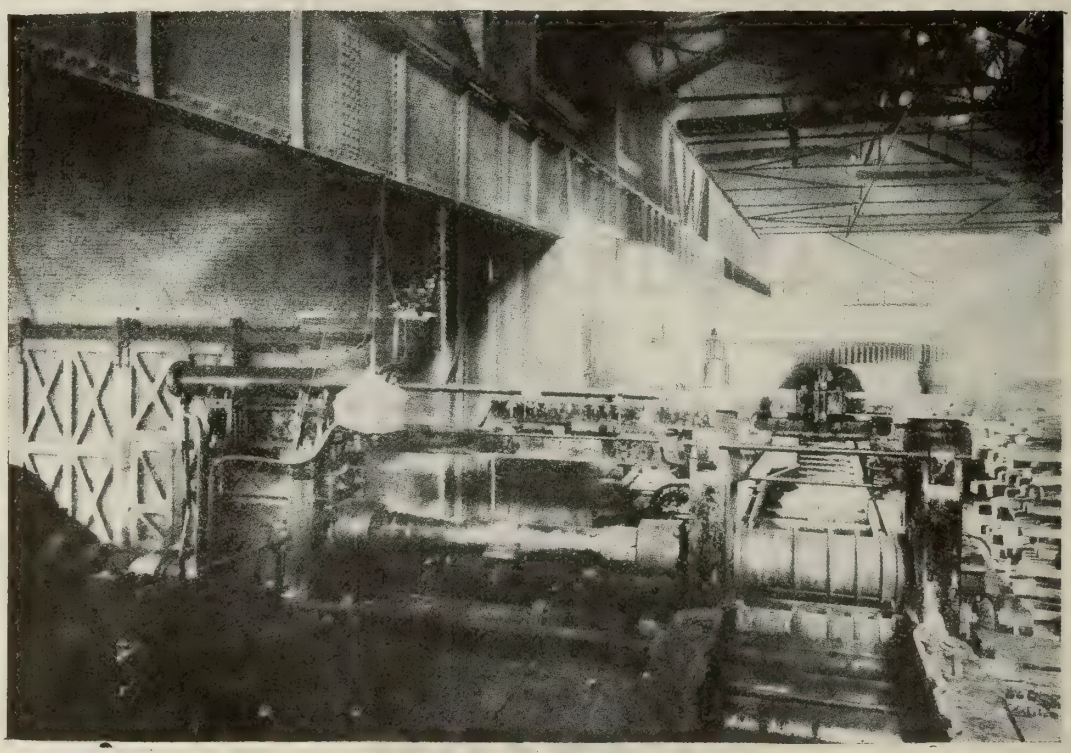
STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

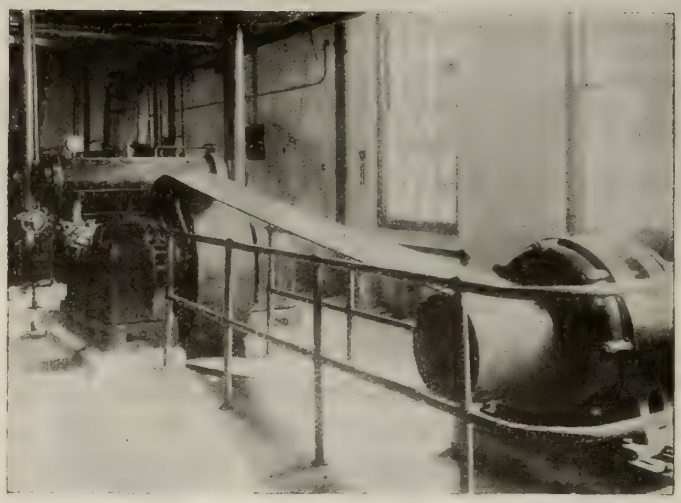
IRON, BRASS AND BRONZE CASTINGS

Sulphuric Acid. *Nitre Cake.*



ALGOMA STEEL CORPORATION, LIMITED
SAULT STE. MARIE, ONTARIO

WILT
Machine shop foremen and superintendent who invariably specify "WILT" when requisitioning tools know WILT Drills are superior — are absolutely guaranteed against defective material and workmanship—are rigidly inspected before being shipped. To produce more, use WILT Drills. To produce more economically, use WILT Drills. Elimination of breakage alone will save you much.
WILT
HIGH SPEED AND CARBON TWIST DRILLS
WILT TWIST DRILL CO.
OF CANADA, LIMITED
Walkerville, Ontario.
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C.2, Eng.
"Where there's a WILT, —there's the Way."



Repeat Orders Talk---There is another of our "PLB-2" Air Compressors in this Montreal Plant

The "PLB-2" Air Compressor Bulletin is K-301-A

Canadian Ingersoll-Rand Company, Limited.

Sydney Sherbrooke Montreal Toronto Cobalt Winnipeg Nelson Vancouver

E S&M

ELECTRIC

Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

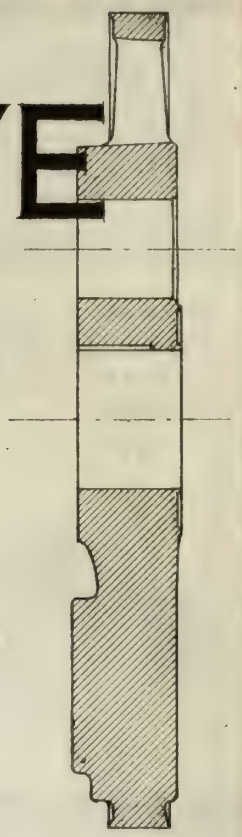
Send us your drawings
for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
WELLAND ONTARIO

Forging Billets and Bars
Electric Furnace
Alloy Steels, Die Blocks
Annealed
Piston Rods Rough Turned
Annealed
High Speed Steel

General Steel Company
Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

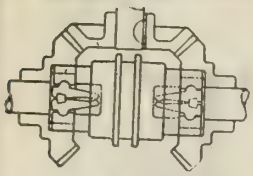
LOCOMOTIVE CASTINGS



CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL

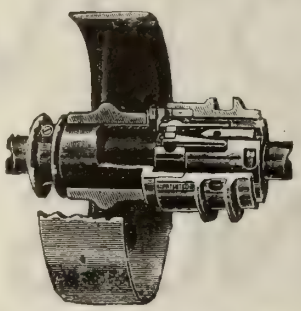
If any advertisement interests you, tear it out now and place with letters to be answered.

THE JOHNSON FRICTION CLUTCH

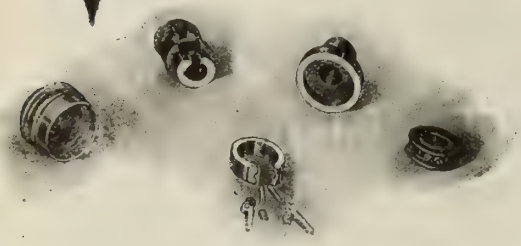


DOUBLE CLUTCH IN NEST OF GEARING

Note the Parts of This Clutch



STANDARD CLUTCH with Pulley Clutch Engaged



FOR SERVICE

The leading engineers are specifying *Johnson Friction Clutches*. Our years of experience in manufacturing friction clutches place us in an excellent position to take care of your requirements. The *Johnson Friction Clutch* has but few parts and is easily modified to meet any conditions. Have *you* noticed the concerns who are using *Johnson Friction Clutches?* There's a reason. Service is in back of it all. What are your requirements?

You Should Have Our Yellow Data Sheets and Booklet "Clutches As Applied in Machine Building"

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1., Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:
104 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

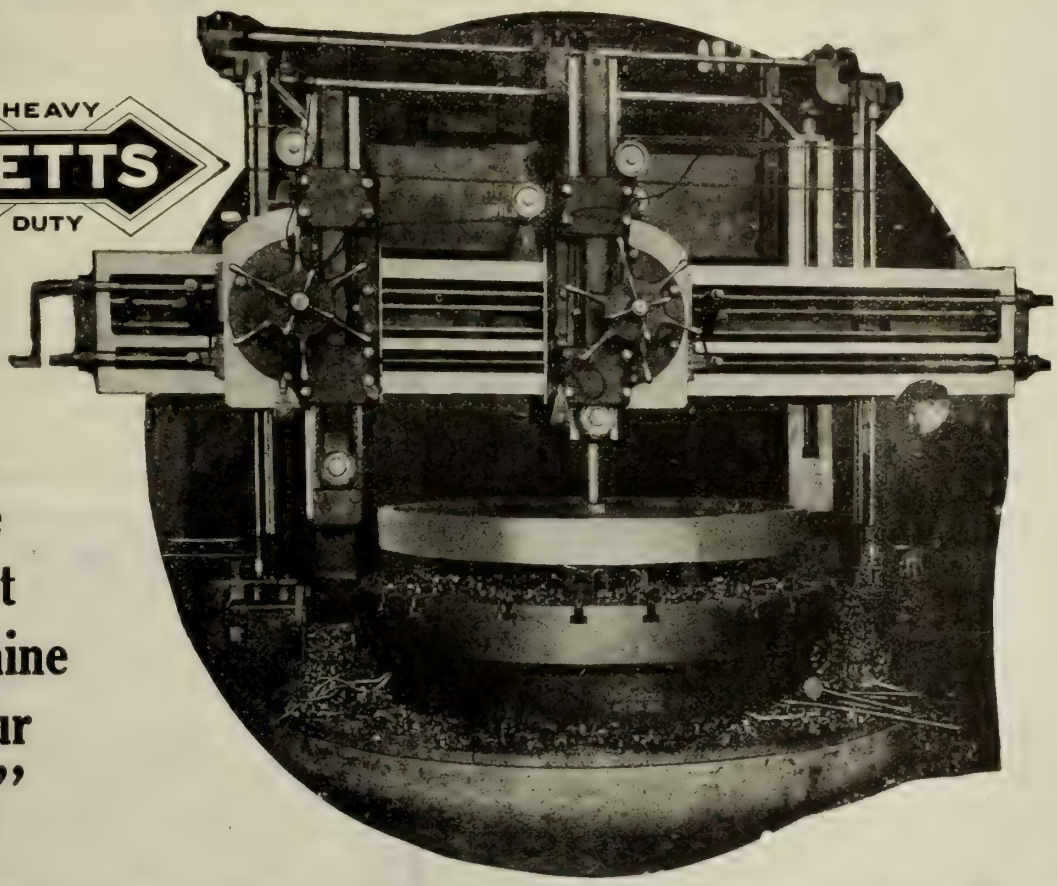
THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

BETTS

Heavy Duty Boring Mill



HEAVY BETTS DUTY

"The Finest Machine in Our Shop"

That was the manager's verdict after this Betts Boring Mill had been put into service —and he wasn't talking about its looks either.

He meant "finest" accuracy in the machine itself and the work it turned out; "finest" in point of output; "finest" when operating conveniences were considered. And this man knows Boring Mills. He is running a big gear making plant, and he has used and is using many machines of many kinds. We value his opinion.

The photograph was snapped just as the machine was finishing a 76 in. diameter gear blank. The face of this blank was 6 in. Material, steel. The chips at the side of the table show the character of the cut being taken.

We'll be pleased to send more details of this 7 ft. Boring and Turning Mill—or any of our smaller or larger machines of this type.

We'd like also to have you see some of these machines in operation and to have you question their operators and owners. We'll send a list of installations in your locality. Write us.

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.

Thirty Years

TEXAS BANNER MILLS
Terrell Milling Company,
Terrell, Texas.

Magnolia Metal Co. Aug. 30, 1918.

Gentlemen:—

Wish to state that we have been using Magnolia Metal for the past THIRTY YEARS.

Magnolia has been used continuously on the wrist of our Buckeye Engine, 85 H.P., 115 pounds pressure, with perfect satisfaction.

We shall continue to use Magnolia Metal.

Yours truly,
TERRELL MILLING COMPANY,
E. M. Friend, Supt.

PRACTICAL ENGINEER POCKET BOOK
Over 600 pages
A valuable reference work imported from England and sold as an advertising medium at the luw price of 40c. post paid.
Address Montreal Office

SOLD BY LEADING DEALERS EVERYWHERE OR BY
MAGNOLIA METAL CO.
OFFICE AND FACTORY:
225 St. Ambroise Street, - MONTREAL

STAINLESS STEEL

FOR CUTLERY PURPOSES

Prices On Application

Armstrong, Whitworth of Canada, Limited

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298-300 ST. JAMES ST., MONTREAL
WORKS
LONGUEUIL, QUE.
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DOMINION BANK BLDG., TORONTO
27 KING WILLIAM ST., HAMILTON
McARTHUR BUILDING, WINNIPEG

IMPERIAL GENUINE BABBITT METAL *The Highest Grade Manufactured*

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

Nichrome Castings

At 1800° Fahrenheit

Nichrome Carbonizing Boxes Give Thousands of Hours of Service

Case Hardening Automobile Cam Shafts is made easier, more dependable and economical.

Manufactured Under Henderson Patents

CANADIAN DRIVER-HARRIS CO.

WESTERN OFFICE AND DEPOT CHICAGO 20 So. JEFFERSON ST.

WALKERVILLE, ONT. CANADA

AMERICAN OFFICE AND WORKS HARRISON, N. J.

BRITISH WORKS MANCHESTER ENGLAND

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

Are your Tools made of "Red Cut"?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.

BOSTON
BUFFALO
CINCINNATI
CHICAGO
CLEVELAND
DETROIT
PITTSBURGH
MONTREAL
NEW YORK
TORONTO

Electrite Uranium

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.
We know "Electrite" cannot be bettered — and stand ready to prove it to you.

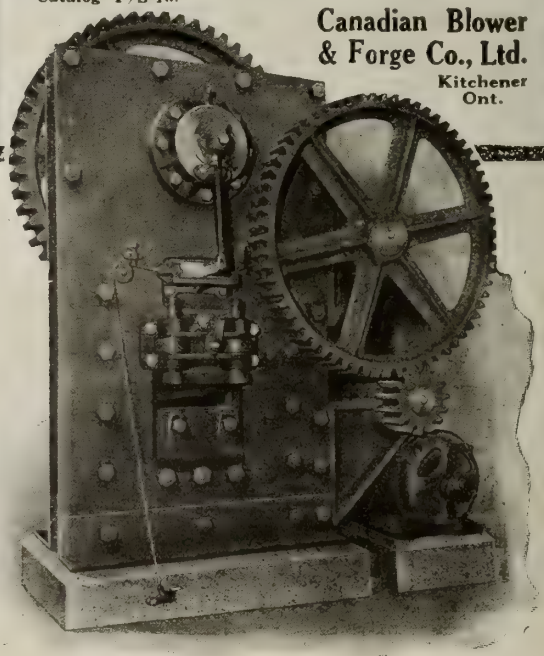
LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

CANADIAN ARMOR PLATE

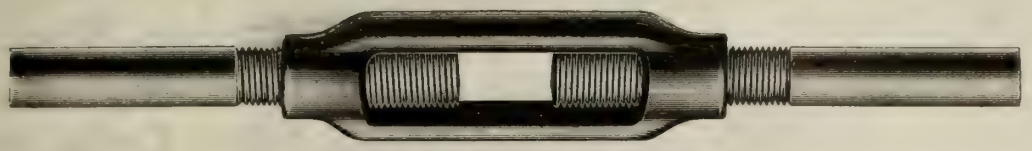
PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.
That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

Canadian Blower & Forge Co., Ltd.
Kitchener Ont.



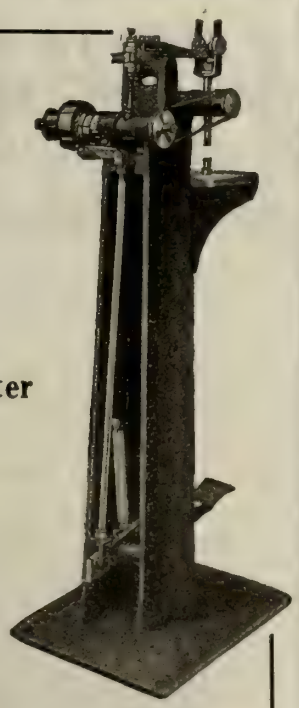
CANADA
FOUNDRIES & FORGINGS
LIMITED

DROP FORGED STEEL



TURNBUCKLES
16 Sizes, with or without Stubs
Large Stock---Quick Action
Produced at
Canadian Billing & Spencer Plant
Welland

A Boy
with this
GRANT
Rotary Vibrating Riveter

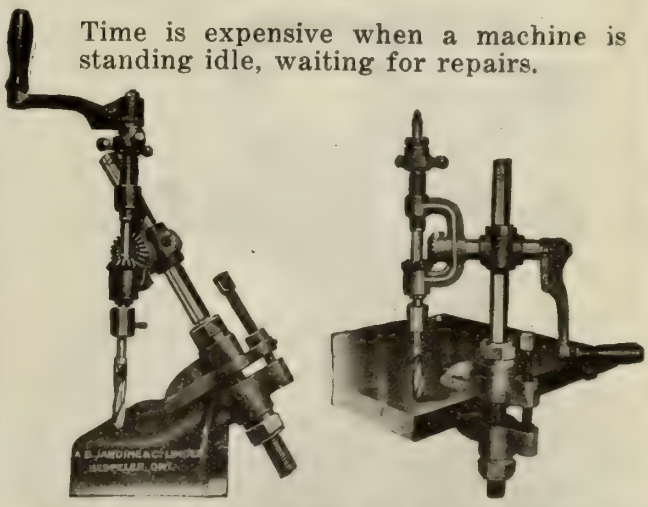


will do better work and more work than any man with any other riveter.
A dollar-a-day boy will place rivets in small, out-of-the-way corners or close up to the shoulder of the casting that will be as smooth and good looking as any placed in easy-to-reach spots. Can you say that of any other riveter, even with a man operating?
And a boy and a Grant Rotary Riveter are a safe combination. For although the Grant can be operated at a speed limited only by that at which the operator can feed the machine, its friction stopping device enables a boy to regulate its speed at will. Write us.

Grant Mfg. & Machine Company
Bridgeport, Conn.

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.
Weight, 40 lbs. Price, $26.50 net.
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

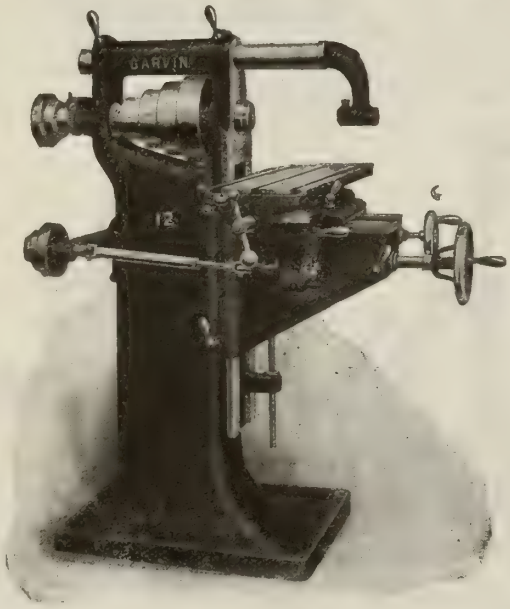
Sole Representatives for Canada

GEO. A. MARSHALL & CO.

1118 Queen Street West, Toronto, Ontario

Phone Park. 250

GARVIN



No. 12 Plain Milling Machine-Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....18 x 6 x 15 in.

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process

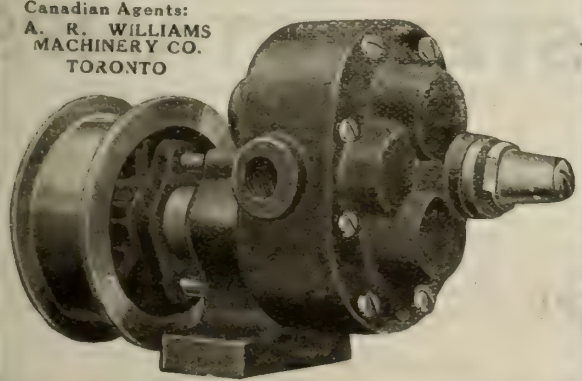
TRAHERN

ROTARY GEARED PUMPS

Use the Individual Pump Different classes of work require different compounds. By using the individual system, as many different compounds as desired may be used. This is a valuable feature. Trahern Rotary Geared Pumps. Would you like to try one? Write.

Trahern Pump Company, Rockford, Ill.

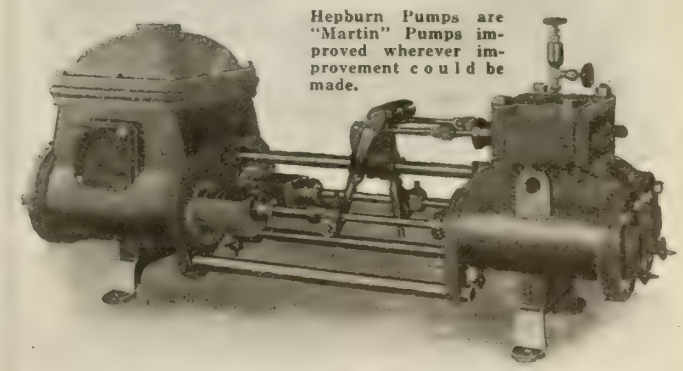
Canadian Agents:
A. R. WILLIAMS MACHINERY CO.
TORONTO



Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED
18-60 Van Horne Street **Toronto, Ontario**

If any advertisement interests you, tear it out now and place with letters to be answered.

IMMEDIATE DELIVERY — Hamilton Stock

FOR IMMEDIATE SHIPMENT we offer the following

FORD-SMITH GRINDERS
- Two 16″ Water Tool Grinders
- Four 12″ Bench Water Tool Grinders
- One 10″ Bench Water Tool Grinder
- One No. 14 General Purpose Grinder
- Four No. 12 General Purpose Grinders
- Five 6″ Bench Grinders
- Four 8″ Bench Grinders
- Two 20″ Heavy Type Floor Grinders

DIAMOND TOOLS
A quantity, imported from England, made with diamonds weighing about a carat and a half each and of the very best quality.

MOTORS—Used, but in first class running order:
- One Lancashire 13 h.p., 3 phase, 720 r.p.m. 550 volts
- One Lancashire 6½ h.p., 3 phase, 700 r.p.m., 550 volts
- One Can. Westinghouse 15 h.p., 2 phase, 1245 r.p.m., 220 volts
- One Can. Westinghouse, 5 h.p., 2 phase, 1880 r.p.m., 200 volts.
- One Can. Crocker-Wheeler, 5 h.p., 25 cycles, 750 r.p.m., 550 volts, 3 phase

FRICTION CLUTCHES
Seven No. 4 Single Friction Clutches, manufactured by Carlyle-Johnson Machine Co., Manchester, Conn.

FORD-SMITH MILLING MACHINES
- Three No. 2 Plain Millers, complete
- Two No. 3 Plain Millers, complete
- Two No. 2 Universal Millers, complete
- One No. 3 Universal Miller, complete

MILLING MACHINE INDEX HEADS
- One 12″ Cincinnati Plain Index Head
- Two No. 1 Kearney & Trecker Plain Centres
- One No. 2 Kearney & Trecker Plain Centres
- One No. 2 Kearney & Trecker Universal Dividing Head

DRILLS
- One 20″ Pollard & Shipman Single Geared Drill
- One Hamilton Tool Co. Speed Drill

AIR CYLINDERS
- Eight 6½″ Air Cylinders, manufactured by Manufacturers Equipment Co., Chicago
- Four 12″ Air Cylinders

We solicit your enquiries re above. On our Special and Standard Grinders, Belt and Motor driven, we can make prompt deliveries.

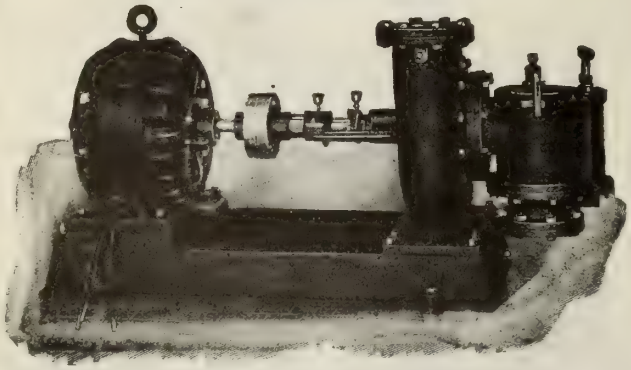
The Ford-Smith Machine Co., Ltd.

Manufacturers of Milling Machines, Floor Grinders, Polishers, Disc Grinders, Swing Grinders

Hamilton, Ontario, Canada

We solicit your inquiries for

Pumping Machinery and Steel Barrels



Pumping Machinery for marine and stationary work — Vertical and Horizontal.
Steel Containers from 12½ to 92 Imp. gal. capacity.

The Smart-Turner Machine Co., Limited
Hamilton, Canada

STEEL STAMPS

FOR MARKING SHELLS, ETC.

We will Give You Satisfaction on all Work of this Kind.

Send for Prices

PRITCHARD-ANDREWS CO.
OF OTTAWA
General Engravers and Die Sinkers
64 SPARKS ST. OTTAWA, CAN.

STELLITE

"Not Steel but its Master"

Anecdotal

The superintendent in one of the largest machine shops on the continent recently tried an experiment with the idea of substituting High Speed Steel for STELLITE under the delusion that High Speed Steel would do as well and be cheaper.

He gave four tools tipped with High Speed Steel and instructions to do his best, to one of the operators. The production report was watched carefully for a week and it was noted that the man with the High Speed Steel tools was daily in advance of his fellows.

The superintendent then paid a visit to the operator to compliment him on his work when the following conversation ensued:—

Q—"Are you the chap I gave the High Speed Steel tools to ?"

A.—"Yes, sir."

Q.—"How do they work?"

A—"Fine, there they are on the bed of the lathe."

Q.—"What have you got in the lathe?"

A.—"STELLITE—how do you think I got my production?"

MORAL—If the operator wants STELLITE, get it for him—he knows, and the results show in added production.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

Chapman

Double Ball Bearings

CONSERVE POWER! There is too much power going to waste the world over. This fact has been noted by the British Government and sweeping reforms are contemplated in Great Britain.

Canada also wastes much power. A reform is necessary here, too. Babbitt bearings are being used too often where **Chapman Double Ball Bearings** should prevail. The adoption of Chapman Double Ball Bearings, wherever an axle or shafting needs support in the transmission of power, results in a saving of 75% of friction loss.

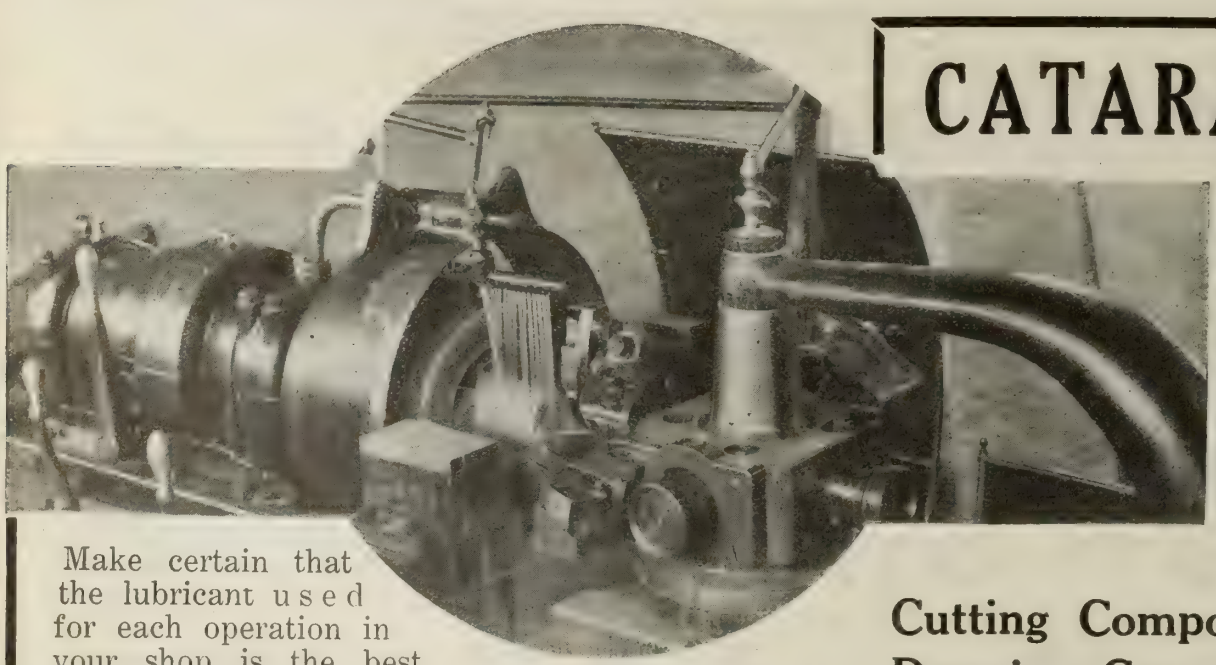
Now in use in over 2,000 Canadian factories. Fit any adjustable hanger. Adopted by Canadian and United States Governments.

Write for full story of their efficiency.

Chapman Double Ball Bearing Company of Canada, Ltd.

Room 408 Shaughnessy Bldg., Montreal. 339-351 Sorauren Ave., TORONTO, Canada.
Transmission Ball Bearing Co., Inc., 1050 Military Road, Buffalo, N.Y.

CATARACT



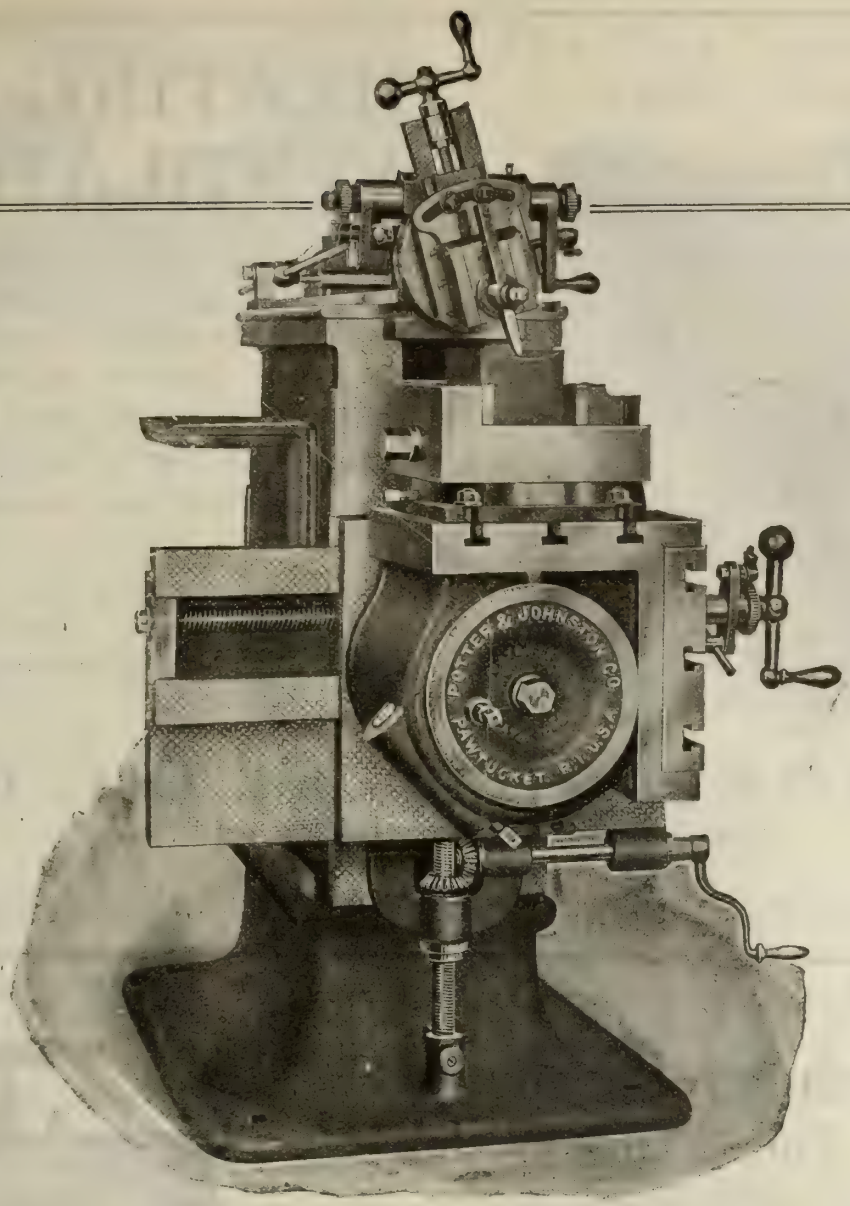
ACME
MYSTIC
SPECIAL

Make certain that the lubricant used for each operation in your shop is the best obtainable for the purpose. Otherwise your men and your tools and your machines work at a disadvantage.

Write us to-day that we may demonstrate how Cataract Lubricants can increase production and reduce cost in your plant.

Cutting Compounds
Drawing Compounds
Cutting Oils
Quenching Oils

Cataract Refining Company, Limited - Toronto, Ont.



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

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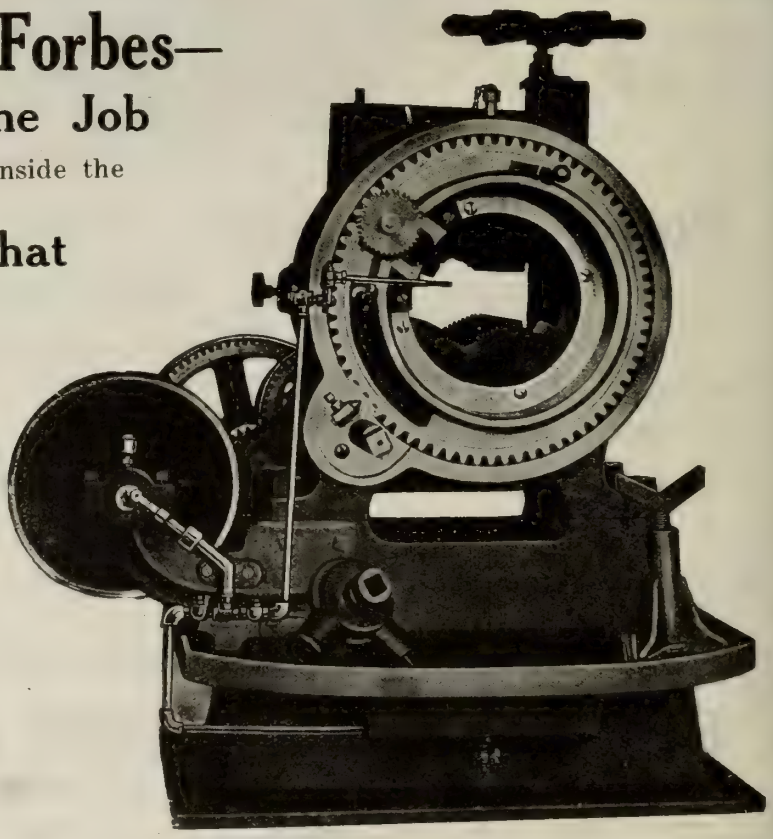

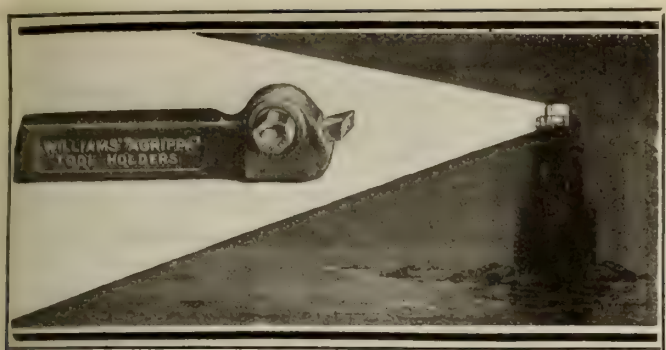

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"THE HOLDERS THAT HOLD"

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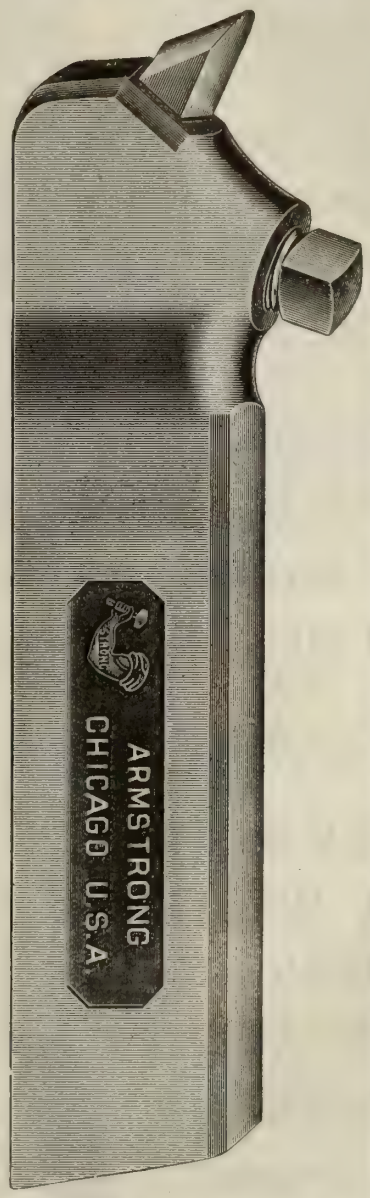

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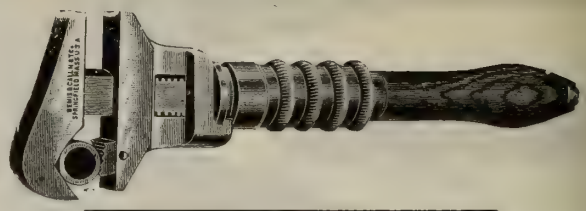

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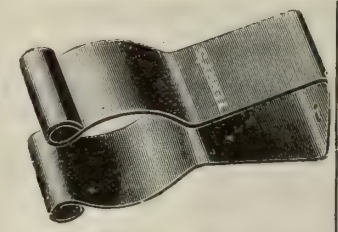

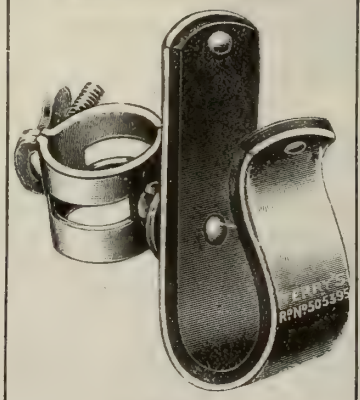

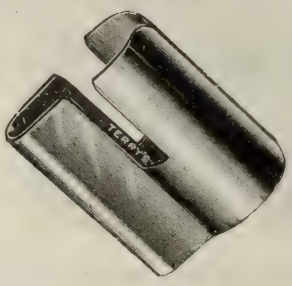

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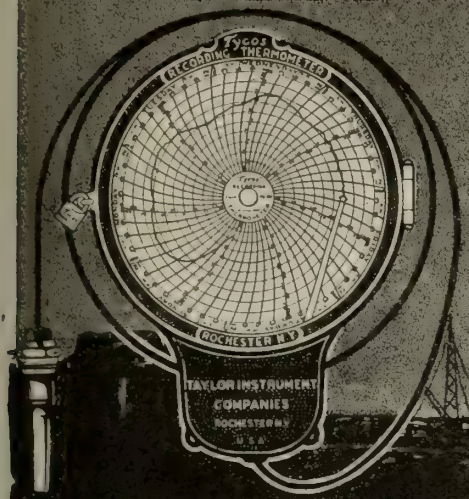

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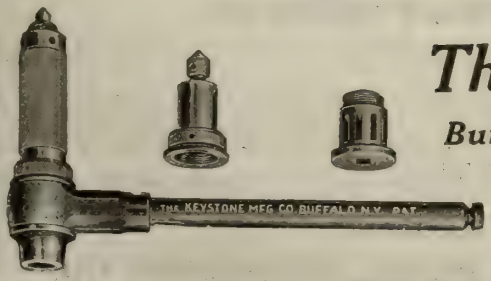

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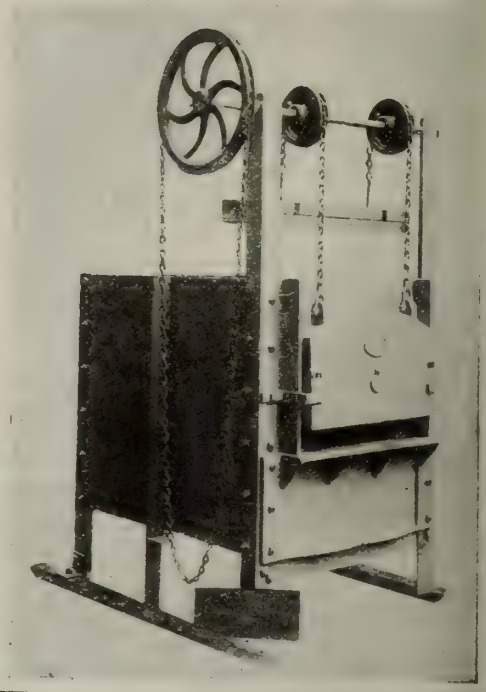

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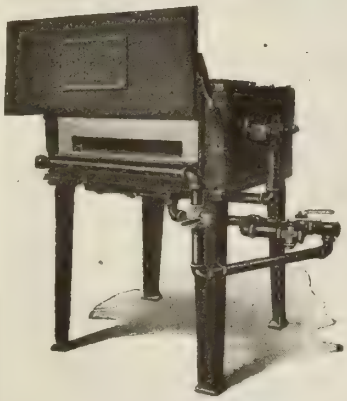

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Increases Production—50 to 100%

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The one striking feature about our repeat orders is that so many of them come from large concerns who had been reasonably satisfied with other standard makes before they put in their first PEERLESS High-Speed, and since then they have sent us order after order for more and more of our machines.

Surely there must be some good reason for this, which will be perfectly clear to you when you try out a Peerless for yourself.

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Delivered from Stock

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For Accuracy

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Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

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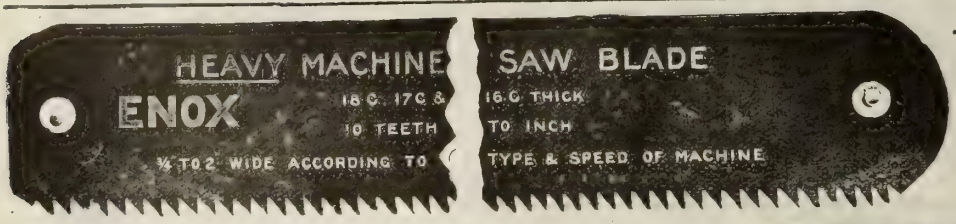

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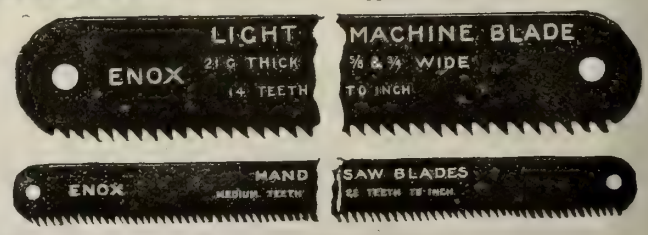

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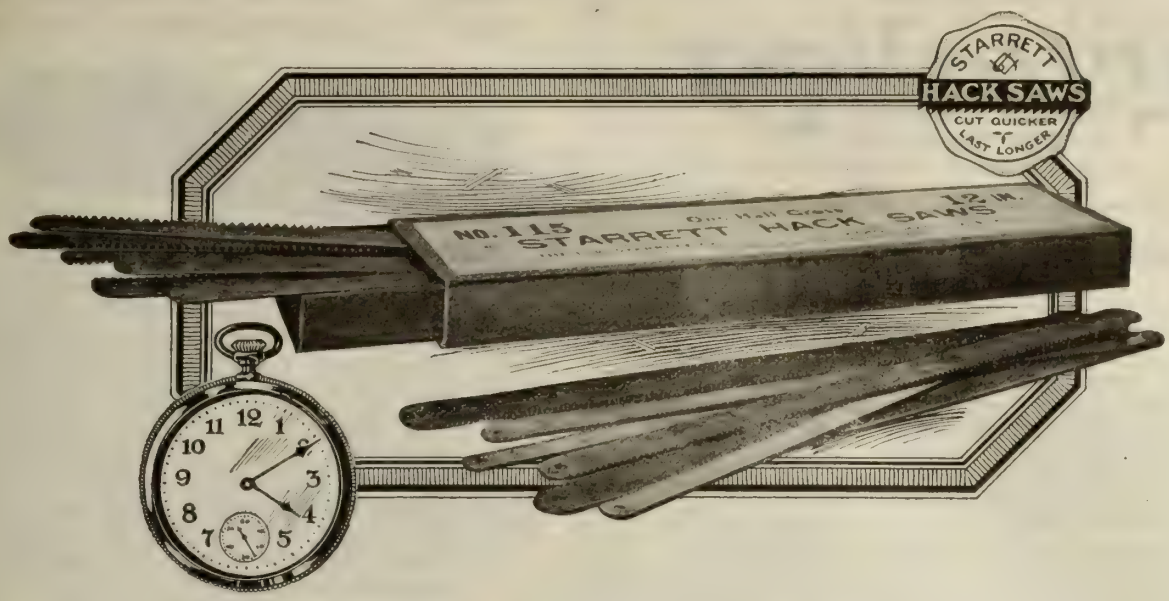

Time—a raw material

The greatest service a hack saw can give to assure economy is to shorten the time of cutting a given piece of material. Time today is vital—the most valuable raw material—don't waste it. Time has often been the difference between profit and loss. Remember that Starrett Hack Saws cut fastest—so saving time.

Write for our Catalog No. 21-3.

Besides the hack saws and frames it shows the many styles and sizes of Starrett fine precision tools.

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Mfrs. of Hack Saws Unexcelled

Athol, Mass.

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42-89

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 23A

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The wheel for grinding cutters must be of a soft, free-cutting grade; the cut must be light and never forced.

The wheels most commonly used are about 46 grains, grades J and K; the coolest cutting abrasive is Alundum. Wheels finer than 60 grain should never be used for cutter grinding of either high speed or carbon steel. Finer wheels are more likely to burn the work than coarser wheels.

Form cutters are usually ground with a saucer or dish wheel. They are held on a short arbor, as illustrated here, and ground on the face only. It is important that the operator keep the cutting edge in a radial line to retain the shape. In this particular type of cutter, it is necessary to do the grinding with the tooth-rest on the back of the cutting tooth instead of on the face.

Cutters of the side-mill type are ground on the top in exactly the same manner as the plain cutter. A cup wheel is employed for grinding the sides, the cutter being held on the edges of a special arbor, as shown in the illustration.

For plain milling cutters, the wheels most used are Alundum 3846 J and K, although 3860 I, vitrified and silicate, is a popular grade in saucer shapes, such as Brown and Sharpe No. 60.

One of the most popular wheels for grinding gear cutters is saucer shape Alundum 3846K. Another good wheel is Alundum 3850 J. In the smaller diameters, 3860 K is commonly used.

On inserted tooth milling cutters, 3846 J and K, are the most popular wheels, and under certain conditions 3836 L meets the requirements.

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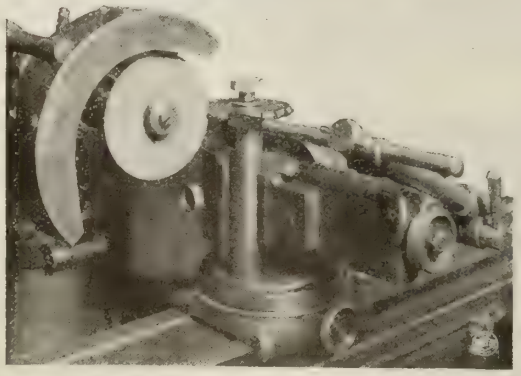

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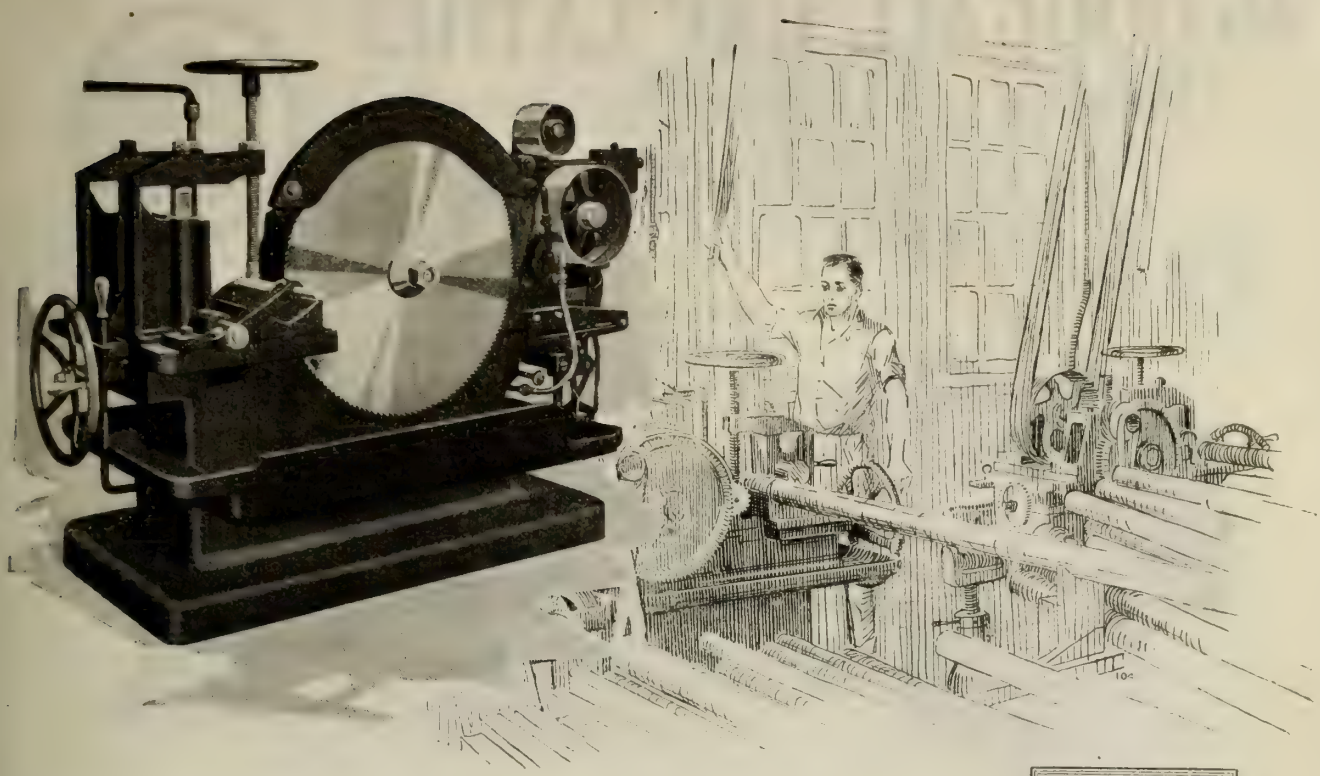

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These machines fully described in Machine Tool Catalog No. 39 C

Got yours?

These high-powered machines drive an exceptionally small, narrow saw, considering their capacity. Consequently the wastage of steel is reduced to a minimum.

On the other hand, they are big producers. Nutter & Barnes Cold Saws are used by some of the largest shops in the world. *They can help you!*

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The high grade workmanship, materials and liberal proportion of parts all make for unusual strength, rigidity and accuracy.

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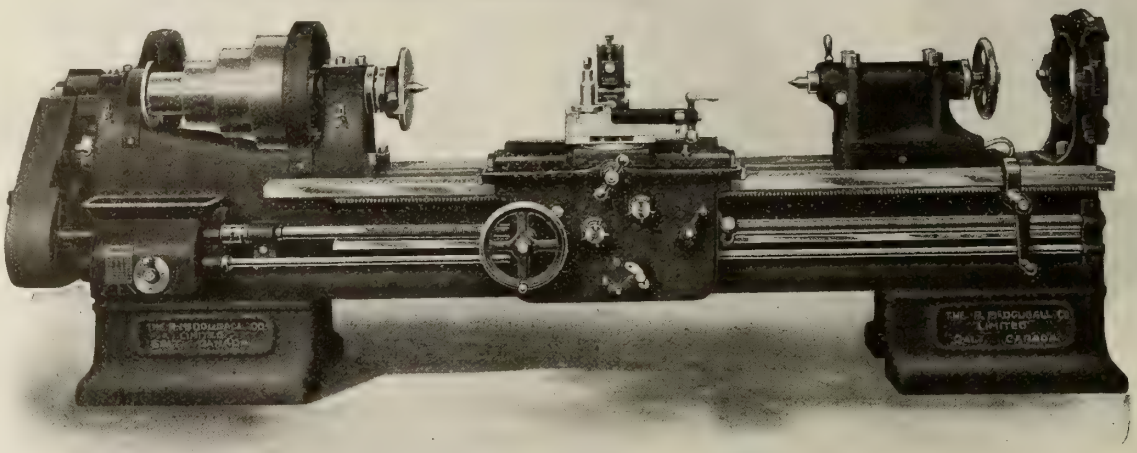

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OUR Stamping Plants contain over 100 presses, including equipment to handle heaviest drawn work.

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Because they are made in Canada by Canadian Capital and Canadian Labor.

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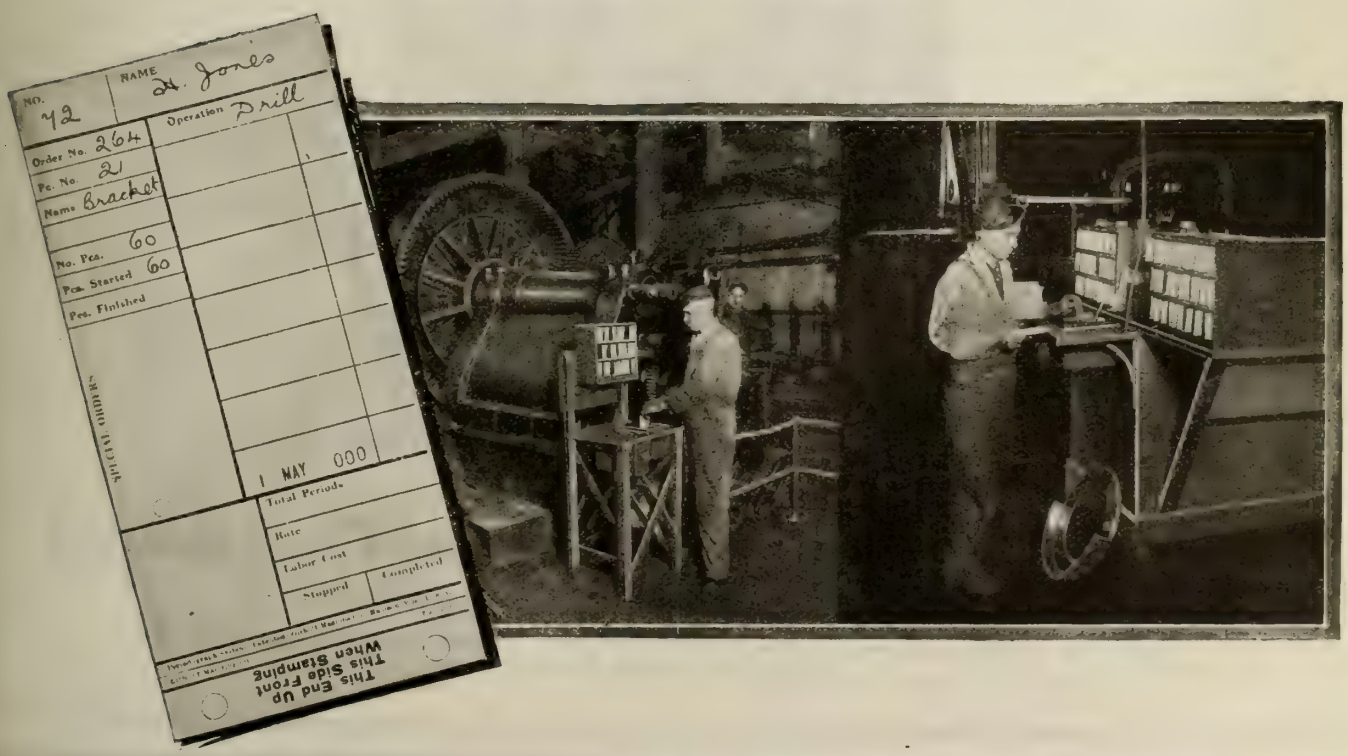
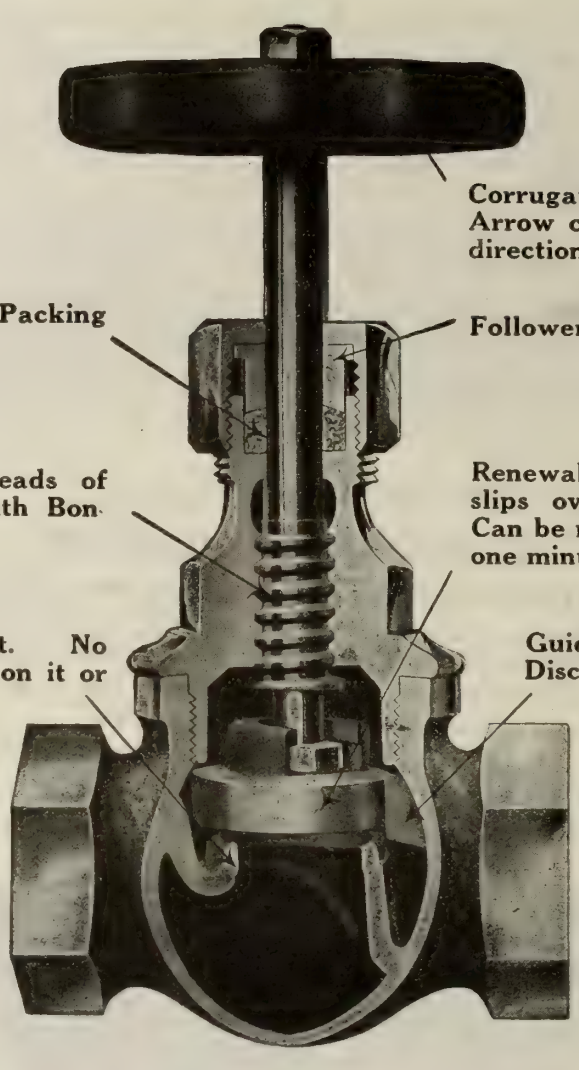


Fairbanks Renewable Disc Valves



The disc of the Fairbanks Renewable Disc Valve can be renewed in less than a minute without removing the valve from the line, a wrench being the only tool necessary.

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The Canadian Fairbanks-Morse Co., Limited

"Canada's Departmental House for Mechanical Goods"

St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XX. No. 9 February 27, 1919

Imagination and Sheet Metal Layout Work

Some Layout Methods For Making Complicated Shapes From Sheet Metal—The Geometrical Construction is Often Assisted by the Exercise of a Little Imagination

By F. SCRIBER

To shape a part of solid stock is one thing, but when we have to cut from tin or other sheet metal a piece that, when bent into shape, will look just like it, we have an entirely different proposition and one that calls for more or less imaginative power. In presenting a few examples of this description it is hoped to help those not familiar with this class of work to see how some things look before bending and how to correctly lay them out either on paper or metal before cutting out to bend into shape.

On the accompanying illustrations the subject is shown in black heavy lines, while all construction lines are made light and extend beyond the subject except when they come on a centre line, when the centre line is shown in dot and dash and it is also used for a construction line.

Fig. 1 shows a rectangle, which needs no explanation as it is evident that all that is required is four sides, two 6 in. long by 4 in. wide, two 6 in. long by 2 in. wide, and two ends 2 in. by 4 in. arranged to bend as shown by the pattern, Fig. 2, this being the common layout of a cardboard box except that strips for pasting together are usually provided in such a layout.

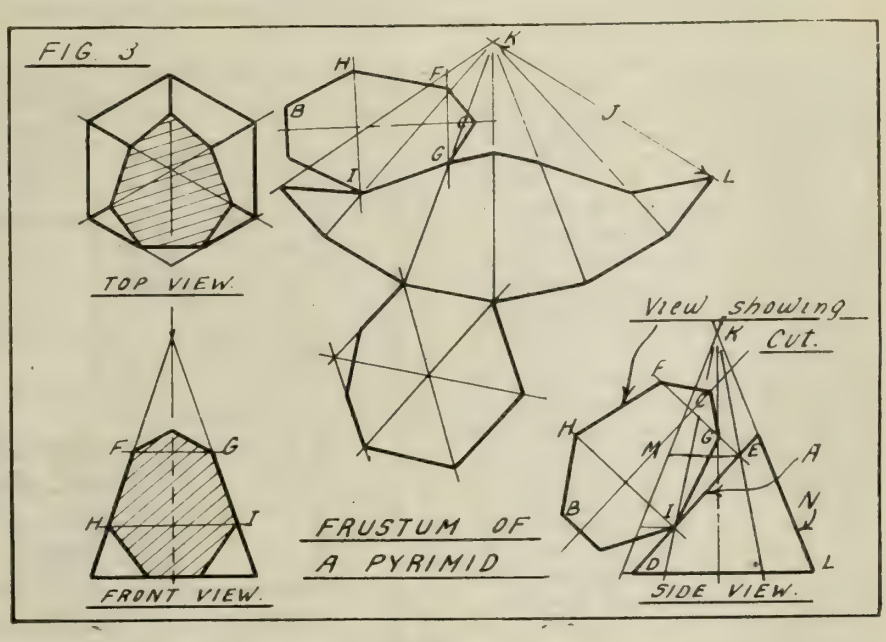


FIG. 3.

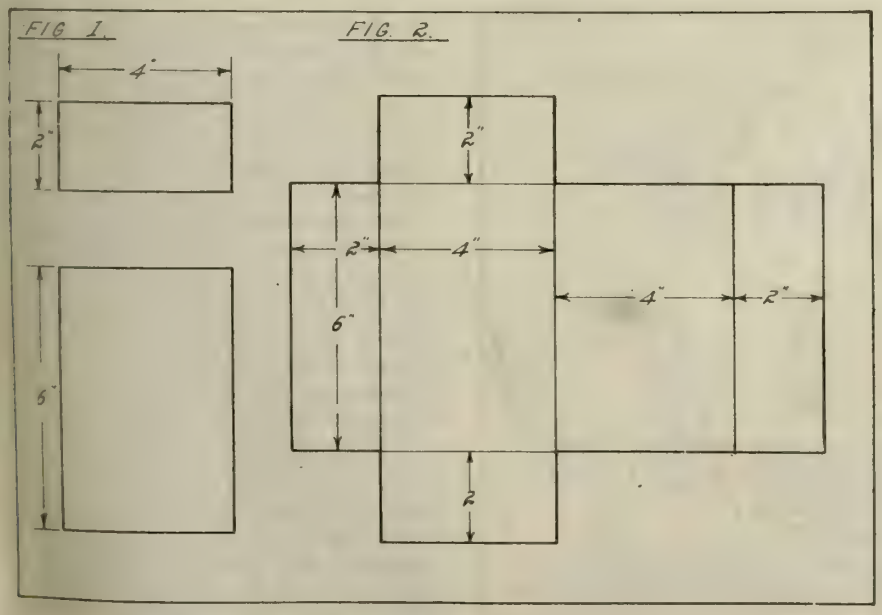


FIGURE 1

In Fig. 3 we follow out the same principle, but it is more complicated. We first draw three views of the hexagon required, namely, front view, top view, and side view; we then cut off the hexagon to the line A, the next drawing required is obtained by drawing a view at right angles to the line A, the length B-C is equal to D-E, while the widths of this view are obtained from the front view, F-G and H-I respectively. Next with J as a radius draw an arc with a radius equal to K-L, and lay off on this arc six sides to represent the hexagonal pyramid at its base. Now, by measuring the distance from the base of the pyramid to the line that it is to be cut off on, along the respective lines, and transferring these measurements to the view being developed, we get a number of points, which, when connected by lines, give the required shape to cut. In this operation care must be taken that

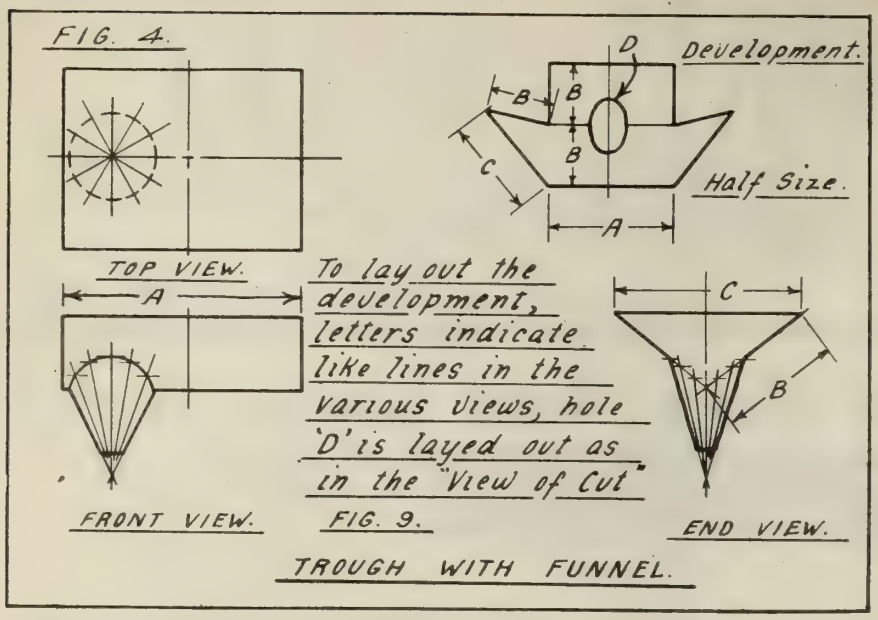


FIG. 4.

all measurements are made on the correct or true length lines, which are the lines that lay in the same horizontal plane and not the lines that slant towards or away from you, and in the side view they are M and N; to get the length of the other lines (the lines that slant towards or away from you) it is necessary to draw lines parallel to the base, from where the lines desired intersect with the line of the cut to the true length lines as shown by the construction lines.

As will be evident, the lines at the top of the figure being developed will be equal in length to the corresponding line of the correct view of the cut and are placed in position as shown, while the base is the hexagon which we have in the top view, and after drawing these in place we can cut out the entire developed view in heavy lines and fold, when we get a frustum of a pyramid, which looks like the drawing from various positions.

Figure 4 shows a trough with a funnel at one end, and is made out of two sides and two ends by bending as shown. The funnel is made as described at the bottom of the illustration, which method is similar to the method described for a cone.

Figure 5 shows a boiler and dome which are cylindrical in shape; here it is necessary to get the shape of the cuts where the two parts intersect. This is obtained by dividing the circles in both cylinders into any number of parts that will give the required degree of accuracy (in the example shown, twelve), and by referring to the numbers in the various views and finding numbers in the other views for the large cylinder and letters for the small cylinder, the method of procedure used for developing can be followed with the help of the notes on the data sheet.

Fig. 6 is one of the most difficult examples shown; it is a frustum of a hexagonal pyramid tipped at an angle and true length lines which are absolutely necessary in development are located by a roundabout method. First draw

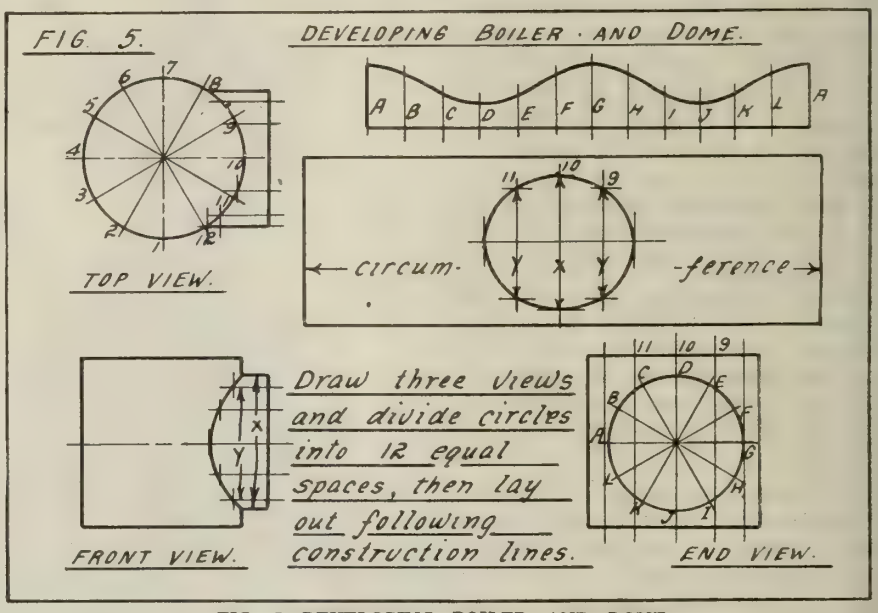


FIG. 5—DEVELOPING BOILER AND DOME.

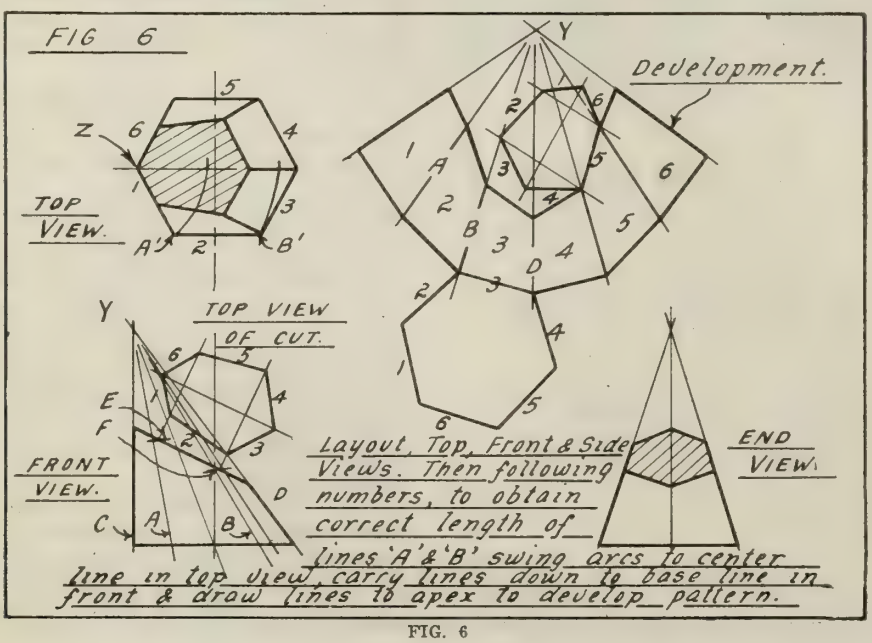


FIG. 6

the top, front end views, then obtain a correct view of the cut as explained under Fig. 3; now owing to the fact that only the lines C and D run perpendicular to the eye they are the only lines that can be transferred directly from the front view to the pattern being developed and for convenience we will lay off from the centre Y the line D in the development, and as the length of the base lines are shown in the top view and are all equal in length, we draw an arc from the lower point on this line equal to the length of one side; next, to obtain the length of the line B with one leg of the dividers at the centre Z swing an arc from the corner B^1 to the centre line, which is equivalent to turning the model round and bringing the line B to a position perpendicular to the eye. Now project down from where the arc intersects with the centre line to the base of the pyramid and from there draw a line to the centre Y. This line will be the true length, and measuring from the centre Y and transferring this to the

development, where an arc drawn with this radius intersects with the arc previously drawn is the point to which the line B is connected. To obtain line A, follow out this same method of procedure as indicated by the construction lines. The line C can be taken direct from the front view and transferred like the others while the length of the lines, where cut off, may be taken direct in the case of C and D, while the measurements for lines A and B are obtained by running short lines E and F over to the construction lines and measuring along the construction lines to the intersecting points.

In this description we have dealt with one half only, but it will be apparent that the other or back half, being directly behind the front will be like it, and is drawn in the same manner. The base of the pattern is the hexagon shown in the top view transferred to the position shown. Now, to get the view which represents the cut-off, we draw a horizontal line from the point where the line

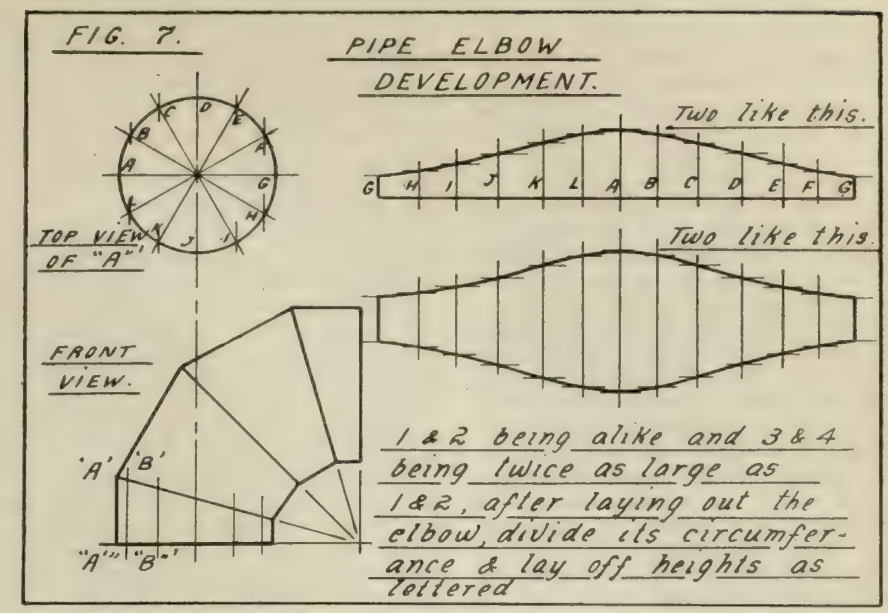


FIG. 7—PIPE ELBOW DEVELOPMENT.

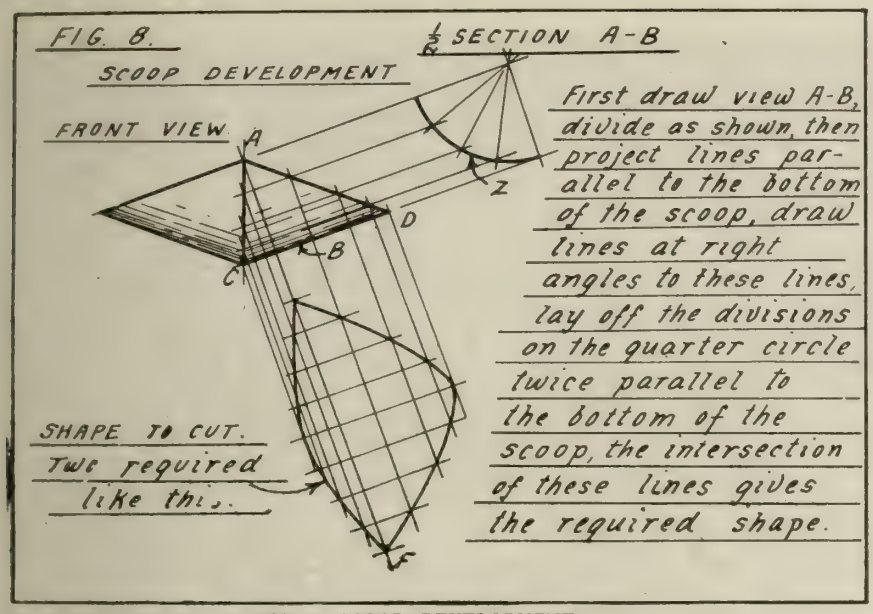


FIG. 8—SCOOP DEVELOPMENT.

of the hexagon intersects with the cut over to the true length line and measuring either the distance from the bottom up or the centre down on the line which corresponds to it on the pattern, and connecting the points thus obtained by straight lines we get the shape of the top. To cover the top it is therefore only necessary to transfer the view of the cut to the position shown at the top of the pattern.

An elbow made up of cylinders, cut so as to make an offset connection and the method used for laying out is shown by Fig. 7. First divide the circle or plan view into a number of parts equally spaced (twelve in this case) and from the points on the circle project down to the front view as shown, next lay off on a straight line twelve parts which correspond to the circumference of the circle, and starting with the centre line lay-off the heights A to A¹, B to B¹, etc.; these points we connect with a curved line, and as the lower piece is twice as large as the upper, laying this off on both sides of the line gives the shape of the lower piece. Two of each shape bent will make an elbow of the type shown, which is a common stove pipe elbow.

Figure 8 shows a scoop similar to those used on scales. First draw a front view of the scoop, then the quarter circle Z, which is a view taken at the line A to B; divide this quarter circle into four or more parts and project to line C-A as shown; now at right angles to line A-B draw lines to intersect with the lines just drawn on line C-A and A-D; next, on line A to F draw eight spaces equal to the spaces in the quarter circle measured on the arc, then draw lines parallel to the line C-D; where these lines intersect with the lines drawn from points on the lines A-C and A-D draw curves as shown, and by cutting two pieces of this shape we can make the scoop by soldering them together.

Figure 9 shows a method for develop-

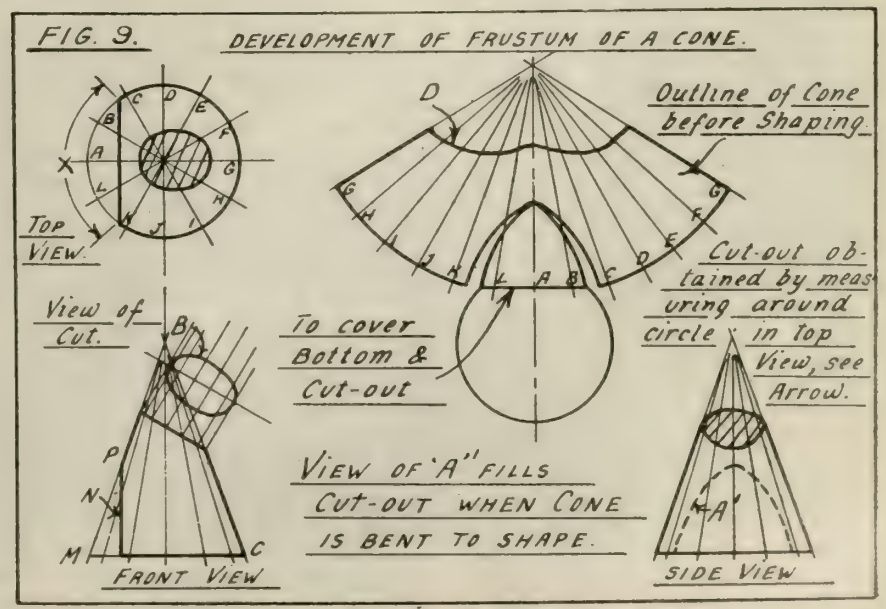


FIG. 9—DEVELOPMENT OF FRUSTUM OF A CONE.

ing a frustum of a cone; first draw three views of the cone, next divide the circle and project down to the base as described for Fig. 7, and from these points in the base draw lines to the apex; to get pattern, with compass set to radius B-C, draw an arc and lay off on this arc twelve spaces equal to the spaces in the circle; now, to get the shape of line D we follow the order of numbering in the various views and measure up from the base lines. As can be seen, we draw a straight line from where the point to be measured intersects with the cut to the outside lines, which are the only true length lines, all the others being lines which slope either towards or away from the eye, and for that reason are not seen in their true length. Now, to get the shape of the cut-out A^1, lay off the distance X on the arc of the pattern, half each side of the centre, and from the front view transfer M to N and M to P; these are connected with a curved line which marks the shape to cut and to cover this space when the frustum of the cone is bent to shape we transfer the dotted view in the side view to the pattern as shown. This makes 2 curved lines, one a little smaller than the other, and if there is any doubt about being able to cover the hole with less than is taken out, it is well to remember that the cut-out is measured on the arc, while the piece to cover it is the cordal measurement or a straight line between the two points on the arc. To cover the top we draw a plan view at right angles to the cut as in the previous examples.

In the next example, Fig. 10, we have a coal hod. First draw a view of the hod and a semi-circle with a radius equal to A to B, divide this semi-circle into six equal parts, project from these points to the centre line and from there to the apex C from where the lines last drawn intersect with the curved line representing the open end of the hod, project over to the outside line of the hod E and with one leg of the compass at the apex C draw the long arcs shown; next on the arc F lay off twelve spaces equal to what would be the circumference of the largest circle or the top of the hod; now from these points draw lines to the apex C; next where the arcs and the lines last drawn intersect draw a curve which is the shape of the top or curved line of the hod before bending. The base of the hod is a circle equal to the small diameter, although it is usually made with a flange on it.

Although these methods are somewhat laborious and require considerable care to lay out correctly, and oftentime the cut and try method fills the bill where the general outline is known, nevertheless they give an insight into development, and will be found valuable for laying out templates.

Whenever joints are to be made up by soldering, rolling the edges or other means, proper allowance must of course be made for this in the pattern or layout of the work, and various applications of the principles employed in laying out these parts will readily suggest themselves to the man up against it.

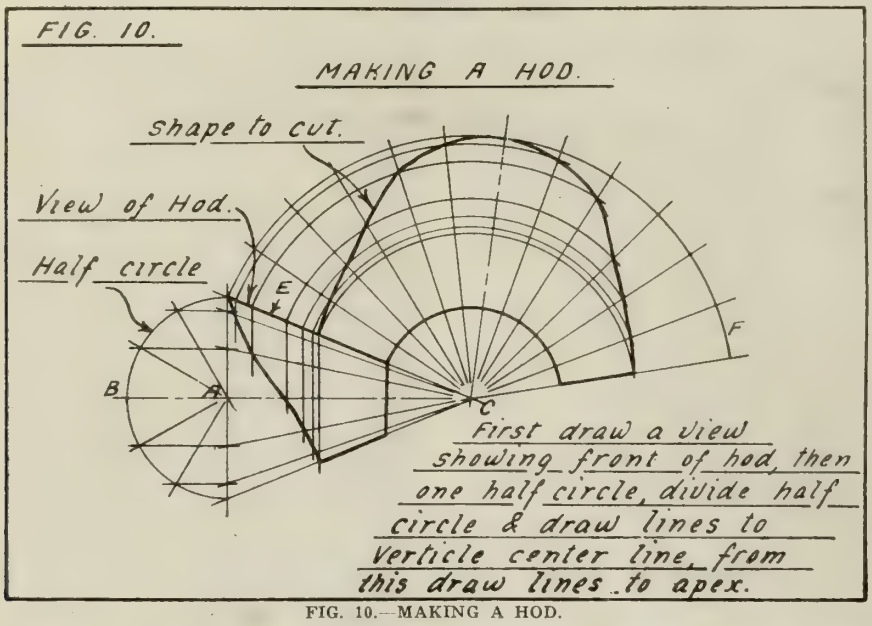


FIG. 10.—MAKING A HOD.

ADJUSTING WORK TO THE WORKMAN

In the days of "dilution" and substitution employers were given a number of workers whose only previous acquaintance with mechanical work had been gained at the desk, or in a shop of some kind, where goods were retailed. These conditions are likely to continue, and it is often very difficult to find a job for them, even under the supervision of a skilled worker. Some of the workers have sufficient common sense to really learn how to do a few things well, and on these particular jobs they earn very good wages when the payment is by piece-work, the really unskilled man in many cases having drawn more at the end of the week than the foreman, who is a highly skilled worker. Where the employer gets this type of workman, he can usually put him on to a similar job and the man will soon earn good wages; but whilst this class of worker will cause little trouble, more often than not the "dilutees" were men who knew better than their instructors, and for these it is difficult to find suitable posts, unless an employer has as many foremen as workmen, which is scarcely a tenable proposition. The only thing to do is to give them work on which they cannot go wrong, usually a very difficult matter, even when the work's equipment is mostly automatic machines, and as these men cannot use hand tools, the difficulty increases. Further, the cost of production is largely increased where inefficient workers are employed, and unless a drastic system of selection is adopted and this class of worker gradually discharged, failure must inevitably result. With trained men, it will be found that their previous employment may have been so different to what is required of them that new training is practically necessary, as, for instance, a man who has been employed in a pipe foundry and can mold pipes with the best workers, is of very little use doing light engineering castings in a jobbing foundry, and he is at a loss for some time, although he will soon make good if he likes, more particularly on the heavier parts of the work, but time must be allowed for the change. The same thing occurs throughout all kinds of work, and it follows that a little care in selecting the work for the men, regard being paid to their previous work, will help materially to solve the problem. A man who has been engaged in a locomotive shop on a big wheel lathe, is scarcely fitted to deal with small electrical work right away, but he may be a very good and efficient metal turner on heavy work. A little careful selection in placing workers on jobs for which they are best suited assists both employer and workman, because more work is got out of the machinery, and more money earned by the men, and at the same time this discrimination tends to promote a good general feeling.

There are sure to be some slackers in all large factories, but where the workpeople are sorted out according to their skill, and the foremen and charge hands get a share of the profits in the shape of production bonuses, these slackers gradually disappear, and it is wonderful what few defects the machinery develops, though repairs have still to be effected.

If an employer can increase his output from his existing machinery, without increasing the cost per article produced, the profits can be materially increased, and wages will increase automatically, and when this happens an employer can rest assured that his workpeople are being placed to the best advantage in regard to both work and wage earning, no matter which particular member of the executive or staff does the actual sorting out of the workmen.

It is very desirable that all applicants should be asked full details of the work they have been previously on and their length of service, and that their records should be kept up carefully week by week, until they finally leave the service of the employers with whom they are "dilutees."—M. M.

Gravity Carriers and Electrical Conveyors

Some Instances Where the Installing of Conveying Systems Resulted in a Considerable Saving in the Cost of Shop Transportation—The Gravity Conveyor is One of the Cheapest Forms of Conveyor to Operate

By F. C. PERKINS

A DECADE ago little was known of the tremendous possibilities back of the idea of utilizing a natural force such as gravity as a means of conveying merchandise from point to point in and about factory plants. To-day it is a recognized element in factory and warehouse economy, its development has been rapid, and scientific, practical men in all lines of manufacturing recognized its value the moment it was brought to their attention, recognized that its chief merits lay in economy of labor and time, the two great essentials in profitable manufacturing. The accompanying illustrations show some of the applications of the force of gravity for conveying materials and finished products about various manufacturing plants and yards.

As shown in photograph, Fig. 1, there is in operation at the mammoth building occupied by Morris, Kansas City, an open gravity 78-foot spiral chute running from seventh floor to the basement. This chute will carry merchandise of every description, and packages varying in weight from eight ounces up to and including several hundred pounds. The spiral passes down through the loading dock to the cars. It has a capacity of 150,000 lbs. of packed meats per day of 8 hours.

The details of construction of an 8 ft. section of gravity roll carrier developed at Merriam Park, St. Paul, Minn., may be noted in drawing, Fig. 2, while the photograph, Fig. 3, shows a carrier handling cement in sacks. The photograph, Fig. 4, indicates the method of handling shingles by the Palmer Lumber Co.

The illustrations, Figs. 5 and 6, indicate the use of a double roller lumber carrier handling cooperage stock at the works of St. Louis Cooperage Co., the form photograph showing a gravity car-

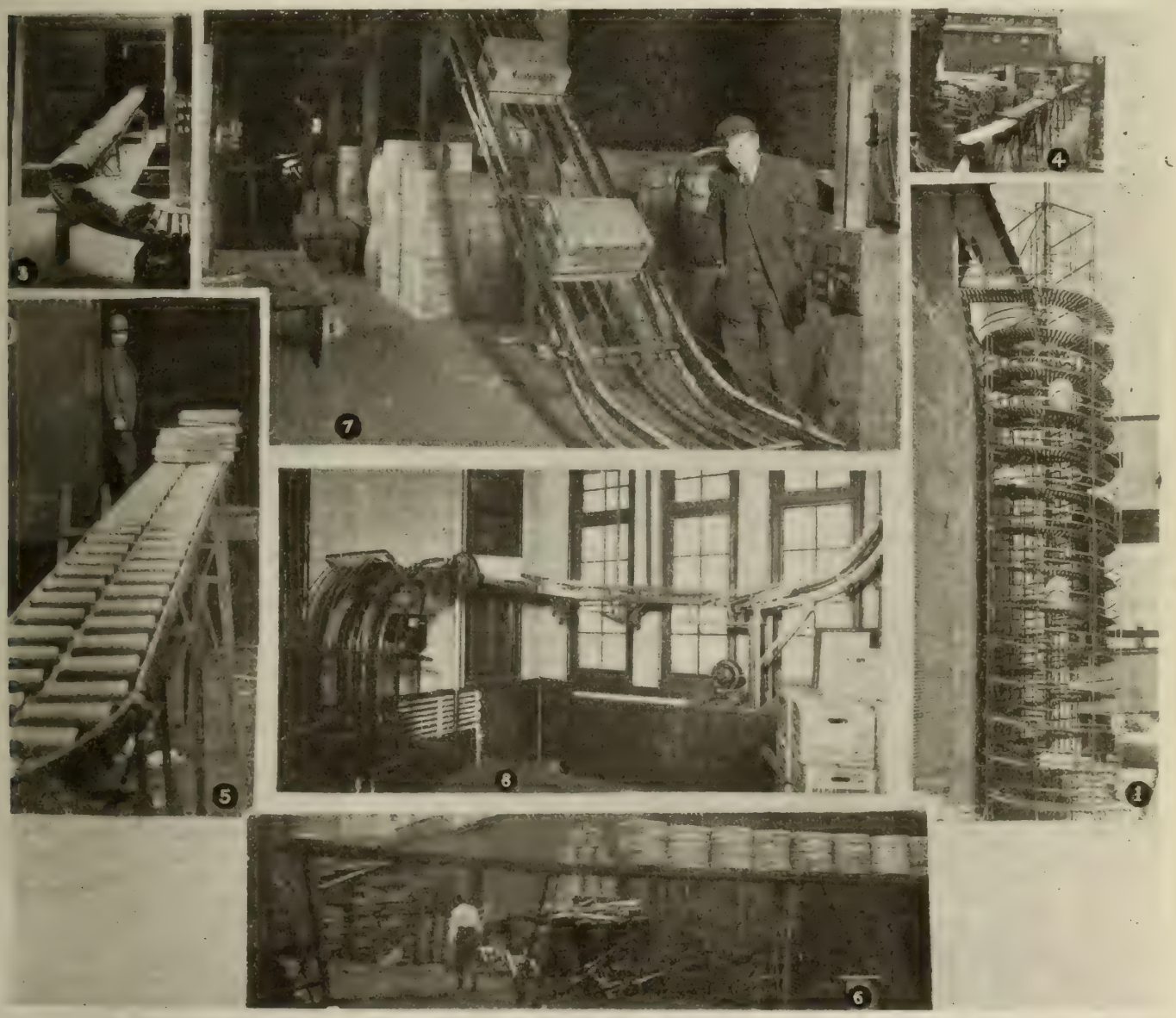


FIG. 1—78 FT. SPIRAL WHICH PASSES THROUGH LOADING DOCK ROOF TO CARS, CAPACITY 150,000 LBS. OF PACKED MEATS PER DAY OF EIGHT HOURS. FIG. 3.—GRAVITY CARRIER HANDLING BAGS OF CEMENT. FIG. 4—HANDLING SHINGLES BY GRAVITY CARRIER. FIG. 5.—LUMBER CARRIER 8 IN. CENTRE OUTSIDE RAIL, EXTENDING FROM DOOR TO PILE. FIG. 6.—DOUBLE ROLLER CARRIER HANDLING COOPERAGE STOCK AT THE PLANT OF THE ST. LOUIS COOPERAGE CO., ST. LOUIS, MISS. FIG. 7.—INCINED ELEVATOR ELEVATING BOXES TO OVERHEAD RUN. FIG. 8.—TOP OF SPECIAL ELEVATOR.

rier of 8 in. centre outside rail extending from the car door to the storage pile.

The handling of brick, cement blocks and tiling, by hand or wheelbarrows, is not only a slow and expensive method, but involves hard and tiring labor. By introducing the gravity brick carriers and automatic elevators a problem has been solved which has proven a boon to manufacturers, furnishing a device on which brick, cement blocks, tiling, and other merchandise will travel by their own weight any desired distance on a four per cent. grade.

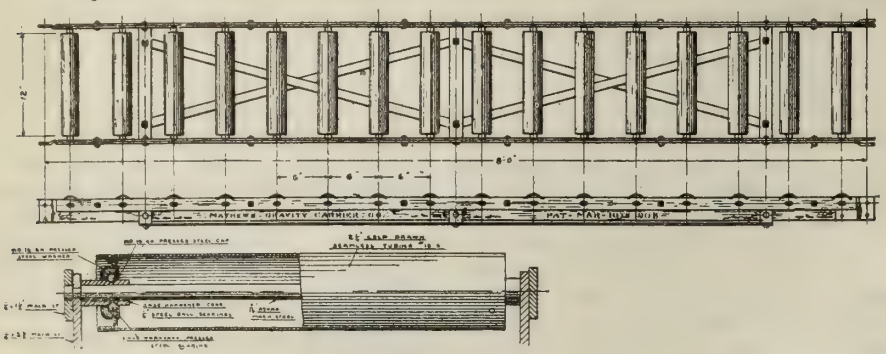


FIG. 2.—ROLLER DETAIL, GRAVITY CARRIER.

The many advantages of this equipment will at once become apparent to all, chief of which is the elimination of great labor expense. The gravity carrier does not cost a cent to operate, as its power is natural gravity. Two men, one at each end of the carrier system, will do the work of from four to six wheelers, and in considerable less time. Brick will travel around single or reverse curves the same as on straight carrier without danger of falling off, and delicate faced or fancy brick and tiling are conveyed just as quickly and safely as common brick. The carriers are made of solid steel in four and eight foot lengths, coupled together. The brick travelled over cold rolled seamless steel rollers, 2¼ in. in diameter, in widths varying from ten to sixteen inches. These rollers are ball bearings and flanged at each end to prevent brick from falling off.

In many cases an inclinable automatic elevator is used in conjunction with the gravity carrier as seen in illustrations, Figs. 7 and 8, at the plant of the Massachusetts Brewers Co. at Boston, Mass. The former shows an inclinable elevator ing boxes to an overhead run, while the latter illustration shows the top of a special elevator arranged so that the boxes continue on around the wall and up to another inclinable elevator.

INDUSTRIAL USE OF GAS MASKS

During the last year the Bureau of Mines, Department of Interior, Washington, has received many inquiries regarding the use of army gas masks in the industries for protection against poisonous and irritating gases. These inquiries show a general belief on the part of the public that this type of mask will protect the wearer under all conditions against any gas whatsoever, of the gas mask and have been taught even in absolutely irrespirable air to the exclusion of the more cumbersome mine rescue breathing apparatus. This erroneous belief will no doubt be further confirmed by millions of discharged soldiers who have been trained in the use that it gives them absolute protection against all gases used in warfare or likely to be used. These men will not realize that out in the open air of the battlefield the percentage of gas in the air can never be anywhere near as large as may occur in the confined spaces of a factory operation. A mask may afford complete protection under outdoor conditions, and break down at once when used indoors where a gas container has burst and filled the room with a greater concentration of gas. It must also be remembered that the absorbents in the army respirator, which filter out the poisonous gas are specially designed for the gases used in warfare, and as a matter of fact do not protect against the more common industrial gases as, for example, illuminating, natural, producer and blast furnace gas.

The army gas mask never should be used in mines because of the uncertainty there is of the kinds and amounts of gases in the atmosphere and liability of insufficient oxygen to support life.

In view of these limitations of the army gas mask, which, if not realized, will lead to serious acidents and fatalities, the Bureau of Mines is issuing this brief statement of the industrial use and limitations of the several dust respirators, gas masks, and oxygen breathing apparatus.

Dust Respirators

Protection from dust and liquid mists is obtained by the use of a simple dust respirator, which removes these particles by means of a filter of moist sponge, cotton, or wool pad, porous paper, or even a very fine mesh metallic gauze. The respirator may enclose the mouth and nose only, or it may be combined with a face mask containing eye pieces if the eyes also must be protected. The simple "pig snout" respirator, containing a moist sponge, has been on the market for years. It is highly uncomfortable to wear, rather insufficient for removing fine dust, and most workmen prefer to tie a large handkerchief over their nose and mouth. Some improvement has been made in recent years, but on the whole a really efficient and comfortable dust respirator that workmen will wear continuously is yet to be devised. On account of the urgent need of such a device for safeguarding the health of workmen in the mining and metallurgical industries, the Bureau of Mines has undertaken a study of dust respirators with a view to seeing that as satisfactory a model as possible is available to these industries.

Army Gas Mask

The army gas mask consists of a face piece of rubber and cloth fabric, containing eye pieces and connected by means of a flexible rubber tube to a canister containing charcoal and soda-lime for filtering out the poisonous gas from the inhaled air. The canister is supported in a knapsack slung from the neck.

The army gas mask is by no means the unusual protective appliance that it is popularly believed. It does not afford universal protection against all gases, nor can it ever be used safely in low oxygen atmospheres. It furnishes no oxygen to the wearer and can only remove comparatively small percentages of poisonous gas from inhaled air, usually less than 1 or 2 per cent. Higher percentages will immediately penetrate the canister and "gas" the wearer. The standard army gas mask will furnish protection against percentages not exceeding two per cent. of the following gases in air: Sulphur dioxide, hydrogen sulphide, chlorine, carbon bisulphide, nitrogen peroxide, aniline vapor, benzyl bromide, benzyl chloride, chloracetone, chlorpicrin, hydrogen chloride, phosgene, sulphur chlorides, xylyl bromide, stannic chloride, titanium tetrachloride, and silicon tetrachloride.

It will be seen from the above that the field of usefulness of the army mask is confined to certain of the chemical industries, around smelters and roasters, where sulphur fumes are given off and in the industries using chlorine and bleaching powder. The army canister also contains cotton filter pads, which remove irritating and poisonous dusts, which increases its usefulness around smelters where sulphur and arsenic fumes must be removed.

The army mask furnishes no protection whatever against carbon monoxide. This is the poisonous constituent of blast furnace, producer and illuminating gases, and of mine gases after fires and explosions in coal mines. Carbon monoxide is also likely to be present in ordinary fire-fighting conditions met by fire departments. Moreover, in all of these cases there is likely to be a deficiency of oxygen. Therefore, for adequate protection against these conditions the oxygen-breathing apparatus must be used, and reliance on the army mask may be fatal.

The Bureau of Mines is working on a carbon monoxide mask and hopes to develop one that may be used in the future for low concentrations of this gas, but such a mask is not now available.

Ammonia is another gas that will penetrate the standard army canister. However, a special chemical may be placed in the army canister which will

adapt it for use around refrigerating plants.

Oxygen-Breathing Apparatus

The self-contained oxygen-breathing apparatus can never be displaced by the gas mask for use in atmospheres deficient in oxygen. Such atmospheres are encountered in mine rescue work, in gas mains, blast furnace stoves, gasoline tanks, etc. Aside from the lack of oxygen, carbon monoxide is also present, for protection against which the army mask is useless.

The oxygen-breathing apparatus must also be used instead of the army gas mask wherever there are large quantities of irrespirable or poisonous gases, as for example, in entering a gasoline tank containing some residual liquid, or similar tanks, towers, and other closed spaces. The concentration of vapors produced by volatile liquids in closed containers is too high to be entirely removed by gas mask absorbents. The only recourse in such cases is a self-contained appliance in which the wearer does not breathe any of the irrespirable atmosphere.

Importance of Expert Advice on Protective Breathing Appliances

Owing to the many factors entering into the use of protective respiratory appliances the importance of competent advice on the selection and use of such appliances cannot be over-estimated. The fact that the army and navy used gas masks has been widely disseminated, and its significance is likely to be misunderstood, especially by men who have had some training in their use. It also should be made known that both the army and navy used the oxygen-breathing apparatus in its appropriate place.

In connection with the Bureau of Mines work of safeguarding the health of miners and workmen in the metallurgical industries, a general investigation of respirators, gas masks and breathing appliances is being undertaken at the Pittsburgh Experiment Station of the Bureau. This research will be conducted by experienced chemists and engineers who had charge of gas mask research in the Bureau's war gas investigations and subsequently in the Research Division of the Chemical Warfare Service, U.S.A.

The industrial respirator investigation will include:

(1) Advice on the suitability of the standard army gas mask for use in various industrial gases.

(2) Approval of industrial gas masks and respirators, when properly submitted to the Bureau by the manufacturer in accordance with a schedule to be announced later.

(3) Instruction of workmen at plants in the use of masks and respirators in a manner similar to that now being given by the Bureau in the use of oxygen-breathing apparatus.

WOOD FLOORS

Wood block floors for factory work were introduced into Great Britain some time ago, but for some reason they have not come so largely into use in engineering shops as was at one time anticipated. The first cost of wood block construction is higher than when certain other materials are used, but on the other hand maintenance cost is almost negligible by comparison by reason of its great durability. It makes many economies in plant operation possible, and after the war there is little doubt that creosoted wood block floors for heavy service will be the rule rather than the exception.

It has been pointed out that the resistance of wood block floors is astonishing. Careful study of the question has shown that under extremely heavy loads and stress of traffic the ends of the wood fibres form a surface that grows harder and more compact with use; the exceptions are when either the blocks have been loosely fitted or the interstices have been left or of large size, and filled with some material which has crumbled away. Where the blocks have been closely packed, hardly any wear is perceptible even in such places as machine tool shops, where the conditions are far from ideal for any kind of flooring. It is admitted that a wood block floor is the easiest to repair should repairs or replacements be necessary. It is firm and hard enough to offer small rolling resistance, yet it never becomes slippery nor loses its resiliency. It absorbs vibration, is a non-conductor of heat and cold, is comparatively noiseless, and does not originate dust, and is waterproof, decay proof, and vermin proof.

Engineers and steel workers will be interested to learn that wood block floors of the better kind resist high temperatures extraordinarily well, and char very slowly even when subjected directly to fire. As a matter of fact, what charring there is is mainly on the surface, and only after prolonged and excessive heating does the charring penetrate any distance into the flooring. When set on a concrete base a wood block floor is extremely difficult to burn. There have been instances in foundry operation of crucibles overturned and molten metal poured on the blocks, which afterwards showed but little damage. An instance is cited of a fire which completely destroyed a large structure in Philadelphia. The structural steel was twisted and warped, and after the wreckage was cleared away the creosoted wood floor was found to be practically undamaged except for a little surface charring. The blocks were taken up, scraped, cleaned, and relaid, and are still giving excellent satisfaction, a practical demonstration of their freedom from damage by fire.

It has been pointed out that a shop or factory floor with all these physical advantages must promote higher efficiency both as regards employees and mechanical equipment. Being free from both cold and dampness, noiseless and easily kept clean, the working conditions are improved. The absence of dust, and the distinctly antiseptic nature of the creosote preservative employed are real factors in securing better health amongst the workmen.

Tests have shown that, owing to the particularly resilient nature of its surface a wood block floor is comfortable to work on, and the employees are spared much of the fatigue attributable to floors composed of harder materials. This characteristic also helps to keep tools from being blunted or castings broken that may be allowed to fall. The absence of dust saves bearings and other delicate parts of expensive machines from injury. Truck labor is greatly reduced, and also the accident hazard is low with a floor that is unbroken, is even, and unpatched, and that never becomes slippery.

The absorption of vibration is another valuable point in favor of wood block floors as it enables greater accuracy to be obtained in the operation of precision tools. Again the use of such small units as wood blocks makes it a simple matter to take up any section of the floor to put down pipes, conduits, or rails, or the foundations of heavy machinery, and to relay it again quickly without any alteration of the floor level. Light machinery can be bolted down directly to the blocks by coach screws, perfect stability being ensured by the strength of the binding material employed. Long-leaf yellow pine has been selected for the better grades of wood block flooring for the reason that on the authority of the American Railway Engineering Association it exerts the greatest resistance to end compression because of the extreme density of its fibre and high proportion of "summerwood," in which short leaf pine is deficient.

Wood block floors must be all sound, square-edged, free from bark and loose or rotten knots, or any other defects detrimental to their strength or durability. The timber should be properly air-dried in order to ensure a rapid, thorough penetration of the wood cells in the creosoting process.

Mention may be made of the fact that a certain manufacturer of wood block floors originated the use of empty cell, specially treated block for floor construction, and the results obtained with these floors are said to bear witness that this is the proper method. Blocks so formed show a minimum of shrinkage when installed in a floor. The creosote used in this process is a pure dead oil, which is a distillate of coke oven tar, and is a product only obtainable by such distillation. It is entirely free from admixture of tar, tar oils, petroleum, or any other product, and in preparation sufficient pressure is used to secure complete penetration. This process in no way reduces the compressive strength of the wood, but it renders it proof against decay, and enables it to resist the action of any oils, acids, or alkalis that may come into contact with it.

It has been announced that E. W. Beatty, K.C., president of the C.P.R., has accepted the position of chancellor of Queen's University, in succession to the late Dr. Jas. Douglas, of New York. Mr. Beatty has the honor to be the third chancellor of Queen's since 1878.

The Rapid Production of Test Pieces

While Descriptive of the Making of Test Pieces From Shell, the Article is Applicable to Similar Work in Any Machine Shop—How Rejects Are Eliminated

By TYKE

DURING the past four years millions of shells have been made, and, as a natural sequence, the manufacture of these has led to writing of many articles, all written, no doubt, with an earnest desire to further the Allied

FIG. 1

FIG. 2

cause by making suggestions, describing a new tool or method of procedure, or relating an experience whereby a material increase had been made in production.

During this time, little, if anything, has been written about the less pretentious test piece, though these have played quite an important part, and had the peculiar distinction of having to be finished on time, otherwise there would have been a very serious delay and consequent trouble, owing to the fact that a whole series of shells would have been held up until the test pieces had been completed and proved.

Owing to this peculiar circumstance, many schemes had to be employed, some of which proved to be first-class, some not so good, whilst others were no good at all.

The whole situation became so serious at one time, that it practically became a manufacturing proposition on a small scale.

The object of this article is, therefore,

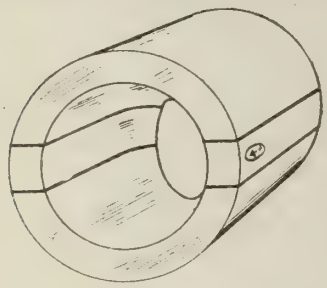


FIG. 3

not necessarily to tell how to make test pieces, so much as to show what can be done by careful thought and application plus good and thoughtful treatment to the help.

The six-inch test piece probably gave the most trouble on account of the large amount of metal to be removed, not to mention the cutting out, which gave any amount of trouble and was responsible for more than one broken shaper, and this is the one we will consider.

After leaving the regular cutting-off machine, the portion left from which the test piece had to be cut was, in the early stages, around 8 inches long, and had to be turned the full length, as shown by Fig. 1. The first one to be turned, in one large shop not a thousand miles from Toronto, took slightly over four and a half hours. The reason for this apparent slow time was twofold; first, the mechanic to whom the job had been allotted felt a certain amount of undue responsibility, and was most anxious not to spoil it, but rather to make a first-class job of it. Secondly, no one in charge appeared to know exactly how good (or bad) a finish was necessary, the consequence being the ends were finished with as great care and with as good and accurate a finish as the centre portion—which of course was the only part that had to be really accurate. Due to the large numbers required as time went along, it was seen that a large saving in time could be brought about by making a change to the jaws of the testing machines. This was done, and in all subsequent test pieces the ends were left approximately square, as shown by Fig. 2, and were now required to be only 5½ inches long. Two pieces were required from each shell, and these had to be cut out diametrically opposite as shown by Fig. 3, care being taken not to destroy the Government stamp, which had to appear on each test piece accepted.

Cutting these out gave the most trouble, and various methods were adopted with varying success. The planer, equipped with two parting tools, gave very satisfactory results for a long time, but the parting tools proved to be a costly item when added to the labor cost, to say nothing of the expensive piece of machinery tied up whilst being used for this work. A much cheaper method was finally adopted and one that gave exceedingly satisfactory results in spite of the energetic opposition that it met with in the early stages.

This latter method was the simple adaptation of the power hack saw after a very slight change had been made. In ordinary times these machines held one saw only, but, by making a special holder they carried two saws and cut the test piece out the proper width at one clamping, and in exactly twenty-five minutes. The shell was then turned around in the vise and the opposite side cut. The holder can be clearly seen in Fig. 4. This was made of machinery steel, and when the saw was not being used on test pieces it was taken off and the original holder replaced. These saws could easily dispose of from 18 to 20 shells each per day, and were amongst some four or five others that were attended to by one man, thus bringing the cost for operation down to something less than seven cents per machine per hour as compared to fifty or sixty cents for shaper or planer work, and not such a large output. The cost of the saws was not more than the cost of the parting tools, hence there was a very handsome saving from that source alone, in addition to which it relieved the other machines for more profitable work.

Since these pieces had to be cut from near the base end of the shell, it frequently happened that the end nearest the base was of a most irregular shape, due of course to the inside profile (see Fig. 3), and it was necessary, though not compulsory, to shape this end in order that the piece in question could

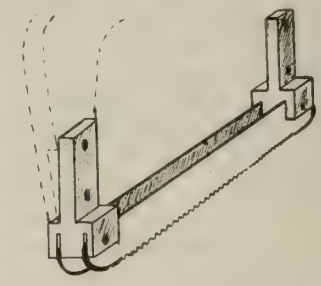


FIG. 4

more easily be handled in subsequent operations. This shaping was accomplished as shown by sketch Fig. 5, there being no great accuracy required beyond being careful not to bring them under size, which would have meant serious delay in getting another Government stamp on the remaining portion of the shell, and cutting another piece out of that.

After shaping, they were then centred on one end only, the other end being caught in the chuck of the lathe as shown by Fig. 6. The next operation was to run a parting tool to within one-eighth of an inch of the finished size, Fig. 7, roughing down to within a thirty-second, then finishing and putting the radius in the corners with the one tool as shown by Fig. 8.

Remarkable as it may seem, centering, parting, roughing and finishing to within a thousandth part of an inch or so could be accomplished in less than twenty minutes, and has been done in a few seconds over fourteen minutes. When it is understood that the rough size of the test piece is approximately 1¼ in. x 1¼ in., and has to be turned down to .564 in. plus .002 in. and minus .003 in. for a distance of 2.400 in., it will

be freely admitted by those familiar with lathe work that it is very rapid work, and day work at that. Some firms handled their test pieces on a piece-work basis, but I doubt very much if they got them any cheaper, if as cheap as those done under the writer's supervision.

At one time a wave of carelessness

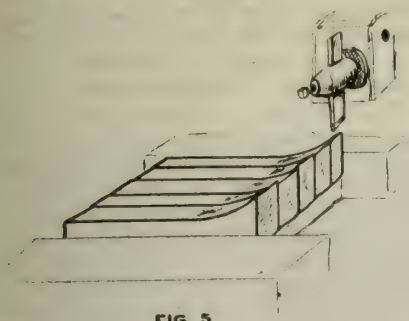


FIG. 5

swept over the shop, and in one week some four or five had been scrapped, for which no one would take the blame.

This state of affairs naturally led to careful investigation, and it was noticed that the mistakes were not the result of bak workmanship, neither were they the result of unsuitable tools or machines, but appeared to the writer to be the result of the job becoming more or less monotonous, and, such being the case, the time was ripe for some method of introducing a little incentive to do better and yet keep the goodwill of the men. Careful observation showed that in nearly every case the error in the turning was one of .025 in. or a thousandth or so over or under that figure, and very seldom one of, say .008 in. or .006 in. This led the writer to infer that it was the monotony of the job that was beginning to tell its story on a set of real good men—none better.

Others had it that it was just carelessness and nothing else. Whatever the cause, the remedy was exceedingly simple, and was, so the writer was informed recently, welcomed by most of the men, for the very good reason that it reduced the chances to a minimum of

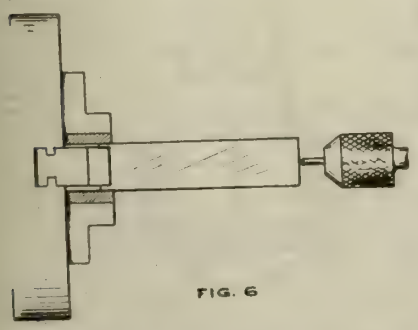


FIG. 6

any man being wrongly accused of making scrap.

It was stated that the error was in the neighborhood of .025 in., and this means that the micrometers had either been set wrongly in the first place, or else the thimble had moved, which is quite possible, but not very probable that it would move exactly one complete revolution. In any case, the remedy was absolutely instantaneous, and since it was religiously kept up, the number of spoilt test pieces was, for many months, less than a half of one per cent. Fig. 9 shows clearly the remedy used, nothing more than a simple form of snap gauge, which was tried on every test piece before taking them from the lathe in which they were turned. This gauging was done in full view of the lathe hand, and it was therefore clearly seen by him that it was for his good as well as for the good of the cause in general.

As time went along, and as there were several apprentices in the shop, it was thought that this job could be handled by some of them to perfection, thus giving them a good start on simple turning, yet turning of a class that called for speed and a reasonable amount of accuracy. At first this looked as if it was going to turn out a failure, but by kindly encouraging the boys, and giving careful attention to the proper grinding of their tools, they were soon made to grasp the spirit of the thing, and in every case they were able to turn out test pieces as good as, and almost as quickly as the most experienced mechanic. Further, it

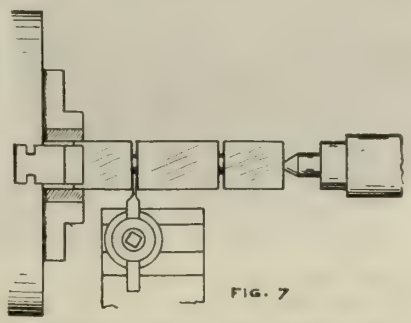


FIG. 7

was noticed that the number of scrap made by the boys was, after the first week or so, considerably less than that of the men, due, no doubt to their enthusiasm and their keenness to make good in their new capacity. It was carefully noticed that any scrap made by the men was in almost every case due to the aforementioned cause, micrometers wrongly set, and seldom due to bad workmanship. It will be readily seen that a large amount of monotony existed in this work for a good mechanic, nevertheless a great number were called upon to do it, and stuck to it like real men, for months at a time.

Before winding up this article it will be interesting to note that the record in this particular shop for a man was thirty-five tensile test pieces and five compressions in twelve hours. The compression test pieces, being ½ in. diameter and ½ in. long, parted to within 1-16 in. It will be seen that this averaged slightly over three an hour, or a little under twenty minutes apiece, which is a mighty good day's work. The record for a boy 18 years of age, was 20 tensile test pieces, all correct and well finished in twelve hours.

Whilst there is, perhaps, nothing new in this article, if the few figures help any apprentices to further effort, it will have done its part.

THE BRITISH ELECTRIC VEHICLE BOOM

Active preparations are being made in Great Britain for the production of every type of electric battery vehicle. Various firms which had been manufacturing in a small way before the war are extend-

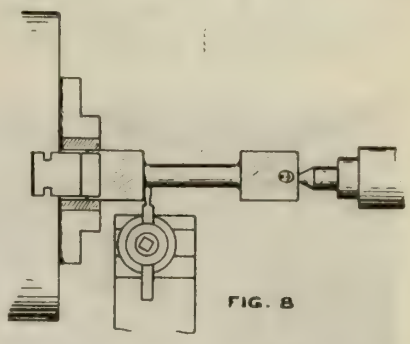


FIG. 8

ing their factories, and, it is now realized that battery propulsion has a field of its own, notably in refuse disposal and other municipal services, in general delivery work through city streets, and in factory transport by means of small trucks. The British motor manufacturers are holding a meeting at which the whole field will be carefully reviewed, so that one may expect to find famous names in the motor world associated with electric as well as petrol and other vehicles. Moreover, arrangements are being made for co-operation with British electrical manufacturers in the production of motors and control gear suitable for electric vehicles. The British electrical manufacturers are so well organized that they will be able without difficulty to select the firms best fitted for the economical manufacture of the electrical parts. The selected firms will concentrate in the work so as to get the benefit of mass production. The British battery makers have also by amalgamation and other developments, put themselves in a position to turn out ample supplies of traction batteries. A great

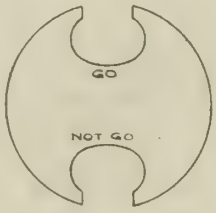


FIG. 9

increase in output will be required to meet the demand of the home market, but the arrangements now in contemplation will provide a large surplus for export to all parts of the world. The development of battery traction in Great Britain has been undertaken by an electric vehicle committee on which representatives of electric supply undertakings, motor vehicle and electrical manufacturers and various motor associations work together for progress.

MODERN PICKLING MACHINES

By P. E. R.

THE accompanying illustrations, Figs. 1 and 2, and drawing Fig. 3, show the design and construction and method of operation of the improved pickling machines developed at the Mesta Machine Works at Pittsburgh, Pa. These pickling machines are in sheet and tinplate manufacture as well as metal products, and are successfully pickling castings, wire coils, strip steel and pipe stampings, small forgings, cartridge cases, gun parts, and various other products of iron, steel, brass and copper.

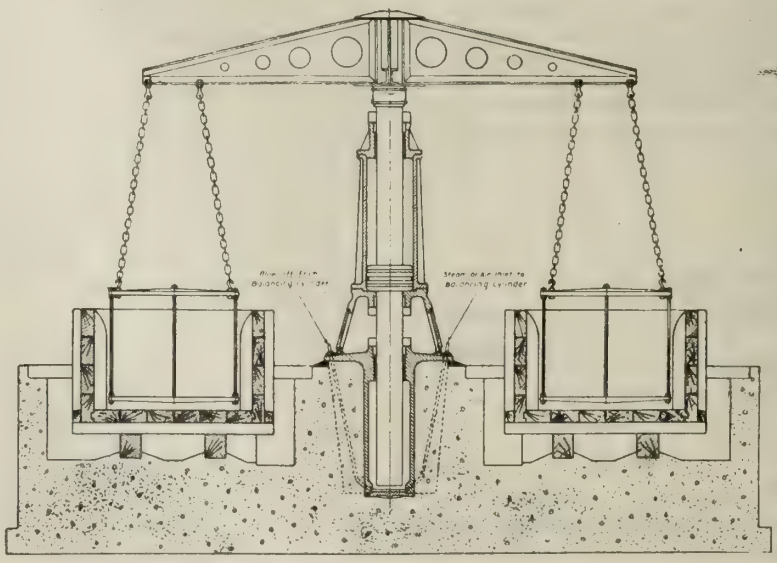
Pickling means the removal of scale and other substances from the surface of metals by the chemical action of acid If the material to be cleaned is simply soaked in the acid an excessive amount of metal may be dissolved, with a consequent waste of acid. The cleaning is both uncertain and uneven because the acid forms in layers of varying densities, and the scale is of varying thickness. Uniform action of the acid on all surfaces is best obtained by thorough agitation and by shifting the material during the pickling, thus exposing all surfaces to the action of the acid and preventing spotting. Furthermore, if the acid washes over the surface of the metal, it has, in conjunction with the loosened particles, a scouring action which not only gives thorough cleaning, but reduces acid consumption. The acid-soaked material should be exposed to the air as short a time as possible in order to avoid the detrimental effects due to air exposure. It has been found that the above results can be properly accomplished only with the aid of machinery.

This machine brings mechanical action into play to such an extent that the material is pickled with much less labor and acid consumption than required by any other method. In operation the machine moves the material through the acid at a predetermined velocity, ending each down stroke with a slight rebound. This action, due to the sudden admission of steam to the cylinder, tends to shake off the loosened particles and separates and shifts the material being pickled so as to allow the free circulation of acid on all surfaces. In pickling sheets this feature is of extreme importance for the reason that by no other practical method can the sheets be properly separated. It has been demonstrated that sheet and tin plate plants are able to materially reduce their inspection departments after the installation of pickling machines, owing to the great reduction in the number of defective sheets produced.

It is claimed that by this method of agitating the acid and material, and by simultaneously performing the operations of pickling and washing, while loading and unloading are taking place, together with the method of changing from acid to washing vat, a more thoroughly and uniformly pickled product is obtained at a lower cost than by any other method. As has been shown in a large number of cases, by the use of this pickling machine, the saving effected in acid consumption. labor cost, waste product, etc., is very great, to pay for the installation within a very short time.

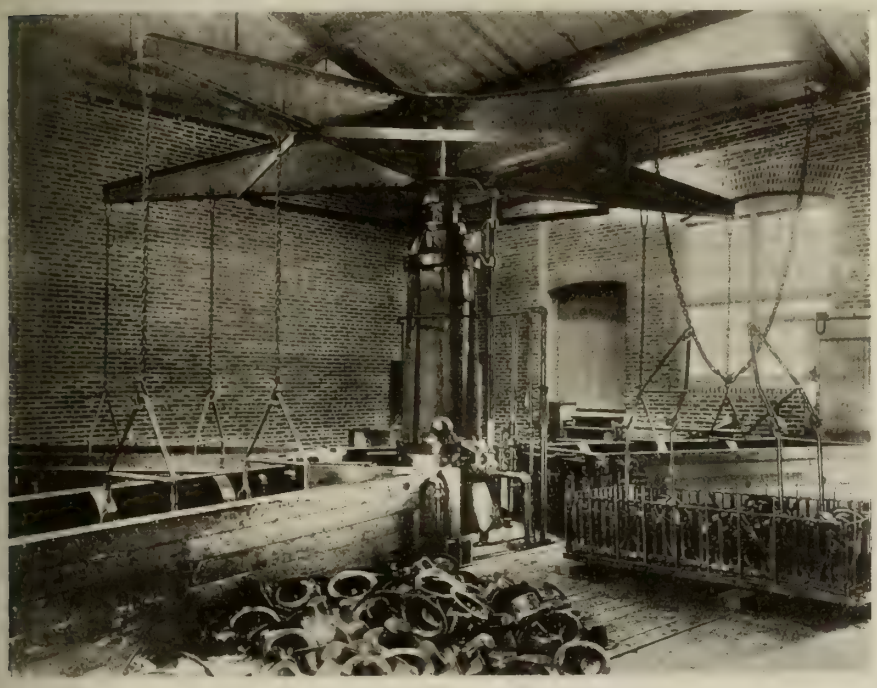
The machine is simple in construction, has few working parts, and does not require skilled operators. A central plunger, operated by steam, carries a number of horizontal arms, from which are suspended acid-proof crates. These crates are varied in size and design to suit the amount, size and character of the material to be pickled, while the number of arms is governed by the number of baths required. During the pickling process the machine is entirely automatic in its action and requires attention only while the crates are being transferred from one vat to another. This is accomplished by depressing a single lever which admits steam to the cylinder and raises the crates from the vats. No crane service is necessary, and the only labor required is that needed to load and unload the crates.

It may be mentioned that the machine takes steam on part of the up stroke only, the remainder of the stroke being accomplished under the combined influence of expansion and inertia, while the down stroke is effected entirely by gravity. The exhaust from the machine, after it has passed through an oil separator, can be used for heating the acid. In places where greatest fuel economy is desired, steam consumption can be reduced by filling the interior of the piston rod and a cylinder located in the bottom of the base with compressed air. Most of the dead weight of the moving parts can thus be balanced, so that a smaller quantity of steam is required for lifting the load in the crates. The machine per-



mits the use of two pickling baths without an increase in labor above that required with one bath. The two-bath system is very economical in acid consumption because the acid from the strong bath, adhering to the material, provides for the strength of the weak bath. Except when employed with this pickling machine, the two-bath system meets with the objection that it increases labor cost.

It is held that much of the disagreeableness of pickling is eliminated by the use of this pickling machine. The operators are not required to work over or near the acid which, consequently, can be kept at a high temperature. As the bats are located compactly around the machine, hoods may be used for the removal of fumes and the machines located in the most convenient position in respect to the flow of material through the plant.



EMPLOYEES RECEIVE EXTRA COMPENSATION

The H. W. Johns-Manville Company Distributes 20 Per Cent. Bonus on Salaries

Many progressive business organizations have adopted one or another form of profit-sharing plan for employees. Few, however, have shown so great liberality in this respect as the H. W. Johns-Manville Company, miners and manufacturers of asbestos and allied products, who will distribute to all salaried employees—men and women—from heads of branches and departments to office boys, who have been in continuous service for the full calendar year, nineteen eighteen, an extra compensation of 20 per cent. on the salaries paid them during 1918.

It has been the custom of the H. W. Johns-Manville Company for some years past to recognize the faithful service of their big business family in this substantial way.

During the past two years especially the members of this organization, in common with many others, have been working under an exceptional strain owing to the depletion of their ranks through enlistment and the high pressure of war production.

In appreciation of this fact, the H. W. Johns-Manville Company has at the end of each war-year, 1917 and 1918, set the mark even higher than before—a full 20 per cent. of the year's salary.

This extra compensation for 1918 will cost the company approximately $1,000,000.

THE ALLIES' DEBT TO THE BRITISH NAVY

In an article entitled, "A Tribute to the British Navy," the "Temps" writes:

"Paris will hold a fete day to-morrow in honor of the Sovereign of Great Britain, George V, and, in his person, the British nation, whose services to the Allied cause have been one of the principal factors of victory in the war which has just been concluded. By the very force of circumstances a very clear distinction of work was established between the different countries which were fighting the Central Empires. All took their part in the general action, but France was chiefly responsible on the land fronts, while Great Britain, the mistress of the seas, had to preserve and strengthen her claim to this title while her fleet guaranteed the freedom of the ocean for the Allies, and, at the same time, kept up the blockade against Germany.

"Great Britain has splendidly fulfilled her task. From the beginning of hostilities she had to purge the seas of all the small German cruisers, those terrible destroyers of merchant ships, and in a short time these pirates, which had sent to the bottom nearly 300,000 tons of shipping, disappeared from the seas. Some had been sunk and others interned, and now the distant ocean became free again, thanks to the British naval forces."

After recalling the naval engagements in which the British fleet so clearly demonstrated its superiority that the Germans realized that they could no longer run the risk of emerging from harbor as long as the British high seas fleet was on the watch for them, the "Temps" adds:

"The struggle which the British navy had to wage against the German submarines was a terrible one, but it terminated victoriously," and continues: "All the Allies have contributed to this victory, but the part played by the British navy should be specially noted. The British merchant ships have transhipped two-thirds of the American troops to Europe, and British battleships have guarded these transport ships. At the same time Great Britain placed an immense minefield between Scotland and Norway to close the submarine route to the north of the British Isles. It also made a direct attack upon the submarine bases at Zeebrugge and Ostend, and was successful in closing them. The British navy has prepared and facilitated the final victory. The applause which King George V. will receive tomorrow will testify to our gratitude to the British fleet for all the services it has rendered."

FREQUENCY OF CLEANING

The frequency with which boilers must be opened up and cleaned internally varies greatly, and depends upon the conditions that prevail in the plant. Hence no very definite recommendations can be made on this point, which could be followed generally. It is often necessary to open the boilers and clean them every week, when the water is bad and the boilers are pushed to the limit of their economical capacity; whereas in other cases it may be sufficient to clean them once a month, or even as infrequently as once in two or three months, if the water is particularly good. The man in charge of the boilers will be able to judge on these points if he is skilled at his work, and the boiler inspector will also be able to give useful advice, because he is familiar with the conditions that prevail at the plant, and he also knows what experience has shown to be good practice in other plants using similar water. Cleaning should be done oftener in dry seasons than in wet ones, because when there is but little rainfall the feed water is likely to be more nearly saturated with solid matter, and a given quantity of water will therefore deposit more scale and sediment at such times.

Cleaning should also be more frequent than usual immediately after a dry season, and likewise when there have been copious rains, or the winter snows have melted and swollen the streams and springs.

WELDING AND CUTTING

The Development of Oxy-Acetylene Welding

Some Interesting Facts Presented Before the Institution of Mechanical Engineers by the Author—Historical Development and Data Regarding Present-Day Applications

By HENRY CAVE, Hartford, Conn.

THOUGH the United States has the honor of having started the commercial use of acetylene through the discovery of Thos. Willson at Spey, South Carolina, of the method of making calcium carbide with the electric furnace and the possibilities of generating acetylene therefrom, and has made rapid strides in its use for lighting purposes, it was backward at the inception of the use of acetylene in conjunction with oxygen for welding and cutting. In Europe, the use of hydrogen in this latter respect was a forerunner of the use of acetylene, but its use for these purposes did not reach America until even later than acetylene, except for the fusion of rare metals

The earliest record of the oxy-acetylene torch in America was the receipt of one in 1903 by Eugene Bournonville, a Belgian engineer, residing in the United States, from his friend Edmond Fouche. This torch was used to a slight extent, operating with medicinal oxygen as no other supply was available at that time. The first commercial development was probably the formation in 1905 of the Industrial Oxygen Company to exploit the Joubert equipment of the Societe L'Oxilite Company. Andre Beltzer, a French chemist, went to the States to introduce the process, and a demonstration plant was established at the Fore River Shipbuilding Company, Quincy, Mass. The torch sold by this company was of the injector type, having changeable outer and inner tips so as to vary the flame. A submerging tray type of acetylene generator was used, and oxygen was produced by the so-called "Epurite" process, which employed, using warm water, the combination of a calcium compound with copper sulphate and sulphate of iron. The extensive introduction of this equipment was prevented by the high price charged, which was about $2,000.00 for equipment.

An Englishman, Cecil Lightfoot, in the meanwhile established at Buffalo, New York, a plant for the production of oxygen from liquid air by the "Linde" process, and, at the same time, purchased the Fouche patents and introduced that torch into the States. Use was made of low-pressure lighting generators as a source of supply of acetylene, as such generators had been produced in the States for years, and had been developed to a high state of efficiency.

Augustine Davis, who had been, from the inception, a fertile inventor in the field of acetylene lighting equipment, as well as an extensive manufacturer of this apparatus, visited Europe in 1906, as a delegate to the Acetylene Congress from the International Acetylene Association of America. Learning of a new use to which acetylene was being put, he investigated the matter and became interested. He learnd that Eugene Bournonville was in Paris, similarly interested, and, upon meeting him, he arranged for a conference in New York, resulting in the formation of a company to exploit the Oxy-Acetylene process.

Davis and Bournonville visited Europe again and made a careful study of the status of the industry and of the various equipments in use, and made arrangements with Rodriques et Cie., to exploit the patents of their medium-pressure (French rating) torch in the United States, having determined that this torch was the most promising of the various developments that had taken place abroad. When Mr. Davis returned from France he brought an expert French workman with him, one skilled in the art of welding and cutting. The cutting equipment at that time merely consisted of a piece of tube with a screw needle-valve clamped to the side of the welding torch. This required a separate hose, regulator and tank of oxygen, and was very inefficient as compared with the wonderful results that are being obtained at this time.

In Europe the use of dissolved acetylene had advanced further than in the United States, probably due to the higher development of the automobile industry there at that time, and the fact that the shorter distances made the general distribution of tanks a much easier problem than in that vast country. Mr Davis, learning that he would be handicapped in the development of the process by being dependent upon dissolved acetylene, proceeded to design a pressure generator, which would provide gas compressed as required by the medium-pressure type of torch, but not exceeding 15 lb. per square inch. This pressure had been found to be safe—acetylene never having been known to dissociate at pressures less than about 25 lb. under any conditions. The development of the industry in the States was greatly assisted by the purity of the carbide produced by a large concern at Niagara Falls, making it unnecessary to use any purifying means, either from the point of view of safety or the effect the purity might have on the welds.

Oxygen was, at that time, a considerable cause for anxiety to most of those engaged in the infant industry, as the only really reliable source of supply was that of a company selling a competitive equipment and, therefore, not likely to give the best service to other than users of their own equipment, which service was very precarious, owing to the scarcity of cylinders in which the oxygen had to be shipped long distances from the one charging plant in this country. The price of oxygen was high, making the process prohibitive for a large amount of work which otherwise could have been very successfully carried out.

About this time Bournonville developed a satisfactory small plant, enabling individual users to produce oxygen from chlorate of potash, and supplied a compressor with the equipment to store the gas, first at 250 lb. per square inch, and later at 300 lb. Manganese dioxide was used as a catalyser so as to generate the gas at a low temperature. Other equipment manufacturers developed similar plants in which the heat was produced by internal combustion, carbon being mixed with the potash. These developments relieved the situation to a considerable extent. Oxygen-supply compan-

ies now started up spasmodically, but were short lived. This was mainly due to the shortage of cylinders and their high cost, as, not being produced in the country, cylinders had to be imported from Europe.

Financial interests connected with a large calcium carbide company took over the Buffalo oxygen plant, separating the apparatus business from the sale of oxygen and adopting a broad policy of supplying all users on an equitable basis. They immediately started to build additional plants in various part of the country, established warehouses, and purchased cylinders in large numbers. This gave a tremendous impetus to the development of the industry, both advantageously and otherwise, for not only did it help the concerns that were striving to develop the business on a sound basis, but it brought into the field a large amount of cheap apparatus that was sold to users without any instruction. A great deal of this apparatus came into the possession of irresponsible parties, who charged exorbitant prices for extremely unsatisfactory work. This gave the process a bad name and retarded its development to such an extent that even to-day its effects are felt in the States.

The dissolved acetylene business was also laboring under a handicap. The owners of the patents had developed a business in connection with railroads and other commercial interests, and had licensed another concern to supply gas for the automobile industry in tanks of limited size. These tanks were not suited to welding purposes, and prices were prohibitive. The parent company refused to supply dissolved acetylene for welding and cutting except where the cylinders were purchased outright; and, as the charge for a cylinder of 225 cubic feet capacity was at that time $150.00, very few of them were sold. Such short-sightedness eventually had its own reward by producing competition even in the face of the patents, the competitors being more generous in supplying the gas without the owning of the cylinders, thus adding an additional impetus to the development of the industry and also unfortunately to the scattering broadcast of cheap welding outfits.

As has been noted, up to 1909 the use of hydrogen had not developed in the States except for a few special uses, as the expensive method of generating the hydrogen by the zinc and acid method was used. In this year, however, the American Oxy-Hydric Company installed electrolytic cells in Milwaukee, Wisconsin, and started to introduce the Oxy-Hydric process, taking over the Jottrand patents of the Belgian Company, of a somewhat similar name, which had made remarkable development. This company was not a financial success, however, for a number of causes, the chief of which was probably the fact that cutting of steel had not been developed to any extent in the States at that time, and, as is well known, welding by means of hydrogen does not compare favorably with the use of acetylene, except on extremely thin metal, for which there was very little scope in this country. The high price of labor made prohibitive all hand work in connection with the manufacture of the numerous small articles which were being welded abroad by this process. The company was then taken over by the same interests that absorbed the other oxygen company. More recently, however, other large companies have come into the field and established oxygen plants of both the electrolytic and liquid air process in different parts of the country.

During the last five years the electrolytic process of manufacturing oxygen has been given a great deal of attention, with the result that several concerns have manufactured and sold a considerable number of plants, which have proved very reliable when operated properly, both as to the purity of the gas produced and the safety of the process. These equipments have been very largely used for production of hydrogen for the hydrogenation, or hardening, of oils, as there is a considerable scope for the process among the big packers of the States. Of course, oxygen in large quantities is produced as a by-product.

For several years the processes of both welding and cutting were carried out entirely by hand. The American Oxy-Hydric Company, however, introduced some machine-cutting devices, such as were used by their parent company in France and Germany. These equipments, however, were mainly hand-driven, and, therefore were not a great improvement over the free-hand method, neither did they meet with a ready sale.

About 1909 Thomas A. Edison introduced from abroad some special machines to weld automatically the seams of the containers used in his storage batteries, these probably being the first machines to be used in this country for actual commercial work. The development of machines of this nature seems to have been neglected entirely in the United States except by the Davis-Bournonville Company and a few concerns who have made devices for special purposes for their own use.

The Davis-Bournonville Company has expended large sums of money in developing machines of a veriety of types for both welding and cutting; in a general way using an electric motor for their operation, but in a few cases being driven by hand-operated mechanisms. The illustrations show several types of these machines. Fig. 1, Plate 1, represents what is probably the most remarkable development of metal-working of the century, the "Oxygraph." This is a cutting machine made on the pantograph principle, being arranged so that the cutting torch can be guided accurately and travel at a uniform speed, so as to cut a shape out of steel, as represented on a drawing, which is carefully followed by means of a tractor-wheel, steered along the lines of the drawing, as a bicycle around a track; the tractor-wheel is driven by a small electric motor, controlled by a governor, which gives an absolutely uniform traverse of the torch, and at the same time variable speeds at the will of the operator. It is a comparatively easy matter, on the majority of shapes that would be required to be cut, to steer the tractor-wheel around the lines with an accuracy of 1-32 of an inch, and as, in one type of this machine, the cutting is carried out with a reduction of two to one from the traverse wheel, any error is reduced by half. It can be seen, therefore, that very accurate work can be produced. Designs can be cut with this accuracy and with any irregularity of shape at the rate of from 6 to 10 inches per minute in steel up to 2 inches in thickness, and at a lesser rate for thicker metal. The smoothness of the cut compares very favorably with the regular machine-shop roughing machine tools. It will be seen that a tremendous saving can be made in cutting dies and many other regular or irregular pieces, which by the ordinary machine-shop method prove extremely tedious to produce, and take up the time of skilled workmen who could be far better applied on other work.

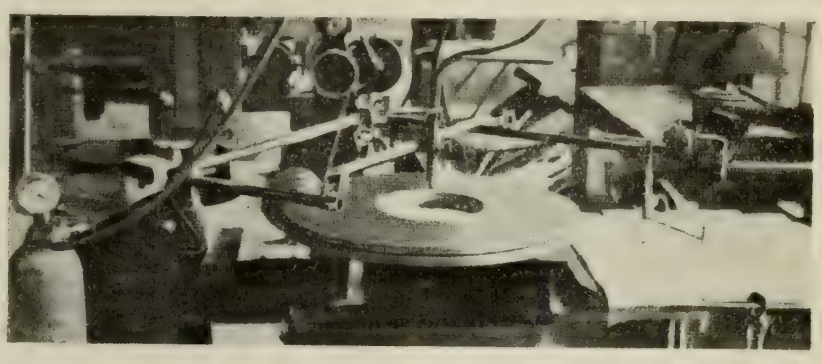


FIG. 1—THE OXYGRAPH

(To be continued)

Gurney Foundry Dinner.—The annual dinner of the employees of the Gurney Foundry Company, Toronto, was held in the lunch room of the plant on West King Street. The chair was occupied by William Gibson, general manager. Speeches were delivered by G. Gurney and E. H. Gurney. They reviewed the year's business and the latter also spoke on co-operation. The entertainer of the evening was Jules Brazil. Seventy-five covers were laid.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

STAMP HOLDERS MADE IN A SHOP

By Tyke

To use an Irishism, there are always more ways than one of killing a pig besides hanging him, and the same applies to the mechanical field, more probably, than to any other line of industry. Whilst one way of doing a certain job may look like the acme of perfection in one shop, the same job

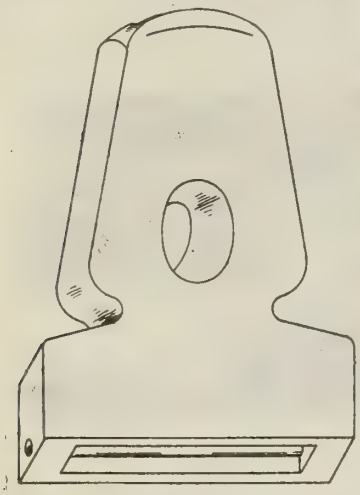


FIG. 1

may, and probably will be handled in quite a different manner in another shop, and with as good as, if not better results. Occasionally one sees "the other" shop doing the same job in a "left-handed" manner as it were, and for this very reason, it is always a profitable half hour that is spent in perusing a good mechanical publication, as the exchange of ideas often leads to a different method of procedure, and helps to reduce costs, increase production or the quality, at no greater cost. Hence this article.

Some months ago an order came along for a dozen steel stamp holders, as shown by Fig. 1. Like most other things mechanical that were ordered six or eight months ago, they were wanted P. D. Q. Of course they had to be as good a job as was consistent with requirements, and the cost had to be within reason. Upon referring to the sketches, it will be seen that but two points had to be really accurate, namely, the pocket for the stamps and the hole for the stamp retaining pin. The pocket had to have a perfectly flat seat for the stamps, and the corners had to be square. The hole for the retaining pin was 5-16 in. diameter, and was a full hole for a distance of ¾ in. at each end, but only half a hole between the ends, and this at first sight looked as if it would cause trouble. It was, however, easily and satisfactorily overcome as will be explained in due course.

The overall dimensions of the holder were 6 in. x 5 in. x 2¼ in., and a good piece of forged steel measuring 5 in. x 2¼ in. and some eight or ten feet long was located, and from this bar twelve pieces were sawn, each a little over 6 ins. long. A template was then made to conform to the shape of the holder, and the pieces were heated and cut as shown at A, Fig. 2. After roughing them out in this manner, they were re-heated, and the hole for the handle punched out, as seen at B, Fig. 2. They were then shaped to size; and the slot S. Fig. 3, was milled ¾ in. wide and 1 in. deep, the full length of the piece, the ends chamfered as shown, and a piece of cold rolled steel of the proper dimensions was welded in at each end, leaving the stamp pocket with perfectly square corners and a flat seating for the stamps. The length of this pocket was accurately maintained by inserting a piece of cold rolled steel of the proper length during the time the ends were being welded in.

After welding, the ends were dressed and marked off for the hole to be drilled. This was accomplished by inserting a piece of cold rolled steel and clamping it in position until the hole had been drilled. It will be seen that the solid

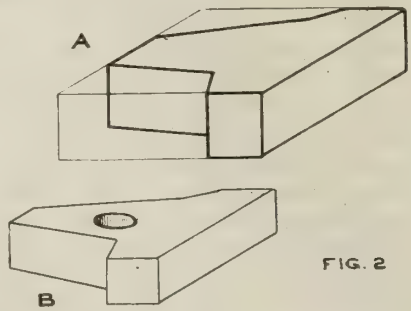


FIG. 2

ends acted as a drilling jig, and the loose piece in the pocket prevented the drill from finding the path of least resistance and spoiling the job. After drilling one holder, this loose piece was taken out and used on three more occasions, or until the four sides had been cut away; thus three pieces were required in order to drill the twelve holders. After drilling they were all touched up a little and given a coat of black paint, which lent an air of finish that is all too seldom seen upon the products of the small shop.

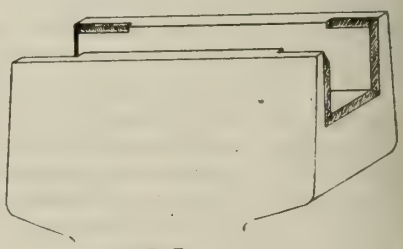


FIG. 3

A NEW DRAFTING INSTRUMENT

I heard a new drawing office story the other day so thought I would send it along to CANADIAN MACHINERY.

Jones is an old architectural draftsman, but owing to the scarcity of work in the building trade he recently migrated into a mechanical drawing office.

The other night he met Smith, who is a mechanical draftsman of many years' experience and the subject naturally drifted into drafting and from that to the equipment used there. Jones was somewhat verbose in his remarks, speaking of the style of tables used, method of keeping records, etc.

He also said that most of the calculations were obtained with the "guessing stick."

It might be well to stop here long enough to describe this instrument.

Subject, Guessing Stick; scientific name—slide rule, an instrument made use of by college graduates and would be's to obtain computations.

An example to show its value is as follows:

Take 3 x 3=9. To obtain this answer with the guessing stick, we move the sliding member in the correct direction (book with full directions given with each instrument) to the proper location and obtain the figures 8.999876. Note the figures underlined are those obtained by guessing, hence its name We next take a factor for expansion

and contraction caused by weather conditions and add it to the above result and obtain the answer 9, which is the correct solution of the problem.

But to return to the story: Jones said one of the boys had an instrument, which was both useful and valuable for obtaining angles, called a Protractor, made in France by a firm Bernier.

Smith tried to remember all the protractors made but could not recall one by that name, so asked Jones to bring it down to look it over.

The next night Jones had it for inspection and when it was taken out of the case it proved to be a standard Brown & Sharpe steel protractor with the Vernier scale.

The name Vernier was foreign to Jones and he had taken it to be the name of the maker but had read it Bernier. Smith told him the instrument was not very new and they had about ten in use in their office.

I haven't seen either of them for a few days and wonder if Jones has discovered anything else original since the new drafting instrument.—Robert Mawson.

BORING AND FITTING LATHE JAWS

By M. H. Potter

Often pieces to be machined are of frail construction and must be held in a way to prevent distortion and ensure a true job after the piece has been removed from the chuck. This result is accomplished by the use of chucking rings added to the casting, the chuck jaws being bored especially to fit. The chucking problem is solved in some instances by providing in the casting three holes of proper dimension in which to insert the jaws.

In connection with the chucking problem comes the order of operations, which sometimes influences the method of chucking. Some castings, if properly chucked, may be finished at one setting, while others will require as many as three or four chuckings before the piece can be finished, especially when the size limits are very close.

The first and most important point is to hold the work securely, and to accomplish this end special jaws are often absolutely necessary.

Surfaces on which the jaws bear are usually tapered, caused by the draft on the pattern or in the forging dies, and this makes chucking difficult with the ordinary standard chuck jaws. However, by boring or turning the jaws to conform to this taper, the work may be held for very heavy cuts.

Jaws for rough castings and forgings should be corrugated and hardened, making teeth from 1-32 in. to 3-64th in. wide on top and from ⅛ in. to 3-16 in. wide at the bottom, and from 1-16 in. to 3-32 in. high. This type is almost always made of machine steel, carbonized and hardened, although tool steel may be used with equally good results if properly hardened and drawn. The teeth of the corrugated jaw sink into the work, and for this reason should not be used on finished work.

When this type of jaw is used under extra heavy work the pressure of the tool will cause the teeth to sink far enough into the work to loosen it slightly, necessitating a second tightening, although the jaws may have been as tight as possible at the start.

The main object in boring and turning jaws is to have them conform to shape of the surface on which they are to bear. The method which has proved most practical and produced the best results is as follows: An object of some kind should be gripped in the jaws as near as possible to the point where the jaws will take their bearings on the piece to be machined. As a standard equipment for this work a set of three studs and a steel ring are used. The studs are placed in the counterbored holes, one in each jaw, and the ring chucked in them. This sets the jaws in the proper position for boring. They should be tightened up on the ring with about the same pressure as will be used when chucking the work.

A greater accuracy is necessary when preparing jaws for chucking on finished work, especially when it is desirable to have the chucked surface run true. The jaws should not be bored the exact diameter of the piece to be chucked but an allowance made for spring. This allowance will approximate .0015 in. to each inch in diameter on the chucking circle for finished surfaces and the allowance should be doubled for rough castings. For example, if a piece to be chucked is 4 ins. diameter, the jaws should be left about .006 in. small when boring and .006 in. large when turning. If the jaws are being prepared for a rough casting, the allowance should be about .012 in. or 1-64 in.

When the jaws are bored or turned on a large circle the measuring must be done from the tool to the jaw.

The allowances given are approximate and cannot be depended upon absolutely. Good results are obtainable by marking the chuck pinion used to tighten the jaws when in the tightened position. When the jaws are tightened on the work the pinion should be in exactly the same position as when boring. If not, the jaws should be rebored or turned as the case may be and more or less stock left to take up the spring as required.

For chucking on finished surfaces, or second operation work, the same pinion should always be used to tighten the jaws on the work as when used to tighten them on the ring when they were bored out or turned. This will bring the scroll to the same position on the rack of the jaw base and the work will run true within .001 in. providing this method is carefully followed and the chucked surface is round and uniform in size. It may be necessary occasionally to rebore the jaws if large numbers of pieces are being machined at one time.

The ring and stud plan is used for turning as well as boring, only the ring is chucked on the studs, which is just the reverse of the boring operation. If a ring cannot be found suitable for the work, heavy soft wire may be used to hold tension on the jaws.

When necessary to resort to the wire the jaws should be run in half an inch or so from the circle on which they will be turned and the wire wound around and securely fastened. Then return the jaws to proper position, being sure wire is tight and proceed to turn to proper size.

If the jaws are taper-bored or turned the taper attachment will of course be used.

ALL-STEEL FACTORY AND SHOP EQUIPMENT BECOMING THE RULE

High-grade furniture steel has proven most adaptable and versatile in the construction of factory and shop equipment such as cabinets, shelving, stock-room partitions, lockers for employees and for material, etc., and is fast being adopted by Canadian firms generally.

There are many reasons for the universal use of steel in such items of equipment, chief among which are its quality of being fireproof, its capacity to bear heavy weights, its indestructibility, its capacity for standardization, permitting a concern to start with a small amount of steel equipment and add other uniform pieces as requirements demand, and its low ultimate cost as compared with wood.

The Dennis Wire & Iron Works Co., Limited, of London, Ont., have pioneered in this industry in Canada, and have achieved for their well-known line of "Dennisteel" factory and shop equipment a very high reputation for quality and durability.

Recent figures on work just completed for The John Bertram & Sons Company, Dundas, Ont., are of timely interest. In the warehouse for small tools alone, this company had no less than one-tenth of a mile of Dennisteel shelving installed, with bin fronts, label holders, etc., besides a great many stacks fitted with drawers for small drills, taps, etc.,—aggregating a total of some 1,200 drawers, each with label holder to indicate contents. These stacks are built to carry extremely heavy weight on account of the nature of the material stored. The standard Dennisteel type shelving and drawers was used in anticipation of the necessity of adding similar units from time to time.

All this equipment was planned and installed so that the stacks, instead of being placed along walls, run out from the walls to the centre of the warehouse, leaving passageways between, and the layout is such that between each row of stacks there is a window, providing sufficient light and air. All stacks extend the same length, and the whole presents a most orderly, uniform appearance, and will make the task of stock-taking comparatively simple.

For the same firm, the Dennis people are installing some 200 steel wardrobe lockers for the use of employees, besides complete equipment of steel tables, footrests, stools, etc., in the drafting room, the whole making one of the most up-to-date installations of all-steel units in the Dominion of Canada to-day.

DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

UPRIGHT GENERATING PLANER

THE Newton Machine Tool Works, Philadelphia, in bringing out their new upright generating planers, have vastly improved upon what were formerly known as slotting machines One of the latest of these machines is shown in the accompanying illustrations.

These rack-driven slotting machines or upright generating planers are built in sizes having 36 to 72 in. maximum stroke, and are now built for reversing planer type motor drive only.

Rapid traverse for table motions can be provided as an extra, when desired, through incorporation of suitable mechanism and use of extra constant speed motor.

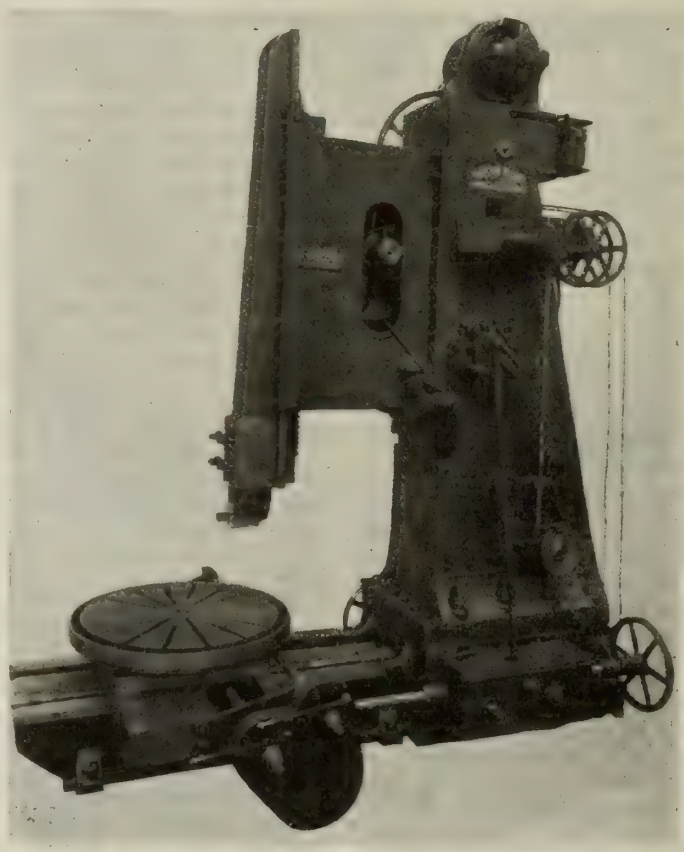
The ram or cutter bar is counterweighted and has square bearings in the guides with a taper side adjusting shoe and, on all sizes, the vertical clamping surface is solid and steel faced and equipped with suitable tool-holding clamps.

Beneath the ram or cutter bar is mounted a newly developed steel swiveling relief tool box apron, which can operate in any position of a complete circle.

Motion is transmitted from the motor to the broad face steel rack on back of the cutter-bar or ram through all steel spur reduction gears, whose coarseness of pitch and width of face increase with reduction of the gear speed.

All gears are covered and on the operating side of machines all gears are totally enclosed. Circular tables are heavily ribbed and of substantial construction and have a full bearing on the saddle, to which they are held by corner clamps. These tables are now centered by a deep face, large diameter bearing.

Oil pans are cast solid with circular tables, and are graduated on the exterior into 360 degrees.



UPRIGHT GENERATING PLANER

Table saddles have narrow guide alignment control with centralized location of feed screw and taper shoe control of fit. Hand adjustment of the saddle is provided for from both ends of the cross slide.

All feed motions are independently clutched, and clutches have independent levers. Cross slide is of heavy box type section and has square bearings on the base, with side adjustment taper shoe. Adjustment is from operating side, as well as from front of machine.

Feed screws have bearings on each end to insure operation in tension. Particular attention is called to a newly developed sensitive stroke control disc the trips on which can be operated by hand while machines are in motion, which is desirable as drift of motors have to be compensated for.

The feed motion is taken from a rock-

SIZE OF CHIPS COMPARED TO A FOOT-RULE

ing friction box, on the outside of which the pawl rod stroke adjusting screw is located.

The circular, cross, and longitudinal feeds are variable in rate, and reversible through the use of pawl and ratchet wheel.

The cutter bar guide on the 26-in. stroke machine is cast solid with frame, and, therefore, does not have any vertical adjustment.

The cutter bar guides of the 56-in. to 72-in. machine inclusive are separate from frame and have vertical hand-controlled adjustment to permit their location in positions relative to cutter bars.

The cutter bar guide adjusting mechanism is of tandem design to prevent dropping of guide in event of accidental breakage of counterweight ropes.

QUICK-MAKE STARTING SWITCH

One of the new equipments brought out by the Westinghouse Electric and Manufacturing Company during the past year is an interesting starting switch. The switch is designed for use where squirrel-cage motors are started with a full line voltage. The switch is known as the Quick-Make (and quick-break) Starting Switch (Type 816). Its characteristics are 10 to 100 amperes, 25 h.p. maximum, three-phase, 220, 440, and 550 volts.

This switch is extremely flexible in its applications; in addition to being a motor starting switch it can also be used to control feeder circuits; it may be supplied in any of the following combinations, each having the "quick-make and quick-break" feature, for either hand or shipper-rod operations:

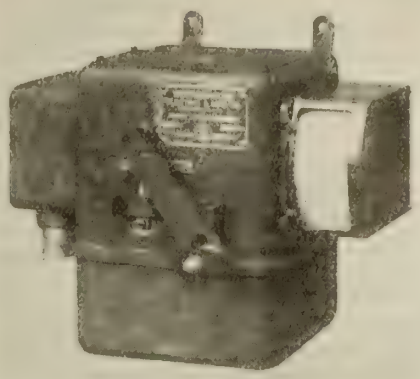
(a) Non-automatic switch.
(b) Switch with low-voltage protection.
(c) Switch with inverse time element overload protection.
(d) Full automatic switch with low-voltage and inverse time element overload protection.

It is especially suitable for shipper-rod operation on account of the positive action of the contacts. It is impossible for the operator to retard the motion of the contacts after they have started to close—there can be no "teasing" of the contacts. Workmen who are accustomed to starting machines from line shafting by means of shifting belts have no confusing details to learn. They may start the motor-driven machine with the same starting motion they use in shifting belts.

Contacts are opened and closed in oil, thus effectually suppressing arcing. The contact is made or broken so quickly that the eye cannot follow the motion. A rolling action confines the arc to the tips of the contacts and prevents pitting or roughening of the seating parts where final contact is made. A strong spring holds the contacts firmly in the closed position. These features result in greatly prolonged life for the contacts.

Construction.—Drawn-steel construction is used, giving maximum strength with light weight, and assuring uniformity and interchangeability when new parts are needed for replacement or repairs. The oil tank is supported by snap ring-latches. Removal of the tank clearly exposes the contacts and makes them easily accessible. When necessary to replace contacts each may be removed by taking out a single screw.

Contacts and contact supports are of the same construction used for Westinghouse type A auto-starters and magnetic contractors. This minimizes the number of spare parts that should be carried.



SWITCH COMPLETE

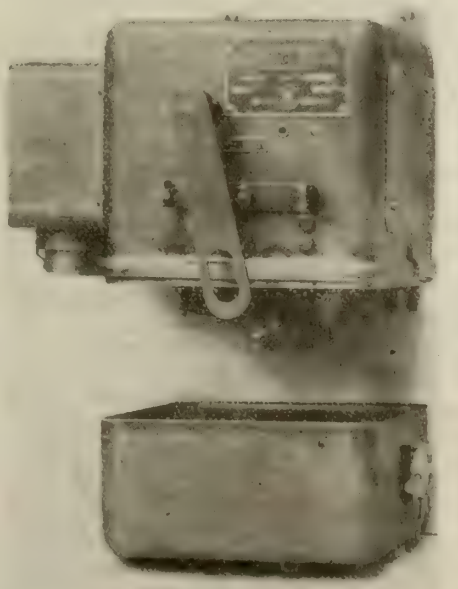
These starting switches are dust-proof.

Openings are provided for conduit wiring into the top of case; terminals for connecting motor and line wires are accessible when cover at top of starter is removed.

Micarta insulation is used throughout.

Overload and low-voltage attachments may be added with no change in switch mechanism, as the toggle trip is common to all combinations of this switch.

Low-voltage protection not only opens the contacts on failure of power, but makes it impossible to close them again until return of voltage. Since the low-voltage coil is connected in the line circuit continuously, means have been provided to close the armature of the low-voltage circuit when the switch is in the "off" position, thereby giving protection to the coil and preventing burn-outs. A safety stop may be provided by connecting one or more push buttons in series with the low-voltage coil.



SWITCH WITH CASE REMOVED

Overload Relay.—The overload relay is the same as that used on Westinghouse type A auto starters. It has the inverse time element feature and is equipped with a regulating device, adjustment of which controls the degree and duration of the overload possible on a motor or feeder circuit. This adjustment can be made without opening the switch cover.

Hand Reset. — This is an additional safety feature which makes it necessary to set the mechanism before the switch contacts can be closed. Whether the contacts have been opened through the operation of the low-voltage coil, the overload relay, or by moving the switch handle to the "off" position, it is impossible to close them again until the switch handle has been moved to the "reset" position. Thus protection is afforded workmen and valuable machinery which might be injured by accidental starting of the motor.

A NEW BY-PRODUCT PLANT.

A new battery of 35 simplex regenerative ovens has recently been erected at the Lambton Coke Works at Fence Houses in Durham (Eng.), and these regenerative ovens were decided upon to avoid the erection of another boiler plant and many considerations had entered into the arrangement of the by-product plant. There was an indirect recovery plant for 35 over, including a rotary scrubber, and room for only two 100,000 ft. per hour exhausters in the exhaust house. It was therefore undesirable to have two separate streams of gas, as there could not be a spare exhauster for each battery. It was therefore finally decided to have one stream of gas on the pressure side, the suctions from the two batteries uniting at the exhauster and being regulated by valves. The gas then went through a Pelouse tar extractor to the saturator, and after cooling, to the benzol scrubber, which consisted of the old rotary scrubber rebrushed, plus the former tower benzol scrubbers. The oven walls in this plant are parallel, which are in many obvious ways a great advantage. It has been said that there were some expanding or salt-containing coals for which parallel walls were unsuitable, but this has yet to be proved. Tapered ovens are a relic of the days when, owing to uneven heating, ovens could not be pushed, and some brilliant genius had thought that by giving a 2 in. taper in 400 in. he was doing something to outdo other coke-oven contractors.

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Know More of Each Other

THIS business of employers organizing to protect **their interests**, and employees organizing to protect **their interests** is not going to get us very far in the bringing about of conditions where industrial expansion will be possible.

It may be a homely way of stating the case, but what is urgently needed is that both employers and employees should organize to understand each other's business.

Go right down to the root of the trouble, and it will be found that suspicion and distrust lies very close to the origin of all the industrial unrest we have.

The man in the office has a sneaking idea that the man in the shop is going to slip one over every chance he gets, while the man in the shop is dead sure that the man in the office is taking advantage of him at every turn.

The more the company knows of the business of the men, and the more the men know of the business of the company, the harder it will be for labor unrest to get a chance to sprout and grow.

No Labor Troubles Here

AN industrial concern in one of Ontario's cities has had good business during the past few years. Work has been hard and long. Foremen and superintendents have been called upon to work hours they never bargained for or thought of. But they did it. The work was there —it was urgent, and they saw it through.

When the annual business meeting of the firm was held not very long ago these services were not forgotten. They were not simply referred to, as is often the case. In fact, for a business body to refer to a man's services without giving tangible recognition of the feeling, is better left undone. The plant officials were presented with cheques. They were not for fifty or one hundred, but ran up in the thousands, many of them for three thousand dollars each.

There might be room to say a very great deal in connection with the working out of this plan, but for the purpose of this little article the only point we wish to make is this:

THIS COMPANY NEVER HAS ANY LABOR TROUBLES.

John Bull Not So Slow

MANY interesting stories are told of the manner in which camouflaged ships were used to advantage during the most trying days of the war. An exchange gives the following:—

"The great Belfast shipbuilding yard of Messrs. Harland and Wolff initiated, quite early in the war, the transformation of certain cargo boats into make-believe warships; such accurate representations of the most powerful super-dreadnoughts afloat, that their very appearance on the horizon sent the Huns scuttling homeward, with the safety valves tied down to get the last fraction of a knot out of the ship. There were 14 of these vessels built at this one yard and they all did magnificent service. One lay off New York harbor for weeks, thereby keeping a large German steamer bottled up, as she dared not face the terrible British battleship lying off-shore. This same 'battleship' was a poor, old disguised tramp, that could have been sent to the bottom by a hit or two from a 3-inch shell!"

John Bull is often pictured as being a little bit slow and not overly quick to pick up with new ideas, but when the story is all told the chances are that it will be seen that said J. B. was very much alive and well up to the front of the procession.

Where Care is Needed

AN Order-in-Council, passed at the end of 1918, provides that engineers holding current certificates shall be eligible to act as inspectors for boilers, so long as they do not pass on boilers that may be directly under their own supervision.

There are very good reasons to doubt the wisdom of such a step.

There are engineers holding certificates who can be entrusted with inspection work, and there are engineers holding certificates who could not pass on a boiler acceptably.

The testing of boilers is a profession in itself. The man who goes about posing as a boiler inspector must KNOW absolutely what he is about. He must not GUESS. His analysis of the situation must be the last word.

To do this work it is necessary to understnad boiler construction from the standpoint of the finished mechanic; it is imperative that a certain knowledge should be had of the technical details that determine the strength of material, of joints, etc. These are matters that take a great deal of study and preparation, and we would be very agreeably surprised were we to be authoritatively informed that every engineer holding a certificate was thoroughly capable of meeting these requirements.

As stated above, there are engineers who can do boiler inspection work. They are qualified beyond doubt. But there are others who are not qualified, and it is a dangerous practice to throw the doors wide open on such an important matter.

The Ton For Ton Basis

CERTAIN French interests are already out with claims as to how much tonnage should be awarded to France to make good the losses which she suffered during the German submarine campaigns. In all, the figures show that France wants to secure almost five million tons of shipping. There is no person in the Allied Countries who would think of doing anything that would hinder the complete re-establishment of the Republic, but there are other figures that should be considered before action is taken.

It would seem only fair that the actual tonnage losses suffered by the various Allies would be a fair basis for replacement figures. There should be no desire to gain advantage in the allocation of tonnage. If all were restored to the same basis of merchant tonnage as they possessed at the outbreak of the war, there should be no cause for complaint.

Lloyd's figures show that the losses of the French merchant marine were 400,000 tons, while the losses to British merchant marine were 4,000,000 tons. Now if France is out for a replacement of five million, will some person with a good head for figures please figure out what tonnage the British people are entitled to ask for.

Ton for Ton Should Be Proper Basis to Adopt

British Are Well Aware of the Necessity of Seeing That Shipping Tonnage is Restored to Pre-War Basis—What French Navy League is Making in Way of a Request

ALTHOUGH little has come to the surface, there is keen discussion going on in many circles with regard to the disposal of the vessels taken from the enemy. The idea, and it is fair, is that these boats should be used to make good the losses caused by the submarine campaign. That is, if Germany sank a thousand tons of British shipping—she should be called upon to replace it with the same amount.

The whole issue is well dealt with by a correspondent of the London *Times*, who signs himself "A Past-President of the Chamber of Shipping." He says:—

Lord Inchcape, in the public-spirited and patriotic action which he and Sir Owen Philipps have taken with regard to the transfer of standard steamers now under construction from the Government to shipowners, has arranged for the vessels to be "distributed as far as possible on an equitable basis having regard to the losses sustained by the owners through enemy action." This is so obviously the fair course to adopt that I hope it will be followed by the Allies and America when they come to deal with the allocation of the German merchant ships in giving effect to the ton for ton policy.

In order to avoid misunderstandings and to present extravagant claims being put forward, it is highly desirable that we should have an authoritative statement of the tonnage possessed by each nation before the war, and the tonnage owned at the present time, after deducting losses sustained and additions made during the war. It is only by this means that we can obtain a clear conception of the position of the shipping industry throughout the world and can view the situation as a whole and in proper perspective.

This is all the more necessary as already claims have been advanced which have no justification in fact, as would immediately be seen by reference to the actual figures. For instance, the French Navy League is reported to have appealed to President Wilson, and suggested that the following steps should be taken to enable the French Mercantile Marine to be reconstituated:—

1. The allocation of 930,000 tons of German and Austro-Hungarian ships, in order to replace, keel for keel and ton for ton, the French vessels destroyed by the enemy.

2. The assignment of German coal to the French iron industry so that French shipbuilders may be on a footing of equality with foreign shipbuilders.

3. To render it possible for French shipowners to purchase immediately 1,000,000 tons of shipbuilding built in the United Kingdom on conditions acceptable to British shipowners.

4. To render it possible for French shipowners to buy immediately 1,000,000 tons of shipping built in the United States.

5. The authorization of American shipyards for the immediate construction of 2,000,000 tons of cargo steamers for French shipowners with permission to transfer the same to the French flag.

This appeal is made to President Wilson with a view to his supporting these claims at the Peace Conference.

I have nothing to say concerning suggestion 2, but with regard to the others, I think it is desirable to state the facts so far as they are available. The most reliable figures dealing with the merchant fleets of the world are those published by "Lloyd's Register of Shipping." I have taken out the particulars contained in Lloyd's Register Book" for 1914, and made up the corresponding figures as far as possible to the end of October, 1918, and find that the steam tonnage owned by the principal Allied and neutral countries was as follows (for the purpose of comparison the tonnage trading on the Great Lakes of the United States is excluded):—

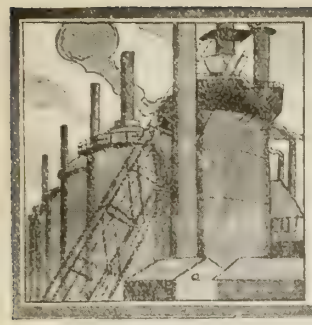
	Gross Tonnage			
Flag	July, 1914	Oct., 1918	Increase or decrease	% on 1914 figures
British—				
U. K. ...	18,892,089	15,031,375	—3,860,714	— 20.4
Col.	1,631,617	1,828,561	+ 196,944	+ 12.1
Total ..	20,523,706	16,859,936	—3,663,770	— 17.9
U.S.A.	2,069,637	5,116,521	+3,046,884	+147.2
Belgian ...	341,025	189,963	— 151,062	— 44.3
Brazilian ..	307,607	508,245	+ 200,638	+ 65.2
Danish	770,430	612,940	— 157,490	— 20.5
Dutch	1,471,710	1,030,137	— 441,573	— 30.0
French	1,922,286	1,536,730	— 385,556	— 20.0
Greek	820,861	259,174	— 561,687	— 68.4
Italian	1,430,475	989,575	— 440,900	— 30.8
Japanese ..	1,708,386	2,039,794	+ 331,408	+ 19.4
Norwegian .	1,957,353	1,414,927	— 542,426	— 27.7
Spanish ...	883,926	671,425	— 212,501	— 24.0
Swedish ...	1,015,364	810,489	— 204,875	— 20.2

Now it will be seen that while France is down 385,556 tons upon her pre-war total, the United Kingdom is down 3,860,714 tons. These figures speak for themselves and render it unnecessary for me to labor the point that, in dividing up the ships of the German Mercantile Marine and in arranging for the production and allocation of new tonnage among her Allies, this country is entitled to the lion's share. Everyone, I am sure, would wish to deal with our gallant French Allies in the most sympathetic and generous manner both as regards shipping and everything else. But we must be just to ourselves, and I am voicing the opinion of many of the members of the shipping community when I say that we fear this necessity is too apt to be lost sight of in some of our international arrangements.

We have already agreed to build some 500,000 tons of ships for France, to build (over a period of three years) some 750,000 tons for Norway, and to supply Italy with steel to enable her to carry out her shipbuilding programme. All this at a time when our own Mercantile Marine is just emerging in sadly diminished numbers and efficiency from the most colossal losses which it has ever experienced, and making heavy demands upon the whole of our shipbuilding resources with a view to its immediate reconstruction.

What is done cannot, of course, be undone, and whatever we have agreed to carry out for our Allies and for neutrals we must honorably fulfil, although upon the figures quoted I fail to see the justification for the agreements already made, but I feel compelled to enter an emphatic protest against any extension of these arrangements in response to extravagant appeals from any quarter whatsoever.

Happily we have in Sir Joseph Maclay, the Shipping Controller, and Sir Thomas Royden, who will represent him at the Peace Conference, men of the highest ability and widest practical experience in shipping matters, and we should all be quite content to leave the question in their hands, confident in the equity of any arrangements to which they may agree. But in case they be overruled in a matter which is of such vital importance to us as a nation—more vital to us than to any other nation in the world—it behooves us to make sure that our heritage of the sea shall not be frittered away by concessions which are not justified by the facts. Let all claims be dealt with by the touchstone of the actual figures, and no one, whether ally or neutral, can reasonably ask for more.



MARKET DEVELOPMENTS

Business Improvements Are in Evidence

One Firm Reports More Machine Tools Being Sold Than in the Same Period Last Year—A Sharp Advance May Take Place in Some Lines of High-Speed Steel

ALTHOUGH it would be too much to state that there has been enough buying of machine tools and supplies to call it a revival of the industry, still there is good business moving now. One dealer stated this week that so far this year they had done more business than during the same time last year, while a supply man stated positively that he had done more business in the last two weeks than in the six prior to that time. Warehouses report a large volume of business moving, along the lines that were in evidence before the war started. So it is evident that the touch of war is being removed from trade in Canada. The process may be rather slow, but it is none the less certain.

Many of the shops in the industrial centres of Canada are in good shape. They have, in reality, turned to their pre-war activities, and find business good. In others the lessons of war work are being applied to present problems. For instance, one shop that did jobbing work before the war, started on the making of marine boilers, securing considerable business from United States Government. They were careful in their operations, and kept strict record of costs, etc. Now they are out after this sort of business again, and are positive that they can compete with any of the yards in the business.

Prices of plates have been brought to a 5.50c per pound base. This is approaching the best that the warehouses can do. They are now in a position to get the 3c price at U.S. points, and as this material is put in with the war-price material it brings down the average. There is a feeling that this price will have to come down a shade yet before it reaches a stage where much trading will be done apart from material for actual consumption. There has been a slight recession in the price of sheets as well. Tubes, also, are on a new list, showing reductions of from ten to twelve per cent. Shipments of these are coming across in good style, and warehouses are well stocked.

The Canadian National Railways are in the market again for more supplies, and dealers are tendering on a good sized list.

Some uneasiness is felt owing to a rather stiff increase in price of high speed goods, which is threatened in catalogue supplements which have been sent out. It amounts to about 30 per cent. on some lines of goods, and some of the dealers are at a loss to explain the matter, as it had been thought high speed steel had gone the limit during the days of the war.

MONTREAL MARKET STILL WAITS FOR MORE PRICE CONCESSIONS

Special to CANADIAN MACHINERY

MONTREAL, February 27. — The general industrial situation is still reflecting the waiting attitude that has been more or less pronounced since the beginning of the year. Many encouraging reports are given as to enquiry for material for domestic enterprise, but actual buying is still confined to immediate requirements, with peace-time interests playing a guarded game, apparently awaiting more settled conditions before embarking on extension programmes. There is evidently a growing enquiry for material, particularly on those lines that have experienced steady declines for the past two months. Steel interests are evidently preparing for greater activity, and the supposition is that this will develop before the early summer. The metal situation is quietly attaining a normal state, but various conditions combine to prevent a hasty return to pre-war status. It is anticipated, however, that a sound basis will shortly be established whereby the confidence of the trade will open the way for a renewal of ordinary business. Trading in machine tools is in a state of transient stagnation, with slight ripples of activity to relieve an otherwise uninteresting situation. Scrap is scrap, and the large volume available at the present time, together with the light demand, eliminates the possibility of dealers' activity for some time to come.

Steel Inquiry Improving

While little can be said of the immediate developments in the steel trade it is encouraging to note that the consumers' interest is far from being stagnant, and the inquiries coming into dealers are of a character to infuse hope before the summer is well advanced. The starved condition of domestic expansion during the past four years is being felt in many quarters, but with the clouds of uncertainty still hovering over the country's activities, few are willing to take the plunge into the rising wave of post-war enterprise. Dealers' reports, however, indicate that prospective buyers are watching developments closely, and as soon as the atmosphere clears heavy trading in steel is anticipated. The fact that restrictions have prevented peace-time expansion for so long a period, is one of the factors influencing the buyer in his policy of waiting a little longer in the hope that conditions will become stabilized and thus instill confidence into trade circles generally.

Keener Competition in Tools

Machine tool dealers have experienced another week of comparative inactivity. Some few sales have been made, but the volume is small when compared to that of a few months back. A feature of present trading is the keen interest displayed by dealers when a list of tools are desired. The competitive character of the trading more than emphasizes the anxiety of tool manufacturers and dealers, to get a slice of what business is now passing. Quite a number of sales of munitions machinery, that is more or

less of a general nature, have been reported, but shell equipment on the whole is not in great demand. Prices at present are an influencing factor and the reasonable offers of lightly used standard tools are being accepted quite freely. The general supply trade is steady, but the volume of the requirements is relatively light, shipyards and railroads being the principal buyers.

Scrap Still Weakening

The decline that has recently taken place in scrap metal quotations has not made much impression on the general situation. Dealers are not overtaxed with demand for material, and consumers apparently are not influenced by what might be considered fair prices under existing conditions. Some business has been done by dealers in the purchase of shell shop equipment, but the disposal of this is a more difficult matter. Small sales are still the order, but buying for future requirements is not in evidence. Local trading is light with prices nominal. Declines are noted on a few steel scraps: boiler plate at $14 shows a drop of $2 per ton. Machine cast iron is quoted at $18, also a decline of $2 per ton. A reduction of $1 is noted on wrought iron pipe, the price quoted being $9 per ton.

REPORT BUSINESS AS MUCH BETTER

More Machine Tools and Supplies Selling Than Has Been The Case For Some Weeks

TORONTO. — The downward trend of prices continues. This week plate and tubes are the articles most concerned. Plate comes down to 5.50 and is gradually working about as close to a competitive price with United States direct shipments as can be done.

Machine tool trade continues to improve. One of the largest firms doing business in Toronto reported this week that they had done more business so far this year than they had for the same time last year, while another dealer in supplies reported more sales of goods for the last two weeks than in the six preceding them.

Prices of machine tools hold firm. In fact the figures that are being placed on some of the high speed lines of supplies are greater now than they were during the time of the war.

The Machine Tool Market

While it is undoubtedly true that dealers are chasing a large number of prospects that never will amount to anything in real sales, yet there is a good amount of actual business being done, both in metal and woodworking machinery. In the latter class there should be selling shortly that would be worth while. There are a large number of places in Ontario where the housing situation has become so acute that action will have to be taken. Prices of material still hold high, as well as the wages of men who would have to be called in to construct the houses. Allowing for this, the necessity for building is reaching such a stage in several places, that it will take more than abnormal costs to hold it up much longer.

"We have done more business this year than we did in the same time a a year ago," is the way one of the largest firms in the country sized up conditions for their Toronto office this week. "The trade that was moving a year ago was all war work, while the sales that are being put through now are very much of the same kind as we handled before the war broke out. It is in reality a return to the pre-war lines that we have heard so much about. I would not say that the business we are handling is confined to any particular lines. It is general. Of course the amount of used machinery that is coming on the market now interferes to some extent with the volume of trade in new equipment that might otherwise be passing, but we are hopeful that the greatest part of this war material will soon be absorbed or scrapped. We had anticipated the effect of this machinery on the market, and it is not working out any worse than we had anticipated."

Speaking of Prices

Some of the dealers in supplies are at a loss to know what is in store for them, in the increase of about thirty per cent. that is being asked by some of the makers of high speed goods in the United States. Io looks as though the action was general in raising the prices, although some of the makers have not forwarded official notification to their selling agencies here. Certain it is that prices are not coming down.

The finding of an exact price for a cutter for instance, has become quite a problem in mathematics recently. During the war extras were added, and to these other extras were tacked on, and fractions of extras. If one were going to compute the price of a cutter that used to be listed at $3.35, it would be necessary to add the following (1) an extra of $1.25, (2) another extra of $1.25; (3) extra of half the last one, or 63c. Total these and you have the American price. Add forty per cent. ($2.59) and the figure comes up to $9.07, which has been all along the price at which the former $3.35 cutter has been selling. Now comes the new price, referred to above. It costs $9.52 to the dealer, and the chances are that by the time the machine shop gets the cutter there will be a bill of about $11.30 against the deal. Several dealers in the city are writing away to the companies in United States to see just what has happened. It looks as though the action had been taken by all the dealers together, as several supplements are being issued to existing catalogues, and it is in these that notice is given of the increases.

Prices Come Down

It was stated in these columns a week ago that the chances were that a reduction would be announced in the price of steel plate before many days. The reduction has been made and it is possible to make $5.50 the base price both in Toronto and Montreal for warehouse shipment. This is possible because a number of the warehouses are getting advantage of three cent deliveries from United States mills. Now that their war stock is pretty well down the new material coming in at the lower level brings down the average of all the material in stock, and the consumer is able to get the advantage of the lower rates. One of the warehouse men in Toronto stated to MACHINERY to-day: "We want to be in a position just as soon as possible to meet United States competition, and the only way to do this is to get right close to their price." Warehouses are doing a good business

POINTS IN WEEK'S MARKETING NOTES

Arrangements are being made to get rid of the surplus stock of war machine tools in United States by selling them to state institutions and foreign countries.

United States reports small sales of machine tools for export because England and France are in such good shape to attend to much of the business.

The New York machinery market is dull. There are many inquiries, but few sales are being made.

While most prices hold firm for machinery, an Ohio builder of punches, shears, radial drills and other plate-working machines, has cut prices about 20 per cent.

Machine tool dealers in Toronto report a decided improvement in business. One firm states that their business this year is much in advance of that for the same period last year.

Canadian dealers are receiving notice of a sharp advance that is being made in the price of high speed cutters, saws, etc.

Plate prices, both in Montreal and Toronto, were pulled down again. The present steel price from warehouses for plate is 5.50.

A new list is out on boiler tubes, and prices for both seamless and lapwelded are down on an average of between ten and twelve per cent.

Pittsburgh mills report that very little business is coming in, and that further curtailment in output is necessary.

When steel mills drop as low in production as 40 per cent. of capacity the ton costs become intolerable. In fact at from 60 to 70 per cent. of capacity the costs become abnormal.

now, and from general lines. In fact the trade now is very much the same as before the war.

There are some firms in Canada that developed a liking for certain lines of work during the war, and they intend to specialize in them now. For instance there is one jobbing house we have in mind. During the war contracts for marine boilers came to this place early in the game, and they got results. They got more orders and studied every step in the process very carefully, in order to make certain that their costs were not too high. Now that the war is over they intend to specialize in this line instead of jobbing. They are satisfied that they can turn out marine boilers in open competition with any firm in the business. In fact a representative of the company is in Washington now trying to secure more business in the building of these boilers, and the chances are that he will secure the orders he needs.

Tubes Are Down

A new price list on tubes went into effect for the week's selling right at the start. The reductions average about ten to twelve per cent. Many of the Canadian warehouses are in good shape to do business at a pretty close price. They are in a good position to compete with American warehouses. There used to be two prices on tubes, one from warehouse, which was about ten per cent. or so higher than a mill delivery. Now the same price applies all around.

TRYING MANY PLANS TO TAKE WAR TOOLS OFF THE U.S. MARKETS

Special to CANADIAN MACHINERY

NEW YORK, February 27, 1919.—The War Department is busily engaged in taking inventory of the surplus machine tools, new and second hand, which it will have to dispose of. Arrangements of a definite character have been made to sell portions of this equipment to state institutions—the sales in the various states being facilitated by committees which have been appointed by the governor of each state, so that there may be a maximum amount of goods sold for state construction work—alms houses, penal institutions, city and county construction work, public utilities and various other state, county, city and borough activities.

A special effort is being made, and in some cases with success, to negotiate sales to foreign governments, the greatest volume of these sales being to Montenegro, Ecuador, Belgium and Italy, as well as to the countries in the near East. It has been found that the volume of sales to France will be somewhat limited through the existing ability of France and England to supply a considerable portion of the needs.

Special efforts will also be made to negotiate a maximum amount of sales to the United States Railroad Administration. However, not much is hoped for in this direction as the Railroad Administration will not make important purchases without the approval of the railroad purchasing departments, and this it is difficult to obtain in the present financial condition of the roads.

After the sales division of the War Department has exhausted every effort to reduce the stock of surplus tools and allied material, an effort will be made to have the manufacturer who produced the equipment take it back upon a basis later to be determined, but which, as reported in previous letters, will probably be about 75 per cent. of its present invoice price. If however, the manufacturer refuses, then all the manufacturers engaged in making similar machinery will be requested to confer regarding the purchase of it from the Government in order to protect the trade interests involved. Failing in this the Government will offer the tools or other material to distributors regularly engaged in dealing in the various kinds of equipment. It is planned to eliminate speculators, brokers, scalpers and others who might improperly profit from the situation.

The machinery markets are still somewhat disturbed over the possibility of considerable machine tool equipment being dumped on the trade by the Government, but latest reports are somewhat reassuring in that the first estimates of the quantity of such equipment which the Government has on hand have been found to be greatly exaggerated.

Machinery Market Dull

The New York machinery market is dull. There are many inquiries, but few sales are being made. A new export inquiry is for quite a number of plate-working machines and allied equipment for a Japanese shipyard. Two export inquiries from France, for shipyards, are not yet acted upon. Nor has any buying been done by the Norfolk-Hampton Roads Ship Repair Corporation, which will build large dry docks and a ship repair plant at Norfolk, Virginia. The Bartlett Hayward Company, Baltimore, Md., which put out two weeks ago a large list of equipment wanted for a ship repair plant, has taken no action toward buying.

Thus it is with many of the sizable inquiries which the machinery trade is receiving.

As was reported last week, the United States Shipping Board is promoting the construction by private companies, with Government aid, of 20 dry docks and ship repair plants along the Atlantic Coast. If proper arrangements can be made ten plants will be built at New York, five at Boston, three at Philadelphia, one at Charleston, South Carolina, and Pensaola, Florida. These are in addition to projects also under consideration for Norfolk, Virginia and Baltimore, Maryland. The ten New York docks would alone represent an investment of $25,000,000. This would include the repair plants and all machinery necessary to such enterprises.

Auto Interest Keen

The automobile industry continues to be the centre of interest for American machine-tool builders. No other industry is buying so actively. The General Motors Corporation is understood to have ambitious plans, some of which have become known. This interest has acquired the Hyatt roller bearing plant at Harrison, New Jersey, and will operate it on automobile ball bearings. It will also build a new plant at Detroit, Mich., for making automobile differentials. Considerable equipment has been bought for the Chevrolet automobile plant at Toledo, Ohio. General Motors is also in control of the Samson farm tractor plant at Janesville, Wisconsin, for which a large list of equipment will be bought.

Aside from the automobile trade, the only importing buying of machine tools is being done by the Navy Department, which is proceeding with its construction program as if the war had not stopped. The Washington Navy Yard is buying for a new torpedo station at Alexandria, Virginia.

Prices hold fairly well in most instances, but an Ohio builder of punches, shears, radial drills and other plate-working machines, has cut prices about 20 per cent. Concessions are being made here and there, but the quotations made by a majority of machine-tool builders are still on the war basis.

PIG IRON MARKET IS NOT BRISK NOW

In Some Places There is Talk of the Furnaces Blowing Out

THE pig iron situation does not appear to be moving to any better stage at present. Although the $31 price is generally granted by the sellers it does not seem to have brought out any more business. It is stated in several centres that stacks are going to be blown out unless there is an immediate revival in buying. Some of the reports are as follows:

New York.—Some business is moving here largely because the foundries are taking all the deliveries for which they contracted when the sellers made the reduction to them of three dollars per ton. There is a large amount of business being done in some of the foundries and there are places where business has been turned away because firms are not able to take on any more castings.

Pittsburgh.—Some price-cutting might be done here, according to those closely in touch with the market, if there were enough business in sight to make it worth while. The market has not been tested on this score, as there have been very few inquiries. In fact some of the mills could cut prices now and still make money, but in so doing they might start something that would mean in the long run the suspension of a good many o

the high cost plants, and the laying off of men.

Chicago.—Some of the furnace yards here are piling iron because the users are asking that shipment be deferred. They cannot use the material as fast as it is being sent. There is no alarm felt yet, as the general expectation is that the iron will be absorbed within a short time. One of the largest southern producers has now come to the $3 reduction, setting the date for this at February 1, regardless of the date and price mentioned in the contract.

Cincinnati.—Foundries are using far below normal of their melts, and as a result, shipments from the mills are being held up.

Youngstown.—England is stated to be ready to buy large amounts of basic iron, but the deal will not be put through until a much lower transportation rate can be obtained.

St. Louis.—Although the three dollar reduction has been generally granted in the south, the effect has not been to show any increase in the volume of sales made.

HINT THAT REDUCTIONS MAY BE ANNOUNCED IN MIDDLE OF MARCH

Special to CANADIAN MACHINERY

PITTSBURGH, Feb. 27.—Buying demand in steel products is lighter than a week ago, if such a thing is possible. Mills state that practically nothing is coming in by way of new business except small "pick up" orders to piece out on something or other. Of regular orders from jobbers or manufacturing consumers there are practically none. Scarcely any steel, and no tonnage that amounts to anything, is being bought for construction purposes. This last named fact is illustrated by the monthly report of the Bridge Builders' and Structural Society, which showed that the bookings of fabricated steel jobs during January represented only 12 per cent. of the fabricating capacity for a month, this being a new low record and breaking the record of 20 per cent. bookings in November, 1914.

Conditions at the Mills

From what the mills report one could hardly estimate that current bookings are equal to 20 per cent., perhaps not 15 per cent. of the capacity, yet mill operations are, as a rule, ranging from 60 to 80 per cent. of capacity. The explanation of the divergence is that the mills are running chiefly on old orders, but as these old orders are running out rapidly there would soon be practically no work for the mills. When a mill operates at 60 or 70 per cent. of capacity the cost per ton is much above normal, but when it operates at less than 40 per cent. the cost is intolerable, so something will have to be done.

Upon the termination of the war the mills realized that it would be some time, possibly many months, before construction work, involving the use of steel, would start on a large scale and they were content to wait. They expected that meanwhile there would be a moderate demand for steel from everyday users, sufficient to maintain some sort of an operation, particularly with the aid of banked up demand that had accumulated during the period of wartime restriction in the distribution of steel. The accumulated demand has now carried the mills for about three months and apparently that is about all it is going to.

When the mills made their slight reductions from Government prices last December they rather thought there might be occasion to make a further reduction April 1, carrying out the principle of a quarterly consideration of prices the War Industries Board had adopted for the period of Government control. There was some talk, whether in earnest or merely for its temporary effect, that the December reductions were the last and that buyers would have to take hold at the slightly reduced prices. At any rate buyers have not done so and show no disposition to do so. At any time, of course, the mills would willingly make a substantial reduction in prices for the purpose of starting the market in full swing, which would mean getting investment buyers in also, the buyers who put up building, bridges, power stations and such like works of permanent construction, but there is no hope of getting such investment buyers in so soon, as even if the steel were cheap enough to satisfy them the cost of erection, in labor and in the materials outside of steel that are needed is altogether too high. The question for the steel mills at this time, therefore, is whether it would pay to reduce prices merely to stimulate the everyday buyer again, the jobber and ordinary manufacturing consumer. Confronted with an operation of far under 50 per cent. the mills are likely to conclude that it really will pay to make substantial reductions even though this will not of itself start construction work again.

Reductions on the Way?

Rumor has it that the steel producers have about made up their minds that substantial reductions, not like those of say $4 or $5 a ton last December, will have to be made, and should be made before the regular period of spring buying. It appears to be a common opinion that the lead in making reductions should be taken by one of the independents rather than by the Steel Corporation, and the prediction is that reductions will be announced the middle or latter part of March. One guesser makes it that the reduction on merchant steel bars will be $14 a net ton, from $2.70 to $2.00, but that represents the extreme of the guesses.

It has been the desire of the mills to avoid any moves towards wage reductions, both because it is not considered fair to reduce wages until there has been a substantial reduction in the cost of living and because of the existing labor unrest. Just how extensive is this unrest is a matter of doubt, some observers claiming it is serious, others that it is not. It is all opinion, there being no important concrete facts upon which to base a conclusion. An item of interest in this connection, however, is the fact that three merchant blast furnaces in the Shenango valley, each acting by itself, put the matter of wages before their men, saying they could not continue to pay time and a half for overtime according to "the basic eight-hour day" principle adopted by the iron and steel trade generally last October, and giving the men time to decide whether they would prefer to work eight hours a day or 12 hours, at the straight hourly rate, and without any confusion the men decided to work 12 hours at the straight rate. Thus they will be paid per day 12 times the hour rate, which is about 42 cents, instead of 14 times that rate.

There has been a sort of mutual understanding that the matter of wage reductions would not be broached before July 1 at the earliest, but if heavy reductions in steel prices are made next month, the matter of wages will probably be brought up at that time.

As a rule buyers have no definite ideas as to the prices that would be acceptable to them and that would cause them to buy freely. Of all incentives to buying in the steel market the most cogent have always been the fear of high prices coming and the fear of deliveries being difficult to obtain. There is no conceivable reduction that would cause buyers to begin fearing at once that the next change would be an advance. As to deliveries, jobbers and manufacturing consumers do not need to carry their normal stocks, since mill shipment on new orders can be obtained almost instantly. Previous buying movements have always been supported in large part by the fact that mills were falling behind in deliveries.

One definite fact in this connection has, however, come out in the past week. Several large oil and gas interests have given to pipe mills details of pipe lines they are ready to start laying at once provided they can get the pipe at certain prices, and the prices they name are only say 10 to 20 per cent. below existing quotations. Here, at any rate, is a definite offer to begin construction work provided certain things are done as to prices. This is exceptional, but it may be a harbinger, like the first bird of spring.

Mills are operating at widely varying rates, but on the whole at lower rates than a week or a fortnight ago. A few small plants are closed entirely, while the large plants generally are running at 60 to 80 per cent. of capacity. The steel industry as a whole is probably doing between 65 and 70 per cent., but if things go on as at present they will soon be below 50 per cent.

Ingersoll Looks Ahead to Busy Days Now

The Old Noxon Plant Has Been Taken Over to House Two Good Industrial Concerns—Large Extensions Being Made to the John Morrow Plant

Special to CANADIAN MACHINERY

INGERSOLL, Feb. 26.—The question of securing houses for the families that want to move to Ingersoll is a serious matter. This place is in for a prosperous season, and the industries that are locating here are of the kind that will give steady employment to men at good wages. The closing down of the Noxon plant some time ago was an unfortunate thing for Ingersoll, and it left a large plant in a sure way to go to pieces.

At present it is being remodelled for two plants, the T. E. Bissell Co., of Elora, and the Ingersoll File Company. The latter, in fact, is the old Port Hope File Co., and the John Morrow Co. have had much to do with putting this new business in the town and making it possible for it to secure working capital necessary for expansion and growth. Both the Bissell plant and the File Co. expect that they will be operating inside of six weeks. As a matter of fact, the tool room of the Files Co. has been working for some time, and it is being added to continually.

Building Extensions

The John Morrow Co. is growing, and it is not any mushroom growth either. The extensions being made to the plant are the very latest word in factory extension, and have been built to take care of an expansion that has been forcing the present plant beyond its capacity limits for some time. In the extensions that are taking place, due consideration is also being given to the proper routing of work, so that there will be a correct sequence of operations from the raw product to the inspection and shipping departments. One of the most advanced ideas is to be seen in the erection of a large cafeteria and rest room, especially for the women workers in the plant. This department is especially designed for light and air, and the lounging room, which is to be placed at the disposal of the women, is a model of simplicity and comfort.

The immense battery of automatics in this plant, as well as the machines of special design in the department turning out drills of all sorts, are working to capacity. In fact overtime is being resorted to three nights a week in order that the plant may keep up with the orders that are coming in. When the additions to the factory are completed and machinery installed, it is likely that there will be about 600 automatics in operation.

Mr. Horton, of the John Morrow Co., stated to CANADIAN MACHINERY that business with their firm was good, even since the war had come to a close. "We are, in some departments of our business, as far as three months behind in our orders. On export business," stated Mr. Horton, "we are not making much progress, although we have a number of customers, especially in Australia, and we still look after them." The securing of the necessary supply of steel is an easier matter now than when the war was in progress.

The Ingersoll File Co.

The northern portion of the old Noxon plant is being used to house the Ingersoll File Co. Mr. H. Swallow, the president and manager of the company, has been in Ingersoll for some time getting things into shape, and a large number of men are engaged in tearing down and rebuilding in order that nothing may be lacking when the place is finally ready for operation. In the rebuilding of the factory every care is being taken that the various operations from the forging room through to boxing and shipping shall be laid out so that there shall be no extra carting or handling of the files in any stage of their progress through the plant. The material used is high carbon crucible steel of about 1.40 per cent. carbon. The machines for the gorging rooms are in the premises and will be installed as soon as the floors are ready. E. H. Fogarty Jr., who has had charge of the forging room of the Port Hope Co., is superintending the work here, and expects to be ready to start the first operations shortly.

In the cutting room every precaution is being taken against jarring or rattling. In the first place this room has a splendid north light along the river. The floor is of concrete, and on this is a wood block floor, making a desirable place for people to work. The pedestal foundations for a large number of the machines that must have absolute rigidity in operation are being constructed. In this, the cutting room, there will be about sixty machines in operation, with a capacity of from 30 to 100 dozen files a day each. The single-purpose idea is put into operation here, as each size file has a certain number of machines reserved for that purpose. It has been found, after experiment and study, that it pays much better to keep a machine standing ready all the time for a certain size of work than to change them over for a number of varieties and sizes.

Make Their Own Machinery

And, speaking of machines, it is well to mention that all the machines used in the cutting room and in other parts of the factory are built right on the premises as there is no place where they can be purchased. For this reason it is necessary to keep a well-equipped tool room in operation.

The preparation of the floor in the grinding room, the building of the pits for the large grinding wheel bearings, etc., has been completed, and these will soon be ready for work. There are eight of these pits built of solid concrete. The grinding stones used in this room weigh about 5,200 pounds each, and run about 750 r.p.m. These stones not only have the ordinary rotary motion, but they travel from side to side about 18 inches in order that the working face may be evenly covered. The lifetime of a grinding stone in a files factory is about ten days or two weeks. Recently the price of these has gone up about 100 per cent., largely on account of the supply of labor. It is necessary that, after being taken from the quarries, they should be seasoned from twelve months to two years. Just recently the file company contracted for $14,000 worth of grinding stones. "There is something where a person can make a fortune," stated Mr. Swallow. "Let some good mechanic come along and solve the problem of doing away with grinding in the making of files; our company or any other file company will be pleased to do business with him on very generous lines."

Much Building Yet

Work is well under way in the construction of a battery of annealing ovens in which fuel oil will be burned under pressure. The power house now boasts a new brick stack, and fire is being put under the boilers. The compressors, etc., will be installed shortly, but electricity will be used as the motive power.

There is a great future for the file business, according to Mr. Swallow. "We sell principally in this country, although we will be in a position before very long to pay more attention to the matter of exporting. We had one order not very long ago that was worth $18,000 and it came from Sheffield, the home of the file-making business. It was repeat business, and when this order came all it asked for was, 'best, as before.' We took that to be one of the finest compliments that could be paid to our goods. We never have any trouble in selling all the files we can make.

Making a Rest Room

One of the upstairs rooms, formerly part of the stock room of the Noxon shop, is going to be fitted up as a rest room for the women who will be employed in the works. A cafeteria will also be put in for the convenience of the workers. The works will be in operation in about six weeks, with forty hands. It is expected that inside of the first year this will be increased to 125. The File

Continued on page 64

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton	.....	.....
Victoria	.....	.....

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel oars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Steel bars	5 50
Small shapes	5 75
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$23 00	$ 22 00
Electro copper	22 00	22 00
Casting, copper	22 00	20 00
Tin	62 00	62 00
Spelter	9 50	8 50
Lead	8 00	6 50
Antimony	9 00	8 50
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 5 50	$ 5 50
Plates, 3-16 in.	5 75	5 75

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$13 00	$13 00
Copper, crucible	16 50	15 00
Copper, heavy	15 00	15 00
Copper wire	15 00	15 00
No. 1 machine composition	14 50	14 00
New brass cuttings	10 00	10 00
Red brass turnings	11 00	10 00
Yellow brass turnings	8 00	8 00
Light brass	6 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5 50	5 00
Heavy lead	3-4	5 00
Tea lead	2-3	3 50
Aluminum	18 00	12 00
	Per Ton	
Heavy melting steel	15 00	14 00
Shell turnings	8 00	6 00
Boiler plate	14 00	11 00
Axles (wrought iron)	20 00	15 00
Rails	20 00	11 00
Malleable scrap	15 00	13 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	7 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	14 00	14 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

Per gross ton

BILLETS

Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, æ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 [illegible]

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks...list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse .....list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 6 50
Sheets, black, No. 10	6 50	6 00
Canada plates, dull, 52 sheets	8 50	8 10
Can. plates, all bright	8 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$28 00	$.....
1¼ in.	32 00	.....
1½ in.	35 00	28 00
1¾ in.	35 00	28 00
2 in.	40 00	28 00
2¼ in.	43 00	30 00
2½ in.	45 00	35 00
3 in.	52 00	40 00
3¼ in.	.....	47 00
3½ in.	62 00	48 00
4 in.	70 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

White			Cts. per lb.
XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

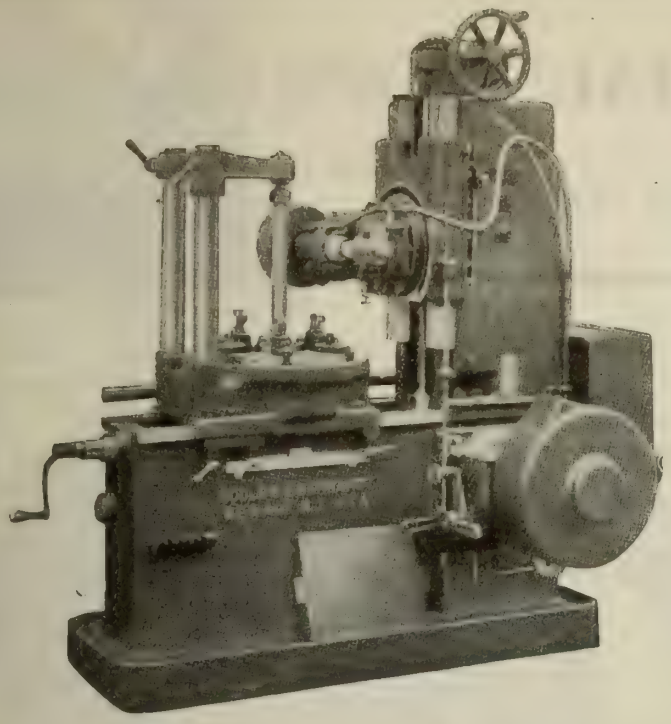
	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.



Gould & Eberhardt Gear Hobbers

For cutting Spur, Helical and Worm Gears up to 120" dia. Also

Multiple Spindle, Continuous Operation Automatic Roughing Machines for large production.

Put your gear-cutting problems up to us. Catalog on request.

Write for prices and deliveries.

A. R. Williams Machinery Company, Limited

ST. JOHN, MONTREAL
WINNIPEG, VANCOUVER

If It's Machinery, Write Williams"

64 W. FRONT STREET
TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

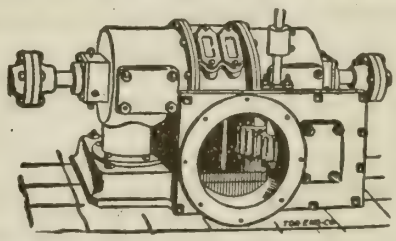
The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

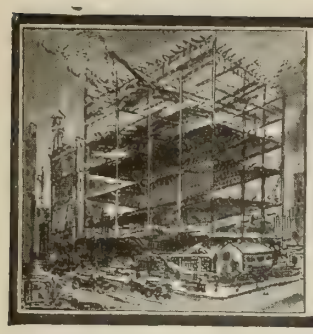
Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Quebec. — The International Paper Company of New York has decided upon the erection of a huge plant at Three Rivers, Quebec. Six million dollars, it is said, will be spent on this paper plant, that will be in the very heart of the wood and pulp industry of the valley of the St. Maurice River, for years noted for its extensive log-driving operations. More than 3,000 workers will be employed there, and the entire plant will cover an area of 100 acres.

MARINE

Quebec.—The National Shipyard Corporation, having vast plants at Three Rivers, is at present working on the construction of ten large wooden vessels. Eight hundred men work there, and it is expected the vesssel will be launched by the end of April.

Victoria.—With four hulls at the Foundation yards ready for the commencement of caulking operations, the edict went forth that a start would be made in plugging up the seams, and the caulkers were told off to warm up for the occasion. Instead of getting down to business, however, they put in a demand for an increase in wages, which the company was not disposed to consider in view of the fact that the wages paid to all crafts in the yards comply with the provisions of the Robertson agreement, to which the Caulkers' Union is a party. Under the Robertson agreement the caulkers are entitled to $7.70 per day, and with the revision of the wage schedules, according to the increase on the cost of living the daily wage of a caulker has been boosted to $8.08. The caulkers, however, demand that they be paid a scale of $8.50. Apparently the men of the other crafts are not in sympathy with the caulkers and there seems to be a lack of unanimity on the score of a raise among the caulkers themselves.

MUNICIPAL

Brockville.—J. Amos Johnston, manager of the Public Utilities Department, has been appointed to the position of industrial commissioner for the town of Brockville. A number of tentative propositions, looking to the establishment of new industries, are under consideration, and these will be taken up at once by the new official.

Hull, Que.—The City of Hull has undertaken a publicity campaign with the object of bringing its advantages to the attention of American and Canadian capitalists, as possessing qualifications which render it a favored place for the founding of industries. The city has promised consideration to new industries and the council has authorized the expenditure of $20,000 in a publicity campaign.

Markham.—Markham Village passed a by-law for $5,000 to bring Hydro power to the village. Of 108 voters, 107 voted for the Hydro. Markham has at present a local power plant, so all that will be necessary is to bring the power from Agincourt and turn it on to the local wires. Markham will then have a 24-hour service instead of a 5-hour service as at present, and the cost will be reduced both for users and non-users, who only pay for street lighting.

Montreal.—The City of Montreal is to be authorized to appoint a commission of at least three members, or a director of housing, for the purpose of taking advantage of the Federal loan for the construction of houses in the city. The loan from the Dominion Government is to be repayable in twenty or thirty years, at the rate of five per cent. The housing scheme provides for loans of from $3,000 to $4,500, these figures to include the planning and laying out of the lots, together with the cost of the building.

Chatham. — Representatives of the Montreal firm which manufactures the motorized Elgin street cleaner were in the city and discussed with city officials the merits of this machine, and to what good use it could be applied in the city. The representatives held consultations with Mayor Hammond, Alderman Fitzsimmons, chairman of the Board of Works, and City Engineer Shackleton. It is understood there is some opposition to the purchase in certain sections of the city, and that a petition is being circulated protesting against the purchase of such a machine.

Montreal.—A delegation, appointed by the Administrative Commission of Montreal, will visit some of the cities of the United States to study modern methods of street cleaning and snow removal. This civic delegation will also attend the meetings of the American Road Builders' Association in New York on Feb. 25-28. The purpose of the investigation is to study whether American methods of road-making and road-repairing can be economically adapted to local conditions. Two engineers of the city Public Works Department will be representatives on the committee.

BUSINESS MAN DIES WHILE IN ENGLAND

J. J. Harty, President Canadian Locomotives, Was Away on Business Trip

Kingston.—A cablegram was received in the city stating that Dr. J. J. Harty, president of the Canadian Locomotive Company, had died in London, England, of pneumonia.

Dr. Harty left on January 29 for England, his object being to secure orders, if possible, for his company.

A few days ago a cablegram was received to the effect that he had bronchitis, but would be around in a few days. Last night another cablegram said that he was dangerously ill, and this morning the news came he had passed away at the Savoy, the cause of death being pneumonia.

Dr. Harty was a son of Hon. William Harty, of this city, formerly president of the Locomotive Company, and for many years was connected with the Locomotive Company, first as secretary, next as general manager and lastly as president. He graduated in Medicine in 1897 from Queen's, but never practised. He took a prominent part in college athletics, and in his day was one of the best hockey players in the country. He kept up his interest in sport, especially hockey.

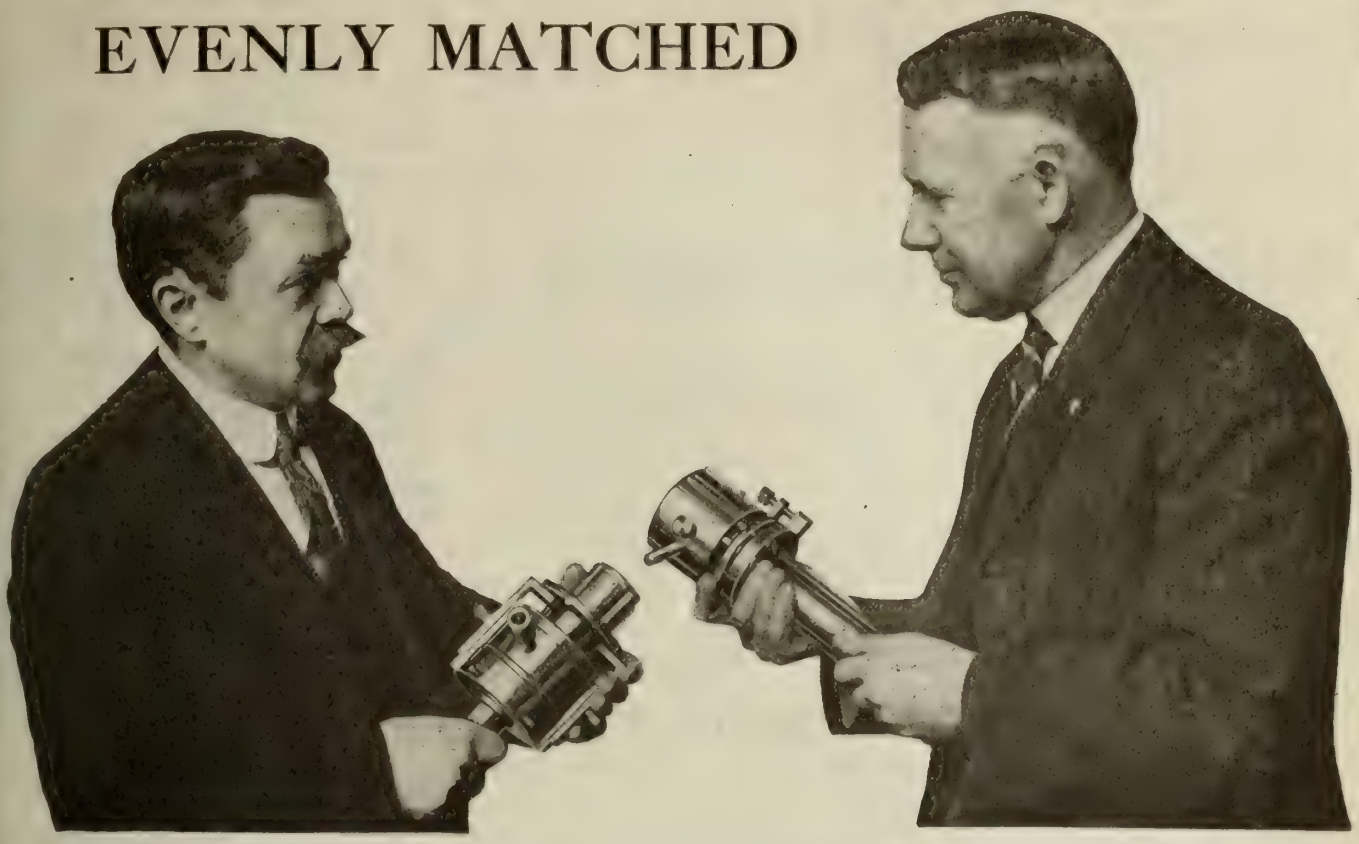
Dr. Harty's only brother, Staff-Major William Harty, who was overseas during the greater part of the war, was with him when he died.

PERSONAL

Thomas W. Pangborn, president Pangborn Corporation, has been elected a director of the Maryland Surety & Trust Co., Hagerstown, Md., one of the largest financial institutions in the State.

Mr. Frank James has been appointed to the position of assistant to F. L. Hutchinson, manager-in-chief of C. P. R. hotels, with headquarters at Windsor street. Previous to his appointment, Mr. James was secretary-treasurer of the

EVENLY MATCHED



The man who is tapping internal screw threads with a Geometric Collapsing Tap is evenly matched with the one who is cutting external screw threads with a Geometric Self-opening Die Head.

Commenting on the policy of THREADS, the monthly publication of The Geometric Tool Company, a London supporter of the Geometric method says:

"The policy you advocate as to work is good, yet you are inconsistent in making a tool that avoids it."

Geometric Self-Opening Die Heads and Collapsing Taps

Help You to Avoid Work by Doing It for You

The Geometric Catalogue will tell you how.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents: Williams & Wilson, Limited, Montreal; The A. R. Williams Machinery Co., Limited, Toronto, Winnipeg and St. John, N.B.

Ritz-Carlton Hotel Company of Montreal.

Thomas McOuat, head of the firm of McOuat and Son, founders, died recently at his home in Lachute, P.Q. Early in his 'teens Mr. McOuat entered the services of the Victoria Foundry, Ottawa, and at the age of 29, when he had attained the position of foreman patternmaker and machinist of that establishment, he and the foreman molder, John McRae, came to Lachute and established the foundry firm which was known as McOuat and McRae until 1903, at which time Mr. McRae withdrew his interests from the business.

TRADE GOSSIP

Armstrong, B.C., will erect a hospital.

Carleton Co. is to spend $40,000 on good roads.

Brantford Tp. is to spend $4,500 for culverts.

St. Michael's Church, Kingston, will build a hospital.

Hospital for Insane, Brockville, will erect $30,000 addition.

Estevan, Sask., may spend $12,000 for waterworks extensions.

Guelph is having plans prepared for a sewage disposal plant.

The Orphanage at Kitchener will build additions to cost $5,000.

W. H. Fairchild, of Galt, is now manager of all the public utilities of that city.

Public Works Department are going to erect a structural steel bridge at Spencerville, for $10,000.

At Orillia, kitchen, laundry, power house and tubercular hospital will be built. All cost about $70,000.

Salvation Army Hospital to be built at Toronto will cost $125,000. Tenders may be called for about May 1.

Nurses' home, $40,000, and wing to infirm hospital, $40,000. That is what plans call for at London. Dept. of Public Works, Toronto, have particulars.

Sarnia is calling for tenders for erection of a garbage incinerator in three contracts: (1) radical brick stack, 125 feet; (2) building with reinforced concrete approaches; (3) furnace, flues etc. J. D. Stewart is city clerk of Sarnia.

Changes at Polson's.—According to reports reaching CANADIAN MACHINERY just as the paper was going to press, the Polson Iron Works, Toronto, has been sold, but to whom, we are not able to state. The new manager, Mr. Forbes, was introduced to the staff this week.

Pledged to Help.—At a dinner at the Galt Club, attended by the majority of the manufacturers, delegates from the Great War Veterans' Association and the executive of the Soldiers' Aid Commission, and held under the auspices of the latter organization, various repatriation questions as they affect Galt locally were thoroughly discussed. Manufacturers promised co-operation in returning soldiers to civil life, and all were unanimous regarding the prospects for a great future for Galt.

Have Own Men.—In a communication received by the Canadian Trade Commissioner in Ottawa from the Canadian mission in London, emphasis was placed on the necessity of individual firms in Canada appointing their own representatives to cultivate the foreign field for anticipated export trade. The Canadian mission will willingly co-operate with home firms, but reiterates the practical impossibility of their carrying out actual agency work for individual Canadian interests.

Opening New Office.—The Cleveland Pneumatic Tool Co., Canada, Ltd., announce the opening of a Montreal office on March 1 at 337 Craig St. West. A complete line of Cleveland pneumatic tools, parts and appliances, "Veribest" air hose, Bowes' couplings, etc., will be stocked. It is also the intention to maintain a fully equipped repair shop or service station. C. D. Garner will have charge of the office, the same as Toronto, and A. M. White, a former mechanical expert from the factory, will be the Montreal representative.

A Hopeful Sign.—The better co-operation that is being manifest between capital and labor was amply illustrated at a recent dinner of the Canadian Manufacturers' Association held at the Ritz-Carlton in Montreal, when Tom Moore, president of the Allied Trades and Labor Congress, was the guest of honor and speaker of the evening. The dinner was presided over by Walter Sadler, the president of the association. Mr. Moore emphasized the fact that the civilization of the future would be what we make it, and that the time had come when labor and capital should join hands in solid friendship for the betterment of trade conditions and humanity in general.

Road-Making Machinery.—Road-making machinery is expected to be in much larger demand during the coming season than it has been for several years. The large programme of road construction that is being entered upon in different sections of the country promises to broaden this market considerably. Only a relatively small percentage of the capacity of plants engaged in this line of manufacture is devoted to the production of such machinery, as it is felt that the Canadian market is too limited to provide great scope. An accession of activity in this department would be of fair importance, and, judging from the prospective programmes already laid down, there will be considerably larger demands on manufacturers than in the past.

New Incorporations. — Joint stock companies incorporated include the following: Shannon Fisheries, Ltd., Montreal, capital $45,000; The Fireless Cooker Co., of Canada, Ltd., Hull, capital $10,000; Thornton, Davidson and Co., Ltd., Montreal, capital $100,000; R. Percy Sims, Ltd., Montreal, capital $20,000; Joseph Papin, Ltd., Contrecour, Que., capital $75,000; Merritt and Co., Ltd., Chatham, capital $75,000; P. J. Dwyer, Molybdenite, Ltd., Toronto, capital $350,000; Henri Peladeau, Ltd., Montreal, capital $99,000; Canadian Fishing and Transport Co., Ltd., Toronto, capital $1,500,000; Canadian Kraft, Ltd., Montreal, capital $100,000; International Button Co., Montreal, capital $100,000; Chats Falls Navigation Co., Ltd., Ottawa, capital $50,000; War Publications, Ltd., Ottawa, capital $50,000; Atlas Bond and Security Corporations, Ltd., Montreal, capital $50,000.

SPEAK SPARINGLY OF WAGE REDUCTION

Steel Men Feel That Price Uncertainty Is Holding Back Business

A Canadian official who has just returned from the annual gathering of managers of the United States Steel Products, which is the export branch of the steel corporation, says that the consensus of opinion seemed to be at that gathering that there would be keen competition for all the business that was offering. This would be due, principally, to the very large capacity of the plants of the United States, as well as to the additions and extensions that had been made under the stress of war in Britain and other countries. The question of prices is unsettled, and it is a matter that those at the meeting were inclined to say little about, beyond admitting that the uncertainty of which way things would go was holding back a lot of business. Another thing brought out was the feeling that a slight price concession would do nothing whatever toward bringing any new business to the point of actual placing.

Costs Serious Problems

The matter of costs is going to become a serious problem very shortly. Labor is still at war levels, and the steel concerns do not want to take the first step to force wages down as long as other costs that draw on the men's salaries remain at their high levels.

It is understood that the Canadian plant of the corporation at Ojibway is hung up on account of the excessive amounts that would be involved in going ahead with the plant at the moment. Officials of the corporation take the position that whatever they invest in the plant is a permanent charge, and if it is very high it will make that much more to work against to make a profit every year. The work may go along slowly, but until there is a more tempting labor cost it is unlikely that anything will be done on a scale in keeping with the size of the undertaking.

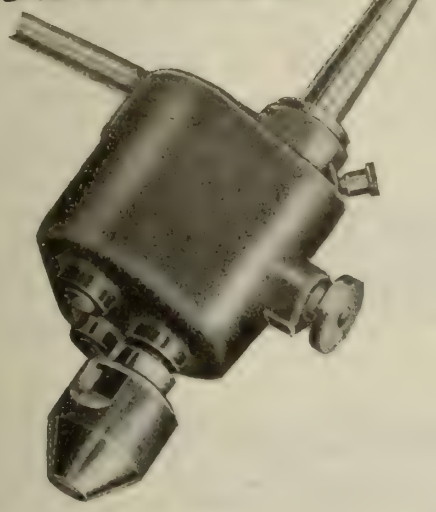
CATALOGUES

The Fitchburg Grinding Machine Company, Fitchburg, Mass., have issued a catalogue descriptive of their line of

DO your Tapping 10 Times Faster

Hand-tapping is an expensive practice you can now eliminate. It is no longer essential to the perfection of your product. With this Aikenhead's Wahlstrom Automatic Tapping attachment, tap holes as squarely as they could be drilled.

Aikenhead's



Wahlstrom Automatic Tapping Attachment

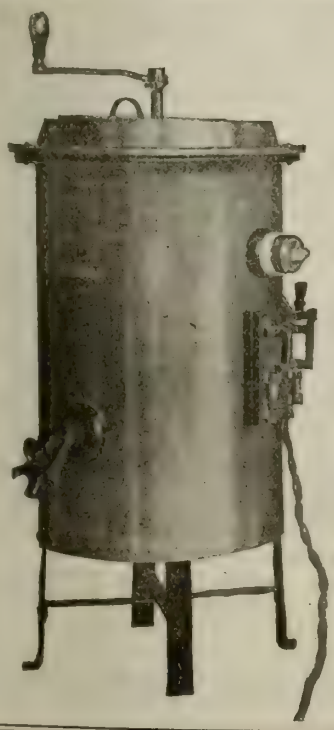
is constructed of hardened and ground steel parts throughout, and has nothing whatever that can get out of order. An oscillating movement mechanically obtained imitates hand-tapping, though 10 times faster, and reduces tap breakage to the very minimum.
Attached to any type of drill press, this Wahlstrom device will pay its cost in short order. Built for taps of all sizes up to ½-inch.

Aikenhead Hardware Ltd.
17, 19, 21 Temperance Street
Toronto, Canada

Aikenhead's

Electric Glue Heaters

for Woodworking and Pattern Shops



Wherever it is realized that glue has the greatest "sticking" strength when maintained at a temperature of 145 to 150 degrees Fhr., the merits of "International" Electric Glue Heaters are quickly acknowledged. For these Heaters, operating on **dry heat**, utilizing every bit of the heat generated because conserving it on the fireless cooker principle, keeps the glue at the correct working temperature all the time. There is no waste because there is no evaporation of water and glue. There are no burn-outs from evaporation of the bath because no water is used in these Electric Heaters. None of the glue is wasted because the electric dry heat principle prevents the formation of skin, scum or dirt on the glue. And less current than an electric flat iron consumes is ample to operate 13 one-quart Electric Glue Heaters. Write for Bulletin.

Aikenhead Hardware Limited
17, 19, 21 Temperance Street Toronto, Canada

grinding machines. The catalogue is descriptive of the six by twenty inch model B machine, which has been designed to grind much of the medium sized work, which formerly has been done on larger machines.

Holcroft and Company, Detroit, Mich., have issued a catalogue on their furnaces and ovens for foundry and metallurgical work. This catalogue is descriptive of core and mold ovens for the foundry, annealing furnaces, heat-treating furnaces, and open-hearth furnaces. Small open-hearth furnaces are shown which are admirably adapted to the use of small steel foundry. Annealing and malleable iron furnaces are also treated at some length.

The Quigley Furnace Specialties Company, 29 Cortlandt St., New York City, have issued Bulletin Number 10, on their method of conveying powdered coal. Powdered coal is rapidly becoming one of the most advantageous industrial fuels and the air transport system, which has been provided for this firm, provides a sufficient means of having a central coal crushing and pulverizing plant and furnaces and other metallurgical equipment where needed.

BOOK REVIEW

Tool Making, by Edward R. Markham, the American Technical Society, Chicago. 288 pages, flexible fabrikoid binding. Many phases of the mechanical development of recent years have increased the importance of the tool maker and at the same time have resulted in the necessity for much increased knowledge on his part. To-day the tool maker represents the most skilled and inventive portion of the mechanical trades, and the contents of the book here reviewed is indicative of his various accomplishments. The tool maker and his equipment are dealt with, and the fundamental requirements for successful work and the necessary tools for accurate work are taken up. The chapter on materials and their treatment takes up the properties and uses of cast iron, wrought iron, machine steel, crucible, alloy and high speed steel, and gives instruction in the use of pyrometers and their application in the art of hardening and tempering. Other chapters take up standard tools and describe the various operations which enter into their construction. Drills, reamers, arbors, taps, thread cutting, dies, counterbores, hollow mills, forming tools, and milling cutters, are all dealt with. The setting up of various machines and the making of the various jigs, fixtures and dies necessary are an important part of modern tool room practice, and several chapters are devoted to these subjects. This book should be a welcome aid to the toolmaker, not only for its value from an educational standpoint, but also from its usefulness as a reference work in the tool-room.

INGERSOLL LOOKS AHEAD

Continued from page 222

Company are considering the advisability of putting in a box-making plant to do their own work. They require a very large amount of this kind of material, and could easily run a plant to advantage as they have the room, and some of their workmen have a good knowledge of the business.

The building to be occupied by the file works is, in all, 600 x 150 feet, making a total floor space of 90,000 square feet.

From the standpoint of the technical man, there is a lot of interesting material at the Ingersoll File Works and the John Morrow plant, and in the near future readers of CANADIAN MACHINERY will have the privilege of reading more about these places from the mechanics' viewpoint.

The T. E. Bissell Co.

Some months ago a fire occurred in Elora, the home of the T. E. Bissell Co., and seriously interfered with the working plans of the organization, so when it became possible for the company to secure premises so well adapted to their line of work it was decided to do so at once. The southern portion of the Noxon plant at Ingersoll is being overhauled to make way for the business of the Bissell Co. It is not their intention to close their Elora plant, but the increase of business makes it possible to operate both places. That is the plan for the present, at any rate, although a policy of concentrating their business may be worked out later. They also have another plant at Barker, N.Y. State, where manufacturing is being carried on for American points. Although the tariff arrangements, as they stand at present are very favorable to the Canadian plants, a change in Government might change all this, and the American plant is probably for the purpose of providing against such a contingency.

Speaking to a representative of CANADIAN MACHINERY, Mr. Bissell, the head of the concern, stated that their only trouble now was in getting the goods fast enough. "I believe I am within the limit in stating that if I could get fifty cars of disc harrows turned out this week, we could sell them all. Our big market," he continued, "is right in this country, particularly the West. We find it difficult just now to get in touch with export business. I believe that the firms getting this business will be those who go after it with their own trained men. It is not likely to come through any Government activity."

The Bissell Co. have a display at the big tractor and accessories demonstration which is at present being held at Kansas City. The company have booked a nice lot of business for the Southern States.

The housing proposition is going to be one that will have to receive attention. Mr. Bissell stated that it was quite likely that arrangements would be made for taking advantage of the Government housing plan, and it was his opinion also that there would be improvements made to this before very long by the Legislature. Conditions in the way of manufacturing were becoming more favorable now, although Mr. Bissell admitted that the shop in Elora was still using $50 per ton pig iron, part of a shipment that was secured at war prices.

It is understood that Elora has not been very satisfactory as a labor market, it being hard to get men to stay in a place of that size. The plant at Ingersoll ought to be in operation in six weeks if plans now under way are not seriously interfered with.

COAL PRICES MAY NOT GO DOWN AT ALL

That is What Men Close to the Trade Say About the Situation

HAMILTON.—Coal, and the dumping of it into one's cellar, is still likely to remain an undertaking of much hazard and luck. Local coal men, in close touch with the situation, said to-day that every indication pointed to a general strike of coal miners on April 1, which, of course, meant that prices would go a-soaring again, and coal would doubtless be scarce.

City Clerk S. H. Kent, who was in Buffalo, conferring with several large coal operators, said he was informed that a strike was generally anticipated. Moreover, the mine-owners, it was stated, are determined to fight, and a strike of four or five months' duration is not deemed improbable.

Proof of the determined stand the mine-owners intend taking is found in the fact that mostly all of the coal mines have closed during the last few days and will remain closed until it is known what action the miners are likely to take.

"Men who know what they are talking about told me that coal would not be any cheaper. I would not go so far as to say that prices will be any higher than they are at present, but everyone has been hoping that, with the ending of the war, coal would drop a dollar or two a ton. It is not a promising situation to my mind," said Mr. Kent.

Better working conditions and higher wages are the miners' demands.

MAY BE AT BOTTOM OF THE SCRAP MARKET

Some Cases Where An Advance in the Prices Has Been Made During the Week

SOME slight improvement is noted in the scrap metal markets. The feeling seems to be that if the prices come down any farther the yards will be sure to stock up. Any movement in this direction would be almost certain to cause an immediate stiffening of prices.

Chicago.—Cast scrap is selling fifty cents per ton better than last week. This is one of the first hopeful signs that has been seen for some time, although it is not safe to gauge the market entirely by

(Continued on page 67)

Have you ever been disappointed in your Conveyor Belts

by their opening up at the plies?

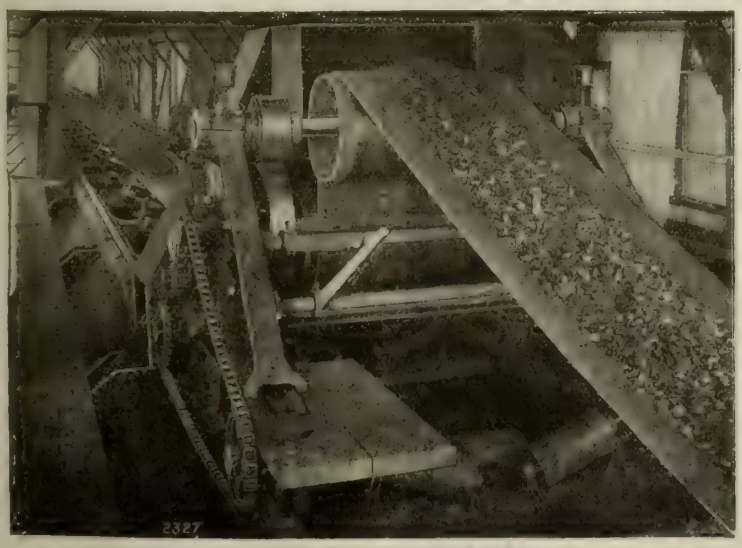
This is one of the commonest reasons for failure in a conveyor belt.

Is there a remedy? YES

Buy a belt that is not built up in plies. Such a belt is

SCANDINAVIA
FEDERAL ENGINEERING & SUPPLIES LIMITED
TORONTO
BELTING

This is a solid woven belt, made of long stock cotton, and it is built to wear. We have just had reports from two large users saying that **Scandinavia** Belting gives them more dollars in value for handling materials than any other belt that they have ever used.

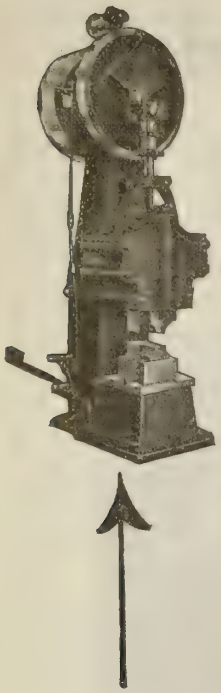


Use it for conveying

CRUSHED ORE
BROKEN STONE
COAL
QUENCHED COKE
Etc.

We want your business and solicit your inquiries.

FEDERAL ENGINEERING CO., LIMITED
172 John St., Toronto



The "Dupont" PATENT Power Hammer

The strength, durability, economy of power and simplicity of adjustment of the Dupont Power Hammer make it a decidedly superior tool.

Made carefully from carefully selected, high-class materials.

Positively Guaranteed

Seven sizes.

With rams from 25 to 300 lbs.

Write for full details.

THE PLESSISVILLE FOUNDRY

Plessisville, Que.

Ontario and Western Agents:
The General Supply Co. of Canada, Ltd.
Ottawa Toronto Winnipeg

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Our large stock of Machine Bolts, Rivets and Washers assures quickly filled orders and prompt shipment. One quality only—The Best.

Send a trial order.

LONDON BOLT & HINGE WORKS
London Ontario

WIRE SPRINGS OF ALL KINDS

Machine Springs, Valve Springs, Automobile Cushion Springs, etc., of a quality that defies competition. Tell us your requirements. Send sample or specification for price.

JAMES STEELE, LIMITED
GUELPH, ONTARIO

JOHN STIRK & SONS, Limited
HALIFAX, ENG.
MACHINE TOOLS
Agents: The A. R. Williams Mcy. Co. Ltd.
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METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

Oil Tempered Steel Springs

—for every purpose and the best for each use.

Special styles of all kinds to order.

THE CLEVELAND WIRE SPRING COMPANY
Cleveland, Ohio
U.S.A.

Old Man Specific

Physician Extraordinary to Nerveless, Enfeebled Copy

By P. K. Marsh

CONTINUED FROM PAGE 2

(Do you appreciate how the "raspberry" phosphate transports the scene from the realms of fiction to that of undisputable unarguable fact?)

And that's the secret of the power of the specific in advertising, too.

It's the simple, pointed, brass tack that nails your claims, your rhapsodies and your rhythmic periods down to the solid oak foundation of facts. It's the brass tack that pierces the shell of scepticism and disbelief of Mr. Average Reader, whose motto is still "Caveat Emptor." It's the word or phrase or sentence in the ad which gives the thrill of conviction and makes the reader feel —"That man actually knows what he is talking about."

Just about now some captious reader is grinning wickedly and saying "Very pretty—very pretty—but why not be specific yourself, old top?"

Gladly, sir—for though it is far easier to find graphic examples of the specific in pure literature than in the commercial branch, still it is possible with a little diligent searching.

Instances From To-day

Do you read food advertising?

Do the vague and varied claims of delicious taste and charming flavor actually convince you, or do you discount them 25, 50 or 75 per cent. as prejudiced statements? Then read this.

"The flavors are highly concentrated. '*Half a ripe pineapple,*' for instance, is used to flavor a single Jiffy Jell dessert. So these delightful dainties have a wealth of fruity taste."

The italics are mine. Note that it doesn't say "pineapple" or "ripe pineapple" or "generously flavored with pineapple." It's the specific fact "half of a" ripe pineapple that gives conviction to the claim.

Libby's mince meat does it differently.

"Tart apples—raisins from 'California'—red 'Valencia' currants—and citron from 'Greece'—snowy white suet, choice beef—candied lemon peel, oranges and spices from the 'Orient.'"

Fine—but even at that Libby slipped on the twenty-sixth and last word. Why not "Java and sunny Sumatra" or "Cey-

Continued on page 69

MAY BE AT BOTTOM OF SCRAP MARKET

Continued from page 64

it. There is a scarcity of scrap in some places, and it would not take much action to force higher prices.

New York.—Prices are better in the local market, and there is some inquiry.

Philadelphia. — Heavy melting steel has sold as low as $14. There is not enough business moving to give a fair idea of where the market stands in any particular line.

Pittsburgh.—Heavy melting steel has been selling around $16. A despatch to an outside paper regarding the situation here, speaking of shells, says: Heavy offerings of six inch unloaded shells are being made at $15 and $16 delivered Pittsburgh, thus taking the range of heavy melting steel, although rightly they should class as low phos scrap. It is stated in connection with these shells that there is only a limited demand for low phose steel scrap, and the dealers, who are the only buyers, cannot well afford to take a chance on paying any more money. Eventually they may be obliged to sell such scrap for heavy melting steel.

DEALING WITH THE RETURNED SOLDIERS

How the Canadian Vickers Has Made a Plan to Meet the Situation

What Canadian Vickers, Limited, Montreal, is doing for the returned soldiers was learned when officials of the firm were approached respecting the various rumors, discriminating against the concern, which have been in circulation. An employment bureau has been erected just outside the main gate specially for the purpose of dealing with this difficult matter, and a returned soldier is in charge, who, previous to enlistment, worked in the Vickers works as a mechanic's helper in the engine shop. A committee of returned soldiers has been elected by the returned men in the works, and this committee is in touch with the Great War Veterans' Association and with the company's officials. This committee is apparently quite in accord with what the company is doing, and in return, is anxious to do its best for the company, recognizing that it is not always possible to place an unskilled returned soldier in a vacancy for a skilled man.

The procedure followed in engaging returned soldiers is as follows: The employment bureau is opened at 6.45 a.m. and the names of the men applying for work are listed and all particulars noted of their training and fitness and their discharge certificates examined. Here again difficulties arise which call for tact both on the part of the company and the committee, due to the fact that unemployed men, who have never been in the army, obtain possession of other men's discharge certificates and present them at the bureau. This particular difficulty is practically overcome by having a returned soldier, fully familiar with the business, in charge of the bureau. The applicant is asked if he has a "tab" from the Soldiers' Re-establishment Bureau, which bureau knows the past record of each man and what branch of work he is qualified for. If suitably experienced men are found, the particular foreman in the workshops is asked if there are any vacancies, and if there are, the returned man gets a job.

CLAIM THE WIRING WAS IN POOR SHAPE

Inquiry Into Death From Shock at The Technical School

Responsibility for the death of Morley L. Smith, chief engineer of the Central Technical School, and formerly on the editorial staff of CANADIAN MACHINERY, who was electrocuted on January 18 last, was definitely fixed on defective wiring conditions both within and without the school at the meeting of the Advisory Industrial Committee of the Board of Education. Evidence was submitted to show that if the "neutral," or third wire, to the electric transformer within the school had been grounded, the current would not have been sufficient to cause Smith's death. In consequence the committee agreed to call upon the Hydro-Electric Department for a report on the condition of the wiring at the time of the accident. The Board of Education, in the opinion of its solicitor, W. J. McWhinney, is likely to be ordered by the Workmen's Compensation Board to compensate the widow and family of the late Mr. Smith.

The power is Hydro-Electric, and comes into the building at high voltage. It is transformed to lower voltage by a transformer in the building. According to one of the witnesses at the enquiry two weeks ago, there was a defect in the wiring inside the building, and Smith had known of that defect. Employees of the school also claimed that there was a defect in the installation of the transformer, in that the neutral wire was not grounded. Had it been it would have been impossible for Smith to receive the blow he did. Since the accident, Hydro-Electric officials had come to the school and grounded the wire.

PLEWES Limited
WINNIPEG
For All
Machinists' Supplies

BLACK DIAMOND OVENS
OVENS
Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal.
Kernchen Siphonage Ventilators, Bakers' Ovens, trucks, casters, etc.
Write for Booklet.
Brantford Oven & Rack Co., Ltd.
Brantford, Canada.

MAPLE LEAF
STITCHED COTTON DUCK
BELTING
DOMINION BELTING CO. LTD.
HAMILTON CANADA

GRAPHIC PRODUCTION CONTROL
Increases Output
Write -
Anderson's Efficiency Service
380 Queen St. West Toronto, Canada

Special Machinery
MADE TO ORDER
Mill Machinery, Engine Work
Grey Iron and Brass Castings
TRY US FOR GENERAL REPAIRS
ALEXANDER FLECK, LIMITED
(Vulcan Iron Works) OTTAWA, ONT.

CASTINGS
Medium Weight Grey Iron, Brass, Etc.
JOBBING
GREENLEAFS, LIMITED
Belleville, Ontario

WM. MUIR & CO., LIMITED
Manchester, England.
Machine Tool Makers.
Specialties: Patent Puncher Slotting Machines, Milling Machines, Boring Machines.
Agents: Messrs. Peacock Bros., 68 Beaver Hall Hall, Montreal.
Send for catalogue.

RUBBER MILL MACHINERY
We shall be glad to hear from firms contemplating improvements or complete installations.
BERTRAMS LIMITED
SCIENNES EDINBURGH

You Know How Greatly it Increased

Production

You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

Hawkridge Brothers' steel for every commercial requirement is just such production-increasing steel as proved this "Hawk" D. Chrome Vanadium. We make

Steel of Every Description

Hawkridge Brothers Company

303 Congress St., BOSTON, MASS.
U. S. A.

'Barnes-Made'

Springs

are unusual in service and wear.

They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-Made" Springs are the best buy.

Established 1857

THE WALLACE BARNES COMPANY

218 South St., Bristol, Ct., U. S. A.

Man'frs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

PATENT ATTORNEYS

RESEARCH BUREAU

REPORTS BY EXPERTS ON SCIENTIFIC, TECHNICAL AND INDUSTRIAL DEVELOPMENT.

SPECIAL RESEARCHES ARRANGED.

PATENTS, TRADE MARKS, ETC.

HANBURY A. BUDDEN
112 DRUMMOND BLDG., MONTREAL

CABLE ADDRESS "BREVET"

PATENTS

Fetherstonhaugh & Co.,
The old established firm. Patents everywhere. Head office, Royal Bank Bldg., Toronto. Ottawa office, 5 Elgin St. Offices throughout Canada.
Booklet Free.

PATENT

YOUR INVENTIONS

Send direct to Ottawa for free patentability report and booklet "Patent Protection." Clients' patents advertised in the "Patent Review."

Harold C. Shipman & Co. PATENT ATTORNEYS
CENTRAL CHAMBERS, OTTAWA, CANADA.

PATENTS TRADE-MARKS AND DESIGNS

PROCURED IN ALL COUNTRIES
Special Attention given to Patent Litigation
Pamphlet sent free on application.

RIDOUT & MAYBEE, 59 Yonge Street
TORONTO, CANADA

Prompt Deliveries

on Gauges, Tools, Dies, Jigs and Fixtures

Special Machinery

CUT GEARS

Contracting and Repairing Machinists

Quotations cheerfully submitted.

Normac Machine Co.
55 Vine Street, St. Catharines, Ont.

MORTON MANUFACTURING CO.

PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R. SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE — WORKS: MUSKEGON HEIGHTS U.S.A.

STEEL PRICES ARE SHADED

New York.—Evidence continues to accumulate that steel prices are being shaded by some producers. Sale of steel bars at $2.40, Pittsburgh, is indicated in a recent transaction. The generally quoted price on steel bars is $2.70, Pittsburgh.

The tonnage involved in the sale at $2.40 was relatively not large. The case, however, is merely one of many of the kind, appearing to indicate there is considerable shading of current steel quotations.

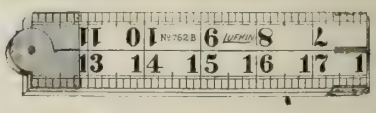
COPPER ON TOBOGGAN

A New York stock letter said: "Small sellers continue to offer copper at 15½c per pound, the lowest level since 1915, when the metal sold at 13c. There is small demand. According to some authorities, investigation of conditions abroad has revealed the fact that Great Britain has on hand about 90,000,000 pounds of virgin metal, and is not expected to come into the market this year."

LUFKIN

TAPES AND RULES

The complete solution of your problem of accurate measurements. Their all-round fitness is in keeping with their accuracy.



THE LUFKIN RULE CO. OF CANADA, LTD.
WINDSOR, ONT.

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works
Allentown, Pa., U.S.A.

Old Man Specific

Continued from page 66

lon and the Dutch East Indies," or any other specific spots instead of the vague and indefinite "Orient?" Think how Masefield would have made each individual spice melt in your mouth.

During the next few months we can expect reams of white space to be employed in frantic efforts to replace war contracts in war-expanded plants. These ads will proffer vague promises of service and engineering investigation. But how many will have the tangible imagination—pricking suggestiveness of the New Jersey Zinc Company's recent ad?

"Instead of brass for a stencil—zinc. Instead of tin for the tip of a shoe lace —zinc. Instead of copper, or brass, or steel, or tin, or aluminum, zinc, for drinking cups, camera cases, alarm clocks, meters, buttons, containers for toilet preparations, pencil tops, bottle caps and hundreds of other articles."

Wouldn't that start a manufacturer to thinking far faster than any quantity of glittering generalities?

Strength, care in manufacture and purity are three qualities which are naturally emphasized in copy of practically every type. Yet in the big majority of cases the emphasis when analyzed consists largely of mere claims—rarely convincing. The individual copy writers will explain that the space assigned did not permit printing the complex facts in proof of these claims. Occasionally this is true but it is usually easily possible to inject a homely, unassuming phrase or meaty sentence to give conviction.

Velvet, for instance, gives a tangible picture of its process in few words of realistic local color.

"No way has been found that surpasses patient ageing of tobacco—in Nature's way—the way Velvet is prepared —two years in wooden hogsheads."

Without the last few words, the first nineteen would drift vaguely and uselessly across my vision. Hogsheads—wooden hogsheads—these are two simple, believable facts quite comprehensible to my lay mind.

The scientific fact is almost always powerful and adaptable to such use. Its truth is rarely questioned, even by the inexperienced mind, simply because it is reasonably tangible, definite and exact.

"Witt's Can and Pail are made of heavy, deeply corrugated steel—galvanized and rust-proof—29 times stronger than plain steel."

Where is the selling force of those twenty-one words—in the first fifteen or in the final six? After the specific fact you are prepared to believe the later sentence—"It outlasts two ordinary cans." The specific fact has made that sentence a statement instead of a claim.

May I here hazard a guess?

The majority of readers who have followed me thus far are thinking—"It's all true but it's blatantly obvious. Why take so much time to a fundamental? A B C?"

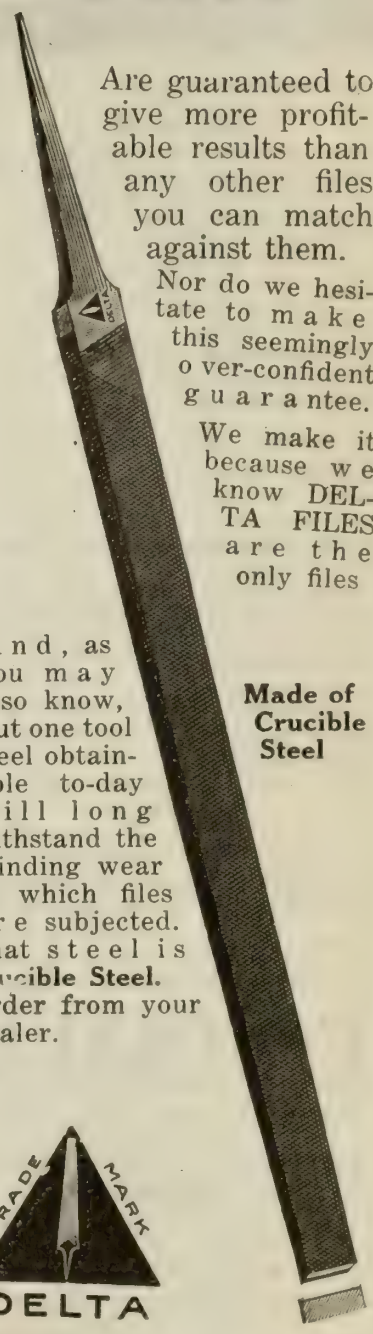
I grant that it seems obvious—painfully obvious. But apparently it is so very obvious that it is overlooked every hour of every day by hundreds of copy writers who prepare the ads and by hundreds of executives who approve them. To secure even the half-dozen examples given here compelled me to dig through a tableful of magazines and read several hundred advertisements, which, to my mind, is a rather startling commentary on what might be termed the Invisibility of the Obvious.

The most searching ordeal for a pet bit of copy of your own conception is to read it a twelve-month later when the ardor of creation is cooled, the halo of enthusiasm dulled and only arbitrary black symbols arrayed on a white background are left to confront you. Then you are almost—but not quite—in the apathetic frame of mind of the Average Reader.

Go through your files of year-old copy. Find out for yourself that wherever old man Specific intruded into your flow of language he left a ring of sincerity and conviction glaringly absent from your pretentious ventures in "Glittering Generalities."

And some day when that copy and utterly feminine jade, "Inspiration," fails to appear to guide your halting pen, call in old man Specific. Mr. and Mrs. Average Reader will appreciate the innovation and buy your goods.

Delta Files



Are guaranteed to give more profitable results than any other files you can match against them.

Nor do we hesitate to make this seemingly over-confident guarantee.

We make it because we know DELTA FILES are the only files

And, as you may also know, but one tool steel obtainable to-day will long withstand the grinding wear to which files are subjected. That steel is **Crucible Steel.** Order from your dealer.

Made of Crucible Steel

TRADE MARK DELTA

Delta File Works

Philadelphia, Pa., U.S.A.

CANADIAN AGENTS:

H. S. Howland, Sons & Co., Toronto
Starke, Seybold, Montreal
Wm. Stairs, Son & Morrow, Halifax
Merrick-Anderson Co., Winnipeg

ALL LEADING JOBBERS

CLASSIFIED ADVERTISING SECTION

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

FOR SALE

ONE 3/16" ADT. MODEL AUTOMATIC WIRE straightener and cutting machine arranged to cut a maximum of 10 feet. E. M. Bride, 113 4th Ave. East, Calgary, Alberta. (c11m)

2 FROG AND SWITCH PLANERS. 1 RAIL and frog filler multiple spindle borer. Box 557, Canadian Machinery. (c10m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

ONE SPINDLE, GRIDLEY, AUTOMATIC, ⅞-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

MACHINERY WANTED

SIX-FOOT RADIAL DRILL FOR BOILER shop; lathe to take in 12' between centers; air hoist, 10" cylinder, 4' lift with trolley; vertical air receiver, 44" inside dia., 14' high. The National Shipbuilding Co., Ltd., Goderich, Ont.

COMPLETE WELDING OUTFIT, MUST BE IN first-class shape. Prest-O-Lite preferred. Send price and particulars to F. Clark, 95 Woodland Ave., St. Catharines. (c9m)

WANTED

WANTED—FENCE FOR INDUSTRIAL PLANT, approximately eight feet high and nine hundred yards long. Send full particulars, and where can be seen, to Box 557, Canadian Machinery. (c9m)

FOR SALE

In first-class condition, Canadian Ingersoll-Rand

AIR COMPRESSOR

Belt driven, 14" by 9" by 12", with automatic unloader. Capacity 470 cu. ft. per min. Vertical Air Receiver, 42" by 10 ft.
75 H.P. Crocker-Wheeler Induction Motor, 550 volt, 25 cycle, 750 r.p.m.

P. W. Ellis & Co., Ltd.

St. Clair Works:

St. Clair Ave. and Prescott St., Toronto

POSITIONS WANTED

FORGE AND DROP HAMMER SUPERINTENDent will be open for a position shortly. Experienced in drop hammer and machinery blacksmithing, upsetting, bulldozers. Long experience in all classes of forge work. Can design dies and harden them. Box 552, Canadian Machinery. (c9m)

OFFICE POSITION, PREFERABLY PRIVATE secretary, with firm manufacturing or handling motor vehicles or machinery, by young married man, Canadian. An experienced accountant, shorthand writer and typist. Have just completed the Complete Gas Engines Course of the International Correspondence Schools. Best references. Reply P.O. Box 566, Lethbridge, Alberta. (c13m)

HELP WANTED

WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

FOR SALE

Two 3 x 36" geared feed Turret Chucking machines with 3" collet chucks, about 3½ years old. Price, each $700.00.

Three 3 x 36" Friction Feed Chucking machines without Collet Chucks, complete with Friction Counter Shafts, about 6 or 7 years old. Price, each $300.00.

The above are Jones & Lamson make.

Three 8 x 8" Open Type Single Horizontal Belt Driven Air Compressors, with unloaders. Capacity 75 cubic feet air per minute. Each $400.00. Extra for Air Tanks if required.

One No. 2A Warner & Swasey Collet, Chucking Machine, complete with Oil Pan, Cross Feed and Counter Shaft. Price, $750.00.

One 26" Engine Lathe x 10', Flather. Price, $350.00.

DARLING BROTHERS, LIMITED
Engineers, Manufacturers and Founders
120 Prince Street, Montreal, P.Q.
(ctfm)

Wanted immediately, **Heavy Duty Lathe**, new or used, good condition, ranging from 40" to 48". Swing, about 25 ft. between centers. Arranged for Motor Drive.

CANADA FORGE CO.'S PLANT,
Welland, Ont.
(ctfm)

MACHINERY

NEW AND SLIGHTLY USED

14—16" x 6' South Bend double back geared lathes.
5—16" x 6' South Bend single back geared lathes.
1—10" x 36" Norton grinder.
1—No. 2 Ford-Smith plain miller.
1—16" x 22" x 8' Sebastian gap lathe.
50 and 75 H.P. Motors.
1—340 cubic ft. Rand Compressor, Aftercooler and Receiver, belt, and 5" pipe.
New Transmission material of all kinds.
12—Racine hack saws.

Cuts, detailed descriptions and prices on application.

ELGIN MANUFACTURING CO., LTD.,
St. Thomas, Ont.
(c11m)

WANTED TO PURCHASE

SECOND-HAND GAP LATHE, in good condition, 72 inch Face-plate, with tail stock, and one or two rests. Give name of maker and all particulars. Swedish Steel & Importing Co., Ltd., 503 Canadian Express Building, Montreal, Que. (c9m)

USED MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, Nova Scotia
tf

IMMEDIATE SHIPMENT

LATHES.

12" x 5' LEBLOND, standard.
14" x 6' McKENZIE, standard.
14" x 8' LEBLOND Toolroom Equipment.
14" x 7' HENDEY Toolroom Equipment.
6—16" x 6' C.M.C. double back gear, quick change gear.
18" x 6' CISCO, double back gear.
19" x 10' LEBLOND heavy duty.
22" x 10' REED PRENTICE, geared head.
12—26" x 12' C.M.C. double back gear, quick change.
28" x 10' CONRADSON geared head.
36" x 14' NEW HAVEN triple geared.
24"—40" x 20' McCABE, double spindle.
28"—44" x 14' BERTRAM gap lathe.
20" x 36" x 14' CMC gap lathe, double back gear, quick change gear.

SHAPERS.

15" McKENZIE B.G. crank.
16" RAE B.G. crank.
16" STEPTOE crank.
20" GOULD & EBERHARDT high duty.
24" and 28" GOULD & EBERHARDT high duty.

MILLERS.

No. 1½ and 2½ LEBLOND Universal.
No. 3H and 4 LEBLOND Universal.
No. 3 FORD-SMITH Universal.
BECKER vertical single pulley drive.
BECKER No. 7HS Lincoln type.
No. 1½ AMERICAN plain.

GRINDERS.

No. 3 LANDIS Universal.
No. 1 LEBLOND Universal Tool.
No. 2 OAKLEY Universal Tool, power feed and wet attachment.
GISHOLT Tool Grinder.
BAY STATE vertical surface.

DRILLS.

10" MYERS bench sensitive.
10" McKENZIE sensitive.
14" MYERS column sensitive.
14" PERFECT column sensitive.
15" BARNES lever feed.
20" BARNES back geared.
22" BARNES sliding head.
26", 28" and 34" BARNES sliding head.
26" and 28" BARNES with tapper.

RADIALS.

2' FOSDICK National pattern.
3' NILES box table.
4' CINCINNATI-BICKFORD, speed box drive.
5' BICKFORD variable speed motor drive.
5' LONDON box table.
5' FOSDICK heavy duty speed box and tapping attachment (new).

PLANERS

24" x 24" x 7' LONDON heavy pattern.
30" x 30" x 8' BERTRAM, one head.
36" x 36" x 12' BERTRAM, one head.
42" x 42" x 10' McGREGOR GOURLAY, heavy pattern, 2 heads.

MISCELLANEOUS.

No. 2 BAKER Keyseating machine.
No. 2 MITTS & MERRILL Keyseating machine.
8" JARECKI pipe threading machine.
4" MERRILL pipe threading machine.
1½" WELLS bolt cutter.

The above list merely gives part of our stock, which is ready for immediate shipment from Toronto.

Write our Service Department and put your proposition up to them.

THE A. R. WILLIAMS MACHINERY CO., LIMITED
64 FRONT ST. W. - - TORONTO

"One insertion of this ad will do"

We receive from three to four ads a month from the firm who told us this when sending in their last ad. So you see they **know** what the Classified Advertising Section can do for them.

There is no reason why it won't do the same for you if you're proposition is of interest to our readers.

Canadian Machinery
Classified Advertising Section
143 University Avenue, Toronto, Ont.

IN THE

Financial Post

THIS WEEK

IMPLEMENTS FOR IRELAND

REPRESENTATIVES of the Irish Co-operative Agricultural Society, now in Ottawa, have concluded arrangements for the purchase of a large quantity of agricultural machinery. This order was placed with the Frost & Wood Co. of Smiths Falls, Ontario, and will be put in hand at once. It is learned that other orders from the Co-operative Society—orders of considerable magnitude will follow very shortly.

Francis H. Whitton of the Steel Co. of Canada on Keeping the Wheels Turning

"There may be justification for criticism in regard to dissatisfaction and strikes in time of plenty, but when it comes down to trade conditions as at the present time, caused by no fault of either the employer or employed, it is time for a consultation to diagnose the situation seriously and call on every source of possible assistance to provide a remedy and no one can escape the personal responsibility to play his part to the full. Our fighting men have proved their metal, our generals have led their forces to a successful issue and I say if our Canadian citizens will do their part in the same spirit through the whole ranks of manufacturers, consumers and distributors of Canadian products, the industrial forces, both employers and workmen, will put forth efforts that will result in Canadian commerce taking on life to a degree that will provide employment and build up business prosperity and confidence."

Besides the important article from which the above quotation is made, THE POST this week deals with the following amongst

OTHER SUBJECTS OF INTEREST

No Longer Need Bonus for Mining Gold
Big Increase for Canadian Manufacturers
Mining Engineers of Two Countries Want More Unity
Uncertainties Ahead for Steel Industry
Four Per Cent. Dividend for Laurentide Power
Woods Manufacturing Co. Did Business of $12,000,000
Holding Company Again Mooted for Laurentide
Shawinigan Co. Shows 28 Per Cent. Gain in 1918 Output
Good Results for Maritime Province Cos.
Western Cities Continue to Show a Falling Off
Dominion Life Finished 1918 in Strong Position
Disgruntled are the Poor Risks With Banks
Standard Bank Profits Reach New High Level
Business Men Still Needed
The Danger of Thinking in Millions
Bond Market Continues on Quiet Side
Seven Houses Underwrite New Tram Power Issue
Dominion Power Showed Record Gross Earnings
Cement Earnings Likely to be Less
1917 Eclipsed Former Years for Minerals
Sovereign Life Weathers Trying Period
Montreal Loan Made 14.3 Per Cent. Net on Capital
Main Principles for Solution of U.S. Rail Problem

Fill in this Form and keep in Touch with Canadian Affairs.

The MacLean Publishing Co.,
143-153 University Ave., Toronto.

Send me THE FINANCIAL POST every week till further ordered. I will pay subscription price, $3.00 per year, on receipt of bill or you may draw on me for this.

Name .....

Address .....

.....

MACGOVERN & COMPANY INCORPORATED POWER MACHINERY

In Stock for Immediate Delivery

Turbo-Generator Units — Boilers
Direct Connected Units — Smoke Stacks
Motor Generators — Tanks
Rotary Converters — Condensers
Transformers — Air Compressors

Separate Published Stock Lists for above apparatus. Staff of Engineering Specialists with three overhauling plants to SOLVE YOUR POWER PROBLEMS.

Buyers and Sellers of New and Used Machinery
Send us details of used plant for sale

MacGovern & Company, Inc.

285 Beaver Hall Hill - - Montreal

Offices: New York, Pittsburg, St. Louis.
Plants: Brooklyn, N.Y.; Lincoln, N.J., and Linden, N.J.

A Continent-Wide Service.

IMMEDIATE DELIVERY

MONTREAL STOCK

Motors 3-Phase 60-Cycle

75	H.P., 550	VOLTS,	450	R.P.M. 2
60	H.P., 550	VOLTS,	450	R.P.M. 1
5	H.P., 550	VOLTS,	1,150	R.P.M. 1
3	H.P., 550	VOLTS,	1,200	R.P.M. 1
2	H.P., 550	VOLTS,	1,200	R.P.M. 1

TRANSFORMERS....3
200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

TRANSFORMERS, POLE TYPE—550-$\frac{220}{110}$ VOLTS
5 K.W.....2 10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

Prompt Delivery and Subject to Inspection.

Low Phosphorus Pig Iron, Electric Furnace Products, Steel Products of all descriptions.

Zenith Coal & Steel Products, Limited

402 McGill Building Montreal

Below is a list of valves and fittings used in connection with pumps, accumulators and shell presses, all of which are in first-class working order:

The following suitable for 1,500 lbs. working hydraulic pressure:—

3—4" flanged, By-pass Valves, steel body (R.D. wood).
7—3" flanged, By-pass Valves, steel body (R.D. wood).
5—3½" flanged, By-pass Valves, steel body (Dean and Steam Pump Co.).
3—3" screwed ends, By-pass Valves, brass body (R.D. wood).
7—3½" flanged ends, Shock Relief Valves, steel body (R.D. wood).
5—3½" screwed ends, Check Valves, steel body (R.D. wood).
8—3" screwed ends, Check Valves, steel body (R.D. wood).
4—4" flanged ends, Check Valves, steel body (R.D. wood).
3—3" screwed ends, Check Valves, brass body (R.D. wood).
12—4" flanged ends, Balance Stop Valves, steel body (R.D. wood).
2—6" flanged ends, Balance Stop Valves, steel body (R.D. wood).
6—3½" flanged ends, Balance Stop Valves, steel body (R.D. wood).
20—3" screwed ends, Balance Stop Valves, brass body (R.D. wood).
2—3½" screwed ends, Balance Stop Valves, brass body (R.D. wood).
5—2" screwed ends, Balance Stop Valves, brass body (R.D. wood).
1—6" flanged ends, Balance Stop Valves, steel body. NEW (R.D. wood).

The following suitable for 250 lbs. working water pressure:—

6—4" Pratt & Cady, screwed ends, Horizontal Flapper Check Valves, iron body.
2—4" Pratt & Cady, flanged ends, Horizontal Flapper Check Valves, iron body.
3—5" Jenkins, flanged ends, inside screw, Gate Valves, iron body.
3—4" Jenkins, flanged ends, inside screw, Gate Valves, iron body.
2—5" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
4—4" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
7—3½" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
3—3½" Jenkins, flanged ends, inside screw, Gate Valves, iron body.

The following suitable for 125 lbs. working water pressure:—

6—5" Pratt & Cady, screwed ends, inside screw Gate Valve, iron body.
1—5" Pratt & Cady, flanged ends, inside screw, Gate Valve, iron body.
2—5" Jenkins, screwed ends, outside screw, Gate Valves, iron body.
5—4" Crane Co., screwed ends, outside screw, Globe Valves, iron body.
8—4" Kennedy, screwed ends, inside screw, Gate Valve, iron body.

Cast Iron, Cast Steel and Steel Forging Elbows, Tees and Flanges, suitable for water pressures 125, 250 and 1,500 lbs.

Canada Foundries and Forgings, Limited (Canada Forge Plant)

WELLAND, ONTARIO

MACHINE TOOLS
FOR SALE

The equipment listed below contains several items that are new. All are available for immediate delivery.

LATHES

1 **New Sidney Lathe**—Double back gears; quick change gears; max. distan e between centers 11′; max. swing over shears 27½″; taper attachment.

2 **Hamilton, O., Lathes**—Swing over shears, 20″ and 21″; max. distance between centers 4′ 4″; opened gears; double back gears; one has Independent chuck and one has one Independent and one Universal chuck; good condition.

1 **Sebastian Lathe**—Swing over shears, 15″; max. distance between centers, 5′ 6″; opened gear; single back gear; one Universal chuck; fair condition.

1 **Sebastian Lathe**—Swing over shears, 15″; gap 2″; max. distance between centers, 3′; opened gear; single back gear; one Universal chuck; fair condition.

1 **LeBlonde, H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 11′; opened gear; single back gear; fair condition.

1 **C.M.C. Lathe**—Swing over shears, 20″; max. distance between centers, 9′ 6″; taper turning attachment; quick change gear; double back gear; one Independent chuck; good condition.

1 **C.M.C. Lathe**—Swing over shears, 18″; max. distance between centers, 3′ 6″; taper turning attachment; double back gear; good condition.

4 **C.M.C., H.D. Lathes**—Swing over shears, 26″; max. distance between centers, 6′; two with and two without taper turning attachment; quick change gears; three with Independent chuck and one with Universal chuck. These lathes are new.

1 **Gleason Lathe**—Swing over shears, 24″; max. distance between centers, 3′; open geared; single back gear; fair condition.

1 **Cisco Lathe**—Swing over shears, 15″; max. distance between centers, 3′; quick change gear; single back gear; one Universal chuck; fair condition.

1 **Barnes Lathe**—Swing over shears, 18″; max. distance between centers, 5′; eight feed changes in apron of carriage; single back gear; one Universal chuck; good condition.

1 **Hepburn Lathe**—Swing over shears, 20″; max. distance between centers, 26″; good condition.

1 **Bertram Lathe**—Swing over shears, 26″; max. distance between centers, 8′; taper turning attachment; quick change gears; double back gears; one Independent chuck; good condition.

1 **Pond Lathe**—Swing over shears, 38″; max. distance between centers, 9′; taper turning attachment; quick change gears; triple back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 30″; max. distance between centers, 16′; quick change gears; double back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 12′; quick change gears; double back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 4′; taper turning attachment; quick change gears; double back gears; one Universal and one Independent chuck; very good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 20″; max. distance between centers, 3′; taper turning attachment; quick change gears; double back gears; one Universal chuck; very good condition.

1 **Hepburn Lathe**—Swing over shears, 20″; 3′ between chuck and carriage; one set drawn in collar near chuck; good condition.

POWER SAWS

5—Atkins power saws, each 14″ capacity; complete with pumps; fair condition.

DRILL PRESSES (Vertical)

1—Barnes, 18″; fair condition.
1—Bertram, 42″; fair condition. Adjustable table and vertical movement on drill carriage.

PLANER

1—London, 36″ x 36″ x 7′ 6″, table; good condition.

TURRET BORING MILL

1—Bertram, 34″; turret with five bars; 17″ between table and cross rail; new.

COLD SAWS

6—Newton cold saws; capacity 7½″ for rounds; 7″ for squares. Direct or line shaft drive.

CUT-OFF MACHINE

1 Hall, suitable for stock 4″ to 6½; fair condition.

MOTORS

5—10 H.P. motors, 25 cycle, 3 phase, 220 volt, 750 r.p.m.
5—125 H.P. motors, 25 cycle, 3 phase, 220 volt, 750 r.p.m.
4—250 H.P. motors, 25 cycle, 3 phase, 2,200 volt, 730 r.p.m.

GRINDER CYLINDRICAL

1 Ford-Smith, swing 16″; centre of wheel to center of tailstock at max. pt. 27″; max. distance between centers, 3′ 6″; actual length of bed, 6″; fair condition.

For Further Particulars Apply to

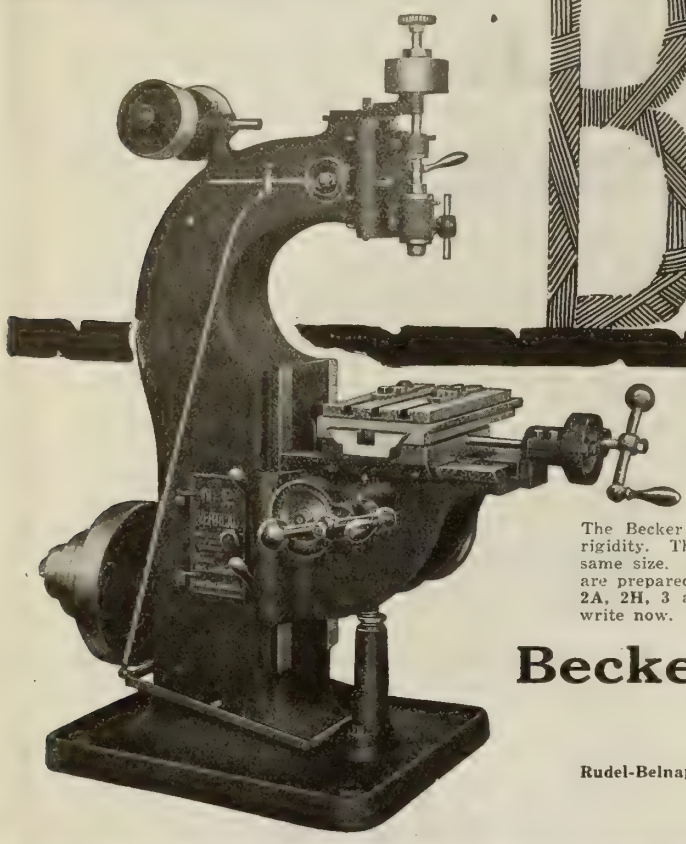
Canada Forge Plant

Canada Foundries and Forgings, Limited

WELLAND, ONT.

Becker Belt-Driven Millers
—The Machines that Give the Smooth Finish

BECKER



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The Becker Miller has many exclusive features which give it matchless speed and rigidity. Then it requires one-third to one-half less power than other millers of the same size. QUICK DELIVERIES—another feature of Becker Machines; in fact we are prepared to ship upon receipt of your order any of the following sizes: **No. 1, 2, 2A, 2H, 3 and 4B.** Any information you may require will be gladly furnished—write now.

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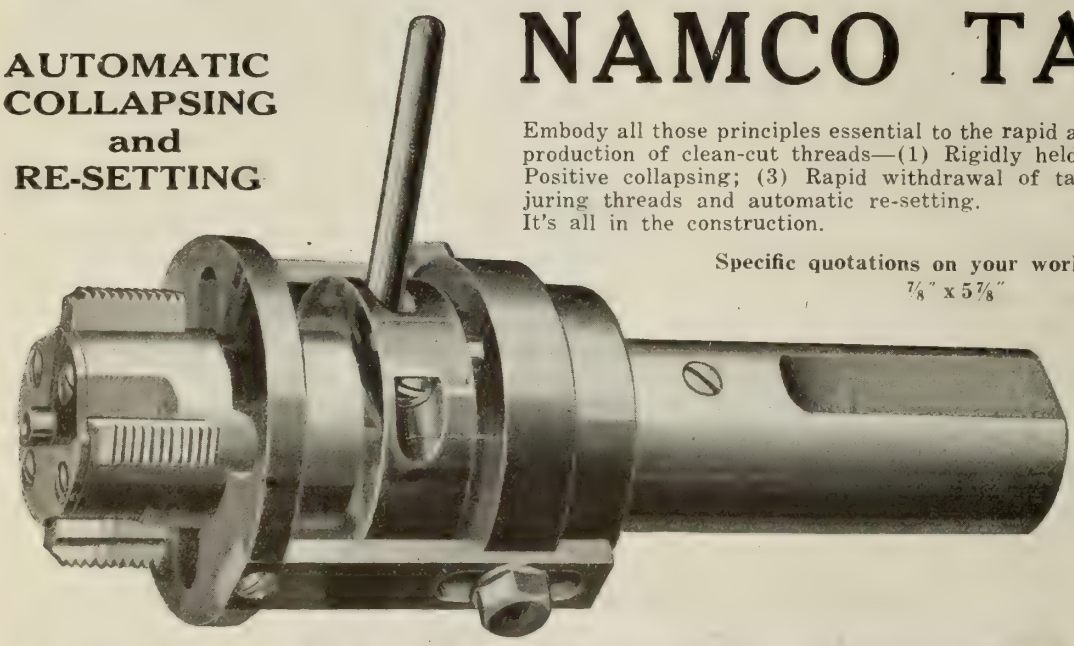
Embody all those principles essential to the rapid and economical production of clean-cut threads—(1) Rigidly held chasers; (2) Positive collapsing; (3) Rapid withdrawal of tap without injuring threads and automatic re-setting.
It's all in the construction.

Specific quotations on your work. Capacities, 7/8" x 5 7/8"



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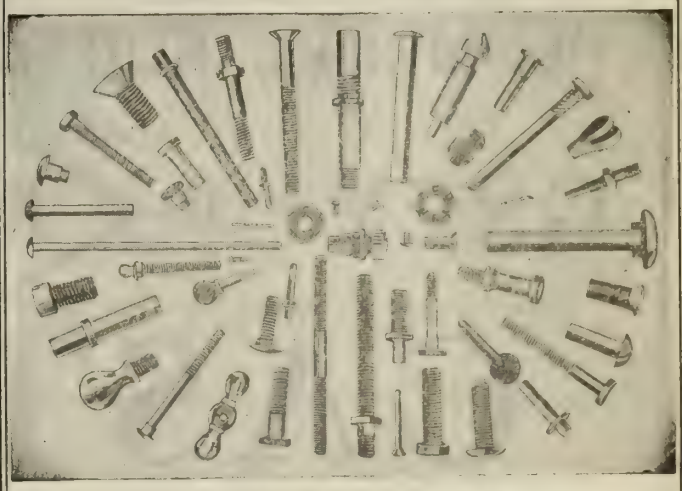

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Our present equipment, which is unexcelled in Canada, enables us to produce Thread Gauges, Tools, Dies, Jigs, Fixtures and other gauge work upon short notice.

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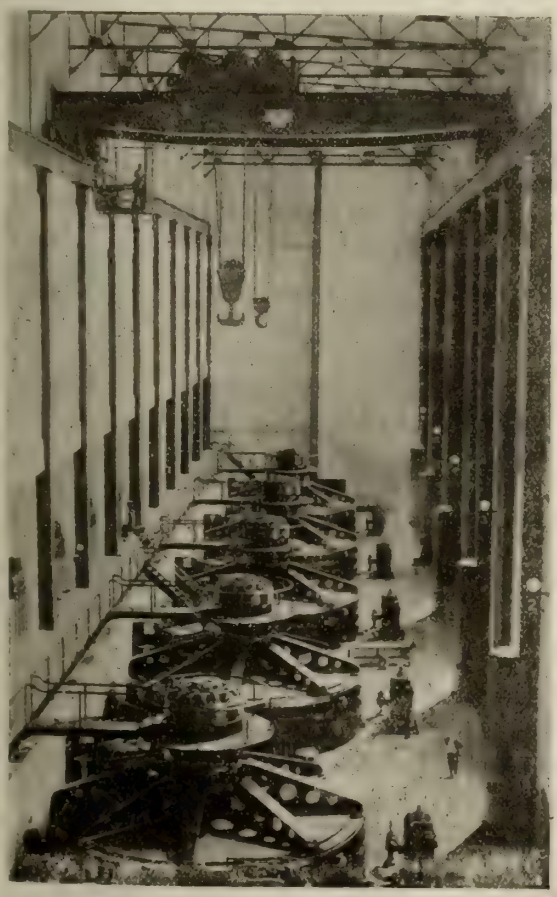

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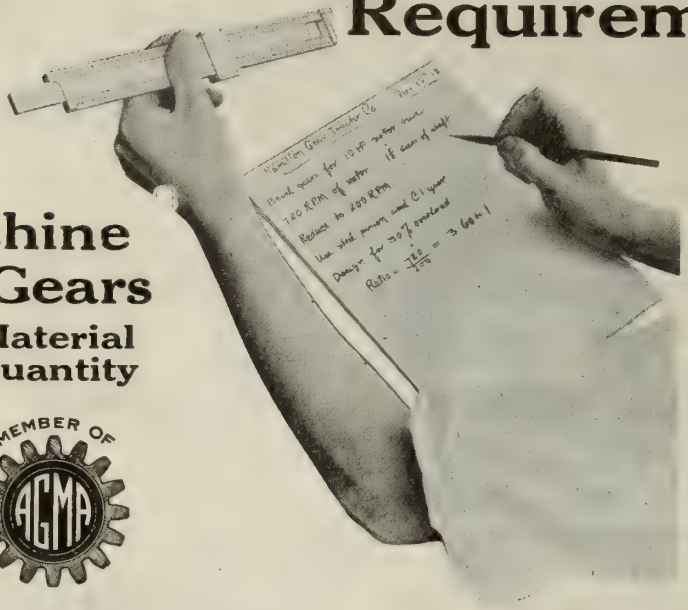

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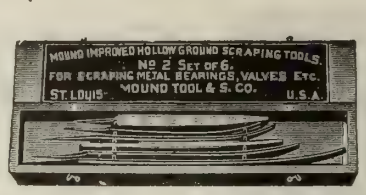

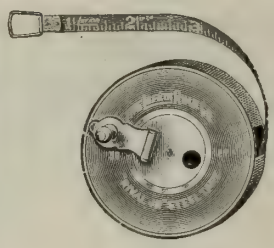

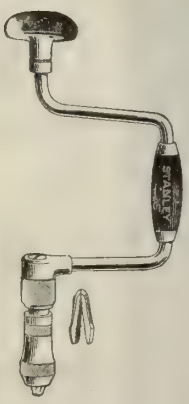

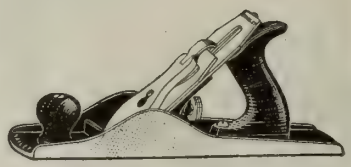

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This cabinet is strongly made and handsomely finished to suit the individual buyer, drawers slide easy and noiselessly, locks securely.

Style 5, shown here, made in two sizes. Send for prices.

For seventy years the Rice Lewis tool department has earned a reputation for quality and service.

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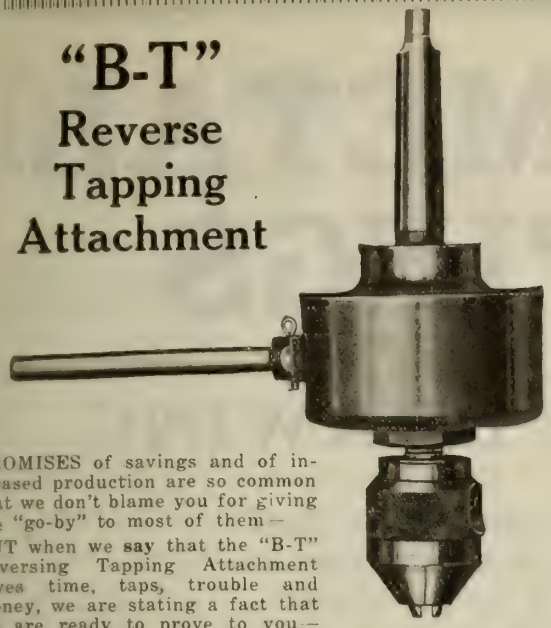

PROMISES of savings and of increased production are so common that we don't blame you for giving the "go-by" to most of them—

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PERFORMANCE in your own shop will show the "B-T" advantages. Equipped with friction drive—the first attachment of its kind built to fit **any make** of drill press—the "B-T" automatically adjusts itself to pressure, eliminating reversing strains and preventing tap breakage due to binding or other breaking stresses. Made also with positive drive.

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Leak-Proof Your Flange Joints

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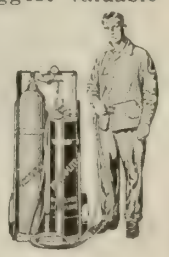

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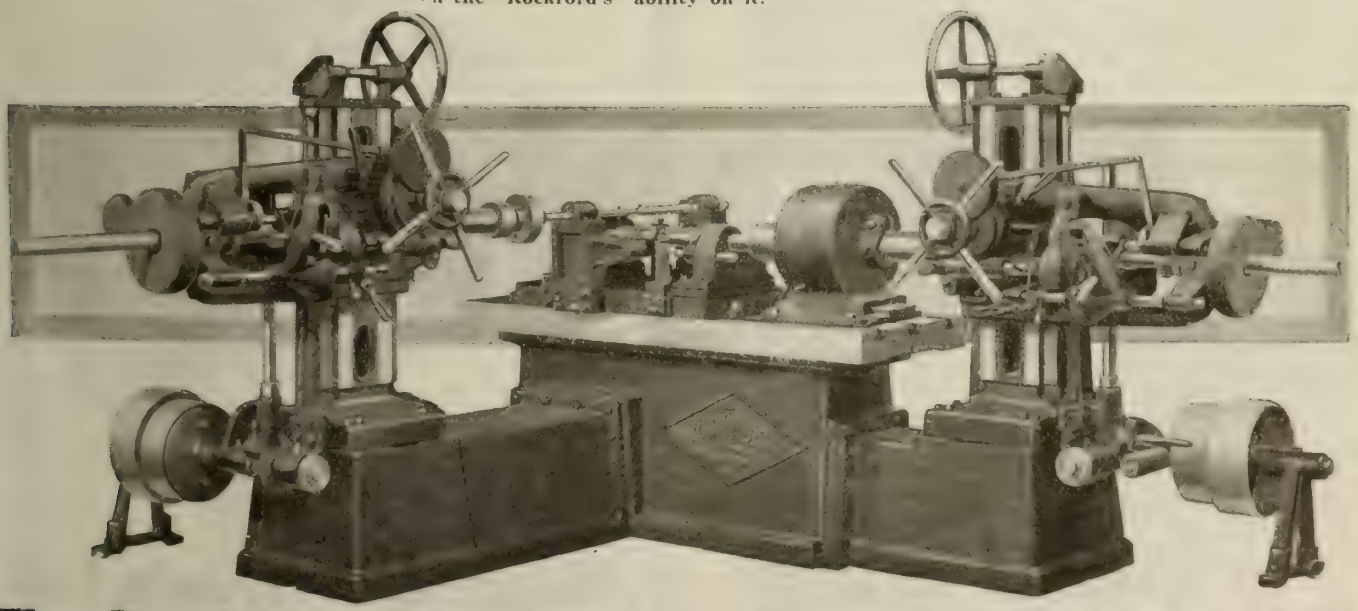
This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



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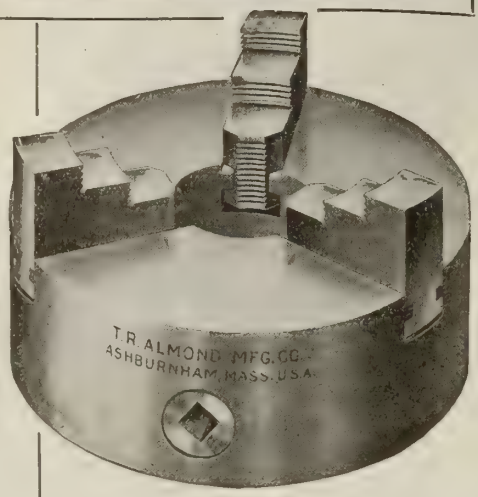
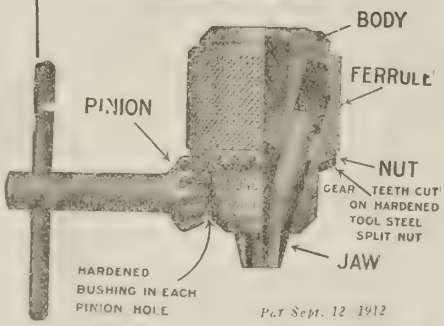
Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".



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English Readings, 1", 2" and 3".

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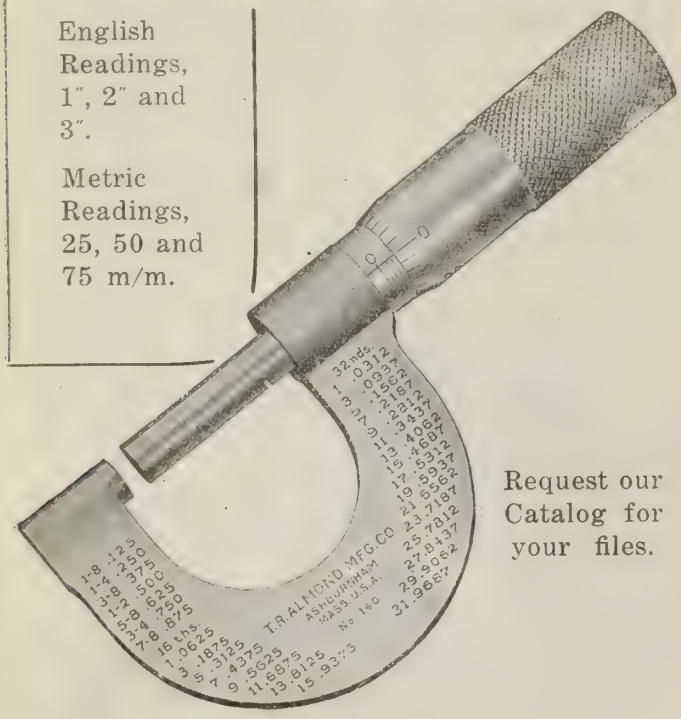

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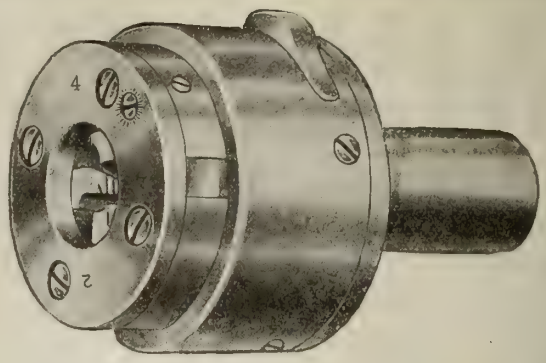

H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

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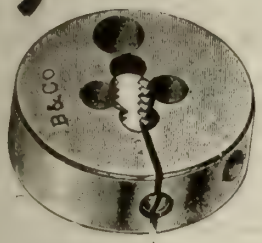
New Haven, Conn., U.S.A.

For Accuracy, Grip *and* Durability

Knight Metal Products, Ltd.
119 W. Adelaide St. - Toronto, Ont.

Butterfield



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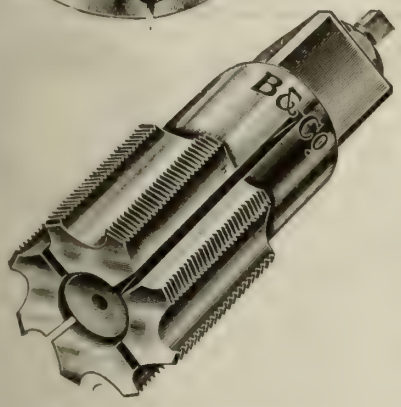
The Deciding Factor in Tool Economy is Quality



Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.

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FOR NEARLY 60 YEARS

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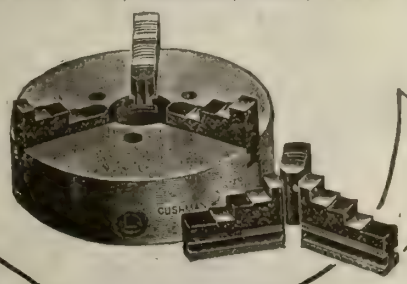

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We might truthfully claim that Jacobs Chucks are the best in the world, in point of material, workmanship, convenience, accuracy and finish. While such claims might interest you, they might not convince. But—

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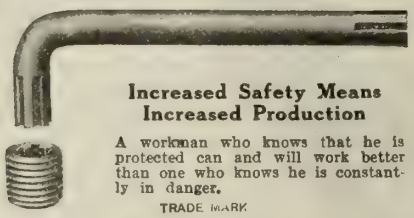

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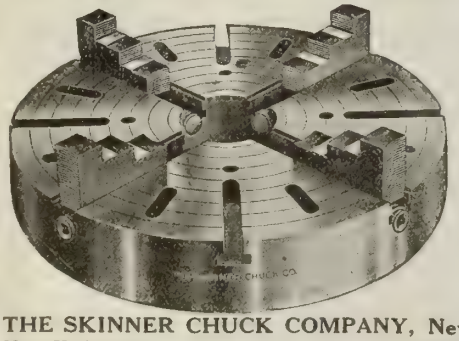

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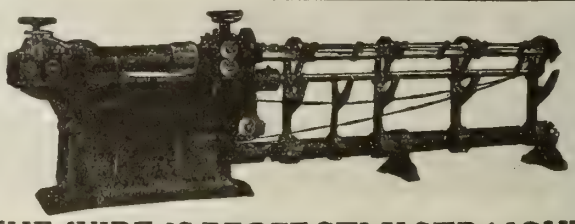

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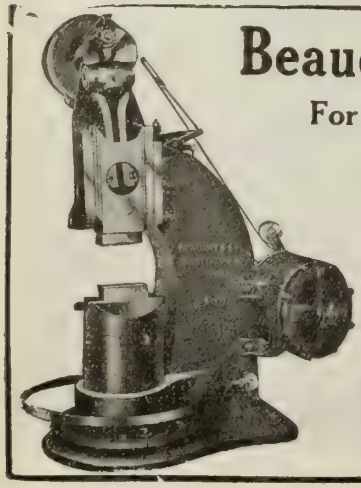

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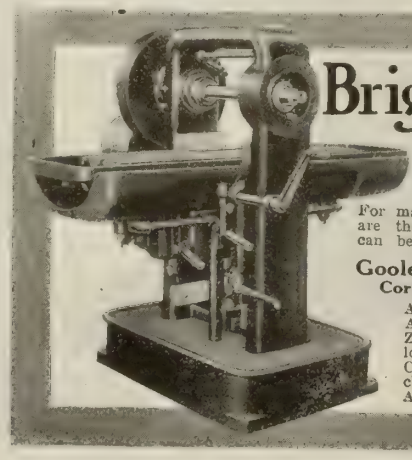

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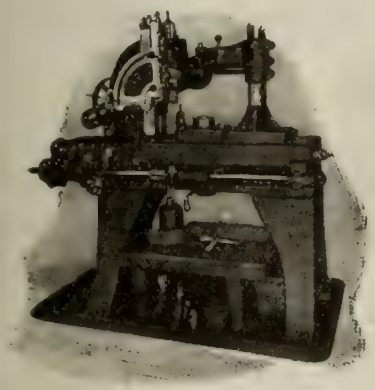

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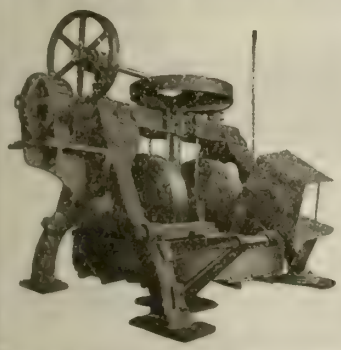

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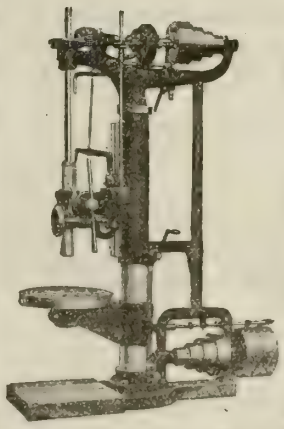

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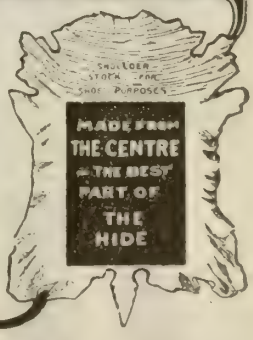

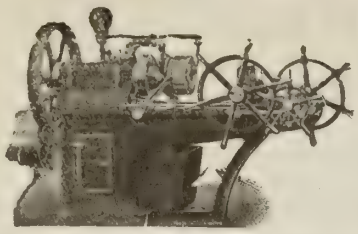

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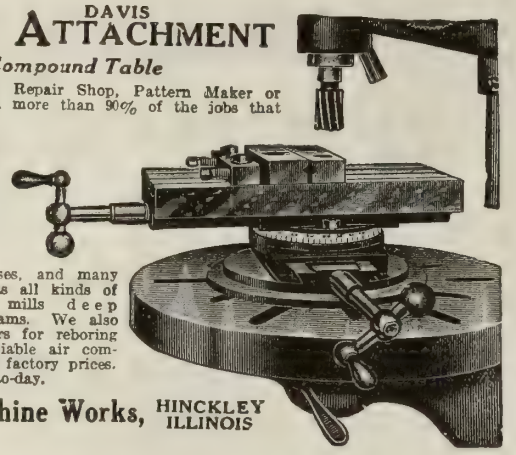

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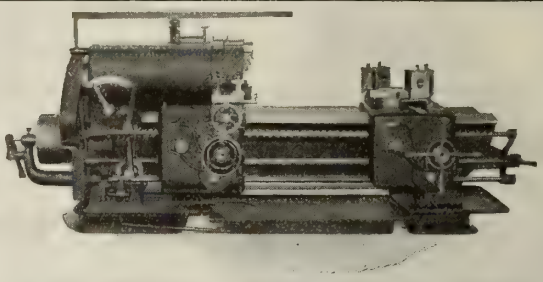

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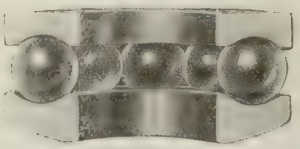

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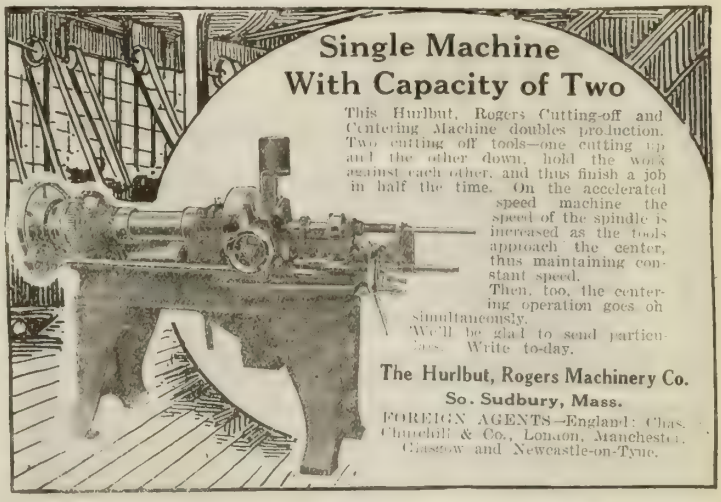

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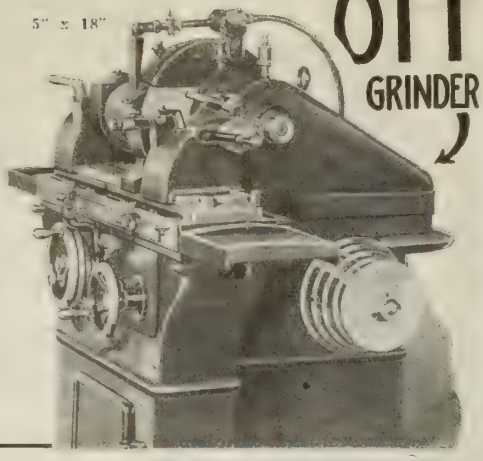

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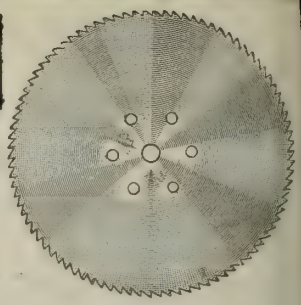

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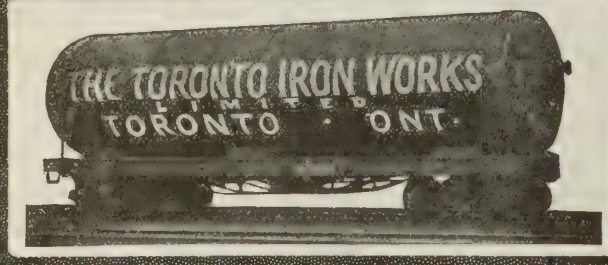

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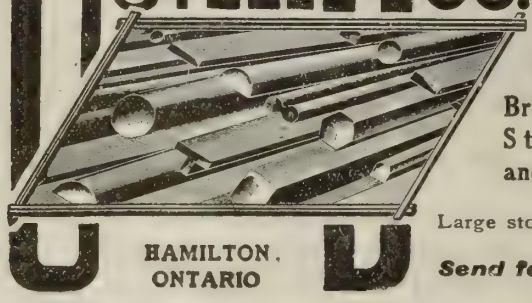

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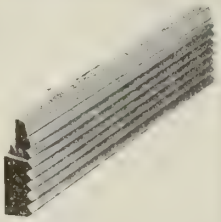

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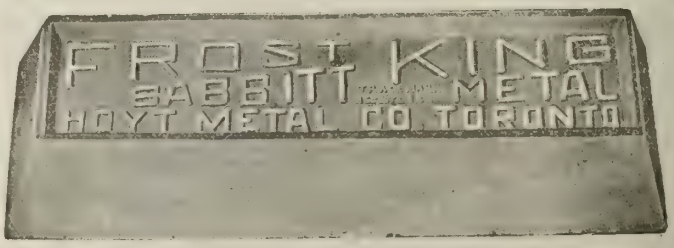

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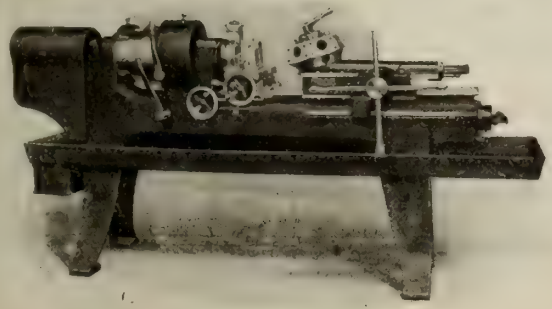

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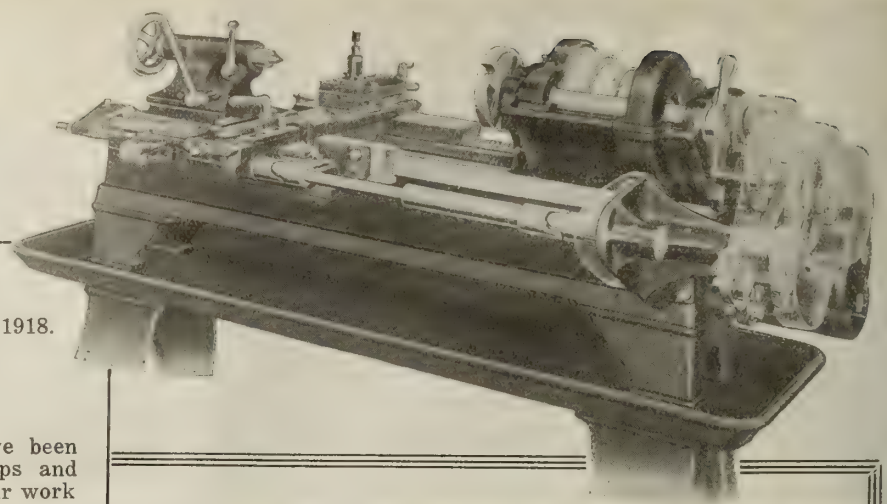
With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"



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Garlock-Walker Machinery Co., Toronto, Ont.
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Hardinge Bros., Chicago, Ill.
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On nights when the German air raiders were out, they sent up strange, luminous balls behind their lines and anchored them above the clouds—globes of fire which could be seen for forty miles or more. What these "onions" were, or how they were kept in stationary position above the clouds, is still a profound mystery. The Allies never learned anything about them, but the Allied night bombing crews steered their course to the Rhineland by the luminous buoys thus provided.

What is known about the onions is told by Lieut. J. Vernon McKenzie in the course of an article, "Raiding the Rhineland," in MARCH MACLEAN'S. It is an intensely interesting article, telling all about the great reprisal campaign which implanted the fear of war in the German civilian heart.

"NO HOPE FOR THE WETS"

"Already the temperance forces are lined up to stop any possible break in the prohibition dam," writes J. K. Munro, in discussing what is going to happen at the coming session at Ottawa. He predicts that Union Government will hold together, but that the habit it has contracted of promising everything asked is going to make a lively session. He expects:

Dry legislation at the earliest possible moment.
The moral reform forces in control.
No change in the Divorce Law.
Tariff concessions made to the West.

The March number, in fact, is full of live, up-to-the-minute features.
The famous Canadian Ace, Lieut.-Colonel W. A. Bishop is on the cover.

Some of the outstanding articles and stories are:

The Transformation (a new serial)—By Frederic S. Isham.
A Canadian King-maker (the story of Lord Beaverbrook in Britain)—By Maurice Woods.
Fitting in the Returned Soldier—By George Pearson.
The Three Sapphires—By W. A. Fraser.
The Strange Adventure of the Nile Green Roadster—By Arthur Stringer.
Fakers—and Others—By E. Ward Smith.
Lend Me Your Title—By Onoto Watanna.
A Shady Deal—By Archie P. McKishnie.
The City of Lost Laughter—By Mary Josephine Benson.

The Voice of Canada Interpreted

A new department starts in this number given over to summarizing and presenting opinion in Canada on outstanding topics, as reflected in the press. In this issue the department is given over to a careful compilation of opinion on the problems of the returned soldier.

Events of the World in the Remaking

Germany Ready for Trade War
Three-Year Marriages in France
No Solution in Ireland Possible?
Controlling Booze in Britain
Is Czar Still Alive?
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Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Morse Twist Drill & Mch. Co., New Bedford, Mass
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRY CLEANING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELEVATOR MACHINERY
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont
Can. Matthews Gravity Carrier Co., Toronto, Ont
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont
Williams & Wilson, Limited, Montreal, Que.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Baxter & Co., Ltd., J. R., Montreal, Que
Brantford Emery Wheel Co., Brantford, Canada
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Trueing Tool Co., Windsor, Ont.

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Gutta Percha & Rubber, Ltd., Toronto, Can.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

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Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES
Brewster Co., Wm., New York, N.Y.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL
J. F. A. Comstedt, New York City, N.Y

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL
J. F. A. Comstedt, New York City, N.Y.

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Can. Foundries & Forgings, Ltd., Welland, Ont
United Brass & Lead, Ltd., Toronto.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich

FANS
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Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

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Atkins & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

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Bowser & Co., S. F., Inc., Fort Wayne, Ind
Canada Wire & Iron Goods Co., Hamilton, Ont

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Fittings, Ltd., Oshawa, Ont.

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Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

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Sleeper & Hartley, Inc., Worcester, Mass.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

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Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

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Can. Billings & Spencer, Ltd., Welland, Ont.
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Dom. Forge & Stamping Co., Walkerville, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Canada Foundries & Forgings, Ltd., Welland, Ont.
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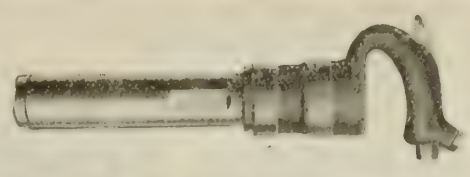

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Rated size	Drills to center of	Wall to end of arm
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13 ft.	26 ft. circle	16 ft.

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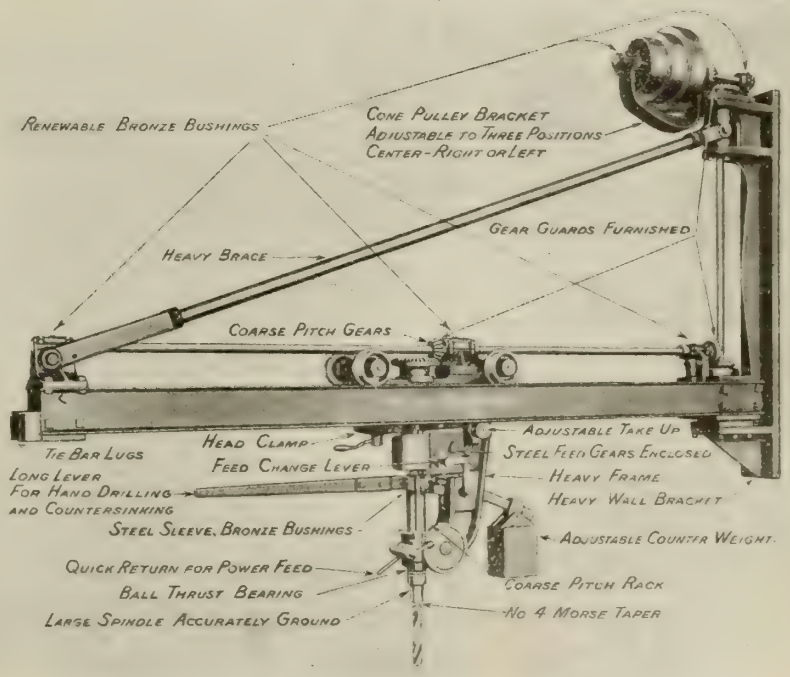

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GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind

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Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

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Normac Machine Co., St. Catharines, Ont.
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Pratt & Whitney Co., Hartford, Conn.
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United Brass & Lead, Ltd., Toronto.
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Worth Engineering Co., Toronto, Ont.

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Taylor Instrument Co., Rochester, N.Y.

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Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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GEAR-TURNING MACHINES, BEVEL
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Dom. Foundries & Steel, Ltd., Hamilton, Ont.
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Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

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Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
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Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Willson & Co., Inc., T. A., Reading, Pa.

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Rice Lewis & Son, Toronto, Ont.

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Standard Optical Co., Geneva, N.Y.
Strong, Kenard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.

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Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Modern Tool Co., Erie., Pa.
Morse Twist Drill & Machine Co., New Bedford.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O
Williams & Wilson, Limited, Montreal, Que.

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Brown & Sharpe Mfg. Co. Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati, Ohio.
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Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
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Heald Machine Co., Worcester, Mass.
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Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
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Modern Tool Co., Erie, Pa.
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Landis Tool Co., Waynesboro, Pa.
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Norton Grinding Co., Worcester, Mass.
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Ford-Smith Mach. Co., Hamilton, Ont.
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Grant Mfg. & Machine Co., Bridgeport, Conn
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Wing & Son, J. E., Hamilton, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
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LeBlond Mach. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York, N.Y.
Wisconsin Electric Co., Racine, Wis.
Williams & Wilson, Limited, Montreal, Que.

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Ford-Smith Mahcine Co., Hamilton, Ont.
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Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Ford-Smith Machine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Racine Tool & Machine Co., Racine, Wis.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
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Canadian Billings & Spencer Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
High Speed Hammer Co., Rochester, N.Y.
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Niles-Bement-Pond Co., New York, N.Y.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Limited, Montreal, Que.

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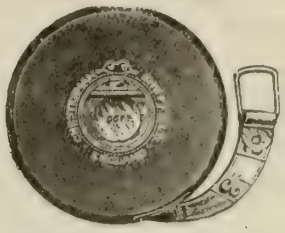

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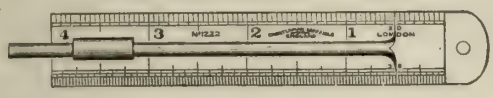

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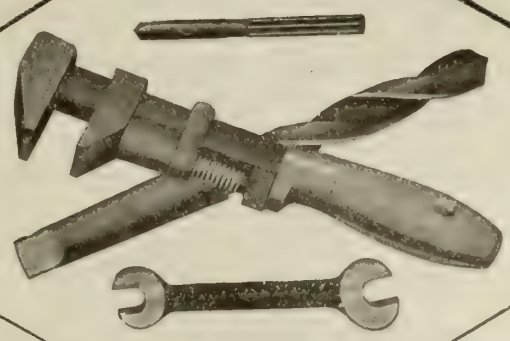

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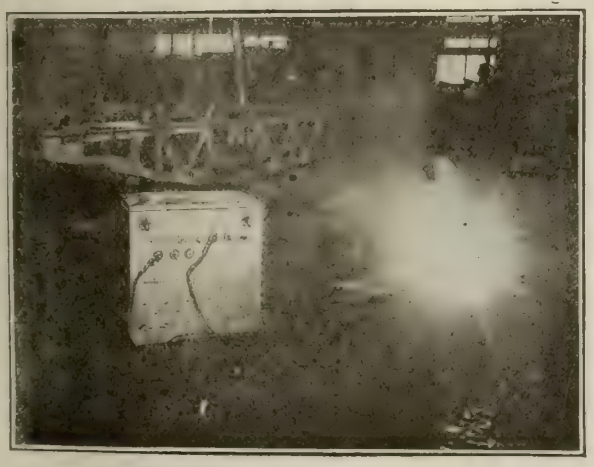

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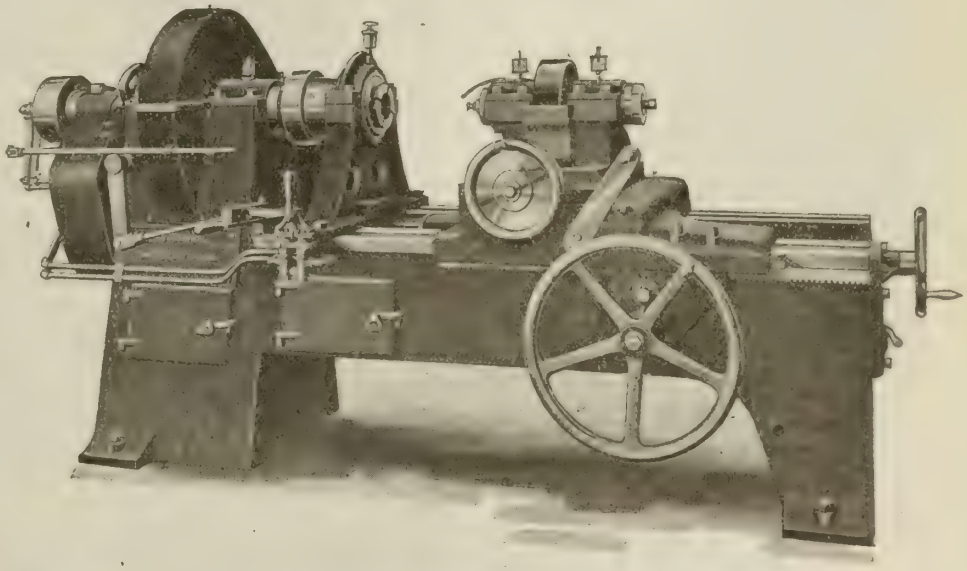

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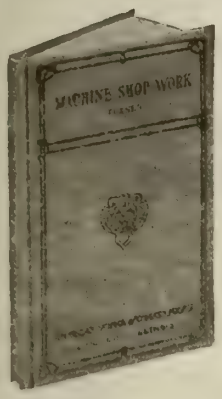

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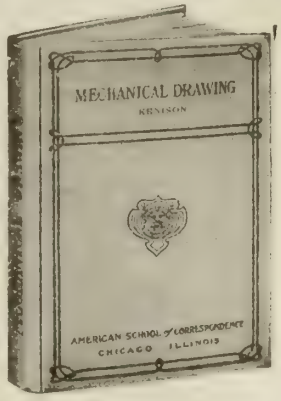

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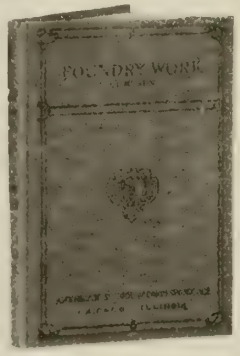

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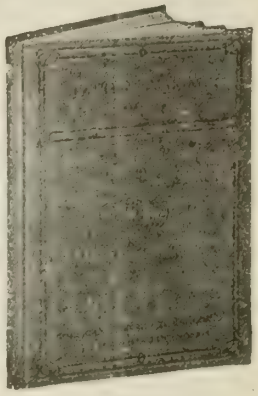

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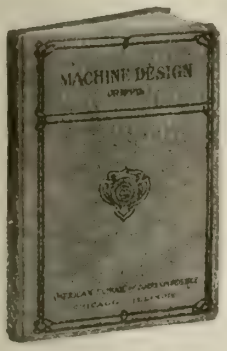

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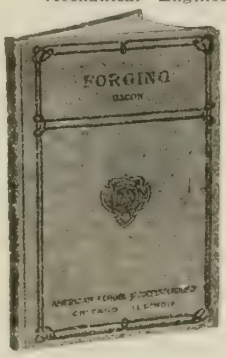

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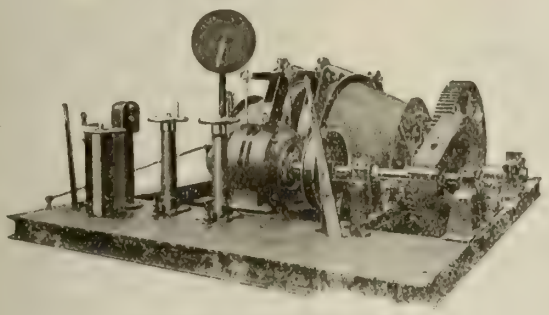

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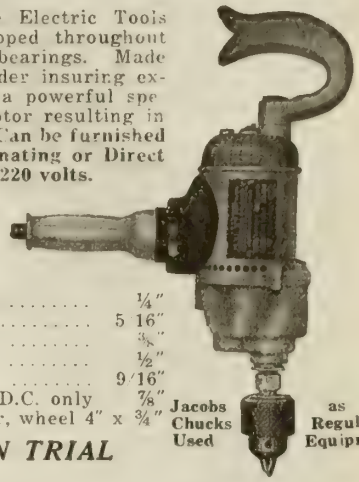

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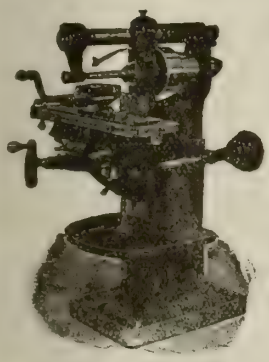

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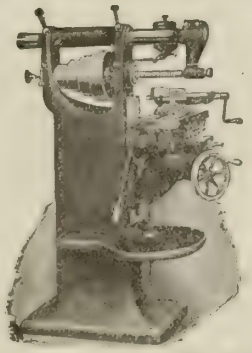

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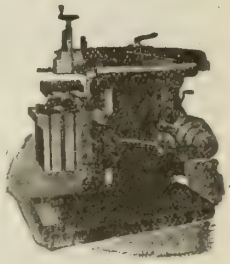

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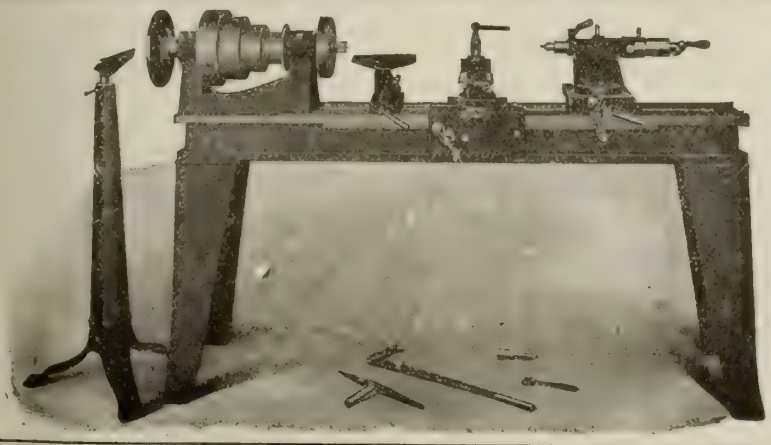

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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
National-Acme Co., Cleveland, Ohio.
Mulliner & Eulund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co, Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPROCKETS, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.

STAYBOLT TOPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

STAIRS, IRON
Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont

STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont
Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.

STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL BALLS
Rochester Ball Bearing Co., Rochester, N.Y.

STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y
Illingworth Steel Co., John, New York, N.Y
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Latrobe Electric Steel Co., Latrobe, Pa
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa

STEEL CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S
Swedish Crucible Steel Co., Windsor, Ont.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co. Montreal, Que.

STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que

STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.

STELLITE, HIGH-SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.

STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.

STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que
Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
New Britain Machine Co., New Britain, Conn.

STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain, Conn.

STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.

STRAND
Page Steel & Wire Co., Adrian, Mich.

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Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

STRUCTURES, STEEL BUILDINGS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

SYSTEMS, REMOTE CONTROL FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

STORAGE AND HANDLING SYSTEMS FOR DRY CLEANERS, AND NAPHTHA
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, RECLAIMING, FOR OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, RAILWAY OIL, STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, PAINT, OIL STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, OIL STORAGE AND DISTRIBUTING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.

TABLES, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

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Sleeper & Hartley, Inc., Worcester, Mass.

TAPPING MACHINES (PENUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto

TANKS, GASOLINE, KEROSENE AND OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.

TANKS, LUBRICATING OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANKS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANKS, STEEL, WATER PRESSURE
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que
Toronto Iron Works, Ltd., Toronto.

TANKS, UNDERGROUND STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.

TANKS, WHEEL, FOR LUBRICATING OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

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James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.

TAPPING MACHINES AND ATTACHMENTS
Bertram, John, & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Niles-Bement-Pond Co., New York
Rickert-Shafer Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

TAPES—MEASURING, STEEL AND WOVEN
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TAPES, POCKET
Lufkin Rule Co. of Can., Windsor, Ont.

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Baxter Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, GUN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
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TAPS, STAYBOLT, "MAX" TAP
Greenfield Tap & Die Corp., Greenfield, Mass.
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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.
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Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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TAP EXTRACTORS
Walton Co., The, Hartford, Conn.

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Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, RECORDING AND INDEX
Bristol Co., Waterbury, Conn., U.S.A.
Taylor Instrument Co., Rochester, N.Y.

TESTING INSTRUMENTS METALLURGICAL
Shore Instrument & Mfg. Co., New York City

TESTING LABORATORIES
Toronto Testing Laboratory, Toronto.

THREAD-CUTTING MACHINES
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Curtis & Curtis Co., Bridgeport, Conn.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

THREADING TOOLS
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Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

THREADING MACHINES FOR BOLTS, NUTS AND PIPES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

THREAD MILLING MACHINES
Taft-Pierce Mfg. Co., New York, N.Y.
Smalley-General Co., Inc., Bay City, Mich.

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Canada Found'ls & Forgings, Ltd., Welland, Ont.
United Brass & Lead Ltd., Toronto.
Williams & Co., J. H., Brooklyn, N.Y.

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Brown, Boggs & Co., Hamilton, Can.
Williams & Wilson, Limited, Montreal, Que.

TIRE BENDERS
A. B. Jardine & Co., Limited, Hespeler, Ont.

TIRE SETTING MACHINES, HYDRAULIC
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.

TOOL CASES
Rice, Lewis & Son, Toronto, Ont.

TOOL HOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Armstrong Bros. Tool Co., Chicago.
Deloro Smelting & Refining Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL POSTS, LATHE
Armstrong Bros. Tool Co., Chicago.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL ROOM PARTITIONS
Canada Wire & Iron Goods Co., Hamilton.

TOOL STEEL
Armstrong, Whitworth, Ltd. of Canada, Montreal.
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Deloro Smelting & Refining Co., Toronto, Ont.
General Steel Co., Milwaukee, Wis.
H. A. Drury Co., Montreal.
Firth & Sons, Thos., Montreal, Que.
Hammond Steel Co., Inc., Syracuse, N.Y.
Harvey & Co., Arthur C., Boston, Mass.
Hawkridge Bros. Co., Boston, Mass.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

TOOLS, BLACKSMITHS'
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.

TOOLS, ADJUSTABLE BORING
The Kelly Reamer Co., Cleveland, O.
Williams & Wilson, Limited, Montreal, Que.

TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago, Ill.
A. R. Williams Machinery Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
United States Elec. Tool Co., Cincinnati, O.

TOOLS, FORMING
Davidson Tool Mfg. Co., New York, N.Y.

TOOLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

TOOLS, LATHE, PLANER, SLOTTER
Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y.

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind.

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Armstrong, Whitworth of Canada, Ltd., Montreal.
Prest-O-Lite Co., Inc., Toronto, Ont.

TRACK, PORTABLE STEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

TRANSFORMERS
MacGovern & Co., Montreal, Que.

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American Pulley Co., Philadelphia, Pa.
A. R. Williams Machinery Co., Toronto.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

TRANSMISSION POLES
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TRANSMISSION ROPE
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MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Wilson & Co., J. C., Belleville, Ont.

TRANSMISSION TOWERS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Dominion Bridge Co., Montreal, Quebec.
MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
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Tallman Brass & Metal Co., Hamilton.

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Cowan Truck Co., Holyoke, Mass.

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Wright Mfg. Co., Lisbon, Ohio.

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Rice, Lewis & Son, Toronto, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Tap & Die Corp., Greenfield, Mass.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Garvin Machine Co., New York.

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TURNTABLES
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UPSETTING AND BENDING MACHINERY
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Becker Milling Machine Co., Boston, Mass.
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New Britain Machine Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

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Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Skinner Chuck Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

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Wilkinson & Kompass, Hamilton, Ont.
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WELDERS, ELECTRIC, SPOT, BUTT, ETC.
Tabor Mfg. Co., Philadelphia, Pa.

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(Autogenous and Oxy-Acetylene) see OXY-ACETYLENE

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Williams & Wilson, Limited, Montreal, Que.

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Kennedy & Son, Wm., Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

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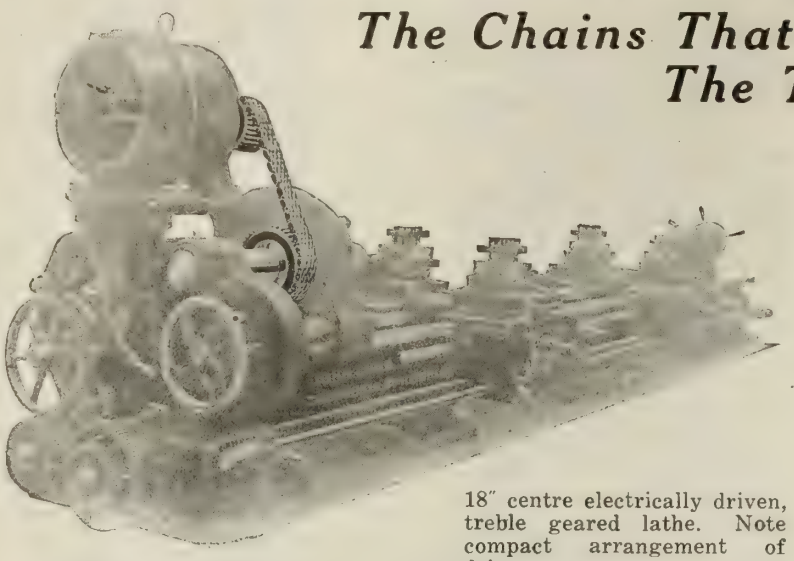
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

"The Coventry" Chain Drives

The Chains That Carried The Tanks To Victory



18" centre electrically driven, treble geared lathe. Note compact arrangement of drive.

Advantages of Chain Transmission

Will work at a high speed and in either direction. Positive yet flexible even turning movement. Will work on centres too long for gears and too short for belts, so that drive can be arranged to suit other details of design. Unaffected by heat or cold. Give positive velocity ratio, minimize journal friction. Will transmit considerable power with high efficiency which is retained.

Increase output, give uniform quality of product, consume minimum of power. Minimum attention required for repairs or adjustment.

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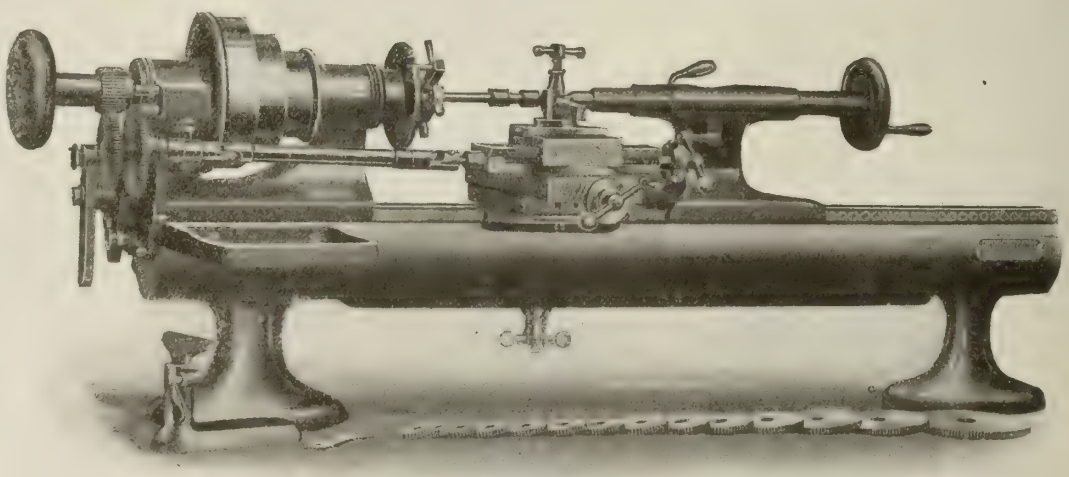

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CANADIAN MACHINERY

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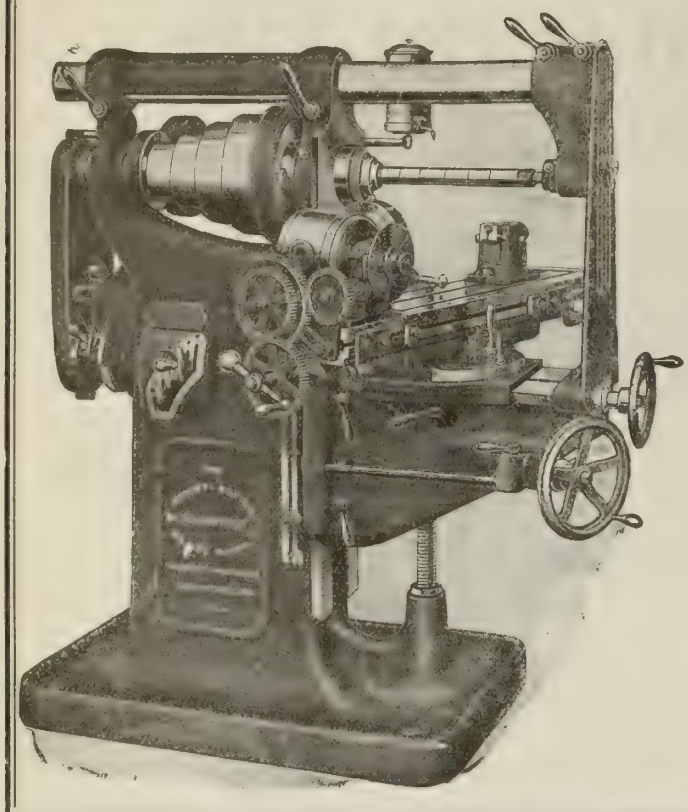
Anybody Can Operate This Miller



and Turn Out a Pile of Work so Simple to Operate is the

"HENDEY"

Skilled mechanics are scarce these days—but anyone can run a machine of its simplicity and turn out work accurately and fast without trouble.

All Feeds positive driven through gearings giving 18 changes.

This is the universal type—designed to handle all milling operations performed on machines of this character, either with regular equipment or by aid of attachments, which can be supplied for increasing efficiency and scope of machine.

Write for full description

The Hendey Machine Co.

Torrington, Conn., U.S.A.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

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BARGAIN

HIGH-SPEED DRILLS *and* BRIDGE REAMERS

in Stock at Montreal

as follows:

TAPER SHANK DRILLS

Size	No. in Stock
1/4"	136
5/32"	112
9/32"	136
5/16"	112
11/32"	124
19/64"	136
23/64"	137
3/8"	136
7/16"	112
31/64"	190
1/2"	126
17/32"	125
35/64"	142
19/32"	124
5/8"	196
23/32"	147
3/4"	136
7/8"	136
15/16"	120
31/32"	146
1"	136
1-23/64"	120
1-13/32"	40
1-3/4"	40

STRAIGHT SHANK DRILLS

Size	No. in Stock
19/64"	17
11/32"	15
31/64"	16
33/64"	229
37/64"	20
19/32"	60
11/16"	45
5/8"	36
45/64"	85
53/64"	27
27/32"	13
7/8"	32
31/32"	11
1"	25
1-1/64"	19
1-3/16"	30
1-3/8"	20
1-7/16"	21
1-9/16"	15
1-5/8"	10

JOBBERS' DRILLS

Size	No. in Stock
7/64"	58
9/64"	48
11/64"	48
3/16"	48
13/64"	48
7/32"	48
15/64"	48
1/4"	150
17/64"	24
9/32"	28
5/16"	48
19/64"	48
21/64"	36
11/32"	60
23/64"	86
3/8"	48
25/64"	259
13/32"	48
27/64"	70
7/16"	62
29/64"	324
15/32"	48
31/64"	199
1/2"	49

WIRE GAUGE DRILLS

Size	No. in Stock
No. 1	50
No. 2	52
No. 3	40
No. 6	40
No. 8	30
No. 9	96
No. 10	62
No. 11	147
No. 12	90
No. 13	74
No. 14	195
No. 15	157
No. 16	152
No. 17	44
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No. 28	62
No. 29	53
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No. 31	77
No. 32	61
No. 33	175
No. 34	46

LETTER GAUGE DRILLS

Size	No. in Stock
B	26
C	17
F	21
G	16
H	36
I	26
J	46
K	56
M	46
N	173
O	134
P	26
Q	36
R	36
S	26
T	16
V	182
W	156

H.S. TAPER SHANK BRIDGE REAMERS

120 only	9/16" dia.
200 only	11/16" dia.
300 only	15/16" dia.
200 only	1-1/16" dia.

ALL SUBJECT TO PRIOR SALE — PRICES VERY ATTRACTIVE

The Geo. F. Foss Machinery & Supply Co., Limited

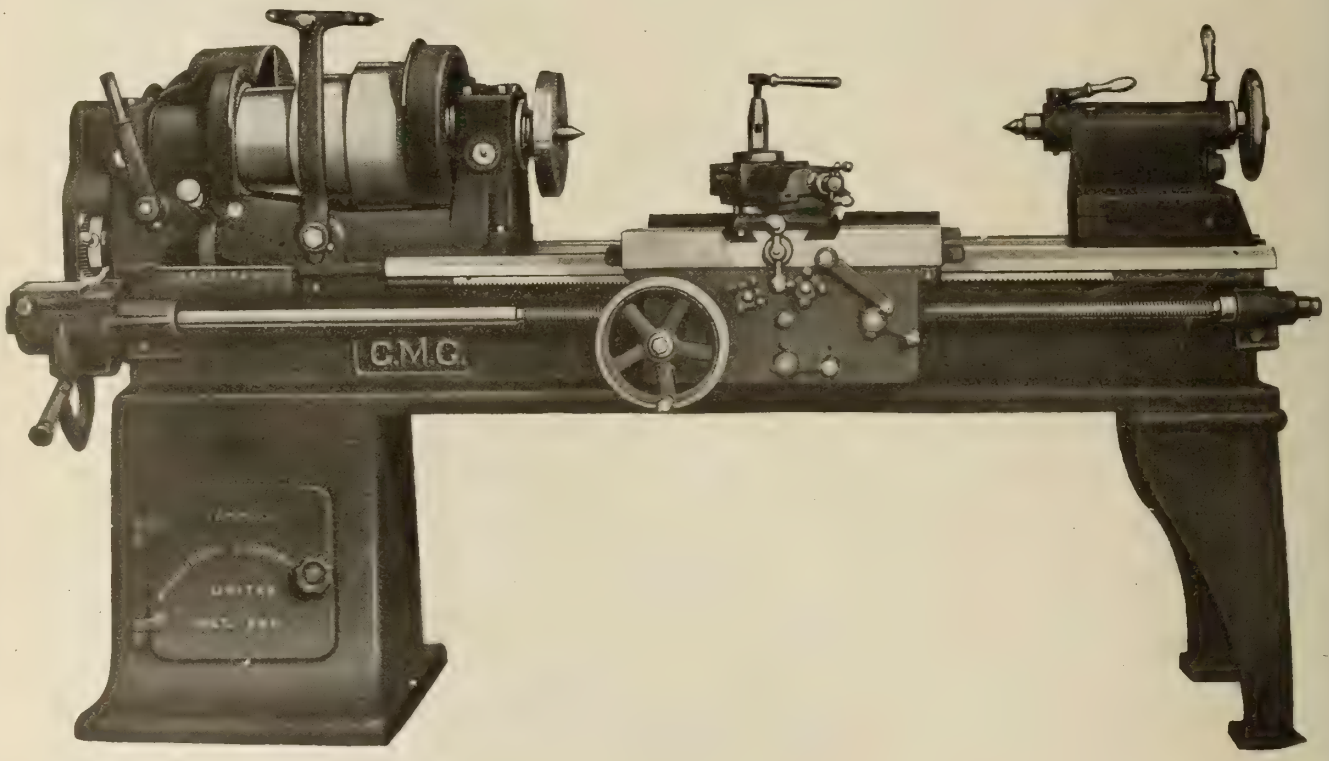
Machine Tools and Supplies

305 St. James Street — Montreal, Que.

THE TRADE MARK and THE MACHINE

Our registered trade mark appears on all machine tools for wood and iron working manufactured by us and is a guarantee that the quality and workmanship are of the highest standard.

Our machines equally uphold the trade mark. Their efficiency under severe working conditions has built up and maintained their enviable reputation.



16″ and 18″ Engine Lathes with Quick Change Gears.
For prompt delivery.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: Brock Avenue Subway

EXPORT NUMBER

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
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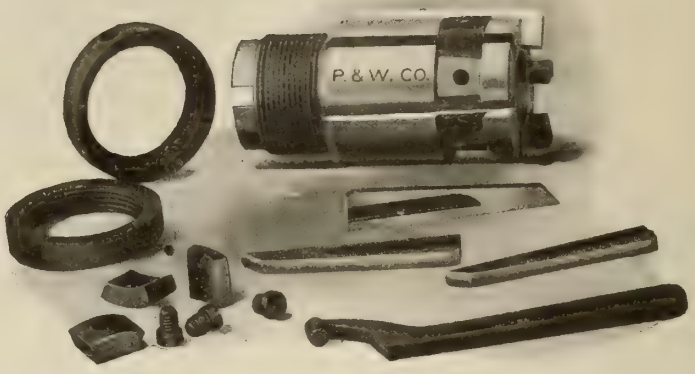
Vol. XXI. No. 10. Publication Office: Toronto, March 6, 1919 Subscription Price $3.00 per Year

MONTREAL TORONTO HAMILTON WINNIPEG

SMALL TOOLS

P. & W. Adjustable BLADE REAMERES



These reamers have eccentric relief and can be set to size without regrinding. They are unexcelled for design and simplicity and ease of adjustment. The eccentrically relieved blades are stronger than others, do not chatter, and produce a smoother hole. The hand, shell and fluted chucking reamers have interchangeable nuts, screws and wrenches. The bottom of a hole can readily be faced. By a simple adjustment of the blades the reamers can easily be set to size without regrinding.

PROMPT SERVICE

Small Tools are carried in stock. Place your order there to-day.

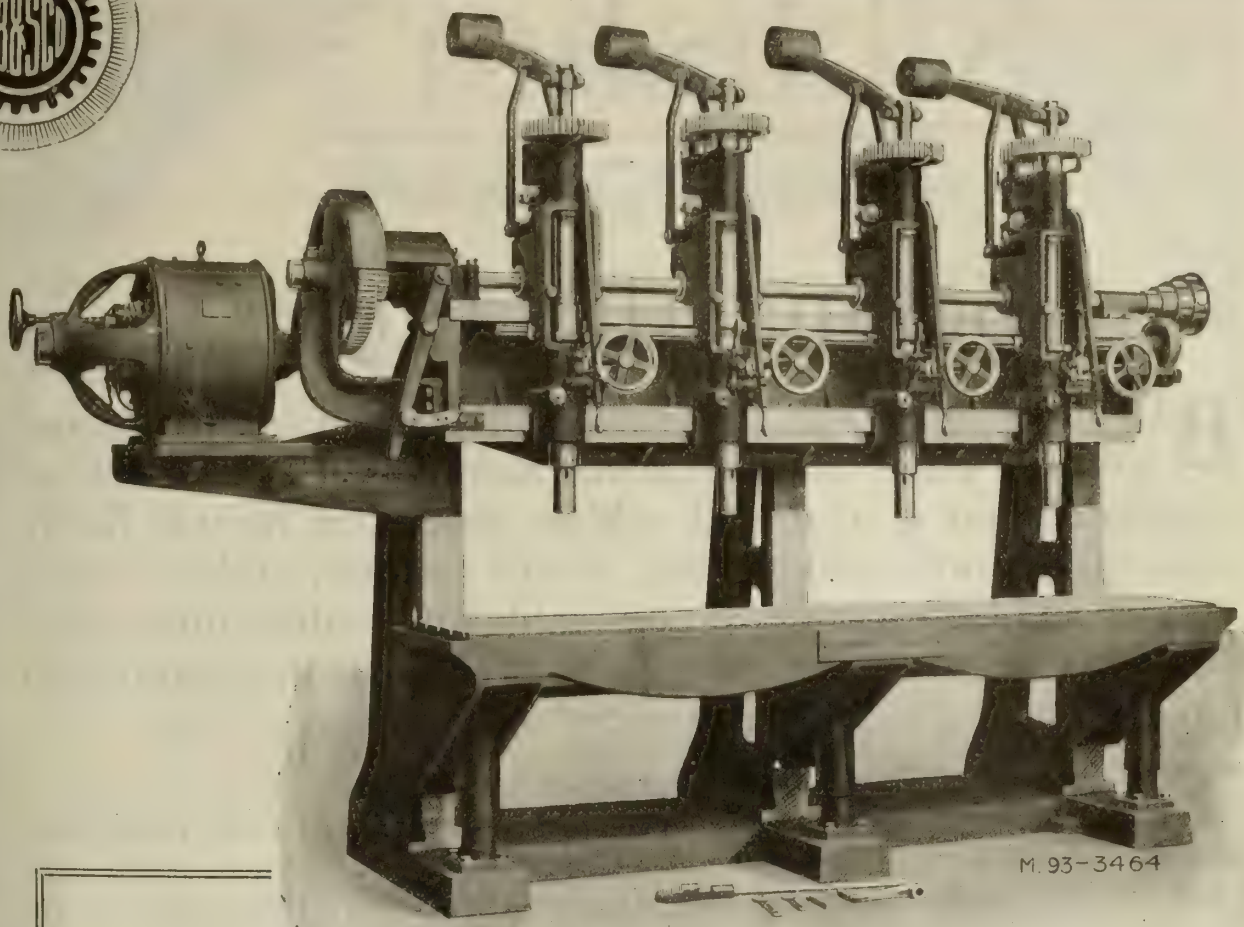
Precision Machine Tools--Standard and Gauges

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg	1205 McArthur Bldg.	B.C. Equipment Co.



Multiple Drills

OF EVERY DESCRIPTION

Bertram 4-Spindle Multiple Drilling Machine for Locomotive and Other Work

SIMULTANEOUS OR INDEPENDENT FEEDS with INDEPENDENT KNOCK-OFF FOR EACH HEAD AND CLUTCH DRIVE FOR EACH SPINDLE.

CAPACITY, FOUR 2-inch HOLES IN STEEL.

Drop us a line for photographs and full particulars.

The John Bertram & Sons Company
Limited

DUNDAS, ONTARIO, CANADA

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723 Drummond Bldg.	1002 C.P.R. Bldg.	609 Bank of Ottawa Bldg.	1205 McArthur Bldg.

The Publisher's Page

TORONTO MARCH 6, 1919

Selling the Buyer

BEFORE you make a sale it is only reasonable to assume that the buyer must be made familiar with the article or appliance you wish to sell. More than that, he will likely demand to know who you are, where you are, and all about you, or sufficient about you to enable him to determine what you have in the way of reputation to back the goods you have for sale.

THE process of making an actual buyer out of a prospect consists primarily in educating him. Education in all branches of endeavor is best accomplished by means of the *printed word*. It is not only the most *effective* medium, but it is the most *economic*. It not only accomplishes what it is intended to do, but it does it with the least possible expense.

IN every branch of commercial and industrial life we have to-day the *technical* or trade journals. Only the unthinking underestimate the power of those educative mediums. Their rapid growth and increasing circulation alone are convincing evidence of their usefulness. They are specialists in their respective fields of endeavor.

They are the great disseminators of practical information and trade news. Their clientele is made up of sober, thinking, ambitious, responsible mechanics and business men. The idly curious and irresponsible do not read them.

IT is because the technical journal is educational in character that so many manufacturers recognize in it the ideal medium for *educating* their army of probable buyers and customers to understand and appreciate the merits of their respective lines. It is because of this recognition and as a result of it that the advertisements of to-day are so vastly superior to the advertising of a few years ago, when, perhaps, the pulling power and value of the printed word was not so generally appreciated.

Canadian Machinery and Manufacturing News, March 6, 1919, Vol. 21, No. 10. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3, 1879.

Quality Service

THERE IS NO ARGUMENT

When you are assured

QUALITY
SERVICE
PRICE

and One Hundred Cents Worth of Value
for Every Dollar You Spend

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar is Worth One Hundred Cents in Canada

THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON MONTREAL

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

BLOOMS, BILLETS, SLABS,

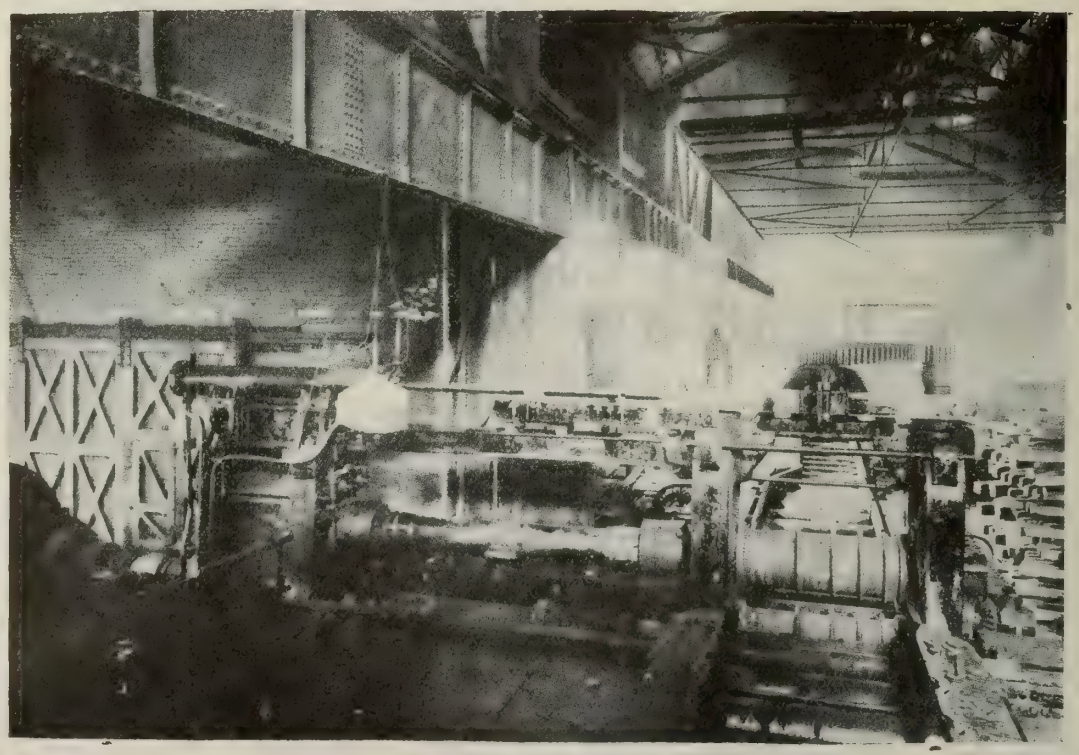
STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

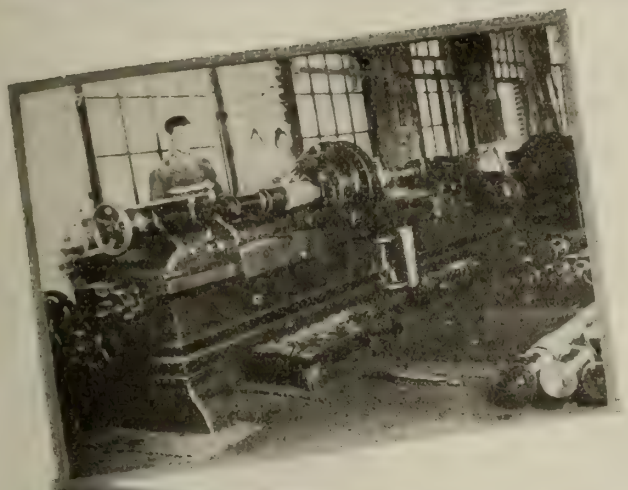
IRON, BRASS AND BRONZE CASTINGS

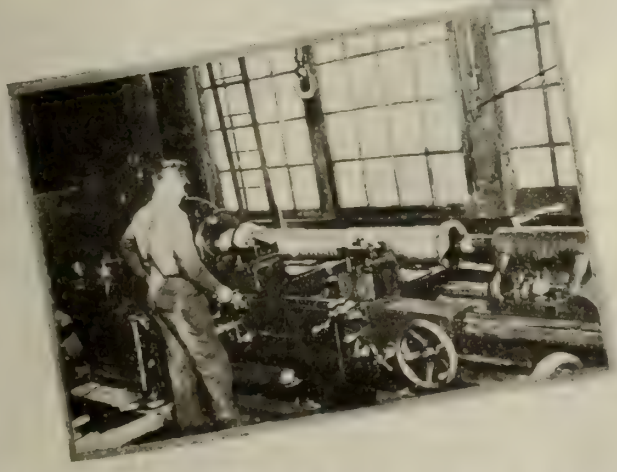
Sulphuric Acid. *Nitre Cake.*



ALGOMA STEEL CORPORATION, LIMITED
SAULT STE. MARIE, ONTARIO

BRIDGEFORD





Heavy Duty Axle Lathes

TO the mechanical official who judges a machine strictly on its merits — "Bridgeford" means a Heavy Duty Lathe which is relied upon to maintain high production and to keep costs uniformly low.

That applies to the Bridgeford line throughout — Engine Lathes — Axle Lathes — Journal Truing Lathes — so that in practically every railroad shop of importance "Bridgefords" handle the lion's share of the difficult heavy turning.

In big plants like the Cambria Steel Company, of Johnstown, Pa., where axle production is on a basis of efficient quantity production, batteries of Bridgefords are kept busy day and night. That these machines have not cost the Cambria Company a nickel for repairs in three years of forced production, is responsible for the recent installation of another large battery of "Bridgefords."

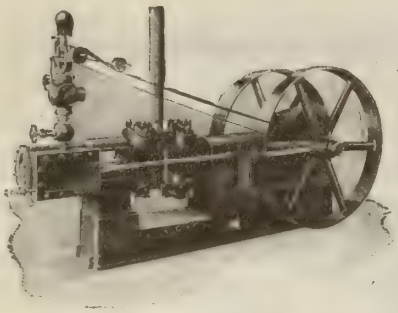
Your demands may be exacting, but Bridgeford Lathes will meet them —your work may be difficult, but Bridgeford Lathes will handle it with ease and economy. Ask us for definite proof of the cost-cutting possibilities of these machines. We can show you a worth-while saving.

Made in sizes ranging from 24" to 72" swing.

BRIDGEFORD MACHINE TOOL WORKS

161 WINTON ROAD, ROCHESTER, N.Y., U.S.A.

Manufacturers of Heavy Duty Lathes for More Than 20 Years



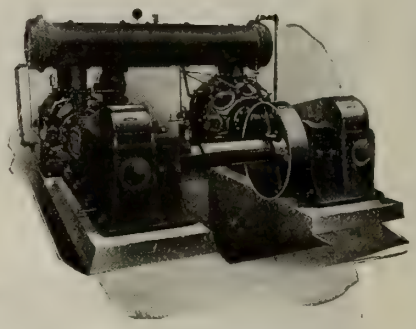
Economy in Upkeep

C-I-R-Co Air Compressors are all tested before leaving the Shop; all sizes are designed for economical running. Flood lubrication is not only cleanly and thorough but low in cost. Modern valve design gives greater output per H.P., input; the efficient intercooler still further lowers the power cost.

IT PAYS TO BUY A MODERN COMPRESSOR

CANADIAN INGERSOLL-RAND COMPANY
LTD.

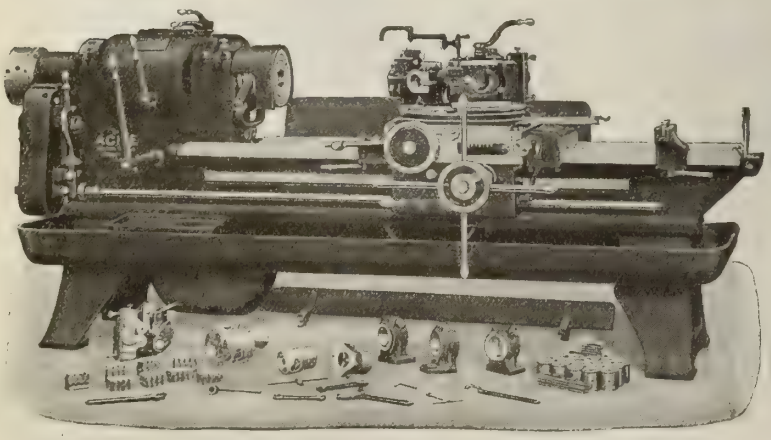
Sydney, Sherbrooke, Montreal, Toronto, Cobalt
Winnipeg, Nelson, Vancouver



Doubly Efficient—Does Both Bar and Chuck Work

This Cincinnati Acme Flat Turret Lathe is a double-production, geared head machine of the sliding gear type. It operates on minimum power because the only gears running are those doing the actual work.

This machine saves remarkable time and labor machining either bar work or chuck work up to 16 in. diameter.



3¼ in. x 36 in. Flat Turret Lathe Equipped for Bar Work.

Head is cast solid with the bed. You know what that means: accuracy, rigidity, constant and perfect alignment of spindle with vees, upon which the turret carriage travels.

We also make a full line of Screw Machines and Turret Lathes.

Write for Valuable Bulletin

The Acme Machine Tool Co.

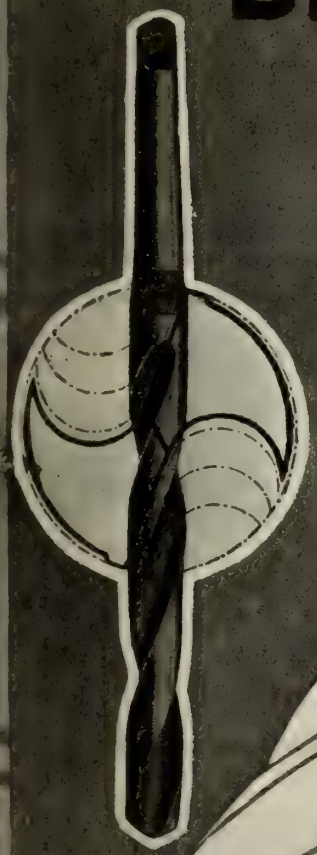
Cincinnati, Ohio

Canadian Agents: Rudel-Belnap Machinery Co., of Montreal and Toronto

WILT

HIGH SPEED AND CARBON TWIST DRILLS

"Where There's a WILT —There's the Way:—"



PERFORMANCE COUNTS

You can't fool the mechanic when it's a question of **Drills.** He knows what to expect of a good **Drill.** Give him a **WILT** and thus make another satisfied worker.

WILT Drills have a record of **satisfactory performance,** equal to any throughout the world.

Our guarantee to make good **always,** our policy of **the best in material** and **workmanship,** and our system of minute and careful inspection is reaping its reward in increased production for the manufacturer.

You should be using **WILT Products.** May we tell you why? Write us.

WILT TWIST DRILL CO.

OF CANADA, LIMITED

Walkerville — Ontario

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, Eng.

THE JOHNSON FRICTION CLUTCH

Courtesy National Acme Co., Cleveland, Ohio.

WATCH

is subject to exceptional hard usage, but it gives unfailing service.

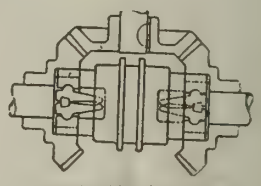
YOUR MACHINE

should be equipped with clutches that will give just such satisfaction.

What are your requirements? Let us know. We maintain an engineering force to work out all clutch installations. They will co-operate with you.

Write for our Yellow Data Sheets and Booklet, "Clutches as Applied in Machine Building"

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal; The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 10 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.



Double Clutch in Nest of Gears

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Coal
Coke
Iron Ore

Pig Iron
Victoria

FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:
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The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

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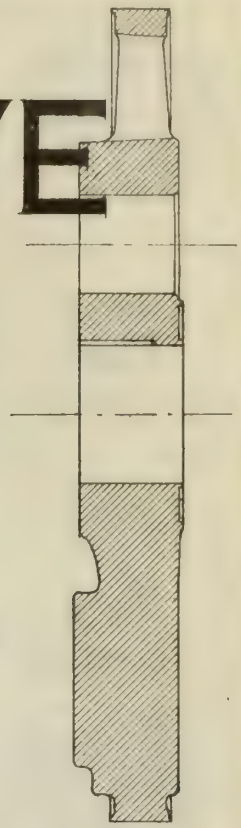

CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL

Swedish Steel & Importing Co., Limited

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Direct representatives of foremost Swedish mills; makers of

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ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

Forging Billets and Bars

Electric Furnace, Alloy Steels

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Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

If any advertisement interests you, tear it out now and place with letters to be answered.

FORD-SMITH MILLERS

No. 2 Plain
24" x 19" x 7½"

No. 3 Plain
34" x 20" x 10"

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25" x 17" x 8"

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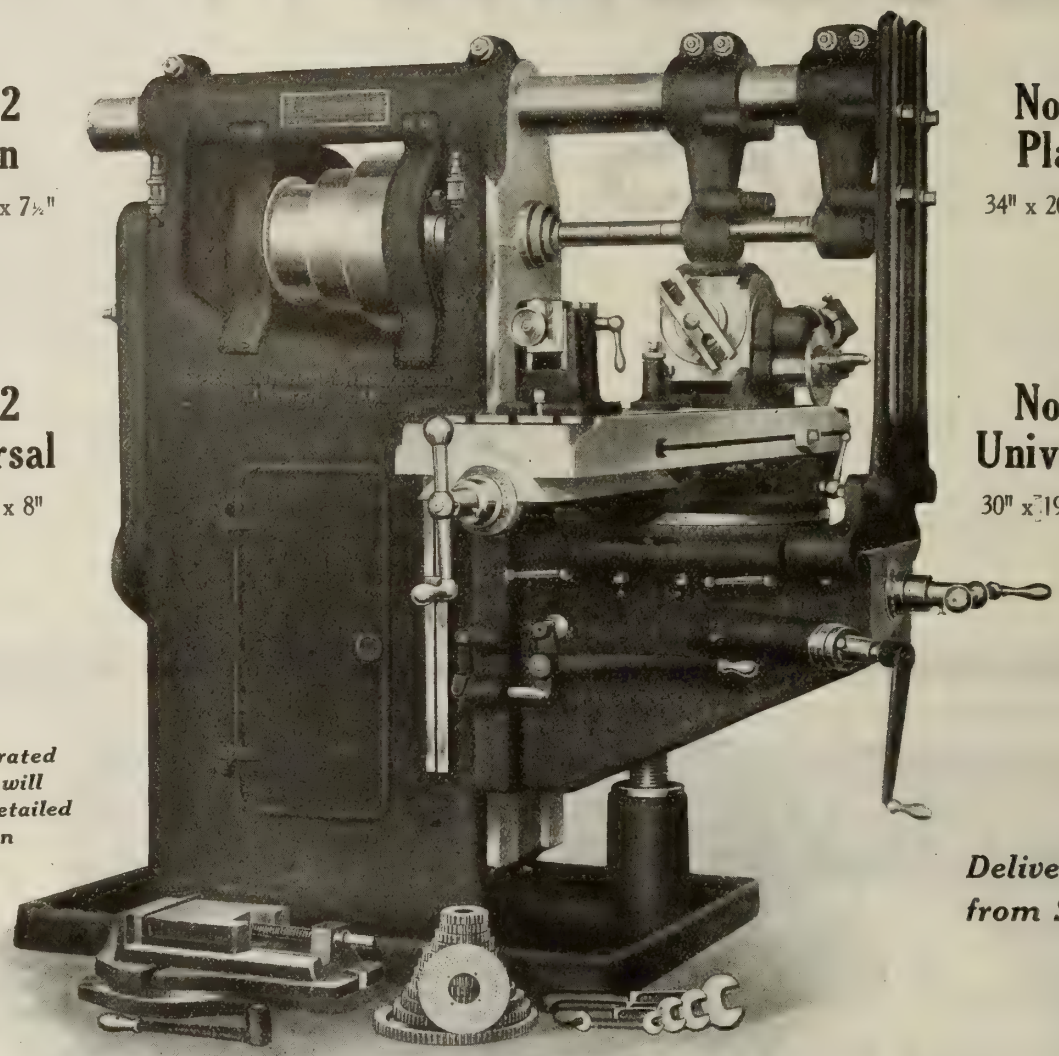

Our Illustrated Catalogue will give you detailed information

Deliveries from Stock

FORD-SMITH No. 3 UNIVERSAL

FORD-SMITH MILLERS have stood the strenuous test of 24-hour-a-day service during the last four years. They have won a reputation for the highest accuracy. Their simplicity of design and convenience of operation are apparent from above illustration. Let us quote you on your Miller requirements.

The Ford-Smith Machine Company, Limited

Manufacturers in Canada of
Milling Machines, Grinders, Machine Tools

Hamilton - Ontario - Canada

Agents : W. E. STOREY, 3 Arundel Street, LONDON, England
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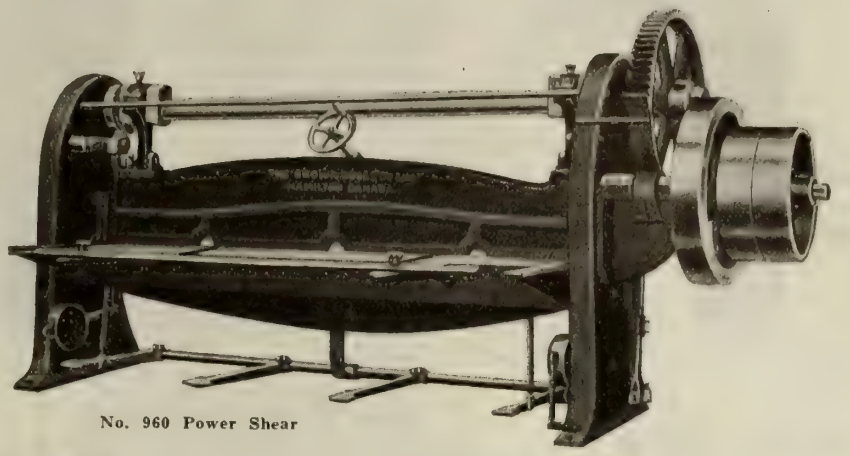
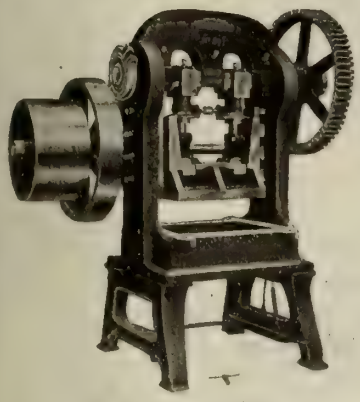
Branches in all Foreign Countries

Stood The Test



No. 960 Power Shear



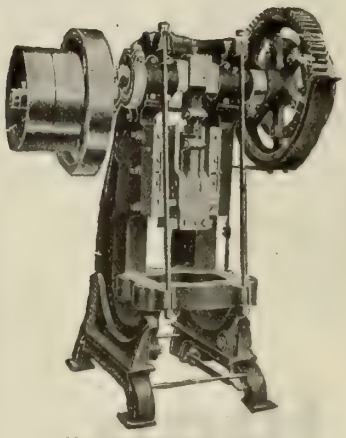
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

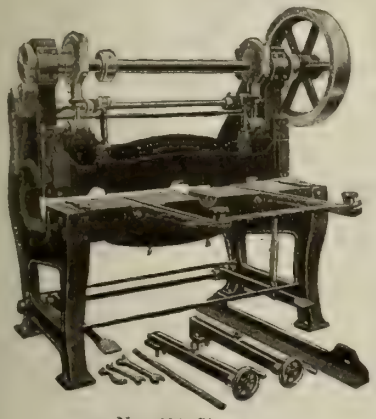
Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

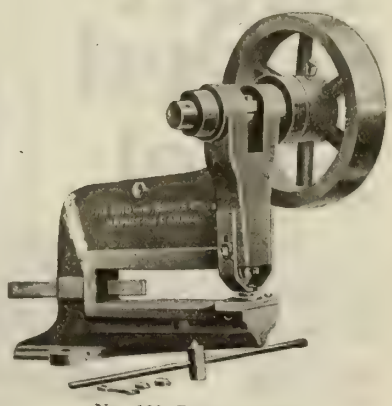
Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press



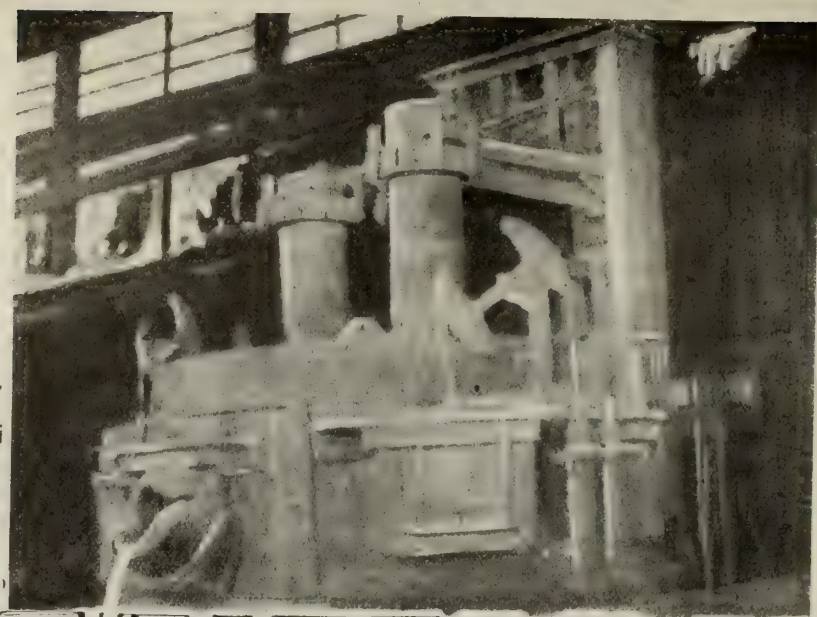
No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada



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High Speed Steel

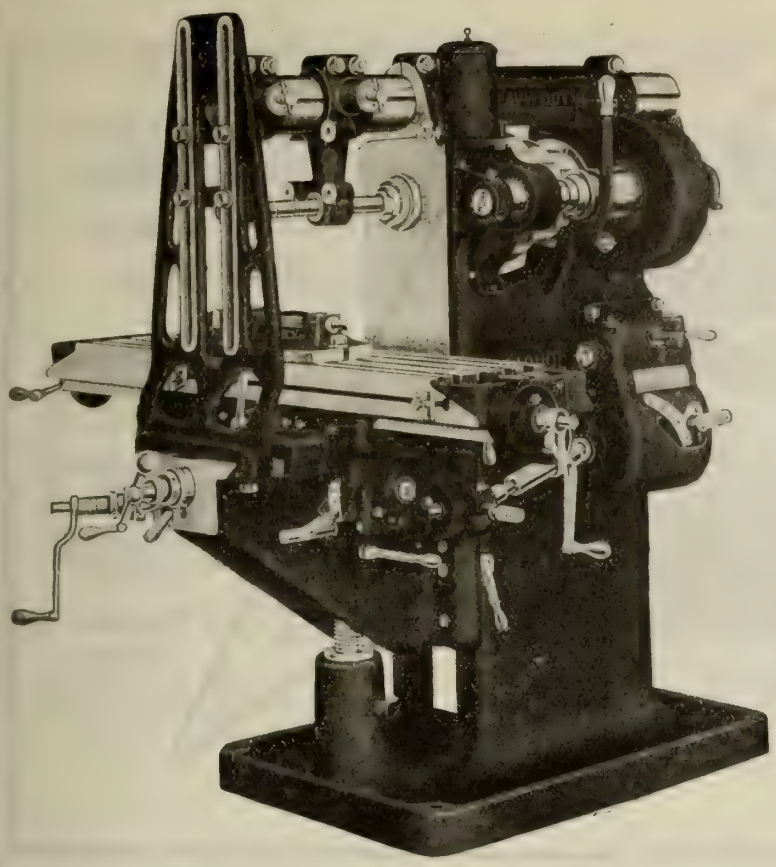
SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art; Electric Furnaces--entirely infallible, automatically regulated, delivering the same result time after time.

Uranium--This rare element, cousin to Radium, effects a profound change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.
LATROBE, PENN.

URANIUM



LeBLOND
Heavy Duty Milling Machines

Plain or Universal Types—Cone or Gear Drive. All commercial sizes No. 0 to No. 5.

Adapted for the Heaviest Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

Patent Self-Aligning Arbor Supports—

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Double-Friction Back Gears—and the simplest type of right-hand control, contribute to an increased production and longer life as a precision machine.

The R. K. LeBlond Machine Tool Company

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Canadian Agents:

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High Grade STEEL Castings

Of Every Description

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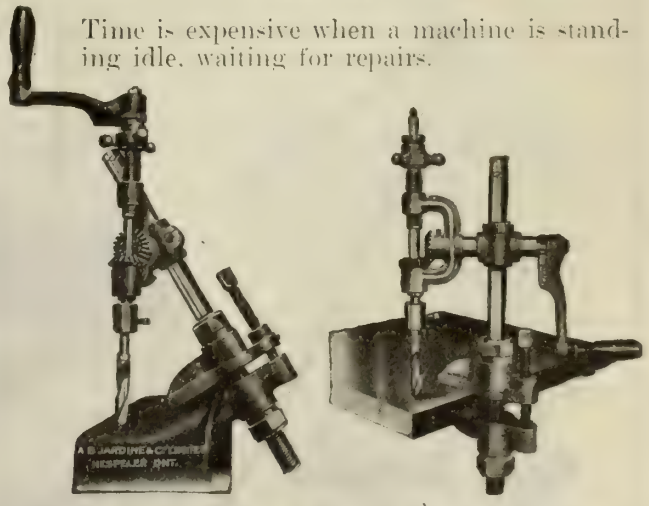
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

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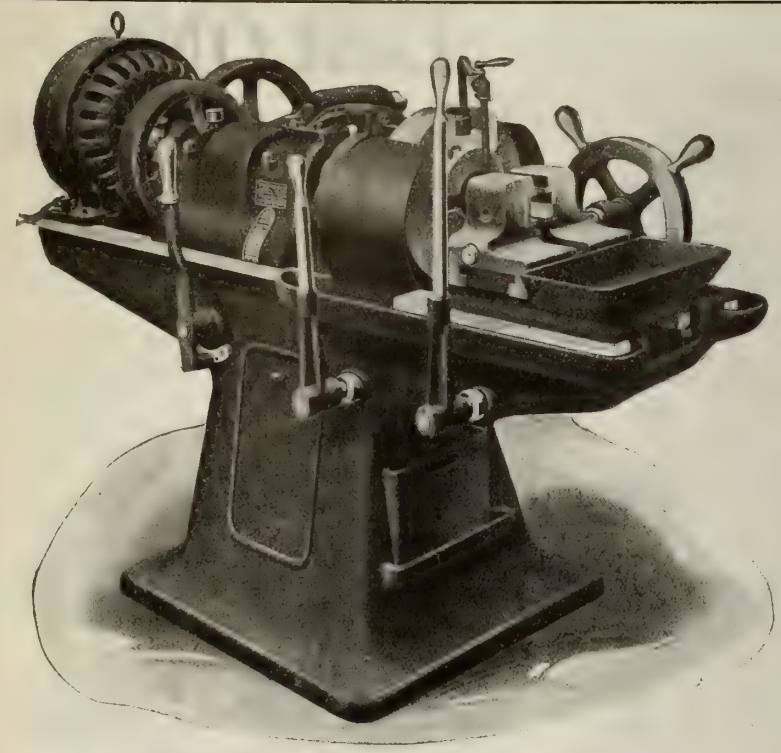

Front View
2 In. Single Head Nipple Machine—Motor Drive

Our New 2" Single Head Rapid Nipple and Pipe Threading Machine—Motor Drive

Constant Speed Motor
All Gear Drive - Change Lever
6 Changes of Speed
Large Reservoir
Special Oil Trough
Cutting Box
Many Other Features

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MANUFACTURERS OF

Pipe Threading Machinery

We Manufacture All Sizes

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Special Machinery

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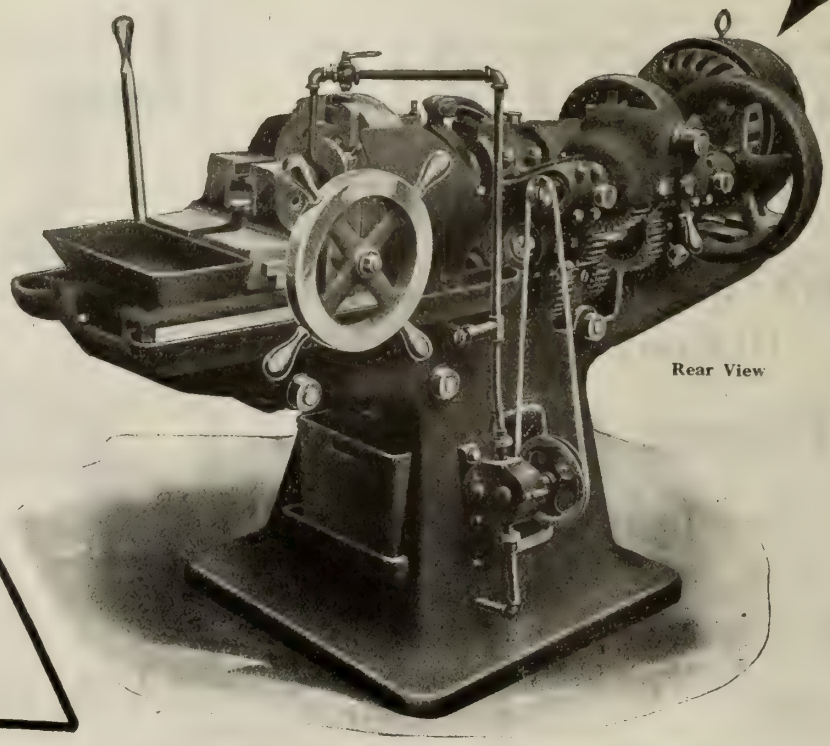
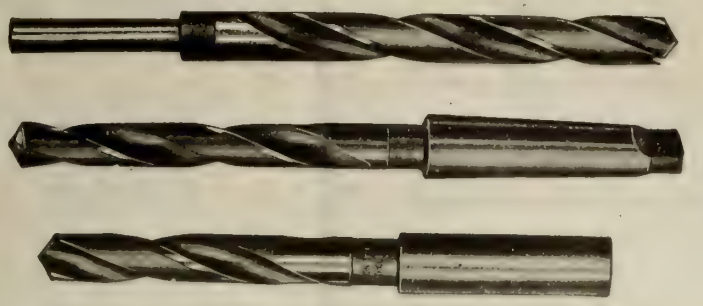


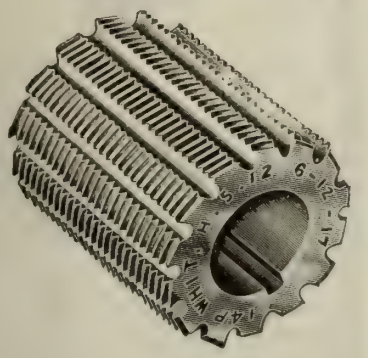
Rear View



BUTTERFIELD

TWIST DRILLS, GEAR AND MILLING CUTTERS

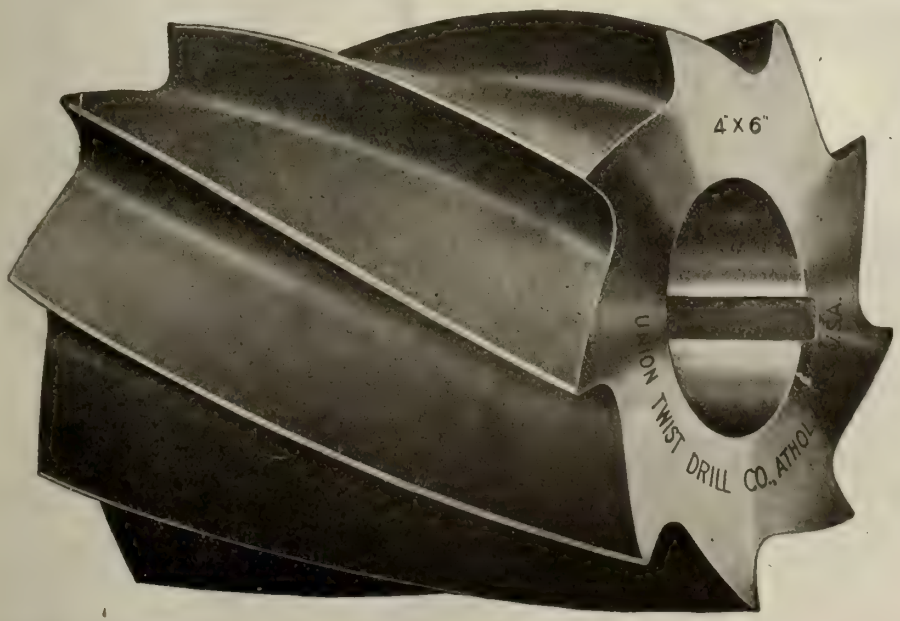
(Carbon and High Speed Steel)



Their ability to serve accurately and long equals that of Butterfield Taps, Dies and Reamers—the sincere praise of a thousand users wouldn't be a better recommendation.

They are the happy result of a great combination of specially trained men and the finest special machinery.

OUR COMPLETE LINE OF DRILLS AND CUTTERS ARE FULLY DESCRIBED IN OUR CATALOG A. Be sure to send for a copy.



Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office: 220 King Street West

THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally Known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

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WOLFRAM
HIGH SPEED STEEL

VULCAN
TOOL STEELS

for Every Purpose

Vulcan Special Vanadium—For Punches and Dies. Has wonderful wearing qualities.

Vulcan Non-Shrinkable—For Intricate Dies. Does not warp. Does not shrink.

Vulcan Regal No. 2—For Fine Finishing Tools. The highest grade tungsten finishing steel.

Vulcan Hecla—For work requiring great strength. The first high grade Chrome Vanadium steel produced in America.

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ALIQUIPPA *Established 1900* PA., U. S. A.

Makers of Wolfram High Speed Steel

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Chicago	16-18 So. Clinton Street	Newark, N. J.	52 No. 11th Street
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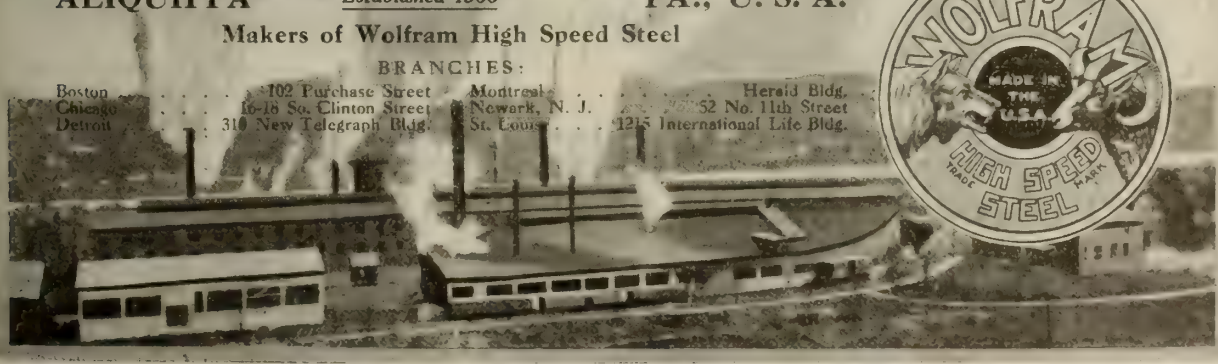

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

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Uranium High Speed Steel

Uranium High Speed Steel has the physical qualities required of the most effective machine shop tool.

A Uranium High Speed Tool will take deeper cuts at a higher speed and keep its edge longer.

It, therefore, will directly increase the productive capacity of every machine in your shop.

STANDARD ALLOYS COMPANY

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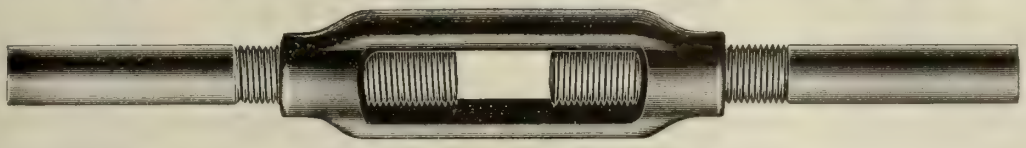
DROP FORGED STEEL



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Large Stock---Quick Action
Produced at
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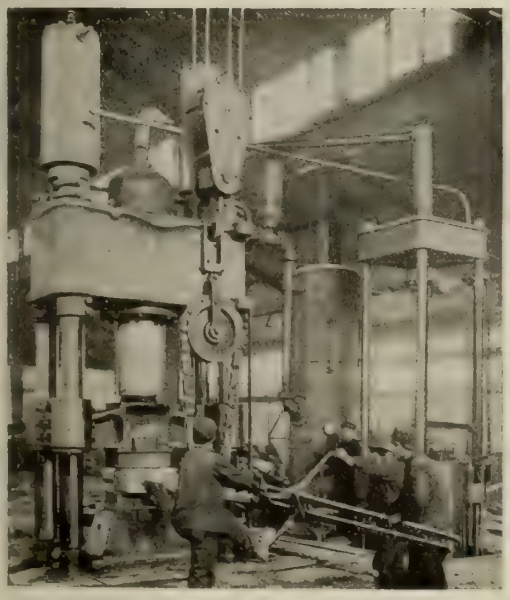


1200-ton Hydraulic Press working steel crank shaft forgings.

Rings by the Thousand

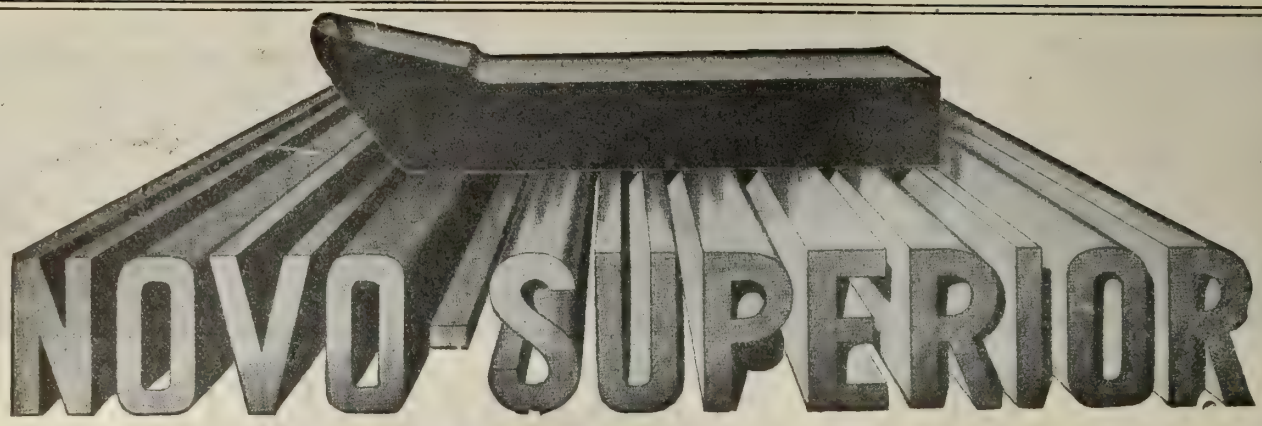
While we are specialists in all kinds of hammered and pressed forgings, the magnitude of the call for HAMMOND WELDLESS RINGS establishes the fact that they have become the Standard in this line of work.

For Ball and Roller Races

try HAMMOND SPECIAL BEARING STEEL made into WELDLESS RINGS. These will go to you forged close to size and true in shape. They will be annealed under perfect conditions and expert care to a Brinnell test which puts them in just the right state for machining.

Send us a trial order and let us prove that for GOODNESS OF MATERIAL and ECONOMY OF LABOR our combination is hard to beat.

Hammond Steel Company, Inc. ∴ Syracuse. N.Y.



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INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
Music Wire for Springs, Steel Balls.
Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws—for wood and for hot or cold metal cutting
Machine Knives--for cutting wood, paper, tobacco, agricultural.

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IMPERIAL GENUINE BABBITT METAL *The Highest Grade Manufactured*

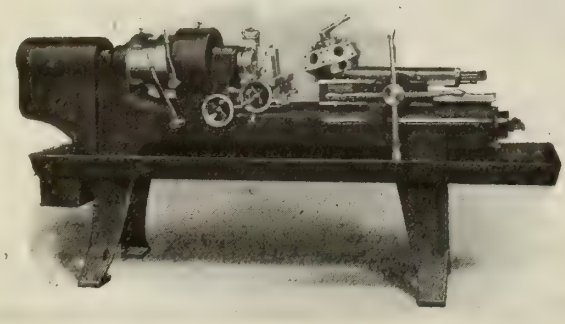
Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



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WOOD TURRET MACHINE CO.

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HIGH SPEED STEEL

The Highest Achievement of British Tool Steel Metallurgy.

H. A. DRURY COMPANY LIMITED

MONTREAL TORONTO NEW YORK

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Crucible
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Open Hearth Steel
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"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.

1856

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Philadelphia GEAR Works
Vine St., Philadelphia, Pa., U.S.A.

Rawhide Gear

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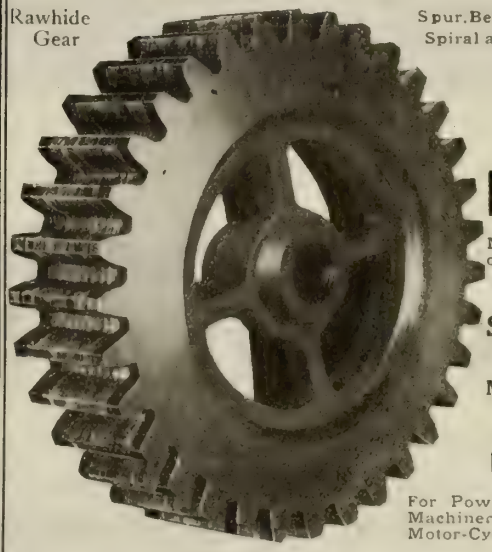

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Made in all kinds of Metals, Rawhide and Fibre

SPROCKET WHEELS
Made to Order

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For Power Transmission, Machinery & Motor Trucks Motor-Cycles and Bicycles

We ship GEARS to all parts of Canada

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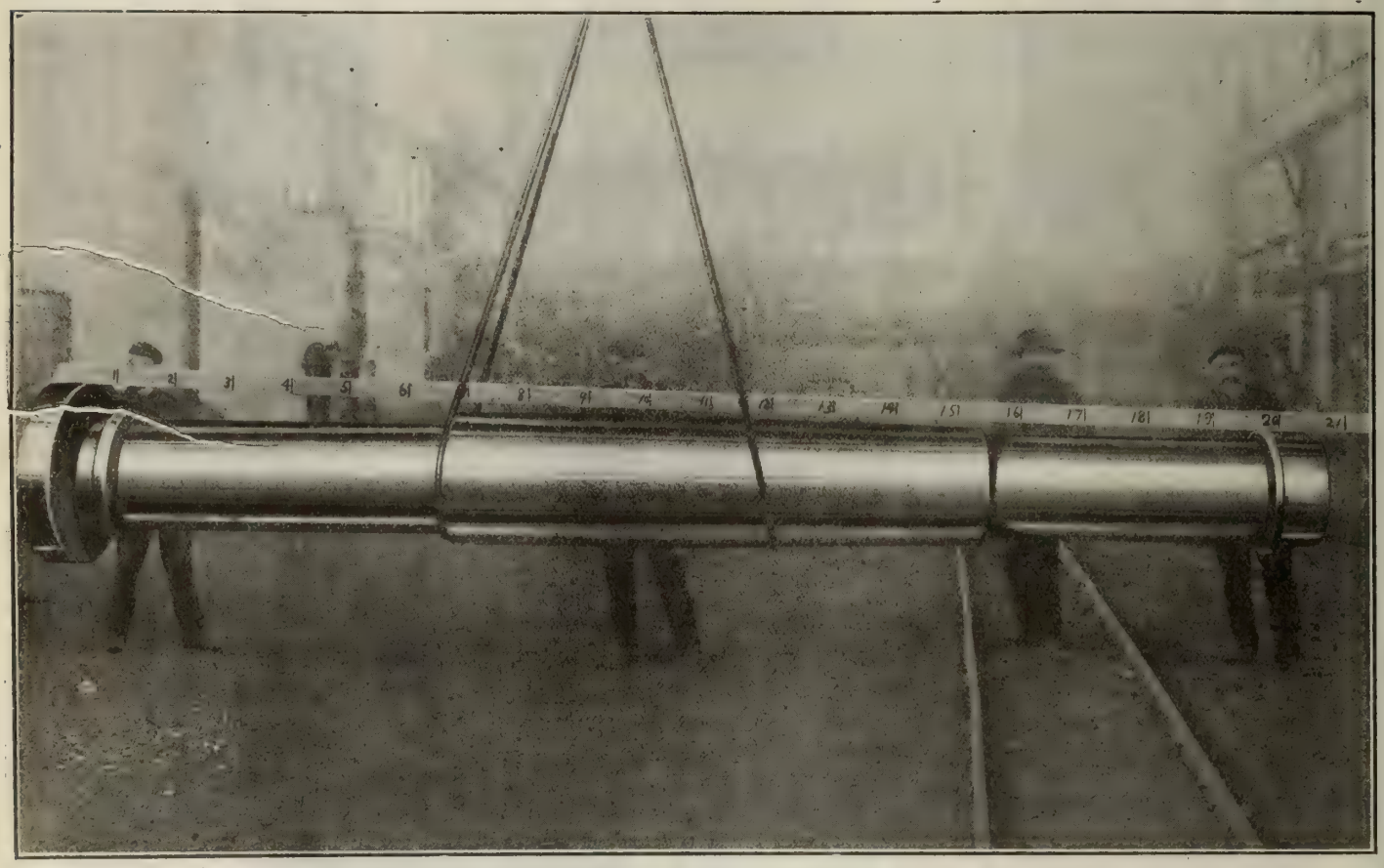
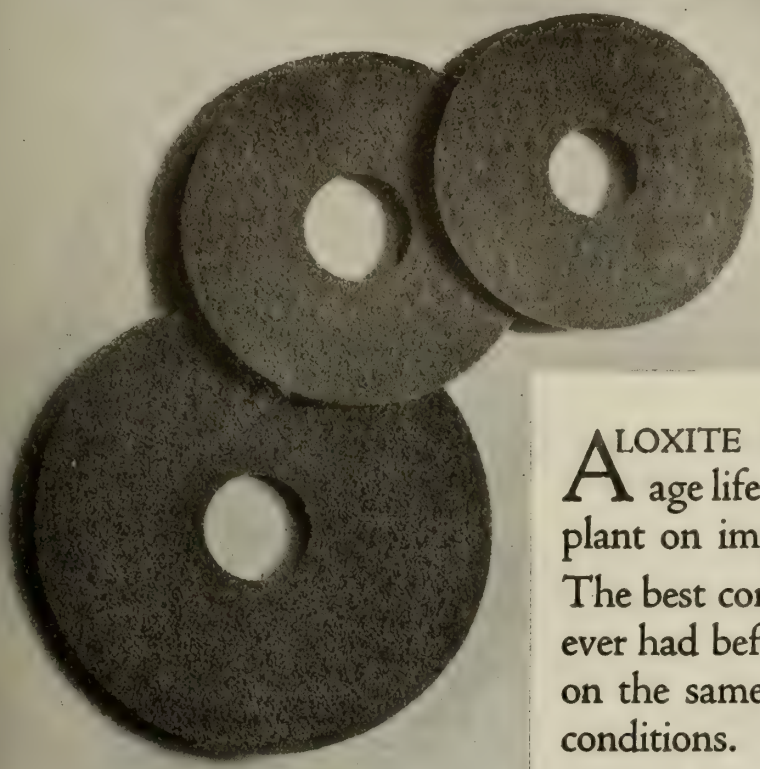


FINISHED COUPLING SHAFT, 18 IN. DIAMETER BY 21 FT. LONG

Heavy Marine Engine Forgings in the Rough or Finish Machined

Our Steel Plant at Sydney Mines, N.S., together with our Steam Hydraulic Forge Shop and modernly equipped Machine Shop at New Glasgow, N.S., place us in position to supply promptly Marine Engine Crank and Propeller Shafting, Piston and Connecting Rods; also Marine and Stationary Steam Turbine Shafting of all diameters and lengths, either as forgings or complete ready for installation, and equal to the best on the American Continent.

Adding 23 Hours to the Life of a Disc



ALOXITE Discs showed an average life of 45 hours in a Buffalo plant on important war work.

The best competitive discs they had ever had before lasted but 22 hours on the same work, under the same conditions.

This is a record that should interest you in getting Aloxite and Carborundum Discs in your plant.

It's because of the way we make our discs; grading them to suit your particular work. They are discs that are uniformly coated, sharp, clean and fast cutting.

And they wear right down to the fabric without glazing. They are

The Discs That Do

ALOXITE AND CARBORUNDUM DISCS

In all grits and sizes; in four weights for all classes of work

THE CARBORUNDUM COMPANY

NIAGARA FALLS, N. Y.

NEW YORK CHICAGO BOSTON PHILADELPHIA CLEVELAND CINCINNATI PITTSBURGH GRAND RAPIDS MILWAUKEE

STELLITE

"Not Steel but ts Master"

The Progressive Mfg. Co., Limited
CANADA

Gentlemen:—

We beg to advise that in spite of the rise in price of imported High Speed Milling Cutters, you can still secure a Canadian product at pre-war prices.

During the War, although our capacity was taxed to the limit in supplying STELLITE to Great Britain and France, as well as helping to keep Canada in the forefront as a producer of munitions, we did not raise our prices, notwithstanding the fact that our costs increased enormously and are still up.

Let us help you to economize and at the same time secure maximum results.

Consult our Engineering Department.

We are, Sirs,

Yours respectfully,

Deloro Smelting & Refining Company, Limited

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200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

Grinding 85 Holes an Hour at the Timken-Detroit Axle Co.

HEALD

Heald Grinders always travel right on the heels of the operator, for speed in grinding, as is well known, is largely a matter of chucking.

Here is a case in point that proves that Heald Internal Grinding Machines, in addition to their dependability, meet all speed requirements. The illustration shows a Heald No. 75 Internal Grinding Machine at the plant of the Timken-Detroit Axle Co., Detroit, Mich. It is grinding holes in small differential pinions at the rate of 85 an hour, or one every 42 seconds.

One feature of Heald Internal Grinders that greatly contributes to speed is the Automatic Wheel Guard which prevents accidents. The operator's attention is not distracted from his work by fear of getting hurt. While grinding, the guard stands to the rear but automatically swings forward to cover the wheel as it moves out from the hole.

The Timken-Detroit Axle Co. has 20 Heald Machines in service.

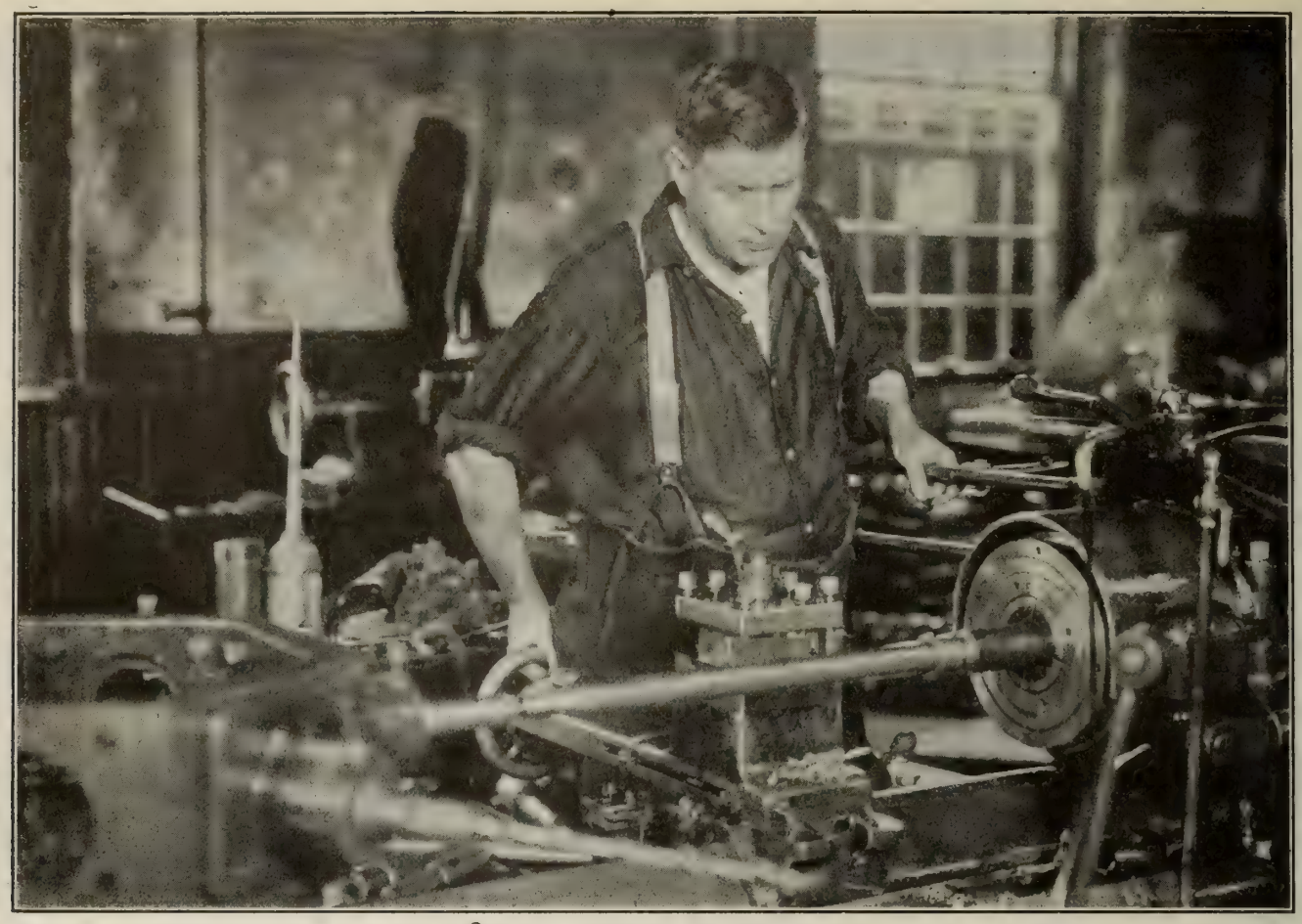
Play safe when you need internal grinding machines. Go to the largest builder in the world specializing in them—the Heald Machine Co. Our nearest Branch Office can give you regular home office service.

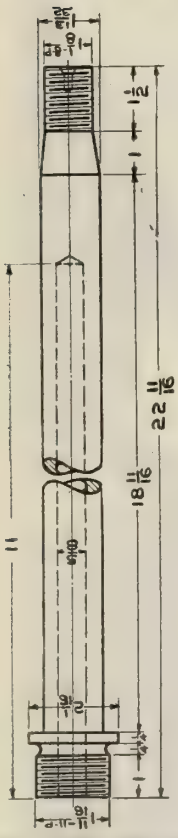
The Heald Machine Company

Worcester, Mass.

New York, 839 Singer Bldg. Philadelphia, 1308 Commonwealth Bldg. Chicago, 24 South Jefferson St. Detroit, 911 Majestic Bldg. Cincinnati, 311 Provident Bank Bldg. Cleveland, 721 Engineers Bldg. Western Agents: Eccles & Smith Co., San Francisco, Los Angeles and Portland. Salt Lake Hardware Co., Utah and Idaho. Foreign Agents: Alfred Herbert, Ltd., England. Societe Anonyme, Alfred Herbert, France and Switzerland. Societa Anonima Italiana, Alfred Herbert, Italy. F. W. Horne Co., Japan. Wilh. Sonesson & Co. Sweden, Denmark and Norway. American Machinery Syndicate, Spain and Portugal.

"Dependability First"





A Difficult Railroad Job

This is a hard job. Yet one of the largest railroad shops in the East is making these "Air Brake Pump Pistons" of cold rolled stock, complete, day in and day out, *one each* 20 *minutes* on a 3-A

Universal Hollow-Hexagon Turret Lathe

The best time on another turret lathe without the advantage of the independent carriage was 40 minutes each.

Increased Production 100%

This is only one job demonstrating the superiority of these machines over those having only a cross sliding head or turret. Then, too, be sure you get the *original* Universal Hollow Hexagon Turret Lathe.

Operations

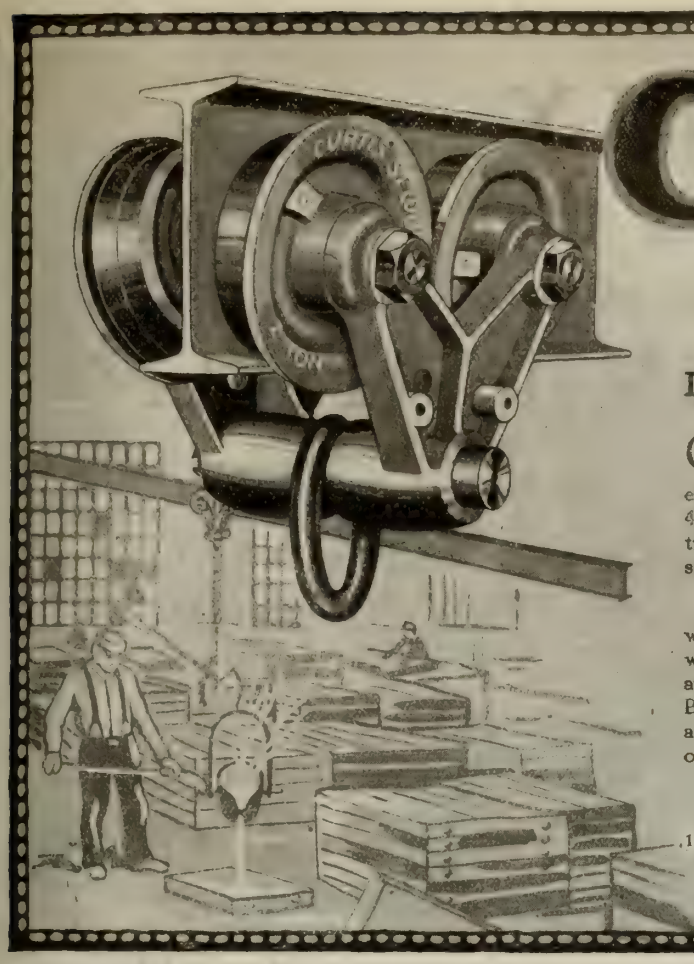
1st Chucking—Turn 1 13/32 in. diameter with Universal Turner, and at the same time turn back of the shoulder with the carriage.
Turn 1⅛ in. diameter with Universal Turner and turn taper with the carriage.
Thread 1⅛ in. diameter with floating die head.
2nd Chucking—Drill ⅝ in. hole 11 in. long.
Thread 1 11/16 in. diameter with floating die head.

Definite figures from your blue prints.

THE WARNER & SWASEY COMPANY
CLEVELAND, OHIO, U. S. A.

NEW YORK Office—Singer Building. **Boston Office**—Oliver Building. **Buffalo Office**—Iroquois Building.
Detroit Office—Ford Building. **Chicago Office and Show Rooms**—618-622 Washington Blvd.

FOREIGN AGENTS: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Allied Machinery Company, Paris and Turin, Brussels, Zurich and Barcelona. Van Rietschoten & Houwens, Rotterdam. Yamatake & Co., Tokio. Benson Brothers, Sydney and Melbourne. A. Asher Smith, Sydney. A. R. Williams Machinery Co., Ltd., Toronto, St. John, Winnipeg and Vancouver. Williams & Wilson, Ltd., Montreal.



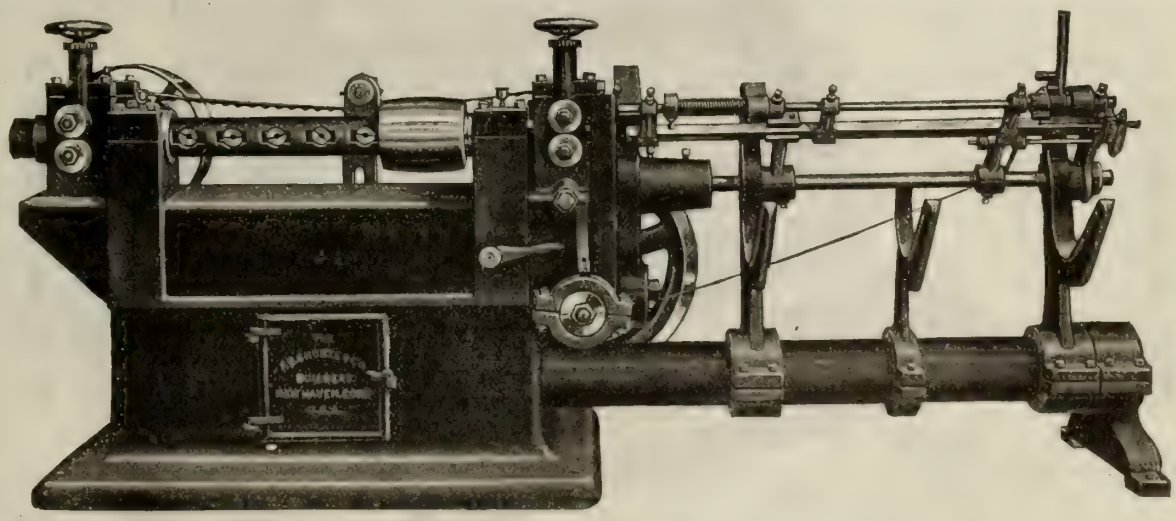
CURTIS TROLLEYS

Increase Production—Save Man-Power

CURTIS Single I-Beam Trolleys are being used by progressive firms demanding the highest operative efficiency. A Curtis Hyatt Roller-Bearing Trolley with a 4000-lb. load can be moved by a 50-lb. pull, while ordinary trolleys require nearly twice as much power to move the same weight.

Curtis Trolleys are constructed with large inclined wheels and self-equalizing steel side-frames—so that each wheel always bears its rightful proportion of the load. They are equipped with shock-absorbing Hyatt flexible Roller Bearings—which make the trolleys easy-starting, easy-rolling and long-lasting. Full information and descriptive literature on request.

CURTIS PNEUMATIC MACHINERY CO.
1585 Kienlen Avenue St. Louis, U. S. A.
Branch Office:
532-F Hudsor Terminal, New York City



Perfect Wire Straightening Quickly and Profitably Done on Our

Automatic Wire Straightening and Cutting Machine

Just put your coil of wire on the reel, adjust the rolls and dies, and set the gauge for the length you want. The machine does the rest—thousands of feet per day, perfectly straight and cut to accurate lengths.

Catalogue tells more about them, and we'll be glad to send you a copy.

THE F. B. SHUSTER CO., New Haven, Conn.

FORMERLY JOHN ADT & SON ESTABLISHED 1866

ALSO MAKERS OF STRAIGHTENERS FOR SQUARES, HEXAGONS, FLATS, ETC.

KELLY

"Production" Tools that "Produce"

Here it is, Mr. Manager

"A TOOL ROOM IN ITSELF"

Every size in Roughing and Finishing reamers from 1" to 5⅜" diameter in Fractional or Metric sizes. No matter how odd the size, it's there. No delay, no holdup in production, always Ready for Service. They Adjust. Indispensable to your tool room, Turret Lathe or Screw Machine Department. No machine shop should be without this set.

READY FOR SERVICE

READY FOR SERVICE

Just one of the KELLY TOOL FAMILY

Write for our new catalogue J-4 and see THEM ALL.

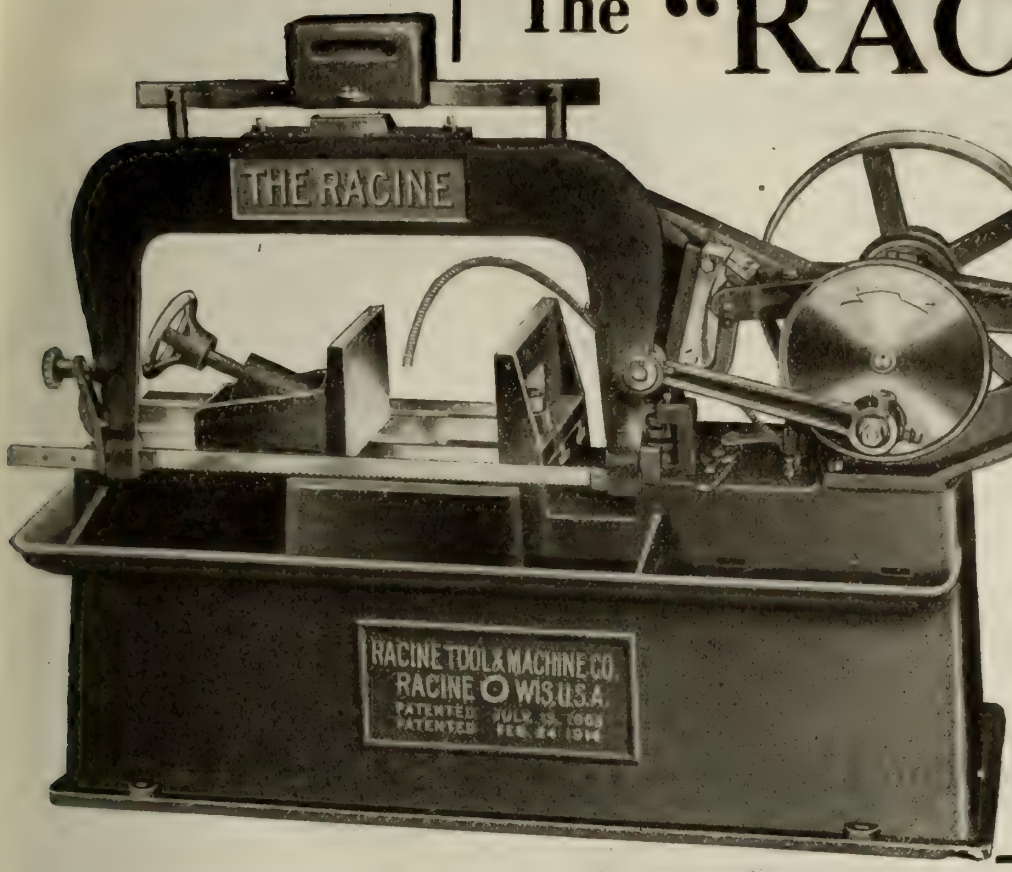
THE KELLY REAMER COMPANY

CLEVELAND, OHIO, U.S.A.

Burton, Griffiths & Co., Ltd., London, English Agents — Burton Fils, Paris, French Agents

40 Domestic Agencies

The "RACINE"



For Speed

For Accuracy

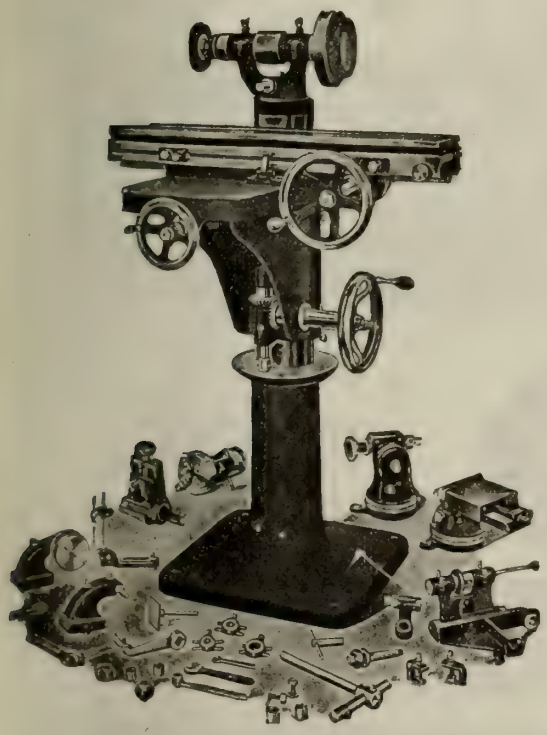
For Quantity Production

For Saving in Blade Costs

For Saving in Material

Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

RACINE TOOL & MACHINE CO.
Melbourne Avenue
RACINE, WIS., U.S.A.



The Greenfield Universal Grinder

For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

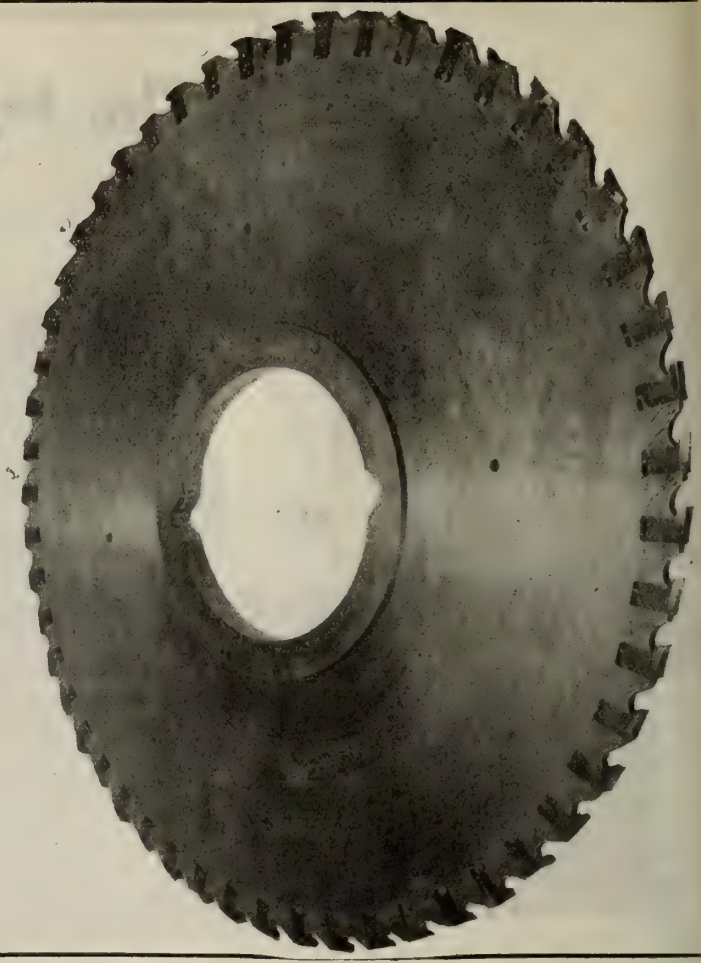
It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

Greenfield Machine Company,
GREENFIELD, MASS., U.S.A.

90-inches in diameter



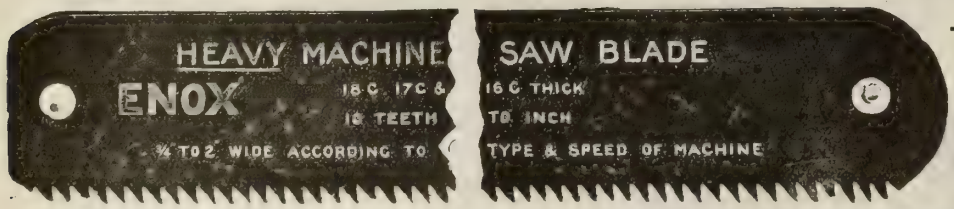
Cut on right shows a Hunter Duplex Inserted Tooth Saw used by the Erie Forge Co. for cutting gun forgings. It is the largest inserted tooth saw blade we know of ever having been made in the United States or any other country —1" plate, 1 5/16" kerf, and contains 56 high-speed steel teeth, and weighs approximately 3,000 lbs.

Hunter Duplex Saws

No matter what your sawing requirements may be, there is a Hunter "Duplex" Saw that is just right for the work. The discs are made of Chrome-Vanadium Steel, oil treated.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Grinders. Hardened Steel Specialties. Write for prices.

Hunter Saw & Machine Co.
Pittsburgh, Pa., U.S.A.



ENOX
Hacksaw Blades
ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William:

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.

-endurance

Endurance
means long life --hence economy

If you want a hack saw to endure—use one made for your particular cutting requirement.

Starrett Hack Saws

are made to endure—to last long and are truly economical because there is a saw for any job.

Our Hack Saw Chart

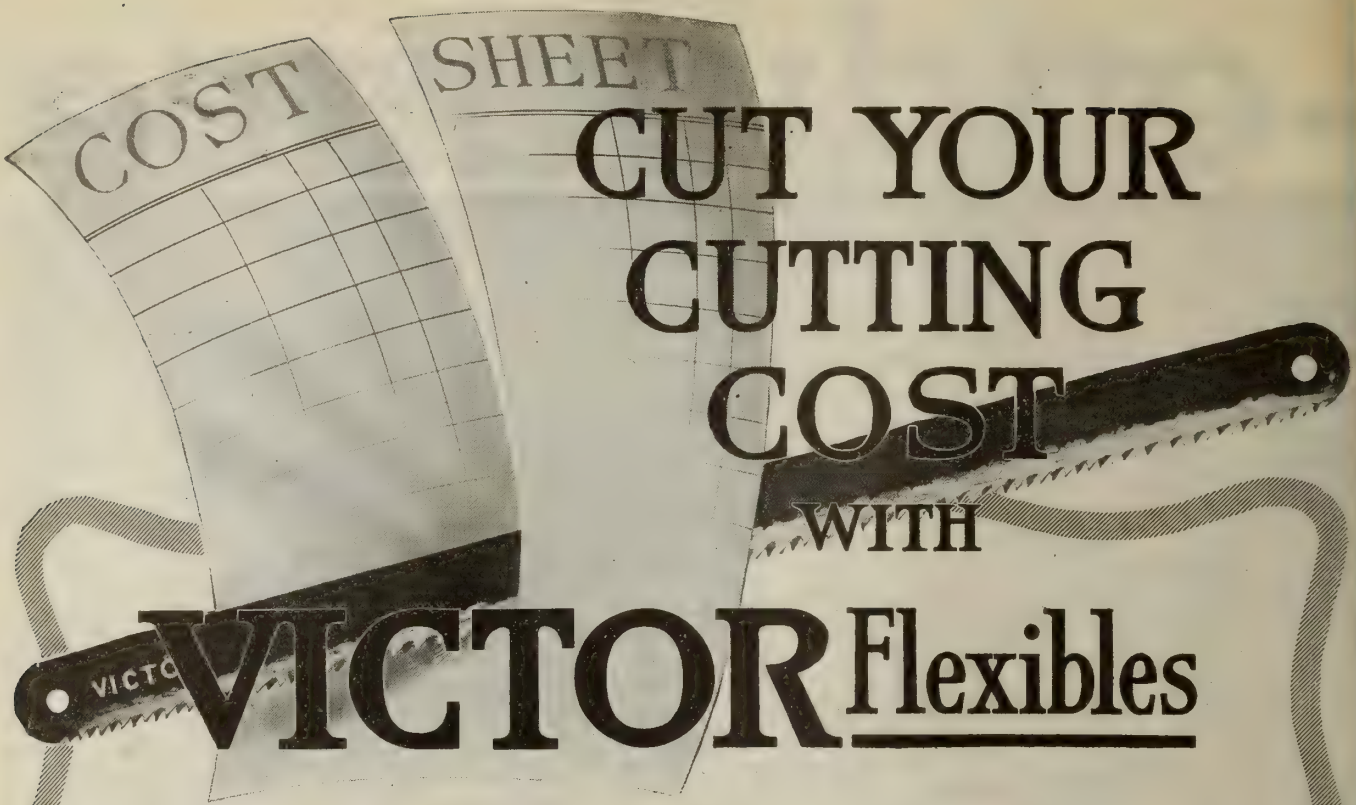
will tell quickly which is the proper saw to use for every metal. Keep it before you. Write to-day also asking for Catalog No. 21-3 on Starrett fine precision tools.

The L. S. Starrett Company

The World's Greatest Tool Makers
Manufacturers of Hack Saws Unexcelled

Athol, Mass.

42-897



CUT YOUR CUTTING COST WITH VICTOR Flexibles

The high cost of tools should emphasize more than ever the importance of quality.

The high cost of hack saw blades ought to drive every hand blade user over to the saw that does not break in ordinary hand work.

VICTOR FLEXIBLE HACK SAW BLADES have exactly the same cutting power as the finest All-Hard on the market, and that they cannot be broken in use except by intentional abuse is an undisputable fact—which will represent a saving from twenty-five percent to thirty-three and one-third percent in breakage alone.

Seventy-five percent of the All-Hard blades used in hand frames break before they are worn out. Watch the All-Hard blades in your own shop and see the enormous amount of breakage—then use VICTOR FLEXIBLES and note the economy.

VICTOR SAW WORKS LTD - HAMILTON, CANADA

VICTOR HACK SAWS

BROWN'S

Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting. Extruded shapes.

Seamless Brass and Copper Tubes.
Guaranteed Ingot Metals—Yellow, Red and Composition Ingots.
We are Purchasers of Copper Bearing Material.

Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

MADE IN CANADA

Malleable and Cast Iron
PIPE FITTINGS

Both Screwed or Flanged,
Black or Galvanized—All Sizes

MALLEABLE AND
GREY IRON
CASTINGS

For General Machine Shop Work, for Manufacturers of Automobiles and Specialty Manufacturers.

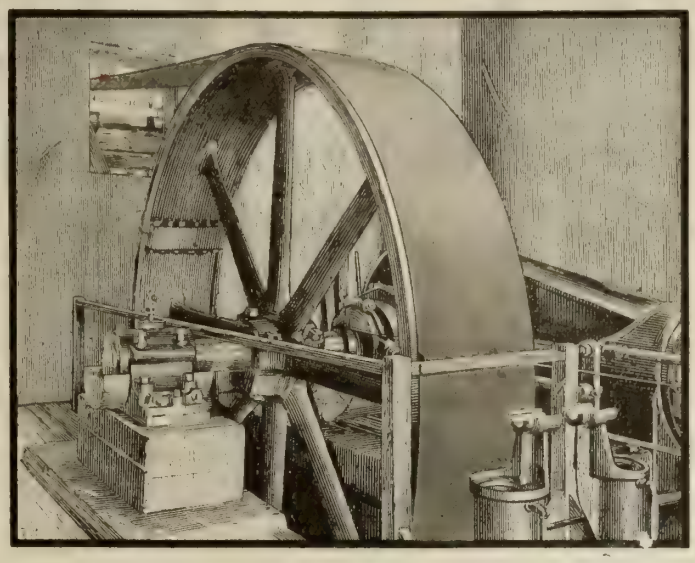
Quality Products

We have the facilities for filling your orders with exceptional promptness. Annual capacity 6,000 tons.

Prompt Service

International Malleable Iron Co., Limited
Guelph, Ontario

GRATON AND KNIGHT



GRATON AND KNIGHT

Nature's Contribution to Power

30-inch Neptune Double Belt, 91 feet long, driving mill of J. C. Halsema Mfg. Co., Jacksonville, Fla. This belt has been in operation five and one-half years, and is in as good condition as when first installed. It has given satisfactory service at an overhead charge of $2.17 per week, or a cost of five mills per horsepower per week.

It's the right material in the right place. Nature provided that material, worn originally on the back of a steer. A steer hide is *naturally* tough, strong, pliable, elastic. All of those characteristic virtues are retained to the right degree in Graton & Knight Standardized Tanning. That tanning is done to meet fixed requirements.

Leather stands hard usage. It has a bull-dog frictional grip. It keeps on taking the punishment of main drives and the side-slapping of shifters—and then comes back for *more*. Good belting must have tractable pliability. It must be firm. It must stretch and come back when required. It must be easy to slice and repair. Nothing beats leather for these characteristics. No belting beats Graton & Knight Standardized Series Leather Belts.

Every Graton & Knight Brand isn't recommended for *every* drive. The work to be done determines the belt to be used—that is the G. & K. Standardization idea. Power transmission requirements are confined to a few classes. There's a standardized belt for every class. The Neptune Double referred to above is one of them. It's the Standardized Belt for use wherever dampness or water is present or where belting is subjected to exposure and rain, snow and other unfavorable climatic conditions; and for excessive loads.

Many of the best belted plants ask us to specify the belting for every *pulley drive*. Try the plan yourself. Then, when buying, call for "Graton & Knight—Brand or equal." This won't commit you to buying our belts. It will put your buying on the one basic consideration—the work to be done.

Write for information about Standardization as applied to Belting.

THE GRATON & KNIGHT MFG. COMPANY, WORCESTER, MASSACHUSETTS, U.S.A.

Oak Leather Tanners, Makers of Leather Belting, Lace Leather, Leather Packings, and Specialties.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES.

Canadian Graton & Knight, Ltd., Montreal. Canadian Representatives: The Canadian Fairbanks-Morse Co., Ltd., St. John, Montreal, Ottawa, Toronto, Hamilton, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria.

Tanned by us for belting use.

GRATON & KNIGHT Standardized Series LEATHER BELTING

Do you know that we have a thoroughly organized engineering department devoted to the interests of all belt users? We have—and it is one of the best in equipment and resources, in the country. You are invited to send us your problems for solution. The only fee involved is your good will.

WALCOTT

The Lathe for Continuous Duty

Hundreds of Canadian shops were working night and day to keep up with the demands of war. This continuous service put a heavy strain upon the machines used. These machines were of quality construction and modern design that stood the strain and gave economical and efficient service. Such is the WALCOTT LATHE. Here is a tool not just built for war purposes; it is a tool that will give you the best of service in peace time as well as war time. And in the WALCOTT you see a lathe with a price as low as possible, compatible with the cost of production.

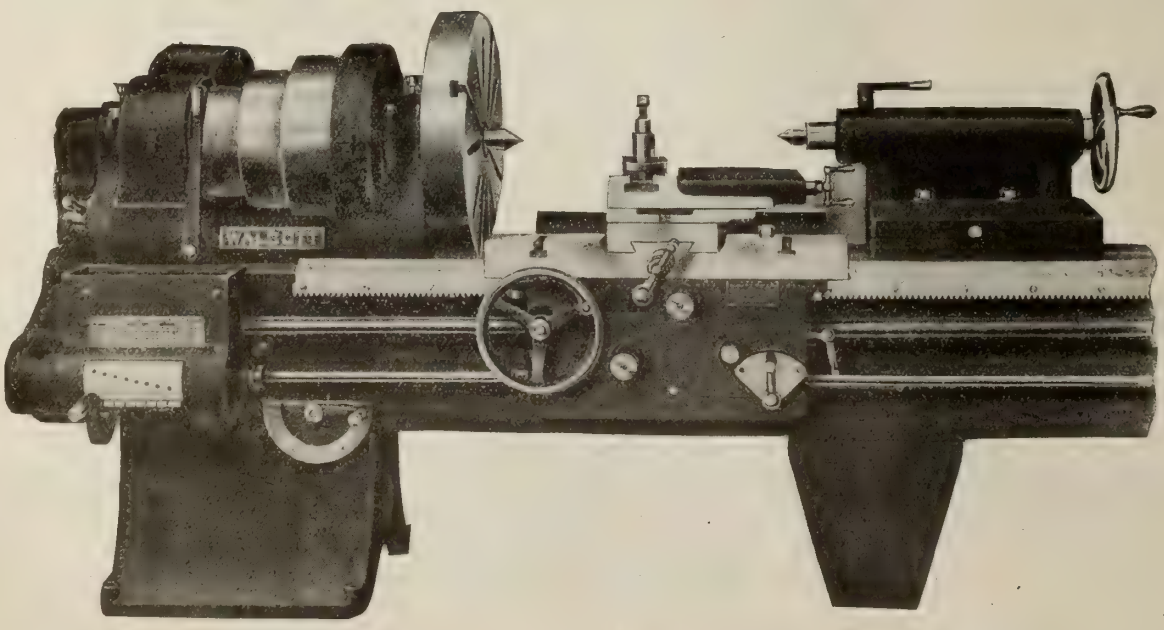
WALCOTT LATHES are in demand, but our increased facilities put us in a position to supply all Canadian requirements.

WALCOTT LATHE COMPANY

Engine Lathes

140 Calhoun Street - JACKSON, MICHIGAN

AGENTS:—Hill, Clarke & Co., Chicago, Ill. Frevert Machinery Co., New York City, N.Y. W. E. Shipley Machy. Co., Philadelphia, Pa. National Supply Co., Toledo, Ohio. Motch & Merryweather Machinery Co., Pittsburgh. H. A. Smith Machinery Co., Syracuse, N.Y. Wm. E. Duff, York, Pa. Wm. E. Duff, Jacksonville, Fla. Brown-McDonald Machy. Co., St. Louis, Mo. Smith-Booth-Usher Co., Los Angeles, Calif. Hendrie-Bolthoff Mfg. & Sup. Co., Denver, Col. Gordon & Finkbeiner, Portland, Ore. Northern Machinery Co., Minneapolis, Minn. Brownell Machinery Co., Providence, R.I. Chas. A. Strelinger Co., Detroit, Mich. Marshall & Huschart Machinery Co., Indianapolis, Ind. Fenwick, Freres & Co., Paris, France. Buck & Hickman, Ltd., London, England. Parke & Lacey Co., Sydney, N.S.W. Standard Machy. & Supplies, Ltd., Montreal, Que. Canadian Fairbanks-Morse Co., Ltd., Toronto, Ont.



More Lumber Mill Testimony

"Extra Power" in Splendid Shape After Three Years of Use

IN practically every line of industrial endeavor belt buyers are learning the merit of Extra Power Belting by testing it on the hard and troublesome drives.

Now comes a verdict from the far West. Mr. S. Thorpe, of the Forrest Mills of British Columbia, tested an Extra Power Belt on a difficult drive.

This belt runs on the edger engine —under conditions as severe as can be found anywhere. The load is jerky and heavy. The belt speed is high—6,050 feet per minute. A heavy tightener, set close to the drive pulley holds the belt down. An idler pulley also holds the belt down on the driven pulley.

"Your Extra Power Belt," he says, "which is 10-inch, 7-ply, has run on the edger for three years and has not given one minute's trouble, and at the present time doesn't look ten per cent. worse than when it was put on."

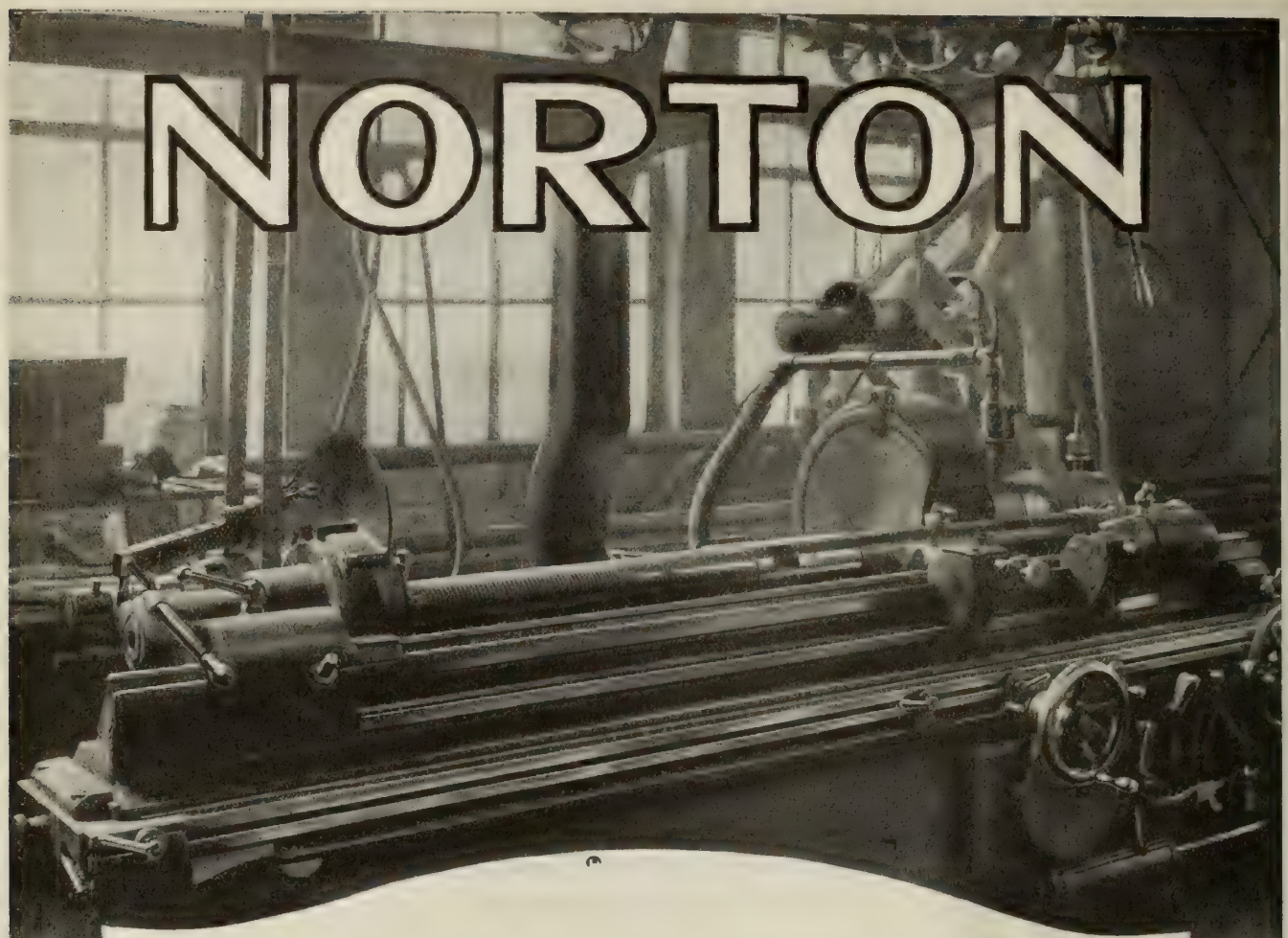
In selecting belting for your plant, remember that it does not pay to be skeptical. Get in touch with the nearest Goodyear belting man. Let him relate to you how the steam and water in pulp and paper mills; the slow, heavy pulls and the shifting pulleys in shell factories and machine shops; the high speed machines and heavy tighteners in lumber mills; the multiple pulley drives in textile mills; the exposed work of quarries, mines, cement plants and brick plants—all have been belted economically and well by Goodyear Extra Power.

The Goodyear Tire & Rubber Company
OF CANADA, LIMITED

Branches: HALIFAX, ST. JOHN, MONTREAL, OTTAWA, TORONTO, HAMILTON, LONDON, WINNIPEG, REGINA, CALGARY, EDMONTON, VANCOUVER.

Service Stocks in Smaller Cities.

GOODYEAR
MADE IN CANADA
EXTRA POWER BELTING



In these days of gigantic demand Nortons everywhere keep production up

Here's a grinding job up in Vermont at the Jones & Lamson plant. It's a Drum Drive Shaft for a J & L Turret Machine. The material is machine steel and its rough size is 1 9/32 in. x 1 17/32 in. x 1 25/32 in. x 1 13/32 in. The finished size is 1¼ in. x 1½ in. x 1¾ in. x 1⅜ in.

A limit is set of .0005 in.—and maintained at the rate of 28 complete shafts per day.

Isn't an installation—in a plant so thoroughly well known in the quality field as Jones & Lamson—an endorsement for Nortons that you can't afford to overlook when you are ready for grinding machines?

Norton Grinding Company, Worcester, Mass.

Chicago Store: 11 North Jefferson Street

Canadian Agents:

The Canadian Fairbanks-Morse Company, Limited

St. John Quebec Montreal Ottawa Toronto Hamilton
Windsor Winnipeg Saskatoon Calgary Vancouver Victoria

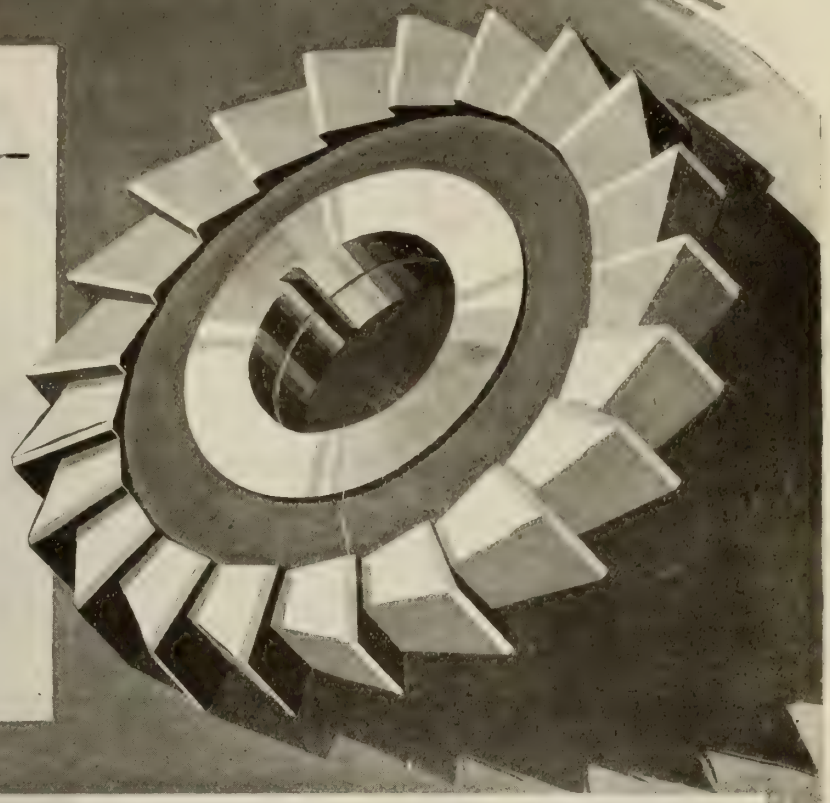
This Tool

was tested in a well-known plant in New York

It is a Davidsonized milling cutter, 4" diameter by ½" face. Run at a speed of 250 R.P.M., and with a feed of 7" per minute, taking a cut ½" wide by ½" deep, it worked without any difficulty for ONE HOUR AND THIRTY-TWO MINUTES.

As against this, a high-speed steel milling cutter of one of the best-known makes, and also a cutter made from one of the best-known high-speed steels, ran under the same conditions for TWENTY-EIGHT MINUTES. At the completion of the test the Davidsonized cutter was in better condition than either of the other two tools.

The material tested was .45% Carbon Open Hearth Steel, containing .70% Manganese.
*Name on request.



You Can't Get Away From Facts Like These

We claim that it is possible in a majority of instances to obtain similar results.

Davidsonized High Speed Steel

offers you great opportunities for increased production, long service and tool-making economy. We guarantee **any** tool of Davidsonized High Speed Steel to give you at least 10% better service than any other tool you have been using on corresponding work. You will be the sole judge. More and more of the leading machine shops are turning to this steel of remarkable service, because—

(1) It increases production 10% or more. Such an increase, figuring factory overhead and labor, multiplies several times over the value of the tool.

(2) The guarantee above gives absolute protection.

(3) Davidson Special Service cuts tool-making time and tool-room costs.

SPECIAL SERVICE

We will supply Davidsonized Tools, semi-finished and easier to machine than any carbon tool steel, within approximately 1/64 of finish on face, 1/64 in bore and 1/32 in diameter, leaving only the final hardening and sharpening to be done in your tool room. A tool that takes 20 hours to make from the solid bar can easily be finished from a Davidsonized blank in about two hours. **And we will guarantee our tools against breakage in hardening.**

This service, though it applies also to standard tools is especially desirable in the case of **tools made to unusual shapes** and other specifications.

Use this special service. It costs you less than to bring your tools from the bar to the stage at which we furnish them. It eliminates the loss of breakage in hardening. And, most important of all, it gives you better tools than you have been using, tools capable of such performances as the one described above tools that will boost your production and give you longer service. Send us a trial order; our guarantee prevents all risks. Correspondence invited.

THE DAVIDSON TOOL MFG. CORPORATION

Head Offices: 118-122 Maiden Lane, N.Y., Works: 56-62 North St., Brooklyn, N.Y.

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Vancouver, Victoria

McDougall SHAPERS

Rigidity Plus

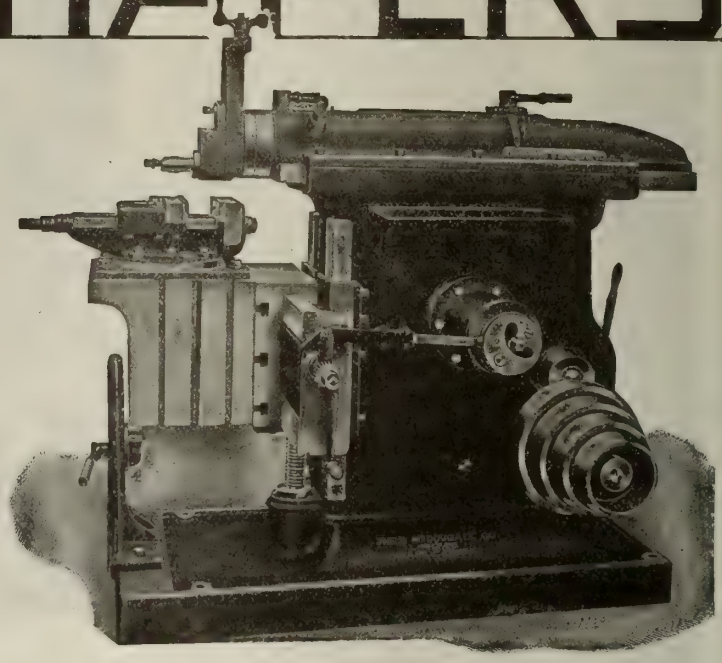
Simple Design and Convenience of Adjustments

give operator every facility for ease of operation and Accuracy in Production

Our circulars, containing complete specifications and descriptions, are ready. Write us for one.

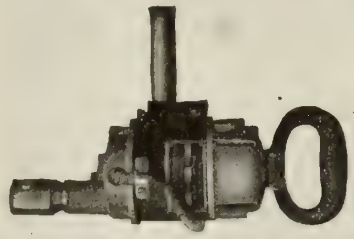
The R. McDougall Co., Limited
GALT, ONTARIO

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED
Sales Agents



U. S. Electric Drills and Grinders

Save Time. Labor and Money



They can be attached to any lamp socket.

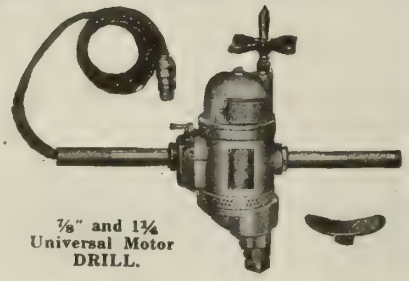
For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES
3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅞" and 1¼ Universal Motor DRILL.

For Sale By

The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

P X H

TRADE MARK

WHY P.H. and IMPERIAL FILES?

Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

Because they are processed entirely by the most expert workmen in this highly specialized trade.

Because they are made in Canada by Canadian Capital and Canadian Labor.

and

Because

"They Cut Faster and Wear Longer."

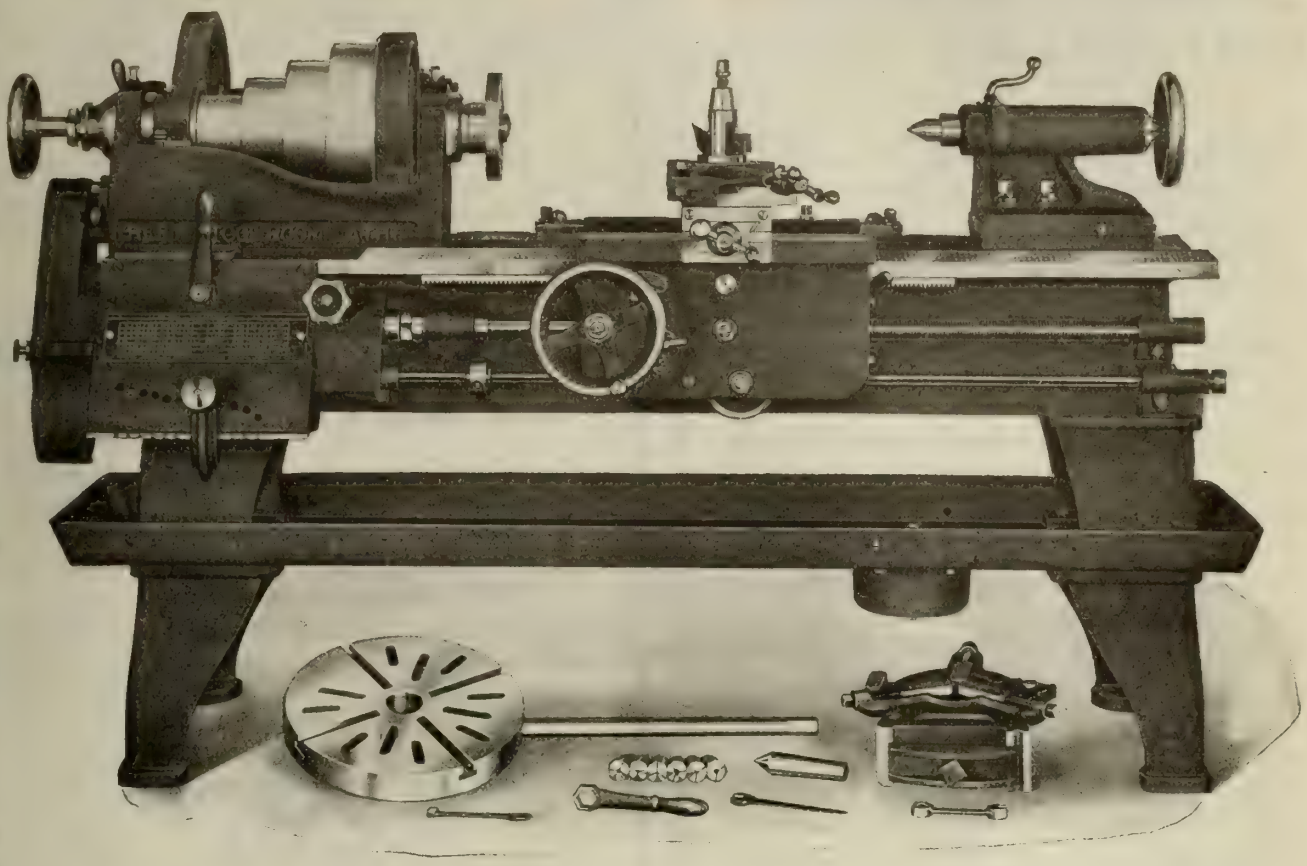
Ingersoll File Company, Limited
INGERSOLL - ONTARIO
"ASK YOUR JOBBER"
Sole Selling Agents
John Morrow Screw & Nut Co., Ltd.
INGERSOLL, - - - ONT.

IMPERIAL

TRADE MARK

REED-PRENTICE COMPANY

WORCESTER MASS. U.S.A.



"REED" ACCURACY

YOU CAN TRAVEL PRETTY MUCH ALL OVER THE WORLD AND FIND MEN WHO HAVE AT ONE TIME OR ANOTHER USED "REED" LATHES.

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Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 32A

Don'ts for the Cylindrical Grinding Machine Operator

(1) Don't attempt to grind without using the proper number and proper application of steady rests, if you wish the work to be ground round, true and smooth.

(2) Do not expect to get round work without round center holes in your work and true center points in your machine.

(3) Don't attempt to grind without a quantity of good lubricant flowing over the work and wheel at the point of contact between wheel and work.

(4) Don't put too much compound in the water; the proportion should be about 40 to 1; too much compound causes undue foaming.

(5) Don't allow compound to foam and froth and run all over the machine and the floor. This can be reduced by sprinkling a little kerosene on the foam in the top of the tank or by adding several pails of clear water.

(6) Don't thin the compound so much that there will be no rust preventive in the water; if you do, your machine will become rusty and corroded.

(7) Don't use hard wheels; soft wheels give greater production.

(8) Don't forget to oil the machine thoroughly at least once a day; preferably on starting up in the morning.

(9) Don't use "any old oil" on the wheel spindle. Special spindle oil is provided and is necessary, due to the amount of clearance left between the diameter of the spindle and the diameter of the box, where clearance must just be filled by the oil used. Therefore, the oil used must be of the proper grade and viscosity to accomplish this object.

(10) Do not worry if the wheel spindle runs warm or cold, so long as it grinds round, perfect work.

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Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

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Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

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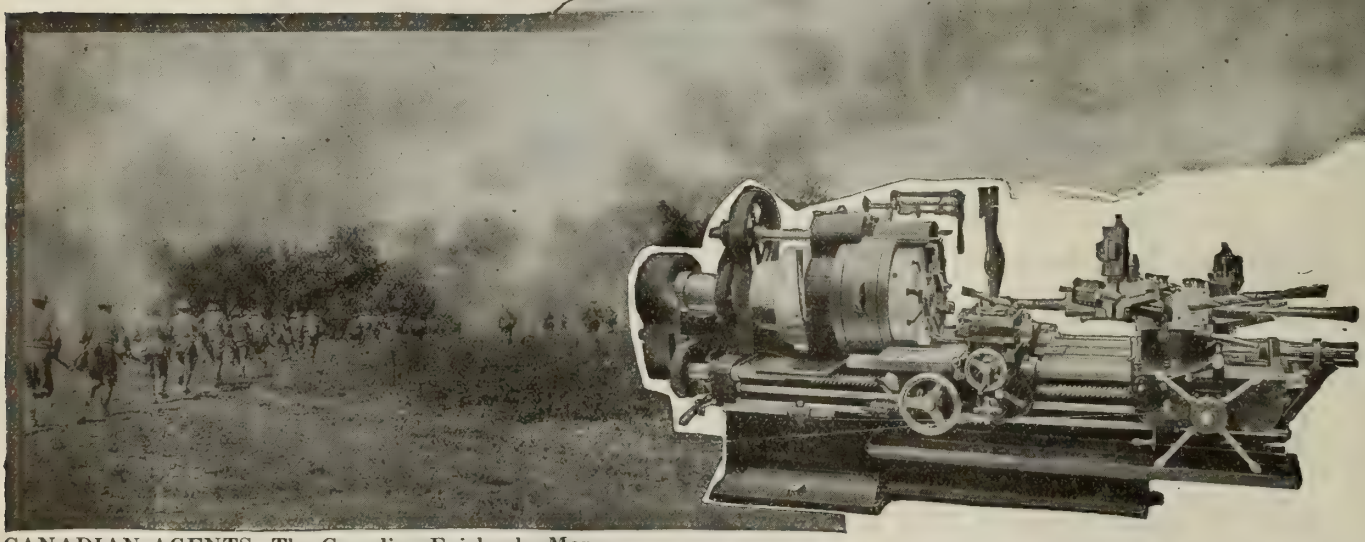
The Drifting Reveals the Scene of Re

Gisholt Methods Insure Accuracy and Economy

Out of the business of *destroying* there arises the bigger problem of *rebuilding*.

Dependable machines are needed—steady production—the certainty of a satisfactory finished product—advice in the methods of meeting the readjusted demands.

Gisholt Turret Lathes, backed by the Gisholt organization, supply these needed requirements. The machines themselves are only a means to an end to secure the results which you will be called upon to deliver.



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Eastern Sales Office: 30 Church St., New York

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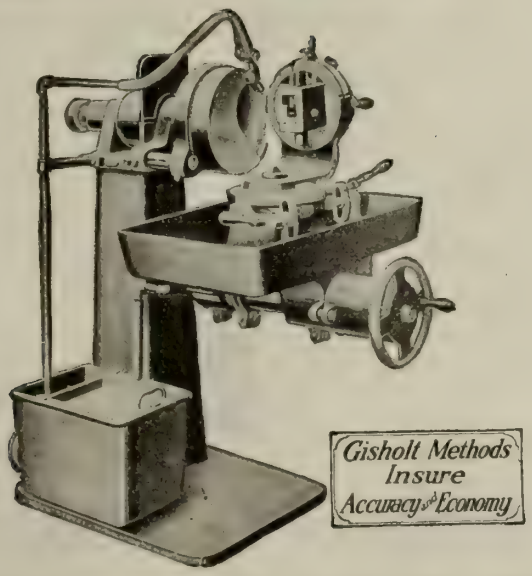
Smoke of Battle construction



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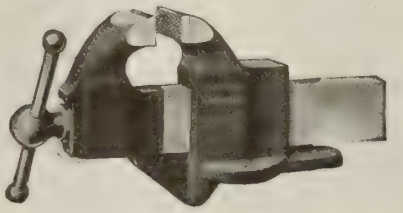

All Good Points In One Vise

NO matter what other make of vise you favor you'll find its best features in Columbian Sledge-Tested Vises — and in addition, many good points of its own.

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Columbian Sledge-Tested Vises will give you all of these and in addition an unbreakable vise. Columbian is the only hollow-jawed malleable iron vise made. You can hammer it with a 16-pound sledge and not break it. It is twice as strong as a cast iron vise and you can obtain a Columbian Vise in any style or size you want at the same price you'd pay for an old-style vise.

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 10. March 6, 1919

Electric Steel Plant; Features of Plant Design

A Description of the Layout of the Electrical Apparatus in a Large Electric Steel Plant—High Power Factor and Good Operating Characteristics Resulted From the Layout of the Equipment

By W. F. SUTHERLAND

THE successful operation of an electric furnace plant depends not only upon the skill with which the furnaces themselves are handled, but also upon the care taken in the original layout and design of the plant. This is particularly true of the electrical equipment, which is an essential feature of and also forms a major portion of the cost.

Plant operation may well be divided into two phases, that having to do with the refining of the steel and that apertaining to the control of the electrical energy supplied. Since these two phases are so entirely distinct, and since the electrical equipment is necessarily costly and needs expert attention, it is well to separate the plant into two distinct portions, the melting house proper, containing the furnaces, and the transformer and control rooms for electrical apparatus.

This arrangement was carried out in a very complete manner in the design of the British Forgings plant, a general description of which appeared in CANADIAN MACHINERY of July 26, 1918, and the following article, while applicable to furnace work in general, is also descriptive of the electrical equipment which entered into its make up.

High Tension Lay-out

The high tension apparatus is necessarily dependent upon the voltage used and also upon the characteristics of the system from which power is obtained. In general design it closely follows standard practice, except that ample circuit-breaker capacity is usually advisable, and circuit-breakers of a higher voltage rating than is necessary from the characteristics of the circuits are used. This is done on account of the variable nature of the load, and also because of frequent interruptions and surges incidental to operation.

Power is received through five 25-cyle, three-phase, 13,200-volt feeders, the sixth being installed but not used. The 250,000 circular mill overhead lines enter through wall bushings, and by reference to Figs. 2 and 3 the connections used

VIEW IN MELTING HOUSE, SHOWING THE TEN 6-TON FURNACES

FIG. 4 VIEW IN ONE OF THE TWO TRANSFORMER ROOMS. INCOMING LINE SWITCHES IN THE FOREGROUND.

will be seen. Disconnecting switches are installed on both sides of the Westinghouse G 3, 40,000-volt oil switch, and lightning arresters are provided for protection from line troubles. Choke coils are also installed. Two sets of current transformers are installed, one set for meters and control, the other for reverse current relays.

High Tension Bus

A 3-phase, high tension bus runs the full length of the transformer rooms and passes through the control room, on either side of which the transformers are located. This bus of round copper is supported on insulators hung from the roof trusses, and is supplied with disconnecting switches for its proper sectionalizing. Choke coils are also provided at this point for the limitation of disturbances. From this high tension bus all transformers are fed, including service transformers for plant equipment.

Transforming Equipment

For the Heroult 6-ton furnaces, ten in all, 1,500 kv.a. transformers are used. Four were supplied by the Canadian Westinghouse Co., and four by the Canadian Crocker-Wheeler Co. Fig. 6 shows one of the C. G. E. transformers which was installed. These transformers have the following characteristics, 1,500 kv.a., 3-phase, 25-cycle, oil-insulated, water cooled 13,200/100 - volt, 65.5/5,000 amperes.

The high tension side of the transformers is connected up as shown in Fig. 5. The leads taken off the high tension bus are provided with disconnecting switches, and C. G. E. K 24 oil switches, and from the oil switch go to the transformer. The high tension side of the transformers is connected star, while the low tension is connected up in delta, this latter connection being made outside the case and at the furnace, as will be explained later. Two sets of current transformers are provided on the high tension leads, one set for the Thury control and the other for relays and graphic wattmeters.

Low Tension Leads

Power factor is sometimes a serious problem in electric furnace work, and much can be in the design of a plant to obtain high power factor in operation. The greatest source of low power factor in furnace work are the low tension leads from the transformer to the furnace and their inductive reactance should be kept low. This is done by making them as short as possible and by keeping opposite polarities close together. It is becoming standard practice to interlace the leads from the transformer and to place the delta connection near the furnace.

In the present case, by careful designing, the power factor of the plant was very high, 95 per cent. in fact. This is for the whole plant, and includes a heavy

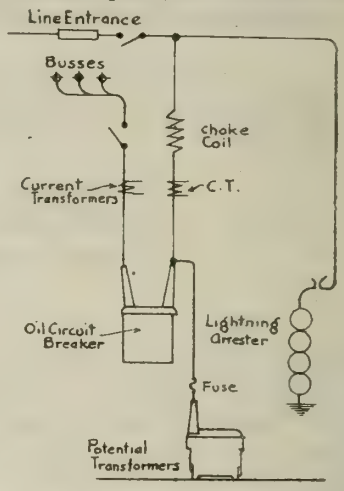


FIG. 3—FEEDER DIAGRAM

induction motor load. The power factor on each furnace averaged 97 per cent., and if everything was clean and in good running order, reached 98 per cent. at times.

The leads were kept short by raising the transformer room floor up to a convenient height. This incidentally was a valuable feature in the plant design in other ways, for it permitted the use of the space underneath for storage bins and for communication with the stock pile outside. The low tension copper was led through an opening in the transformer room wall and was supported by massive insulators from both the wall and also from the crane girder just above. The delta connection is shown in Fig. 7, and it is an interesting piece of design work in flat copper. The furnace catenaries are also shown in the same illustration and the barriers between phases are also clearly visible.

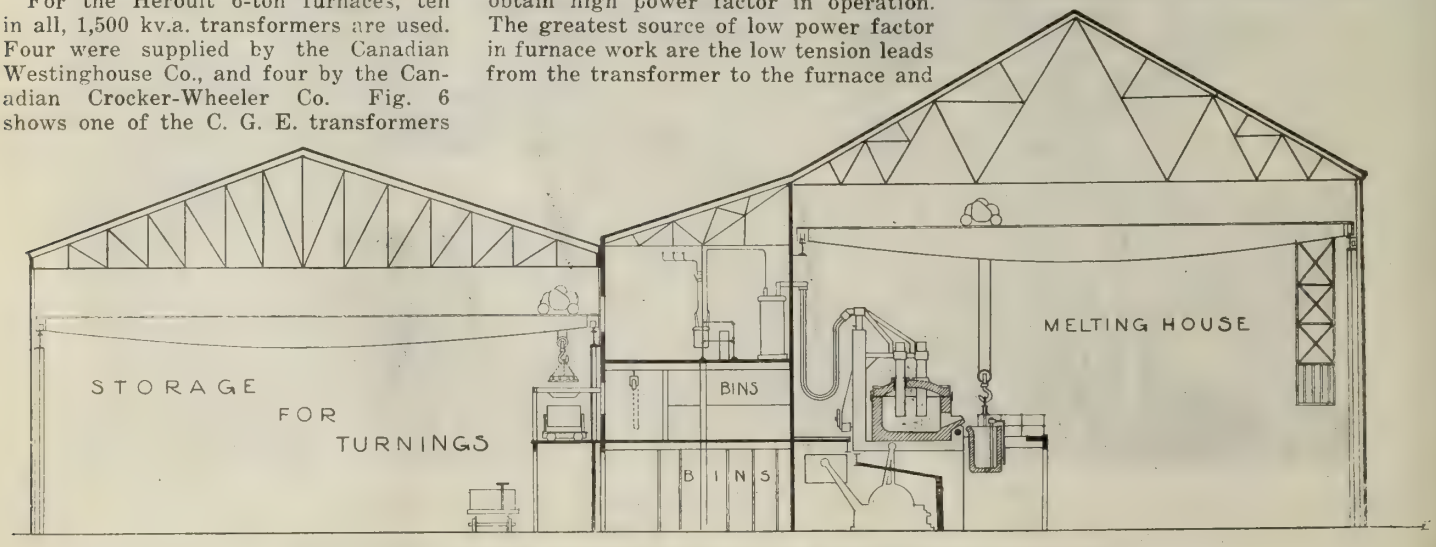


FIG. 1—CROSS SECTION THROUGH MELTING HOUSE TRANSFORMER ROOM, ETC.

Control

The oil switches controlling both the transformers and the incoming feeders are electrically operated and remote controlled, the feeder switches from the control room and the transformer switches from the control board at each furnace. The furnace attendant thus had complete control of his furnace, but over nothing else.

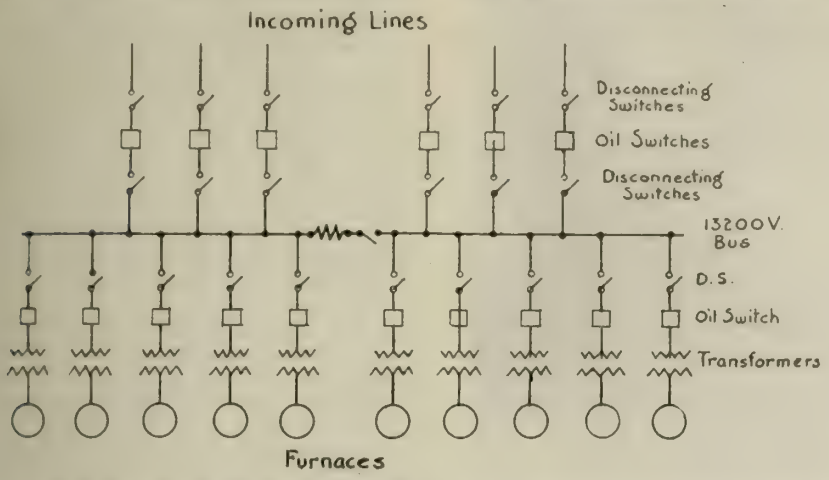


FIG. 2—SINGLE LINE DIAGRAM OF CONNECTIONS. NO SERVICE TRANSFORMERS, ETC., ARE SHOWN

The main control and instrument room located as mentioned before, between the east and west transformer rooms, contained two switchboards, one for the feeders and station service and one for the meter panels for the furnace.

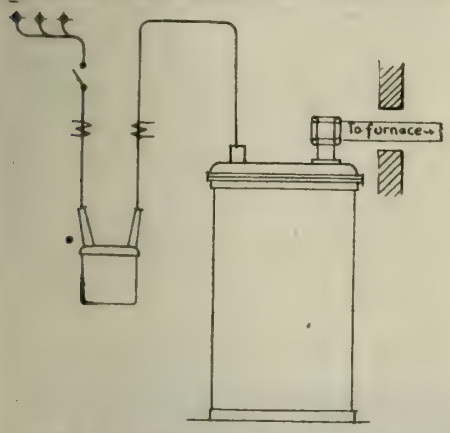


FIG. 5—DIAGRAM OF TRANSFORMER CONNECTIONS.

Fig. 8 shows the main control board for the incoming feeders and station service equipment. The first panel to the left is the battery control panel. A sixty-cell storage battery forms part of the equipment, and together with a small motor generator, supplies current for the control of the oil switches. The next panel controls one incoming line and also controls a 13,200-volt feeder which goes to the forge plant direct. The next panel controls two incoming feeders, and next to it is the service transformer panel. The two remaining panels serve to control two feeders and have space for one more each.

The incoming line panels are provided with reverse current relays, seen at the bottom of the board, while the forge shop feeder and service transformer panel are equipped with C. G. E. plain overload relays in conjunction with a Westinghouse time element feature.

The service transformers mentioned are three in number and are, Packard 300 kv. a., single-phase, 13,200/550-volt oil-insulated, water cooled. They supply whatever 550-volt a.c. power is required, and also operate motor generator sets, which run the crane and other variable speed motors around the plant. These motor-generator sets are two in number and are contained in a room under the control room. This room also contains a d.c. switchboard divided into two sections, serving the east and west portions of the plant.

One motor-generator is of Swedish General Electric Co. make, and has an a.c. synchronous motor, 550 volts, 750 r.p.m., direct connected to a 450 h.p. d.c. generator, generating current at 245 volts. The other generator is made by the Crocker-Wheeler Co. and is of 250 kw. capacity.

Meter Board

This switchboard is shown in Fig. 9 and meters the plant load. The left hand panel is a totalizing panel for the plant load and has a graphic wattless component meter in addition to a graphic wattmeter and an integrating wattmeter. The next two panels meter each furnace load separately, and have a graphic wattmeter for each furnace. C. G. E. overload relays and Westinghouse inverse time elements are also fitted for each furnace. Red and green indicating lamps are mounted for each furnace and test links are supplied for testing. The next panel contains, in addition to equipment for two furnaces, a test set consisting of a graphic wattmeter and a graphic wattless component meter, together with an integrating wattmeter This equipment can be swung on any furnace by means of switches made for this purpose by the Pennsylvania Appliance Co. The performance of any furnace thus can be readily checked up and the instruments on the panel at the furnace calibrated. The fifth panel is for metering the forge plant load. The graphic wattmeters are of Canadian Westinghouse make.

The tilting motor control for each furnace is mounted on the charging platform, where close regulations can be maintained.

The furnace operation is controlled by the Thury system, the ten Thury regula-

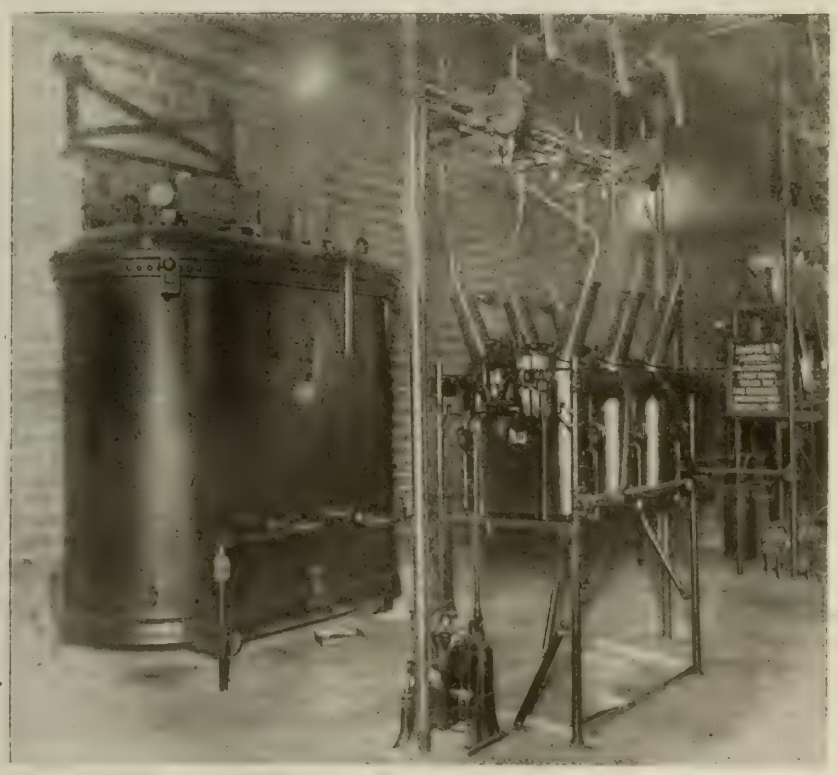


FIG. 14—DETAILS OF TRANSFORMER ARRANGEMENT

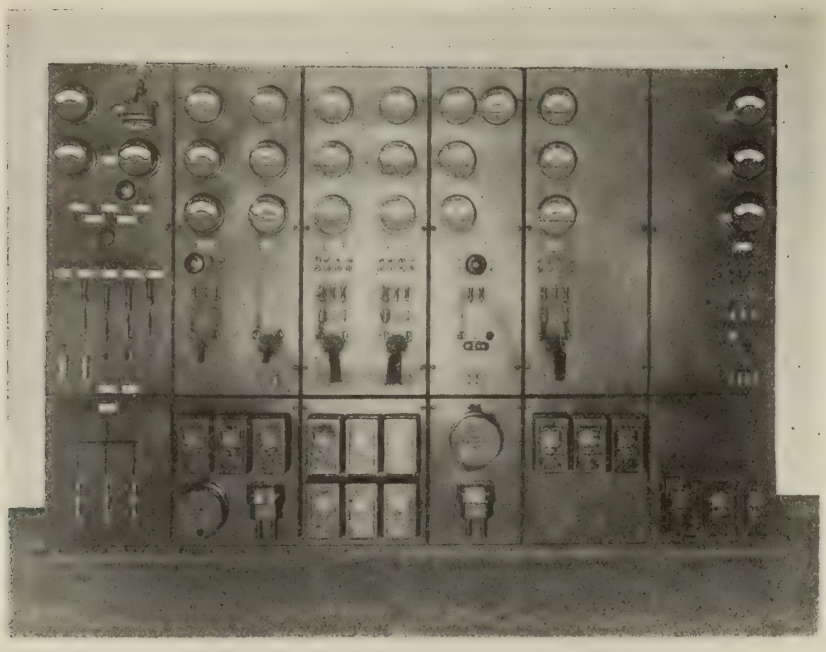


FIG. 8—CONTROL BOARD FOR INCOMING FEEDERS STATION SERVICE, ETC.

tors being supplied by the Volta Mfg. Co., Welland.

ALUMINIUM ALLOY

An alloy of aluminium with 10 per cent. of calcium is reported to be not only lighter than aluminium itself, but to have exceptional merits. It can be readily remelted, does not decompose in water and is more resistant to corrosion than alloys of aluminium with copper, tin, or zinc. In castings it takes on minute details of moulded designs, it machines well and satisfactorily, and is free from brittleness.

BRAZILIAN INDUSTRIES

By M. M.

Owing to the situation created by the war there has long existed for the centres of consumption something like a crisis in the difficulty of obtaining from the producing countries manufactured goods of every description. Practically all the big industrial nations became belligerents, and, incidentally, the consumers were brought face to face with an almost desperate problem—that of supplying their own local needs.

In the case of many countries industrial activities had been neglected in their infancy by reason of the transport facilities, which enabled manufactured goods to be placed on their markets at a reasonable price. The consequent lack of stimulus to develop material activities left their needs to the entire discretion of those more enterprising than themselves. Brazil offered a striking example of this. Her people were accustomed to receive from abroad practically every manufactured article they required.

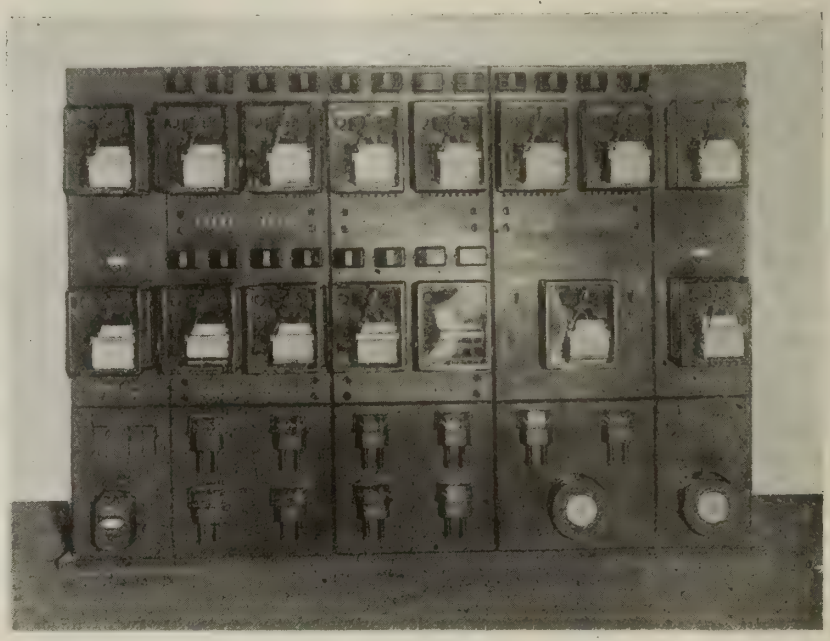
Conditions changed completely with the advent of the war, bringing a new and unknown situation to be faced. Brazilian energy awoke and, visualizing a long period before hostilities would come to an end, began to utilize the best of its abilities with the object of giving to the world, in concrete form, one of the convincing proofs of the spirit of industrial enterprise. The task was as great as its achievement.

In the course of two years the situation was greatly improved, evident relief being felt everywhere. This was the result of an untiring and persevering endeavor, that served as a revelation when it was disclosed that the country was in the way of industrial emancipation. The effects of this new era of activities attracted accumulated and idle capital, which began to be used to build up new factories, to the benefit both of the individual and national harmony. North and south, capital, brains and labor were engaged in erecting plants for whose production the war had opened up a good domestic market.

To-day, according to a very recent industrial census, Brazil possesses such a number of new factories as to place herself in assured protection against any further surprise. In regard to all descriptions of clothing, for instance, the production is already beyond home requirements, and new markets have been found for the surplus output in several of the South American Republics. In this line Brazil will have a place amongst the greatest textile manufacturing countries, for she has, at the very gates of her mills, the highly appreciated raw material that comes from Pernambuco, Piauhy, Rio Grande del Norte Ceara, Maranhao, Bahia, and some of the Southern Brazilian states. The most important factories are located in Bahia, Rio de Janeiro, Sao Paulo and Rio Grande do Sul.

At the beginning of the present year an exhibition of Brazilian cloths, principally cottons and woollens, took place in Buenos Aires and Montevideo with a view to increasing trade in those promising markets. Factories from Rio de Janeiro, numbering about 30; Minas Heraes, 20; Espirito Santo, 1; Pernambuco, 7; Bahia, 6; Rio Grande do Sul, 6; Rio Grande do Norte, 1; Sao Paulo, 30; Sergipe, 8; Alagoas, 5; Maranhao, 2; Santa Catharina, 3, participated in the display, and it can be said without exaggeration that as a result Brazil has found two first-class customers. The Brazilian articles have acquired a high reputation for their excellent quality.

Sao Paulo ranks, as a progressive centre, among the leading manufacturing communities, not only of Brazil, but of the whole South American sub-continent. Since the war began, Sao Paulo has erected the large number of 323 factories, all of which are in full working order. Among them are cloth mills, sugar refineries, coffee mills, and mills for the grinding of cereals; establish-



METER BOARD FOR FURNACES

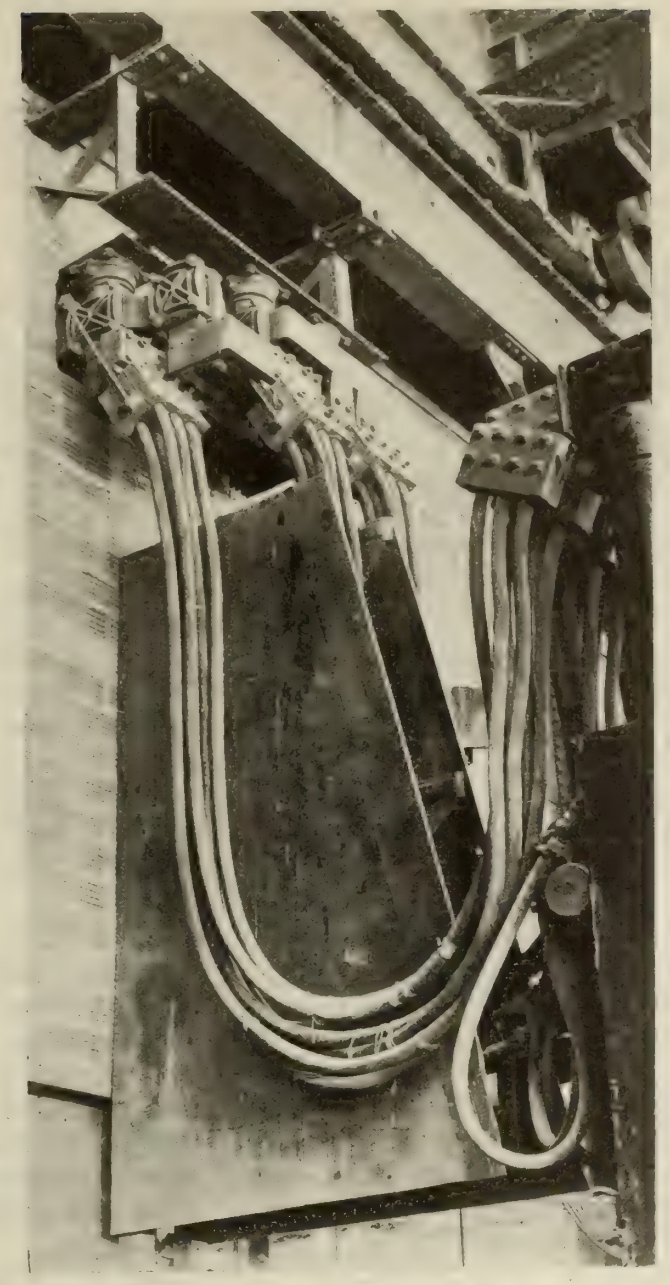
ments for the manufacture of hats, shoes, knitted articles, stockings, linens, corsets, shirts, tinned goods, preserves, biscuits, sweets and chocolate, flour and starch, rubber goods, briquettes, pipes, vases, butter, lard, beer, furniture, and pharmaceutical products, tobacco, chalk, mica, ice, cement, umbrellas, agricultural implements, toys, frozen meat, and many other commodities, saw mills, and plant for various industrial purposes.

In Rio de Janeiro the number of factories is much greater than the needs of its population and the extent of the demands warrant. Rio is the scene of tireless activity, and, being the metropolis, is necessarily the centre of the industrial effort of the nation. About 150 new factories, mostly cold storage works, have been established in the State of Rio Grande do Sul; nearly 20 in Santa Catharina, 40 in Parana, 15 in Parahyba, and 20 in Para, as is shown by the available census so far reached. The majority of the Brazilian states have not as yet been tabulated. This superficial enumeration of facts serves the purpose of this article, which is to call attention to the marked advance Brazil has actually realized in such a short period.

The erection of a paper mill in the State of Parana, with a capacity of eight tons per month, deserves special mention in view of the alarming shortage of paper. This quantity may appear ridiculously small when compared with the productive capacity of English mills, but when it is considered that the establishment referred to represents an effort to establish in Brazil on a permanent and ever-increasing basis a new industry so essential to the large number of newspapers and other indispensable requirements, it shows plainly the benefits of even such a concern to the country.

The State of Parana is destined to be one of the most important factories in the life of Brazil in consequence of its exceptionally favorable conditions for the expansion of foreign capital in the most remunerative investment of the day—cattle-breeding for meat production. Its pastures are of the richest.

Thus, Brazil is demonstrating the capacity of supplying her markets to her own benefit, together with a gratifying encouragement to future generations, which, no doubt, will endeavor to confirm Mr. Roosevelt's prophecy that Brazil will be the country of this century.



DELTA CONSTRUCTION AND CATENARIES TO FURNACE.

OILS AND THEIR USES.

By M. E.

Everyone knows something about the usefulness of oils in the workshop, but there are a great many who employ them indiscriminately, thereby making more or less serious mistakes. A little general understanding and common sense is necessary and also a little discernment as to the nature of the oils which are in everyday use. A very common mistake is to oil a sewing machine, bicycle, pram or clock with any kind of oil which happens to be handy. Frequently these are oiled too often, and yet again they are oiled too seldom, being left till they squeak. Then they are given too much oil, often of the wrong sort, and then there is more trouble. The right oil to use for a clock, no matter what sort it is, is clock oil, which is clean, thin, lubricating oil that does not dry or get sticky. It is also suitable for any light machinery. The least possible touch of oil on the working parts only of clock will suffice, and, as the movements are slow, they do not need it often. Now if this oil were used for sewing machines and the like they would require it too often, so a machine oil with more body is best used very lightly, but as frequently as may be needed to keep all the parts slightly greased. Fast running machinery requires oiling the oftenest. Whereas once a year might do for a clock, once a day would be necessary for a machine in constant use. And the heavier the machinery the heavier the oil should be; engine oil is really heavy machine oil. Linseed oil, in appearance, might seem to be a good lubricant, but it is altogether unsuitable. It dries like a hard varnish, and, of course, would clog any machinery almost as badly as varnish would, except that it hardens slowly. If a piece of rag that has been used in sperm oil, and another wet with linseed oil, be left exposed to dry air for a considerable time, the former will be still the same, but the latter will have become stiff and heavy. For this reason it is quite unfit for using on hones and whetstones when sharpening tools, for it makes them hard and useless, but it is often used in workshops, and thus many workmen have spoilt their stones before finding the reason out. If used for oiling the bright blades of saws or other tools, it makes them brown and varnishy. But linseed oil is the very best for rubbing into the wood parts of tools to keep them clean, and it imparts a hard finished surface. For woodworking and polishing it is invaluable; also in the manufacture of varnishes, oilcloths and imitation leathers. Boiled linseed oil is the only kind for mixing paint, or it would never dry. The more it is unadulterated the longer it takes to dry. It is also essential for making putty; the best is made from raw linseed oil and whiting. Very often cotton-seed oil is used as a substitute for linseed oil, but it is a very poor substitute. Linseed oil is useful for domestic purposes in reviving varnished furniture and leather goods. It is sometimes employed for machine belting but castor oil is considered best for the purpose, also for the leather of bellows and such like articles, where suppleness and durability are required. As it is expensive however, palm oil makes a good substitute. Petroleum or paraffin, besides being the recognized burning oil for lighting and heating purposes, is excellent and cheap for cleaning the working parts of machinery before lubricating. It is good for thinning down machine oil before lubricating, and makes a capital lubricant for locks and light machinery, if a little sperm oil is added. For sharpening tools on the whetstone many workmen prefer it to any other.

You Can't Get Too Much Arithmetic

Not long ago CANADIAN MACHINERY was discussing the question of apprenticeship problems with one of the most successful shop managers in this district. One statement he made regarding the schooling that an apprentice needed if he were going to go ahead with his work was to the effect that he could not get too much arithmetic. His own experience he summed up as follows:

"When I had been at my trade about a year I began to see that I was going to end up against a stone wall. At the end of my second year I could already feel that stone wall with my elbows. I wanted to do better work, but I did not know how. I wanted to do old things in a shorter and more certain manner, but I had not the method at my disposal. Sum it all up and I can say that I did not know enough. The one thing I needed above all else was arithmetic. That is one thing I would say to any apprentice who intends to follow his trade through and get into some of the worth-while positions. Learn all there is to get about arithmetic. Become an expert at shop arithmetic. It will pay all the time."

How to Get Training

There are shop managers who have had to dig this training up as best they could. We can recall off-hand a dozen who have turned to night schools, correspondence schools and technical books and papers for the training they did not get while they were attending school.

CANADIAN MACHINERY will begin next week the publication of a series of articles on "Shop Arithmetic." It will begin right at the beginning. It will aim to start at a point where a person with an ordinary public scho knowledge of arithmetic can follow the problems and directions, and from then on it will advance, step by step, through the working out of problems that are met with in any of the shops where good work is done.

The series is being conducted by James H. Rodgers, Montreal, associate editor of CANADIAN MACHINERY. He has given a great deal of attention to this matter. He knows from actual experience in the shop just the sort of material that is needed, and in this series he will give it in such a way that the apprentices can follow and absorb it.

It would be a good idea for mechanics, other than apprentices, who have not followed the question of shop arithmetic as closely as they might, to get in touch with this series. It may be that you have given considerable attention to the matter. If so you may be able to suggest plans that are not covered and points that are not made in this series.

The best way is to follow the series from week to week. Draw the matter to the attention of others whom you may think need such study. Cut the pages out week after week. Put them away and get a binder. If this is done you will have a lot of material that will be valuable for reference purposes, and which may be the means, in after years, of helping some young mechanic to get the mathematical training he requires.

Watch for the shop arithmetic series. They will start in the next issue of CANADIAN MACHINERY.

The Design of High Pressure Valves and Fittings

The Author, in a Paper Read Before the American Society of Mechanical Engineers, Describes the Joints, Fittings and Valves Used on a 7,500-lb. Per Square Inch System, Both Those That Proved Satisfactory and Those That Failed Being Discussed

By WM. W. GAYLORD

WITH the greater use of hydraulic machines of various sorts as the result of the large manufacture of munitions, a greater interest is to be expected in the design of valves and fittings for such machines. This paper gives the results of my experience, and I have written it largely in the hope that others may be led to publish the results of theirs.

2. A few years ago, when the problem was presented to me of designing a new hydraulic system for a working pressure of 5,000 lb. per sq. in., with the probability that this would be increased to 7,500 lb. per sq. in., I found there had been very little published on the design of valves and fittings for this pressure, and that the designing formulae given in standard handbooks were either incorrect or unsatisfactory. The formula most generally given was that of Lamé, based on the maximum-stress theory, which, while correct for cast iron, is not satisfactory for steel. Lanza, in his "Applied Mechanics," gives a modification of the Grashof formula, based on the maximum-strain theory, which I had used before with fair results for steel fittings on lower pressures. I had, however, noticed some unaccountable failures when applied to the pipe and fittings of a system using a working pressure of 4,000 to 4,500 lb. per sq. in.

3. While studying these failures my attention was called to the maximum-shear theory proposed by Guest, and this seemed to explain most of them. About this time the results of the experiments of Cook and Robertson were published in "Engineering" (December 15, 1911), and after considerable study I became convinced that these offered the best basis for design.

4. The form in which they give the formula for fiber stress, based on the maximum-shear theory, is:

$$\frac{P}{f} = \frac{K^2 - 1}{2K^2}$$

where P is the internal pressure in pounds per square inch, f the fiber stress, and K the ratio of external to internal diameter. This is the equivalent of the usual formula:

$$f = P\,\frac{2}{1 - \dfrac{d_0^2}{d_1^2}},$$

where d_0 is the internal diameter and d_1 the external diameter, as can be seen by substituting $\dfrac{d_0}{d_1}$, for K; thus:

$$\frac{P}{f} = \frac{\dfrac{d_1^2}{d_0^2} - 1}{2\dfrac{d_1^2}{d_0^2}} = \frac{d_1^2 - d_0^2}{d_0^2} \times \frac{d_0^2}{2d_1^2} = \frac{d_1^2 - d_0^2}{d_1^2}$$

whence

$$2\,Pd_1^2 = f\,(d_1^2 - d_0^2)$$

or

$$f = P\frac{2d_1^2}{d_1^2 - d_0^2} = P\frac{2}{1 - \dfrac{d_0^2}{d_1^2}}.$$

5. The results of their experiments show that if a factor of 1.2 were introduced, the equation would more nearly represent the actual results, so the formula suggested by them becomes:

$$\frac{P}{f} = 1.2\,\frac{K^2 - 1}{2\,K^2}.$$

6. This formula I transformed to give the thickness of cylinder wall t for cylinder of inside radius r by substituting $\dfrac{r+t}{r}$ for K; thus:

$$\frac{P}{f} = 1.2\,\frac{\left(\dfrac{r+t}{r}\right)^2 - 1}{2\left(\dfrac{r+t}{r}\right)^2}$$

$$= 0.6\,\frac{r^2 + 2\,rt + t^2 - r^2}{r^2} \times \frac{r^2}{r^2 + 2\,rt + t^2}$$

$$= 0.6\,\frac{2\,rt + t^2}{r^2 + 2\,rt + t^2}$$

or

$$Pr^2 + 2\,Prt + Pt^2 = 1.2\,frt + 0.6\,ft^2$$

Transposing,

$$0.6\,ft^2 - Pt^2 + 1.2\,frt - 2\,Prt = Pr^2$$

or

$$(0.6\,f - P)\,t^2 + 2\,(0.6\,f - P)\,rt = Pr^2$$

$$(t + r)^2 = \frac{Pr^2}{0.6\,f - P} + r^2$$

and

$$t = -r \pm \sqrt{\frac{Pr^2}{0.6\,f - P} + r^2}$$

which makes it much more convenient for general use.

7. From this formula it is apparent that a material having a working fiber stress of 12,500 lb. sq. in. or less would not be safe, however thick the pipe wall. This, of course, eliminates bronze, cast iron and semi-steel as materials for making these fittings. After careful consideration of the materials available it was found that cold-drawn, seamless steel pipe annealed to give 45,000 lb. per sq. in. elastic limit, and steel castings for fittings giving 30,000 to 35,000 lb. per sq. in. elastic limit, could be obtained, and it was decided to use these. As the system had no accumulator and therefore was not subjected to severe shocks, a working fiber stress of 0.6 of the elastic limit was used.

8. The largest pipe in the system was to take the discharge of five pumps, each of 60-gal. per min. capacity, making a maximum flow of 300 gal. per min., but most of the time only three pumps or 180 gal. would be used. In view of this a maximum velocity of 20 ft. per sec. or a usual velocity of 12 ft. per sec. was allowed, which required a pipe of 2¾ in. inside diameter. From the above formula the thickness required for a pipe of 2¾ in. inside diameter is

$$t = -1.375 \pm \sqrt{\frac{7500 \times 1.375^2 \times 2}{0.6 \times 27000 - 7500} + 1.375^2}$$

$$= -1.375 \pm \sqrt{\frac{28360}{17400} + 1.891} = -1.375 \pm 1.876$$

$$= 0.51 \text{ in.}$$

and for a fitting

$$t = -1.375 \pm \sqrt{\frac{7500 \times 1.375^2}{.6 \times 19500 - 7500} + 1.375^2}$$

$$= -1.375 \pm \sqrt{\frac{28360}{8400} + 1.891} = 0.925 \text{ in.}$$

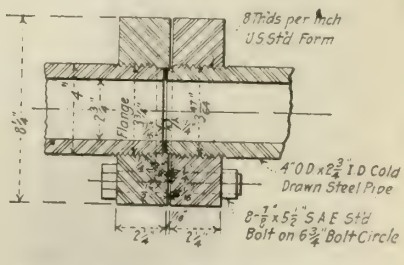


FIG. 1—TYPICAL FLANGED JOINT FOR 7,500 LBS. PER SQ. IN.

9. A pipe having 4-in. outside and 2¾-in. inside diameters was chosen, as this was a commercial size and allowed the necessary thickness of metal for threading in a joint of the type shown in Fig. 1. The fittings were made with a 1-in. wall thickness, the tee shown in Fig. 2 being an example of the type used.

10. The bolting of the flange was

figured by assuming that the full pressure was applied to the area of a circle of the outside diameter of the gasket. In the joint in Fig. 1 this would make a total load on the bolts of $1.875^2 \times 3.142 \times 7.500 = 83.150$ lb., which would require eight 1⅜-in. bolts if U.S. standard bolts were used, allowing a working fiber stress of 10,000 lb. per sq. in. This would have taken a flange about 11 in.

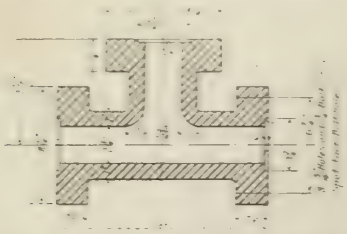


FIG. 2—TYPICAL FLANGED FITTING FOR 7,500 LBS. PER SQ. IN.

in diameter and would have made the piping very hard to install in the limited space available, so it was decided to use bolts made to the S.A.E., or, as it was then known, the A.L.A.M., standard. Using a working stress of 22,500 lb. per sq. in., this allowed the use of eight ⅞-in. bolts in an 8¼-in. flange. This is open to the objection that a careless mechanic may replace these special bolts with standard bolts and thus cause the failure of the joint, but there has been no trouble from this cause.

11. When the piping was installed, some of the gaskets were of soft copper and the rest of red fiber, but experience has shown red fiber to be more satisfactory as the copper soon hardens and a slight water hammer will often start the joints leaking, while the red fiber does not give this trouble.

12. The system was to supply three machines from a group of five pumps, and the piping was to be so arranged that the large machine, which was to use pressures up to 7,500 lb. per sq. in., could be operated with any or all of the pumps, while the other two machines were to be operated with one or two pumps each, but the connections were to be so made that any pump could be connected to any machine. This was done by using a manifold tee on the discharge of each pump with a valve connecting to each pipe line.

13. The valves originally put in were of two types; one a wedge gate valve with cast-steel body and hard bronze wedge, the other a stop valve for the balanced type having a cast-steel body and bronze plunger. The gate valves proved impracticable as the bodies could not be made sufficiently rigid to prevent distortion of the seat and the starting of a leak which would grow very rapidly because of the cutting action of the water. The other valves were more satisfactory and could be kept fairly tight by frequently dressing the seat and plug; but it was found more satisfactory to use blank flanges and pipe spools in place of the valves to make necessary changes in connections.

14. The machines were in effect single-acting presses in which the ram was returned by an auxiliary low-pressure system. The main operating valve therefore became a bypass valve which was closed to drive the ram forward and opened to allow the ram to stop and be returned. The valve in Fig. 3 was chosen for this place and was first made without the loose connection shown in the stem, but it was found very hard to open it after it had been shut tight, so the connection was added and this difficulty overcome. Experience had shown that the form of seat used with the beveled recess for the plug would last much longer than if the valve had a flat seat.

15. This system has been in use five years, often with a working pressure of 8,000 lb. per sq. in. for short periods, with no failures and, with the exception of the valves mentioned, has given good satisfaction.

16. On two similar systems more recently installed for operating pressures of from 4,000 to 5,000 lb. per sq. in. the same type of pipe and fittings has also been used with success. The operating valves furnished for these systems were made as shown in Fig. 4 and proved unsatisfactory, as the water pressure on top of the plug held the valve closed so that it was almost impossible to open it. These were replaced by valves similar to Fig. 3, which are working satisfactorily.

17. These machines had an exhaust valve as shown in Fig. 5 which returned

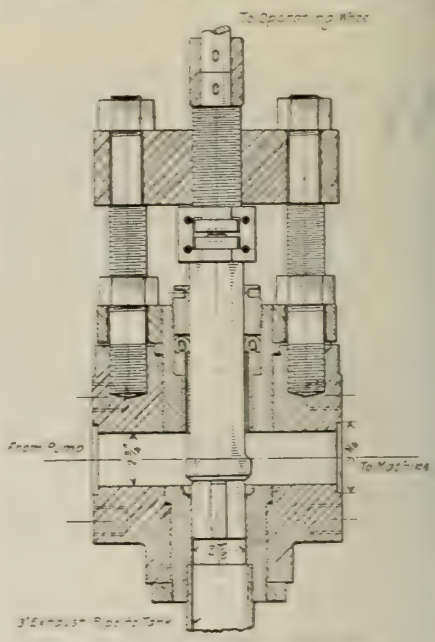


FIG. 3—OPERATING VALVE FOR 7,500 LBS. PER SQ. IN.

the water direct from the main cylinder to the tank on the return stroke of the ram. These gave much trouble by the intermediate piece between the valve body and operating cylinder breaking through as indicated. This in two cases blew the operating cylinder entirely off the valve body. Two of the valve bodies also failed by splitting. In view of this and the fact that a leakage through the U-leather packing might also blow the operating cylinder off, it was decided to redesign this valve, using a cast-steel

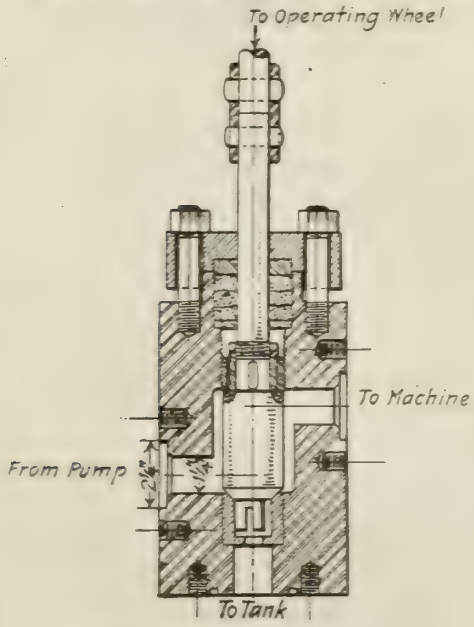


FIG. 4—OPERATING VALVE FOR 5,000 LBS. PER SQ. IN. (UNSATISFACTORY DESIGN)

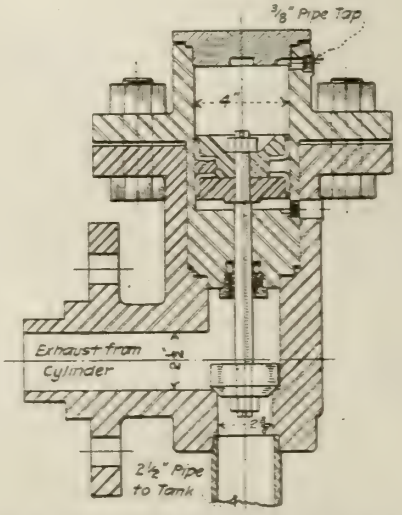


FIG. 6—EXHAUST VALVE FOR 5,000 LBS. PER SQ. IN.

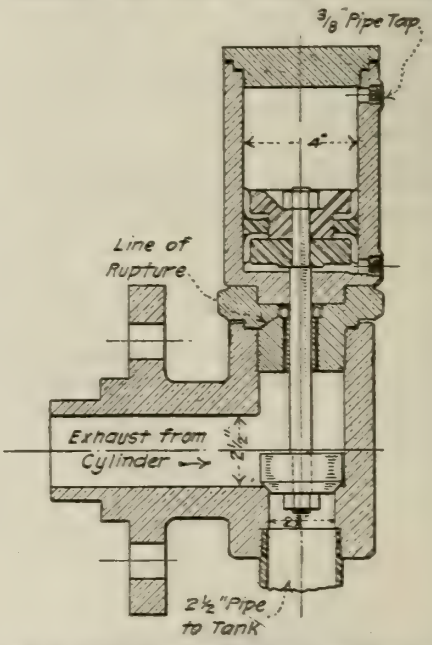


FIG. 5—EXHAUST VALVE FOR 5,000 LBS. PER SQ. IN. (UNSATISFACTORY DESIGN)

body and cylinder arranged to eliminate these faults. Fig. 6 shows this valve, and, although it is rather difficult to build, it has proved very satisfactory in operation.

18. On a smaller press having three double-acting cylinders designed to operate in regular sequence, a multiple valve of the semi-balanced spring-closed type, shown in Fig. 7, was used, having the individual valves opened by bell-crank levers moved by face cams mounted on a common shaft. The cams were so arranged that rotation in one direction would cause the cylinders to operate in the proper order. The valve was so designed that when open, the area through the seat was greater than around the stem, thus reducing the velocity of water through the seat and largely eliminating the cutting of the seat. Fig. 8 is a key plan of Fig. 7. Fig. 9 is a section through one of the valve seats of Fig. 7, showing areas.

19. This press is connected directly to the pump through this valve, and it has proved much more satisfactory than the four separate valves which it replaced, one bypass and three reversing, as a careless operator cannot work the valves in the wrong order and break the press.

20. The piston rod in the large cylinder of this press is two-thirds the diameter of the piston, and it was found that when

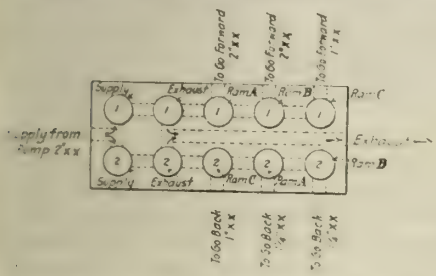


FIG. 8—KEY PLAN, SHOWING ARRANGEMENT OF VALVES IN FIG. 7.

the speed of the press was increased by speeding up the pump, the valve controlling the head end of the cylinder was too small to allow the water to escape quickly enough on the return stroke of the ram to prevent a rise in pressure in the opposite end of the cylinder and consequent blowing of the relief valve at each stroke of the ram.

21. After considerable experiment it was decided that the best way to overcome this difficulty would be to devise some method of returning the water from the head end of the cylinder direct to the suction tank of the pump on the return stroke of the ram. This was accomplished by inserting the valve shown in Fig. 10 in the pipe between the operating valve and the head end of the cylinder. As will be seen from the figure, the upper valve will open when water is admitted from the operating valve, while the lower valve will be held closed. When the pressure from the operating valve is relieved and the ram starts to return, the lower valve will open and the upper valve close, thus returning the water direct to the tank through the 2-in. pipe. This eliminated practically all trouble with the operating

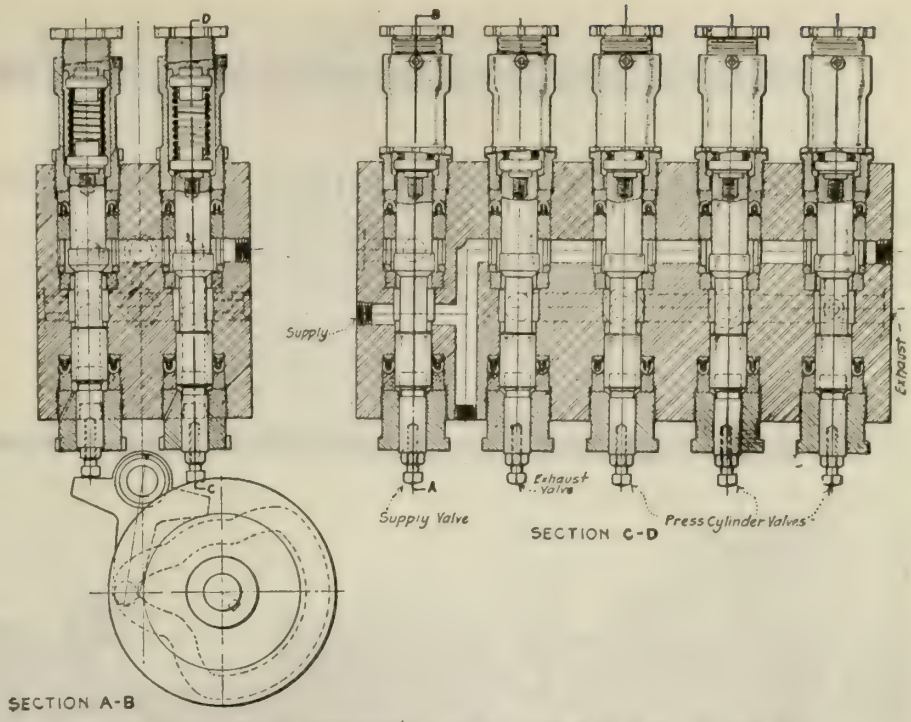


FIG. 7—MULTIPLE OPERATING VALVE. (SEE KEY PLAN IN FIG. 8).

valve and materially increased the speed of the press.

22. As the highest pressure used in this system was 1,500 lb. per sq. in., double extra strong pipe and malleable-iron extra heavy hydraulic screwed fittings were used and have proved satisfactory.

23. In designing valves and fittings for service on accumulator systems, I have found that it is usually the severity of the water hammer rather than the actual pressure that determines the strength required, and that in laying out such a system, all possible care should be used to avoid trouble from this source. However, as the severity of water hammer in a new system can never be exactly determined before it is in operation, I have used the designing formula given in the first part of this paper, with a working fiber stress of one-third to one-half the elastic limit of the materials employed, depending on the prob-

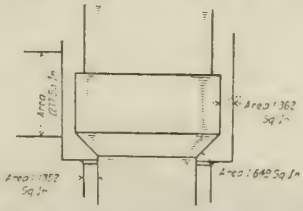


FIG. 9—SECTION THROUGH VALVE SEAT OF ONE OF THE VALVES IN FIG. 7, SHOWING AREAS.

able severity of shock from this cause. This I have attempted to check by figuring the rise of pressure to be expected due to the inertia of the moving parts of the accumulator if all operating valves should be closed at the same time. This is done by assuming the ram of the accumulator to be coming down with a maximum velocity and figuring the force necessary to cause a negative acceleration sufficient to stop it in an assumed minimum time of closing the valves. This at best can only be a rough check, but it has proved sufficient in several cases. The piping of such a system should be so supported and anchored that water hammer will not cause any considerable

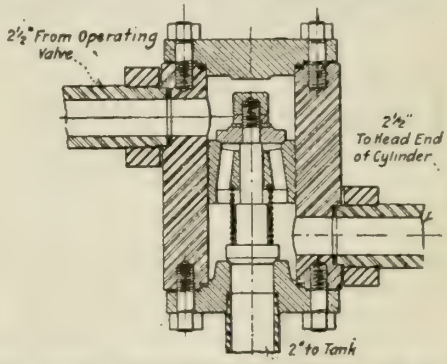


FIG. 10—VALVE FOR BY-PASS TO TANK ON RETURN STROKE.

whip in the piping, as this is the usual cause of broken fittings and leaking joints.

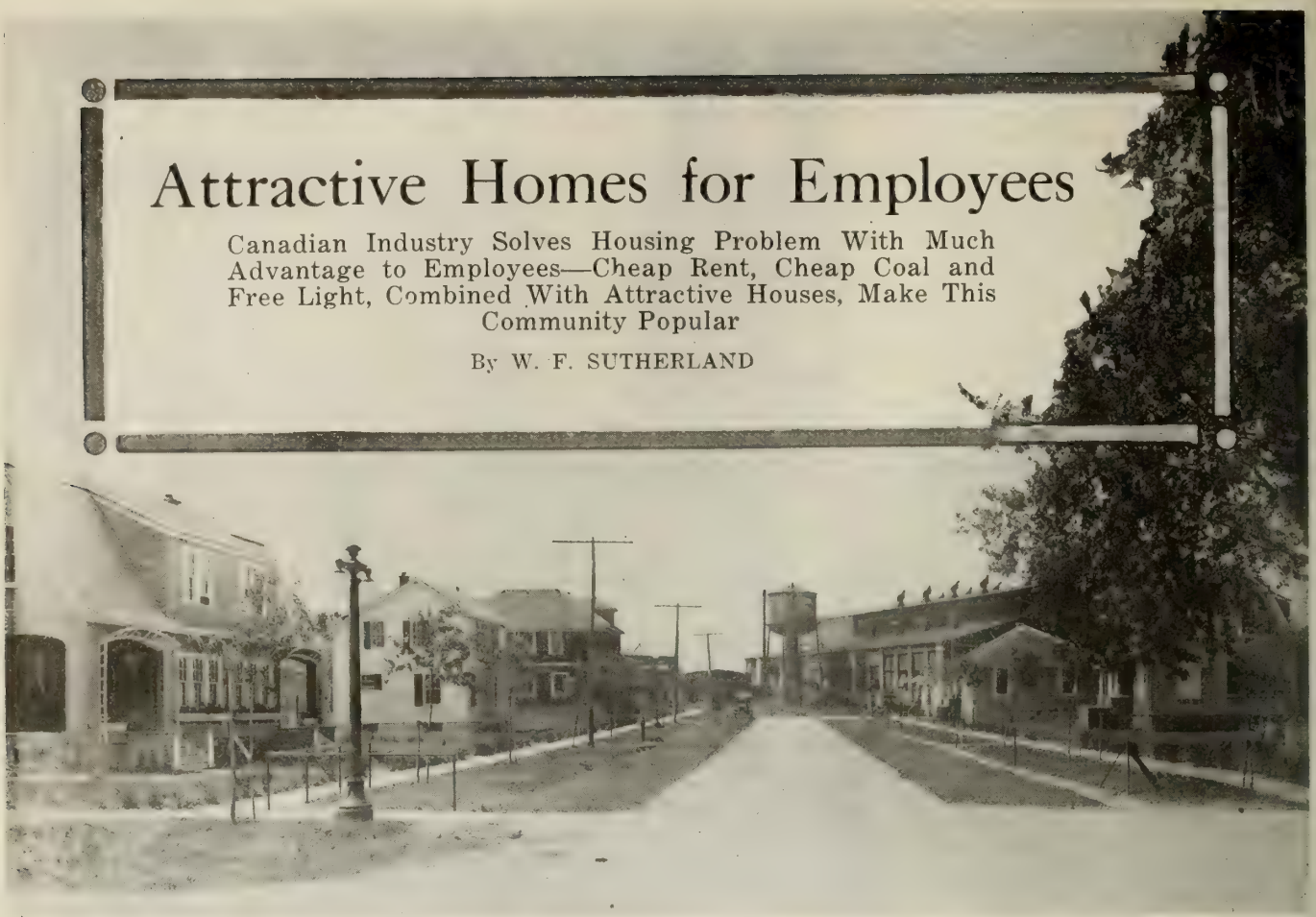
24. The valve most used to control single-cylinder machines like draw benches on an accumulator system is a combined throttle and reversing valve, while the valves for multi-cylinder machines are too numerous and complex to describe in this paper, but the principles used in their design are the same as for the valves already described, except that greater care must be exercised to prevent too rapid opening and closing, and consequent destructive water hammer.

German substitutes for rubber in automobile tires were many and ingenious. Some of the many materials used were tyres of hides, skins, leather, fibre, rope and cordage; woven fabrics, felted yarns, paper and pasteboard bristles; wood, cork, celluloid, and elastic substances of various kinds.

Attractive Homes for Employees

Canadian Industry Solves Housing Problem With Much Advantage to Employees—Cheap Rent, Cheap Coal and Free Light, Combined With Attractive Houses, Make This Community Popular

By W. F. SUTHERLAND



THE housing of the workman is receiving a large amount of attention, and justly so, for the industrial developments of the last few years have to a large extent altered conditions formerly encountered. Many industries have sprung up in districts remote from large centres, and even the cities themselves have felt the pressure incidental to the increased numbers of workers in the munition plants, which have been operating in such large numbers. The Governments of many of the Allied countries have taken considerable interest in this phase of the labor problem, and many firms have themselves gone to considerable expense to create satisfactory conditions for their employees.

One of the most interesting of these private housing schemes has been worked out by the Norton Company, both in Canada and in the United States. The industrial community created by the Norton Company at Indian Hill, near Worcester, was described in CANADIAN MACHINERY several months ago and the present article treats of the developments which have recently been completed at Chippewa, where their Canadian plant is located. The problems encountered in each place were widely different and lead to a somewhat different treatment of the Canadian project.

The location of the Norton Co. at Chippewa, while ideal from the standpoint of power supply and industrial facilities, was somewhat at a disadvantage as regards housing conditions for employees. Houses were scarce and unsatisfactory, and rents were high, necessitating the employees living at Niagara Falls and coming to work by street car, the night shift having a car service at only one hour intervals.

To ameliorate these conditions the company started a comprehensive housing scheme in 1916, the major portion of which has recently been completed. Land, which was formerly a cow pasture and swamp, is now filled in, graded, with well built roads and lighting, and forms the nucleus of an exceedingly attractive community.

Layout

The community is located somewhat to the south of the plant and centres around a new cross street, which intersects the main approach to it.

This street, together with that leading to the plant, has been graded, paved, sidewalks put down and made attractive by the planting of trees and the wise utilization of those already grown to full size. An additional pavement has also been put down for the space of several blocks to provide a satisfactory means of entrance from the village of Chippewa proper.

The types of houses developed by the architects, Wright and Kremers, of Niagara Falls, N.Y., are vastly different from those usually met with in industrial communities. All too frequently in

THIS ILLUSTRATION SHOWS A TYPICAL SINGLE AND A TYPICAL DOUBLE HOUSE.

new developments one sees block after block of houses the same in every respect, closely jammed together and with no attempt made to relieve the monotony by varying the architectural features of individual houses, if, indeed, they have any.

In the development here described, the value of plenty of yard space for each unit was well considered. Each house, or double house, is set well back from the road, with an ample back-yard and a uniform street line has been carefully avoided. In a typical block the central feature will be found to be a double house of substantial appearance, set well back from the road. On each side of it the houses approach the road more nearly, the corner houses of each block being the nearest to the street line. The houses are symmetrically disposed as regards their type on each side of the central feature, or double house, and while this is done, the exterior features are arranged in such a manner that no appearance of similarity exists. One house may have shingled walls, and its counterpart in plan will be given an entirely different appearance by the use of clapboard siding, and a different verandah treatment.

THE COMPANY RUNS A WELL APPOINTED CAFETERIA FOR EMPLOYEES

The Vanished Back-yard Fence

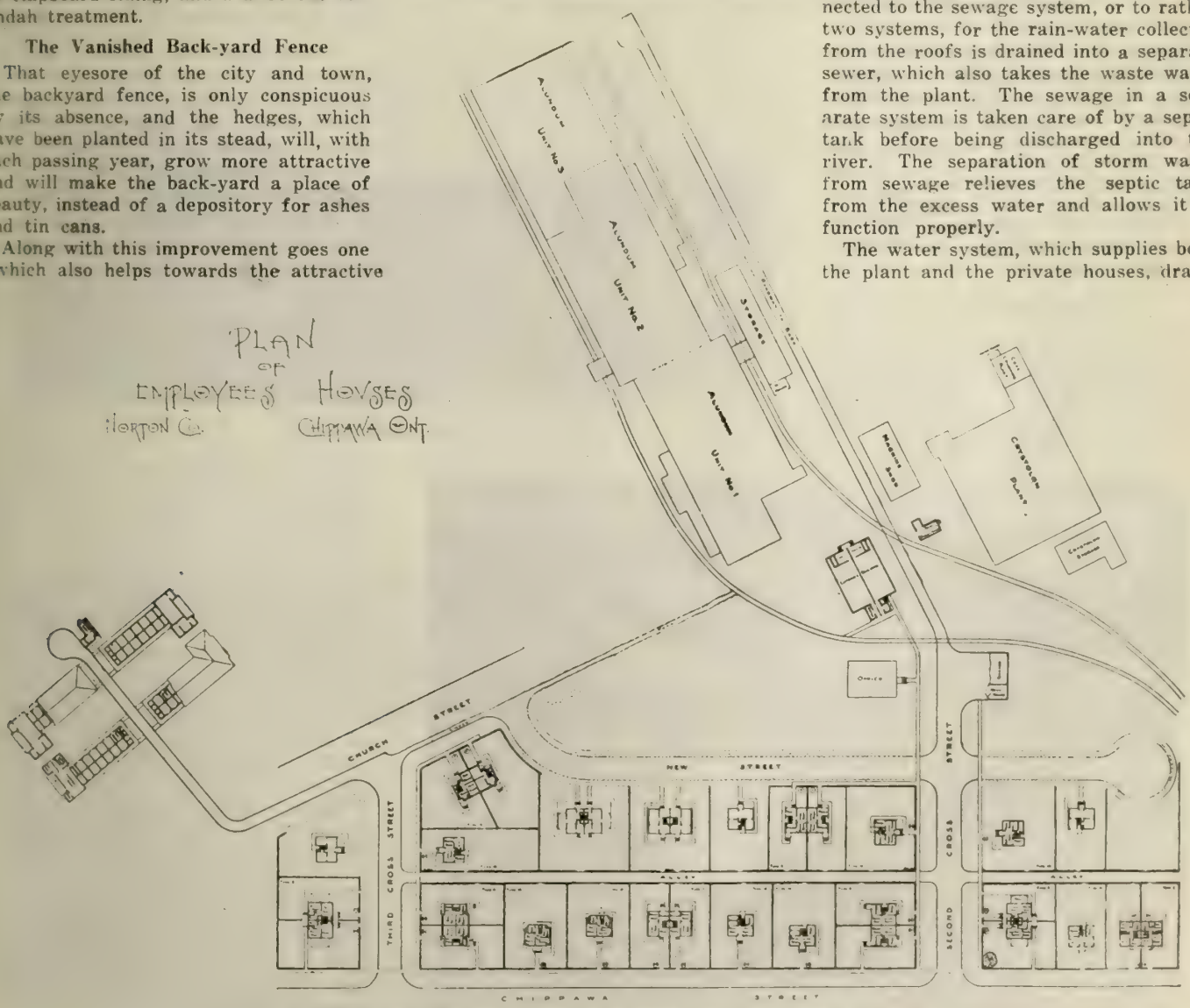
That eyesore of the city and town, the backyard fence, is only conspicuous by its absence, and the hedges, which have been planted in its stead, will, with each passing year, grow more attractive and will make the back-yard a place of beauty, instead of a depository for ashes and tin cans.

Along with this improvement goes one which also helps towards the attractive appearance of the community. No one will admit that the twice a week appearance of ash and garbage cans on front lawns is an aid to civic beauty. This has been avoided in the present instance by the provision of a through lane, serving every house in a block. Through this lane all coal is delivered and all garbage collected. The garbage cans are chained to posts so that their removal is a matter of some difficulty

Sanitary Provisions

Since the Village of Chippewa has no sewage or water systems, the company have considered it good policy to provide both for the community which they have established. Every house is connected to the sewage system, or to rather two systems, for the rain-water collected from the roofs is drained into a separate sewer, which also takes the waste water from the plant. The sewage in a separate system is taken care of by a septic tank before being discharged into the river. The separation of storm water from sewage relieves the septic tank from the excess water and allows it to function properly.

The water system, which supplies both the plant and the private houses, draws



PLAN FOR HOUSING DEVELOPMENT AT THE CHIPPEWA PLANT OF THE NORTON CO.

THE FIRST AID ROOM IS COMPLETE IN EVERY RESPECT.

its supply from the Welland River. A duplicate chlorinating plant is installed, a vital necessity when it is considered that even "the bright, sparkling well water" of the village was highly contaminated with organic matter, and at times a dangerous source of typhoid.

The chlorination of all water used in both the private houses and the plant removes the possibility of infection from this source.

Fire Protection

For the protection of plant and community from a fire, a fire department has been organized with hydrants located at proper distances apart. Two volunteer fire companies have been organized and are provided with a hose reel and a chemical wagon, housed in an attractive station. Fire alarm boxes of the break glass type are located on the ornamental lamp posts. These boxes serve to operate an indicator in the fire hall, and also operate an electric syren at the plant. This signal gives the operator at the pump house notice to boost the pressure.

Plan Arrangement of Houses

As will be seen from the accompanying illustration, the single house has three rooms on the lower floor with a back porch. The dining room is 10 ft. 8 in. square and opens onto the living room of larger size. A swing door connects with the kitchen, which is provided with a sink and pantry closet. A rear entrance leads to the outside and also to the basement, the cellar stairs being located under the stairs leading to the second floor.

The second floor contains three good-sized bedrooms and bath, closet space being provided for each room.

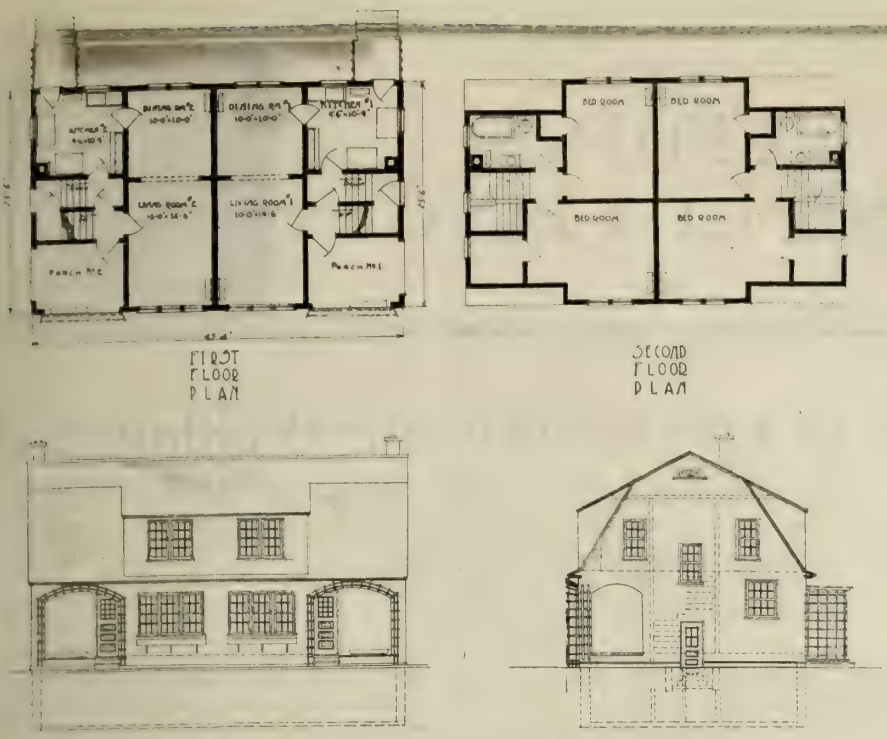
The double houses are arranged on a slightly different plan, the stairs leading to the second floor from a small hall, instead of directly through the living room. A front porch is also provided, instead of one off the living room. The kitchen is directly off the hall and opens into the dining room through a swing door. The bedrooms upstairs are only two in number, but are of generous size.

THE FIRE BRIGADE.

The double house admits of slight variation in plan, several different arrangements being used. All the houses are heated by hot air, and all are provided with conveniences and electric light. Their popularity with the working staff is such that there is a waiting list for houses, which from time to time are vacated.

In order to make provision for those employees who are unmarried the company found it necessary to take over the old Baltimore house in Chippewa, a frame building which has existed for a good many years, for almost a century in fact. The interior of this building was completely remodelled, a new veranda built and other alterations made, which resulted in a very comfortable home for employees who wished to take advantage of it.

FOR THE UNMARRIED EMPLOYEES WHO WISH TO AVAIL THEMSELVES OF ITS ADVANTAGES, THE COMPANY OPERATE THE BALTIMORE HOUSE.



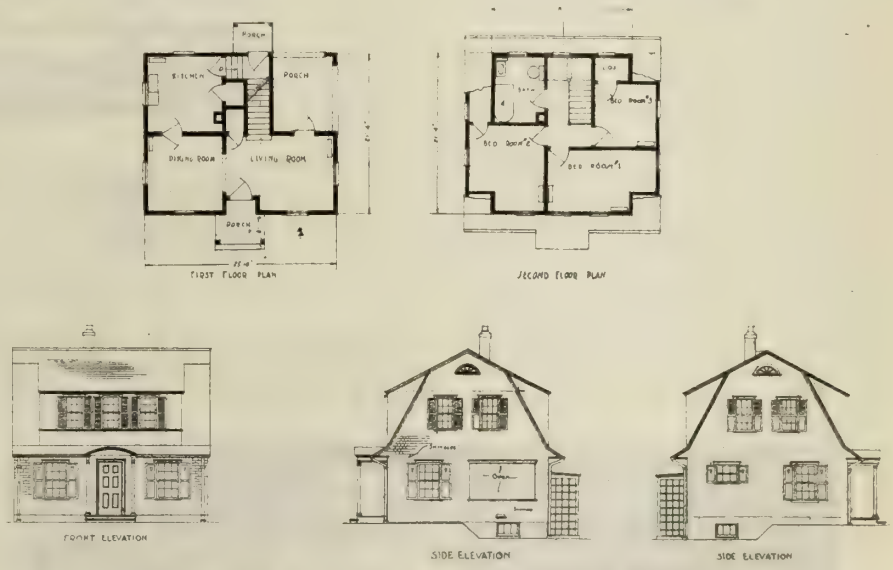
PLAN AND ELEVATIONS OF TYPICAL DOUBLE HOUSE.

First Aid Not Neglected

As may be seen from the illustration of the first aid room shown, this phase of plant management was not neglected. The equipment shown and the room in which it has been installed might well do credit to many a hospital. A cot has been provided, and an operating or first aid table is shown. Sterilizing apparatus and an instrument table will be noticed in the illustration, together with other apparatus of like nature.

THE "HEAT UNIT BASIS"

In large plants, where the consumption of fuel is heavy, it pays to buy on what is called a "heat-unit basis," because in this way the consumer gets exactly what he pays for, in all cases. In applying this method, an estimate is first made of the number of pounds of water that will probably be evaporated by one pound of coal, under standard specified conditions, and a nominal or basic price is then agreed upon, as representing the value of the coal in case it should yield the exact amount of heat that has been assumed. Tests of the coal that is actually delivered are then made from time to time, and the basic price is corrected in conformity with the results that are obtained—the dealer receiving a proportionately greater price if the heat production exceeds the estimated value, while the buyer receives a corresponding rebate if it falls short. In applying this method in practice, a sample shovelful is retained from each load of the coal, and all these samples are thrown into a suitable receptacle, where they are kept, protected from the air and the weather, until some definite and predetermined quantity has accumulated, or until one entire shipment of the coal has been delivered. The individual samples that have been saved out are then thoroughly mixed, and a smaller sample is withdrawn from the whole and sent to the chemist for testing.



PLAN AND ELEVATIONS OF TYPICAL SINGLE HOUSE.

VIEW SHOWING TYPICAL HOUSES, NORTON DEVELOPMENT, CHIPPEWA.

WELDING AND CUTTING

The Development of Oxy-Acetylene Welding—II

Some Interesting Facts Presented Before the Institution of Mechanical Engineers by the Author—Historical Development and Data Regarding Present-Day Applications

By HENRY CAVE, Hartford, Conn.

Fig. 2, plate 1, illustrates a machine called the "Duograph" designed for the welding of the longitudinal seams in barrels and other metal containers. The barrels are welded while in cylindrical form, then the bilge is formed by various methods of rolling, expanding by hydraulic pressure, or in another style two beads are rolled out which answer the same purpose. It will be realized that the weld to stand this abuse and produce a reliable article for a shipping container must have strength and ductility approximating the original metal. This can only be obtained by a special feature of this machine, the use of two torches, one flame on each side of the metal being welded, and one torch travelling slightly ahead of the other. In this way welds are produced, which under tension tests cause the metal to break outside the weld, and yet have sufficient ductility to stand the extreme distortion in forming the bilge.

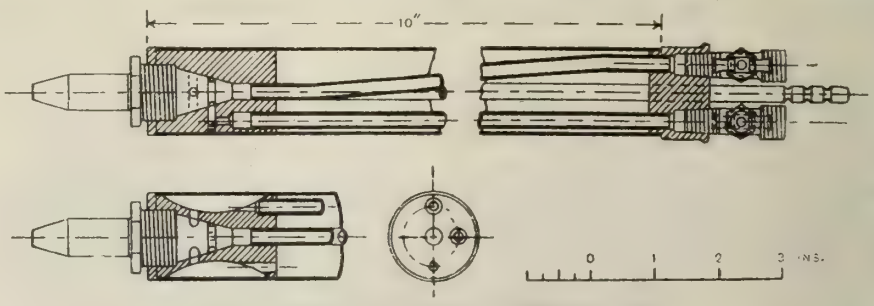


FIG. 3—WELDING TORCH, WATER-COOLED

The development of the use of mechanical welding for the manufacture of tube has been very extensive in the last few years, and there is a very large amount of tubing used for the construction of bedsteads, baby carriages, and in various parts of the cheaper grade of automobiles being manufactured in this way. The cost, of course, is very much lower than for the solid-drawn product, and when the welded tube is redrawn there is very little difference in appearance or accuracy. The abuse that a welded tube will stand when made in satisfactory manner is remarkable. Specimens have been squeezed up under a press without the welded seam opening up in any way, and even after this treatment it is difficult to determine the location of the weld. The grooved tubing used for automobile wind-shield frames is very extensively manufactured in this way. One of the developments which has helped the production of articles of this nature is the use of multiple jet-tips. Such tips are made with as many as six flames, and these weld very much more rapidly than with a single jet, less heat being dissipated sideways into the body of the metal than with the equivalent single flame. Welds have been produced with these tips at the rate of eight feet per minute, without preheating.

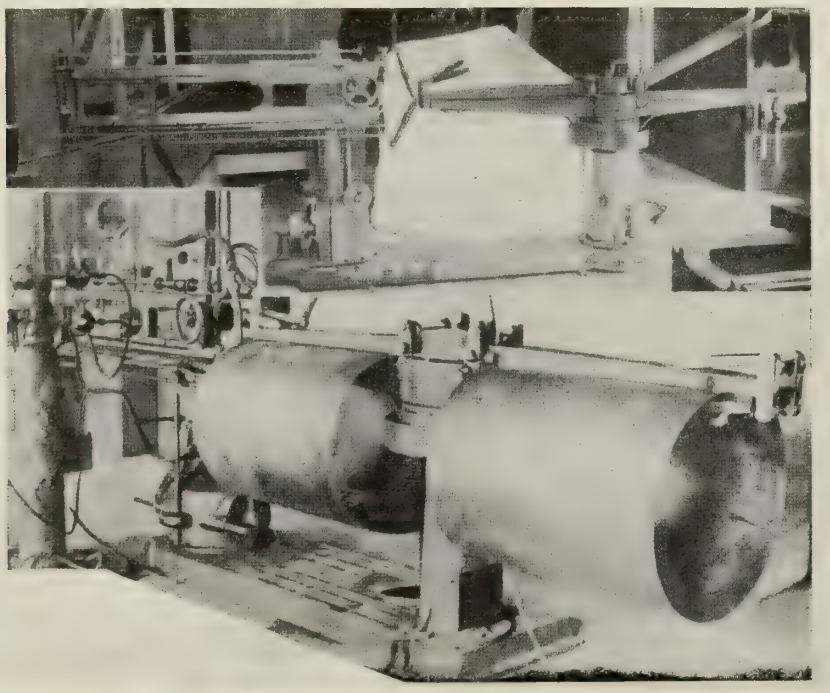


FIG. 2—TWO VIEWS OF THE DUOGRAPH

However, it has been found necessary, on this class of work, to use a water-cooled torch, fig. 3. The water circulates completely through the torch head and down close to the point of tip, fig. 4, on one side, passing up the other, and

conveyed to and from the torch by small rubber hose. The use of this system of water-cooling is not due to any fear of burning the tip, but to a change of the gas mixture, caused by the variation in the temperature of the torch head. Such a change would affect the flow of the gases, thus producing variation in the amount of heat applied to the metal, and which in turn would give irregular conditions and require constant watching by a skilled welder, who would from time to time have to change the gas mixture or vary the rate of speed of the material passing under the flame to compensate for such variations. Even with the best possible operator, the results would not be in any way comparable with that produced by a water-cooled torch with a comparatively unskilled machine tender. The size of the flame and the speed of traverse would, of course, be determined by an expert and standardized for the various thickness and conditions of material.

The use of the welding torch operated by hand has attained tremendous proportions in connection with repair work, particularly on broken parts of automobiles, and in connection with the repair of breakages of the higher grades of cars, spare parts for which are comparatively expensive. For a time the welding of automobile cylinders, cracked due to freezing in winter, was very extensively carried out. In the last two or three years, however, the knowledge of the requirements of an automobile in this direction has spread so generally as largely to eliminate trouble from this cause.

The welding of defective castings in the foundries has not developed to an extent that might be expected, mainly due to the difficulties encountered in connection with the expansion and contraction, and the hard metal resulting from the inferior welders that were frequently employed. To a very large extent the fact that foundries sell their castings, and their customers object to receive material that has been fixed over, mitigates against this use, and that small castings, which would produce the most fertile field for the process, are made at such a low labor cost (the labor being the only saving, as the iron can be used over again), the use of the process for this purpose is largely eliminated. The welding of small steel castings with oxy-acetylene is quite extensive. Not so, however, with heavy castings, as the cost of the process is so much in excess of that of the electric process, which was found to make welds good enough for a great variety of this work, where strength is not required.

The Use of Welding in the Manufacture of Small Articles

This has not developed to a large extent, owing to the high cost of labor in the United States, necessitating machine methods for cheap production, even at the sacrifice of some of the advantages of designs that might result from the use of hand methods such as oxy-acetylene welding.

Welding on Steam Boilers

This is practically limited to repair work, of which there is a considerable amount in marine boilers, but a comparatively small amount in land boilers, excepting possibly locomotives. Restrictions of some of the State authorities and by all of the insurance companies had advisedly kept down the amount of this work, and to some extent also the welding of pressure containers; otherwise, the large number of cheap equipments in the hands of unskilled operators employed by irresponsible concerns would have unquestionably resulted in numerous disasters due to poor work, and also due to work having been carried out in locations that would make it inadvisable. Certain operations, such as the welding of the fire-end of boiler-tubes to the tube-plate, are being carried out almost entirely by the electric method, as the large amount of heat put into the plate by the slower oxy-acetylene process causes trouble.

Welding of Malleable Cast Iron

This is entirely carried out by the use of Tobin bronze rods, all other materials having proved unsatisfactory. The difference in color of this adding metal and the generally small value in malleable iron castings make it prohibitive for the repair of defective castings in the foundry.

Welding of Monel

Considerable study has been given to this natural alloy of copper and nickel, which presents unusual difficulties to satisfactory welding. One firm is now turning out Monel tubes formed up from sheet and then welded by this process.

Welding of Gas Mains

This has developed very rapidly within the last two or three years for high pressure service between townships. The welding of the large mains for the Panama Pacific Exposition, and the subsequent publicity, gave a great impetus to the use of the process for this purpose. At the present time, however, there is not much of this work being done, owing to the high price of pipe, and to the increase in price of metals resulting from the demands of the European war, making it undesirable at this time to carry out numerous extensions in gas mains, which otherwise would have been installed. Some remarkable results are being obtained in the speed of laying pipes by this method. At a recent demonstration of pipe welding before a convention of gas engineers, 4-inch I.D. pipe was welded in 3 minutes 20 seconds actual welding time, and at another demonstration, joints in 2-inch pipe were made at the average rate of 1½ minutes per joint. These results show the best possible practice, but unfortunately very much slower times are being made by a large number of welders, due partly to the failure of the concerns to realize the necessity of using skilled operators, and partly due to the scarcity of really skilled operators, and the large wages that they command in this country. Flanged or threaded connections are not reasonable at the valves in an otherwise welded pipe-line. The cast-iron valve casings usually used are very liable to break and cause trouble, and even loss of life, and cast-steel is expensive and unsatisfactory for welding. The valve is made up from standard pipe entirely by the oxy-acetylene process, both the cutting and the welding being carried out by this means; even the seat of the valve is welded, being made of Monel, which has been found to be the best metal for this purpose. The Monel is deposited on the end of the pipe and forms the valve-seat.

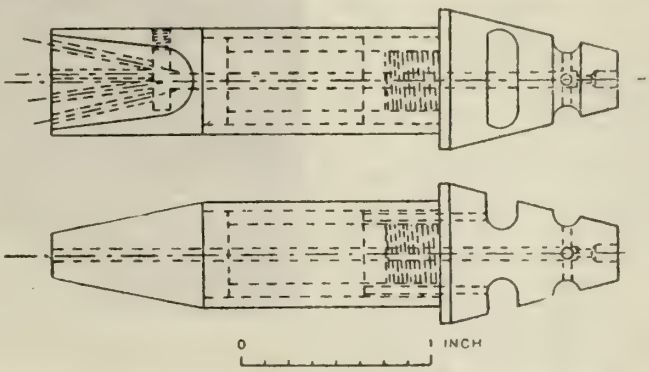


FIG. 4—MULTIPLE WELDINF TIP, WATER-COOLED

The war has caused a much greater advance in the application of the cutting torch than in that of welding; and among other developments the nicking of billets from which projectiles are made, enabling them to be subsequently broken up so that the fracture can be examined, is being carried out very extensively at the present time.

The Cutting of Risers

In the steel foundry has become very general, some foundries having almost eliminated the use of mechanical methods of cutting.

The Cutting up of Scrap Steel With Oxygen Due to the Higher Metal Value

Has developed very rapidly in the last two years. Prior to that time the cost of cutting was hardly warranted by the price that could be obtained for the scrap metal.

Armor-Plate Cutting

This is being done very extensively, hydrogen being generally used as a heating gas. Heavy cutting of this sort is

mostly carried out by a small machine called the "Radiograph," Fig. 5, Plate 1, which carries a motor, driving through a variable speed-gear two of the wheels, a third wheel being of castor type, so as to allow for steering. This device carries a cutting torch and can be steered over the plate which is to be cut by means of a small hand-wheel, or the machine can be used on the end of a trammel cutting a circle from a centre where the cutting is in a straight line. It can be used, as well, on guide-rails which are laid on the work, or the rails can be supported above the work in such a manner as to allow the cutting to be carried out. The torch can be swivelled in any direction so as to allow for a bevel to be cut. This device has been used for cutting port-holes in armour-plate, and a large amount of similar work, and has effected a remarkable saving.

Acetylene generators of the "water-to-carbide" type and made on the flooding principle, so commonly used in Europe, have never found favor in the United States, owing largely to the regulations of the Board of Fire Underwriters. The use of "carbide-to-water" generators is practically universal.

The terms "Low-pressure" and "High-pressure" systems do not mean the same in the United States as in Europe, where the names refer to whether the gas is taken from low pressure generators or from dissolved-acetylene tanks, the latter being, of course, called "high-pressure." In the United States the terms refer to the type of mixing device embodied in the torch, and not to the source of supply of gas. The type, in which the oxygen under a considerable pressure draws in, by injector action, the acetylene which is under only a few ounces pressure, comprises the "low-pressure" system. Sometimes torches of this description will be used with acetylene up to about 2 lb. pressure, the principle being practically the same as when only using a few inches of water pressure. Torches of this class can obtain their acetylene from a generator either of the "high-pressure" or "low-pressure" type, or from a dissolved-acetylene tank. The "high-pressure" type has the pressure of the oxygen and acetylene more nearly uniform, the acetylene being under sufficient pressure so as not to require the injector action of the oxygen to cause the mixture. The most popular type of torch has a mixing device in which the oxygen and acetylene are driven together at right angles by their own pressure in a detachable tip, thus producing the maximum vortex; this results in a very thorough mixture and a close approximation of the theoretical correct proportion of one part of oxygen to one part of acetylene required to produce the reaction to carbon monoxide, which is the only part of the flame used in welding; the balance of oxygen required to produce complete combustion is taken from the air. The acetylene in this case cannot be taken from a low-pressure generator. Either a high-pressure generator working up to 15 lb. per square inch or dissolved acetylene is used, and owing to the lower cost of the former method it is adopted wherever possible for stationary work. Dissolved-acetylene cylinders are used almost universally for portable requirements, portable acetylene generators being prohibited by the insurance authorities.

Lack of skilled operators has greatly retarded the development of the industry in the United States, because there is no systematic method of instruction as in France, Germany, and Great Britain. The larger firms selling apparatus give a small amount of instruction free. This is necessarily limited, however, merely to defining the fundamental principles, and instruction is given at a time when the student has not sufficient knowledge of the process readily to absorb

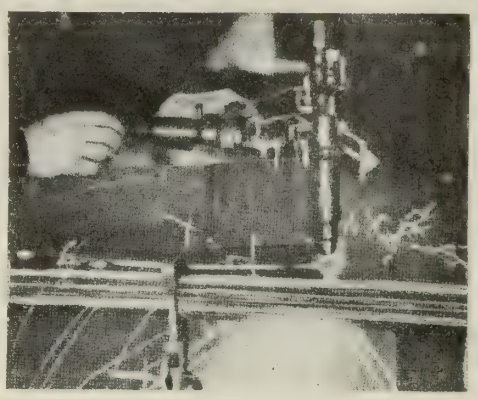


FIG. 5—THE RADIOGRAPH

it. The price charged for the apparatus does not warrant a large expenditure by the manufacturers for this free instruction.

Other operators are developed from helpers around the welding shops. The practice necessary to produce skilled welders must then necessarily be obtained on productive work, with the result that the general standard of work is lowered, and the industry suffers thereby. There is no doubt that the industry would expand by leaps and bounds if some system of producing skilled welders were developed; and it would be a great advantage if these welders could be also skilled in the various trades in connection with which they work, as there are big advantages for a boiler welder to be also a first-class boiler maker, a welder in connection with machine-shop work to be a machinist, and likewise in the other trades.

A PROBLEM IN LUBRICATION

By M. E.

Mr. W. B. Hardy, M.A. (secretary of the Royal Society), discussed the problem of lubrication in relation to colloids. Water, ether, alcohol, benzine, and strong ammonia were apparently entirely incapable of maintaining a lubricating film on glass. "Seizing" occurred just as readily when they were present as it did with cleaned surfaces. Glycerine differed from those fluids in the fact that, though it would not maintain a lubricating film, it did prevent "seizing" when present in excess. For instance, the maximal tangential force which a pair of cleaned surfaces would support without slipping was measured in grammes 55. Flooding the surface with water, benzine, alcohol, etc., left that value unchanged. When a film of glycerine was deposited on the surface the force stood at 55, measured in grammes, but it fell as the quantity of glycerine present was increased to 9, when the surfaces were fully flooded. The expression "film" denoted a layer of fluid on the solid surface, so thin as to comprise probably only a single layer of molecules. With a true lubricant the facility for slipping was maximal when a layer of such excessive tenuity separated the solid faces and nothing was gained by increasing the thickness of the layer. Thus with castor oil the weight required just to start one face of glass slipping over another was 10 grammes, when only the invisible film of fluid mentioned above was present, and it was still 10 grammes when the surfaces were flooded with oil. Some fluids indeed seemed to lubricate better in thin than in thick layers; to act, that is to say, in the contrary way to glycerine. Acids as a class behaved in that way, the solid faces again being of glass. The pull in grammes was as follows:

	Film	Surface flooded
Acetic acid	40	47
Sulphuric acid	37	47
Oleic acid	10	13

If that result could be fully substantiated it would be an important and striking physical fact likely to throw much light upon the process of lubrication.

One broad conclusion emerged—namely that lubrication depended wholly upon the chemical constitution of a fluid, and the fact that the true lubricant was able to render slipping easy when a film of only about one molecule deep was present on the solid faces suggested that the true lubricant was always a fluid which was absorbed by the solid face. If that be so, then the problem of lubrication was merely a special problem of colloidal physics.

In a paper read at Toronto, A. V. White estimates the water power available on the St. Lawrence River at an average of 2,150,000 h.p.

* * *

A scheme originating in Germany for housing airships involved the digging of a huge circular trench in the earth and the covering of this trench by a movable roof in sections. Two airships could be stored side by side and the total number under cover would depend on the diameter of the circle. In this system the roof of the shed can be made to slide about the centre of the circle, so that it would be possible to send out any airship whose axis was pointing into the wind

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

ETCHING AS A MACHINE SHOP OPERATION

By C. E. H.

THE etching process is one which deserves much greater attention than it seems to receive at present. Much time, temper and profanity might be saved by this simple but neglected process.

Take the case of a tight bolt or cap screw for instance, when the only available tap or die is worn or otherwise useless. By slightly heating the screw and immersing for a few seconds in about three parts water and one part nitric acid the screw will be uniformly reduced. Wash off all trace of acid and oil it to prevent rust, or better still neutralize in any akaline solution and then oil it. If still too tight wash off oil (benzine or gasoline is best if available) and repeat the operation. A few trials will soon render "repeats" unnecessary.

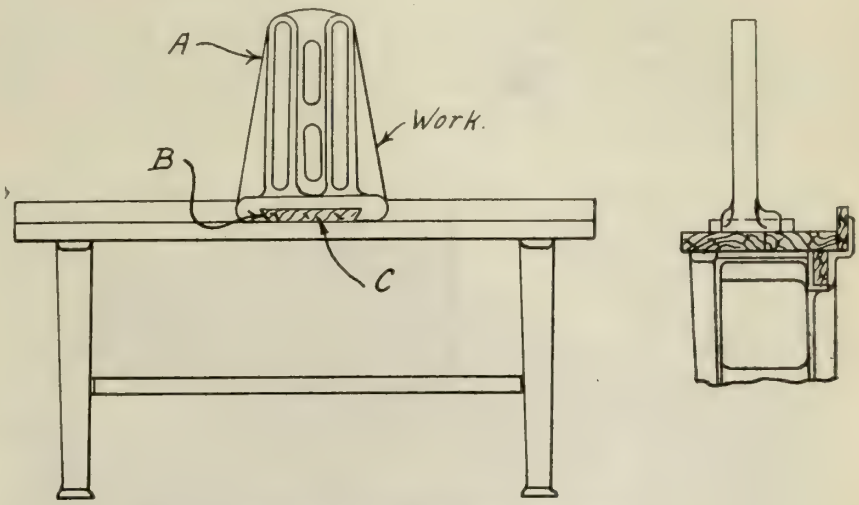
Again, etching comes in very useful in uniformly reducing uneven surfaces, as in the case of small embossing dies, (and this is where the writer uses it extensively); where fifteen minutes or so of the etching process will accomplish the same result, which would take several hours of hand work with gravers and chisels. Further, if certain parts are not to be reduced, they can be painted over with asphaltum varnish, care being taken to cover about 1-64 in. beyond the parts to be protected all round. This is to avoid undercutting by the acid and any small margin can be cleaned up afterwards. Place a little wall or dam of beeswax, or better still "Plasticene modelling clay," as it is very easily handled and very cheap, all round the part to be etched to retain a body of acid. Previously warm the article, as the hotter it is the quicker the re-action.

On multitudes of small jobs this simple process will suggest itself as a great time saver, and consequently a "cost cutter."

It is used extensively in the manufacturing jewelry business and should prove equally useful in the machine and other small shops of varying kinds.

A WORK HOLDING KINK FOR THE BENCH

The accompanying illustration shows a simple method for holding the work A on a bench while it is painted. The part shown is an overarm brace and is used on a milling machine, this part is dovetailed at B and advantage is taken of this for holding it.



WORK HOLDING KINK FOR THE BENCH.

The illustration shows a block of wood C that is cut so it will fit the dovetail in the work. The work is pushed over this block of wood in the manner shown and is held thereby in the position illustrated while both sides are painted, this makes it unnecessary to turn the part over to paint it and prevents smearing the same.—G. H.

SELECTION AND CARE OF PAINT BRUSHES

By M. A.

Flat brushes of widths suitable for the various uses up to 5 or 6 in. wide are more generally used than other forms because a greater amount of surface can be covered at a stroke. With flat brushes, however, the paint cannot be rubbed out as well as with a suitable round brush. For painting sashes and other small surfaces small oval brushes with a chisel-shaped end are most satisfactory. Varnish brushes are also made chisel-shaped or slightly tapering instead of being spare on the end as this allows the varnish to be flowed on more evenly, which is essential. For whitewash or calcimine a very wide brush may be used since these are applied lightly to the surface and are not rubbed in.

Brushes for applying oil paints must be well cleaned after using, though for keeping overnight it is generally sufficient to wrap them in several thicknesses of paper. Some painters keep their brushes overnight by putting them in water. If, however the brush is not to be used for several days the paint should be washed out of it. Turpentine is one of the most satisfactory materials for washing a brush but it is expensive and a brush can generally be washed as well with kerosene, which is much cheaper. After washing off the paint with kerosene the brush should be rinsed with petrol or benzine, then thoroughly shaken, and well washed with soap and warm water. As soon as this washing is complete the brush should be shaken thoroughly, so as to throw as much water out of it as possible, and hung up to dry with the bristles down; when dried the brush should be thoroughly protected from dust.

If much painting is being done, it is less trouble to keep the brushes in turpentine or kerosene. For this purpose hooks should be fastened on the inside of a pail with a close fitting cover, and the brushes should be suspended either by holes in the handles or by loops of string so that the ends hang in kerosene or turpentine in the bottom of the pail. If kerosene is used for cleansing it should be removed by shaking the brush and rinsing it in turpentine before using again with paint.

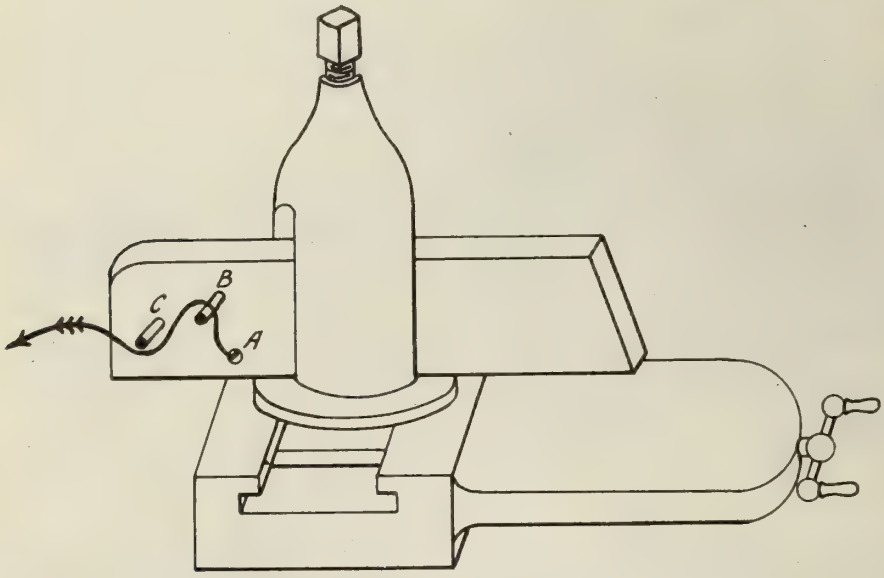
Brushes used with whitewash or cal-

cimine should simply be washed and not put in the same liquids in which the brushes used for oil paints are kept. If a brush has been used for shellac varnish, it should be kept in alcohol or in the varnish itself. In general, a varnish brush may be kept in the varnish in which it is used.

A SPRING WINDING TOOL

Spring winding, which sometimes is a very irksome job, can be made easy if the device illustrated is used.

In form it is similar to the regular toolholder, fitting the lathe tool post. The hole A can be any size reasonably near that of the spring wire which it is purposed to wind. As a matter of fact the one holder will take several sizes of wire.



SPRING WINDING TOOL

The wire comes through the hole in the direction of the arrow, over the pin B, and under the pin C, and then around the arbor, which is between the lathe centres. As may be seen, all that remains to do is to engage the half nuts, as in thread cutting, and the rest is easy.—Wm. Earnest.

HOW I BROKE INTO PRINT

By D. A. HAMPSON

Under that none-too-elegant title we would expect to find a ten cent "work" for the instruction of budding authors, shelved beside the other "how" books in our news stands and book stores. So far as trade and business paper writing is concerned, there is no "how" to it at all —it is simply a case of Do and Do Again.

In CANADIAN MACHINERY we see appeal after appeal to the men on the firing line to open up and share the interesting experiences and the trade kinks that they have met with in their work. Whenever two or three mechanics get together one of the subjects of conversation is how they did this difficult job without the proper tool or how the boss in their shop discovered a new, quicker way of doing a time-honored piece of work. And these mechanics are just as bad as so many women—they can't wait for one to finish to get in another experience equally as good or better—if nothing prevented, they could and would talk a whole day without exhausting the subject.

These are the experiences the editor wants. Write them just as you would tell them—the editors will smooth off the rough edges and put on the polish if needed. The very methods and tools which may be common property of the shops in your vicinity may be unknown elsewhere and local pride, if nothing more, should want to put that vicinity on the map and bring it that much credit for mechanical initiative. Over and over again some acquaintance has told me of reading something of mine in a certain paper; invariably my reply has been, "Yes, but, Will you have been so much farther than I and have had such varied experiences that you should have material for a year's writing, all of it being more valuable than mine."

Those people who have such goods to sell—and it's a selling proposition—rarely get down to the point of actually trying, or if they do try once and get turned down by an editor, they become disgusted, like the Grouch that complained in a recent issue. Why, one of the standing jokes in our household was for me to be met at the door with, "You've got another R. M.," R. M. standing for returned manuscript, a highbrow name for what was often but half a sheet of paper.

There are articles that lack merit and subjects that are hackneyed, but anyone who reads the paper he expects to contribute to can select an experience or two which steer clear of these dead lines. And then the old matter has to be brought up ever so often for the benefit of the younger generations in the trade. Basic principles and operations remain the same for long, long years, and will bear repeating at intervals, for all technical papers strive to educate the newcomers as well as the older men. These basic operations are subject to new and ingenious applications with the modern advances in the art. All of these things can be worked into articles that the editor is glad to receive.

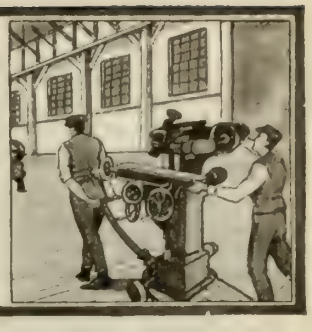
Two of us as apprentices subscribed to this paper. We found a world of information in it to discuss and compare—I'm afraid often on the shop's time, but then we were pushers and ready to try anything new or quicker for the shop. Sometimes we had a job to do that seemed as good as those we read about and naturally one of us remarked, "Let's send it to CANADIAN MACHINERY." That got to be a joke, but finally I took a picture of a planer job that turned out well and wrote a couple of hundred words about it and sent it to the editors without saying anything around the shop. When that appeared in print and I showed the cheque for four dollars that went with it, the idea ceased to be a joke any longer. Following that first successful instance, there was a long list of rejected "articles" and a few money orders for fifty cents, but the editors were courteous and the rejections only served to spur on to better efforts—to be frankly critical of one's own work is the first step toward success.

And it pays the author in every way. The Buick Six that serves as a splendid refresher after a long day inside could be bought with the money received from writing and its maintenance and that of the cars I have owned before more than covered by the same source. And then there is the self-improvement side of writing—"writing makes a ready man," and as he writes he is sure to stumble on points of doubt upon which he must read up before he turns out the completed article. Often a single point entails many evenings of study, to the ultimate good of the student. Then anything that is written fixes itself much more firmly in the mind than what is simply read. All of these things help the writer as much or more than the ones who read them and have a distinct broadening effect. Added to the foregoing is the fact that some one is waiting for what you write—glad to read it, and some one else is ready to pay for it at substantial rates.

BURNING ASHES

There is always more or less unconsumed coal in the ashes that are removed from the boiler, and this coal, if it were separated from the ashes with which it is mixed, would be available for further use as fuel. Except for this slight proportion of coal that has slipped through the grates, ashes are entirely incombustible. They are what is left, after everything has burned that will burn. The compounds that are placed upon the market and which, when mingled with ashes, are supposed to make them suitable for fuel for the further production of steam, are absolutely without value.

DEVELOPMENTS IN SHOP EQUIPMENT



Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

"SUPREME" QUICK-ACTION VISE

THE Spafford Tool Works of Hartford, Conn., have recently placed on the market a new quick-acting vise for general machine shop use, though it is particularly adapted for hand and power milling machines, grinders, and machines on which vises or fixtures are used.

The vises are made in four sizes, namely 3 in., 4 in., 5 in., and 7 in.

The steel parts are made from drop forgings and bar stock to gauges, hardened and ground, and the base is scraped to fit the slide.

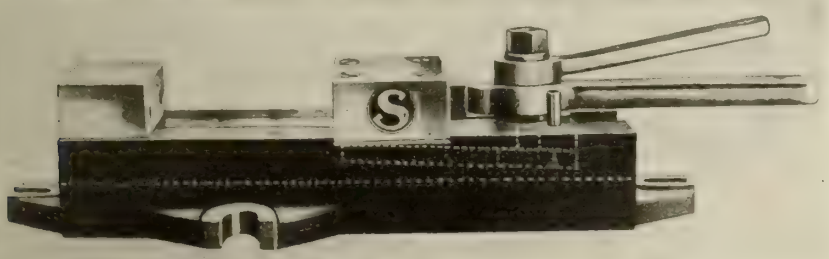
The jaws are drilled to gauges to permit of the loose jaws being transferred from one vise to another.

The stationary jaw is let into a recess in the semisteel base to prevent it from changing position, as it might do if simply dowelled on top of the base.

The bolt holes for clamping the loose jaw to the stationary jaw are located so that it is convenient to tighten them without coming in contact with the bumper block.

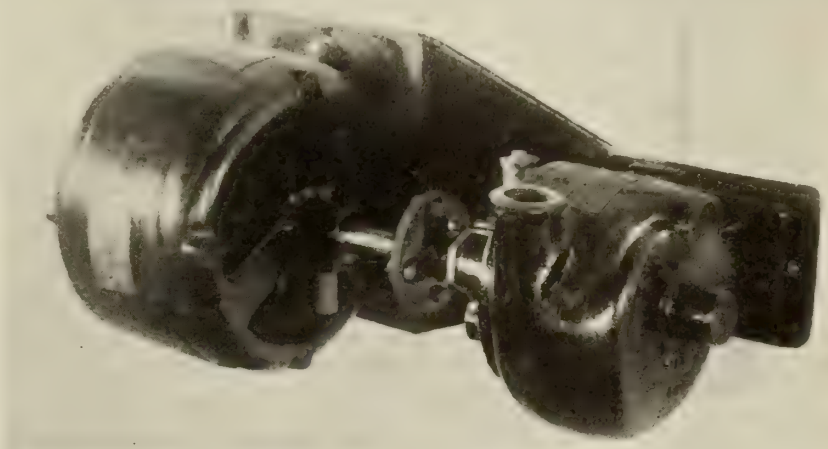
The pin which the cam lever works against in opening the vise is so located that when the vise is fully opened the lever slips past the pin, thus avoiding breaking the pin, or elongating the slot in the semisteel base.

The hardened slide is smooth on top without any serrations for the dirt to get into and wear off, the levers being firmly held in place by means of a bolt in a T slot, the underside of which is on an angle, also the bolt head to correspond, thus giving it a wedge shape, which makes it impossible for the bolt to slip back.



QUICK ACTION VISE

The sliding jaw is operated by means of a cam lever which draws it tight against the work, while the eccentric lever gives it a final tightening, thus holding the work securely.



NEW FULFLO PUMPING UNIT

A NEW FULFLO PUMP

The Fulflo Pump Company, Blanchester, Ohio, has placed on the market a line of direct connected motor driven pumps. These pumps are designed for use in connection with high-class motor driven machine tools, oil circulating baths, and for supplying batteries of machines with cutting oils or compound.

They are all centrifugal in type, but retain their prime without the aid of valves or other mechanical means, each pump being provided with a priming chamber and having both intake and outlet located at the top, which makes it impossible for the pumps to lose their prime. The impellors are of the semi-enclosed type, and are supported by a bearing at either end of the impellor shaft. The thrust is on the suction side of the impellor and is taken care of by a hardened steel thrust collar on the impellor shaft which thrusts against the nose of the bronze bush supporting the impellor shaft on the suction side of the pump. The thrust at this point is very slight as most of it is taken up by the coupling between the pump shaft and the motor shaft.

The main pump bearing also forms the pump gland and is of cast iron. The lubrication of this bearing is taken care of by a sight feed oiler which feeds into a pocket completely surrounding the bearing.

The shaft is of hardened and ground steel. The packing used is the flexible metallic type and is guaranteed not to cut the shaft. The life of this pump is exceptionally long as the impellor, the only internal pumping part, does not depend on any contact fits for its pumping efficiency. Standard pumps have cast iron bodies, covers and impellors, but may be furnished in brass or bronze when so desired.

The base is arranged for three point mounting, which enables it to be leveled without the necessity of machining the surface to which it is to be attached. The pump is attached to the base by six screws, three of which extend through the motor and pump base and three of which extend through the motor base only, the pump base resting on their points. This makes it possible, by the adjusting of the screws, to bring the pump exactly in line with the motor, after which the screws are locked in place.

The coupling used is the "Flexite" type, manufactured by F. R. Blair & Co., and it is fastened to both pump and motor shaft with Woodruff keys and set screws. Robbins & Meyers motors are regularly furnished.

The outfits are furnished in four sizes:

⅜ in. pump with 1-6 h.p. motor, maximum rating of five gallons per minute, 18 in. suction without using valve and 15 ft. head lift.

¾ in. pump with 1-3 h.p. motor, maximum rating of 18 gallons per minute,

THIS MACHINISTS' OILER MADE IN ½ AND ¾ PINT WITH 5½ IN. AND 9½ IN. SPOUTS 3½ IN. BASE

12 in. suction without valve and 20 ft. head lift.

1 in. pump with ¾ in. h.p. motor, maximum rating of 27½ gallons per minute, 18 in. suction without valve and 40 ft. head lift.

1¼ in. pump with 1 h.p. motor, maximum rating of 40 gallons per minute, 18 in. suction without valve and 40 ft. head lift.

These pumps can be furnished arranged for either wall or floor mounting.

The pump shown in the enclosed photograph is ¾ in. size equipped with 1-3 horse power motor running 2,700 revolutions per minute, overall dimensions are as follows:

Length, 19⅜ in.; width, 8 in.; height, 9¼ in.; weight complete, 58 lbs.

Tests on twelve of these pumps showed the following average result:

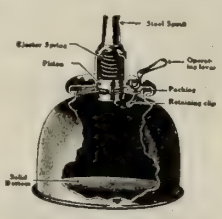
Speed, 2,700 r.p.m., 21 gallons per minute, 11 ft. head; speed 2,700 r.p.m., 20 gallons per minute, 12½ ft. head; speed, 2,700 r.p.m., 11 gallons per minute, 24 ft. head.

Cutting compound was used in making these tests.

These pumps will be furnished with motors of varying speeds and sizes to meet varying conditions.

FORCE FEED OIL CAN

The accompanying illustrations show a new oil can developed by Gustave Lidseen, Desplaines street, Chicago. The mechanism controlling the feeding of



INTERIOR VIEW SHOWING SIMPLICITY IN CONSTRUCTION

oil is all in the spout and its arrangement is such that it will entirely empty the can. The oil can spout is self cleaning, and is easy to operate. The drawn steel body and heavy welded spout make the can leakproof. The spout is held on the can body by means of curved flanges

SHOWING WIDE OPENING FOR FILLING ALSO CURVED FLANGES AND LOCKING MEMBERS WHICH MAKES IT LEAK AND WEAR PROOF AT THIS CONNECTION.

with a packing ring held in the spout flange.

The can has a large opening and is therefore easy to fill and having a positive force feed is self cleansing and requires no spring bottom.

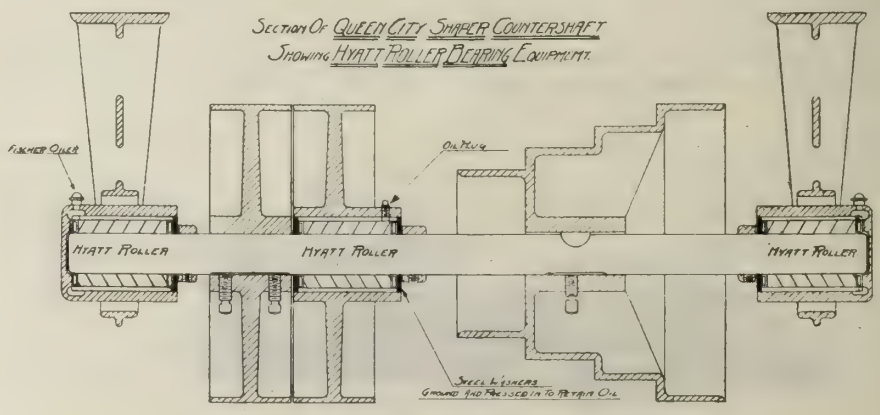
NEW SHAPER COUNTERSHAFT

The Queen City Machine Tool Co., Cincinnati, Ohio, announce that on all shaping machines manufactured after March 1st, countershafts will be fully equipped with Hyatt Roller Bearings as shown in the accompanying illustration. As may be seen the installation is simple and efficient. This is the latest of a series of improvements mapped out by this company in an endeavor to make their shaping machine most efficient for peace time reconstruction.

This refinement brings the countershaft up to the same efficiency as the shaper for which it is intended.

SCALE

Boiler scale is very common, and more or less of it is quite sure to be formed unless the water is unusually soft and pure. It varies greatly in composition, but its chief constituents are usually sulphate of lime, carbonate of lime, and carbonate of magnesia. Chloride of magnesia and sulphate of magnesia also occur more or less frequently, and these are particularly objectionable because they are corrosive and tend to attack the metal of the boiler. The physical constitution of the scale varies greatly, and two samples of similar chemical composition will sometimes differ a great deal in hardness and porosity. Sulphate of lime usually makes a hard, stony scale when it is present alone, or when it is the chief constituent. Carbonate of lime, under ordinary conditions, forms a soft scale in horizontal tubular boilers, though it often takes a hard form in heaters and in water-tube boilers. It is rare to find a scale composed of any one substance alone, however. Various substances are usually present in it, mixed in varying proportions, and combined also with sand, clay, iron-rust, and other sedimentary deposits. Boiler scale tends to deposit wherever the circulation in the boiler is sluggish, and where the heat is greatest and the evaporation most rapid. Scale that is formed in the upper parts of the boiler also becomes dislodged from time to time, falling down upon the lower parts, where, if not removed at proper intervals, it is likely to become cemented together in a compact mass, which not only diminishes the efficiency of the boiler, but also causes it, in many cases, to become badly damaged by overheating.



SECTION THROUGH COUNTERSHAFT ASSEMBLY

The Ohio Electric and Controller Co., Cleveland, Ohio, have published a new catalogue on their mill type lifting magnet. This publication is descriptive of the magnet in detail, and shows some very interesting applications of the magnet to actual work around the foundry and other industrial plants.

What Does Your Employment Office Look For

The Man Who Has Looked For a Job so Many Times That He is in the Professional Class, is Very Apt to Fool Even the Most Capable Employment Agent

By A. J. SCHNEIDER, Employment Manager of the Cincinnati Planer Co.

EMPLOYMENT managers will find much of interest in the following paper. It was prepared and presented by A. J. Schneider to the last meeting of the Cincinnati Employment Managers' Association. Mr. Schneider is the employment manager of the Cincinnati Planer Co., and has had plenty of opportunity to make observations on a large scale.—EDITOR.

1. Job analysis is the act of studying the requirements of a given occupation so that the best applicant is placed at the right work and it is necessary that the function of the employment department may be placed upon a scientific basis.

2. In my opinion the study of job analysis and specifications is one of the most important functions of the employment department. Although employment departments and executives generally will agree with this statement, I have seen very little of this work actually done right.

3. The best work along this line that I know of is that which is being done by the Westinghouse Co., of Pittsburgh, as explained by an executive of that company at the employment managers' meeting in Rochester about 14 months ago. They have made a study of occupations, operations and pay rates in order to standardize them. In other words, as far as job analysis is concerned, they made up a standard list of occupations with complete detail written requirements of each occupation. A copy of these was placed with each department to educate and have a common understanding throughout the plant.

4. Such work as this cannot be done by the employment department without the co-operation of the management and department heads. In other words, before you can make this go, the boss must believe in it, take an interest in it, and have great faith and patience in the employment department. This work is the same as other employment work in that it is necessary for the employment department to sell the idea, and educate and train the management and department heads. This is sometimes the hardest part of the work. In a first-class, well-managed organization, we will not have so much trouble along this line.

5. I think the first step in job analysis is the application blank. In a machine shop where we may have from 25 to 100 standard occupations, it can be seen that if we have just one application card that this would naturally take care of job analysis only in a general way. In my work I try to get general information which is required for about 90 per cent. of the occupations on the application form. After getting this information, I believe it is my duty to give the applicant the necessary information. To do this, I must have a good understanding of the job requirements. A written scientific study of the job or occupation would help me immensely without a doubt. It is really necessary but our company has not reached that point.

6. I make it my business to have this information and understanding in mind, at least, if not on paper. This comes through experience, co-operation and study. I have worked in machine shops all my life and when I interview a planer operator or vise hand, I know just about what is required. I do not claim that I am absolutely sure that I have hired a first-class planer operator, but after having a good talk with him and possibly taking him to the department and having a talk with the foreman, we are not very likely to make a mistake as far as the hiring is concerned.

7. We have job analysis because we want to buy something. What do we want to buy? We want to buy service. We must know what service we expect or we had better not buy until we do know. It is the same as buying anything. If we buy a house, we must first know what kind of a house we want. How many and what kind of rooms, closets, how about the heating, location, surroundings, victory garden, water, etc.

8. I try always to remember that the type of applicant generally known as a floater is sometimes foxy, a nervy talker, and, having had lots of experience at hunting a job, may know better how to get one than the worker known as a sticker who makes very few changes, and is likely to be nervous or backward.

9. We once had an applicant who told me that this was the first time in 27 years that he had to look for a job and he didn't know what to say or how to go about it. This man, being a pretty square fellow, I decided right then and there that I would either hire him myself or get a job for him. The fellow who is a talker and has the right personality may sometimes fool you. Also the fellow who is a poor talker (or we might say poor salesman) may be just the right man for you. Most applicants whom I have interviewed might be termed as clumsy at getting a job. This seems to be the case and probably always will be, because the applicant has not the experience or study at getting a job that the employment manager has at hiring. Do not make this comparison as the applicant's specialty is the work he does, not getting a job, and yours is to hire him. Talk to your applicant on the level, don't look **down** on him, and don't look **up** at him. You and he are **both imperfect.**

10. In order to have a complete job analysis it is necessary to have a medical department and require the applicant to pass a physical examination in accordance with the requirements of the occupation. This, I think, is a very good thing and necessary that employees will be properly placed. If you don't want a man with flat feet to work for you as a trucker running around the shop all day, how are you going to avoid this condition without a physical examination?

11. In many occupations it is necessary to have a job analysis so that the efficiency and pay may be properly determined. Where job analysis is not studied, the rates of pay will be out of proportion, causing dissatisfaction and inefficiency. A good standard wage and salary schedule is impossible without the job analysis.

Nat Goodwin's will shows that he left about $6,000. He made a lot of money, but he had a lot of wives. The wonder is that he had a single red cent left after his half dozen wedding trips.

Some folks made quite a lot of money out of the war. But some of them know how to get it even with no war on. For instance, a chap went into a Detroit bank a few days ago, whacked the cashier on the head and made off with $10,000.

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Must Get After Business

SHORTLY after the signing of the armistice Canada sent a deputation to Europe to look for business. There had been much talk of reconstruction. and the idea seemed to be prevalent that this country could and would get a large share of that business.

Here is the situation, in words of official reports:

"The Canadian mission in London, in a communication to the Canadian Trade Commission in Ottawa, reiterates the impossibility of their carrying out actual agency work for individual Canadian firms. 'We think it a wise policy,' the communication states, 'to impress upon Canadian manufacturers that they must not depend upon us to make actual sales on their behalf. In every case where they are prepared to cultivate export business with Great Britain or other European aountries, manufacturers should either send their own representative to this market, or appoint a reliable firm or agency on the spot to represent them.

"The Canadian mission, however, will be glad to receive catalogues and other facts which would enable them to give information about Canadian goods in reply to the enquiries they are receiving in growing numbers."

Several Canadian firms have received practically the same word from the trade commissioners. It is apparent that business will go to those firms that go after it. There must be a large volume of business moving, but there are also a large number of countries in pretty good shape to attend to it.

Large concerns can send their own men overseas looking for trade, and smaller ones can probably work to advantage in groups. The point is: Don't sit back and wait for foreign business to come up and rattle the door of your establishment. In the present keen competition for business the orders are not walking around or tearing the hinges off your premises.

The Government's Department of Trade and Commerce has never been famous for the assistance it has extended to Canadian firms looking for business. The best policy is to become as self-reliant as possible. Put up your own props, and they are apt to stay.

A Tribute From His Partner

IN a recent issue of the Montreal "Gazette" appears an appreciation of the late George E. Drummond, of the firm of Drummond-McCall. It is signed by "J. T. McC.," the other member of the firm, who had been intimately associated with the deceased. In part the article says:—

"In the death of Mr. George E. Drummond in London, on the 17th inst., there has passed away the last of a remarkable family of four brothers, all well known in Montreal, and all famous for their connection with public and business interests in this city and throughout Canada.

Mr. Drummond was well known in connection with the development of iron and steel manufacturing in Canada. He went into this business with the utmost enthusiasm, feeling that he was helping in developing one of the most important industries of the country, and his strong, persistent determination carried him over difficulties that would have daunted most of us. If there was an industry that required judicious Government assistance, it was the manufacture of iron from the ore, and the attitude of the successive Governments at Ottawa towards this matter was vacillating and inconsistent. What might be called the secondary stages, such as the rolling of iron and steel bars, the manufacture of nails, steam and water pipe, etc., were abundantly protected and consequently flourished. These trades were allowed to import their raw material free, or at a nominal rate of duty, but the premier industry, the smelting of iron from native or American ores, latterly received altogether inadequate protection. The returns from this industry were, therefore, up to the year 1914, altogether incommensurate with the enormous capital outlay required. This state of affairs could not continue indefinitely, and in the early part of 1914 the position of the iron smelting business in Canada was far from profitable, and indeed, altogether unsatisfactory. These conditions, however, were completely changed in the latter part of that year, and it is no secret that the iron business owes its present flourishing position almost entirely to the impetus it has received from the enormous demand and consequent high prices caused by the needs of the war. But Mr. Drummond was out of iron manufacturing before then, and did not share in the success that has attended this department of the business during the last four years.

"The picture of Mr. Drummond left in my mind is that of a man of strong, lovable nature, who endeavored in all his dealings with his fellowmen to "play the game." It is such men, whether they are personally successful or not, who build up a new country like this, and his influence will be felt long after he has passed away."

Buying Second Hand Equipment

ACCORDING to an item in the Humboldt (Sask.) "Journal" of recent date a new boiler is needed for the town plant, and the engineer in charge of the plant also recommends that a condenser should be added to the equipment.

In fact, the situation is that the plant will soon have to be shut down for repairs unless a new boiler is added.

The town council has heard the situation outlined, and has been informed that a condenser should increase the efficiency of the plant some twenty-five per cent.

Prices have been secured on new boilers that run from $2,650 up, and a condenser, it is said, would cost around $4,000. Of course, there are variations from these figures.

But the council has wind of an outfit that can be secured in Saskatoon for much less money. The boiler is said to be on the market for $500, while the condenser is to be had for $800. And so it is that the heart of the town goes out to the Saskatoon outfit.

Of course, there would be an immediate saving. Between the figures quoted for new and used outfit there is a spread of $5,350. But what of it? It may be that the Saskatoon outfit is a regular bargain, in good shape, and put on the market under exceptional circumstances. If so, then the town stands to gain.

But why should a place of any size go into the market for second-hand equipment for a municipal power plant? Buying a second-hand boiler and a second-hand condenser is, as a general thing, doubtful policy. That states the case mildly. If the tubing has defects which come to the surface after put in use again, the difference in price can soon be absorbed in the re-tubing of the equipment.

Humboldt would be much better advised to send their specifications directly to a list of responsible firms in

Canada, and ask for quotations on a new outfit of lines that are known to be good.

Councils often make mistakes of this sort. They imagine that a boiler is a boiler, and a condenser is a condenser. The fact that the thing has boiled before or condensed before is not taken into consideration.

The belief grows with men who have an expert knowledge of such affairs that it is good policy and good financing to go into the machinery or power transmission market with a requisition for new material that carries with it the backing and guarantee of the people who make it.

Steel Ships Now Needed

THE craze and need for building wooden vessels has gone. It is well that there should be a fair understanding of the reason for their construction. They were born of necessity. Tonnage was required quickly, and there was not enough plate mill capacity in the Allied world to supply it. And so it was that wooden vessels were put on the ways in the yards.

The Toronto *Mail and Empire* refers to the matter as follows:—

"In view of the pressure on the Dominion Government to give contracts for wooden ships, as part of the national merchant marine, the experience of the United States Shipping Board is worth noting. Against the advice of General Goethals, and other technical experts, the Board yielded in 1917 and 1918 to the clamor for wooden ships, and ordered hundreds of them. Up to October 31 last, 84 had been delivered, 227 hulls had been launched, and 469 had been contracted for. Then suddenly the project suffered a collapse. So far, not one of the wooden ships has crossed the Atlantic. Two lying in New York harbor are reported to be unfit for sea. About a million dollars has been paid for repairs on wooden ships used in trade with Honolulu. Underwriters refuse to insure them and Chairman Hurley, of the Shipping Board, threatens to organize a Government Marine Insurance Board. The underwriters point out that in many of the ships the long keel beams are merely spiked together, the rudders are frequently put on in a very faulty way, some of the engine beds are shaky, and green timber used is constantly warping. The Shipping Board has spent fully $400,000,000 on them, and now is seeking bids and charters for them without result. The whole wooden ship programme has been a fiasco, so far as trans-oceanic service is concerned. Canadian yards turned out a number of wooden ships for British account, the orders being placed through the Imperial Munitions Board, and nothing has been heard respecting the utility of these. But now that steel ships can be obtained in plenty, the wooden ship freighter is again obsolete. It is fortunate for Canada that the national shipbuilding programme was decided on after the wooden ship fever had abated."

Can This Country Meet British Competition?

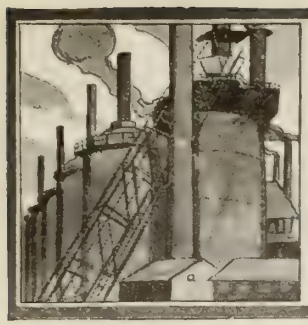
IN another part of this issue will be found a table of comparative cost of labor in England, Montreal, Port Arthur and the Pacific coast. These figures are illuminating and show what the Canadian shipbuilder will have to try and meet if he wants to build ships for private owners when the present Government contracts are finished. Taking the whole of the trades connected with shipbuilding, the average increase in wages over the English rate is for Montreal district, 75%, for Port Arthur and the great lakes, 108%, and for Pacific coast about 105%. This is a considerable handicap to overcome, because when a shipowner wants a ship to earn profits at the prevailing competitive freight rates, he cannot afford to invest in first cost double the amount he would be required to if his vessel was constructed in England. The trend in Great Britain is for higher wages, and in the near future wages may be more in proportion to those paid here, but they will have to rise considerably to equalize costs to any extent. Now that the British builders are relieved from the war tension, they will be devoting their thoughts to improved production methods, tending to still further decrease the cost of ships built there.

Some of the Bolsheviks declare they are the salt of the earth. Well that's all right, but what's the use of them climbing in as the pepper and mustard also?

Current Events in Photograph

Remains of Sir Wilfrid Lying in State

The funeral of the Liberal leader, held at Ottawa, was one of the most largely attended public funerals ever held in Canada. During the time that the remains lay in state thousands of people from all parts of the country visited the hall. The floral offerings, as may be seen from the photo, were unusually beautiful and came from all parts of the Dominion.



MARKET DEVELOPMENTS

Canadians Watch the U. S. Steel Situation

New Prices Expected—One Rumor Has it That Price of 2.90 Was Quoted on Some Canadian Business—Machinery is Still Selling at the Prices That Prevailed During the War

SOME weeks ago it seemed likely that the market would be swamped with second-hand machine tools, taken from the war shops of the country. The dealers find now that their fears in this regard are not being sustained, because much of this material is being absorbed by the trade, and other large quantities of it are being sent to the scrap heap. It is quite within sight that this material shall be accounted for inside of the next few months. In some ways the presence of this machinery on the market provides a way out for the man who cannot or will not go in and pay the present prices for a new machine tool. Although the war is over, prices for new machinery still stand high, practically one hundred per cent. higher than at the outbreak of the war. Dealers do not seem inclined to think that the high prices are holding back sales, as they state they are doing a very fair volume of business.

Several firms are at the point where they have concluded their investigations as to which lines they will follow, and it is quite reasonable to suppose they will be in the market to purchase definite lists before many weeks have passed.

Canadian interests are watching the movement in the steel-producing centres of United States where price jockeying is getting to be one of the chief pastimes. There have been rumors on the Street of a price of 2.90 base being quoted on a contract for delivery to this country, but it has not been possible to locate the price-cutter, or to find on what particular business the price was given. There are a couple of big plate jobs being hung up because those interested will not pay the 3-cent base price. Canadian dealers look for a decrease around the first of April, while Pittsburgh market men agree that some announcement may be made then.

The scrap market is stagnant. That really describes the situation. Dealers state that they are losing money on the present volume of business with a practically fixed overhead. Some of the larger yards go so far as to state that they are out of the market entirely for the present so far as buying goes, and there is undoubtedly a feeling that prices will scrape lower yet before the actual bottom of the market is touched.

MONTREAL SCRAP DEALERS TURN AND BATTER PRICE LIST LOWER

Special to CANADIAN MACHINERY

MONTREAL, Mar. 6.—Despite the fact that the prices on many commodities are constantly declining, business activity has apparently shown little improvement of a stable character. There is, however, a current of optimism pervading trade circles to the effect that the coming of spring will open new channels of business. Machine tool dealers are looking forward to a revival of the demand. Metal interests are anxiously awaiting trade developments and are endeavoring to stimulate buying by lowering prices. Scrap dealers are still more or less affected by the dull conditions, and price reductions are weekly developments.

Improvements in Steel Expected

It cannot be said that business activity has increased to any great extent, but the outlook is undoubtedly of a better character than a few weeks back. Dealers report that they are enabled to stock plate to better advantage, due to the lower price at the mills. There is an evident tendency to show that users are beginning to realize that conditions will not be much better than at present, and enquiry that has been awaiting more satisfactory readjustment of price may now develop into tangible business. It is recognized that dealers here must meet the quotations of American mills, as far as possible, in order that consumers may be persuaded to purchase from warehouse supplies. This is necessary under existing conditions, as many have been holding off for more reasonable prices. Large purchasers are seldom reported, but the better inquiry would indicate that early activity would be on an increased scale. A factor that may have some bearing on early developments is the tendency to reduce wages at the mines and the mills, this having already been done in several cases. Little is expected in this connection, however, until the Government food control is removed and prices of commodities decline to lower levels.

Metals Still Decline

Metal demand is still of the hand-to-mouth character, and general activity is not pronounced. The recent inquiry has a tone of improvement, but little actual business is developing. Price quotations continue to seek lower levels, but even this, apparently, has little influence on the trade. Consumers are showing a reluctant spirit in acquiring metal for future requirements, and continued uncertainty is a large factor in maintaining this attitude. Spelter and lead has taken on a little firmness during the past week and prices in the States, particularly on lead, has strengthened. Demand here is comparatively light and dealers report a quiet week. This week's quotations reflect the downward trend, as a consequence of the dullness that prevails. Producers and dealers are attempting to stimulate a buying movement, but consumers are acting cautiously, covering only their immediate requirements. Coppers show a decline of 2 cents per lb., the price quoted being 21 cents for lake, and 22 cents for electro and castings. The better supply of tin, coupled with the light demand, continues to force down prices, the quotation of 58 cents

representing a decline of 4 cents per lb. Spelter is a little weaker here, but sales are steady; price of 9¼ cents is a drop, on the week, of ¼ cent per lb. Dealers here are asking 7½ cents for lead, but the market is a little firmer. Antimony is the only metal that has attained its pre-war quotation, this week's decline of ½ cent placing it on a par with that quoted in August, 1914, namely, 8½ cents per lb. Aluminum is quiet, but firm, at 40 cents per lb.

Future Inquiry Improving

Varying reports are given by machine tool dealers as to the volume of business going. Some say that sales are good, while other intimate that there is little doing. Nearly all report a good inquiry, but actual sales seldom develop. There is a feeling that within the next two months the demand will show considerable improvement, as there is a possibility that orders for European requirements may be placed in the near future. Negotiation to this end are now developing in Government circles. A feature that must not be overlooked is the fact that, while the volume of sales may not compare favorably with those of a year ago, they are not associated in any way with destructive war work. This is very encouraging, and further confidence will follow the final settlement of European differences. Considerable used equipment is still offered for sale, and its disposal is having a quieting effect on new machinery business.

Scrap Prices Still Lower

Nothing has developed to indicate that scrap prices have reached a temporary resting place, as quotations still show a downward movement. The more notable declines are in the old metals and a few of the steel lines, the bulk of the latter maintaining their previous firmness. General business is light, but there is a tone of confidence that may eventually develop into greater activity. Some dealers report a fair volume of business, but invariably the sales are of a transient character, little interest being displayed on the part of the dealer or the consumer, to acquire more than for their immediate needs. On the old metals the quotations this week represent declines ranging from one to four cents per lb., nearly all the commodities being affected. Heavy melting steel and rails are down $5 per ton, the respective nominal quotations being $10 and $15 per ton. Other declines are $2 on shell turnings and boiler plate, the prices quoted being $6 and $12 per ton, respectively.

POINTS IN WEEK'S MARKETING NOTES

There is a feeling, quite decided and marked, that a cut will be made in steel around April 1.

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Machine tool buying, is more brisk in New York than for some time past, the automobile industry being responsible for much of the demand.

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Under the Sherman law steel manufacturers cannot meet to discuss and frame up prices, but they can come together to discuss Secretary Redfield's proposal for taking the war-time inflation out of prices.

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One railroad shop in Belgium is out with a list for 50 machine tools.

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Shipyards of France and Belgium are likely to come into the market as large buyers.

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Machine tool dealers in Toronto report that business is satisfactory, while warehouses in most cases are doing a large trade.

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Prices on machine tools still remain at a high level, which is about 100 per cent. above pre-war prices.

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Dealers believe that all the available and desirable second-hand machinery from the war plants will soon be taken up. This equipment has not caused anything like the glutting of the market that was feared at one time.

—

One of the puzzling things in the steel situation is that mills should be operating at a high rate, especially the corporation plants, while practically no orders are being booked.

BUSINESS MOVING IN MACHINE TOOLS

Toronto Dealers Say They Have No Complaints—Looking for Cut in Steel

TORONTO.—The period of investigating market conditions and the other circumstances that are always necessary to know before venturing in any commercial enterprise are pretty well over in some cases. The chances seem to be that before long we will have a number of announcements telling that firms are going to enter new lines, or further develop old ones that had been laid aside by reason of the pressure of war work.

Machine tool dealers report that a fair amount of equipment is on the move. There are several fairly large deals that should be wound up this week. Prices still stay on the high levels that were reached during war time.

Market Not Swamped

There was a feeling some weeks ago that the market was in danger of being overrun and swamped with used machinery that was being released in very great quantities upon the termination of the various war material contracts. Dealers assert that the most desirable in this is being absorbed without hurting the market, while much of the simon pure single purpose material has gone to the yards of the scrap dealer.

"Do the high prices of machine tools hinder sales?" was the question put to one of the larger dealers in Toronto today.

"I would not say that the prices had much to do with most of the sales that are being put through," was the reply. "At present the average price of these tools is at least double what it was at the outbreak of the war. But we do not see much to show that prices are likely to break. Very often if the price seems a little stiff the customer will work his way out by going into the used machinery market, and is often able to pick up a tool that has not been in use very long. New lists that are coming out do not show concessions in prices. As long as firms can sell at the present prices there is not much chance for a lower level of values."

Price Must Come Down

There is a feeling in the market and in the trade generally that a cut is likely to come in steel prices. When? Perhaps on either side of April first. That, at least, is the opinion of one Toronto dealer whose guesses are seldom far off the mark. There seems to be a growing belief that prices of material are holding back considerable work that might otherwise be gone on with. For instance, there is a large amount of plate wanted for the building of penstocks for a power plant near St. Catharines. Figures given for 300 tons of plate were at 3c per pound, which is the lowest price announced for some time. The firm interested is reported to have kept out of the market on that reason, claiming they would use wood first. It is thought that a plate price of 2.50 would get that business. There is another case that illustrates the same point. An Ontario city has an estimate in for a very large bridge. The figures of the engineer stated that the city should get the bridge built for a certain sum. When the estimates were made it was found that the amount the city had voted to spend was away below that which the bridge would cost, and so the work is held up.

Just how much more business would be booked at a lower steel price is, of course, problematical, but several of the dealers are quite certain that the coming of a lower figure would bring a lot of buying to the market.

Business, though, is good for the warehouses, and is showing up much better than last month. The turnover in several places is at least fifty per cent. above the work last February, although it must be remembered that transportations are much better this year.

Some of the warehouse men are anxious for lower prices. They have in many cases pretty well cleaned out their high-price war material and are ready to take advantage of the cuts made from now on. One of the warehouse men, speaking to-day of prices, ventured the opinion with some degree of certainty that

the first of April would see a 2.60 price on plate, against the present 3c.

Scrap Market Still Poor

The fact that copper on the New York market shows a tendency to get down a little more yet leads some of the scrap metal dealers to anticipate lower levels before the turn for the better comes. "For the present," stated one of the largest yards to-day, "even at the low level of the list now, we are out of the market."

The suggestion was made by CANADIAN MACHINERY that if prices moved any lower, and material was offering, it might be good policy for the yards to start and buy.

"That will not work out," was the reply. "As soon as we went into the market to buy there would be an immediate recovery from the low prices, and as a matter of fact we have all the stock we want for the present. Many of the yards are pretty well filled up, and some of them are carrying material for which rather high figures were paid. Although prices are low now in comparison with the last year or so, I do not think the bottom has been reached yet. At any rate we are not open to buy at present at the published lists."

THE STEEL EXPERTS ARE PUZZLED BY PRODUCTION AND SALES SHOWING

Special to CANADIAN MACHINERY

PITTSBURGH, Mar. 6.—The iron and steel market situation has become much more interesting, but chiefly because it is more puzzling. The high rate of mill operation is difficult, if not impossible, of explanation, but it must be accepted as a fact, and as a fact what it portends is a matter of doubt. It may mean that too much steel is being made now, or it may mean that the country's steel-absorbing power has so greatly increased that it is going to be very easy to find employment for all the capacity. Then as to prices, the steel mills are talking more strongly than formerly about the improbability of there being reductions, at least in the near future, when it rather appears that the market is about to decline, and is indeed on the very verge. The steel producers would prefer that declines should come as a surprise to buyers, for anticipated declines lead to postponement of buying.

High Operating Rate

The average rate of steel mill operation is fully 75 per cent. Considering the extreme dullness in nearly all lines of consumption this is a remarkable rate, particularly when one considers that during the war, or since 1914, the steel making capacity has increased 40 per cent. It stood at about 35,000,000 gross tons of steel ingots per annum at the end of 1913—also at the end of 1914 as there was no new construction to speak of in that year—while now it is 49,000,000 tons, actual commercial, not rated, capacity. Thus a 75 per cent. operation now would mean the same tonnage as a 105 per cent. operation in 1913, but as a matter of fact the mills did not run full throughout 1913, and produced only 30,280,130 tons of ingots in the year, against 30,284,682 tons in 1912, each year showing 5,000,000 tons more output than the best preceding year.

In detail, as to operating rates, it may be said that the Steel Corporation easily leads. Difficult as it has been for the trade to believe it, the Steel Corporation has been operating at more than 90 per cent. of capacity. Among the large independents the rate has commonly been in the neighborhood of 65 per cent. in the past fortnight, but a few are running at higher than that. Then among the small independents there is the most remarkable diversity. For instance, one small steel producer in Pittsburgh and another in Buffalo are closed entirely, while there are several small independents that are operating at 90 per cent. or more. This divergence is due chiefly to differences in the classes of trade served, and in general there are great differences due to the fact that some mills have cultivated a regular line of customers while others have gone out to sell where there was the most money to be obtained, a policy that is very profitable at one time and correspondingly unprofitable at another. The average operating rate in January was 85 per cent., as shown by the American Iron and Steel Institute statistics, as quoted in this report a fortnight ago.

Contrasted with this high operating rate, with an output comparable to the best rate attained before the war when all consuming lines were busy and taking as much steel as anybody thought they could take, is the present stagnation in the consuming markets. The only specific instance of great activity is the automobile trade, and it cannot possibly engage 5 per cent. of the steel producing capacity. The agricultural implement factories are working fairly well, but are understood to be depending largely upon stocks. It has come out as to both steel and coal that various industries, essential and otherwise, had much larger stocks at the end of the war than would be suggested by the fears they expressed that war-time regulations would make trouble. The regular building trades are doing nothing, jobbers are ordering only from hand to mouth, and manufacturing consumers as a rule are but slightly employed.

Explanations offered for the apparently contradictory showing are along two lines, one being that the Steel Corporation is building up stocks, which would account for a little tonnage, but not a great deal, while the other is that war-time construction is still largely in progress, though when it comes to citing details few can be mentioned. There is the Government's nitro plant in West Virginia and of course there is considerable shipbuilding.

Price Prospects

To one familiar with the finesse the steel trade has displayed over a period of many years it would appear that the steel producers are planning to exhibit a necessity as a virtue. Last week a number of prominent steel producers were meeting in New York and according to the authorized version they "discovered" that George N. Peek, recently named by Secretary Redfield as chairman of "The Industrial Board of the Department of Commerce" was in town, and accordingly they invited him in, to explain Secretary Redfield's plan for the deflation of war-time prices. Indications are that the steel producers are going to make a show of resisting the movement, but will gracefully yield at the last moment. The bald fact, however, is that when the steel producers last December tried to secure the sanction of the War Industries Board for the price reductions they desired to make, and failed, as the board would not even permit the schedule of reductions to be read into its minutes, they were even then hoping that some means would be found, about April 1, to secure any kind of Government sanction obtainable for a further reduction, the whole object being to make such and such a reduction and no more. If ordinary price cutting began it would become indiscriminate and there would be no way to put a peg in. Now the desired opportunity is very nicely presented, but if it were embraced with open arms Secretary Redfield's board would ask for reductions greater than the steel producers want to make, hence there is going to be a show of resistance, and there will be whatever delay can be occasioned. By reason of the Sherman law the producers would not feel free, in ordinary circumstances, even to have a general meeting to discuss prices, but now there is ample justification for calling a general meeting, to discuss Secretary Redfield's proposal. The meeting will accordingly be held in the near future. The procedure will probably be the same as that which worked so nicely last December. The meeting then did not consider prices in detail, but gave its committee power to act, by submitting reduced prices to the War Industries Board, and they adopted the reduced prices, no more and no less, even though the committee recommendations did not actually get before the War Industries Board and when, moreover, they had not even been presented at the meeting. This next meeting likewise will in all probability agree upon something without knowing just what it is, but when the suggestion or recommendation is announced, whether by Secretary Redfield's board or otherwise, they will adopt the prices and each producer individually will endeavor to adhere to those prices and not go below them. Last December's reductions averaged about $4 a ton on the full line, seeing that wire products were not reduced at all, but the next reductions will probably average considerably more, possibly even more than $10 a ton or half a cent a pound.

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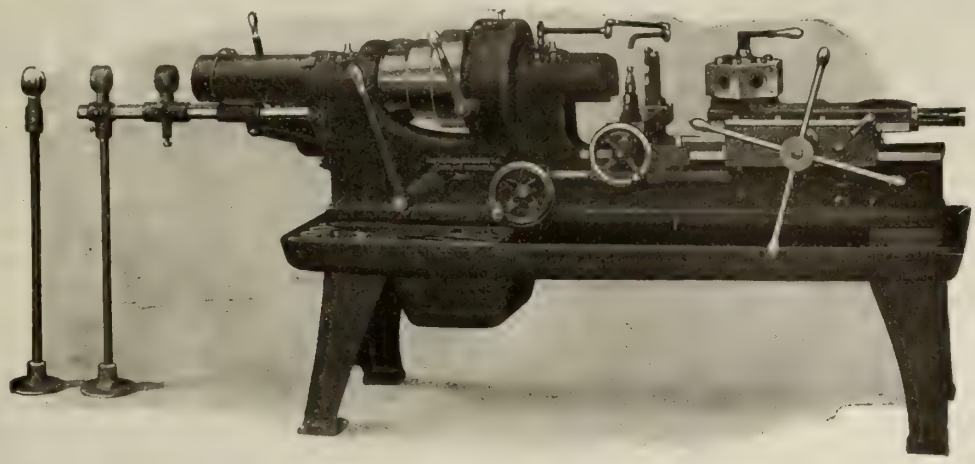

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CONDITIONS IMPROVED IN NEW YORK MARKET AND MORE SELLING IS DONE

Special to CANADIAN MACHINERY

NEW YORK, March 6.—Business in machine tools is showing an improvement. The automobile trade is particularly active as a buyer and some of the export prospects, which have been afloat for some weeks, show signs of developing into actual orders.

Most of the domestic activity is confined to the automobile manufacturing trade, and orders placed within the past two or three weeks at Detroit, Cleveland and Cincinnati are estimated at several million dollars. The General Motors Corporation plans expansion of nearly all of its plants and will do further buying. The Cleveland Automobile Co., which will manufacture a low-priced car at Cleveland in association with the Chandler Motor Company, will erect a new plant and buy equipment for it.

Large buying by the automobile trade is attributed to the fact that several of the large companies are planning an annual production of cars which will exceed any record of past years. The activity extends to manufacturers of accessories and parts. The Weekes-Hoffman Co., Syracuse, N.Y., which has received a contract for gears for Ford cars, has bought about $100,000 worth of new tools. The New Process Gear Corporation, also of Syracuse, which recently issued a list of about 50 tools, intended for gear work, has not yet bought.

It now appears probable that the French Government will permit sales of American machine tools to machinery houses in France, provided a year's credit is given. Such sales will probably total about $40,000,000. In addition to this, the French High Commission will purchase a large list of tools for reconstruction work in France and Belgium. The Standard Oil Co. of New Jersey has received quotations on a list of equipment to be shipped to Roumania and these machines will soon be bought. An engineering firm has issued an inquiry for about 50 tools for a railroad car shop in Belgium and a New York export house has an inquiry out for more than 50 plate-working machines for a shipyard in Japan. There are other inquiries in the market for shipyards in France and Belgium, on which some action is expected soon.

SHADING PIG IRON PRICES WOULD NOT HELP SITUATION

THOSE who follow the pig iron market have many explanations for the small amount of actual business being placed. They may point to inquiries and prices, but the fact remains that not much business is resulting. The conditions at some of the producing points may be summarized as follows:

Chicago.—Many of the foundries have been forced to ask the makers to defer shipments owing to the amount of pig they are stacking in their yards. The best part of this is that these requests are not as numerous now as they were a little while ago. Some progress is being made in the matter of settling claims for the cancellation of war work.

New York.—Most of the foundries in this district have now large stocks of raw material on hand. Many of them have had large deliveries of raw material made since the armistice was signed, and output has dropped off. High silicon foundry iron is in considerable demand, owing to the amount of scrap that is being put through in some of the heats.

Pittsburgh.—Some of the inquiries that are being renewed by the larger buyers are so small as to lead to the belief that they are out more to test the market than for any other purpose. There is talk of cut prices, but such a step, it is felt, would only serve to remove the stability from the entire business at a time when it should be maintained. Production figures at some of the furnaces are starting to show a slight downward tendency.

Buffalo.—The fact that much of the buying done now is on certain well specified analysis shows that purchasing is for actual needs. Users are taking material on old contracts, but no new inquiries are bringing real business to the surface.

Cleveland. — Some furnaces report that they are shipping all the iron they can produce. Prices hold well and the only concessions are those made by interests that want to absorb part of the freight rates, so that those buying from them shall be on equal terms with purchases made from producers nearer to the point of use.

Cincinnati.—Furnaces in the south report in many cases that no interest seems to want to buy pig iron of any kind. The market is unusually quiet and there are no inquiries.

St. Louis.—Melters are not looking for any great revival in business here. In fact many of the foundries are so well filled with material that furnaces are beginning to wonder where their output is going to be marketed. The $31 price is becoming more common.

Philadelphia.—The fact that a lot of 500 tons was the best piece of business in sight for the week gives an idea of the market here, although furnaces are hopeful on account of the fact that nothing much is being piled.

HOW BRITISH FIRMS TURN TO PEACE WORK

Transformation of industries in Britain from a war to a peace basis is going on with a surprising degree of celerity. The "London Times" commented recently on the rapidly-changing industrial situation as follows:

"Every day sees some fresh progress in the transition of industries from munitions to peace production," says "The Times." "The seventy small private firms in the neighborhood of Leicester which were engaged on munitions have all returned to their pre-war work. Enterprising firms are in many cases not only undertaking their former manufactures, but others also, which are quite new to them, in an endeavor to capture trade formerly held by other countries.

"One such firm at Hull, in order to meet German competition, is beginning the manufacture of cast iron valves for both water and steam purposes. They are also laying down a plant for the making of malleable iron fittings. The firm hopes to retain a large percentage, if not all, of the women previously employed on munitions. A Newcastle company, changing over to general steel castings, hopes, similarly, to retain the female labor for core-making and laboring."

Activity in Many Lines

Other transformations of industry include the following:

A Nottingham firm is making works additions in order to increase the output of malleable castings for the motor car trade. The bulk of them before the war were imported.

A firm of woodworking machinists proposes to undertake the manufacture of precision grinders and small surface grinders.

A firm of airplane makers is turning over to its pre-war trade of shop-fittings, jewellers' cases, etc., and has enough orders for three years.

Tinplate manufacturers in South Wales are very busy, and likely to continue so for some considerable time.

A Newcastle firm is changing over from bombs and eighteen-pounder shrapnel shells to gas and steam pipes and shipyard castings.

A bicycle firm proposes to make motorcycles—a new departure for them; while another company has added standard railway wagons to its pre-war productions.

A firm making seed drills has sufficient orders to keep it busy till the end of the year, and a lace manufacturer reports a somewhat similar state of affairs.

A Glasgow firm is employing the greater part of the labor formerly employed in munition work on boilers, cranes, stokers, etc. Another firm has absorbed all its staff, including women, on pump-making.

A firm of sugar-mill machinery makers anticipates a busy time for at least a year. It is endeavoring to capture the former German trade with Java in sugar machinery.

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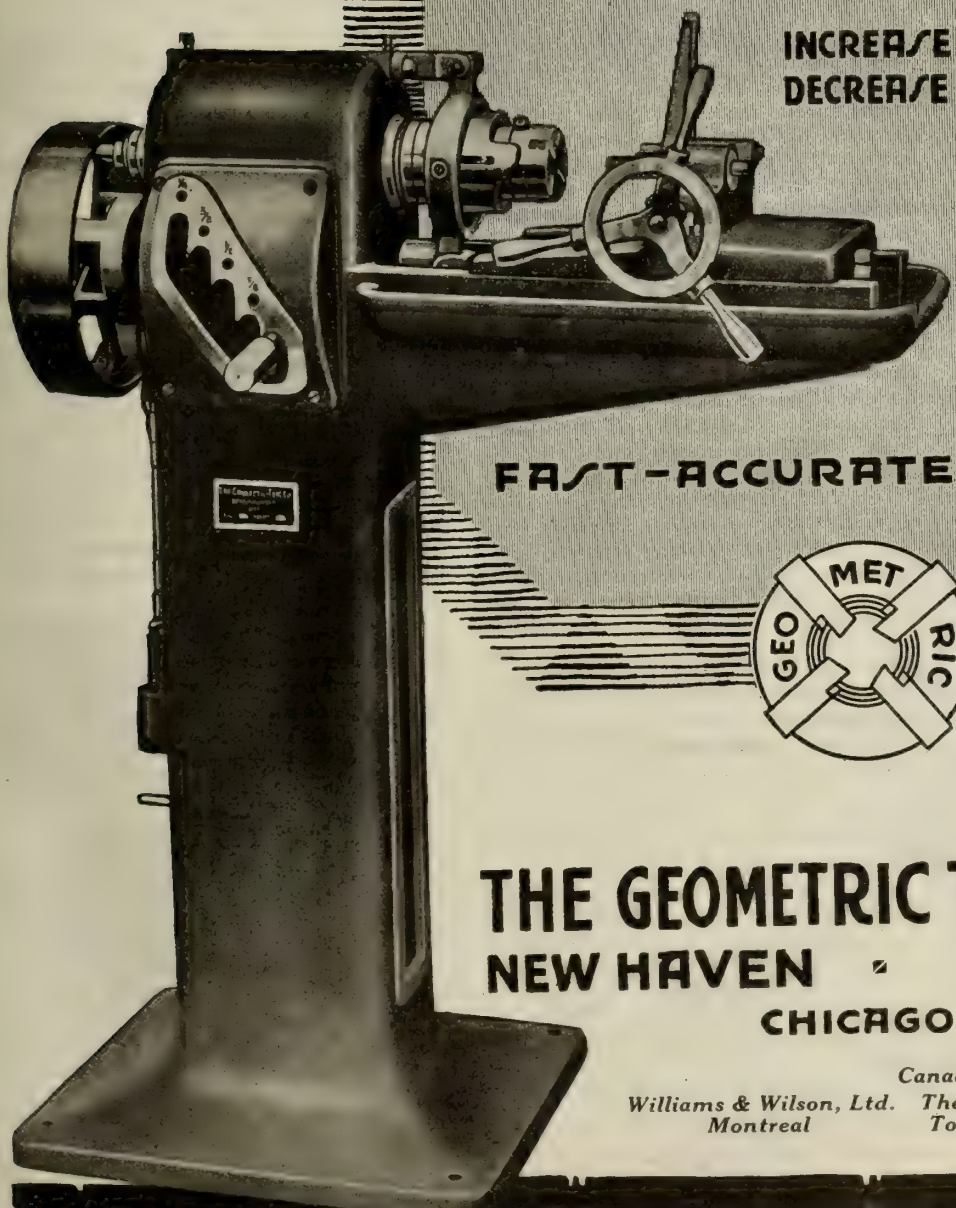

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THE SCRAP MARKET IS STILL A CRIPPLE AND IN POOR SHAPE

IN Canada the scrap market shows no signs of coming to life. In fact there are indications that further skidding may be done before anything approaching a basis is reached. In the United States the situation is sized up as follows:

Chicago—The feeling here is regarded as much better, and the belief is expressed that the bottom of the price slide has been reached. Certain lines of scrap have nothing to test them, as manufacturing is restricted.

New York—The mills were in the market here for a short time, but it is apparent that they have covered all their interests as no more purchases are being made for them.

Pittsburgh—A variety of guesses have been made as to whether the real bottom of the market has been reached, and the variety of answers is very large. Low phosphorus scrap would be in demand were the price to come a little lower, and several dealers are watching the market for this reason.

Buffalo—There are several cases in this district where dealers have had chances to fill orders, but have not seen their way clear to close on account of not knowing where to get the material.

Cleveland—Dealers are putting up the claim that prices right now are on a level with those of 1914. They point to increased prices for labor and freight, and allowing for these, say that they are now on the pre-war level. It is hard to see how prices can go much lower.

Cincinnati—Cancellations for scrap contracts are still quite common here. Dealers claim that they are not making ends meet on the amount of trade that is passing. In fact every sale that is made now is for some definite purpose and is generally shipped and used at once.

St. Louis—The fact that no reductions were made during the week is taken to mean in some quarters that the end of the toboggan in scrap prices has arrived. This is merely the opinion of many dealers, as well as the wish, and it may be that lower levels will yet be reached before trading is again taken on.

Birmingham—Business is at such a low ebb in this district that some of the dealers threaten to close up and wait for a return of better conditions. Some of the more pessimistic ones do not look for any improvement for three or four months.

Philadelphia—Contrary to general expectations there has been another decline in almost every grade of scrap that comes on the market, but the feeling is growing that there cannot be much space between the present prices and the lowest that can come. There is a greater willingness on the part of certain buyers to come into the market now.

MONTREAL NOTES FOR THE WEEK

CANADIAN manuacturers have been invited by the Canadian Trade Commission to attend meetings in Ottawa for the purpose of forming groups through which information secured by the commission may be communicated to the trades. Present European business is of an urgent character, and therefore some system should be established whereby the information and requirements can be given immediately to all concerned. All those interested in this proposition are requested to be represented at these meetings. The first meeting will be held this week and will deal with the agricultural machinery industry; dates of subsequent meetings will be announced later.

Plans now under consideration by the Provincial Government for the rehabilitation of the returned soldiers, provide for the free allotment of land, not only to the returned men of the Province of Quebec, but to any other soldiers of Canada or the British Empire. In addition to the land grant, it is the purpose, as far as possible, to establish settlements so that men may be grouped in units for their mutual association.

R. M. Wilson, M.E.I.C., chief engineer of the Montreal Light, Heat and Power Co., at a recent meeting of the local branch of the Engineering Institute of Canada, read a paper that dealt with the ice problems in connection with the operation of Hydro-Electric power plants. He described in detail the methods for dealing with ice troubles at the Cedars plant. With experience and improved design of hydraulic equipment, Mr. Wilson believes that machinery can now be designed that will be immune from ice troubles, excepting, perhaps, only those depending on canals running across country, where means cannot be taken to mitigate or eliminate the difficulties.

A series of free lectures has been planned by Dean Lee, of the Faculty of Law, McGill University, for the purpose of disseminating correct information on Government institutions, at a time when the air is filled with projects of change. These lectures are an attempt at a scientific enquiry into Government as it is. The lecturers will constitute various professors of McGill University.

Record winter operations on the St. Lawrence this year are being reported from time to time. The latest report is to the effect that the ice-breaker Montcalm, which accompanied the steamer "Canadian Voyageur" from Quebec to Halifax in January of this year, will make a try for the St. Lawrence at an early date, success meaning another mid-winter record.

Mark Workman and E. M. MacDonald, president and legal adviser respectively of the Dominion Iron and Steel Co., both of whom are now in Europe, are making representation to the British Ministry of Shipping for the release of the company's ships requisitioned by the Government. It is claimed that considerable loss has been experienced by the coal company as a result of the great falling off in coal shipments, and the hold that the American interests are securing on the market previously served by the company. Sir Robert Borden will be urged to take steps to remedy this condition.

John Burns, who has been acting as assistant works manager at the Angus Shops of the C. P. R. at Montreal, has been appointed to the position of works manager in place of H. Osborne, retired. Mr. Burns is a native of Montreal, having been born here in 1877. He served his apprenticeship with the Grand Trunk, and joined the C. P. R. in 1898. He has held various subordinate positions prior to his present appointment.

H. Osborne, late works manager of the Angus Shops of the C. P. R., has been with the mechanical staff of this company for over 35 years, and has just recently been retired to enjoy a period of well-merited rest after many years of diligent and faithful service.

P. M. Draper, official representative of Canadian labor at the Peace Conference, is now on his way back from Europe, having sailed on the Mauretania.

NEW MANAGERS ARE NAMED FOR POLSONS

R. J. Cluff and M. E. Forbes Will Assume Executive Control

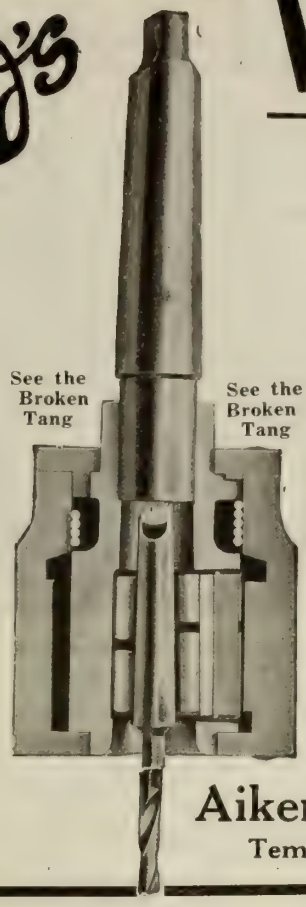
More profitable operation of the Polson Ironworks, Toronto, may be expected following slight changes now taking place in the management. A joint general managership is being arranged. Col. J. B. Miller is relinquishing the position of general manager, but continuing that of president. His place will be filled by two energetic executives, R. J. Cluff, of Toronto, and M. E. Forbes, of Dayton, Ohio. Mr. Forbes has up till the present been vice-president and general manager of the Dayton, Ohio, Production Company.

Except for this change in personnel affecting the active management of the company's business, there is no alteration in administration of the Polson Ironworks. Any suggestion that there has been a change of ownership of the plant is emphatically and authoritatively denied.

THE NEW SCHEDULES

Youngstown, Ohio.—Under terms of the bi-monthly wage settlement between representatives of the Amalgamated and Western Bar Iron Association, puddlers will be paid $15.80 a ton during the March-April period, a reduction of $1.75 from the $16.80 rate in effect since September 1, 1918. Puddlers' wages began to advance in November, 1914. The slump just anounced is the first in almost four and a half years. According to the settlement just made, the average selling price for bar iron in January-February was $62 a ton, against $69 throughout the last half of 1918.

Aikenhead's Wahlstrom Chuck



This Chuck will quickly earn its cost many times over. You need it on every drill press in your shop.

It has neither collets, sockets nor keys. Nothing about it can get out of order.

Holds No. 1, 2 or 3 Morse Taper Drills.

Saves minutes every time a tool is changed, because it self-centers the tool, enabling the operator to remove one drill and insert another in two seconds, without stopping spindle.

In hundreds of shops this Wahlstrom Automatic Chuck has increased output 50 per cent. It drills, reams, counterbores and taps **without stopping spindle.**

No strain can weaken the grip of this Wahlstrom Automatic, or cause slippage, for the cam action is such that the jaws grip more firmly as resistance on the tool increases.

Write for Booklet

Aikenhead Hardware Limited
Temperance Street, TORONTO, CANADA

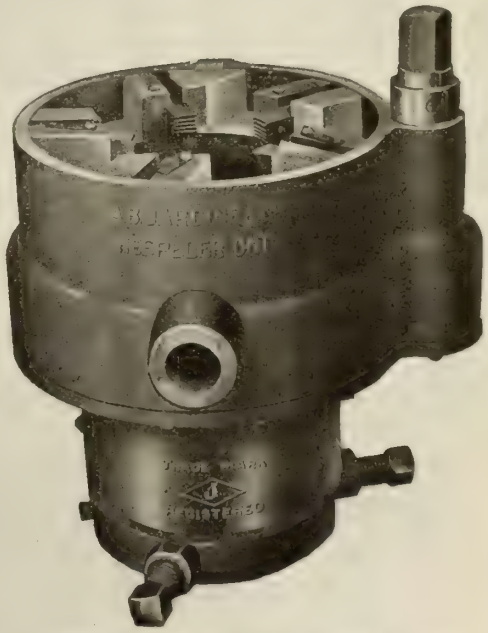
With This Pipe Tool
ONE Man Can Do the Work of TWO

This Jardine tool takes much of the labor out of pipe cutting and threading because the cutters in this tool never "squeeze." The actual cutting is done by the clean-cutting mouth threads; the back threads of the cutters merely steady the tool.

Aikenhead's Jardine
Pipe Threading Tools

enable one man to do the work of two. For instance: In one minute one man cuts 2" pipe; in 8 minutes, 4" pipe; in 16 minutes, 6" pipe; in 30 minutes, 8" pipe. And this is no exceptional record for Jardine Tools; it is what you may expect from an average workman in an average shop.

The Jardine Tool illustrated has leading screws and gears protected from dirt and chips, and the ratchet enables one man to thread 2½" to 4" pipe in ditches or positions close to walls or ceilings. **Order a Jardine or write for further particulars.**



GEARED ADJUSTABLE THREADING TOOL No. 22

Aikenhead Hardware Limited
17 Temperance St. TORONTO

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	....
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton	....	....
Victoria	....	....

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	**11 00**
Tire steel	**5 50**
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	**12 20**
Chequered floor plate, ¼ in.	**12 00**
Staybolt iron	**11 00**
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Steel bars	5 50
Small shapes	5 75
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$21 00	$ 22 00
Electro copper	20 00	22 00
Castings, copper	20 00	20 00
Tin	58 00	62 00
Spelter	9 25	8 50
Lead	7 50	6 50
Antimony	8 50	8 50
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 5 50	$ 5 50
Plates, 3-16 in.	5 75	5 75

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$13 00
Copper, crucible	13 00	15 00
Copper, heavy	13 00	15 00
Copper wire	13 00	15 00
No. 1 machine composition	10 00	14 00
New brass cuttings	8 00	10 00
Red brass turnings	8 00	10 00
Yellow brass turnings	6 00	8 00
Light brass	5 00	7 50
Medium brass	8 00	9 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	5 00
Tea lead	2-3	3 50
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 00	14 00
Shell turnings	6 00	6 00
Boiler plate	12 00	11 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	13 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	7 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	14 00	14 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	**10**
Machine screws, fl. and rd. hd., brass	**add 20**
Machine screws, o. and fil. hd. brass	**add 25**
Nuts, square blank	**add $1 50**
Nuts, square, tapped	**add 1 75**
Nuts, hex., blank	**add 1 75**
Nuts, hex., tapped	**add 2 00**
Copper rivets and burrs, list plus	**30**
Burrs only, list plus	**50**
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	**$8 50**
Structural rivets, as above	**8 40**
Wood screws, flat, bright	**72½**
Wood screws, O. & R., bright	**67½**
Wood screws, flat, brass	**37½**
Wood screws, O. & R., brass	**32½**
Wood screws, flat, bronze	**27½**
Wood screws, O. & R., bronze	**25**

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

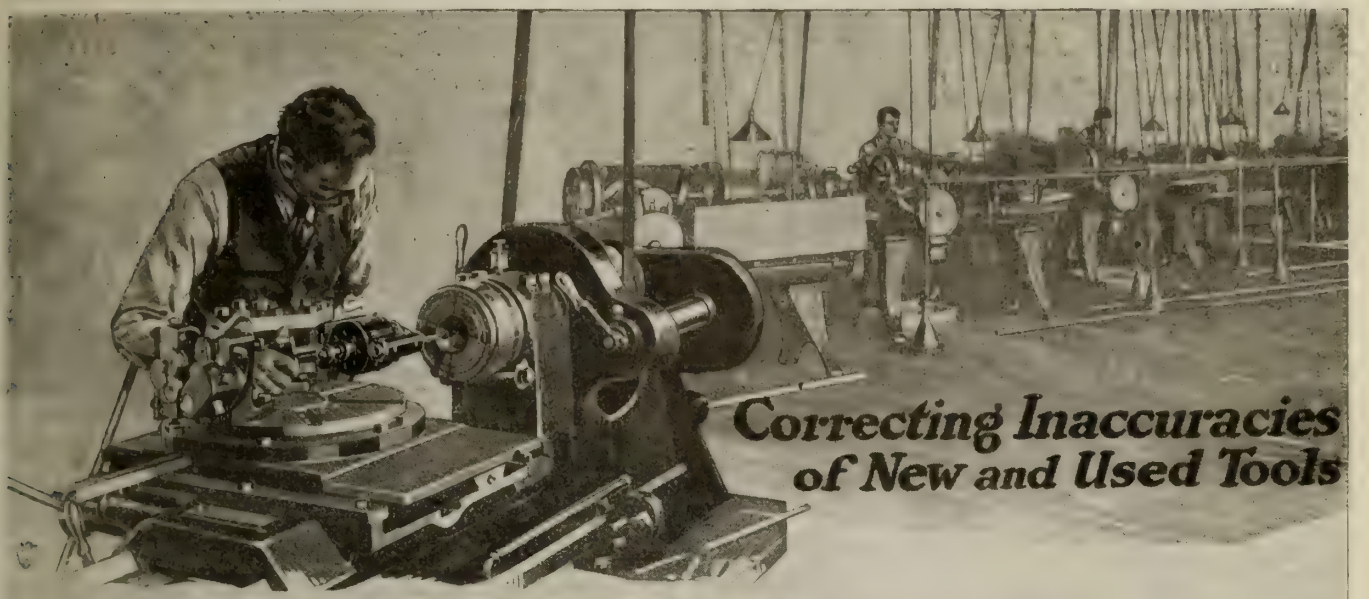
Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net



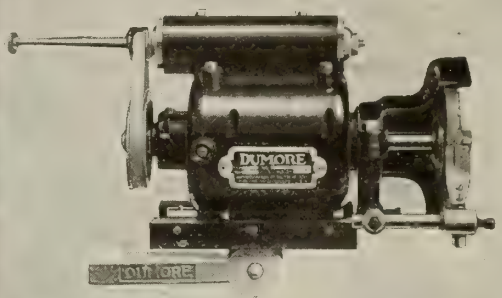
GRINDING chuck pads true with the spindle of the screw machine is a positive, easy method of obtaining accuracy when you have a **DUMORE**. War-time production has told heavily upon machines and tools—your own shop verifies this—and the change back to a peace basis demands a start with efficient equipment.

Your products are always as good as your tools—never better. And the accuracy of your jigs, dies and gages depends upon your facilities for grinding them. Close limits can be obtained only from a grinder having both speed and balance. That's why the **DUMORE** carries a dynamically balanced armature and operates at speeds ranging from 10,000 to 50,000 R. P. M. Chatter-marks, taper and bell-mouth are positively eliminated.

Now is the right time to put your tools in shape. Let your dealer demonstrate right in your own shop what a **DUMORE** grinder will will do for you.

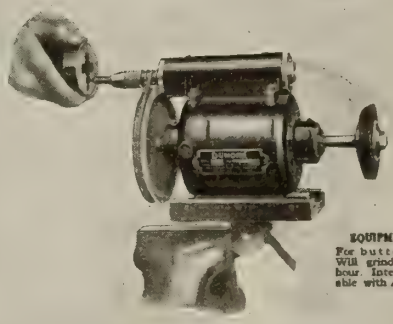
WISCONSIN ELECTRIC CO.

2909 16th St. RACINE, WIS



EQUIPMENT A
or general tool room use. ncludes High Speed Internal Spindle A with reach 3 inches. 30,000 R.P.M. omes fully equipped. Veighs 17½ pounds.

EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 6 50
Sheets, black, No. 10	6 50	6 00
Canada plates, dull, 52 sheets	8 50	8 10
Can. plates, all bright	8 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$28 00	$.....
1¼ in.	32 00	.....
1½ in.	35 00	28 00
1¾ in.	35 00	28 00
2 in.	40 00	28 00
2¼ in.	43 00	30 00
2½ in.	45 00	35 00
3 in.	52 00	40 00
3¼ in.	.....	47 00
3½ in.	62 00	48 00
4 in.	70 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	.....
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

White			Cts. per lb.
XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

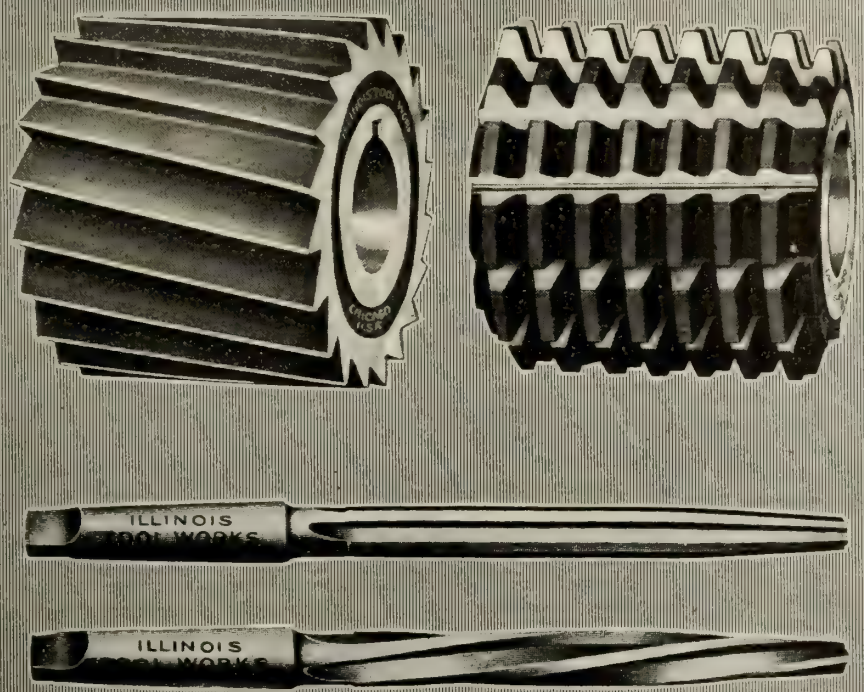
Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

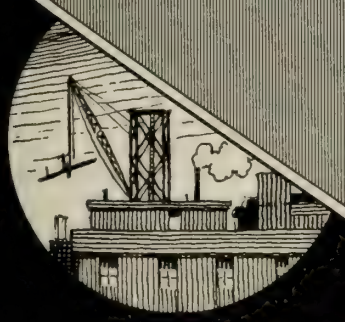
Prices per lb. unless otherwise stated.

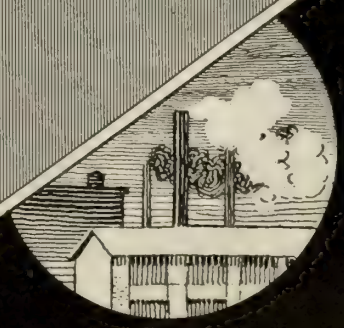
ILLINOIS

CUTTERS
HOBS
REAMERS

NONE BETTER CAN BE MADE







ILLINOIS TOOL WORKS
CHICAGO

Detroit Store, 997 Woodward Avenue. Represented by A. C. Towne & Co., Buffalo; Lewis G. Henes, Monadnock Building, San Francisco and Title Insurance Building, Los Angeles

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Guelph.—An industrial expansion of some magnitude has been proposed for Guelph, involving the building of a $175,000 factory for the manufacture of rubber footwear by F. E. Partridge. A four-storey building of 200 by 80 feet will be erected, according to the plans drafted. The output of rubber footwear would amount to 5,000 pairs a day, and 500 persons, half of them women and girls, would be employed. The company with which Mr. Partridge is associated in the new venture, and which is distinct from the present Partridge Rubber Co., is asking the City of Guelph for a loan of $50,000 at 4½ per cent., and it is proposed that a by-law to this effect shall be submitted to the ratepayers.

Toronto.—The Toronto Railway Company will spend $800,000 on three and one-quarter miles of new track in the city this year. Notification has been received by the city that new tracks will be laid down as follows: Broadview from Queen to Danforth, 1 1-4 miles; on Gerrard from Broadview to Carlaw, about 3-4 mile; on Carlton from Sherbourne to Parliament, about 1-4 mile; on Spadina from Queen to College, about 5-8 mile, and on Front from Yonge to Simcoe, about 3-8 mile. The railway company will, on this work, spend about $250,000. The city, which under the agreement, must lay the substructure for any new tracks, will have to provide the other amount of about $580,000. Works Commissioner Harris has $390,000 in the 1919 estimates for this work, and another $190,000 is believed to be available.

Toronto.—A large deputation from Northern Ontario waited on the Ontario Government. The mission, as outlined by one of the speakers asked for the extension of the T. and N. O. on to the bay, the construction of branch lines to Gowganda and Kirkland Lake and the construction of trunk roads through the now partly developed areas. Instancing the difficulties and cost of communication, even to such a rich and well known property as the Miller Lake-O'Brien Mine, he said the supplies from Elk Lake out, cost $1.25 per hundred pounds to transport. He spoke with a high note of eloquence when telling of the future ocean port at Moose Factory, which is ice free for five months of the year, and capable of being used as many months as the ports of Montreal and Quebec. The T. and N. O. had brought great wealth to the province, and its extension to salt water would be equally profitable.

MARINE

Toronto.—The following notice of the opening of navigation for the present season appears in the papers:—Commencing Wednesday, March 5th, Str. "Macassa" will perform daily service (except Sunday), leaving Toronto at 5.00 p.m. and Hamilton at 9 a.m.

Brockville.—Capt. Lewis J. Estes, of Chippawa Bay, made his usual trip by motor boat from Chippawa Bay to Alexandria Bay yesterday, encountering only a small amount of floating ice on the way. Capt. Estes has made this trip every week this winter. This is the first winter in the recollection of any of the present generation that the St. Lawrence, among the Thousand Islands, has not frozen over.

Ottawa.—If Canada is to get the full benefit of her growing merchant marine, the vessels must be manned by Canadians thoroughly trained in navigation, according to a report of the Department of Marine and Fisheries tabled in the House of Commons. Where Canadians are not available. British or American seamen should be used, in order that a common language might be used by both officers and crews.

Ottawa.—In the House of Commons,

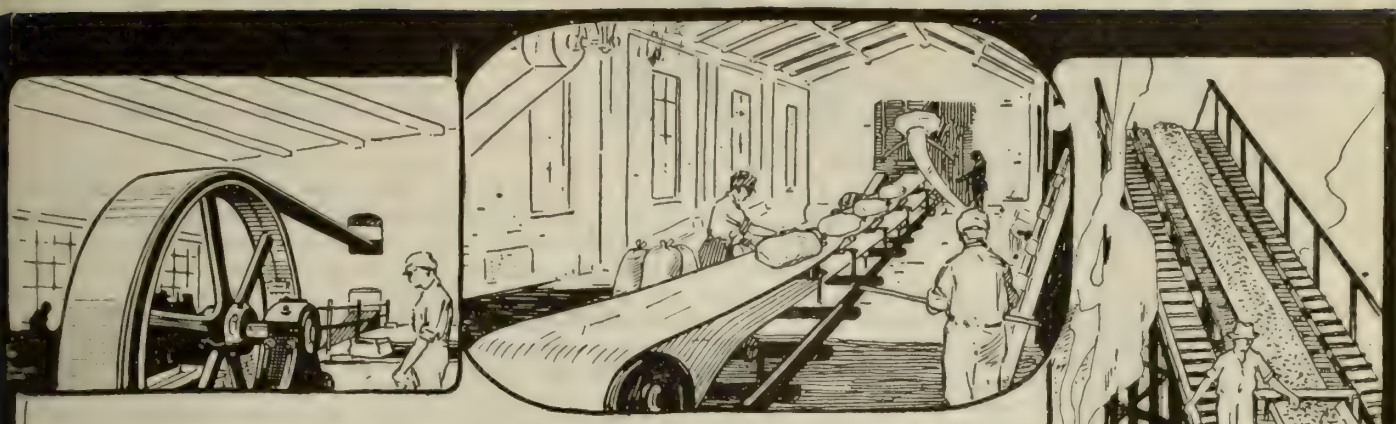
TRACTOR MAKERS FIND IT HARD TO COMPETE FOR BUSINESS NOW

ON a statement given to the "Brantford Expositor" by John Muir, president of the Goold, Shapley & Muir Co., the point is made that the outlook for tractor makers in Canada is none too bright under existing tariff regulations. The Brantford paper says:

Asked if the Goold, Shapley and Muir Company were competing successfully with American tractor manufacturers, in view of the fact that the company was shipping tractors to the West, Mr. John Muir stated to "The Expositor" that it was either a case of compete or quit the business altogether. The margin of profit on tractors being sold was reduced to such an extent that it was most discouraging on a new line of industry which doubtless had a wonderful period of expansion before it. In fact, the removal of the duty on tractors was characterized by Mr. Muir as 'one of the rawest deals ever put over,' and was something to entirely discourage development of the industry. He gave several reasons therefor.

It was only recently that raw materials could be secured from the United States and during the embargo on the export of raw materials from the U. S., the Canadian concerns manufacturing tractors had to secure their steel and iron in Canada at a greatly advanced price. They were now able to secure raw materials from the U. S., and the increase in cost was a matter of freight charges. In the Western States there was an important group of big manufacturers all with their eye on the Canadian West. They could sell more cheaply to a foreign country than in their own because it was policy, and because they sold outright. On the other hand, the Canadian manufacturers had to erect expensive warehouses in the West and send out travellers. The Americans merely sold their machines to jobbers who financed the business and despatched the money to the United States.

As to the cost of labor, Mr. Muir said that it was higher here than in Wisconsin where the motors for the G. S. and M. tractor were made. Asked as to what protection the industry should have, Mr. Muir stated that 20 per cent. or even 15 per cent. might be considered reasonable. It had been 27½ per cent. Why a farmer should be taxed on the shoes he wore, his hat, clothing, and everything else except implements, was something he could not understand. It was discrimination against an increasingly important industry in this country. 'When the Mackenzie Government went down before the National Policy, it was a matter of a revenue tariff for the country of 17½ per cent,' said Mr. Muir. 'Was such a revenue tariff not required at this period of reconstruction in Canada?' he asked. 'A revenue tariff was needed every bit as much now as then.'"



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There is yet to be found a process, condition, use or industry in which belting is required that the Dominion Rubber System's belting engineers have not successfully and efficiently served with some type of our Belting.

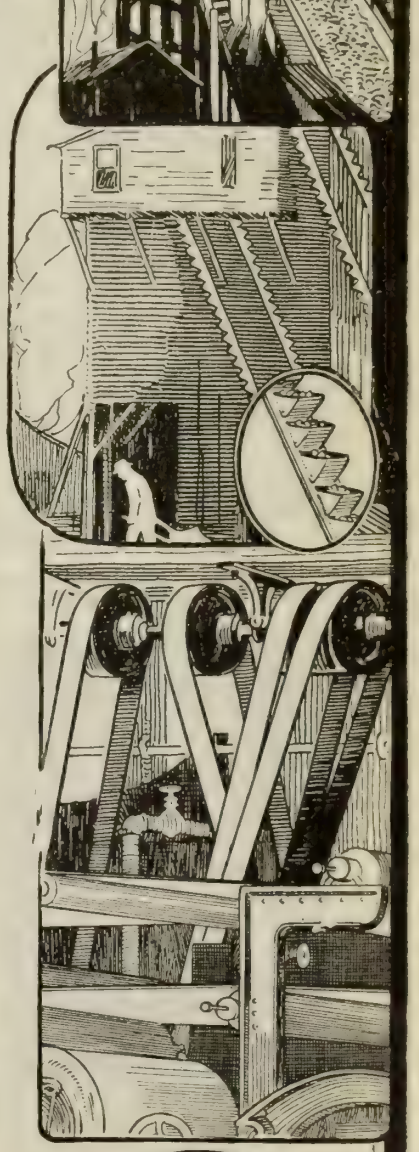
If you have a problem for which there is no parallel, our technical experts will undertake to solve it without charge, and produce, if necessary, a special type of belt to satisfactorily meet your requirements.

Nearly every factory, mine, quarry, paper or flour mill, grain elevator or railway shop, is using our Belting as a satisfactory part of its equipment—some of the largest users specify it exclusively.

Our **Dominion Friction Surface Belting** will out-serve, at lower cost per horse-power, any belt made—because it is built up to the highest quality standard—by the oldest, largest and most highly specialized rubber organization in Canada.

An important factor in the service of Dominion Rubber System Belting is in placing the right type of belt where it will produce maximum efficiency—this is primarily due to our Dominion-wide service branches, through which the free advice of our belting engineers is available to every user of belting.

As one of these service branches is within 'phone distance of you, put it up to our experts to get you out of any difficulty that concerns belting.



Service Branches

Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, London, Kitchener, North Bay, Fort William, Winnipeg, Brandon, Regina, Saskatoon, Edmonton, Calgary, Lethbridge, Vancouver, Victoria.

17

CANADIAN CONSOLIDATED RUBBER CO. LIMITED
DOMINION RUBBER SYSTEM
AND ASSOCIATED COMPANIES

J. E. Armstrong, of Lambton, introduced a Bill to place shipping on Canadian inland waters under the jurisdiction of the Railway Commission. At the present time, Mr. Armstrong said, these boats are allowed to charge any rates they pleased and to call at any place they liked. Canada had spent about three hundred and fifty million dollars on her waterways, and by lack of control over shipping on her inland waterways is placed in a somewhat humiliating position. The bill was read a first time.

London.—There are further indications of a favorable turn in the labor situation. The Thames ship repairers, who are on strike, held a mass meeting and decided to resume work and to negotiate afterwards on the question of an increased wage. The shipyard platers employed by the North Ireland Shipbuilding Company at Londonderry, who had been striking since January 27, demanding a 44-hour week, also returned to work pending a settlement of the question of hours. The Tyne shipyard workers, who had been striking for eight weeks, also returned to work in goodly numbers.

London.—Mark Workman, president of the Dominion Steel and Coal Company, and E. M. Macdonald, legal representative of the company, have made strong representations to the Ministry of Shipping for the release of the company's ships requisitioned by the British Government. Mr. Workman pointed out that previous to being requisitioned, the company's ships had carried two million tons of coal up the St. Lawrence from the Nova Scotia mines. Since the ships were taken over the coal trade had fallen to 70,000 tons, and the United States had captured the market and doubled the price to Montreal consumers.

STARTING OUT TO MAKE NEW LINES

Gray Ball Bearing and Manufacturing Co. Will Shortly be Starting Operations

The Gray Manufacturing and Machine Co., Toronto, are adding new lines to their industry and will in a short time be in the market with them. Speaking of the changes, Alex. Gray, president of the concern, stated to CANADIAN MACHINERY:

"We are at the present time reorganizing our business and are commencing the manufacture of ball bearings, heavy stamping and automobile parts. Our ball bearings will be for transmission line shafting and countershafts, and also thrust and other types of bearings for automobiles and machines.

"Our authorized capital has been increased to $150,000 to take care of this, and the firm name will shortly be changed to the "Gray Ball Bearing and Manufacturing Co., Ltd."

"We have now associated with us as directors in our company, John Reekie, who will have charge of sales and W. J. McCallum as chief engineer and works manager. Mr. Reekie and Mr. McCallum have for some years been in connection with the Chapman Double Ball Bearing Co. of this city, and we feel that with their addition to our organization we will be in a position to energetically push the manufacture and sale of our new lines with great confidence in the future of our business."

MUNICIPAL

Guelph.—Plans have been prepared by a Toronto architect for a four-roomed public school, to be erected on Exhibition street, in St. David's Ward, to cost about $5000. Provision is made in the plans for a further extension of the building to a 12-room school without any tearing down of walls or other expense, should the board see fit to do so in the future.

TENDERS

Ottawa.—Sealed tenders will be received until 12 o'clock noon, Wednesday, March 19, 1919, for the construction of Educational Block, R.M.C., Kingston, Ont. Plans and specification can be seen and forms of tender obtained at the offices of the Chief Architect, Department of Public Works, Ottawa, the Overseer of Dominion Bldgs., Central Post Office, Montreal; Superintendent, Dominion Bldgs., Postal Station "F," Toronto, and of the Resident Architect, Kingston, Ont.

TRADE GOSSIP

For French Business.—A Mitchell firm has received a big order for cement mixers from the French Government and their employees are working overtime to catch up with the work.

Declared Dividend. — Dominion Steel Corporation declared 1½ per cent., payable April 1 to shareholders of March 5. Dominion Iron and Steel preferred declared 1¾ per cent., payable April 1 to shareholders of March 15.

Moved Office. — Morse Chain Co., Ithaca, N.Y., announce that they are advised by P. A. Morse, of the Morse Engineering Co., their Western representatives, St. Louis, Mo., that the Kansas City offices have been removed from the old quarters in the R. A. Long Building, to more commodious rooms, Suite 211-212 Finance Building, where Mr. W. V. Warner, the office district manager will greet their friends.

Negotiations Are On. — Sir John Gibson confirmed the report that negotiations for the purchase of the National Steel Car Co. by the American Car and Foundry Co., were in progress, but he declined to say anything further. It is rumored that under the terms of sale proposed, the American company will pay $114 for the preferred stock and $25 for the common, but that the payment will be spread over a term of years.

Paris. — The insurance underwriters have Paris in class "D" for the first time in the history of the town. The last inspection was held in December 17, and the following is what the underwriters require: "The installation of another pump of 600,000 gallons' capacity, and that the reservoir be just about doubled in size; where the water mains cross the river they should be duplicated to insure service in case one should be broken; an additional eight-inch main to be run from the reservoir.

The Price Doubles.—The first of a number of new switch engines ordered by the G.T.R. for Toronto yards has been in service and given entire satisfaction. The engines to-day cost the Grand Trunk something like $45,000; previous to the war the same engine could be purchased for from $22,000 to $25,000. "The increase," said an official, "was brought about by the scarcity of steel and labor in war times, so that a locomotive to-day is double the price it was five years ago."

Made Big Profits.—The annual report of Penmans Limited, for the fiscal year 1918, shows that the company concluded the period with record profits. After all deductions have been made the report indicated a balance at credit of profit and loss account of $850,167, as compared with $807,868 in 1917, and of $672,493 in 1916. The surplus is equivalent to 39.5 per cent. on the common stock outstanding of $2,150,000, as compared with 35.4 per cent. in 1917 and 26.7 per cent. in 1916. Gross profits amounted to $1,953,643, as against $1,671,105 in 1917, an increase of $282,538.

Canada Forgings Directors.—At the annual meeting of Canada Foundries and Forgings, Limited, the officials of the company selected were as follows: president, W. M. Wier, Montreal; vice-president, J. Gill Gardner, Brockville; secretary-treasurer, J. H. A. Briggs, Brockville. In addition to the above the following directors were appointed: T. J. Dillon, Welland; Hon. G. P. Graham, Brockville; Lieut.-Col. Monsarratt, Ottawa; Lieut.-Col. Smith, Montreal; H. Howser, Toronto; H. Bertram, Dundas, and Hon. W. J. Shaughnessy, Montreal.

Want Protection.—Although a soda ash and other by-products' plant has been erected at Amherstburg at a cost of more than a million dollars, by the Brunnell-Mond Company, a subsidiary of the Solway Process Company of Detroit, there will be no attempt made at starting operations until some assurance is received from the Government that adequate tariff protection will be extended the industry. At present, soda ash comes into Canada duty free, except for the war tax of 7½ per cent. The local Chamber of Commerce has taken the matter up.

Steel Prices are Holding.—Statements by Judge Elbert H. Gary, chairman of the board of the United States Steel Corporation, that reports of unemployment have been exaggerated and that conditions generally are far better than has been believed by the public at large, are reassuring to those who have maintained all along that industrial good fortune was in store for the country. A

The REGO

Welding and Cutting Torches

Save You Money Every Day---Look

In the REGO the 25 cubic feet of oxygen which is saved is taken from the atmosphere, and of course costs nothing, whereas in less efficient Torches this amount of oxygen is required from the Tank, which costs money. So, use the REGO and save at least $3.00 per day.

Other Torches require per hour 125 cubic feet of Oxygen per 100 cubic feet of Acetylene; *The REGO* No. 10 requires *only* 100 cubic feet of Oxygen per 100 cubic feet of Acetylene---

Saving per Hour . . 25 cubic feet.
Price per cubic foot 2 cents.
Saving in cost per hr. 50 cents.
6 hours.
Saving per Day . . $3.00

The Principle of the REGO

The REGO Torches are not an improvement on existing patterns, but are designed entirely on a new principle, which incorporates the following features:
The REGO is technically designed. It was built around certain established oxy-acetylene facts, the importance of which previous constructors had not recognized. No oxy-acetylene authority has disputed or can dispute the correctness of the principle of REGO torches.

The REGO saves oxygen—lots of it—it absolutely eliminates the time-wasting flash-back, and it uses lower pressures than any torch heretofore constructed.

Its mechanical features also strongly appeal to the practical welder. The gases mix in the tip, and this tip is a nickel copper alloy. The seat is a broad-angle cone, made tight to the head by means of a union nut threaded to the outside of the head. A tight joint is always maintained without hazard of splitting or distorting the head—there is no wedge principle in this construction.

Air-gas preheating torch flame playing on mixing chamber of welding torch until tip and nut are at a red heat.

A SUPERIOR WELD

The absence in the REGO of excess of oxygen to get through the flame produces a steel weld remarkably free from oxides.

—NO FLASH—

Drilling hole through 5-inch axle. Tip in hole. No escape for sparks or heat except against tip.

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significant statement made by the head of the Steel Corporation, who has come to be the spokesman of the industry, was that prices were being well maintained. Certainly if prices are being maintained by a wholesome amount of new orders prices will not be arbitrarily cut, at least for the immediate future.

Fredericton, N.B.—Practically all the coal mines in the Grand Lake mining area have been closed because of the unsatisfactory conditions of the coal market. Some 500 or more men have been thrown out of employment in the vicinity of Minto alone, and the only mines that are now running are those of the Minto Coal Company. Coal which last year at this time was difficult to get at $6 per ton at the mines is now offered at $3.75, and not finding ready sale even at that price. So serious has the situation at the Grand Lake mines become that this morning Premier Foster announced that the Provincial Government had wired to Hon. Dr. E. A. Smith, Minister of Lands and Mines, who is at Ottawa, to place the matter before the Federal Government.

At the Lyons Fair.—A despatch, speaking of the Canadian Fair at Lyons, France, says: "The Canadian section includes fifty-three firms, the Canadian National Railways, Departments of Mines, Agriculture, Forestry, and the Canadian Pacific Railway, with all Canadian industries represented. The Paris edition of the 'New York Herald' says the Canadian exhibits are a striking feature of the fair, constituting a complete display of Canada's industrial and commercial products. The Mayor of Lyons and the management of the fair will be the guests of Canada at lunch, over which Sir George Foster will preside, accompanied by M. Phillippe Roy, Canadian Commissioner to France. Mr. Lloyd Harris, of the Canadian Trade Mission, and a party of forty-six allied press representatives at the Peace Conference, will be guests of the fair on Thursday next. The British participation at the Lyons Fair has advanced from fourteen exhibits in the first year to more than four hundred and fifty, including the Canadian and Australian sections."

Closed Plant Again.—An item in the Redcliff (Alta.) "Review" states: "The rejoicing over the news that the Rolling Mills was to open up again this morning was short lived. The mill opened as arranged all right, but when the men arrived and started to work they refused to carry out the wishes of the management regarding the engaging and placing of the men. This meant that the management of the plant was practically taken out of the hands of the manager and intimated that the men intended to run it to suit themselves. Of course this procedure could not be tolerated in any concern and the result was that instructions were given to have the works shut down again immediately. In conversation with Manager Perrins this morning he informed us that although there was no immediate demand for materials, he had decided to open up for a time at least in order to provide employment for a number of men who were now idle and thus help to bridge over the period between war and peace time conditions. It was the intention to start in on the muck mill to-day and on the finishing mills on Monday. However, since conditions have turned out as above mentioned, these plans have been upset and we have been unable to get any definite date as to when business will be resumed."

CATALOGUES

Green's Economizer Limited, Toronto, have issued a 64-page catalogue on "Green's Economizer," which is descriptive in a very able manner of the use of an economizer in the power plant. The historical aspect of the subject is well dealt with, and the publication forms a text-book for those interested in the subject of fuel conservation.

The Aberthaw Construction Co., Bos-

MADE IN CANADA AUTOMOBILE IS PROGRAMME FOR PEACE TRADE

ANNOUNCEMENT has been made by T. A. Russell, concerning the reconstruction plans of the Russell Motor Car Co. These involve the construction of a made-in-Canada automobile by the Willys-Overland, Limited, and the reorganization of that industry. During the war passenger cars were assembled at the West Toronto plant of the Willys-Overland Company, and attention was concentrated on the manufacture of munitions. The machine tool equipment of the plant was wholly devoted to war work, including the manufacture of airplane engines. A peace program has now been developed that includes the manufacture of two models of automobiles, a popular-priced light four, equipped with electric lights and self-starter, and a higher-priced car, in which the Knight engine will be installed. Work will be commenced on the light four model almost immediately ,and it is probable that it will be on the market by midsummer.

Will Make Gramophone Motors

The reconstruction plans of the Russell Motor Car Company as well have been brought to completion, at least in part. The headquarters of the automobile industry will be centred in the Willys-Overland plant, and the forward step marks the union of two organizations that were successful in two of the most intricate lines of war industry, namely, the manufacture of fuse parts and airplane engines. At the King street plant the manufacture of gramophone motors will be entered upon. This is an important line of manufacture which has not previously been established in Canada. Preliminary work has already been finished in connection with these motors and after successful tests were made recently, the company is already entering on quantity production, which, it is expected, will be at the rate of 1,000 a month. This industry will supply an important part for Canadian-made gramophones, and the market is capable of great extension. Other lines of production at the Russell plant on King street will include gramophone and piano hardware, spark plugs and bicycle chains. None of the above articles has previously been manufactured in Canada, and the new ventures are more noteworthy for the reason that the commodities that will be turned out will widen the manufacturing field in Canada and will not be in competition with the products of existing industries.

The other products of the metals and stampings plant will comprise small stampings, including parts of electrical equipment and parts of safety razors that will be supplied to manufacturers.

Larger Bicycle Production

In connection with the Canada Cycle & Motor Co., Mr. Russell stated that production is being maintained at full capacity, and that there is a large market for the products of this industry which could not be taken advantage of during the war on account of other requirements. A representative will leave within the next month to secure business offering in Australia, which has been a profitable market in the past for bicycles, and which is believed to offer greater possibilities in the future.

The Willys-Overland plant will employ over 1,000 men, and will provide employment for practically all the executive and sales staff of this concern. Before and during the war some five models of assembled cars were handled. The fact that production will be confined to two models is significant of the policy of the company. The larger stampings will be secured in Canada from a company specializing in this department. This will mean that all the parts of the cars to be manufactured at the Willys-Overland plant will be made in Canada, with the possible exception of the springs.

Company Official Changes

Changes in the company include the retirement of Mr. F. J. Sleght, who has been general manager of the company, and who is leaving Canada about the first of May to take up important duties in connection with the Willys interests in the United States. Mr. Willys is retiring from the presidency of the Canadian company, and will become chairman of the Board of Directors. T. A. Russell, formerly vice-president of the company, will become president. It will require some months for the installation of machinery before the company can enter upon full production. The capital stock of Willys-Overland, Limited, is being increased considerably.

ton, Mass., have issued an exceedingly attractive pamphlet descriptive of water front construction. The subject matter of this publication is descriptive of some of the many water-front constructions undertaken by this firm, and includes everything, from the building of a single dock to the building of a marine railway or the erection of a complete shipbuilding plant.

The Jones Superior Machine Co., Chicago, Ill., are issuing a bulletin No. 15, which is descriptive of the Superior automatic gear hobbing machine. The method of operation is described in detail, outlined by drawings and half-tone engravings combined to give one a good idea as to the detailed design of the machine. The Oliver Machinery Co., Grand Rapids, Mich., has issued an attractive catalogue describing the Universal Wood Milling Machine, which is especially adapted to industrial engineering plants, railroad shops, shipyards, arsenals, and all manufacturers using woodworking machinery. This machine fills the place in the woodworking industry that the milling machine does for the metal trade.

ANNUAL MEETING OF SERVICE GUILD

Nautical Schools to be Established at Various Points for Marine Men

The second annual meeting of the Canadian Merchant Service Guild was held in Toronto recently with delegates present from all the principal ports in the Dominion. The business of the past year was reviewed and found to be most satisfactory, both in membership and financial standing. The membership now exceeds six hundred, although the Guild is only one year old, having been organized in the City of Toronto on February 28, 1918.

The Canadian Merchant Service Guild works on similar lines to the Imperial Merchant Service Guild of the British Isles, but is independent of the latter, its aims and objects are to draw into closer unity those who are carrying on our merchant service and to set forth the important position our mercantile marine profession must assume if the power and prestige of the Dominion of Canada is to be upheld throughout the world. Also to build up the integrity of the profession so that the future safety and prosperity of the trade and commerce with the outside world may be assured. The Guild at present has a nautical school operating in Collingwood, Ont., and intend establishing in the near future other schools throughout the Dominion, so that all marine men can be educated to the highest standard of their profession. The membership is not confined to marine men actively en-

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The Patent on a continuous impulse REVERSIBLE GENERAL PURPOSE INTERNAL COMBUSTION ENGINE, inexpensive to build and most economical to use. Patented, Canada, Jan. 18, 1916, No. 167,188. Patented in England, Sept. 11, 1912, No. 20,762. Address W. T. Smith, 638 Arlington Ave., Lockland, Cincinnati, Ohio, U.S.A.

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Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.
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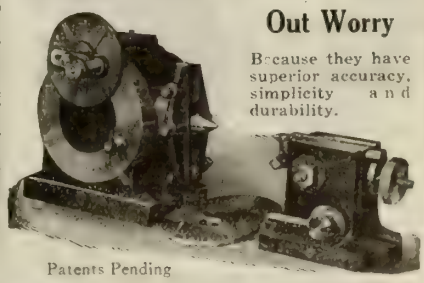
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You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

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gaged in their profession, but any British subject may become an associate member. Capt. W. W. Inkster, of Collingwood, Ont., has been engaged as secretary-treasurer, and will devote his entire time in the interests of the Guild. The counsel for the Guild is John Birnie, K.C., of Collingwood. The Guild will issue a magazine monthly.

THE REDFIELD PROPOSAL

SO MUCH is said of Secretary Redfield's proposition to readjust prices of basic materials in the United States, that CANADIAN MACHINERY publishes the remedy he suggests:

1. It is believed that a remedy for these conditions can be had by a comparatively simple programme. As the President has approved my appointing a board which will make a study of the subject and take action thereon, and as it will be made plain that the Department of Commerce and its board has the support of the President, there can be no doubt that industry generally will be glad to co-operate with the board in an endeavor to arrive at a solution of the difficulties.

2. Therefore, one of the first steps which the board should take would be to call into consultation and conference the leaders of industry in such numbers and by such groups as it may be felt is wise. Probably the first of these conferences should be with representatives of industries producing basic materials, such as iron, steel, lumber, textiles, cement, copper, brick, and other construction materials and from time to time thereafter such others as may be deemed proper. It is believed however, that industries dealing in finished products will be able to largely (if not entirely) adjust their prices in line with the above policy without material aid from the committee.

3. At such conferences the general situation or conditions outlined above, and as they may change up to the time of the conference, should be considered and carefully understood, and the above-mentioned principles which ought to apply and govern the solution of the problems should also be fully understood and appreciated. It is believed that these principles and views will be readily accepted by the great majority of those called into conference, and further, that if any of those who come into conference question these principles and

FINANCE DEPARTMENT

DOMINION INCOME WAR TAX ACT

TO WHOM APPLICABLE.

Every person who in 1918 resided or ordinarily resided in Canada or was employed in Canada or carried on business in Canada including corporations and joint stock companies

WHO SHOULD FILE RETURNS.

1 Every unmarried person or widow or widower, without dependent children under twenty-one years of age, who during calendar year 1918 received or earned $1,000 or more.

2 All other individuals who during calendar year 1918 received or earned $2,000 or more.

3 Every corporation and joint stock company whose profits exceeded $3,000, during the fiscal year ended in 1918

FORMS TO BE FILLED IN AND FILED

FORM T1. By individuals, other than farmers and ranchers
FORM T1A. By farmers and ranchers
FORM T2. By corporations and joint stock companies.
FORM T3. By trustees, executors, administrators of estates and assignees
FORM T4. By employers to make return of the names of all directors officials, agents or other employees to whom was paid $1,000 or more in salaries, bonuses, commission or other remuneration during the calendar year 1918
FORM T5. By corporations, joint stock companies, associations and syndicates to make return of all dividends and bonuses paid to shareholders and members during 1918.
Individuals comprising partnerships must file returns in their individual capacity.

GENERAL INFORMATION.

All returns must be filed IN DUPLICATE

Forms may be obtained from the Inspectors and Assistant Inspectors of Taxation and from the Postmasters at all leading centres.

Returns should be filed immediately

Postage must be prepaid on letters and other documents forwarded by mail to Inspectors of Taxation.

Address of Inspector of Taxation for this District

TORONTO DISTRICT.

Inspector of Taxation.
59 Victoria Street, TORONTO, Ont

views, a discussion thereof in the conference will, without any considerable delay, lead to a unanimous acceptance thereof.

4. In addition to giving assistance to industry in reaching satisfactory price bases the board ought to be able to give valuable advice in regard to such questions as the disposal of surplus war materials, it being desirable to accomplish this in such a way as to have as little detrimental effect as possible upon private industrial activities.

It will be the endeavor of the Board to act promptly by consulting and interchanging views with these representatives of industry in the fullest and freest manner possible, with a view to aiding and assisting industry in general to resume activities to the fullest practicable extent. The immediate object is to bring about such reduced prices as will bring the buying power of the Government itself, including the railroads, telephones, and telegraphs, into action and make it possible for the Government to state that it is willing to be a buyer for its needs at the reduced prices. If these conferences result in such an understanding on the part of the Government with respect to the important basic industries concerning proper prices and bases for prices at which purchases may be made by it, and these are approved by the board, it is believed that upon announcement thereof to the country in general the public will feel justified in promptly beginning a programme of extensive buying.

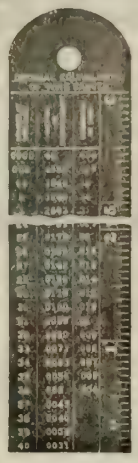
Such a procedure will in substance establish immediately a basis upon which to resume activities, and in this way the law of supply and demand will be enabled to come into play, and from that time forward it will control the changes and readjustments in selling prices of materials and the trend of prices, it is believed, will be upward and not downward.

WILLIAM C. REDFIELD,
Secretary of Commerce.

GOOD ENGINEERS AND FIREMEN

It is hard to exaggerate the importance of having good men in charge of the boiler room. The unskilled man, usually proves expensive. He is wasteful of fuel and of other supplies,—not intentionally, but because he is careless or unskilled. There is also a large chance that the inferior man will damage the boilers and machinery under his care, by incompetence or neglect; and many costly boiler explosions have resulted from failure to do something or other in the right way, or at the right time. Sometimes the authority to hire the men, or to determine what shall be paid to them, rests with the wrong person,—with a person, namely, who does not appreciate that while a clerk can usually waste nothing but his own time, a boiler-room attendant can not only waste tons of coal in addition, but can also endanger the whole plant. A mistake of this kind should be promptly rectified, by giving more authority to some one who has a better understanding of the boiler-room problem.

LUFKIN



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All standard patterns, also Combination Steel Scales and Reference Tables, carrying DECIMAL EQUIVALENTS OF FRACTIONS AND WIRE GAUGES, TAP AND DRILL SIZES OF ALL STANDARDS.

Handy and Durable

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MONTREAL, QUE., CANADA

Prompt Deliveries
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Special Machinery
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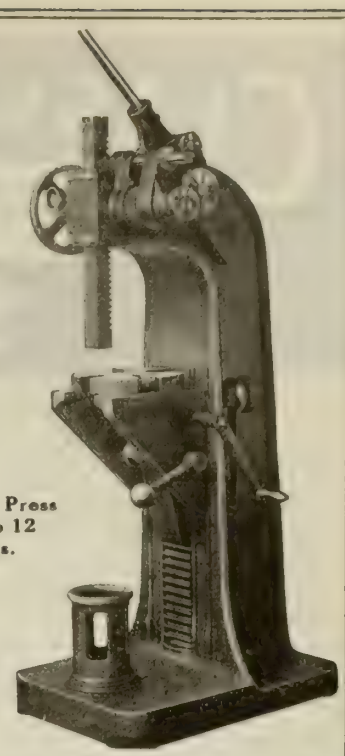
Contracting and Repairing Machinists
Quotations cheerfully submitted.
Normac Machine Co.
55 Vine Street, St. Catharines, Ont.



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10 to 12 tons.

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330 N. Park St.
Kalamazoo, Mich., U.S.A.

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Wired and Frosted
Portlights

ROBERTS GLASS BEVELING CO. INC.
RSG
TRADE
PORTLIGHT
MARK
LENS
NEW YORK

PROMPT DELIVERIES

Canadian Representative:
John Lindsay
34 Victoria Street, Toronto

CLASSIFIED ADVERTISING SECTION

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

FOR SALE

ONE 3/16" ADT. MODEL AUTOMATIC WIRE straightener and cutting machine arranged to cut a maximum of 10 feet. E. M. Bride, 113 4th Ave. East, Calgary, Alberta. (c11m)

2 FROG AND SWITCH PLANERS. 1 RAIL and frog filler multiple spindle borer. Box 557, Canadian Machinery. (c10m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

ONE SPINDLE, GRIDLEY, AUTOMATIC, ⅞-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

ONE NO. 3H LeBLOND UNIVERSAL MILLER. One LeBlond heavy duty 21" lathe. One LeBlond heavy duty 17" lathe. All of above slightly used and as good as new. Reliance Motor & Tool Co., Ltd., Toronto. (c13m)

FOR SALE OR RENT

1 STEAM HOIST, 7 x 12, BEATTY DOUBLE drum, complete with boiler 100 lbs. pressure. 1—Vertical boiler with all fittings, 25 H.P., 100 lbs. 1—Air compressor, belt driven, Chicago pneumatic, 12 x 10, 300 cu. ft., at 100 lbs. 2—Cement guns, complete with all accessories. 1—McLaughlin auto truck, new stake body. 2—Air compressors, belt driven, Bury, 650 cu. ft., at 30 lbs. Burns & Roberts, Toronto. (c12m)

HELP WANTED

WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

POSITIONS WANTED

OFFICE POSITION, PREFERABLY PRIVATE secretary, with firm manufacturing or handling motor vehicles or machinery, by young married man, Canadian. An experienced accountant, shorthand writer and typist. Have just completed the Complete Gas Engines Course of the International Correspondence Schools. Best references. Reply P.O. Box 566, Lethbridge, Alberta. (c13m)

Wanted immediately, **Heavy Duty Lathe**, new or used, good condition, ranging from 40" to 48". Swing, about 25 ft. between centers. Arranged for Motor Drive.

CANADA FORGE CO.'S PLANT,
Welland, Ont.
(ctfm)

FOR SALE

Two 3 x 36" geared feed Turret Chucking machines with 3" collet chucks, about 3½ years old. Price, each $700.00.

Three 3 x 36" Friction Feed Chucking machines without Collet Chucks, complete with Friction Counter Shafts, about 6 or 7 years old. Price, each $300.00.

The above are Jones & Lamson make.

Three 8 x 8" Open Type Single Horizontal Belt Driven Air Compressors, with unloaders. Capacity 75 cubic feet air per minute. Each $400.00. Extra for Air Tanks if required.

One No. 2A Warner & Swasey Collet Chucking Machine, complete with Oil Pan, Cross Feed and Counter Shaft. Price, $750.00.

One 20" Engine Lathe x 10', Flather. Price, $350.00.

DARLING BROTHERS, LIMITED
Engineers, Manufacturers and Founders
120 Prince Street, Montreal, P.Q.
(ctfm)

MACHINERY

NEW AND SLIGHTLY USED

14—16" x 6' South Bend double back geared lathes.
5—16" x 6' South Bend single back geared lathes.
1—10" x 36" Norton grinder.
1—No. 2 Ford-Smith plain miller.
1—16" x 22" x 8' Sebastian gap lathe.
50 and 75 H.P. Motors.
1—340 cubic ft. Rand Compressor, Aftercooler and Receiver, belt, and 5" pipe.
New Transmission material of all kinds.
12—Racine hack saws.

Cuts, detailed descriptions and prices on application.

ELGIN MANUFACTURING CO., LTD.,
St. Thomas, Ont.
(c11m)

Good Used Tools

At Low Prices

1—26 x 26 x 8 Planer
1—36 x 36 x 10 "
1—40 x 40 x 16 "

1—42" Boring Mill

2—16" Shapers

1—16" x 8' Lathe
1—18" x 8' "
1—22" x 6' "
1—24" x 6' "
1—26" x 8' "

2—Power Hack Saws

Charles P. Archibald & Co.
Machinery and Supplies
164 St. James St. - Montreal

FOR SALE

In first-class condition, Canadian Ingersoll-Rand

AIR COMPRESSOR

Belt driven, 14" by 9" by 12", with automatic unloader. Capacity 470 cu. ft. per min. Vertical Air Receiver, 42" by 10 ft. 75 H.P. Crocker-Wheeler Induction Motor, 550 volt, 25 cycle, 750 r.p.m.

P. W. Ellis & Co., Ltd.
St. Clair Works:
St. Clair Ave. and Prescott St., Toronto

USED MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, Nova Scotia
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IMMEDIATE SHIPMENT

LATHES.

12" x 5' LEBLOND, standard.
14" x 6' McKENZIE, standard.
14" x 8' LEBLOND Toolroom Equipment.
14" x 7' HENDEY Toolroom Equipment.
6—16" x 6' C.M.C. double back gear, quick change gear.
18" x 6' CISCO, double back gear.
19" x 10' LEBLOND heavy duty.
22" x 10' REED PRENTICE, geared head.
12—26" x 12' C.M.C. double back gear, quick change.
28" x 10' CONRADSON geared head.
36" x 14' NEW HAVEN triple geared.
24"—40" x 20' McCABE, double spindle.
28"—44" x 14' BERTRAM gap lathe.
20" x 36" x 14' CMC gap lathe, double back gear, quick change gear.

SHAPERS.

15" McKENZIE B.G. crank.
16" RAE B.G. crank.
16" STEPTOE crank.
20" GOULD & EBERHARDT high duty.
24" and 28" GOULD & EBERHARDT high duty.

MILLERS.

No. 1½ and 2½ LEBLOND Universal.
No. 3H and 4 LEBLOND Universal.
No. 3 FORD-SMITH Universal.
BECKER vertical single pulley drive.
BECKER No. 7HS Lincoln type.
No. 1½ AMERICAN plain.

GRINDERS.

No. 3 LANDIS Universal.
No. 1 LEBLOND Universal Tool.
No. 2 OAKLEY Universal Tool, power feed and wet attachment.
GISHOLT Tool Grinder.
BAY STATE vertical surface.

DRILLS.

10" MYERS bench sensitive.
10" McKENZIE sensitive.
14" MYERS column sensitive.
14" PERFECT column sensitive.
15" BARNES lever feed.
20" BARNES back geared.
22" BARNES sliding head.
26", 28" and 34" BARNES sliding head.
26" and 28" BARNES with tapper.

RADIALS.

2' FOSDICK National pattern.
3' NILES box table.
4' CINCINNATI-BICKFORD, speed box drive.
5' BICKFORD variable speed motor drive.
5' LONDON box table.
5' FOSDICK heavy duty speed box and tapping attachment (new).

PLANERS

24" x 24" x 7' LONDON heavy pattern.
30" x 30" x 8' BERTRAM, one head.
36" x 36" x 12' BERTRAM, one head.
42" x 42" x 10' McGREGOR GOURLAY, heavy pattern, 2 heads.

MISCELLANEOUS.

No. 2 BAKER Keyseating machine.
No. 2 MITTS & MERRILL Keyseating machine.
8" JARECKI pipe threading machine.
4" MERRILL pipe threading machine.
1½" WELLS bolt cutter.

The above list merely gives part of our stock, which is ready for immediate shipment from Toronto.

Write our Service Department and put your proposition up to them.

THE A. R. WILLIAMS MACHINERY CO., LIMITED

64 FRONT ST. W. - - TORONTO

PARTIAL LIST OF TOOLS

2—60" Bullard Vertical Boring Mills
1—60" Niles Vertical Boring Mill
No. 4—B. & S. Plain Miller
1—36" x 36" x 8' Gray Planer, two heads
No. 3—Cincinnati Universal Miller
5—No. 0 Steptoe Hand Millers
13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
14" x 6' New Carroll-Jamieson Quick-Change Lathe
15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
15" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 17"
17" x 8' New National Quick-Change Lathe
3—17" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 19"
17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 19"
18" x 24" New Rahn Larmon Lathe, D.B.G. Quick-Change
19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 21"
9—19" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 21"
25" x 14' New Sidney D.B.G. Quick-Change Lathe, swing 27"
33" x 14' Putnam, arranged for Motor Drive
6' Western Radial Drill
5' Bickford Single Pulley Drive Radial
100-lb. New Little Giant Hammer
50-lb. New Little Giant Belt Hammer
25-lb. New Little Giant Belt Hammer
30-ton Watson & Stillman Hydraulic Press

FRANK TOOMEY INC.

127 North Third Street PHILADELPHIA, PA.

IN THE

Financial Post

THIS WEEK

STEEL REDUCTIONS ON THE WAY?

"Rumor has it, according to the Pittsburgh correspondent of the FINANCIAL POST, that the steel producers have about made up their minds that substantial reductions, not like those of say $4 or $5 a ton last December, will have to be made, and should be made before the regular period of spring buying. It appears to be a common opinion that the lead in making reductions should be taken by one of the independents rather than by the Steel Corporation, and the prediction is that reductions will be announced the middle or latter part of March. One guesser makes it that the reduction on merchant steel bars will be $14 a net ton, from $2.70 to $2.00, but that represents the extreme of the guesses."

Besides the important article from which the above quotation is made, THE POST this week deals with the following amongst

OTHER SUBJECTS OF INTEREST

Dominion and Scotia Steel at Cross Purposes

Stock Markets Discounting a Business Improvement

New Managers for Polson's Iron Works

Forgings Profits Showed Drop of Nearly $90,000

St. John People Stirred by Talk on Bolshevism

Steamships in Strong Position, 21 Per Cent. on Common

Fourteen Banks Close Up Doors in Minnesota

Montreal Cottons Earned 14 Per Cent. on Common Stock

Bankers Urged to Contend With Foreign Problem

Railroad Income and Expense Under U.S. Government

Some Problems in Price Readjustment

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143-153 University Ave., Toronto.

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Name .....

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C.M.

WANTED

One Power Press, equal to No. 220 Brown Boggs or No. 6 Consolidated, with 3" to 6" stroke.

One Positive Pressure Blower good for two-pound pressure, equal to No. 30 Connersville.

FOR SALE

One Gleason Iron Planer 36" by 36" by 10 ft., in good condition. Price, $2,000.

One 4 ft. American Radial Drill in fine condition. Price $1,800.

One 16" by 24" B. G. Butler Shaper in good condition. Price, $500.

One Heavy Duty Single Purpose Horizontal Boring Mill, suitable for lathe and pump manufacturing. Price, $500.

One 12 H.P. Boiler with stack. Price, $150.

One Plating Outfit complete. Price, $250.

The Gray Manufacturing & Machine Co., Ltd.

686 St. Clarens Ave., Toronto.

IMMEDIATE DELIVERY

MONTREAL STOCK

Motors 3-Phase 60-Cycle

75	H.P., 550	VOLTS,	450 R.P.M.	2
60	H.P., 550	VOLTS,	450 R.P.M.	1
5	H.P., 550	VOLTS,	1,150 R.P.M.	1
3	H.P., 550	VOLTS,	1,200 R.P.M.	1
2	H.P., 550	VOLTS,	1,200 R.P.M.	1

TRANSFORMERS....3
200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

TRANSFORMERS, POLE TYPE—$550\frac{220}{110}$ VOLTS
5 K.W.....2 10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

Prompt Delivery and Subject to Inspection.

Low Phosphorus Pig Iron, Electric Furnace Products, Steel Products of all descriptions.

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Gauges, Tools, Dies Special and Rolling Mill Machinery

High-grade workmanship and accuracy on all work guaranteed.

RELIANCE MOTOR & TOOL CO.
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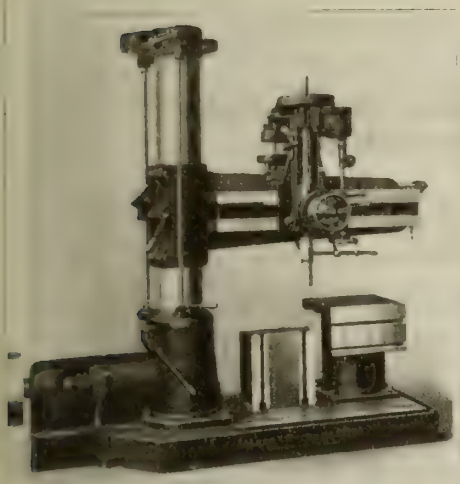
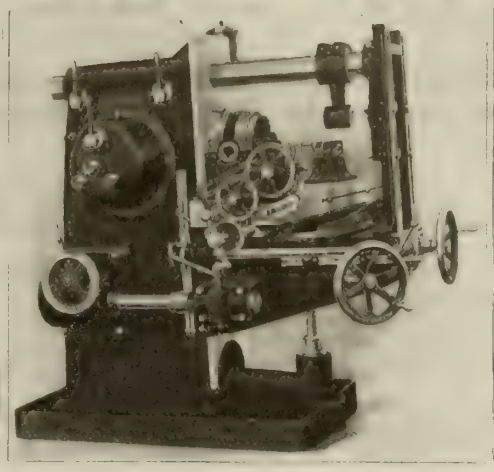
427 Queen St. W. - Toronto, Canada

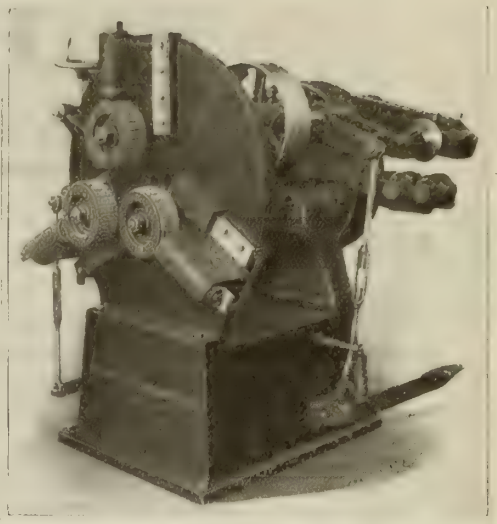
Metal Working Machinery
For Any Operation



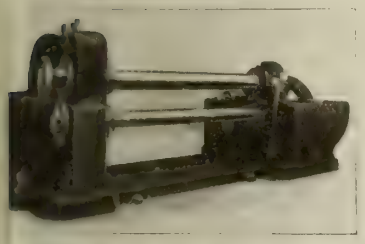
erson 1' Plain Radial Drilling Machine with gear box drive.



No. 3 Ryerson-Conradson High Power Single Pulley Drive Universal Milling Machine.



A Universal Machine for cutting and cleaning from 1½" to 6½" flues.



is machine is designed for straight uring of sheets and plates and can be iciently used for cutting round and square or flat bars.

IF YOU WANT

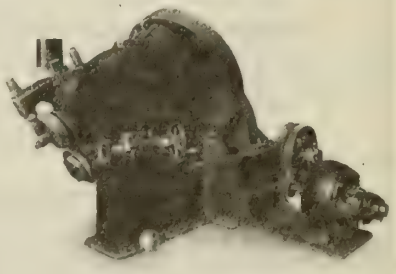
Machine Tools

NEW OR USED

Complete equipment for Boiler Shops, Structural Steel Works, Railroad Spring Shops, Flue Shop, or Machinery for any other purpose, or Woodworking Machinery of any kind

Get Our Quotations

Illustrations show a few of our machines for immediate shipment



The most efficient machine now on the market for beveling irregular and curved sheets, boiler heads, flanges, dome sheets, plates, angles, etc.

1 Ryerson High Speed Friction Saw for ting Structurals, round and square bars.

A light type drill, having hand wheel, hand lever and automatic feed.

Garlock-Walker Machinery Company, Limited

32 Front Street West, Toronto, Canada

TORONTO MONTREAL WINNIPEG

"Everything in Woodworking and Metal Working Machinery"

MACHINE TOOLS
FOR SALE

The equipment listed below contains several items that are new. All are available for immediate delivery.

LATHES

1 **New Sidney Lathe**—Double back gears; quick change gears; max. distan between centers 11′; max. swing over shears 27½″; taper attachment.

2 **Hamilton, O., Lathes**—Swing over shears, 20″ and 21″; max. distance between centers 4′ 4″; opened gears; double back gears; one has Independent chuck and one has one Independent and one Universal chuck; good condition.

1 **Sebastian Lathe**—Swing over shears, 15″; max. distance between centers, 5′ 6″; opened gear; single back gear; one Universal chuck; fair condition.

1 **Sebastian Lathe**—Swing over shears, 15″; gap 2″; max. distance between centers, 3′; opened gear; single back gear; one Universal chuck; fair condition.

1 **LeBlonde, H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 11′; opened gear; single back gear; fair condition.

1 **C.M.C. Lathe**—Swing over shears, 20″; max. distance between centers, 9′ 6″; taper turning attachment; quick change gear; double back gear; one Independent chuck; good condition.

1 **C.M.C. Lathe**—Swing over shears, 18″; max. distance between centers, 3′ 6″; taper turning attachment; double back gear; good condition.

4 **C.M.C., H.D. Lathes**—Swing over shears, 26″; max. distance between centers, 6′; two with and two without taper turning attachment; quick change gears; three with Independent chuck and one with Universal chuck. These lathes are new.

1 **Gleason Lathe**—Swing over shears, 24″; max. distance between centers, 3′; open geared; single back gear; fair condition.

1 **Cisco Lathe**—Swing over shears, 15″; max. distance between centers, 3′; quick change gear; single back gear; one Universal chuck; fair condition.

1 **Barnes Lathe**—Swing over shears, 18″; max. distance between centers, 5′; eight feed changes in apron of carriage; single back gear; one Universal chuck; good condition.

1 **Hepburn Lathe**—Swing over shears, 20″; max. distance between centers, 26″; good condition.

1 **Bertram Lathe**—Swing over shears, 26″; max. distance between centers, 8′; taper turning attachment; quick change gears; double back gears; one Independent chuck; good condition.

1 **Pond Lathe**—Swing over shears, 38″; max. distance between centers, 9′; taper turning attachment; quick change gears; triple back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 30″; max. distance between centers, 16′; quick change gears; double back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 12′; quick change gears; double back gears; good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 26″; max. distance between centers, 4′; taper turning attachment; quick change gears; double back gears; one Universal and one Independent chuck; very good condition.

1 **LeBlonde H.D. Lathe**—Swing over shears, 20″; max. distance between centers, 3′; taper turning attachment; quick change gears; double back gears; one Universal chuck; very good condition.

1 **Hepburn Lathe**—Swing over shears, 20″; 3′ between chuck and carriage; one set drawn in collar near chuck; good condition.

POWER SAWS

5—Atkins power saws, each 14″ capacity; complete with pumps; fair condition.

DRILL PRESSES (Vertical)

1—Barnes, 18″; fair condition.
1—Bertram, 42″; fair condition. Adjustable table and vertical movement on drill carriage.

PLANER

1—London, 36″ x 36″ x 7′ 6″, table; good condition.

TURRET BORING MILL

1—Bertram, 34″; turret with five bars; 17″ between table and cross rail; new.

COLD SAWS

6—Newton cold saws; capacity 7½″ for rounds; 7″ for squares. Direct or line shaft drive.

CUT-OFF MACHINE

1—Hall, suitable for stock 4″ to 6½; fair condition.

MOTORS

5—10 H.P. motors, 25 cycle, 3 phase, 220 volt, 750 r.p.m.
5—125 H.P. motors, 25 cycle, 3 phase, 220 volt, 750 r.p.m.
4—250 H.P. motors, 25 cycle, 3 phase, 2,200 volt, 730 r.p.m.

GRINDER CYLINDRICAL

1—Ford-Smith, swing 16″; centre of wheel to center of tailstock at max. pt. 27″; max. distance between centers, 3′ 6″; actual length of bed, 6″; fair condition.

For Further Particulars Apply to

Canada Forge Plant

Canada Foundries and Forgings, Limited

WELLAND, ONT.

Below is a list of valves and fittings used in connection with pumps, accumulators and shell presses, all of which are in first-class working order:

The following suitable for 1,500 lbs. working hydraulic pressure:—

3—4" flanged, By-pass Valves, steel body (R.D. wood).
7—3" flanged, By-pass Valves, steel body (R.D. wood).
5—3½" flanged, By-pass Valves, steel body (Dean and Steam Pump Co.).
3—3" screwed ends, By-pass Valves, brass body (R.D. wood).
7—3½" flanged ends, Shock Relief Valves, steel body (R.D. wood).
5—3½" screwed ends, Check Valves, steel body (R.D. wood).
8—3" screwed ends, Check Valves, steel body (R.D. wood).
4—4" flanged ends, Check Valves, steel body (R.D. wood).
3—3" screwed ends, Check Valves, brass body (R.D. wood).
12—4" flanged ends, Balance Stop Valves, steel body (R.D. wood).
2—6" flanged ends, Balance Stop Valves, steel body (R.D. wood).
6—3½" flanged ends, Balance Stop Valves, steel body (R.D. wood).
20—3" screwed ends, Balance Stop Valves, brass body (R.D. wood).
2—3½" screwed ends, Balance Stop Valves, brass body (R.D. wood).
5—2" screwed ends, Balance Stop Valves, brass body (R.D. wood).
1—6" flanged ends, Balance Stop Valves, steel body, NEW (R.D. wood).

The following suitable for 250 lbs. working water pressure:—

6—4" Pratt & Cady, screwed ends, Horizontal Flapper Check Valves, iron body.
2—4" Pratt & Cady, flanged ends, Horizontal Flapper Check Valves, iron body.
3—5" Jenkins, flanged ends, inside screw, Gate Valves, iron body.
3—4" Jenkins, flanged ends, inside screw, Gate Valves, iron body.
2—5" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
4—4" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
7—3½" Crane Co., flanged ends, inside screw, Gate Valves, iron body.
3—3½" Jenkins, flanged ends, inside screw, Gate Valves, iron body.

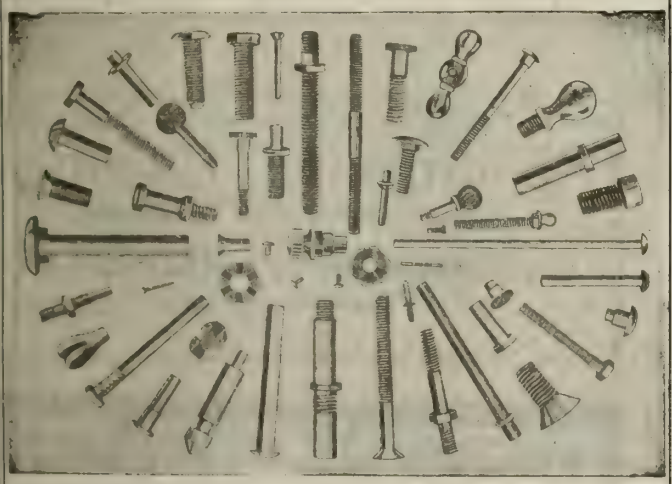
The following suitable for 125 lbs. working water pressure:—

6—5" Pratt & Cady, screwed ends, inside screw Gate Valve, iron body.
1—5" Pratt & Cady, flanged ends, inside screw, Gate Valve, iron body.
2—5" Jenkins, screwed ends, outside screw, Gate Valves, iron body.
5—4" Crane Co., screwed ends, outside screw, Globe Valves, iron body.
8—4" Kennedy, screwed ends, inside screw, Gate Valve, iron body.

Cast Iron, Cast Steel and Steel Forging Elbows, Tees and Flanges, suitable for water pressures 125, 250 and 1,500 lbs.

Canada Foundries and Forgings, Limited (Canada Forge Plant)

WELLAND, ONTARIO



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ACCURACY QUALITY

Our Mechanical Engineers are at the service of our Clients.

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W. L. TOBIAS, *Superintendent*
Formerly Superintendent National Cash Register Co.

ACCURACY

When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

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GALT MACHINE SCREW CO., LIMITED
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Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

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SPECIAL MACHINERY
JIGS AND FIXTURES PUMPS
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ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

National High Speed Cutters

(The Cutter that gives service)

Let me quote you on your next requisition

Drills

High Speed and Carbon

Immediate shipment and right price.

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Machine Shop Supplies

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Special Equipment

Built to Specification

Steel Plate and Structural Steel Work

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High Quality and Prompt Service Double-Sure

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WILLIAM HAMILTON CO., Limited
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"Made to Endure High Temperature"

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AMERICAN OFFICE AND WORKS HARRISON, N J

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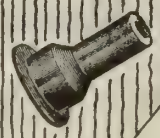
TOOLS & STAMPINGS



We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.

HOMER & WILSON

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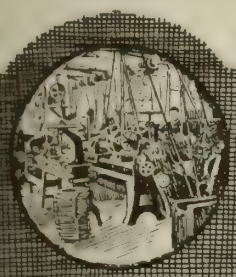
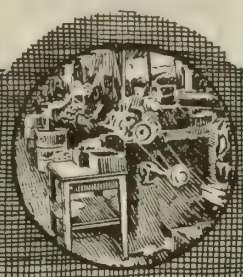
Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems

Toronto Tool Company
516 Richmond St. West Phone Adel. 1181

Do you want someone to handle your small stamping work?

An advertisement in the contest section will put you in touch with firms who have the facilities for handling small stampings, small tools, jigs, fixtures, etc. If you need their help, tell them so here.

CANADIAN MACHINERY
Contract Work Section
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SPECIAL MACHINERY

Built to Orde

Also gauges, punches, jigs, dies, small tools, etc.
Prompt Service.
Moderate cost.
Send Blueprints for estimate.

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TORONTO IRON WORKS
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Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

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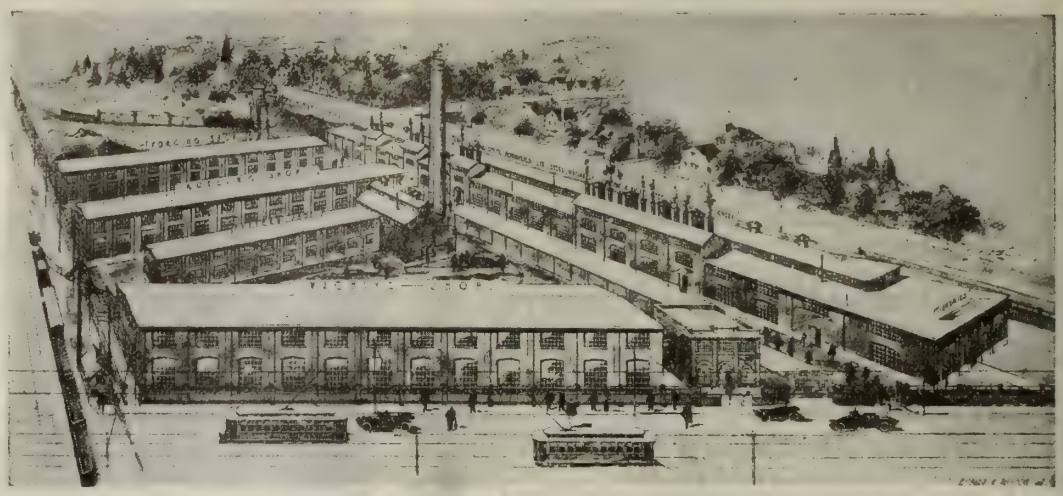
When our plans are completed, "HISCO" will be the largest plant of its kind in Canada.

Two big new electric furnaces are being added to our present large equipment. And cleaning and annealing department measuring 300′ x 100′ is about to be completed.

This will place us in a position to handle orders big and small with unequalled facility.



Specify "HISCO" Products

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Cement Mill and Mining Machinery Castings, Stamp Mills, Crushing Plants, Excavating Outfits, Steel Car Wheels, Locomotive Driving Wheels and Frames, etc.

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By Using Parts Made in the Punch Press

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We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

A Battery of presses is also available at our plant to manufacture parts for you with the understanding that you pay only for good parts made. Our facilities ensure prompt deliveries at right prices.

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PATTERNS
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Free Tool Grinding Chart

Grind your cutting tools in exactly the right way to get best results—and you save time. That's obvious. It is precisely that that this Tool Grinding Chart enables you to do.

It has been adopted as standard by many firms that found it a long way better than guess work.

CANADIAN MACHINERY would like to see this Chart in every shop in the Dominion. Mail the coupon below for your copy to-day.

Shows at a glance Correct Clearance and Rake Angles for Cutting Tools

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153 University Avenue, Toronto.

Please send me/us free, one of your tool grinding charts.

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Mild Steel, High Carbon Steel, Manganese Steel, Chrome Steel

We are manufacturers of Steel Castings running from ½ lb. to 5,000 lbs. each and are in good position to furnish prompt deliveries at moderate prices. Try us with your next order.

The Wm. Kennedy & Sons, Limited, Owen Sound

ESTABLISHED 1860

PLUMBING, BUILDERS and HARDWARE

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GREY The K—T Foundry IRON

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CASTINGS

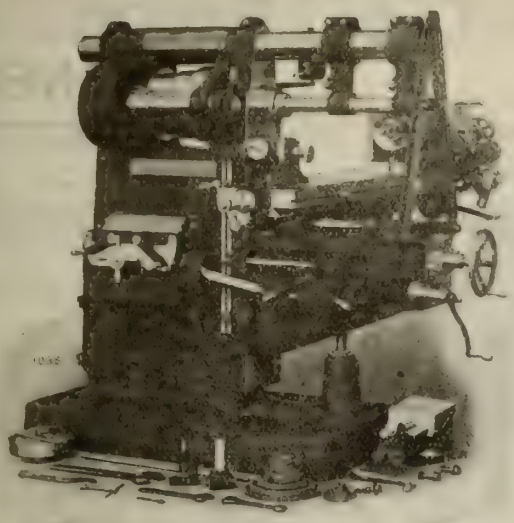
These are our SPECIAL LINES. But at this time we are prepared to handle contract work up to 15 tons per day. For gated pattern, match plate, stripping plate, machine and repetition work of any kind we are prepared to quote you most attractive prices and prompt delivery.

Would You Like to Know

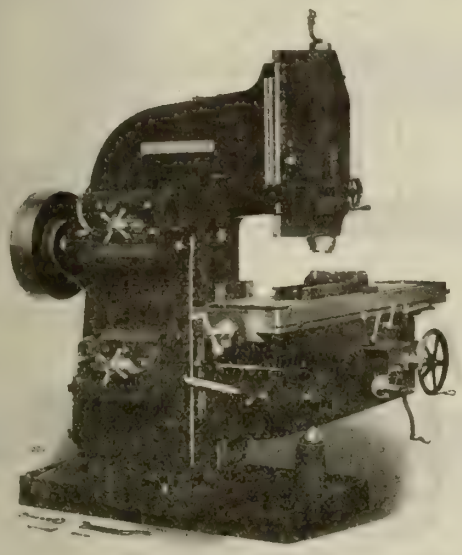
the analysis and physical test of metal in your castings? How they could be made cheaper? What properties of metal would facilitate your finishing operations or improve their quality?

We can furnish semi-finished Castings, being equipped to do lathe drilling and reaming work—also expert metal pattern work.

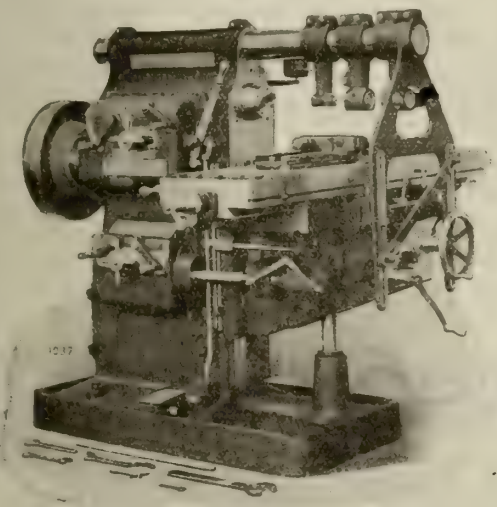
Ask Us



One of our 5-cone Driven Universal Millers. We make 8 corresponding high power single pulley machines.



One of our three sizes of high power, single pulley, vertical Millers.



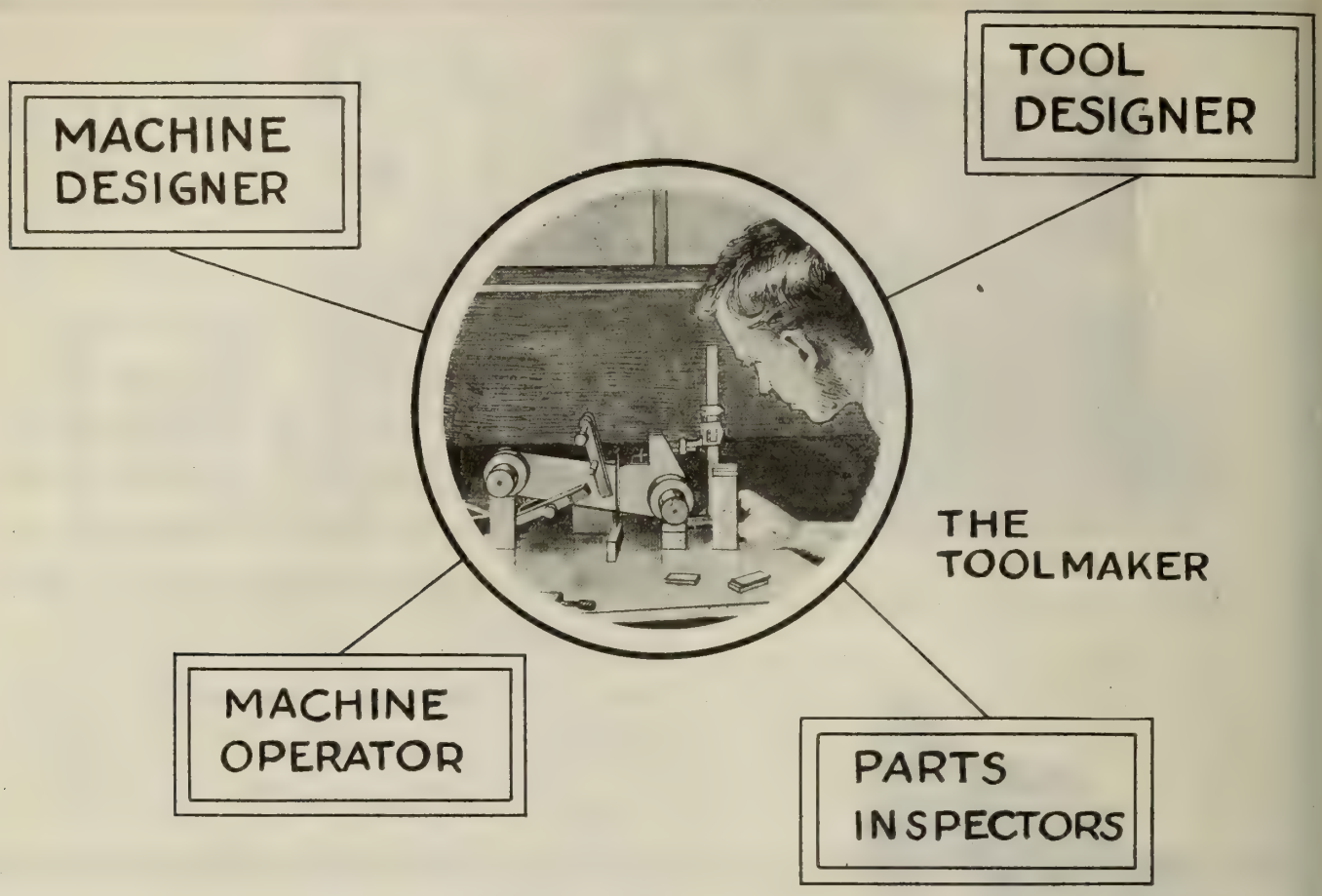
One of our 8 high power single pulley plain Millers. We also make 7 cone driven plain machines.

THE Manufacturer who is looking for any one specific size and type of Milling Machine, can exactly satisfy his need from the line of Cincinnati Milling Machines. Included is every commercial size—from 18 in. table travel to 50 in. table travel—from 1 h.p. normal capacity to 20 h.p.—from 1450 lbs. net weight to 11,000 lbs.—and between these two extremes, 27 sizes and styles of Horizontal Millers. In addition to that a full line of Vertical Millers and Automatic Manufacturing Millers.

You will grant that from such a complete line, you can fill your shop's needs in Millers as perfectly as a plug gauge fits its corresponding ring. A few of them are shown on this page. All of them have won the highest reputation everywhere. Complete details are given in our literature, which will be sent to anyone who is interested.

The Cincinnati Milling Machine Company

CINCINNATI, OHIO, U.S.A.



The Center of Control

One single mistake in the toolroom causes more trouble than a hundred mistakes out in the shop. The reason for this is—the toolmaker is the centre of control of the shop's sizes. If a toolmaker does not build his work right, how can the shop production be right?

There are shops that neglect to equip their toolmakers with the means for knowing when their work is right. There are shops that expect their toolmakers to build work WITHOUT Johansson Gages so well that it will PASS INSPECTION with the Johansson Gages in the inspection department. This is putting the toolmaker at a disadvantage.

There are many toolmakers who will tell you it isn't fair to expect a man's work to pass Johansson Gages unless he has been allowed to build it with Johansson Gages.

If you are in a busy shop of this kind, and know how Johansson Blocks would help you and the others, put the whole thing up to your foreman and get him to see the superintendent. Both of these men are very busy, but anything worth having is worth asking for. Put the Johansson Gage question before them—show them how they can get more and better work when the toolmakers are allowed to use the Blocks as a practical shop tool in building their toolwork.

It stands to reason, doesn't it, that work *built* with the Blocks will *check* with the Blocks.

Read our new gage catalog—then put the question to the men in charge.

Johansson

SWEDISH GAGE COMPANY, 10 CATHCART STREET, MONTREAL

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Standard Gages, Parallels, Angle Irons V Blocks, Etc., Carried in Stock

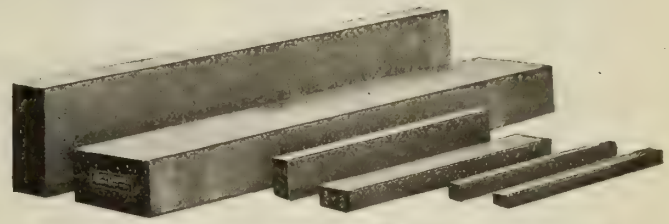
"Specials" Designed and made by our Specialists

The Taft-Peirce line of standardized tool room accessories is comprehensive—includes a wide variety of close limit equipment necessary for tool room operations—and saves time and trouble all along the line.

Cast-iron Box Parallels
Style 160

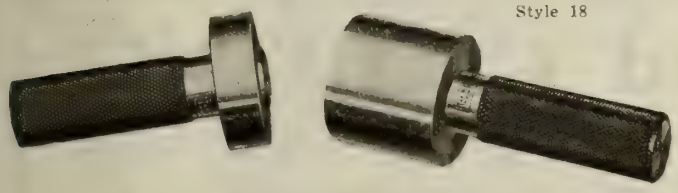
Style 16

Universal Right-angle Irons



Steel Parallels
Style 150

Style 18



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Besides regular equipment—Standard Gages, Parallels, Angle Irons, V Blocks, etc., we have standardized certain "specials," designated by our tool specialists, notably Taft-Peirce Plug Gages—a flexible system of handles with interchangeable gages in all sizes from 1/4 to 3 inches.

We carry these tools in stock and can make shipments promptly on most orders. Exact duplications on re-orders assured. Ask for Catalogue 104-E.

Adjustable External
Limit Gage
Style 22

TAFT-PEIRCE
Woonsocket, R.I., U.S.A.

NEW YORK, Woolworth Building DETROIT, Majestic Building

WILLIAMS & WILSON, LIMITED
MONTREAL AND QUEBEC

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PNEUMATIC TOOLS

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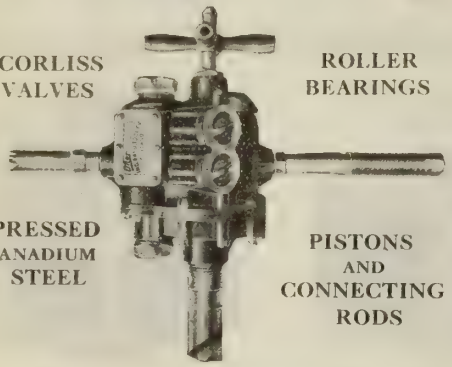
ELECTRIC DRILLS

AIR DRILLS



Four cylinders two on each side—with Semi-Corliss Valve close to each pair, giving greater power and efficiency.

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CHIPPING HAMMERS

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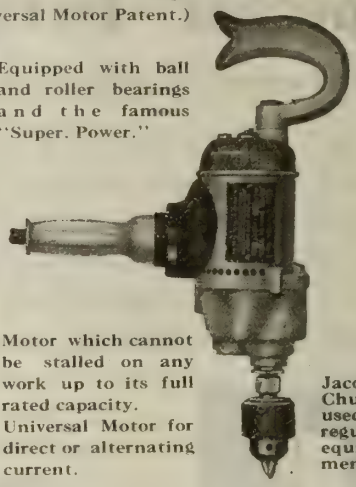
All parts hardened and ground.

(Licensed under Burke Universal Motor Patent.)

Equipped with ball and roller bearings and the famous "Super. Power."



Motor which cannot be stalled on any work up to its full rated capacity. Universal Motor for direct or alternating current.

Jacobs' Chucks used as regular equipment.

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DAVIS
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DAVIS-BOURNONVILLE CO. N.Y.

THE CARTER WELDING COMPANY OF TORONTO, LIMITED, are the sole Canadian agents for the DAVIS-BOURNONVILLE Welding and Cutting Apparatus, and handle—

Portable Generators	Carbide	Carbon Removers
Stationary Generators	Welding Rods	Portable Trucks
Welding Torches	Flux	Compressed Acetylene
Cutting Torches	Carbonite Rods	Electrolytic Oxygen
Regulators	Goggles	99.80% pure
Hose		

There is no connection with any other firm in Canada under a similar name.
All correspondence to be sent to Toronto office.

The CARTER WELDING CO. of TORONTO

LIMITED

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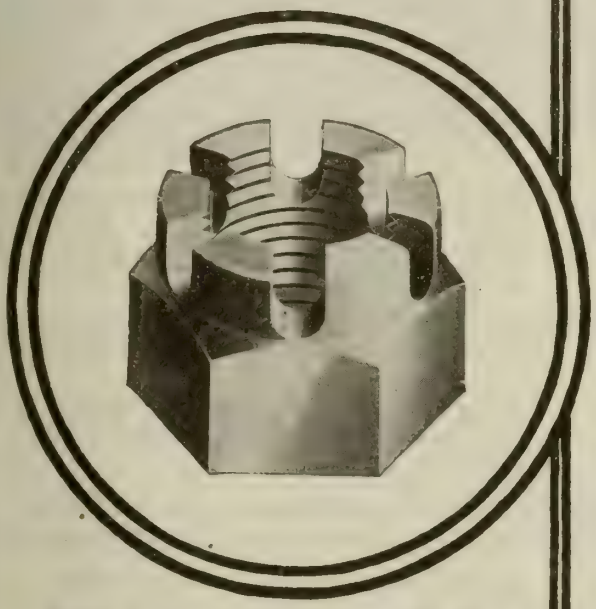
STANDARD OR SPECIAL



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Plain—S. A. E.
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SPECIAL SCREW MACHINE PRODUCTS

Made to specifications in sizes up to 2¼" in diameter, 10½" long.

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TO SELL or buy from Canada such lines as machinery, hardware, food products, dry goods, books and stationery, paper, printing machinery and supplies and general merchandise of almost every description, raw or manufactured, use or consult the MacLean Business and Class Publications, as per list below. For special information, write the publishers. Concerning the quality of the MacLean publications, let this copy of CANADIAN MACHINERY which you hold in your hands speak for all. The MacLean list of 14 publications is as follows:

The Canadian Grocer (Est. 1886)
Serving the Grocery, Provision and Foodstuffs Trades. Published weekly.

Hardware and Metal (Est. 1889)
Serving the Hardware, Stove and Metal-working Trades. Published weekly.

Dry Goods Review (Est. 1889)
Serving the Dry Goods Trade generally; Wholesale, Retail, Manufacturing and Department Stores. Published monthly.

Men's Wear Review (Est. 1898)
Serving the Manufacturers of Clothing, Underwear, Shirts, Collars, Neckwear, Footwear, Hats and Caps and Allied Sundries, and their Retail Distributors. Published monthly.

Canadian Machinery (Est. 1905)
Serving the Machinery, Metal-working, Iron and Steel, Foundry and Allied Trades. Published weekly.

The Power House (Est. 1907)
Serving the Operating and Consulting Engineers and Power Superintendents, Devoted to the Generation, Transmission and Application of Steam, Gas, Electric, Air and Water Power; and to the operation of Refrigerating Machinery. Published monthly.

Bookseller and Stationer (Est. 1884)
Serving the Book, Stationery, Fancy Goods and Associated Trades. Published monthly.

The Sanitary Engineer (Est. 1907)
Serving the Manufacturers of Sanitary, Heating and Ventilating Machinery, Systems and Equipments, and those installing them. Published semi-monthly.

Marine Engineering of Canada (Est. 1910)
Serving the Marine Engineering, Merchant and Shipbuilding Trades. Published monthly.

Canadian Foundryman (Est. 1909)
Serving Foundries and the Pattern-making, Plating and Polishing Trades. Published monthly.

Printer and Publisher (Est. 1892)
Serving the Publishing, Printing, Paper-making and Allied Trades. Published monthly.

The Financial Post (Est. 1907)
Serving the Business, Investment and Financial Interests of Canada. Published weekly.

MacLean's Magazine (Est. 1896)
A popular family and literary magazine; the most important in its field in Canada. Published monthly.

The Farmers' Magazine (Est. 1910)
Serving the agricultural and rural communities of Canada. The only farm and country life publication in Canada having extensive national circulation. Published semi-monthly.

This fact may interest you: namely, the MacLean organization is the largest concern of its kind in the British Empire. The output of its mechanical department every working day is the equivalent of a 125-page publication of the size and type of this copy of *Canadian Machinery*.

Our London Office 88 Fleet Street, E. C.

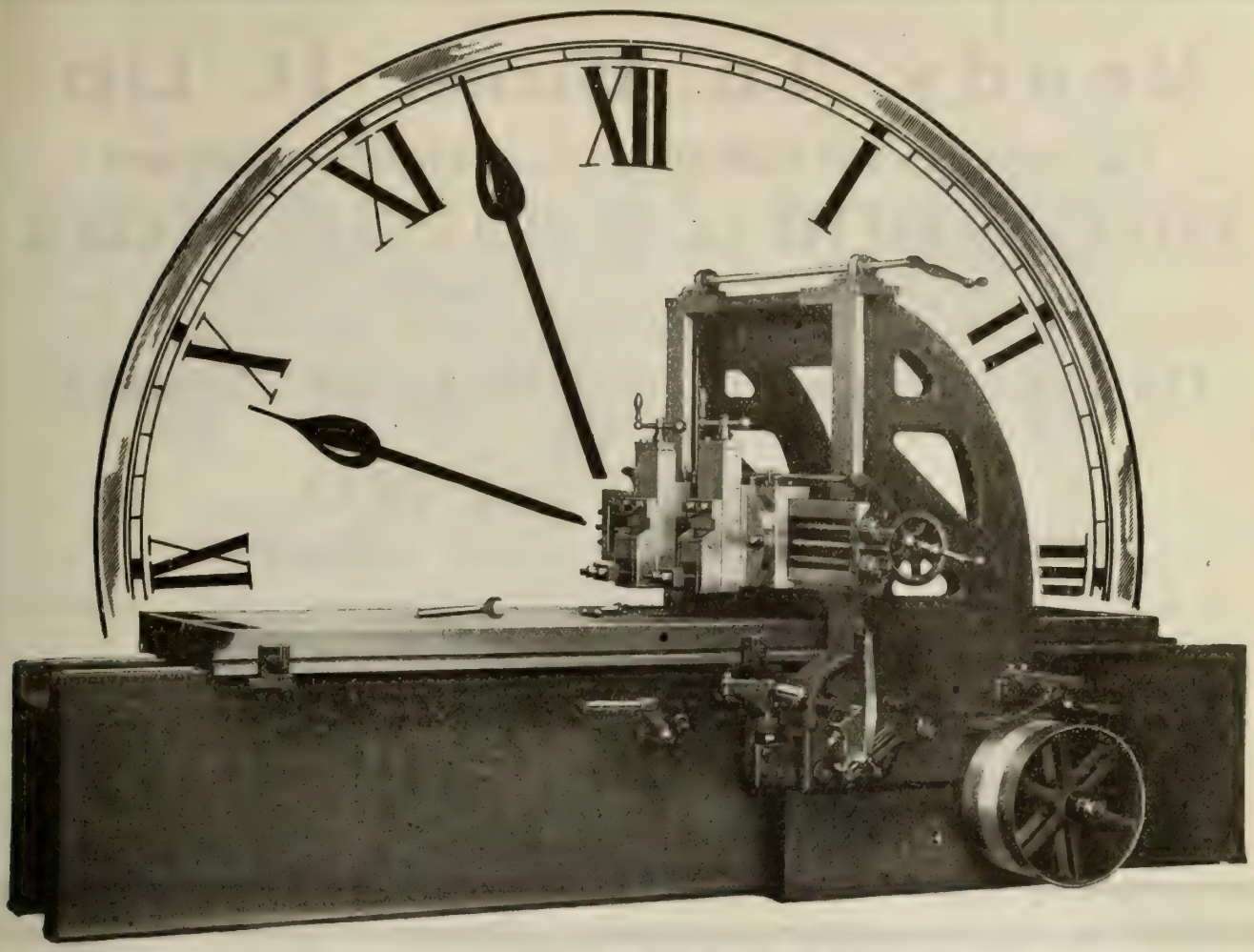
Also at New York Boston Chicago Montreal Winnipeg

For over 20 years the MacLean Publishing Company has maintained a fully-staffed London office, and has rendered British and Continental manufacturers, shippers, and traders an invaluable service in many directions.

Specimen copies of the MacLean publications will be cheerfully forwarded to all asking for them. Address us at London or Toronto.

The MacLean Publishing Co., Limited

143-153 University Avenue Toronto, Canada



The Advantage of the Second-Belt Drive Becomes More Evident as Time Goes On

In the construction of Whitcomb-Blaisdell Planers the usual rapid running train of gears is eliminated. This means the absence of shocks and jars, and not only assists in turning out smooth, finely finished work—work that is free from chatter marks—but actually prolongs the life of the planer.

The substitution of the second belt drive for the usual train of spur gears **reduces noise and friction losses.** More power is delivered to the table, and there is a noticeable lack of "chatter." The "cushioned" reverse of the Second-Belt Drive permits the **exceedingly high table speeds** that would rack to pieces the ordinary full-geared planer.

THE IDEA BACK OF THE WHITCOMB-BLAISDELL IS THE BEST RESULTS IN THE SHORTEST TIME.

Why not investigate? May we send catalog?

WHITCOMB-BLAISDELL MACHINE TOOL CO.

WORCESTER, MASS., U.S.A.

Whitcomb-Blaisdell Planers

Ready To Back It Up

YES, we're ready to back up our plain, unqualified Statement

THERE'S NO BETTER LATHE BUILT THAN THE CISCO

Try it in power or pull; test it in accuracy; compare it in simiplicity of operation; use it for efficiency; run it for economy.

ITS THE BEST LATHE ON THE MARKET TO-DAY

IT'S THE

LATHE WITH THE PULL

THE LATHE OF SIMPLIFIED ACCURACY

We make it in four sizes—14", 16", 18", 24". We make it either cone drive, plain motor drive, geared head or motor driven geared head.

WE MAKE IT FOR YOU

The Cisco Machine Tool Company

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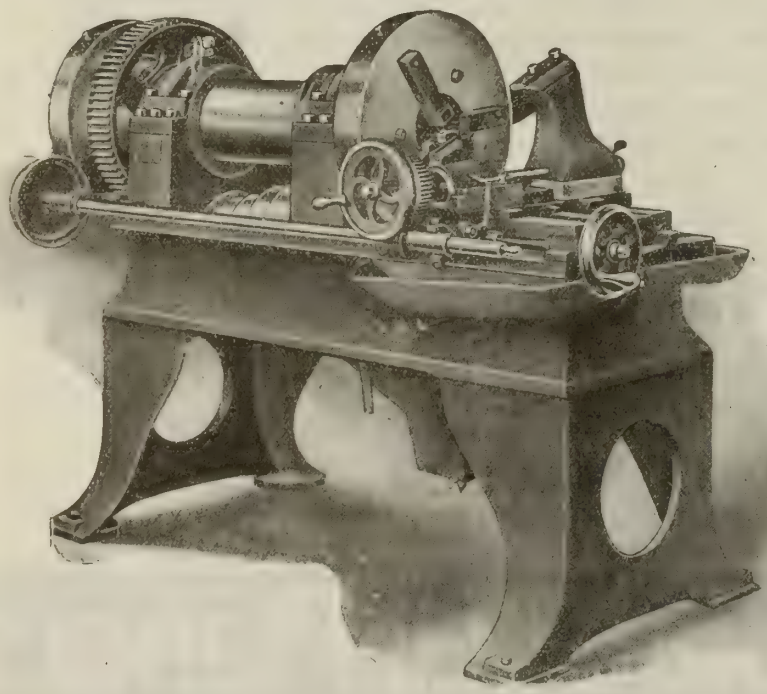
Doubles the Production

—Cuts the Cost in Half



Hurlbut, Rogers Cutting-off and Centering Machine

TWO Tools work in the same cut on the HURLBURT, ROGERS PATENTED CUTTING-OFF AND CENTERING MACHINE. **Twice the amount of work is turned out.**

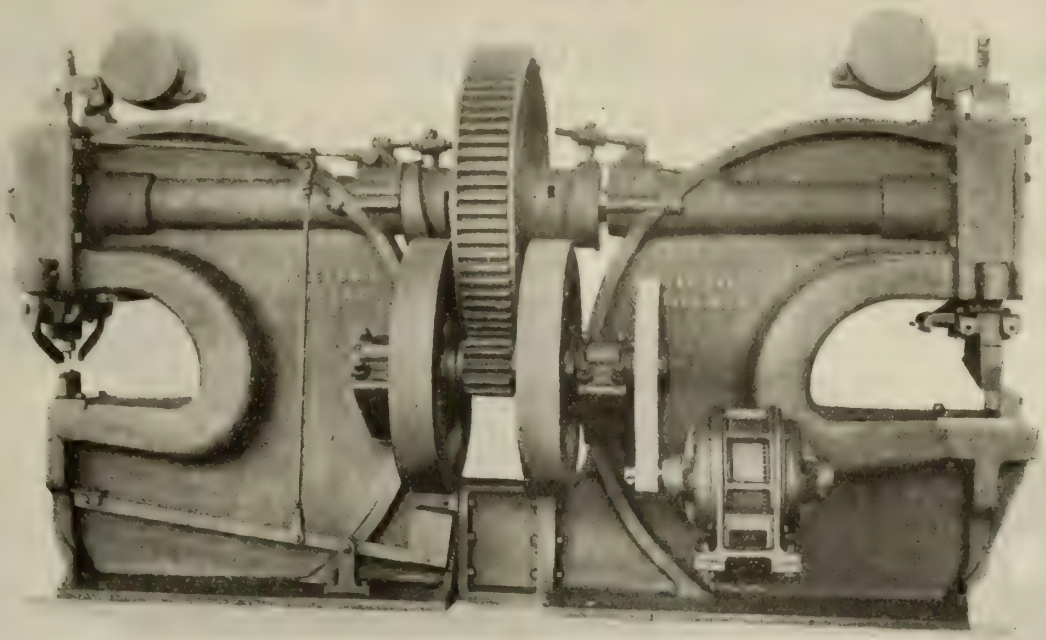
Don't you think this opportunity of doubling your production, and cutting your costs in half is worth investigating? Look this illustration over carefully, then drop us a line for the full details—do it now!

The Hurlbut, Rogers Machinery Co.
South Sudbury, Mass.

Foreign Agents—England: Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne.

WICKES' Heavy Duty Double Punch

Built for Real Service

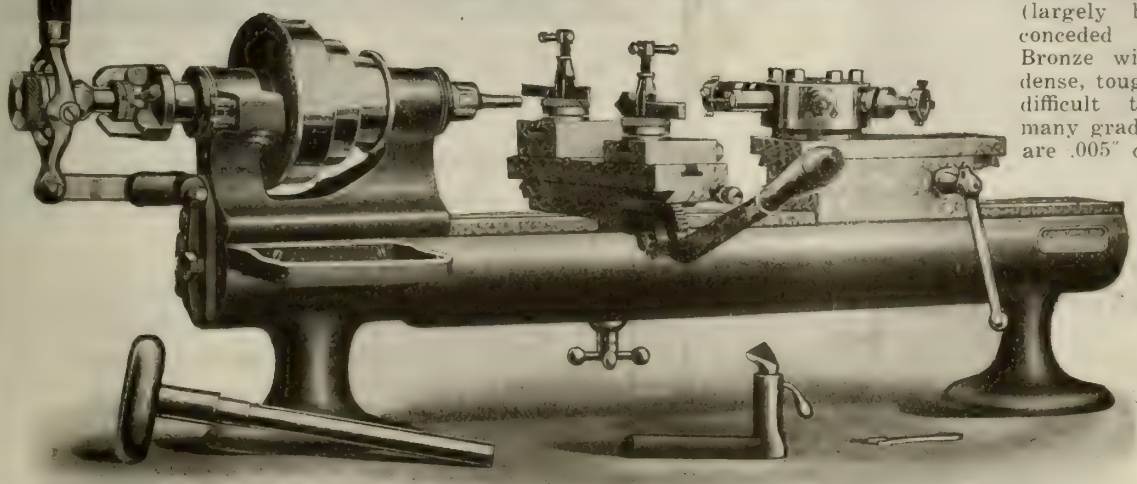


We also manufacture High Grade Horizontal and Vertical Rolls, Angle Rolls, Single Punches, Shears, Sprue Cutters, Radial Wall Drills or Counter-sinking Machines, Flanging Clamps and Heavy Duty Engine Lathes. *Ask for Catalogue.*

∴ WICKES BROS., SAGINAW, MICH., U. S. A. ∴

CATARACT BENCH LATHES AND ATTACHMENTS

Are Doing Remarkable Work



Here's an example of what was accomplished with a Cataract Bench Lathe: In the American Bronze Corporation they are used for finishing Non-Gran products (largely bushings). It is conceded that Non-Gran Bronze with its distinctive, dense, tough quality, is more difficult to machine than many grades of steel. Limits are .005" on length .002" for flanges and .0005" for diameters and concentricity—.00025" not infrequently required; but no matter how exacting requirements, four "Cataracts" handle the work to complete satisfaction of all concerned.

Cataract Bench Lathes Have Made Good Everywhere

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ALFRED HERBERT CO., Limited, Coventry, England, are our representatives for United Kingdom, France, Belgium, Russia, Japan, Manchuria, Korea, Formosa, China, Italy.

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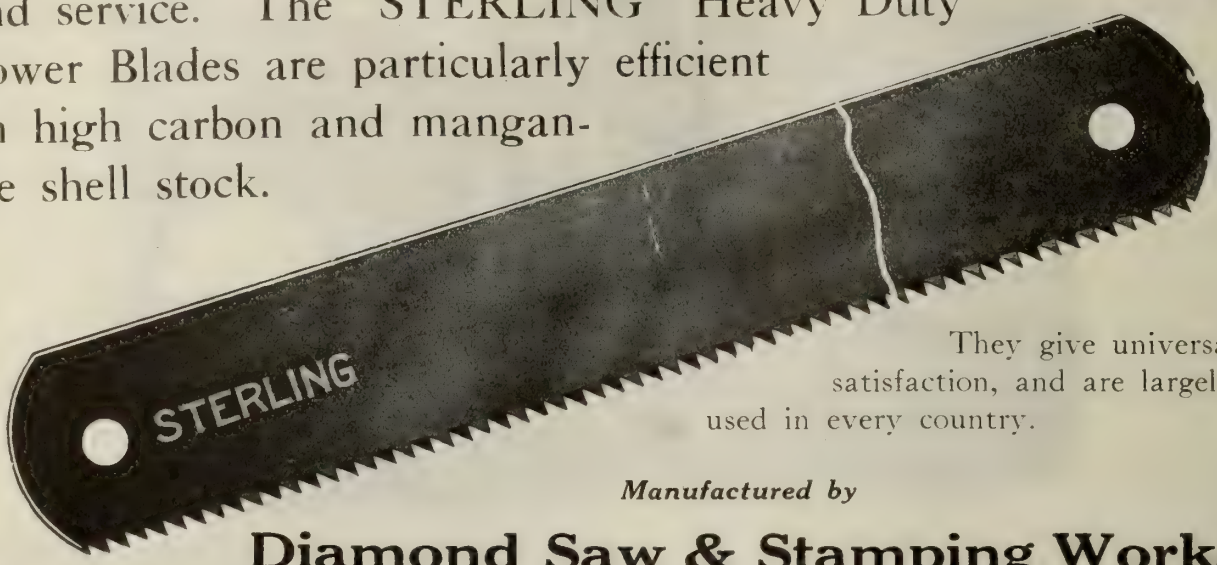
This brand of HACK SAW BLADE spells good value and service. The "STERLING" Heavy Duty Power Blades are particularly efficient on high carbon and manganese shell stock.



They give universal satisfaction, and are largely used in every country.

Manufactured by

Diamond Saw & Stamping Works
BUFFALO, N.Y., U.S.A.

(Showing DENNISTEEL Locker Built In)

Buy Steel Lockers, Shelving, Etc. by this name

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It's worth while paying a trifle extra to get the best obtainable. Our complete line of steel equipment for shop, store and factory is the best on the continent. We have been longest at this business and are in a position to give better service by putting in better material and giving a finer finish, over superior workmanship.

Use our engineering department's services freely. Write for estimate on any proposition in our line. We are strictly "on the job" to serve you in All-Steel Factory, Store and Shop Equipment, Ornamental Bronze, Iron and Wire Work, Commercial Wire Work of all kinds, General Builders' Ironwork.

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We have recently increased the capacity of our plant and can guarantee quick delivery on castings weighing anywhere from 100 lbs. to 50,000 lbs.

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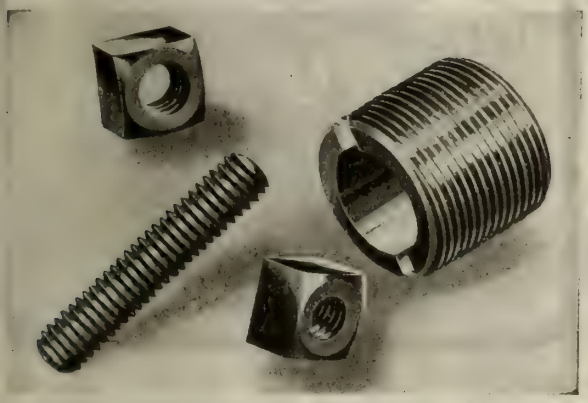

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Manufacture Brass Automatic Screw Machine products. Capacity of machines 1/8 in. to 2 in.

WE

solicit your inquiries. Send us your samples or blue prints. Satisfaction guaranteed.

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for hand feed or with power attachment.

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Successors to C. G. Garrigus Mach. Co.
Bristol, Conn.

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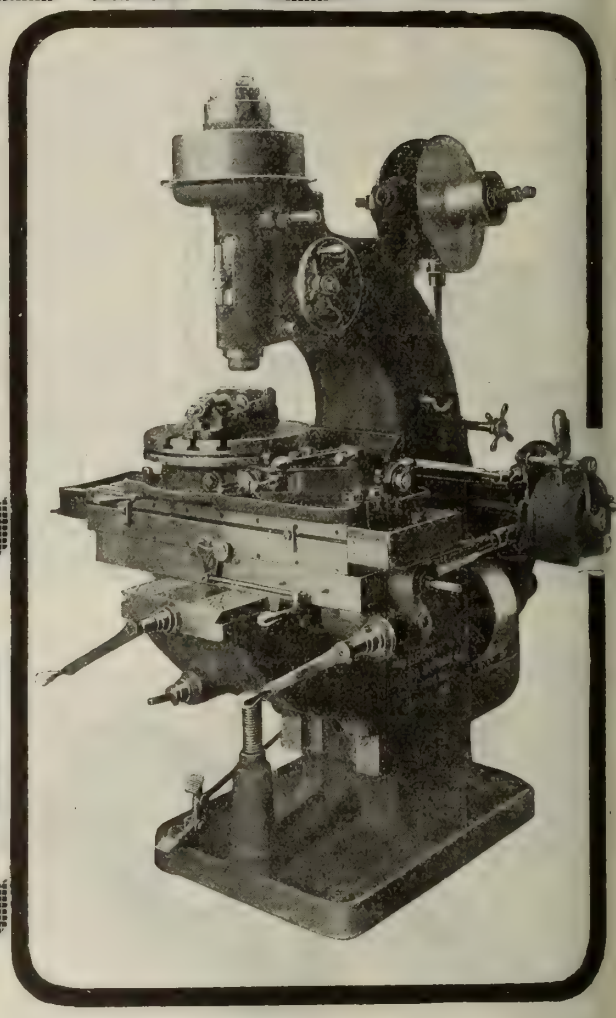
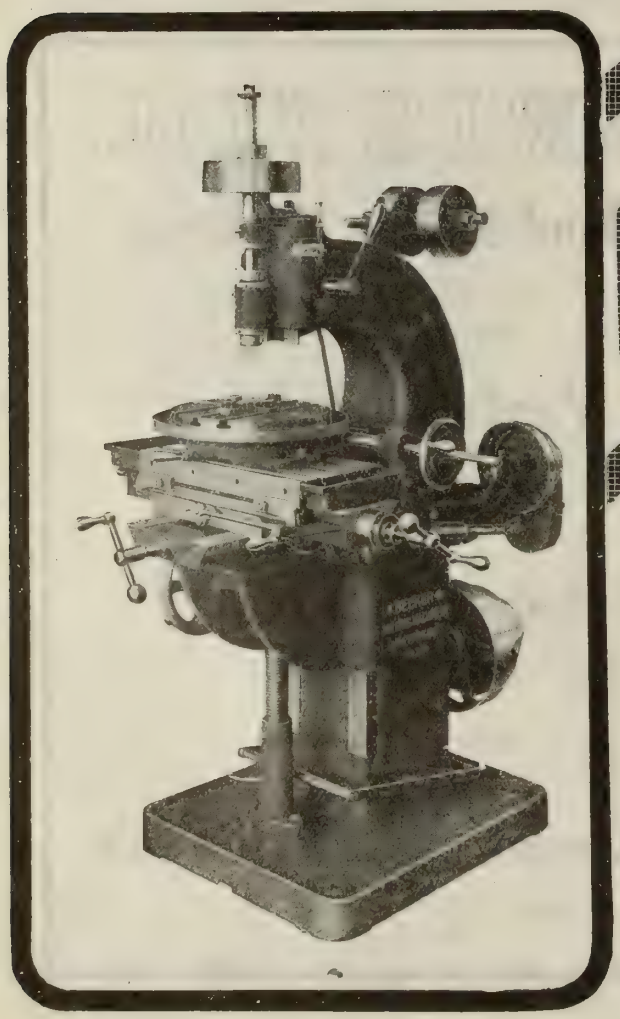
Belt Driven Millers

The Machine that Gives the Smooth Finish

Days of stiff competition are dawning. It behooves you to adopt time-saving equipment of the most modern type to secure work and produce it at a profit. Becker Millers are the tools you need. Their great productive qualities justify any manufacturer in replacing present equipment with these modern machine tools.





Consult our Engineers Regarding Milling Problems

Our engineering department is prepared to advise you. Send blue prints and they will give you estimates on your work.

We are prepared to make prompt deliveries. Write us about them.

Becker Milling Machine Co.

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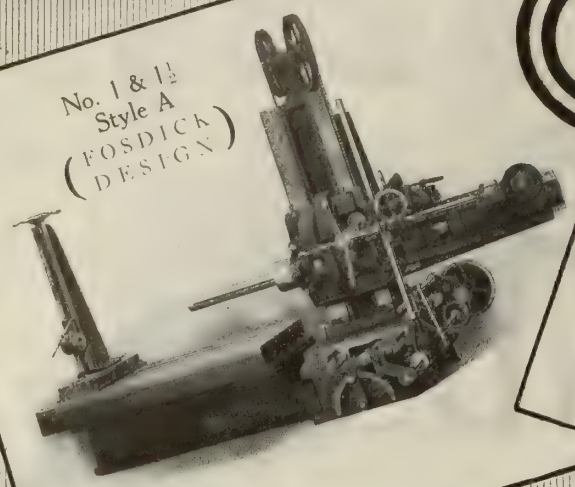
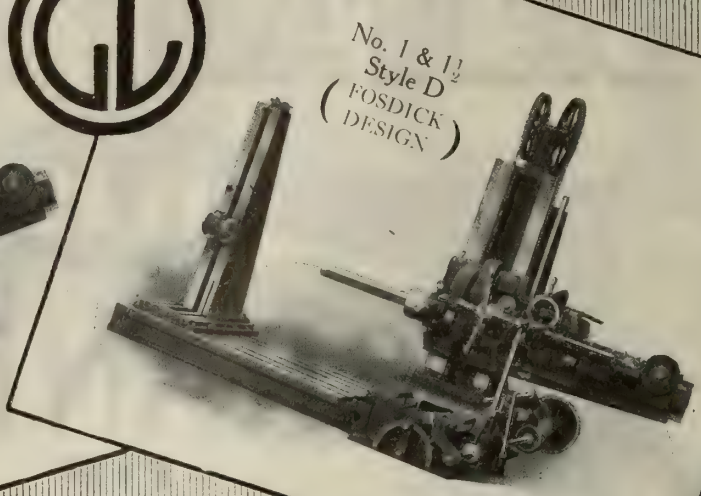


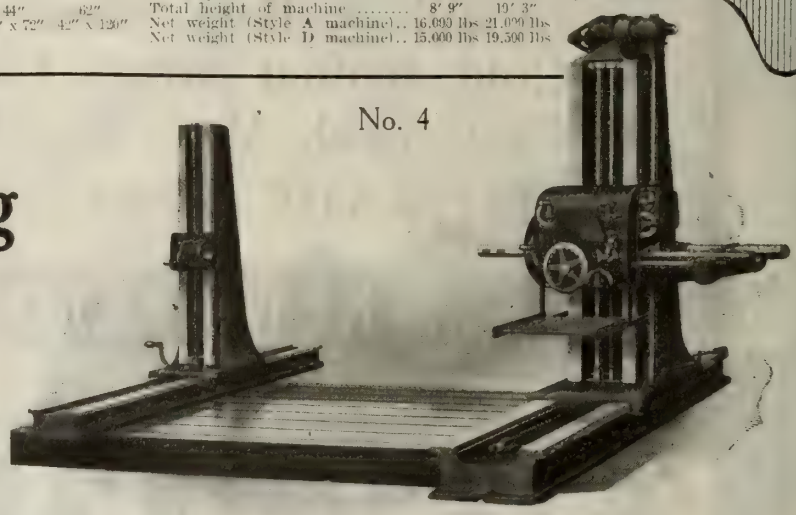


Size of Machine	No. 1	No. 1½
Diameter of spindle	3½"	4"
Morse taper No.	5	6
Traverse of spindle	28"	30'
Vertical adjustment of head	36"	54'
Horizontal adjustm't of column	36"	62"
Maximum, work bed to center of spindle (Style D)	44"	62"
Size of work bed	42" x 72"	42" x 120"

Size of Machine	No. 1	No. 1½
Speeds (4 to 255 R.P.M. geometrical progression)	12	12
Feeds, in all directions (.007 in. to ¼ in. per revolution)	8	8
Motor horse power	7½	10
Floor space	9' x 15'	11' x 19'
Total height of machine	8' 9"	19' 3"
Net weight (Style A machine)	16,000 lbs	21,000 lbs
Net weight (Style D machine)	15,000 lbs	19,500 lbs

HORIZONTAL

Boring, Drilling and Milling Machine



Built for accurate machinery of pieces whose shape and size make it impossible to handle them any other type of machine tool.

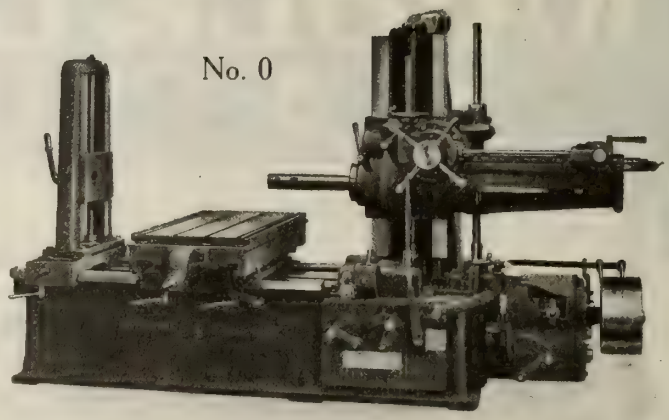
Designed with a view to adaptability, simplicity and ruggedness, accomplishing convenience and ease of operation and elimination of all vibration.

NO. "4" FOR BIG WORK

Diameter of spindle	5
Size of hole in spindle	No. 6 Morse
Size of floor plate	8' x 12"
Floor space required	16' x 24' 6"
Weight	50,000 lbs.

NO. "0" FOR PRECISION WORK

Diameter of spindle bar	3⅛ in.
Spindle bored to fit Morse Taper No.	5
Longitudinal travel of spindle	26 in.
Vertical adjustment of head on column	25½ in.
Size of table	24 in. x 50 in.
Traverse travel of table	30 in.
Longitudinal travel of table	32 in.
Approximate net weight	9,500 lbs.



Drop us a line for detailed information and catalogue.

Giddings & Lewis Manufacturing Company, Fond Du Lac., Wis.

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High Speed STEEL HOISTS

The Right Solution for Your Lifting Problem

Wright Hoists will outlift and outlast any other block on the market.

Every load sustaining part is practically indestructible.

Constructed of steel and cast iron throughout.

Wright hoists raise loads quickly, easily and economically—they are the Hoists that NEVER FOUL, the hoists that will save money for your plant.

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CONSERVE POWER! There is too much power going to waste the world over. This fact has been noted by the British Government and sweeping reforms are contemplated in Great Britain.

Canada also wastes much power. A reform is necessary here, too. Babbitt bearings are being used too often where **Chapman Double Ball Bearings** should prevail. The adoption of Chapman Double Ball Bearings, wherever an axle or shafting needs support in the transmission of power, results in a saving of 75% of friction loss.

Now in use in over 2,000 Canadian factories. Fit any adjustable hanger. Adopted by Canadian and United States Governments.

Write for full story of their efficiency.

Chapman Double Ball Bearing Company of Canada, Ltd.

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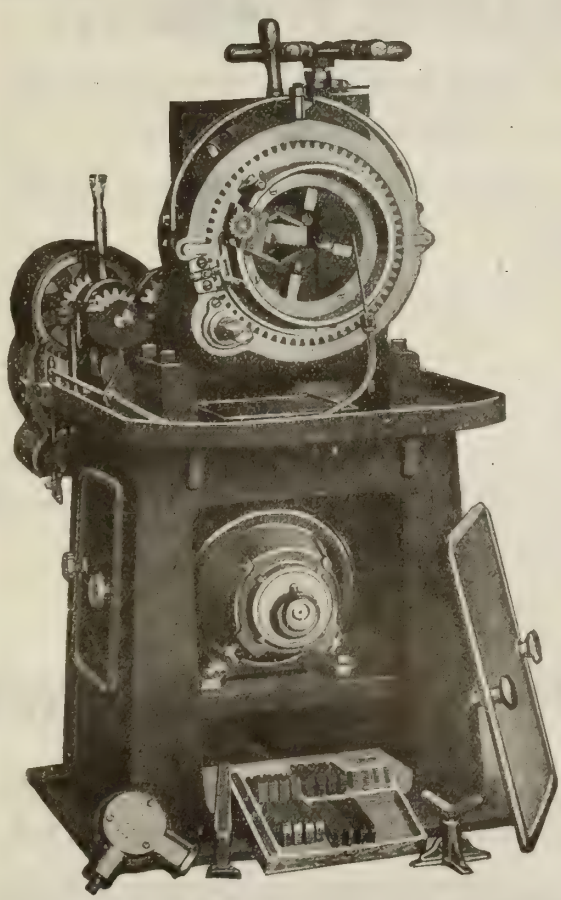
Transmission Ball Bearing Co., Inc., 1050 Military Road, Buffalo, N.Y.



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We make many styles and sizes of machines for cutting and threading pipe. They can be run by hand or power.

The Forbes can be carried to the job, saving time and expense of hauling pipe to and from your shop. The larger size "Forbes" will cut 15" pipe.

Get a copy of our catalog now and learn how a Forbes saves labor, time, increases production and profits.

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For Welding Cutting and Lighting

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IMPERIAL CARBIDE
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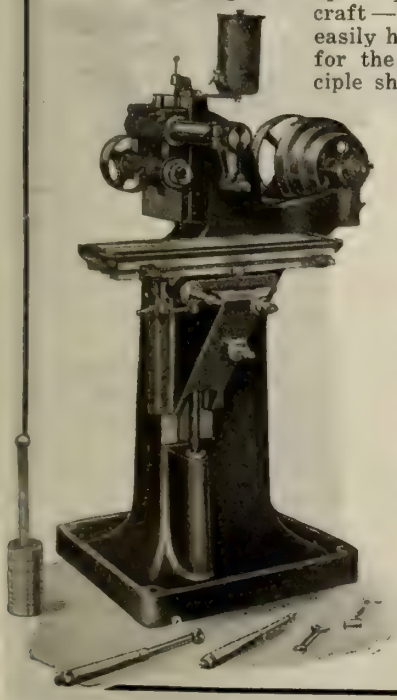
Large Stocks maintained at convenient distributing centres throughout Canada

Battleships steamed for the harbor when enemy submarines were about. That's where they belonged. The work of fighting the deep sea pests was left to smaller craft — they were quicker, more easily handled and more capable for the work. The same principle should apply in your shop practice.



U.S. MILLER

should be used for milling small parts. They too are quicker, more easily handled and more capable for this work than big tools. You can actually reduce your milling costs one-third to one-half on each part by the use of the U. S. Hand and Weight Miller. Finely built to combine speed, accuracy and durability.

United States Machine Tool Co.

CINCINNATI
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Put Your Shop on a Better Paying Basis

Why tie up expensive equipment on your shaping and slotting operations when the RHODES Improved Shaping and Slotting Machines will do the work quicker, cheaper and more efficiently?

The Rhodes cuts the costs of toolmaking, die-making, modeling and other classes of light work of this nature. Their capacity is greatly promoted by adjustments which are quickly and easily attached.

Rhodes shapers and slotters have won their way into the best shops of the world. Let us prove to you their ability to make good in your plant.

The Rhodes Mfg. Co.

Owned and Operated by the Jacobs Mfg. Co.
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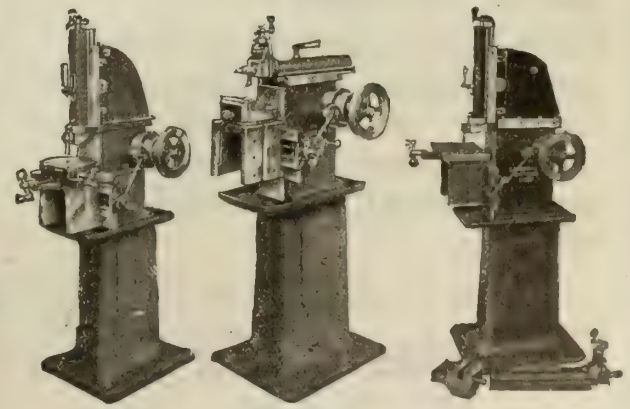

3 1-2 inch 7 inch Combination

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HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, when properly tightened, will not break away, or slip.

If you break it we will furnish a new one free of charge.

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Save Tap Breakage

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Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on ⅝-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.

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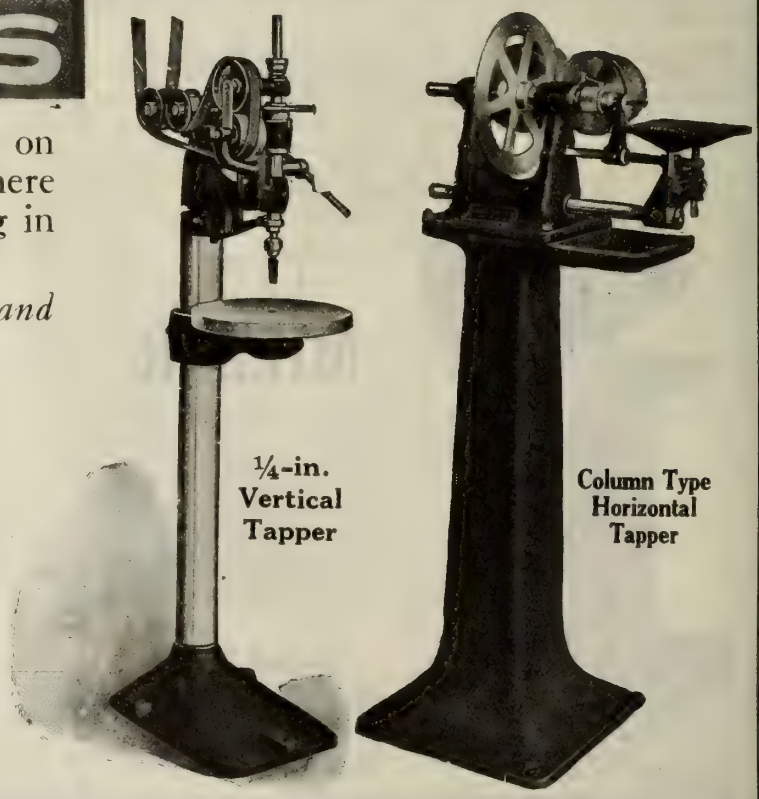

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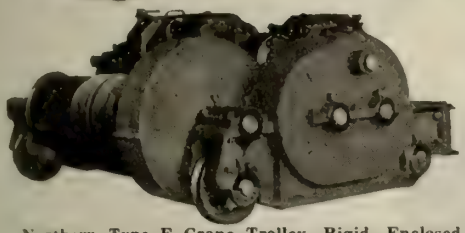
Electric and Hand Traveling Cranes

Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons



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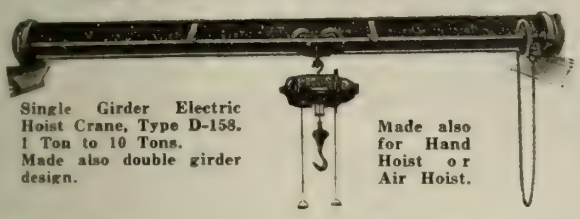
We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1½ ton to 100 tons.



Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.

Type D Electric Hoists —½ to 10 Tons.

Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

Northern Crane Works, Limited

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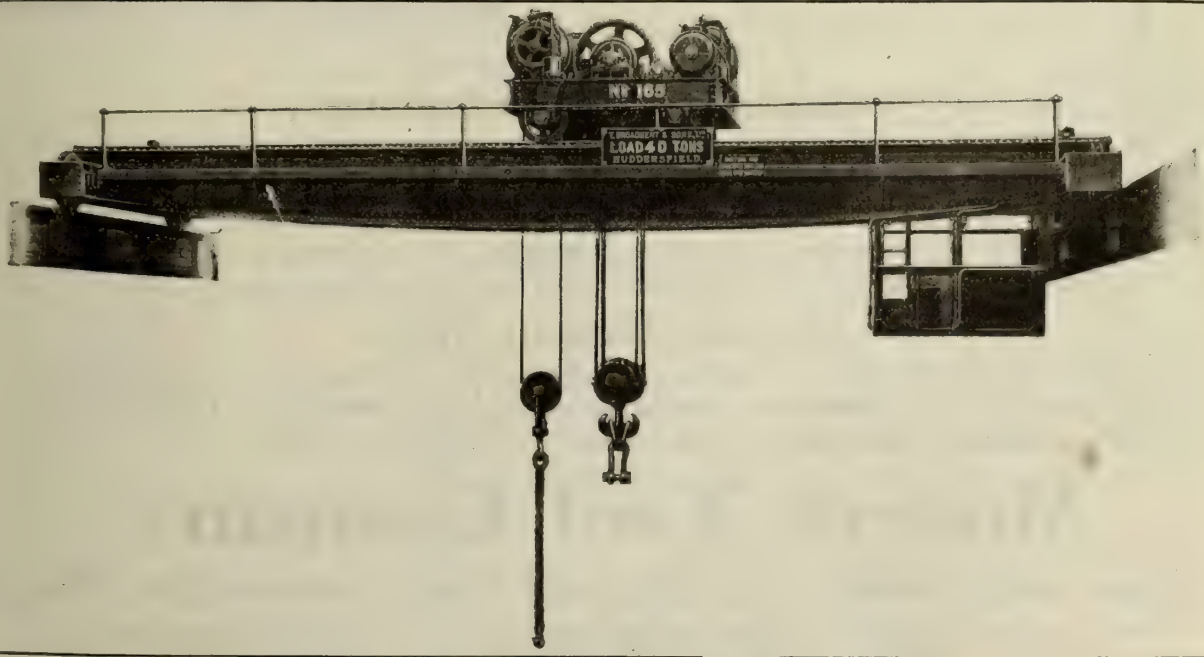

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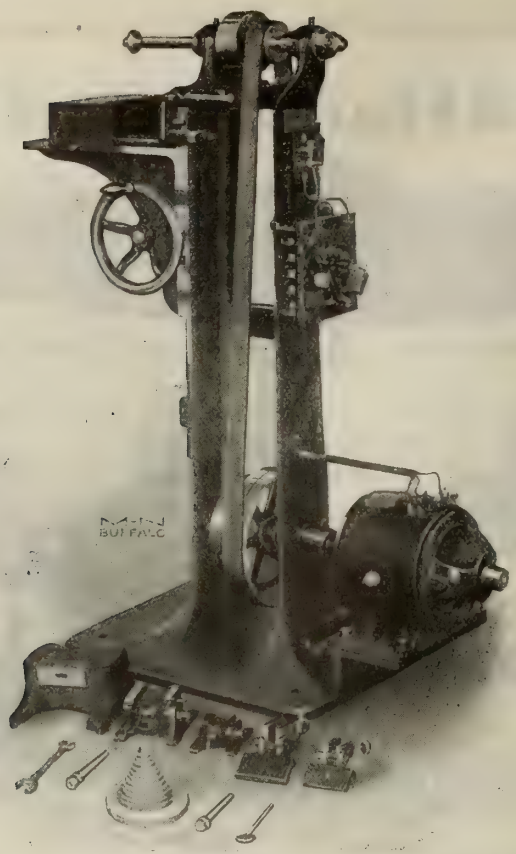

The "MODERN" Die Chaser Grinder

Let Your Die Troubles End Right Here

Why let Die Trouble stand between you and maximum production?
In the

Modern Die Chaser Grinder

you will have a machine that does away with die trouble—because its output is **marvellously eccentric.**

Made for belt drive or a complete motor-driven unit. Special attachments for grinding Spring Dies, Pipe Dies, Reamers, Taps, Hobs, Spiral and End Mills, Milling Cutters, etc.; can be furnished with the regular equipment.

For Fast Accurate Work

Bulletin C. G. will give you full details. We would also be pleased to send you full particulars re **"Modern" Self-Contained Grinding Machines.** Tools splendidly adapted to meet the present demand for large production.

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This Advertisement is one of a series based on actual occurrences.

"The Oakite Platers' Cleaner in that tank does it.

"The day the Oakite man got in here, we were cleaning steel automobile bumpers which were covered with emery and oil. We were about 300 behind and were only turning out about five or six an hour, because we had to brush them.

"The Oakite man made up three tanks with Oakite Platers' Cleaner and we caught up on our back work in *one day*—eliminated brushing—and we have never been a single piece behind since."

OAKITE MANUFACTURED BY OAKLEY CHEMICAL CO. 44 THAMES STREET · NEW YORK

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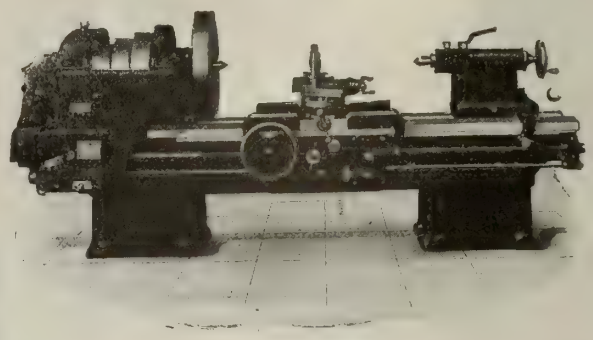
Sidney for Service

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohio

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

LANDIS

PRODUCTIVE MINUTES

Every minute is a productive one on a Landis Grinding Machine. All control levers are within easy reach of the operator.

The Automatic Sizing Device assures accurate duplicate work and permits the operator to prepare work while the machine is in operation.

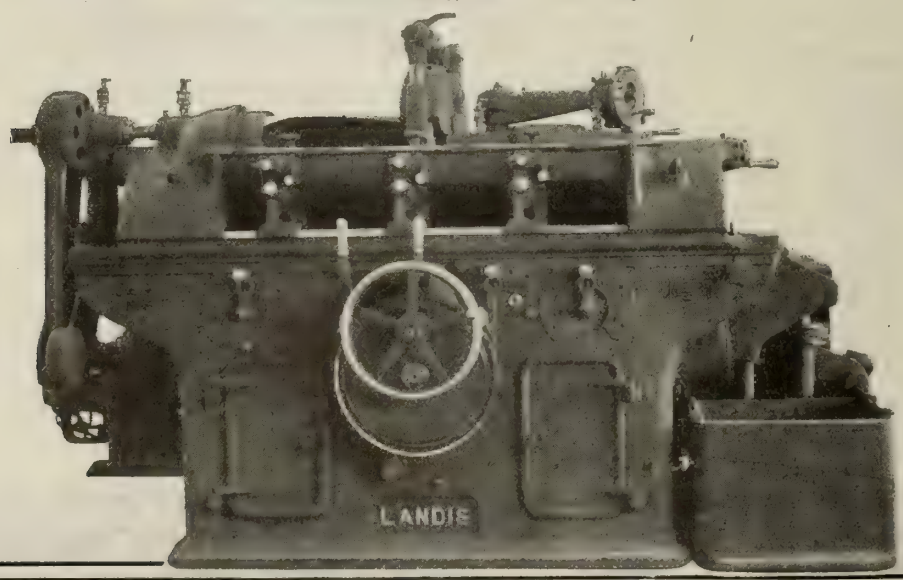
Independent work and traverse speed change levers, readily shifted during operation of machine.

The Landis is a superior manufacturing grinding machine for straight and taper work.

Catalog contains full details. Write.

LANDIS TOOL CO., WAYNESBORO, PENN.

50 Church Street, New York City



LANDIS—The Reconstruction Threading Tool

Threads will play a mighty big part in reconstruction here and abroad. Economy in producing these threads will be more important now than ever, and it is vitally necessary that the most efficient and most economical machines be employed.

Landis Die Heads and Machines will meet all demands, whether for quality, production or low threading cost. The chaser is fundamentally different in design from any other thread-cutting tool, and this design insures clean-cut, well-formed threads on iron, steel, brass, monel metal or any material.

Production is doubled due to the chaser having a strictly tangential disposition to the cutting edge, thereby eliminating all unnecessary friction.

Threading costs are reduced from 50 to 75% since the chaser is merely given a slight grinding at the cutting edge, when dull. The chaser has three inches of available cutting material, which permits of 90 to 120 grindings, and no annealing, hobbing or retempering is necessary.

Familiarize yourself with the other big features; they are worth knowing.

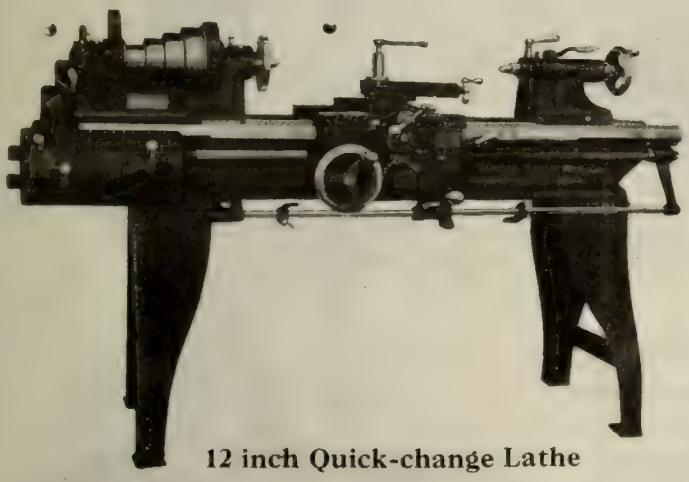
Ask for Catalogue No. 24

LANDIS MACHINE COMPANY

Waynesboro, Pa.

"STAR" LATHES

9"-11"-12"-13" Swing Sizes



12 inch Quick-change Lathe

Simply and strongly built, only the very best material and workmanship goes into them.

The Seneca Falls Mfg. Co., Inc.

366 W. Falls St. SENECA FALLS, N.Y.

Canadian Agents:

The A. R. Williams Machinery Co.

ST. JOHN, N.B. MONTREAL OTTAWA TORONTO WINNIPEG VANCOUVER

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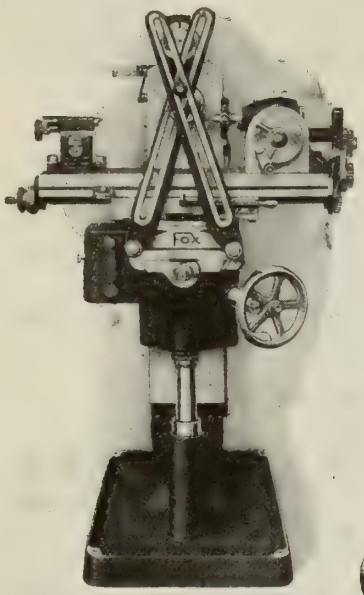
MILLING MACHINES

FOR

Rapid Production of Motor Parts

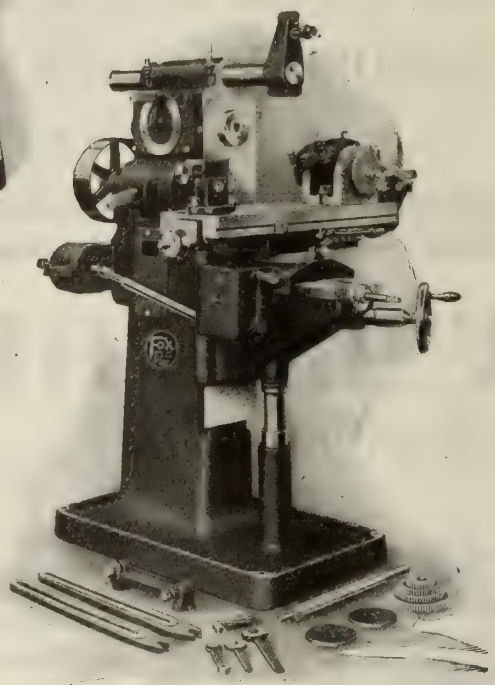


The **demand** for increased production **requires tools** of **great strength** and **durability**; the Fox 2-A Universal Milling Machine illustrated has met this demand, and is being used wherever extreme accuracy and quantity production are required.

The machine has a universal table, spiral cutting attachment, 10" Dividing Head with 6" Universal Chuck, making it a machine **especially adapted for Tool Room Work.**

The **United States Government** used this machine in its various **repair shops** for **Aeroplane Motors.**

You should be using this tool to help the production of parts necessary for reconstruction.



Specifications—No. 2-A Miller.

Spindle speeds 12
From 21 to 423 r.p.m.

Table feeds 6
From .317" to 2.79" per min.

Table .....8½ x 27"
Long. feed (power) 26".
Vertical feed (hand) 13".
Trans. feed (hand) 8½".

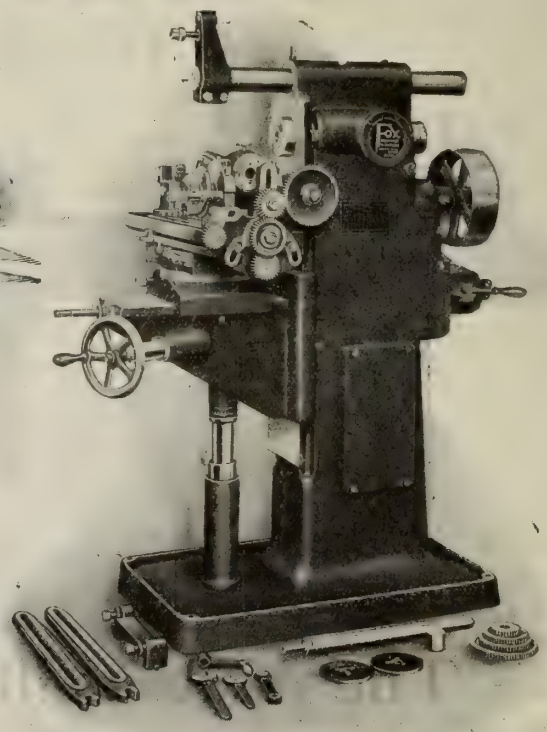
Drive...Single pulley 10 x 3" running 250 r.p.m.

Gears — Hardened steel.
Weight .....1,500 lbs.

We build this same machine with a plain table, omitting the spiral cutting attachment and Dividing Head.

Our No. 1 type machine has a four-step cone drive, and while being a lighter machine is a "bear" for work. This was proven by **the hundreds** of **them in** the **largest munitions plants.**

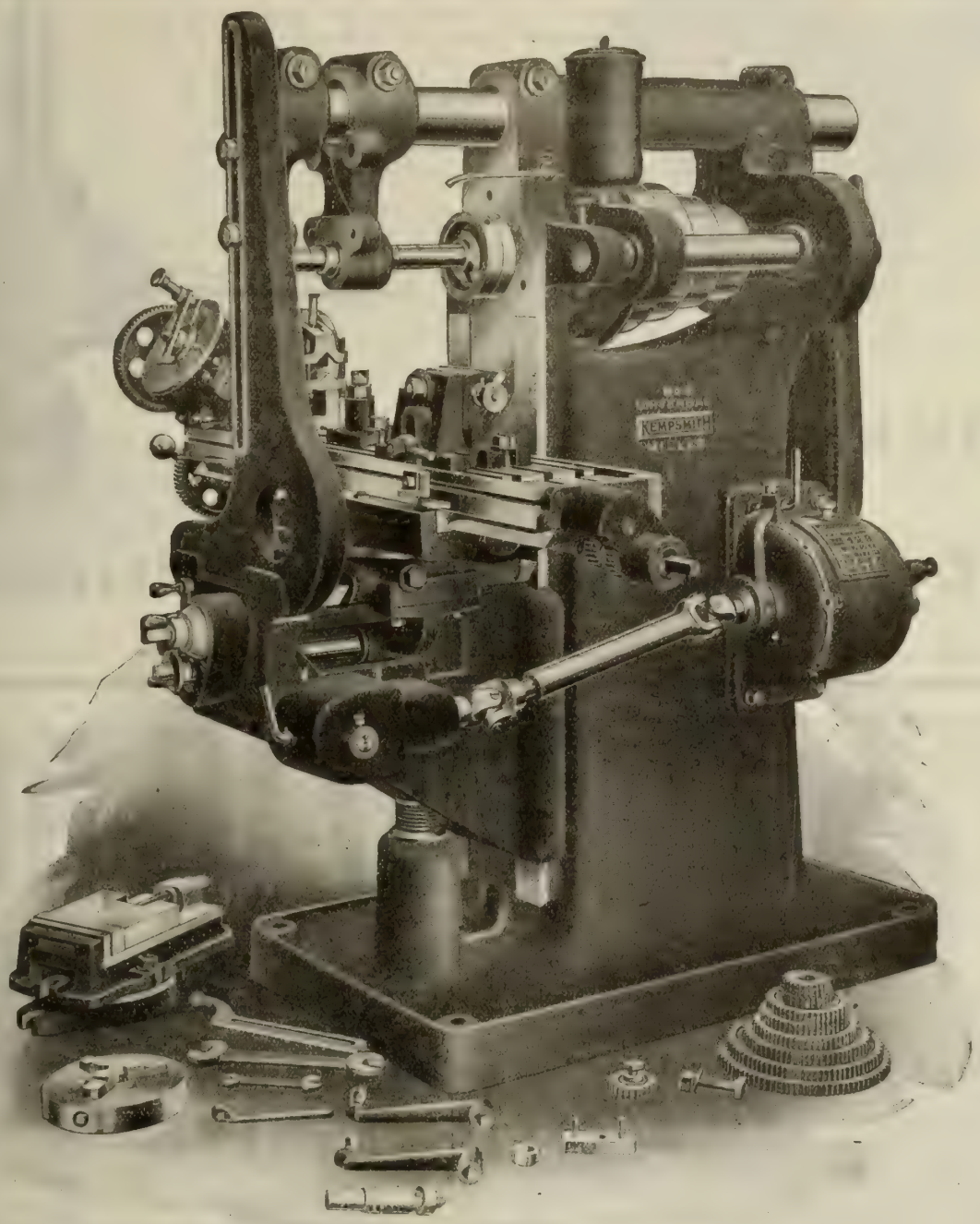
We also build the Fox Multiple Spindle Drilling Machines.



FOX MACHINE COMPANY
1047 W. Ganson St., Jackson, Michigan, U.S.A.

KEMPSMITH

MILLING MACHINES



KEMPSMITH No. 2 Universal Milling Machine

Equipment—Double friction countershaft, 10½ inch Universal Dividing Head complete with tailstock, centering rest, Hill patent dog and driver, two index dials, set of change gears for spiral milling and index charts for operating; 6 inch Universal Chuck, 1 inch arbor, two arbor supports, brace, No. 3 Swivel Vise, outside tool shelf and all necessary crank handles, wrenches and accessories as shown.

THE KEMPSMITH MANUFACTURING COMPANY

MILWAUKEE, WIS., U. S. A.

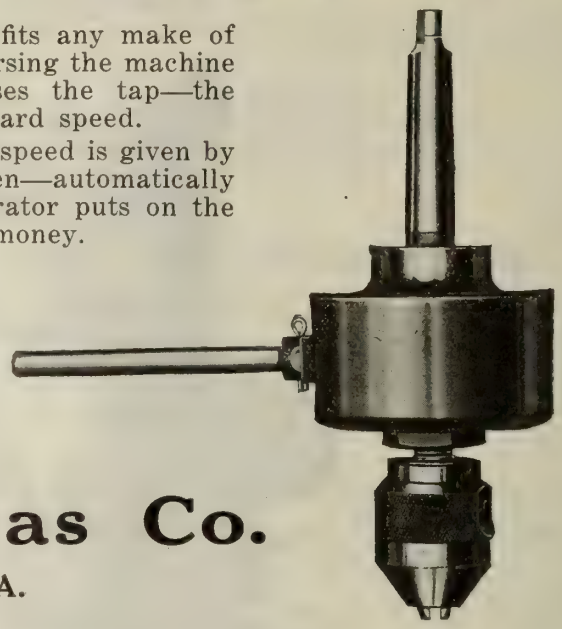
FOREIGN AGENTS: Barandiaran & Co., 3 Alameda, San Sebastian, Spain. Edgar Bloxham, 12 Rue du Delta, Paris, France. D. Drury & Co., 1-2 Central House, Main St., Johannesburg, S. Africa. Nielsen & Winther, Copenhagen, Denmark. Parke & Lacy Co., Ltd., 60 Clarence St., Sydney, N.S.W., Australia. Selson Engineering Co., 85 Queen Victoria St., London, E.C., England, and 19 Via Botero, Turin, Italy. Spliethoff Beeuwkes & Co., Leuvehaven, W.Z. 159, Rotterdam, Holland. American Trading Co., Tokio, Japan.

A Fitter Fit Is Impossible

The "B-T" Reverse Tapping Attachment fits any make of drill press. It eliminates the necessity of reversing the machine spindle. Simply raising the spindle reverses the tap—the machine, meanwhile, goes ahead at full forward speed.

A reverse speed twice that of the tapping speed is given by an internal gear drive. It is friction driven—automatically adjusted by the amount of pressure the operator puts on the drill spindle. It saves taps, trouble, time and money.

Can also be had with positive drive. Both plain and friction chucks are fitted with jaws to grip round and square end of tap.

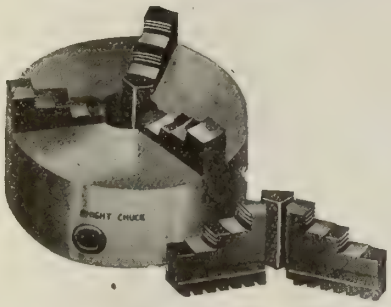


Get the details—In our Bulletin Write to-day.

Bicknell Thomas Co.

Greenfield Mass., U.S.A.

"B-T" Reverse Tapping Attachment



Scroll Chucks

Three-Jaw Universal Geared

The best material obtainable is used in the manufacture of KNIGHT Chucks.

First grade gray iron bodies and backs, steel scrolls, pinions, jaws and wrenches.

These chucks are thoroughly tested and inspected as to workmanship, position, synchronization and finish before leaving the factory.

Knight Metal Products

LIMITED

119 West Adelaide Street
Toronto, Ont., Canada

Cable: "Knightmetl"; Code, Western Union

VICTOR

COLLAPSIBLE TAPS

Do threading operations in actually less than half the time ordinary taps require, because Victor Collapsible Taps trip positively and operate extremely fast. They make smooth, clean threads because, when backing off, they never clog with chips and roughen or tear the thread. Sizes 1¼" to 12".

Send blue-prints for time estimate on shell work and other threading.

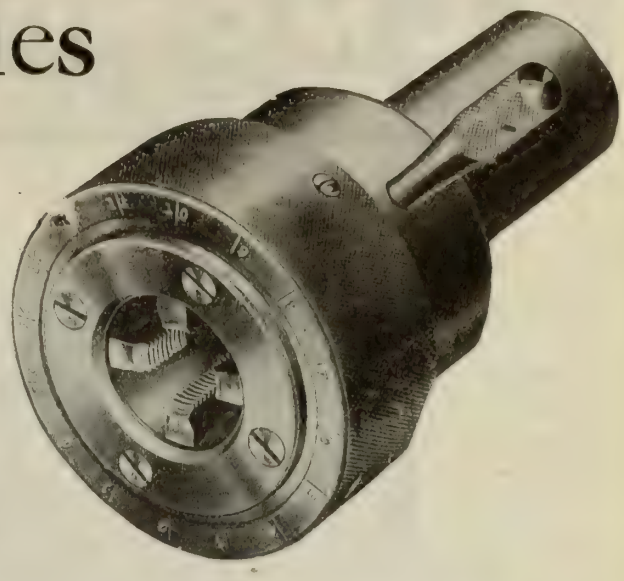
Victor Tool Company

Waynesboro, Pa., U.S.A.

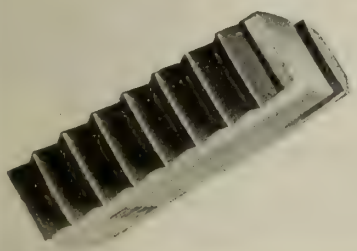
Quick Deliveries

ON

MURCHEY CHASERS



We make a specialty of quick deliveries to the users of our tools, and if you'll become one of our patrons you'll find at the end of a year's time that you have saved many hours' valuable time through the quick deliveries we make on Murchey Chasers.



This saving, coupled with the great economy that always accompanies the use of Murchey Automatic Self-opening Dies, Collapsing Taps and Hand Sizing Taps, is a saving worth while in these days of high production costs. Use them.

ENQUIRIES GLADLY ANSWERED

MURCHEY MACHINE & TOOL CO.

75 PORTER STREET, DETROIT, MICH.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England

Fenwick Freres & Co. - - 16 Rue Fenelon - - Paris, France

H & G

Die Head Cuts

Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

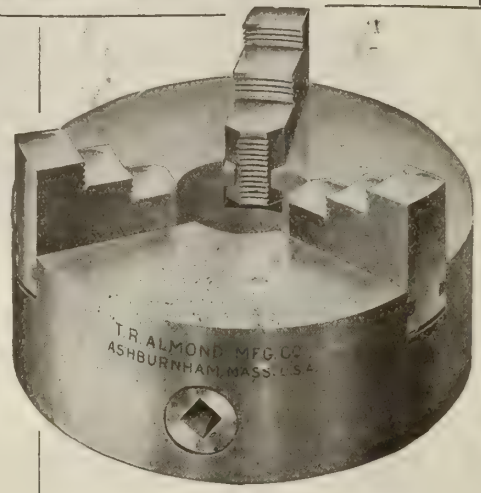
Ask for Catalog

Eastern Machine Screw Corp.

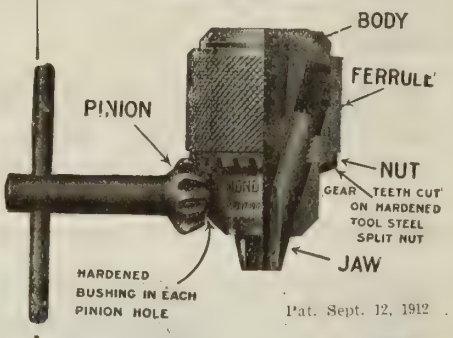
New Haven - Conn.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



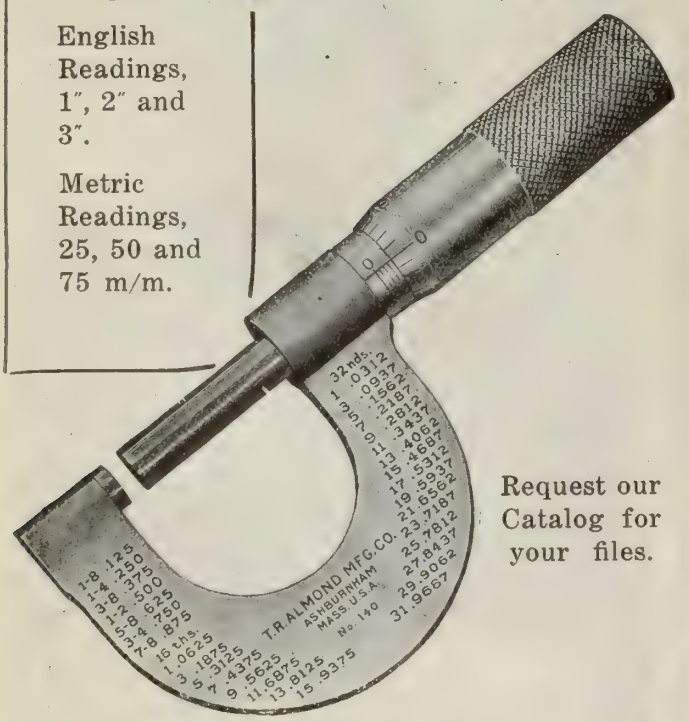
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.

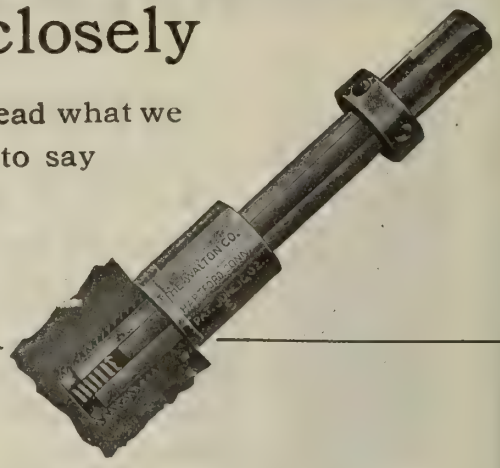


Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.

Look at this again —closely

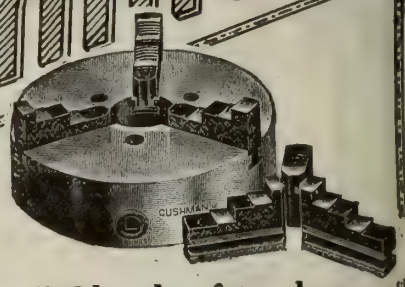
and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

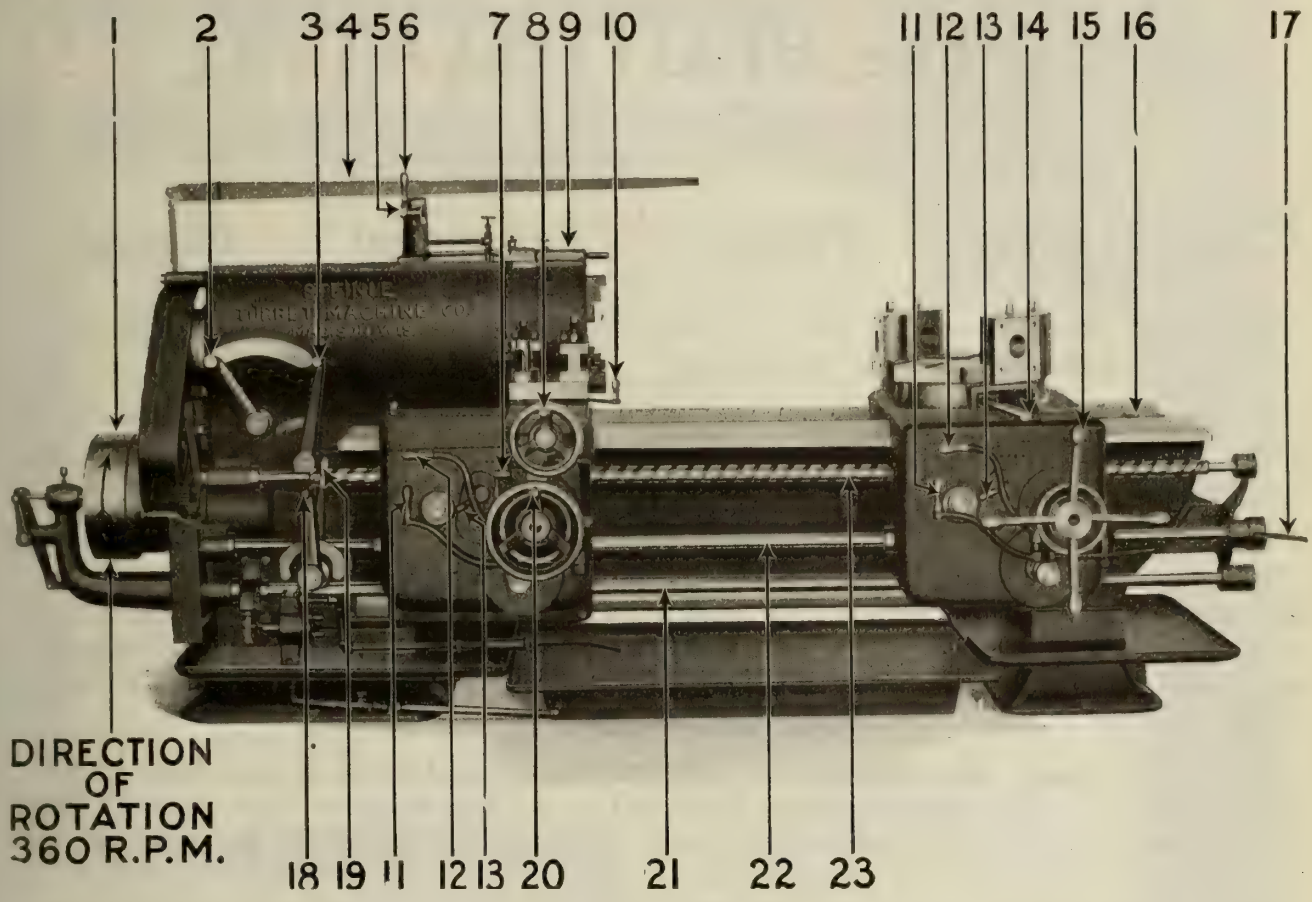
The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

CHUCKS

STEINLE



THE STEINLE 24" FULL SWING SIDE CARRIAGE TURRET LATHE

This machine has thirty reversible spindle speeds, a wide range of carriage and turret feeds independent as to rate and direction, a wide screw cutting range and independent power traverse for both carriages. All of these functions are controlled by conveniently located levers shown by numbers.

No. 1 Driving pulley 16" diameter for 5" belt. This one belt furnishes power for operating all functions of machine.

No. 2 Lever governing ratio of first train of gears.

No. 5 Lever for engaging back gearing.

No. 6 Lever for engaging triple gearing.

Nos. 18 and 19 Levers for manipulating change speed mechanism which, operating in connection with the three gear ratios and positive reverse motion, give thirty reversible spindle speeds.

No. 3 Lever for operating quick change gear feed box.

No. 8 Hand feed for cross slide on side carriage.

No. 7 Engages power cross feed of slide on side carriage.

No. 20 Hand travel of side carriage.

No. 10 Locking lever for turret tool block on side carriage cross slide.

No. 15 Hand travel of turret.

No. 14 Turret locking lever.

No. 16 Location stops for turret.

No. 12 Lever for operating independent quick change power longitudinal feed on both carriages.

No. 13 Feed reverse on both carriages.

No. 11 Lever for operating independent power traverse on both carriages.

No. 17 Knock out for power traverse of turret; similar provision is made for knocking out power traverse of side carriage at head end of machine, this mechanism being hidden from view.

No. 9 Removable oil guard over chuck.

No. 21 Power traverse shaft.

No. 22 Feed shaft.

No. 23 Lead screw.

There are sound mechanical reasons resulting from long turret lathe experience back of every point in the above design. Let us tell you about them.

STEINLE TURRET MACHINE COMPANY

MADISON, WISCONSIN, :: :: U.S.A.

COPYING by PHOTOGRAPHY

The PHOTOSTAT

(Trade Mark Registered)

The Photographic Copying Machine produces

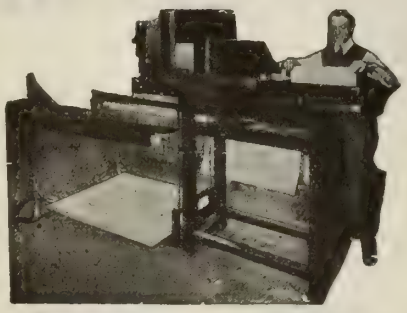
Clear Clean Perfect Permanent Facsimiles

Why spend time and money with old methods when the PHOTOSTAT does better work in a fraction of the time at less cost?

The Westinghouse Lamp Company say: "Photographic copying, as we discovered two years ago, is a wonderfully efficient process, not only for all sorts of work that formerly required detailed tracing, but for important documents where identical copies are needed, and in fact, wherever quick reproduction is necessary.

"Our analysis shows that where it formerly required a skilled draftsman approximately five to six days to trace from a blue print in order to make more blue prints, our photographic copying machine—the Photostat—can reproduce the same work in 15 minutes, and with absolute accuracy, as this device catches every item, whereas a draftsman is liable to omit a line.

"Reduction of large drawings to letter size or enlargement of small ones is an important advantage. The machine, as is indicated by the figures above, soon pays for itself in time and salary saved—but what is more important, is its ability to speed up our production."



This cut shows a PHOTOSTAT in operation

Copy Your Own

Pencil Drawings	Maps
Ink Drawings	Letters
Tracings	Telegrams
Reports	Documents
Shipping Lists	Data Sheets
Specifications	Contracts
Blue Prints	Records
Sketches	Graphs

Illustrations for Salesmen
Drawings for Advertising

Copies made direct upon paper.

and developed and fixed right in the machine itself. No expert knowledge required.

The PHOTOSTAT is manufactured by the Eastman Kodak Company exclusively for the

COMMERCIAL CAMERA COMPANY

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ARMCO IRON WELDING RODS

AMERICAN ARMCO INGOT IRON

The trade mark ARMCO carries the assurance that iron bearing that mark is manufactured by the American Rolling Mill Company with the skill, intelligence and fidelity associated with its products, and hence can be depended upon to possess in the highest degree the merit claimed for it.

THE old theory that successful welding necessitates a choice of one from many compositions of welding rods was based upon the assumption that welding rods should have exactly the same composition as the material to be welded.

Experience has shown this to be wrong. Seldom is it possible or practical to determine the exact composition of the material to be welded, and even if it were, the melting of the rod and metal in the presence of surface impurities, gases from the torch, etc., so alters the original filler composition that its *true* welding value is *not* the theoretical.

The chemists, metallurgists and research engineers of the American Rolling Mill Co., and the Page Steel and Wire Co., spent years of profound study and experiment in determining the exact conditions existing and the transformations taking place. Their results and actual commercial experience in welding have proven that one composition of rod *in two tempers*, one for oxy-acetylene and another for electric welding, meets every requirement.

The advantage of using Armco Iron Welding Rods of a single composition in two tempers—is obvious. A shop doing general welding work, instead of having to carry stocks of many compositions, can meet all requirements from a small stock of Armco Iron Rods that takes up small space and involves only a small investment.

Give Armco Iron Welding Rods at least a trial, and you will be pleased with the first cost, ease of manipulation and reliability of the finished work.

Ask for our book "Armco Welding Rods"

Steel mill ladles welded with Armco Iron Welding Rods

PAGE STEEL & WIRE CO.

Established 1883 as Page Woven Wire Fence Co.

STEEL AND WIRE PAGE QUALITY PRODUCTS

Makers of "Copperweld" Copper Clad Steel Wire; ARMCO Iron Welding Rods and Electrical Wire; Wire Mill Products, Plain and Galvanized; Wire of Special Analysis; Wire Fencing for all Purposes; Factory Gates; Ornamental Iron Fence; Machine Guards; Tool and Stockroom Partitions; Architectural Iron.

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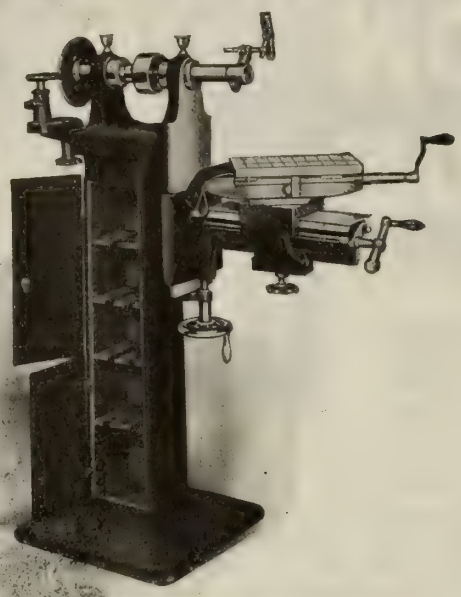
OBTAIN THE BEST RESULTS



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL

CUTTER AND SURFACE GRINDERS

Simple Light Running Accurate

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriege is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

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MANUFACTURED BY

THE GARVIN MACHINE COMPANY

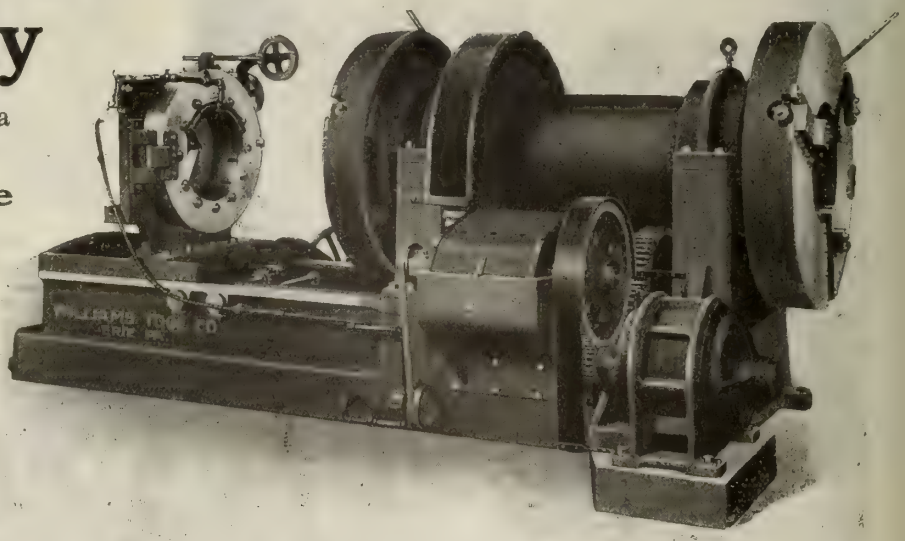
Spring and Varick Streets *(Visitors Welcome)* **50 Years New York City**

Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

Williams Pipe Machine

that's on the job.
For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.
It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.
The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



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Williams Tool Company

Erie - Penn. - U.S.A.

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The A. R. Williams Machinery Co., Ltd. Toronto Canada

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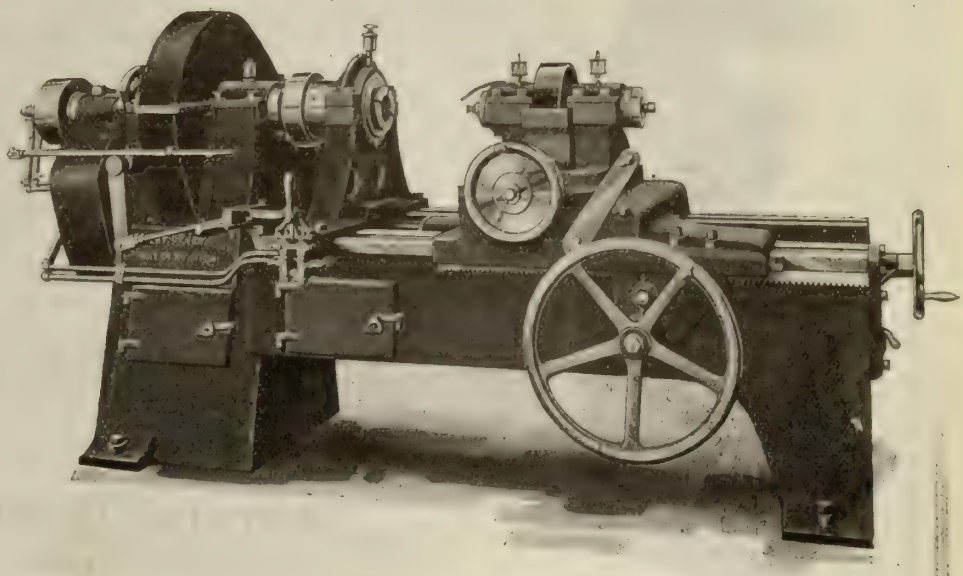
Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.



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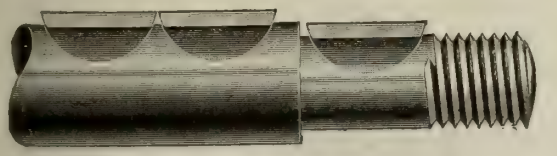
Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

"WHITNEY" MACHINE KEYS

For the

Woodruff System of Keying



If you are not already using the "Woodruff System" write us at once. Remember that the operations of cutting the Keyseats and inserting the Keys require no skilled labor. Used by all manufacturers to whom economy, rapidity, and interchangeability are essential.

Furnished in our Special Carbon Steel

Furnished in Nickel Steel Heat Treated

The Whitney Mfg. Co.
HARTFORD, CONN.

Chains Keys and Cutters Hand Milling Machines

Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

Cut Down Your Manufacturing Costs

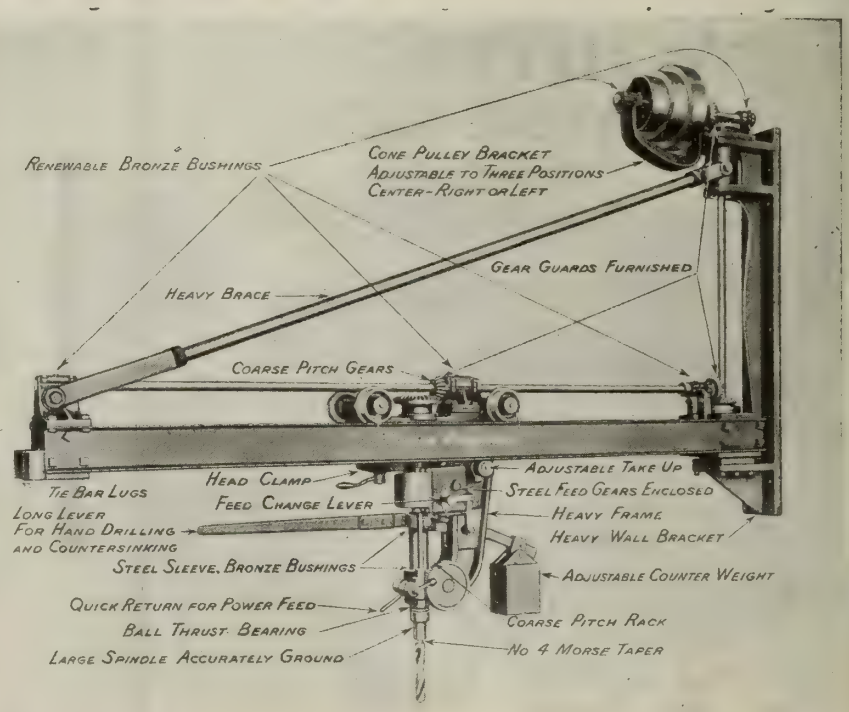
This Wall Radial Drill is especially designed for maximum production at minimum operating expense. In making additions to your equipment the necessity of having machines suitable for any job that may come along has doubtless been the biggest question in your minds. Here's a machine we believe will answer this question for your wall radial drilling needs.

Get our detailed bulletin covering the machine; you'll certainly be interested.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY
419-425 Atlantic Avenue BOSTON, MASS.

Quantity Production
— And Franklin Die-Cast Parts

The full development of Canadian manufacturing possibilities means quantity production.

But successful quantity production—with its many advantages—depends primarily upon low-unit costs. And low-unit costs can be achieved best, in many instances, by the substitution of die-castings for more expensive machined parts.

It is not alone because the Franklin Manufacturing Company pioneered the die-casting craft in America that we are recognized as the leading manufacturers of high-grade die-castings. Rather it is because our 27 years' experience has taught us how best to apply die-castings to industries of all kinds.

To Canadian manufacturers wishing bigger production and lower costs by the **correct substitution** of die-castings for machined parts, we offer the services of our expert engineers, metallurgists and designers.

Send samples or blue-prints to-day for recommendation and estimates on die-castings in aluminum, tin, zinc or lead base alloys. Booklet "C" containing interesting facts on die-castings will be sent upon request.

Franklin Manufacturing Co.

746 Gifford Street Syracuse, New York, U.S.A.

"CANADIAN"

ACCURATE work demands accurate and efficient tools.

The Canadian No. 5 has some features worth considering.

Eight speeds, three power feeds—also hand and lever feeds.

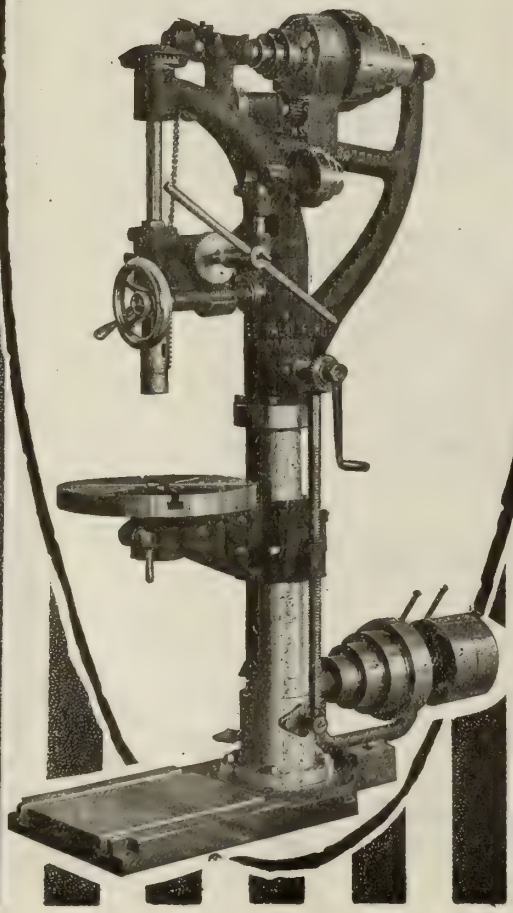
The twist of a knurled knob changes instantly plain drive to back geared drive—no tools to get lost or bother with.

An adjustable automatic trip throws out power feed when piece has been drilled to required depth.

Split adjustable bearings, ball bearing graduated spindle—but then there are so many features — for complete description write for literature.

Circular 1199-16 describes the whole Canadian Upright Series

Canadian Blower & Forge Co., Limited
Kitchener, Ontario



Can Ship at Once
Your Albany High Speed Tool Room Drill

It is ready for immediate use, and you can use it immediately, at any speed from 268 to 2140.

Starts and stops quickly: speed changes are made easily, and both the speed the drill is running and the speed it should run in different metals are shown on the machine; changes of drills or chucks are rapidly made; micrometer depth gauge, with both metric and English graduations, accurately controls depth of drilling.

This is really a wonderful machine of the highest grade construction throughout, and absolutely guaranteed in every way. It will be a pleasure to send full description; ask for it.

Albany Specialty Mfg. Company
Albany, Wisconsin

FOREIGN AGENTS: F. W. Horne & Co., Tokyo, Japan, China, Korea. R. L. Scrutton Co., Ltd., Sydney, Australia and New Zealand. Litton's Machine Tool Co., London, England. A. Berthoin, Grenoble, France. V. Lowner, Copenhagen, Denmark. Aktiebolaget, Rylander, Asplund, Stockholm, Sweden. Gillespie Bros. & Co., South Africa (New York City). Monti & Oscuro, Milan, Italy.

Wire Cloth
of every description

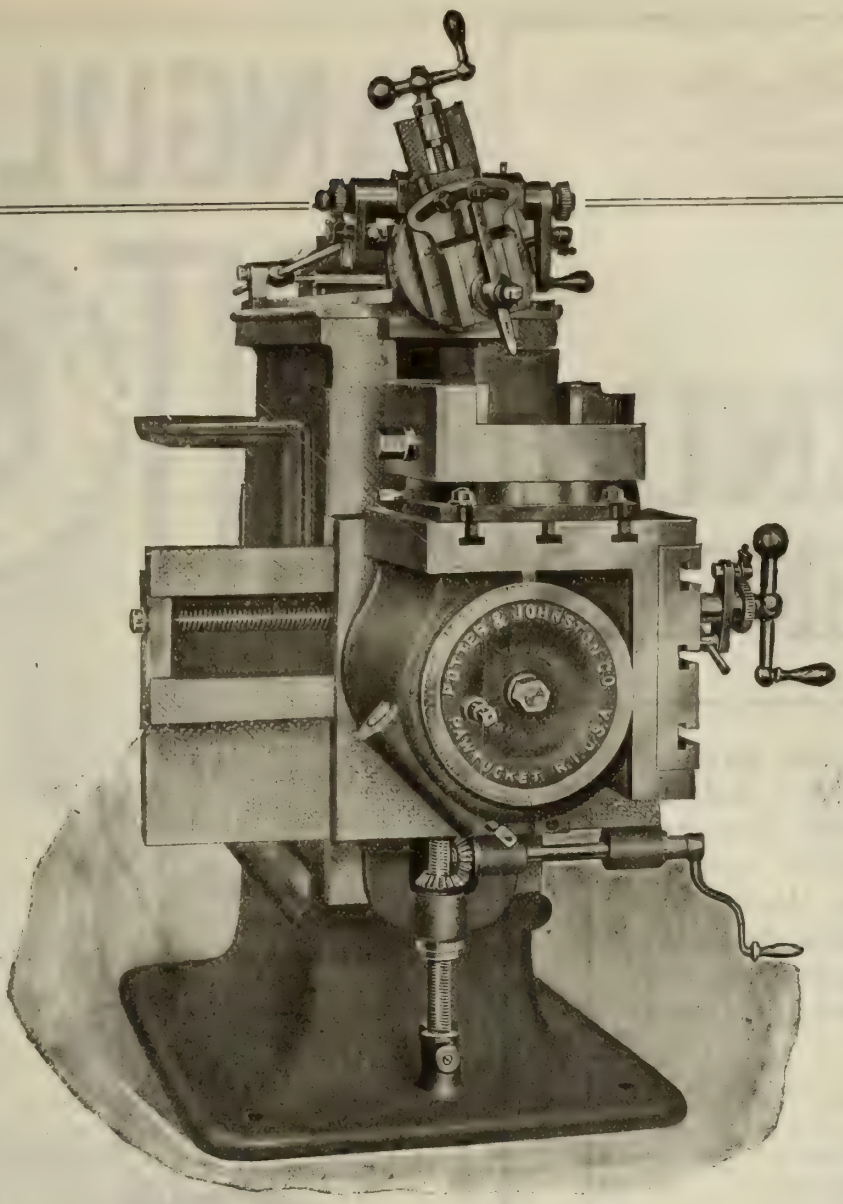
We make **Machinery Guards** of all kinds.

Metal Lockers for Clothes.

Steel Shelving for all purposes.

Drop a line for full details

Canada Wire & Iron Goods Company
Hamilton, Ontario
Eastern Representative:
H. E. O. Bull, 184 Mance St., Montreal, Que



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

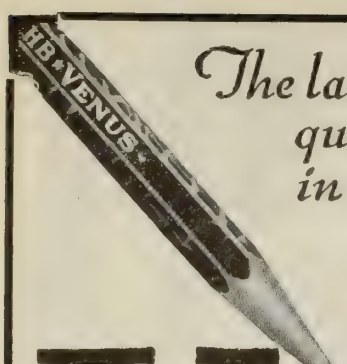
WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA



The largest selling quality pencil in the world

VENUS PENCILS

ENGINEERS and Architects buy VENUS pencils for themselves and for their staffs because the VENUS is always dependable in quality and grading. VENUS Pencil perfection means pencil accuracy, pencil efficiency and pencil economy.

17 black degrees and 3 copying

For bold heavy lines,
6B - 5B - 4B - 3B

For general writing and sketching, use
2B - B - HB - F - H

For clean fine lines,
2H - 3H - 4H - 5H - 6H

For delicate thin lines, maps, charts,
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Special 14c. Offer

Send 14 cents for three trial samples mentioning degrees. After you find how perfect VENUS Pencils are, buy them at any dealer.

American Lead Pencil Co.

238 Fifth Avenue, New York
and Clapton, London, England

ANGULAR GRIT

Saves Labor
Saves Time
Saves Costs

Quicker and Better

One ton of Angular Grit equal carloads of sand

ANGULAR GRIT offers you the most advanced and economical method of cleaning castings, etc. Its angular and irregular cutting points clean raw castings and forgings more thoroughly and with greater speed than either sand or shot.

ANGULAR GRIT dispenses with sand bins and sand dryers, and there is no dust nuisance where it is used.

If you are using sand, think of the labor you can save by adopting ANGULAR GRIT in its place.

Used for all kinds of cleaning operations—best materials for cleaning shells. Prove its superiority by giving it a trial.

Pittsburgh Crushed Steel Co.

Established 1888

Pittsburgh, Pa., U.S.A.

Canadian Representatives:
Williams and Wilson Ltd., Montreal, P.Q.

MORRIS OVERHEAD RUNWAYS

For Moving Materials Quickly and Economically

ARE YOU PLANNING TO MEET COMPETITION IN THE PRODUCTION OF YOUR GOODS

Then why not follow the example of hundreds of up-to-date concerns—speed up and economize in your material handling operations.

Let us send you our book C66, showing Morris methods for the efficient handling of your materials. Write our nearest office.

THE HERBERT MORRIS CRANE & HOIST COMPANY, LIMITED

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NIAGARA FALLS, ONTARIO

TORONTO OFFICE
KENT BUILDING

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Production of Rare Quality at Lowest Labor Costs

There is unusual strength, accuracy, speed, convenience and range in

AURORA

Drilling Machines

You can use them to great advantage on any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.
Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works

AURORA, INDIANA, U.S.A.

The BARNES DRILLS

TRADE MARK

Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

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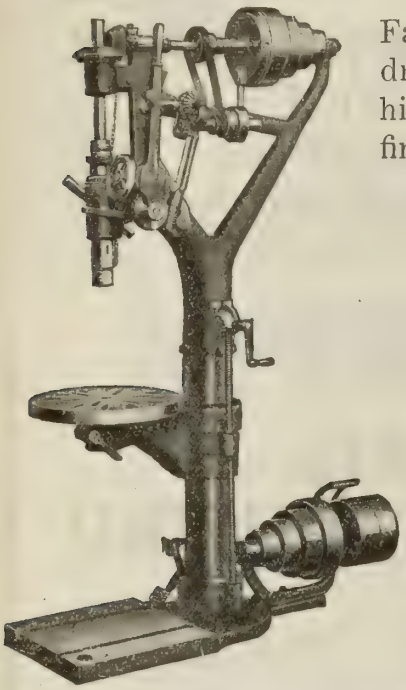
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

Silver's Drills

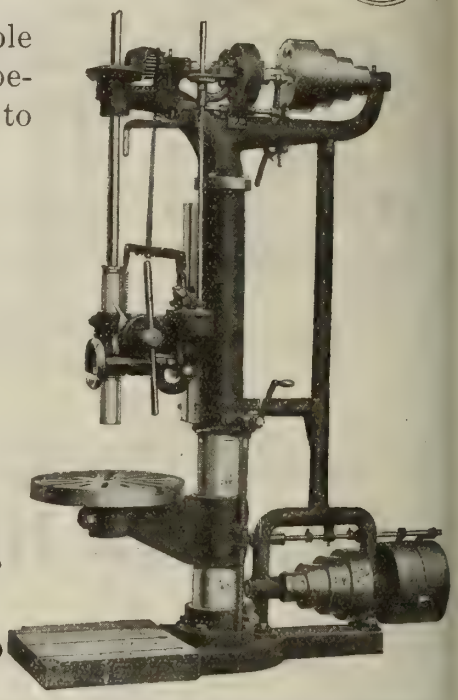


Fast, Strong, Accurate and Dependable drills with an experience of 65 years behind them—they can be depended on to finish the work and do it right.

The 20″ is made in four distinct styles with round or square base, and can be furnished singly or in gangs of 2, 3, or 4 spindles.

The 25″ has eight spindle speeds and six positive geared feeds.

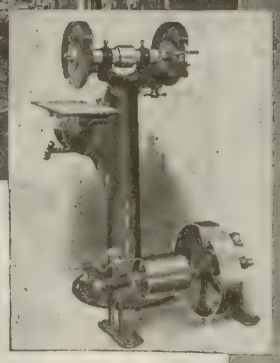
Send for full description and quotations



The Silver Mfg. Co.

290 Broadway

SALEM - - OHIO



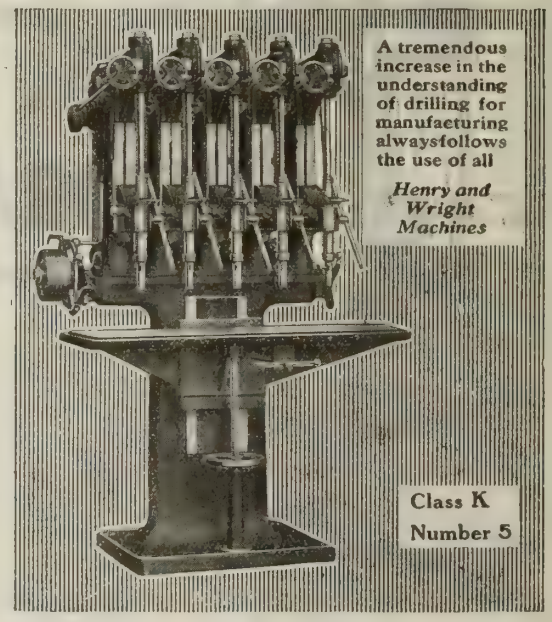
WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable, practical grinding outfit.

The Blake & Johnson Co., Waterbury, Conn.

HENRY & WRIGHT

Drilling Machines



A tremendous increase in the understanding of drilling for manufacturing always follows the use of all *Henry and Wright Machines*

Class K
Number 5

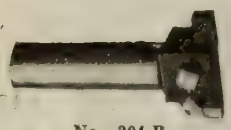
The Henry & Wright Mfg. Co.

Hartford, Conn.

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.

No. 203—Slide Tool

No. 204-A
Angle Cutter Holder



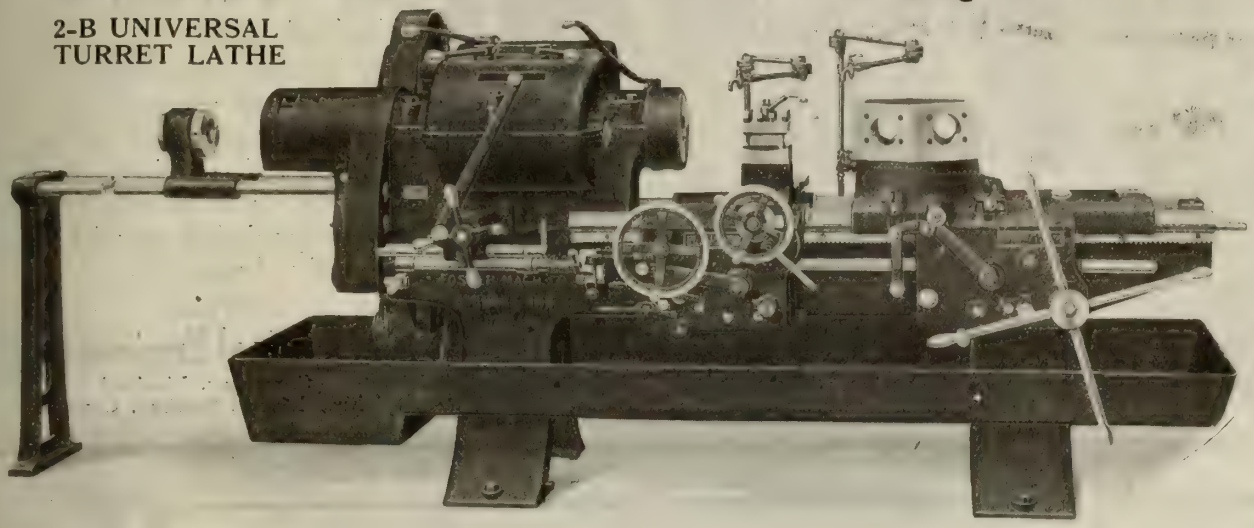
No. 204-B
Straight Cutter Holder

No. 204—Multiple Turning Head

No. 210—Rear Tool Holder

THE MACHINE WITH THE TOOL EQUIPMENT

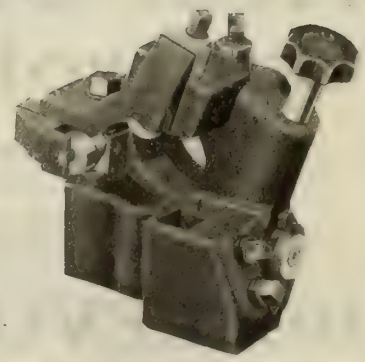
2-B UNIVERSAL TURRET LATHE



Push-Out Collet with Bushings

This is the equipment that you need to reduce your production cost to a minimum now that the war is over and the time of keen competition is here once more.

Don't delay. Investigate the merit and the tremendous capacity of production of the Foster 2-B Universal Turret Lathe. Send us blue prints of your work and give us an opportunity to show you what this machine can do.



No. 199—Single Cutter Turner

THE FOSTER LINE

No. 1-B UNIVERSAL TURRET LATHE
Bar Cap. 2" — Swing over Carriage, 14" over Cross Slide, 8"

No. 2-B UNIVERSAL TURRET LATHE
Bar Cap. 3¼" — Swing over Carriage, 20" over Cross Slide, 13½"

No. 0 PLAIN HEAD SCREW MACHINE
Bar Cap. 7/8" — 10" Swing

No. 1 PLAIN HEAD SCREW MACHINE
Bar Cap. 1⅛" — 11" Swing

No. 2 PLAIN AND FRICTION HEAD SCREW MACHINES
Bar Cap. 1 1/16" — 13" Swing

No. 3 PLAIN, FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1 3/16" — 14½" Swing

No. 4 FRICTION HEAD SCREW MACHINE
Bar Cap. 1 5/16" — 17¼" Swing

No. 5 FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1¼" — 17¼" Swing

Nos. 6, 7, 8, 9, 10 FRICTION HEAD SCREW MACHINES
Bar Cap. 2 1/16"; 2 5/16"; 2 7/16"; 2 13/16"; 3½" resp. — 20" Swing

No. 2 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1 1/16" — 14" Swing

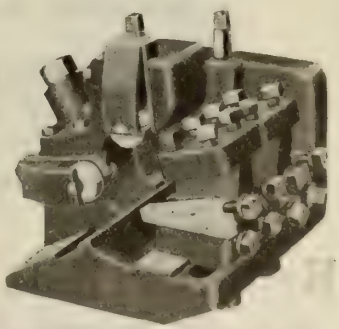
No. 2 FRICTION SET-OVER TURRET LATHE
Bar Cap. 1 1/16" — 14" Swing

No. 3 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1 5/16" — 16" Swing

No. 3 FRICTION HEAD SET-OVER TURRET LATHE
Bar Cap. 1 5/16" — 16" Swing

THREAD MILLERS
Manufactured under the Holden & Morgan Patents

Taper Attachment

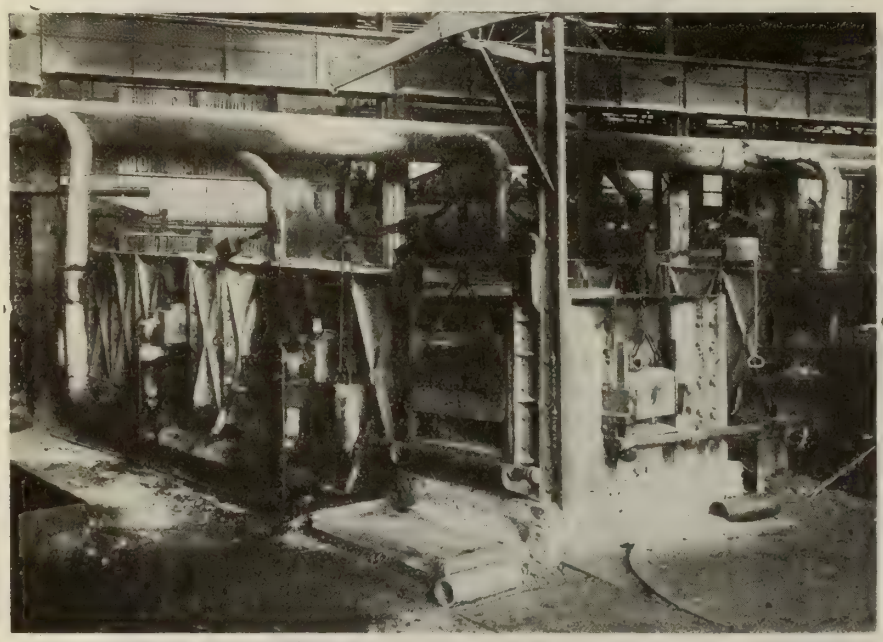


No. 200—Multiple Cutter Turner

FOSTER MACHINE COMPANY, ELKHART, IND., U.S.A.

Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering
Company, Limited
Three Rivers, Quebec, Canada

Heat Under Accurate Control

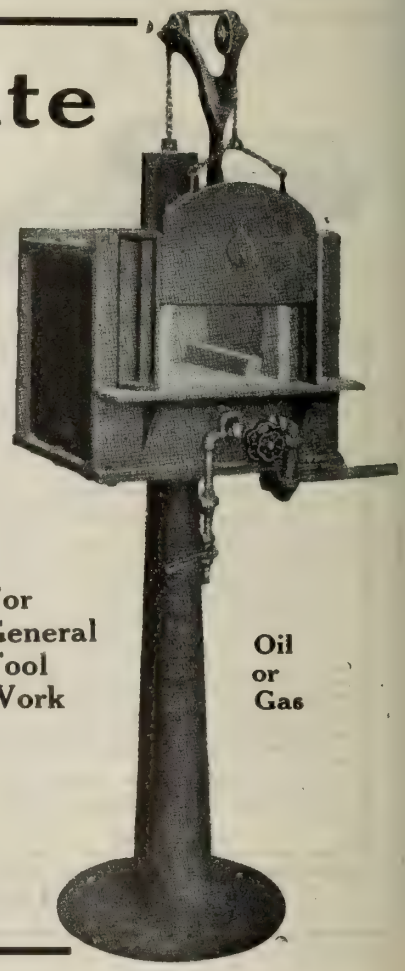
Here is an important factor in the heat treatment of metals. An intense heat, rapidly developed, and always under accurate control of the operator, are features that distinguish

BELLEVUE FURNACES

These tool forges are particularly adapted for the requirements of the small machine shop for annealing and tempering dies, cutters, reamers, etc.

Combustion is perfect and no flames come in contact with material. Built to stand the highest temperature. Doors are properly counter-balanced. In every way BELLEVUE FURNACES meet with the demand for durability, efficiency and convenience.

Let us advise you about your heat-treating problems.



For General Tool Work

Oil or Gas

Bellevue Industrial Furnace Company
Julius C. Hinz, President
703 Bellevue Ave. - Detroit, Mich.

Representatives in Canada : H. W. PETRIE, LIMITED, Toronto, Canada

The Newest of the "OTT" Line

and SOME PRODUCER too

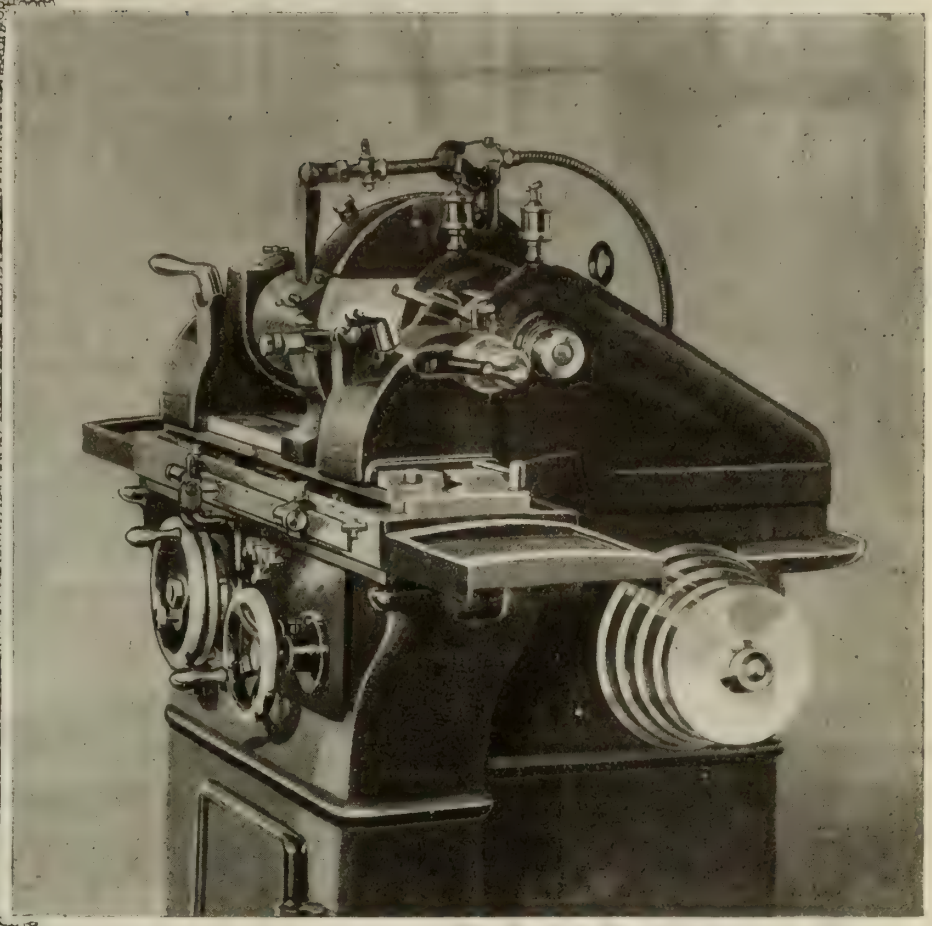


Illustration shows our 5" x 18" Plain Grinder.

It has automatic feeds, bearings of Non-Grain Metal, large self-feeding oilers and Hyatt roller bearings on the countershaft. It is especially adapted for the rapid and economical production of large quantities of small duplicate, straight or taper cylindrical parts requiring close limit grinding.

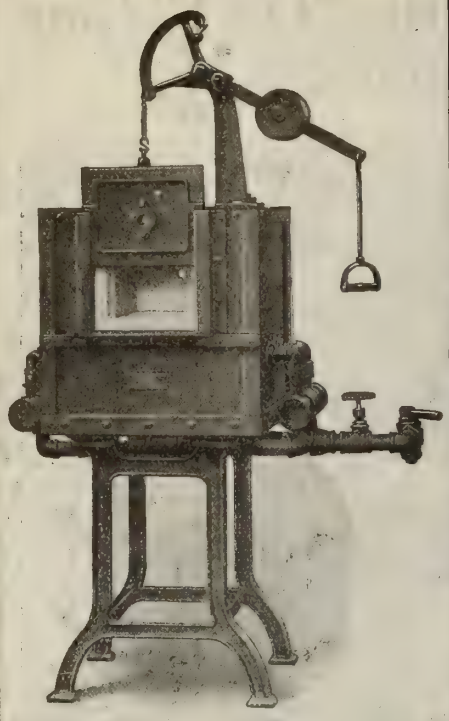
Fifty-seven varieties of work, more or less, from cast iron bushings to high-speed steel cutters, take their accurate finish from Ott Grinders; and the initial machine in any plant—no matter what it makes—invariably recommends others.

It occupies but 31" x 68" floor space. Its production capacity is worthy of larger and costlier machines.

Let Us Send the Full Description

Ott Grinder Company

INDIANAPOLIS, INDIANA, U.S.A.



TYPE K HIGH SPEED STEEL FURNACE

The Right Furnace for High Speed Steel

Too much—too little or an uneven heat treatment of High Speed Steel renders it practically worthless for the purpose intended.

This Gilbert & Barker furnace has been designed especially for the correct heat treatment of High Speed Steel. A temperature of 2400°F. is quickly obtained and **easily maintained.** The heat is uniform on all sides of the work and loss by radiation is reduced to the minimum by special insulation.

More than 50 years' experience in designing and building furnaces, especially for the accurate and economical heat treatment of metals is your guarantee of satisfaction.

PROMPT DELIVERY ON G. & B. FURNACES

Recent additions to our plant, already one of the largest in this field, makes it possible to offer immediate shipment of your order.

Tell us your problem and we will tell you the type of furnace you require, but first send for Bulletin 24. To-day is a better day than to-morrow--write.

Gilbert & Barker Mfg. Co.

West Springfield, Mass., U.S.A.

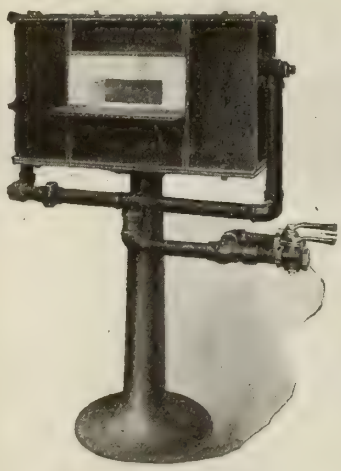
Canadian Agents: Williams & Wilson, Montreal, Que. New York Office, 26 Broadway.

GILBERT & BARKER MFG. CO. G&B SPRINGFIELD, MASS. U.S.A. EST. 1865

STANDARD FURNACES

OIL or GAS

Immediate delivery on all tool room types.



Oil Tempering Furnace

For

Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting

Furnaces built for special requirement

Toronto Office:

STANDARD FUEL ENGINEERING CO.

W. N. KIRK, Manager
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STANDARD FUEL ENGINEERING CO. DETROIT, MICH.

W. D. Anderson's Engineering Efficiency Service

Manufacturers often spend thousands of dollars on additional buildings and equipment in order to get greater output and profits long before their product reaches 80 per cent., or their profits 50 per cent. of what may be easily secured from the facilities they already have.

Are you satisfied with your output? We can and will increase your production.

Ring up Anderson's Efficiency Service

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380 Queen West Toronto, Canada

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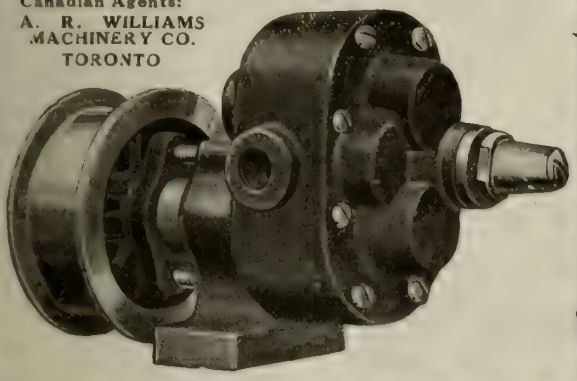
ROTARY GEARED PUMPS

Use the Individual Pump

Different classes of work require different compounds. By using the individual system, as many different compounds as desired may be used. This is a valuable feature. Trahern Rotary Geared Pumps. Would you like to try one? Write.

Trahern Pump Company, Rockford, Ill.

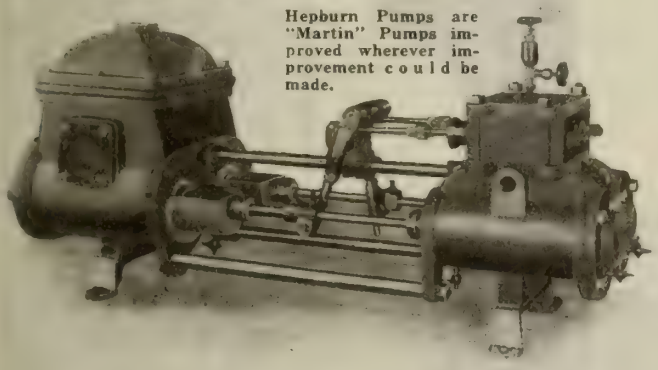
Canadian Agents:
A. R. WILLIAMS MACHINERY CO.
TORONTO



Hepburn Pumping Machinery

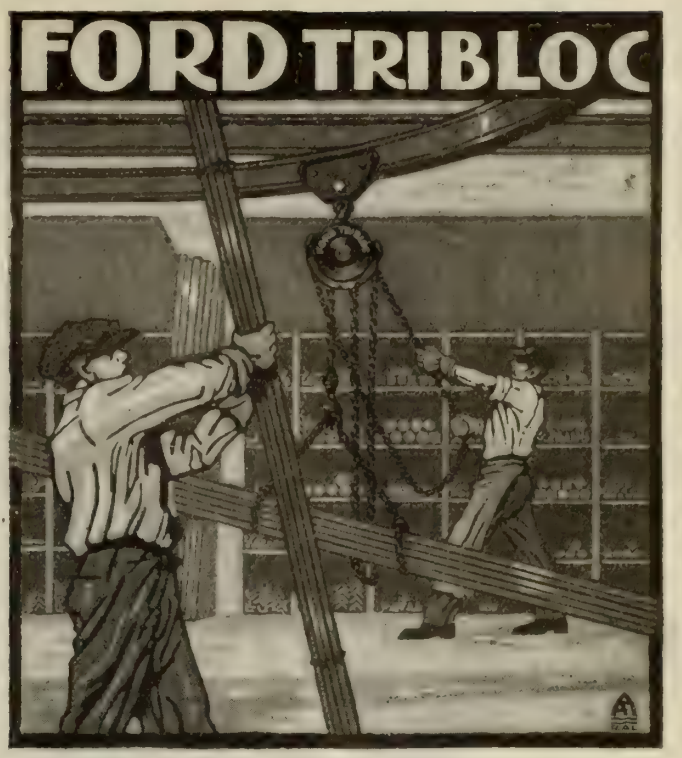
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED
18-60 Van Horne Street **Toronto, Ontario**

FORD TRIBLOC



A Ford Tribloc hand-chain hoist in the stock room hustles heavy pieces in and out with a speed that saves time all over the shop —turns 80% into 100% efficiency, and doesn't balk at a rush or overload.

For a Ford Tribloc is safe, no matter how fast it is operated. Its exclusive feature, the Loop Hand Chain Guide, keeps the chain on the wheel and prevents "gagging."

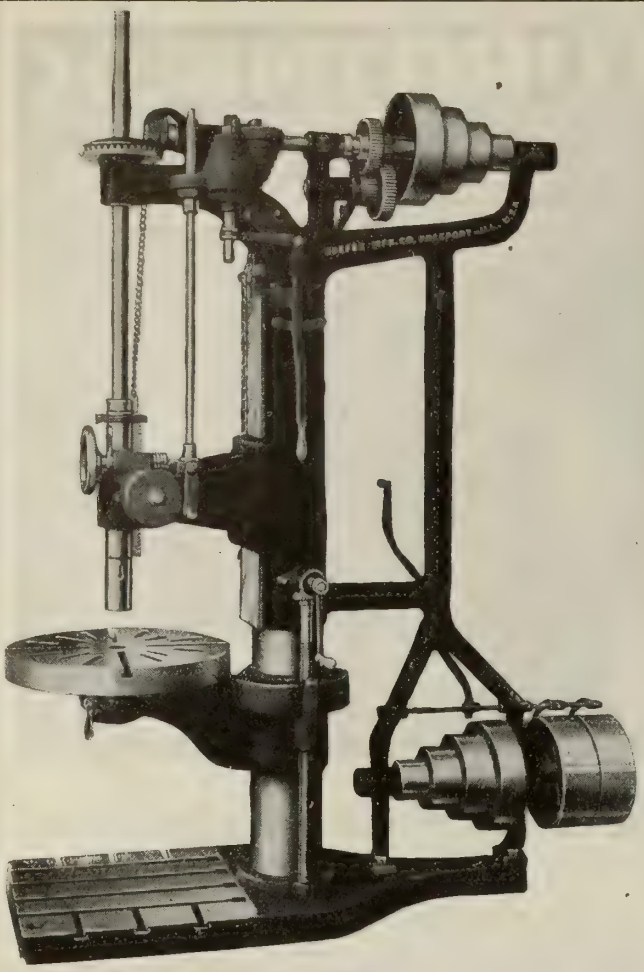
It will handle loads greater than its rated capacity, without danger of slip or break—the all-steel planetary gears are responsible for that.

Tribloc performance means much to us—that's why our five-year guarantee means much to you.

Ford Chain Block & Mfg. Co.

Second & Diamond Sts., Philadelphia, Pa.

OVER-SEAS REPRESENTATIVE
ALMACOA — ALLIED MACHINERY COMPANY OF AMERICA — ALMACOA
120 BROADWAY, NEW YORK, U.S.A.



HŒFER

for

PRECISION DRILLING

For over 25 years the name Hœfer has been associated with drilling equipment. Drillers have been our specialty.

Hence it is only natural that Hoefer Drillers should embody the latest word in design, efficiency and accuracy.

And they do. Regardless of the size of press, drilling to a fine degree of precision is always possible.

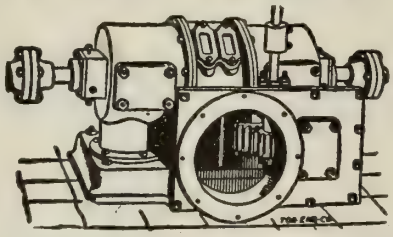
Hœfer Drillers are looked upon as a recognized standard—the standard by which satisfactory service can be measured.

Catalog showing complete line on request.

HOEFER MFG. CO.
FREEPORT - ILL.

DRILLERS

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO

Your Riveting?

How is it done? Are you getting the necessary speed? Is the quality of the highest character? How much is it costing you?

The Grant Rivet Machine has established the records of one clean, perfectly finished rivet per second. Is that speedy enough, or is it too speedy? This is the fastest any similar machine will work and if too speedy it could be worked in conjunction with some other work. Our catalogue is worth writing for. There is one for you.

THE GRANT Mfg. & Machine Company
Holland Ave.
BRIDGEPORT, CONN.

BRIGGS

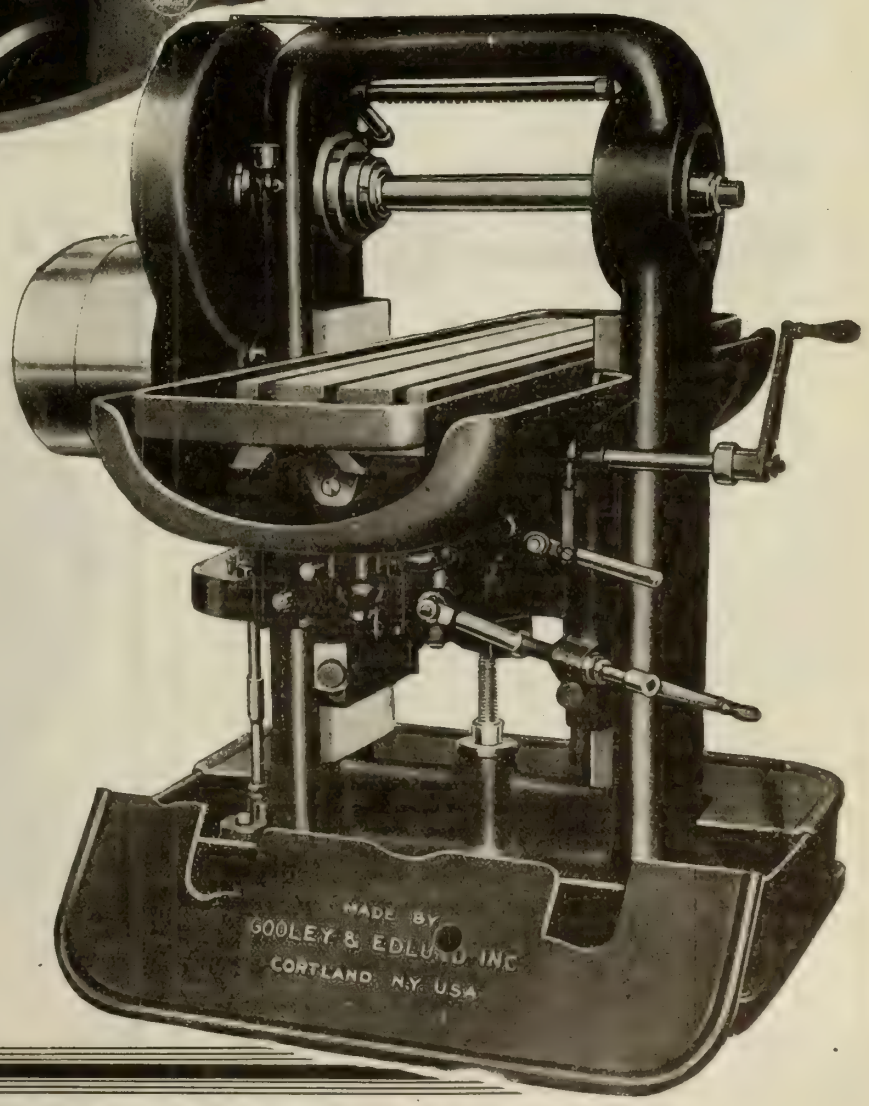
MILLER

Breaking Production Records

Forcing the feed on the "BRIGGS" to an extent impossible on any other machine.

THE photograph shows twelve belt lacer jaws clamped together on the table of a Briggs Milling Machine, where two straddle-mounted cutters mill the channels at one setting, though the stock is cold rolled steel, one inch thick. 15 minutes completes the operation, this speed being attained by forcing the feed to an extent impossible with any other milling machine. There is no chatter—the surface is "finished" when it comes from the machine.

Rigid, powerful and easy to operate. Takes wide, deep cuts without showing least sign of distress, and will produce accurate work when running at a high rate of speed.



Gooley & Edlund, Inc.

Cortland, N.Y., U.S.A.

Williams & Wilson, Ltd., Montreal

FOREIGN AGENTS:—Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia and Barcelona; C. W. Burton Griffiths & Co., London, Manchester and Glasgow; Andrews & George Co., Tokyo, Japan.

USE

THWING

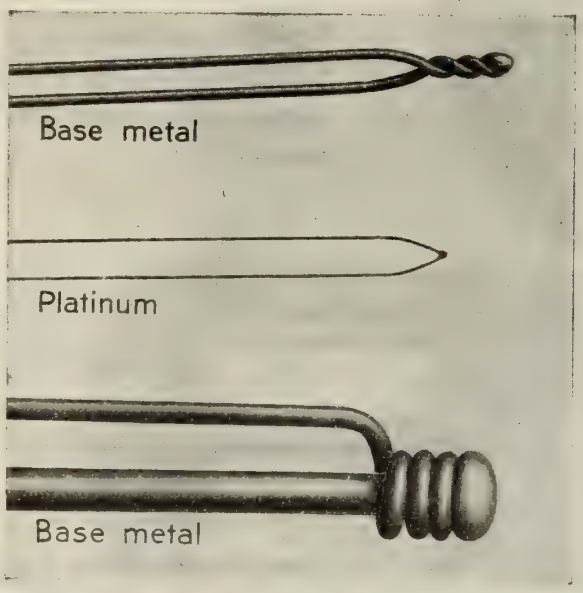
HIGH RESISTANCE MULTIPLE RECORD

PYROMETERS

with

Best Metal Thermocouples

Avoid the expense of platinum and at the same time secure greater mechanical strength and more constant electrical qualities.



The present excessive cost of platinum makes it more advantageous than ever to use Thwing Base-Metal Thermocouples for measuring temperatures below 1300° C. (2400° F.).

The above size comparison for equal duty indicates the far greater mechanical strength of base metal, which enables it to withstand very severe service and rough handling.

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In addition to **six** renewals of base-metal being cheaper than **one** of platinum, base-metal thermocouples also give good service with practically no maintenance attention.

The facts as to this greater economy and high efficiency of Thwing Base-Metal Couples are a matter of long-time record in many industries and we are prepared to demonstrate these advantages beyond question.

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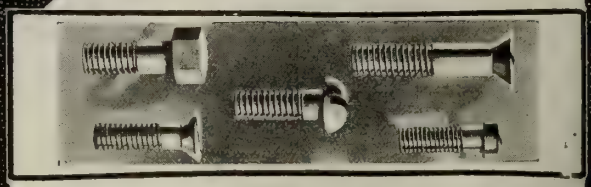

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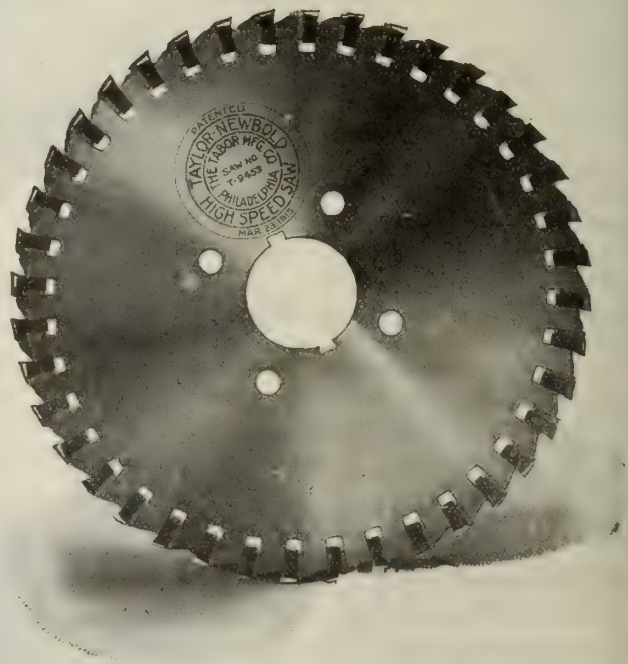

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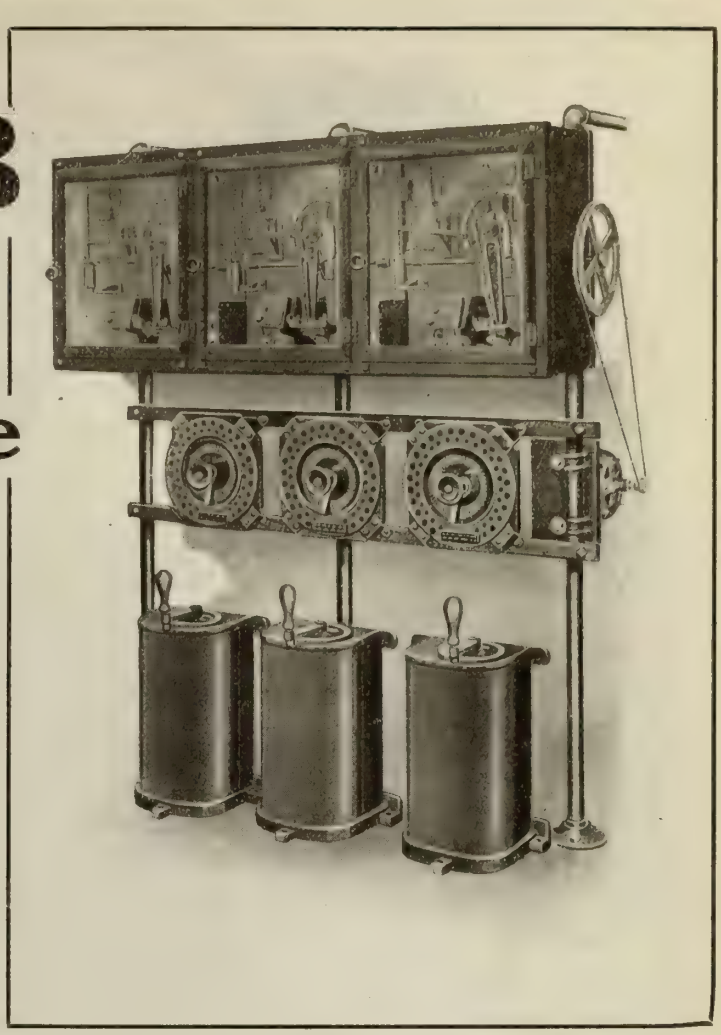

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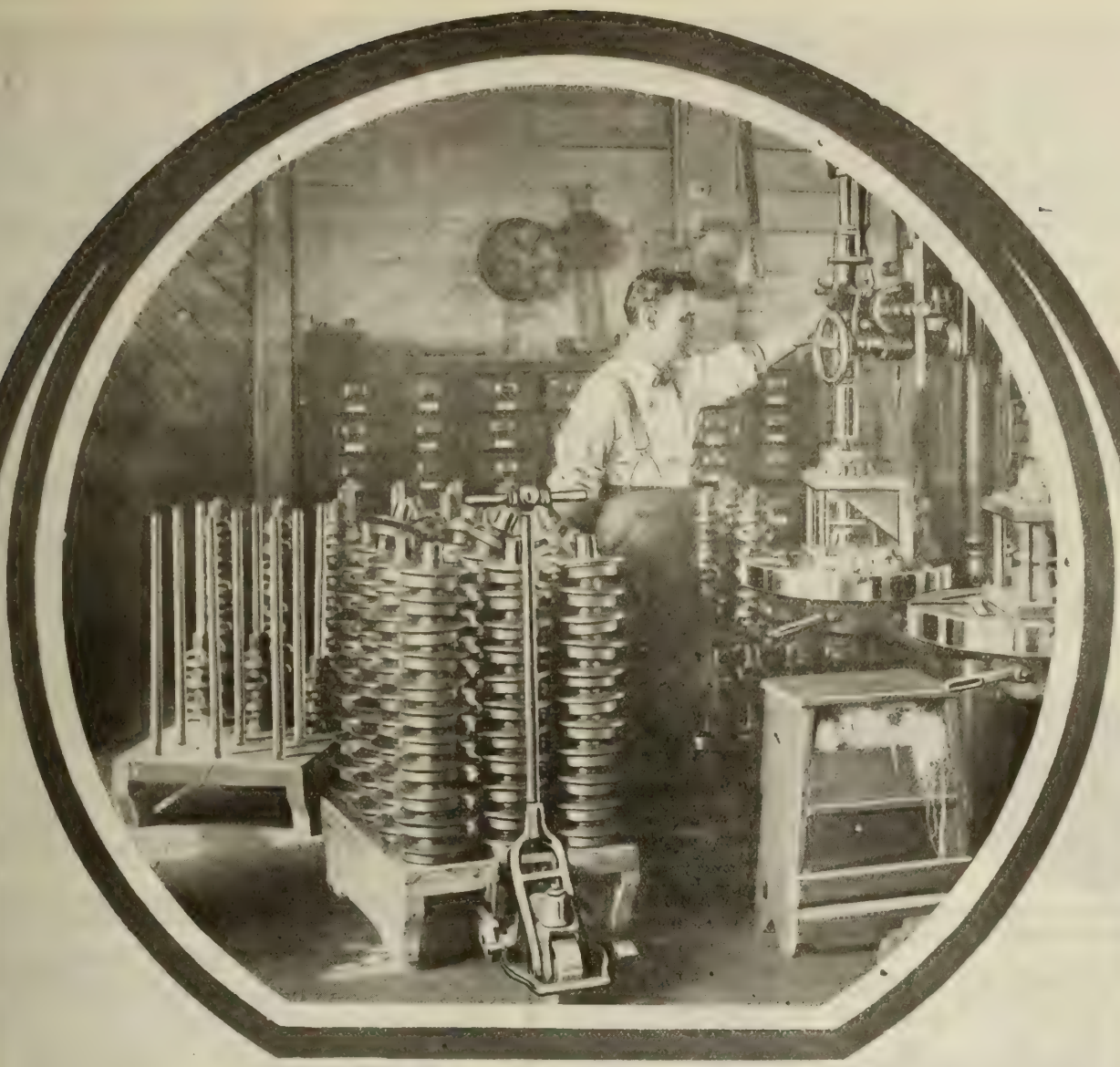

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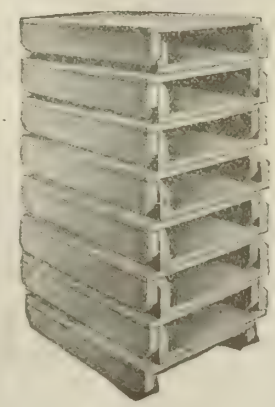

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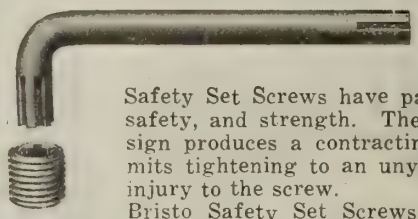

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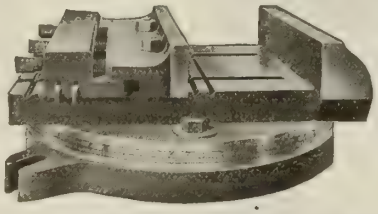

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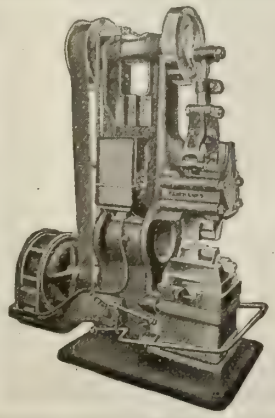

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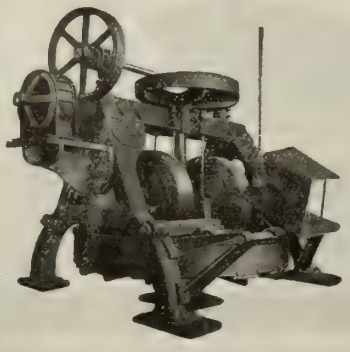

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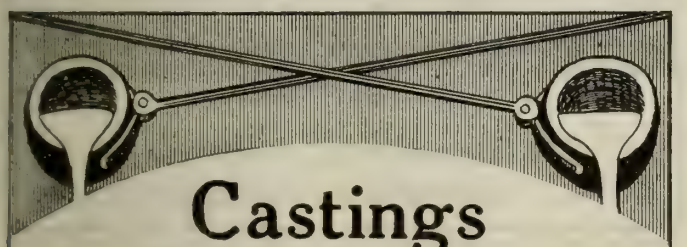

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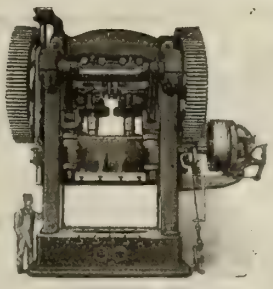

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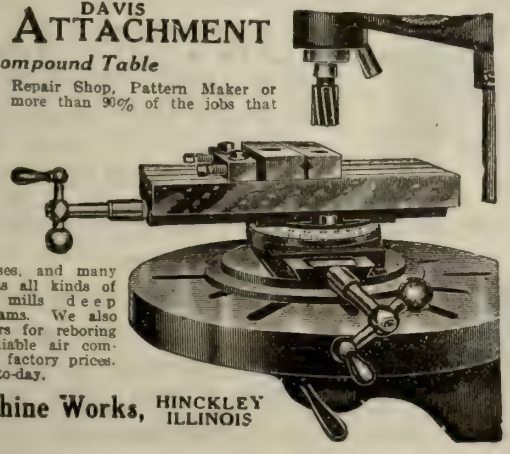

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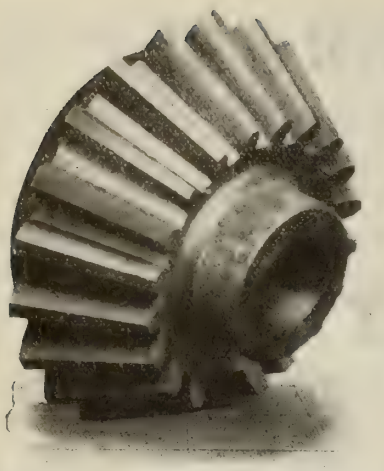

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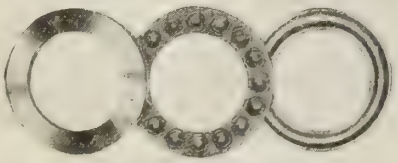

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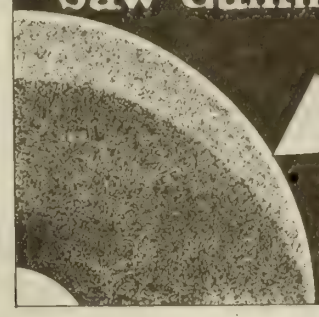

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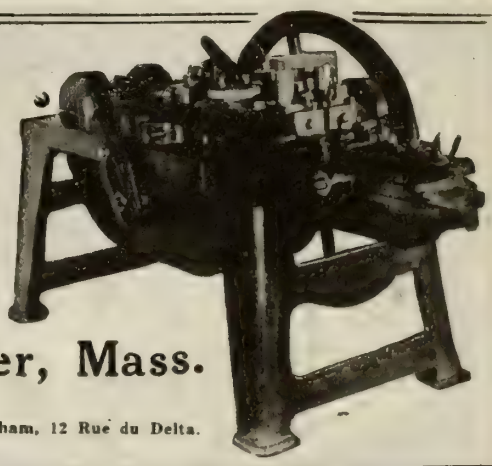

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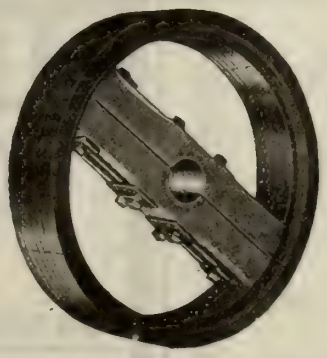

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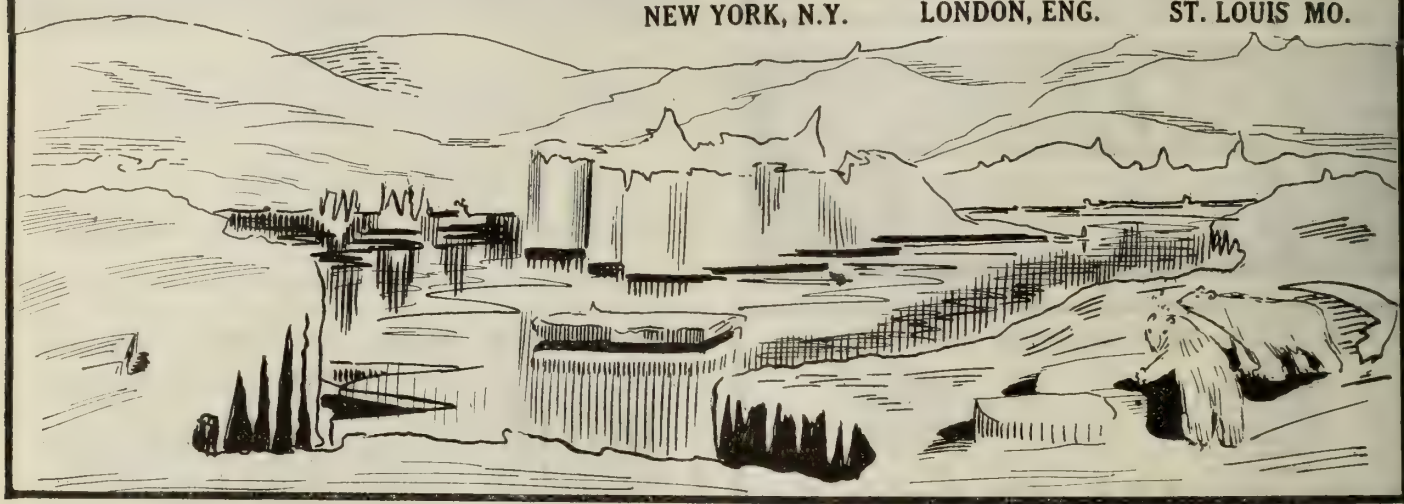

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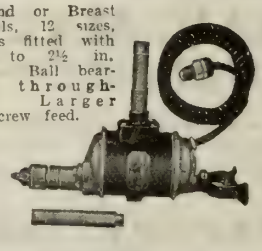

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ALUMINUM
Canada Metal Co., Toronto.
United Brass & Lead, Ltd., Toronto.
Tallman Brass & Metal Co., Hamilton.
Williams & Wilson, Limited, Montreal, Que.

ALLOY, STEEL
Armstrong, Whitworth, of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal Que.
Firth & Sons, Thos., Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hawkridge Bros. Co., Boston, Mass.
Standard Alloys Company Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ALTERNATING CURRENT, ELECTRIC WELDING EQUIPMENT
Arcwell Corporation of Can., Toronto, Ont.

ARBORS
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
J. C. Wilson & Co., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co. Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Co., Walkerville, Ont.
Sheldons Ltd., Galt, Ont.
Pangborn Corporation, Hagerstown, Md.

AUTOGENOUS WELDING AND CUTTING PLANTS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

AUTOMATIC MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Natonal Acme Co., Cleveland, O., and Windsor.
Pratt & Whitney Co., Dundas, Ont.
Rodofson Machine & Tool Co., Toronto, Can.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

AUTOMATIC METAL CUTTING-OFF MACHINES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.

BABBITT METAL
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto
Rochester Ball Bearing Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BALLS, STEEL
Boker & Co., Inc., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Katie Foundry, Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Williams & Wilson, Limited, Montreal, Que.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie, Ont.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Can. Consolidated Rubber Co., Ltd., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn
Williams & Wilson, Limited, Montreal, Que.

BELTING, CONVEYOR
Can. Consolidated Rubber Co., Ltd., Montreal.
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BELTING, FRICTION AND SURFACE
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal, Que
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, WOVEN
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENCH LEGS, STEEL
New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

BENDING ROLLS (PLUTE & AUGH)
Wickes Bros., Saginaw, Mich.

BENDING MACHINERY
Bertram & Sons Co., John, Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BLASTING MACHINES, SAND
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio
Williams & Wilson, Limited, Montreal, Que.

BILLET MARKERS
Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste. Marie, Ont.

BILLETS, FORGING
General Steel Co., Milwaukee, Wis.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BLOW PIPES AND REGULATORS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.

BLUE PRINTING MACHINERY
Commercial Camera Co., Province, R.I.
Mulliner-Edlund Tool Co., Syracuse, N.Y.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que.
Joyce, Koebel & Co., Inc., New York.

BOLT CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Riverside Machinery Depot, Detroit, Mich.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BOLTS, SPRING SHAKLE
Can. Winkley Co., Ltd., Windsor, Ont.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich.
Williams Machinery Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BOLT THREADING MACHINERY
Jardine & Co., Ltd., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto
Canadian Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Gisholt Machine Co., Madison, Wis.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland, Ohio.
New Britain Mach. Co., New Britain, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland, Ont.

BRASS AND COPPER BARS, RODS AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.
Tallman Brass & Metal Co., Hamilton, Ont.

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co. Inc., Toronto, Ont.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BRICKS, FIRE
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

BRIDGES, RAILWAY AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.

BRONZE, COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville, Ont.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananogue, Ont.

BUSHINGS, BRONZE
Oberdorfer Brass Co., M. L., Syracuse, N.Y.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CALKS, BOOT
Lufkin Rule Co. of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J
Brown, Boggs & Co. Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBONIZING BOXES
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal.

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CASTINGS, MACHINERY
Winnipeg Iron Foundry Co., Winnipeg.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER
Algoma Steel Corp., Sault Ste. Marie, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

CARRIERS
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Fittings, Ltd., Oshawa, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Walkerville, Can.

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
Fittings, Ltd., Oshawa, Ont.
International Malleable Iron Co. Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Burlmirt, Rogers Mach. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Itnaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A
Williams & Wilson, Limited, Montreal, Que.

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Williams & Wilson, Limited, Montreal, Que.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S

COKE AND COAL HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

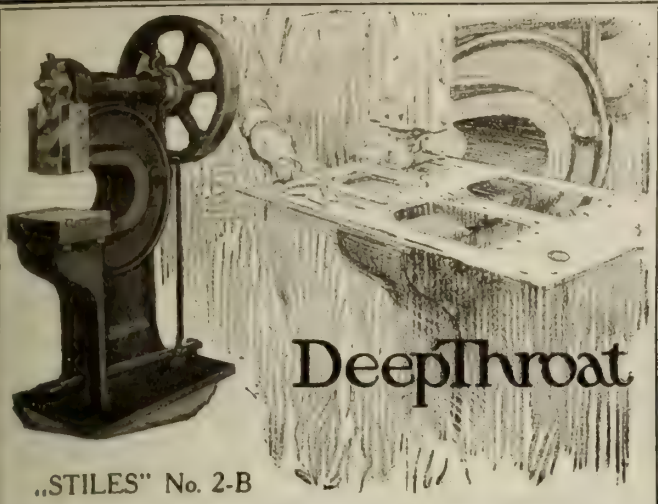
COLLETS
Becker Milling Machine Co., Boston, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.



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For reaching into the center of large sheets of metal, this model of the "Stiles" type of Press is provided. The massiveness of the frame and its special design make it rigid, even under the most severe punching strains.

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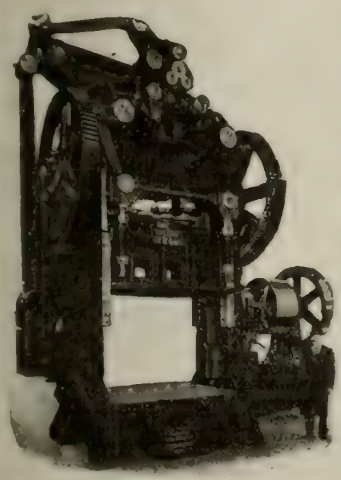
The "Toledo" Toggle Drawing Presses



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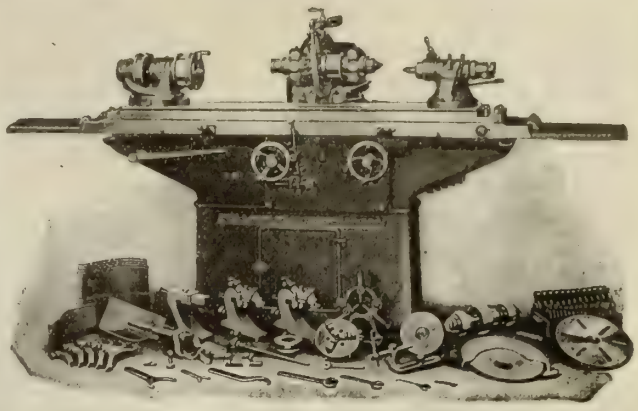

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Garlock-Walker Machinery Co., Toronto, Ont.
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Rice Lewis & Son, Toronto, Ont.
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Ford-Smith Mach. Co., Hamilton, Ont.
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Standard Machy. & Supplies, Ltd., Montreal, Que.
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Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES
Brewster Co., Wm., New York, N.Y.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL
J. F. A. Comstedt, New York City, N.Y.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont.
United Brass & Lead, Ltd., Toronto.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

FENCE, IRON AND FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

FILLING STATION EQUIPMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland, Ohio

FIRE BRICKS
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

FITTINGS, MALLEABLE AND CAST IRON
Fittings, Ltd., Oshawa, Ont.

FIXTURES
Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

FORGINGS, STEEL AND IRON
Can. Foundries & Forgings, Ltd., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE

FORGING AND WELDING
Victoria Foundry Co., Ottawa.
Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

FORGINGS, SPECIAL
Armstrong, Whitworth of Canada, Montreal, Que.
Canada Foundries & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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FRICTION SURFACE BELTING
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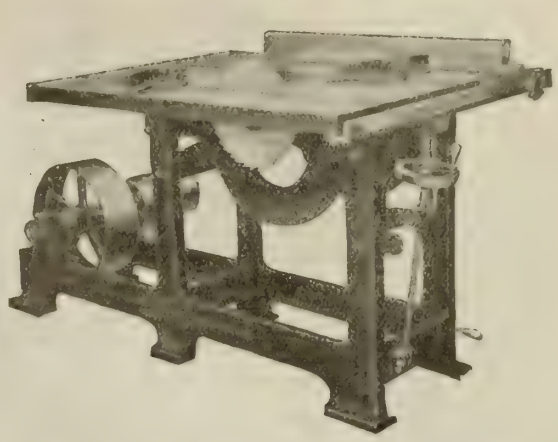
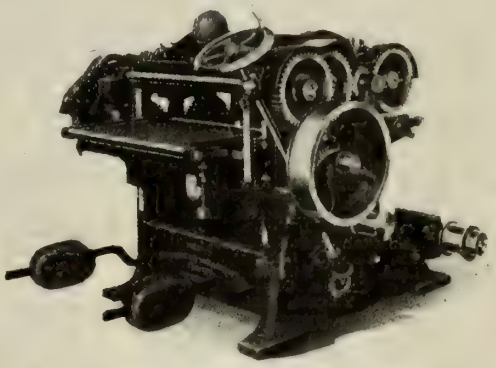


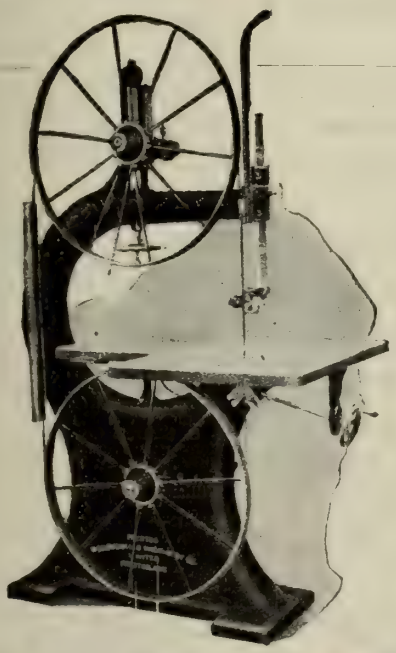
No. 125 Tilting Top Saw Table

A medium weight machine, very desirable for pattern shop work. Supplied with guard. Capacity up to 3" thick.



No. 121 Light Surface Planer

Planes either 20" or 24" wide x 8" thick. Much superior to a larger machine for running material within its limit.



No. 132—36" Band Saw with All-Steel Wheels

Guarded to meet requirements of Factory Inspector.

No. 143 Buzz Planer and Jointer

With round safety cylinder and guard to conform with safety requirements of Government Inspectors.

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Standard Fuel Engineering Co., Detroit, Mich.

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Bowser & Co., S. F., Inc., Fort Wayne, Ind.

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Taylor Instrument Co., Rochester, N.Y.

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GAUGES, HYDRAULIC
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GAUGES, STANDARD
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Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Normac Machine Co., St. Catharines, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

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Taylor Instrument Co., Rochester, N.Y.

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Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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Garlock-Walker Machinery Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
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Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

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Willson & Co., Inc., T. A., Reading, Pa.

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Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

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Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, DIE AND CHASER
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
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Wells Bros. of Can., Galt, Ont.
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Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
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Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, PNEUMATIC
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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, ROTARY SURFACE
Bristol Machine Tool Co., Bristol, Conn.

GRINDERS, TOOL AND HOLDER
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Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Wing & Son, J. E., Hamilton, Ont.

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Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
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Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Reed-Prentice Co., Worcester, Mass.
Wing & Son, J. E., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
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Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
LeBlond Mach. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York, N.Y.
Norton Grinding Co., Worcester, Mass.
Wisconsin Electric Co., Racine, Wis.
Williams & Wilson, Limited, Montreal, Que.

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Norton Grinding Co., Worcester, Mass.

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Aikenhead Hardware Co., Toronto, Ont.
Baxter Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Mahcine Co., Hamilton, Ont.
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Norton Co., Worcester, Mass.

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Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

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Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.

GUN TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

HANDLES, BALANCE, CRANK AND MACHINE
Williams & Co., J. H., Brooklyn, N.Y.

HACK SAW BLADES
Aikenhead Hardware Co., Toronto, Ont.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Ford-Smith Machine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Racine Tool & Machine Co., Racine, Wis.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

HACK SAW FRAMES
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

HACK SAWS, POWER
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Erie Foundry Co., Erie, Pa.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
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Canada Machinery Corp., Galt, Ont.
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Williams & Wilson, Limited, Montreal, Que.

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Canada Machinery Corp., Galt, Ont.
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Williams & Wilson, Limited Montreal, Que.

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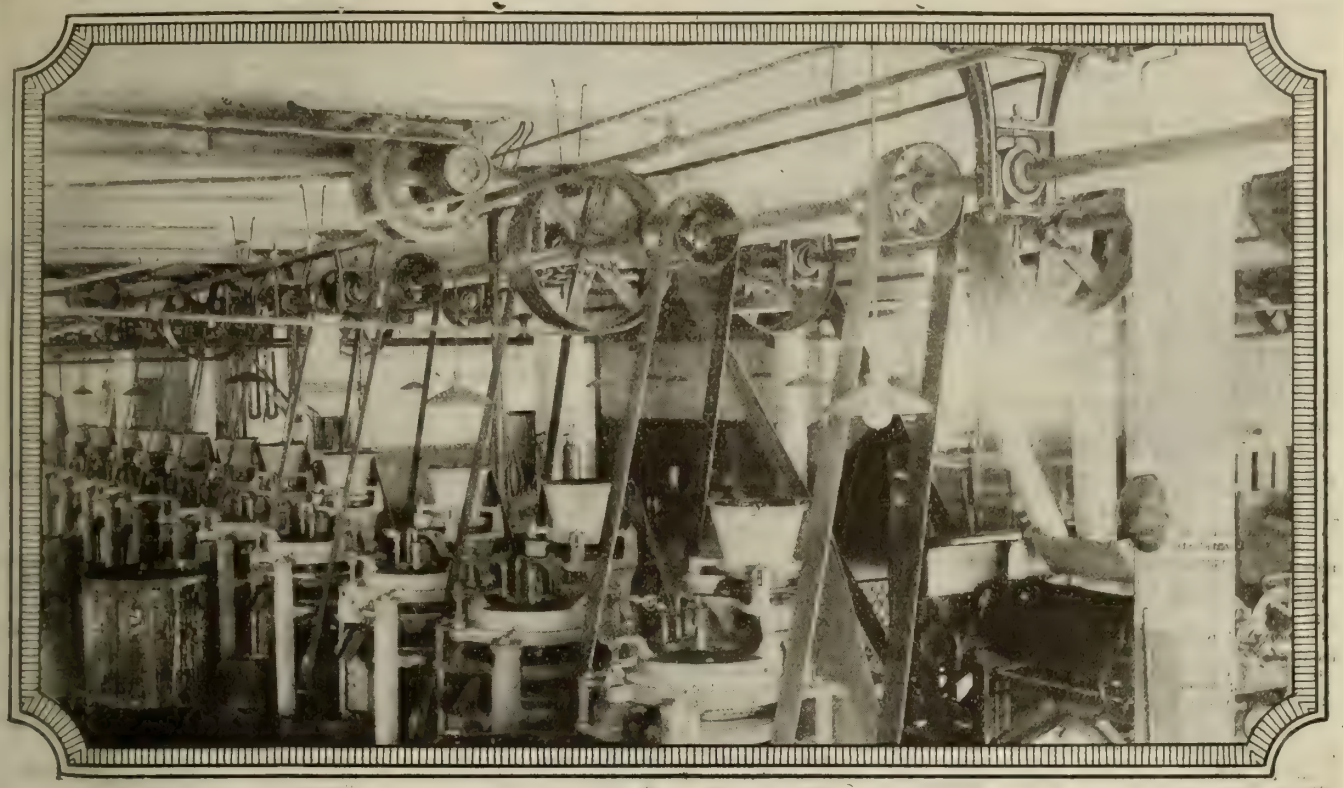
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh, Pa.



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Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
Beaudry & Company, Inc., Boston, Mass.

HAND LEATHERS OR PADS
Graton & Knight Mfg. Co., Montreal.

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Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

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General Steel Co., Milwaukee, Wis.

HIGH SPEED TOOL ROOM DRILLS
Albany Hardware Spec. Co., Albany, Wis.

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Deloro Smelting & Refining Co., Toronto, Ont.
J. F. A. Comstedt, New York City, N.Y.

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Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES
London Bolt & Hinge Works, London, Ont.

HOBS
Greenfield Tap & Die Corp., Greenfield, Mass.
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.

HOBS, MILLING

HOISTS, AIR
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Can. Matthews Gravity Carrier Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, CHAIN AND PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

HOPPERS
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

HOSE, PNEUMATIC
Baxter & Co., Ltd., J. R., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

HOSE, SAND BLAST
Gutta Percha & Rubber, Ltd., Toronto, Can.
Pangborn Corporation, Hagerstown, Md.

HOSE, STEAM
Gutta Percha & Rubber, Ltd., Toronto, Ont.

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Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.
Williams & Wilson, Limited, Montreal, Que.

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Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

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Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Athol, Mass.

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Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Taylor Instrument Co., Rochester, N.Y.

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United Brass & Lead Ltd., Toronto.

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Nova Scotia Steel & Coal Co., New Glasgow, N.S.

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Hanna & Co., M. A., Cleveland, O.

IRON SAND
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

IRON, WROUGHT, ROLLED AND PIG
Swedish Steel & Importing Co., Ltd., Montreal.

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Can. Fairbanks-Morse Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK
Canadian Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

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Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

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Elliott & Whitehall Mach. & Tool Co., Galt.
Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.
Normac Machine Co., St. Catharines, Ont.

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Canada Foundries & Forgings, Ltd., Welland, Ont.

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Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

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Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
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Northern Crane Works, Walkerville.

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LAMPS, TUNGSTEN
Can. Laco-Philips Co., Toronto, Ont.

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Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHE CHUCKS (SEE CHUCKS)

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Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

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Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
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Cincinnati Lathe & Tool Co., Cincinnati, O.
Cisco Machine Tool Co., Cincinnati, Ohio.
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Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
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Miles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
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Sidney Tool Co., Sidney, Ohio.
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Whitcomb-Blasdell Mach. Tool Co., Worcester, Mass.
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Fittings, Ltd., Oshawa, Ont.
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Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
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Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
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Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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Cisco Machine Tool Co., Cincinnati, Ohio.
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Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
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Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
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Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
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Warner & Swasey Co., Cleveland, O.
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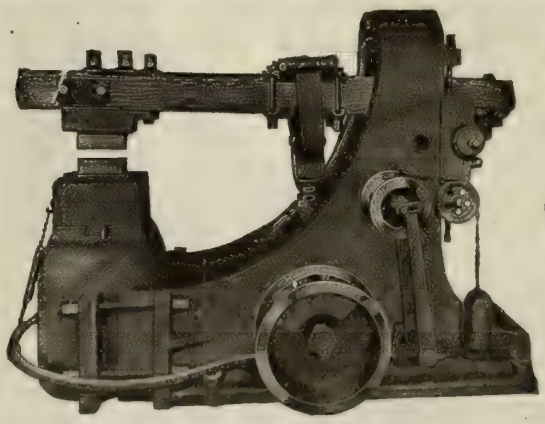

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Fox Machine Co., Jackson, Mich.
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Hendey Mach. Co., Torrington, Conn.
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Garlock-Walker Machinery Co., Toronto, Ont.

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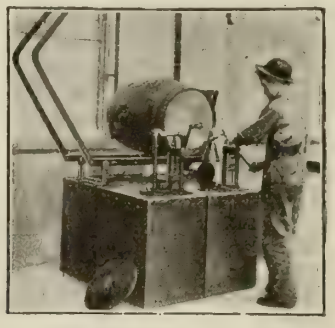

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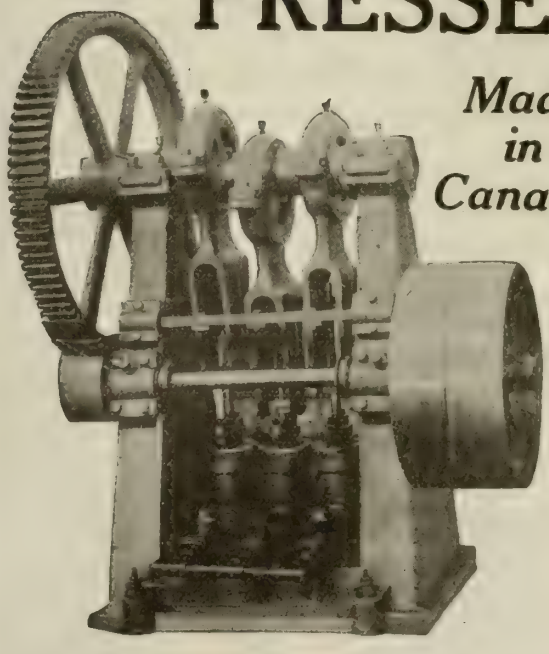

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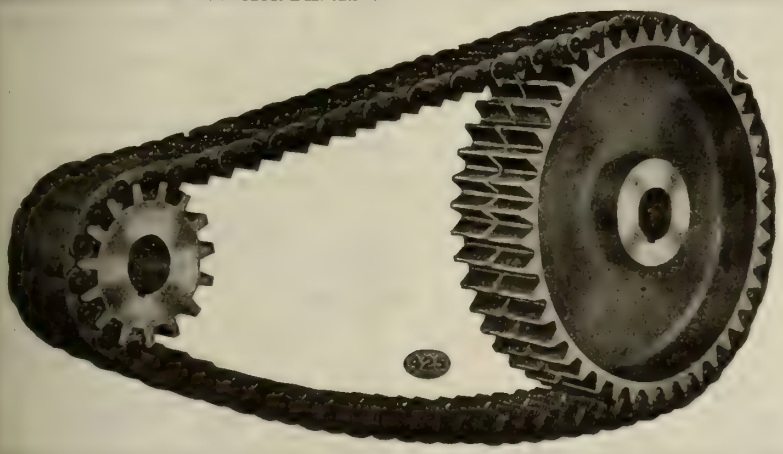

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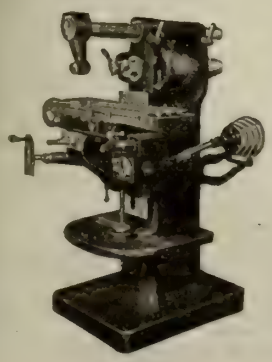

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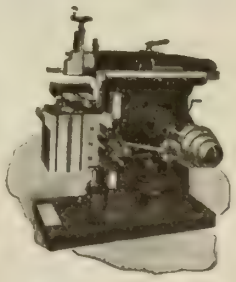

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Wells Bros. of Can., Galt, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

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Steel Co. of Canada, Ltd., Hamilton, Ont.

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Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
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Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
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Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

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Williams & Wilson, Limited, Montreal, Que.
F. B. Shuster Co., New Haven, Conn.

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Page Steel & Wire Co., Adrian, Mich.

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Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
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"The Mysterious German Onions"

On nights when the German air raiders were out, they sent up strange, luminous balls behind their lines and anchored them above the clouds—globes of fire which could be seen for forty miles or more. What these "onions" were, or how they were kept in stationary position above the clouds, is still a profound mystery. The Allies never learned anything about them, but the Allies night bombing crews steered their course to the Rhineland by the luminous buoys thus provided.

What is known about the onions is told by Lieut. J. Vernon McKenzie in the course of an article, "Raiding the Rhineland," in MARCH MACLEAN'S. It is an intensely interesting article, telling all about the great reprisal campaign which implanted the fear of war in the German civilian heart.

"NO HOPE FOR THE WETS"

"Already the temperance forces are lined up to stop any possible break in the prohibition dam." writes J. K. Munro, in discussing what is going to happen at the coming session at Ottawa. He predicts that Union Government will hold together, but that the habit it has contracted of promising everything asked is going to make a lively session. He expects:

Dry legislation at the earliest possible moment.
The moral reform forces in control.
No change in the Divorce Law.
Tariff concessions made to the West.

The March number, in fact, is full of live, up-to-the-minute features.
The famous Canadian Ace, Lieut.-Col. W. A. Bishop, is on the cover.

Some of the Outstanding Articles and Stories are:

The Transformation (a new serial)—By Frederic S. Isham.

A Canadian King-Maker (the story of Lord Beaverbrook in Britain)—By Maurice Woods.

Fitting in the Returned Soldier—By George Pearson.

The Three Sapphires—By W. A. Fraser.

The Strange Adventure of the Nile Green Roadster—By Arthur Stringer.

Fakers—and Others—By E. Ward Smith.

Lend Me Your Title—By Onoto Watanna.

A Shady Deal—By Archie P. McKishnie.

The City of Lost Laughter—By Mary Josephine Benson.

The Voice of Canada Interpreted

A new department starts in this number given over to summarizing and presenting opinion in Canada on outstanding topics, as reflected in the press. In this issue the department is given over to a careful compilation of opinion on the problems of the returned soldier.

Events of the World in the Remaking

Germany Ready for Trade War
Three-Year Marriages in France
No Solution in Ireland Possible?
Germans Hoped to Raise Ships
Is Czar Still Alive?
Did Dr. Diesel Die?
The Secret British Ferry
The Poison That Didn't
The Problem
The German Spy in Holland
The Mysterious Sinn Fein Leader
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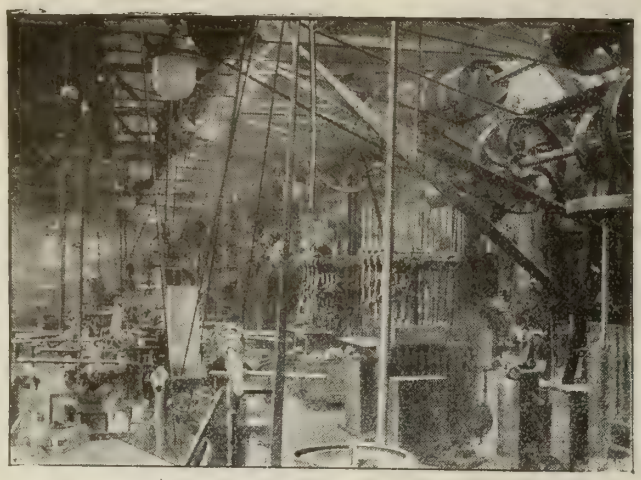

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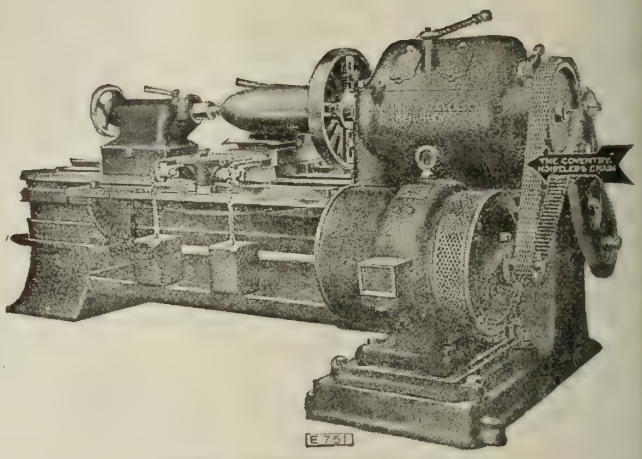

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CANADIAN MACHINERY

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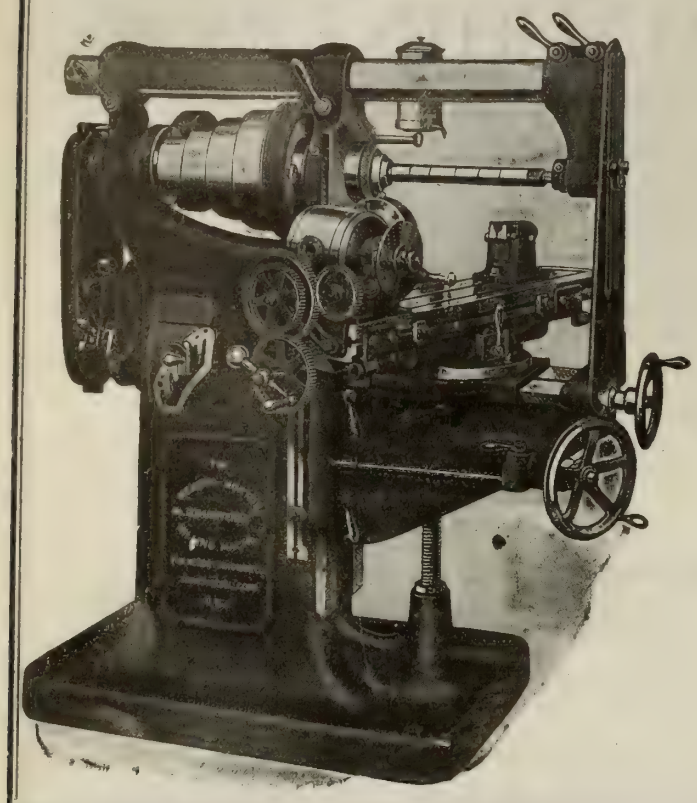

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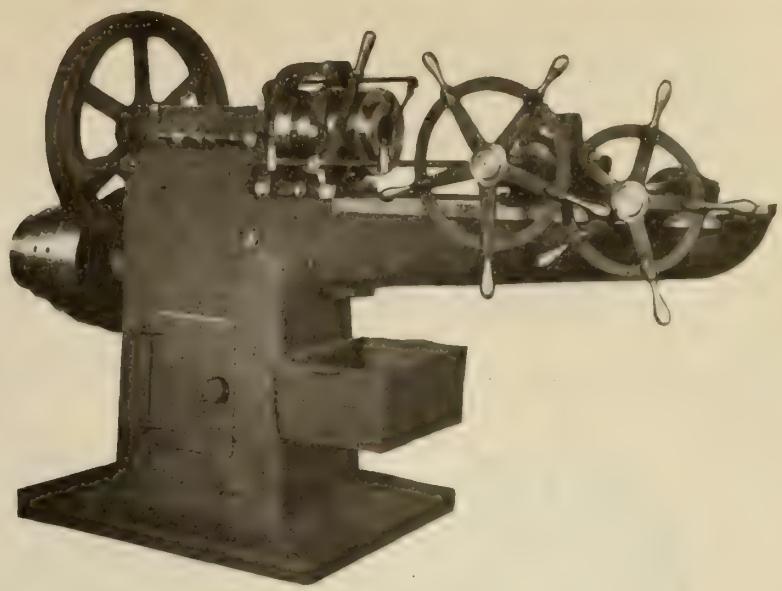
Splendid Values

in New and Second-hand

Machinery



LATHES SECOND-HAND AND NEW

2—19″ x 10′ Sidney Quick Change Gear Engine Lathes.
1—17″ x 10′ Sidney Quick Change Gear Engine Lathes.
5—18″ x 10′ Mueller Standard Heavy Duty Engine Lathes.
1—16″ x 8′ Monarch Quick Change Gear Engine Lathe.
1—28″ x 14′ Boye & Emmes Instantaneous Quick Change Gear Engine Lathe. In first class condition.
1—18″ x 8′ McDougall Quick Change Gear Engine Lathe. In good condition.

MILLERS NEW AND SECOND-HAND

2—No. 1 Kempsmith Universal Milling Machines.
2—No. 2 Kempsmith Universal Milling Machines.
1—No. 1 Kempsmith Universal Milling Machine. In first class condition.
1—No. 3 Kempsmith Universal Milling Machine. In first class condition.
2—No. 21 Garvin Plain Milling Machines. In first class condition.

SHAPERS NEW AND SECOND-HAND

1—28″ Smith & Mills Actual Stroke 32″ Single Pulley Gear Box Drive Shaper.
1—26″ x 30″ C.M.C. Back Geared Crank Shaper.
1—20″ Smith & Mills Back Geared Crank Shaper.
2—16″ Smith & Mills Back Geared Crank Shapers.
1—20″ Ohio Back Geared Crank Shaper. In first class condition.
1—16″ Ohio Back Geared Crank Shaper. In first class condition.

DRILLS NEW AND SECOND-HAND

2—Class "B" 8″ Henry & Wright Sensitive Drills.
2—Class "B" 12″ Henry & Wright Sensitive Drills.
1—20″ Silver Plain Drill.
1—76″ C.M.C. Portable Radial Drill. Complete with motor attached. In first class condition.

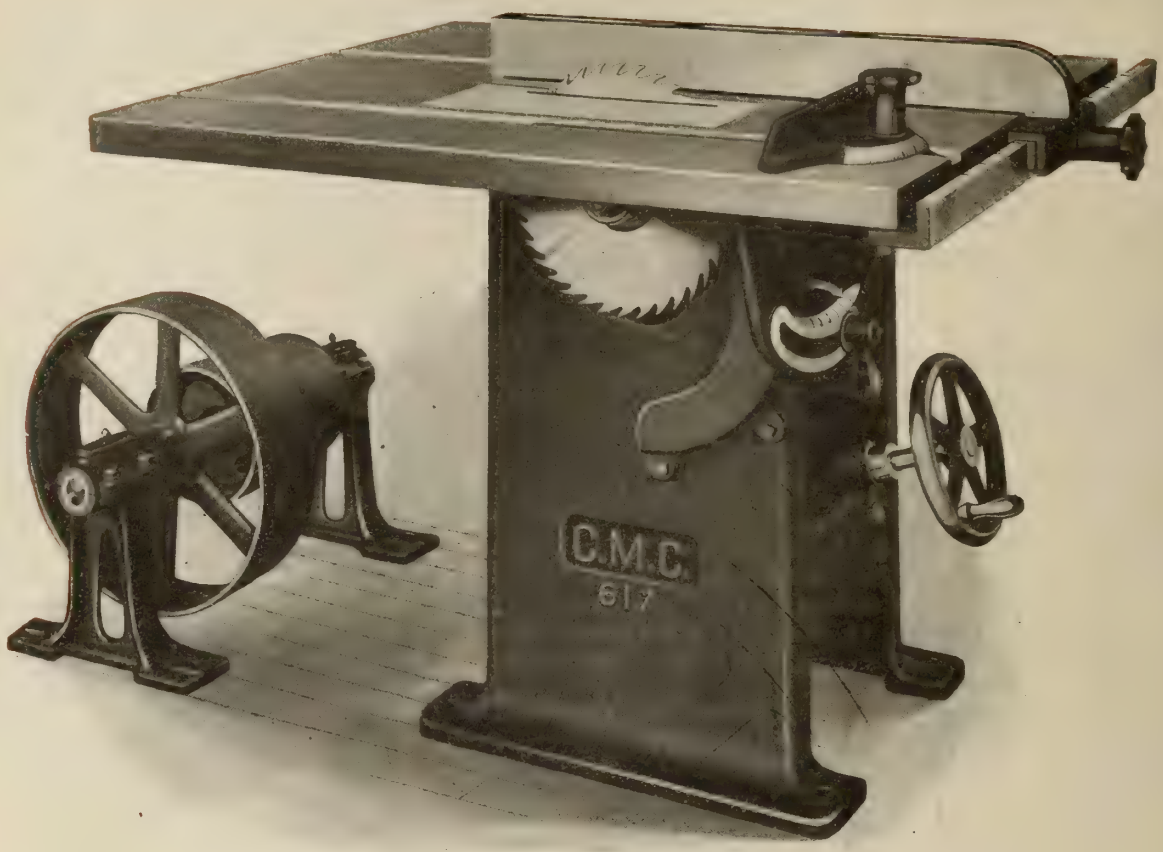
The above is a partial list of new and second-hand machines we have in stock for immediate shipment. For further particulars write, wire or phone us. Get our monthly stock book.

Inspection invited

The Geo. F. Foss Machinery & Supply Co., Limited

Machine Tools and Supplies

PHONE MAIN 8500 305 St. James Street **MONTREAL**



C.M.C. OUR No. 617 VARIETY SAW C.M.C.

with tilting table

is a compact, rigid, strongly cutting machine of great adaptability. It may be used for plain or bevel ripping, square cutting-off, mitreing, dadoing, grooving, rabbiting, etc., and will give admirable service in

CARPENTER SHOPS **CABINET SHOPS** **PATTERN SHOPS**

Write for special descriptive bulletin.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: **Brock Avenue Subway**

CANADIAN MACHINERY AND MANUFACTURING NEWS

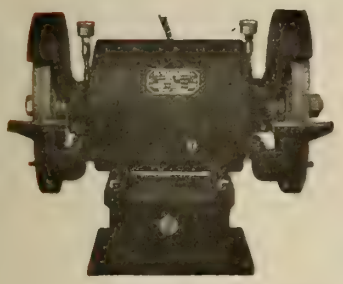
A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

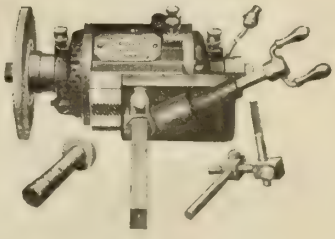
Vol. XXI. No. 11. Publication Office: Toronto, March 13, 1919 Subscription Price $3.00 per Year

Machine Tools and Supplies

THE STANDARD of quality that characterizes our Machine Tools and Mill Supplies places us in a position whereby we can emphasize to prospective buyers their guaranteed reliability.

Conclusive proof of their fundamental merit and the assurance of service and satisfaction they carry is represented in increased trade.





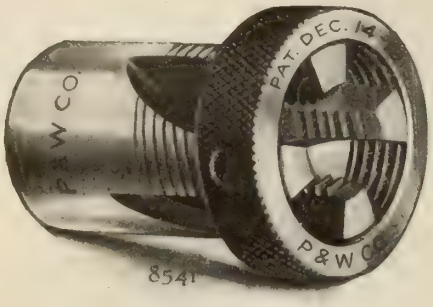
Geo. F. Foss Machinery and Supply Co., Limited

305 St. James Street
MONTREAL
QUE.

THE GEO. F. FOSS MACHINERY & SUPPLY CO. LIMITED · MONTREAL · Foss

SMALL TOOLS

Taper Thread Adjusting Collar



Spring Screw Die

Insures Uniform Concentric Adjustment

P. & W.

Spring Screw Dies and Hollow Mills

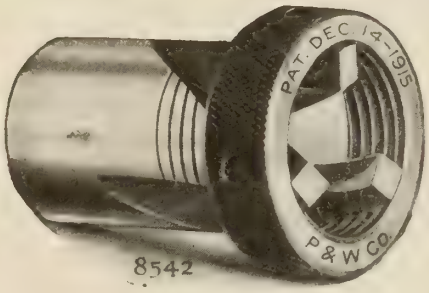
Advantages of the Taper Thread Adjusting Collar

Ease and delicacy of adjustment to FINE LIMITS are secured without trouble and loss of time.

All lands or prongs of the die or hollow mill are adjusted in or out exactly the same amount by merely turning the collar, thus giving rise to the term CONCENTRIC ADJUSTMENT.

This concentric adjustment results in each land or cutting edge doing its proper share of work, and as a perfect circle is always maintained, accurate results are assured.

By having the bearing always on the point, there is no tearing while backing off, and the correct amount of clearance is obtained.



Hollow Mill

Write for 4-page descriptive Circular giving size and dimensions.

Precision Machine Tools, Standards & Gauges

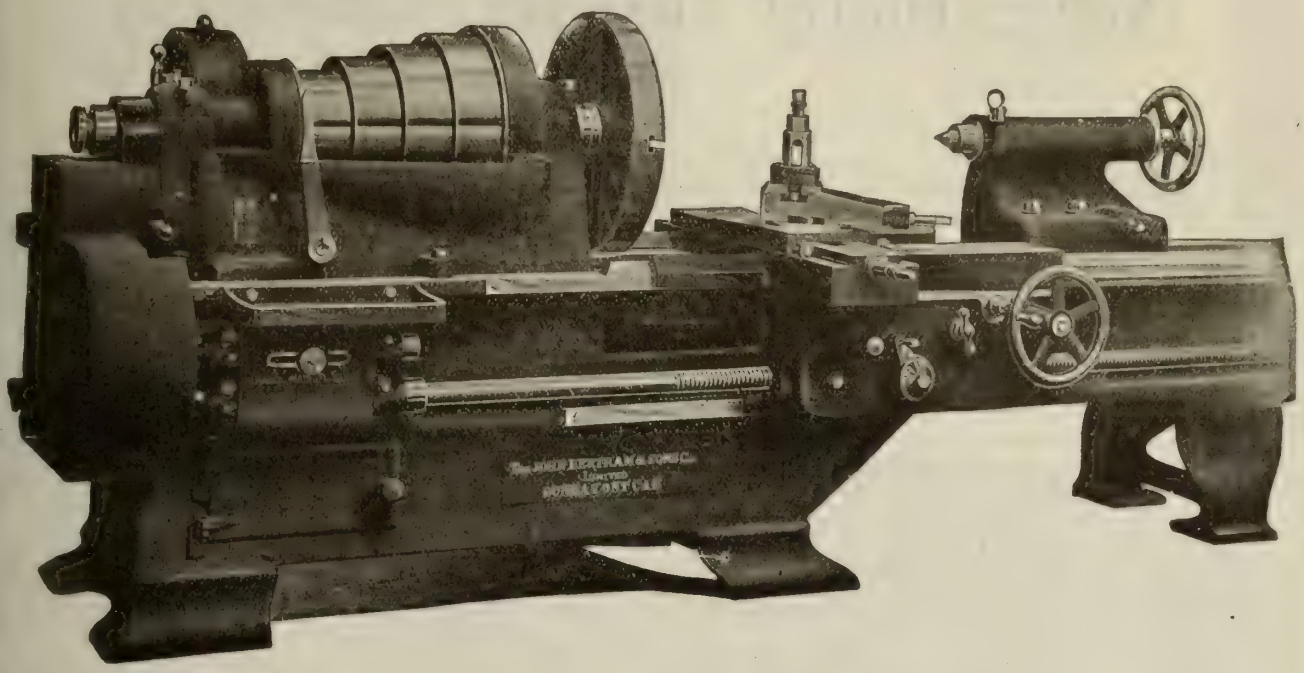
PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe

26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons, Co., Limited

MISCELLANEOUS DEPARTMENT

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO MARCH 13, 1919

Advertising and the Salesman

By A. R. Maujer

(From an address at a salesmen's convention of the Underfeed Stoker Company of America, Cleveland, 1918)

ADVERTISING has been and still is often misrepresented by the deceitful and ignorant. Because of this misrepresentation many seeming failures have transpired, and advertising has been condemned wrongfully. Because your company has just launched an epochal advertising campaign, I want to state the case for advertising fairly and squarely, so that you will know the aid it will give you, but at the same time you will not be drugged into the belief that all you now have to do is to sit around with your feet upon the desk and acknowledge the orders as they come rolling in. Advertising is not a patent medicine; it is not a cure for all your troubles.

If Walter Johnson were to be transferred to the Cleveland "Indians," he would undoubtedly strengthen the team. But his advent would be no sign that the rest of the team could quit hustling. They would still have to play their positions and they would still have to go up to the plate and whang out a hit with reasonable regularity.

Similarly, with this championship team of stoker salesmen, because advertising has been drafted to help you win it does not follow that your playing speed should be let down.

Now, how will advertising make your work in selling easier and more efficient? To explain this it is necessary to trace the history of a typical or average stoker sale.

To-day it is truly said, things are sold, they are seldom bought.

For your product to be purchased you must attract attention, arouse interest, create desire and secure action.

You can attract attention by a series of personal calls. If the prospect is in and he isn't too busy to see you, you may arouse interest. If he is the proper man to see and if the plant isn't already equipped with satisfactory stokers or if, in the case of a new plant, the stoker question hasn't already been settled, you may create desire and secure action.

However, the starting point of all is the attracting of attention. Unless you get that you get nothing at all. If they don't know about you they certainly are not likely to give you a chance to figure.

Now, attention can be secured by the delivery of a catalog, the opportune arrival of a circular or letter, or by a printed advertisement about as well as by a personal call.

For the purpose of merely attracting attention any of the methods just mentioned will do. But, from the standpoint of cost, the advertisement ranks first. Assume that the average range per day for a salesman is six calls and the salesman's cost is—well, each of you can figure out what it costs you to make six calls—say it's five dollars a call. Mind you, this would be only to secure attention. Having secured attention, interest, desire and action would still have to be aroused. Thus, if we assume 1,000 actual plants in Cleveland and, say, 500 available ones, we would have a cost of $2,500 for canvassing Cleveland just once.

Sending a catalog or circular would be cheaper, but still unnecessarily high-priced for merely attracting attention. The catalog could not cost less than 25 cents, delivered, and the circular letter would be at least five cents. An effective advertisement costs about 1.25 cents. In other words, for the cost of canvassing Cleveland just once by personal call you can canvass 25,000 actual and potential buyers in all parts of the country for eight to sixteen weeks at weekly or bi-weekly intervals.

Larger-scale production and turn-over mean low cost. Witness the Ford car and Woolworth's nickel bargains. Advertising is large-scale production in gaining attention and arousing interest.

Then, if it is used instead of the more expensive alternative methods, the general efficiency of the selling organization is increased.

Advertising of itself cannot sell stokers any more than artillery of itself can win battles. What is required is a winning combination of advertising to form the barrage; the catalog, circular, follow-up letter and house organ to serve as the machine-gun equipment and the personal sales force to act as the infantry to go over the top at the critical time and actually take the stronghold of the buyer by storm.

The earlier months of the Great War were studded with advances costly in human life because shells were scarce and the artillery preparations were, of necessity, brief and insufficient. On the other hand, low-casualty advances were achieved in the closing months because barrages were sustained and effective.

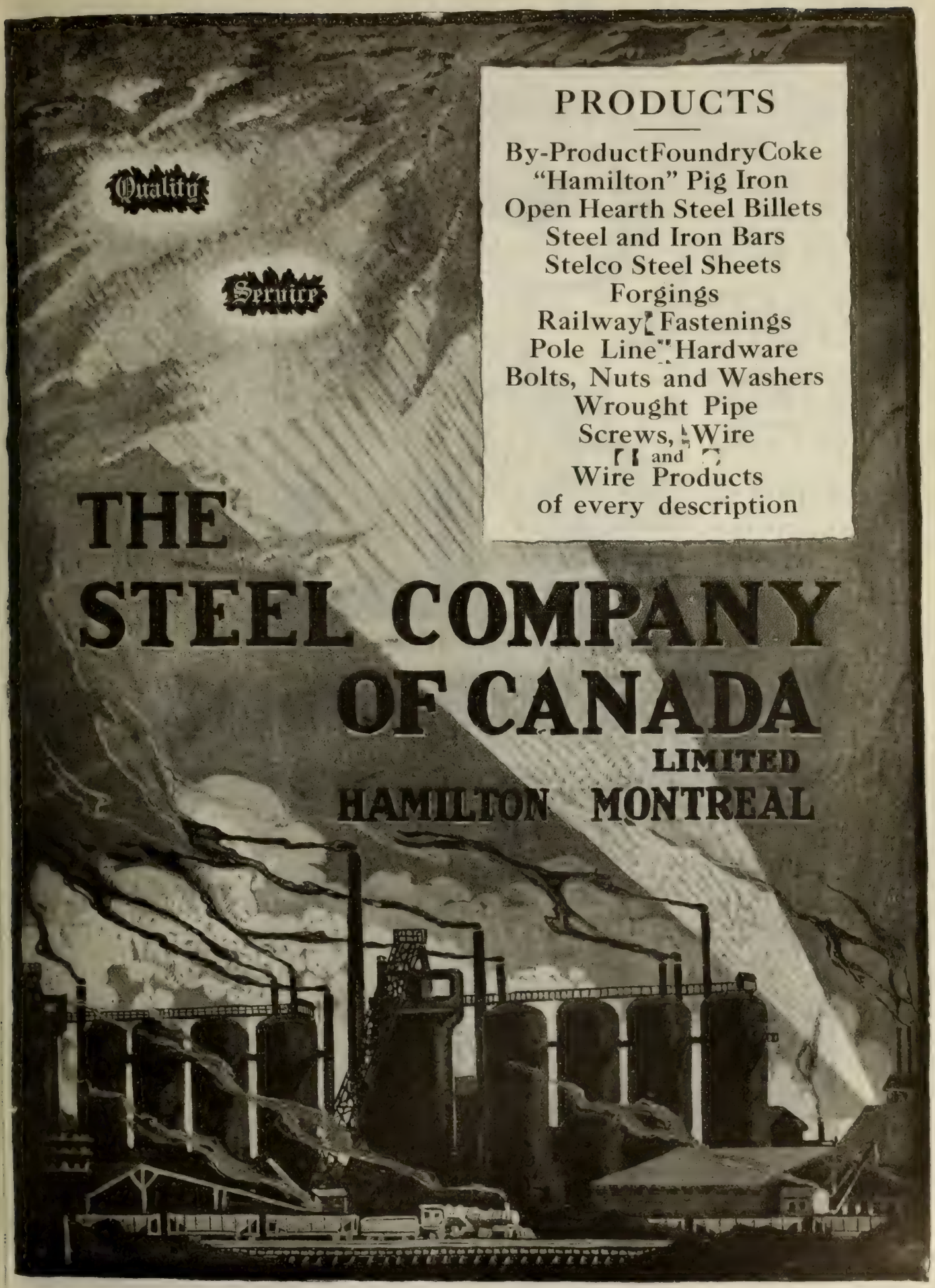
Just as a deficiency of adequate artillery preparation means high cost in casualties, so does a deficiency in advertising preparation mean high cost in sales opportunities and orders actually fought for, lost.

Sales campaigns conducted without adequate advertising preparation must ever prove costly because much of the work is done before the catalog or the salesman ever gets to the prospect; just as much of the work of a low-casualty battle is done before the troops ever start to go over.

When we examine the history of a typical stoker sale we can see the reason. Such an important piece of equipment as a stoker, involving a rather large investment, is seldom bought on snap judgment. The purchase is usually the result of considerable thought and investigation.

Continued on Page 59.

Canadian Machinery and Manufacturing News, March 13, 1919, Vol. 21, No. 11. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3, 1879.


Quality
Service
PRODUCTS
By-Product Foundry Coke
"Hamilton" Pig Iron
Open Hearth Steel Billets
Steel and Iron Bars
Stelco Steel Sheets
Forgings
Railway Fastenings
Pole Line Hardware
Bolts, Nuts and Washers
Wrought Pipe
Screws, Wire
and
Wire Products
of every description
THE
STEEL COMPANY
OF CANADA
LIMITED
HAMILTON MONTREAL

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

Sulphuric Acid. *Nitre Cake.*

BLOOMS, BILLETS, SLABS,

STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS

ALGOMA STEEL CORPORATION, LIMITED
SAULT STE. MARIE, ONTARIO

BETTS

Betts Heavy Duty Machine Tools Have Stood the Test of Time

For more than fifty-seven years the name "Betts" has been identified with the building of heavy duty machine tools.

A line of machine tools must have merit to warrant the confidence and good-will of the industrial world for so long a period and to have acquired a reputation for reliability and accuracy.

If you are interested in any Betts Tool let us send you specifications, quotation and delivery. Many Betts owners will be glad to show you their machines in operation. Write for list of installations.

The present Betts organization is upholding the traditions of development and service established by the Betts Machine Co. in 1861.

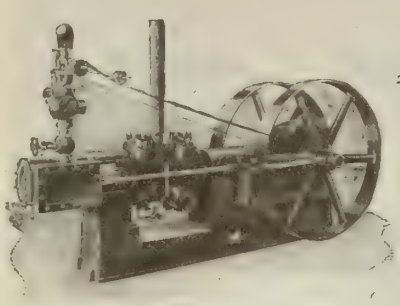
HEAVY BETTS DUTY

Planers
Boring and Turning Mills
Horizontal Boring
Drilling and Milling Machines
Tire Turning Mills
Car Wheel Borers
Crank Slotters
Coach Wheel Lathes
Driving Wheel Lathes

BETTS MACHINE CO.

408 Blossom Rd. Rochester, N.Y.

Formerly of WILMINGTON, DEL.



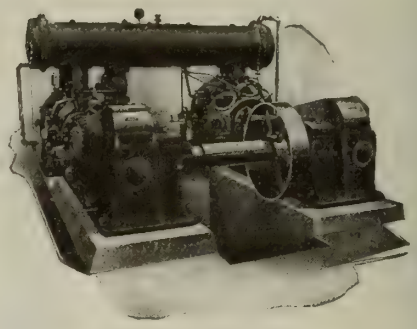
Economy in Upkeep

C-I-R-Co Air Compressors are all tested before leaving the Shop; all sizes are designed for economical running. Flood lubrication is not only cleanly and thorough but low in cost. Modern valve design gives greater output per H.P., input; the efficient intercooler still further lowers the power cost.

IT PAYS TO BUY A MODERN COMPRESSOR

CANADIAN INGERSOLL-RAND COMPANY
LIMITED

Sydney, Sherbrooke, Montreal, Toronto, Cobalt
Winnipeg, Nelson, Vancouver



Coal
Coke
Iron Ore

Pig Iron
Victoria

FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & CO.

Sales Agents, CLEVELAND

Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel
The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

LOOK FOR THIS NAME WILT

" Where there's a WILT--- There's the Way "

High Speed and Carbon Twist Drills

The WILT line of High Speed and Carbon Twist Drills is a line you can depend upon for satisfactory results.

With highest quality material and workmanship, they are built on the right principle and made right—built to stand up to the job.

There is no danger of using WILT Drills and wishing you had used others. Once used you will always look for that name —WILT.

WILT TWIST DRILL CO.

WALKERVILLE OF CANADA, LIMITED ONTARIO

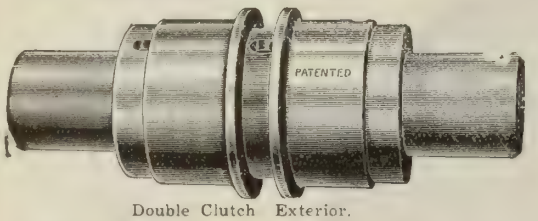
London Office : Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E. C. 2, England.

THE JOHNSON FRICTION CLUTCH

In the "Snyder" and a Host of Other Drill Presses

We feel justified in saying that Johnson Friction Clutches are in use wherever efficient drilling machines are manufactured.

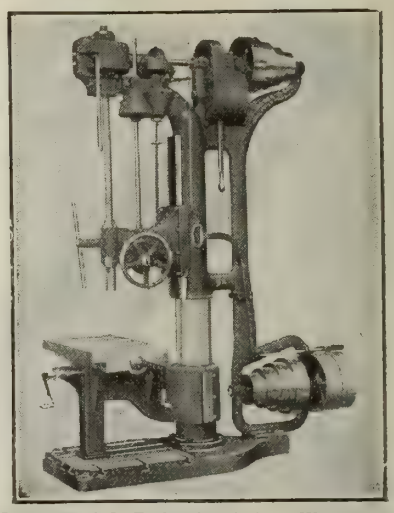
Every day sees new names added to our long list of machines which have Johnson Friction Clutches in their design. This wouldn't be so if there wasn't something a little better than ordinary about Johnson Friction Clutches. A simple request for information about your own proposition will bring surprising details and prices.



Double Clutch Exterior.

Write us for our Yellow Data Sheets

HERE



Courtesy of J. E. Snyder & Son, Worcester, Mass.

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal; The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.

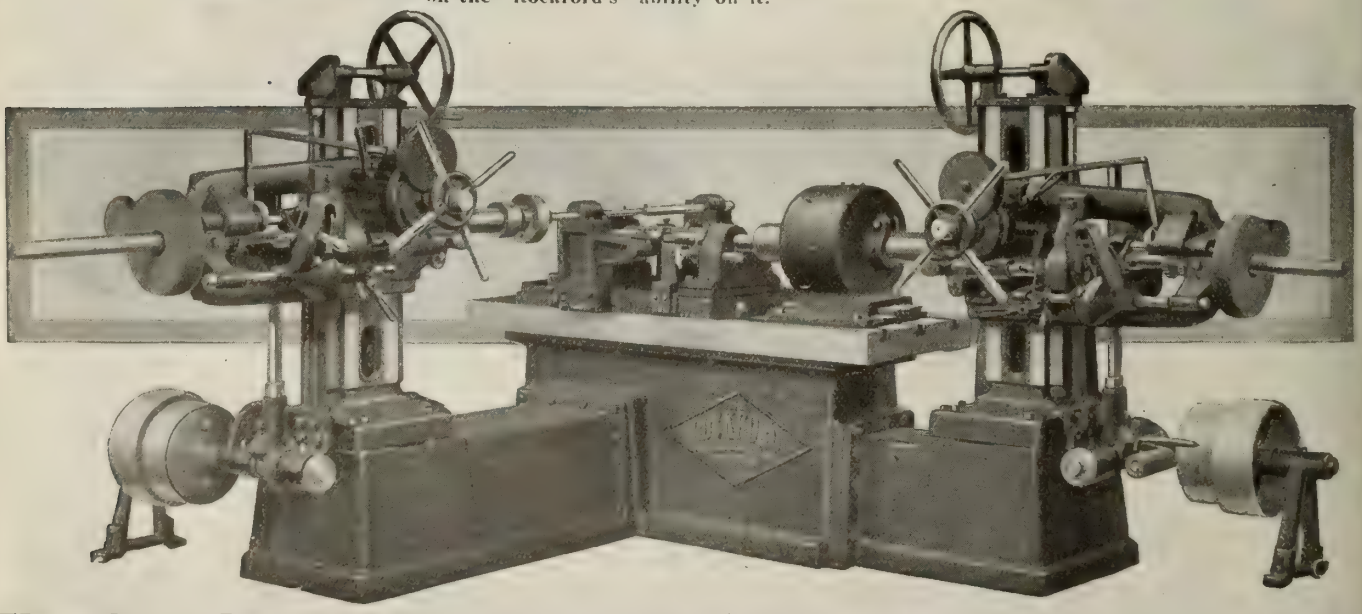
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Rockford Horizontal Boring Machine

For Automobile Manufacture

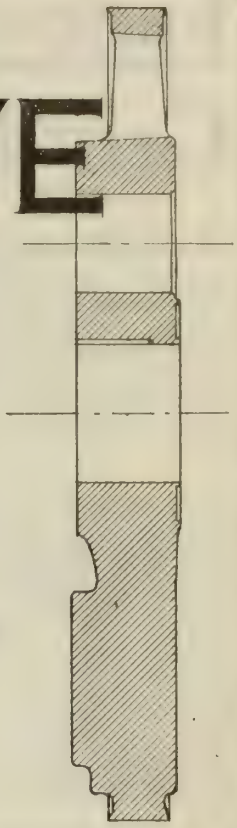
This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



The Rockford Drilling Machine Co., Rockford, Ill.

LOCOMOTIVE CASTINGS



CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL

Electrite Uranium High Speed Steel

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.
We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE
ELECTRIC STEEL CO.
LATROBE, PA.

GSC

Forging Billets and Bars
Electric Furnace, Alloy Steels

Die Blocks
Annealed—Heat Treated

Piston Rods
Rough Turned—Annealed—Heat Treated

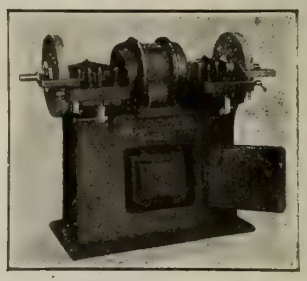
High Speed Steel

General Steel Company
Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

FORD-SMITH Grinders

A fine example of high grade material and workmanship

Water Tool Grinder



Motor Driven Floor Grinder.

General Purpose Grinder.

Motor-Driven Grinders
Floor Grinders
Bench Grinders
Water Tool Grinders
Swing Grinders
Disc Grinders
Special Grinding Machinery
Hack Saws
Swivel Tables

Write for Catalogue and price list.

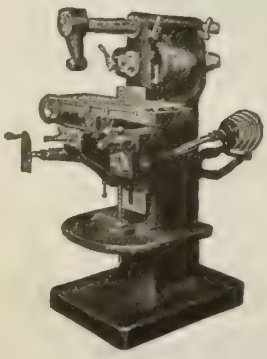
FOREIGN AGENTS:
W. E. Storey, 3 Arundel St., London, Eng. Alf. Herbert, Limited, 54 Dey St., New York, U.S.A.

The Ford-Smith Machine Co., Ltd.
HAMILTON - ONTARIO

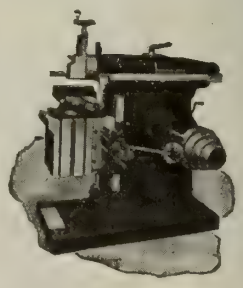
IMPERIAL GENUINE BABBITT METAL *The Highest Grade Manufactured*

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver



74 years of experience in the manufacture of high-grade Machine Tools, with thousands of our machines in shops giving daily satisfaction, are a recommendation for our product that should not be overlooked when buying new equipment.



We would appreciate your inquiry.

John Steptoe Co., Cumminsville, Cincinnati, Ohio, U.S.A.

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STELLITE

"Not Steel but its Master"

The Progressive Mfg. Co., Ltd.
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Gentlemen:-

We beg to advise that in spite of the rise in price of imported High Speed Milling Cutters, you can still secure a Canadian product at pre-war prices.

During the war, although our capacity was taxed to the limit in supplying STELLITE to Great Britain and France, as well as helping to keep Canada in the forefront as a producer of Munitions, we did not raise our prices, notwithstanding the fact that our costs increased enormously and are still up.

Let us help you to economize and at the same time secure maximum results.

Consult our Engineering Department.

We are, Sirs,

Yours respectfully,

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THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally Known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

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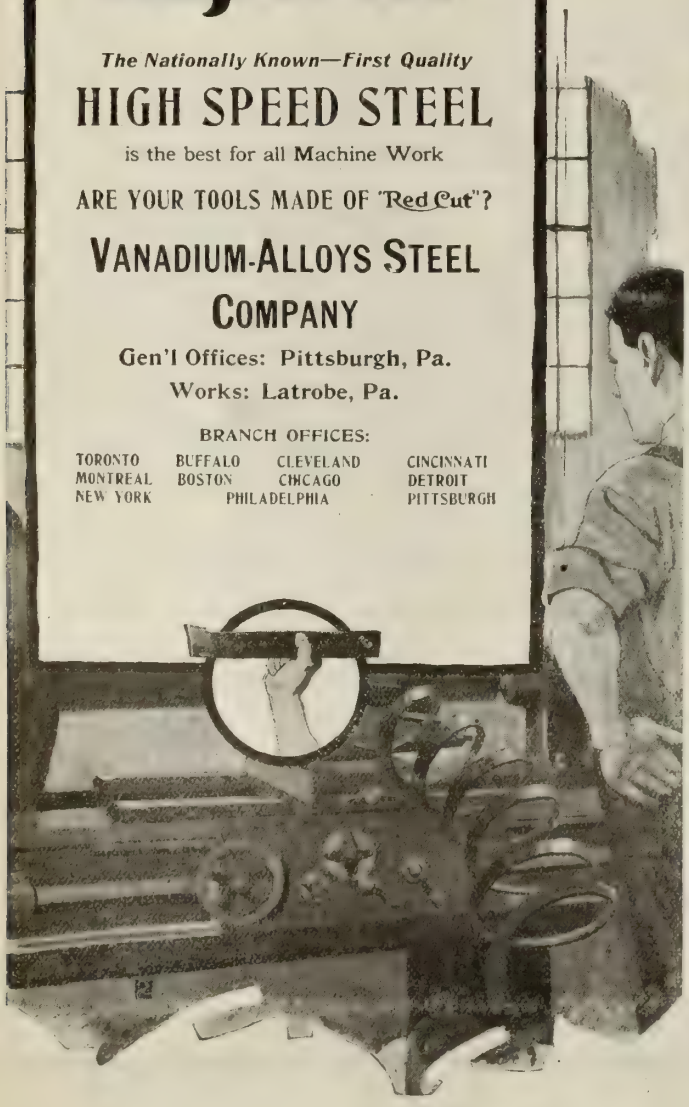

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Direct representatives of foremost Swedish mills; makers of

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ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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PROMPT SHIPMENTS from large stock

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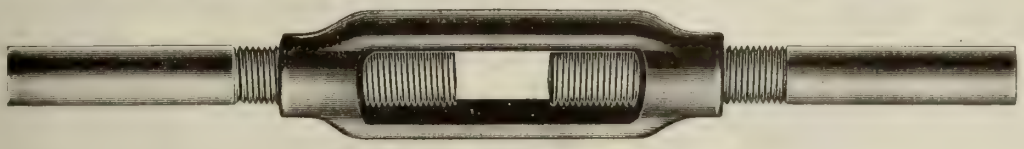

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16 Sizes, with or without Stubs
Large Stock---Quick Action
Produced at
Canadian Billing & Spencer Plant
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LOCOMOTIVE AND CAR
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HIGH-SPEED AND CARBON
TOOL STEEL

MISCELLANEOUS SHOP TOOLS

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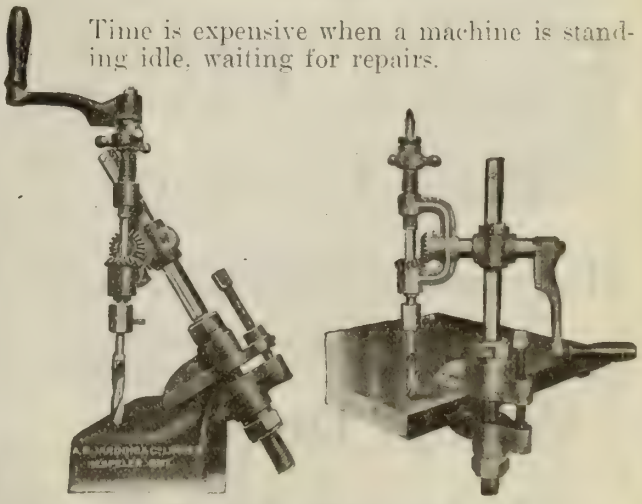
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

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"WACO"

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High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

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Peerless HIGH SPEED

THE NEW STANDARD

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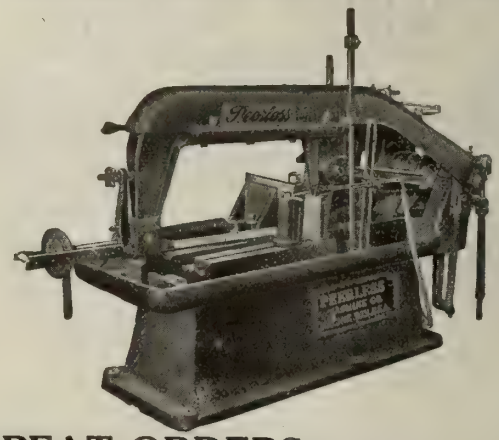

REPEAT ORDERS—

Here we are talking about repeat orders again, but if you could see the way they come in you would pardon our dwelling on that subject.

The one striking feature about our repeat orders is that so many of them come from large concerns who had been reasonably satisfied with other standard makes before they put in their first PEERLESS High-Speed, and since then they have sent us order after order for more and more of our machines.

Surely there must be some good reason for this, which will be perfectly clear to you when you try out a Peerless for yourself.

Let us ship you one on thirty days' trial. If you don't keep it we pay freight both ways.

PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN

Don't Handle It—CONVEY IT

Manufacturing is more than putting raw materials through machines. The handling and transfering of materials from one machine or department to another enters into production costs just as much as machine operations.

You invest in machinery that will enable you to shave costs even slightly. Why not invest in equipment which, in many cases cuts handling costs 50 to 75%.

Link-Belt Conveyors transport finished or raw materials at the lowest possible cost at factory, mill or wharf—anywhere indoors or out. In many cases they are the pace makers for the operation of entire factory departments. There's a Link-Belt Conveyor for every purpose. Write us. Let us send you our Conveyor Book. 223

CANADIAN
LINK-BELT COMPANY
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LINK-BELT
ELEVATORS AND CONVEYORS

We Also Make

- ☐ Elevators and Conveyors
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The "RACINE"

For Speed

For Accuracy

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For Saving in Blade Costs

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Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

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UNEQUALED IN QUALITY ANY SIZE OR LENGTH

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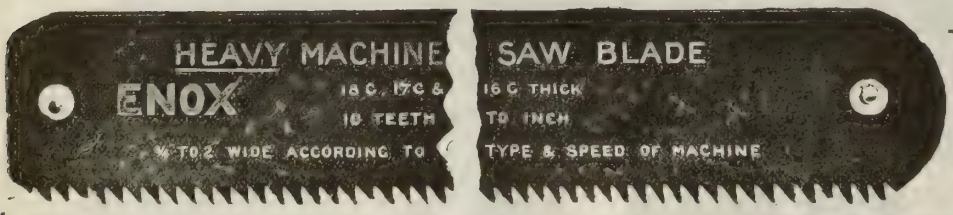

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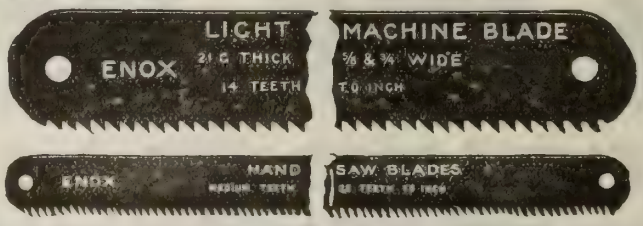
Hacksaw Blades

ARE THE BEST



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AN ENTIRELY BRITISH COMPANY

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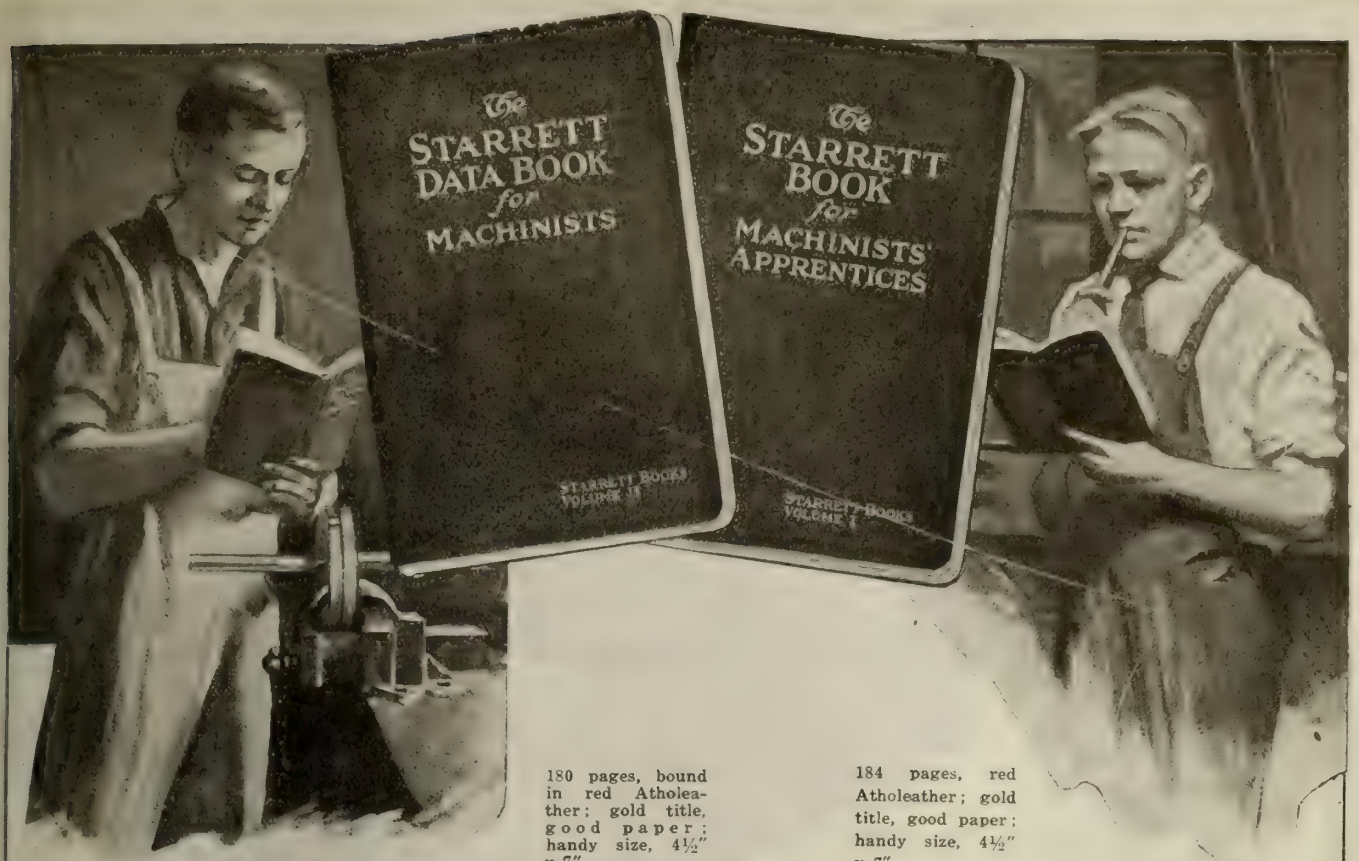
Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.



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184 pages, red Atholeather; gold title, good paper; handy size, 4½" x 7".

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These handy reference books are of exceptional value to you, whether you are an apprentice or a highly skilled mechanic.

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180 pages of important technical data, tables relating to machine speeds, power transmission, drilling, turning and milling, materials, etc.

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We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

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"The Marshalltown Throatless Shears"

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Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

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Cut Down Your Manufacturing Costs

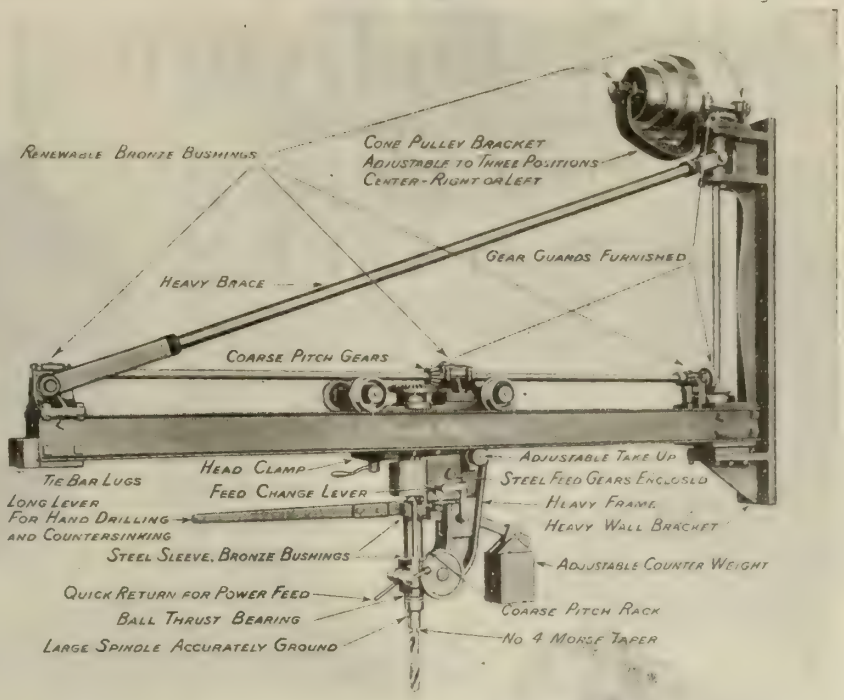
This Wall Radial Drill is especially designed for maximum production at minimum operating expense. In making additions to your equipment the necessity of having machines suitable for any job that may come along has doubtless been the biggest question in your minds. Here's a machine we believe will answer this question for your wall radial drilling needs.

Get our detailed bulletin covering the machine; you'll certainly be interested.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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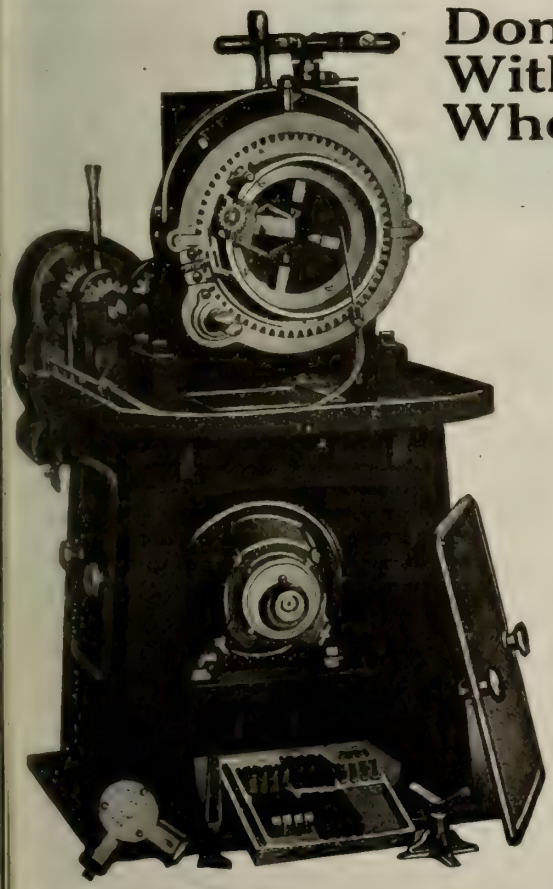


Don't Talk Man Shortage With Six Men on Pipe Work Where There Should be One

Don't let urgent work lag for the want of men while you employ a gang of men instead of one man and a

Forbes Pipe Cutting and Threading Machine

on your pipe work.

The old-style stock and die method of cutting off 15-in. pipe required six men. It can now be done with one man and a Forbes Machine.

The motor-driven type follows the pipe-fitting work wherever an electric wire can be run. No hauling of heavy pipe to and from a stationary machine.

In the Forbes Machine the dies revolve. The pipe remains fixed in the self-centering vise. And the threads cut! They're the kind that make tight joints, because they're clean, accurate.

Write to-day for our catalog.

The Curtis & Curtis Co.

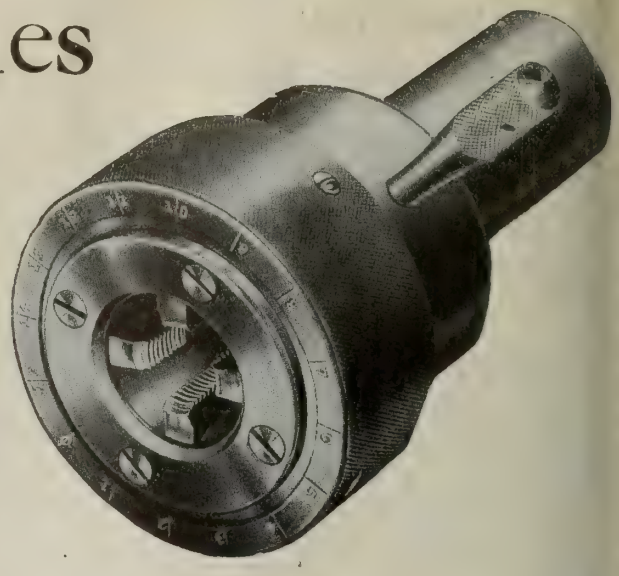
115 Garden Street Bridgeport, Conn.

Quick Deliveries

ON

MURCHEY CHASERS

We make a specialty of quick deliveries to the users of our tools, and if you'll become one of our patrons you'll find at the end of a year's time that you have saved many hours' valuable time through the quick deliveries we make on Murchey Chasers.



This saving, coupled with the great economy that always accompanies the use of **Murchey** Automatic Self-opening Dies, Collapsing Taps and Hand Sizing Taps, is a saving worth while in these days of high production costs. Use them.

ENQUIRIES GLADLY ANSWERED

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The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
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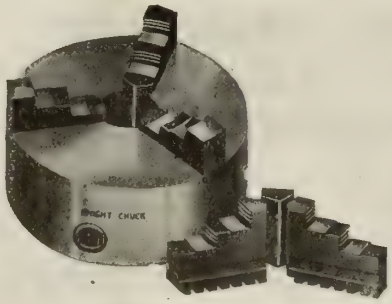

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Three-Jaw Universal Geared

The best material obtainable is used in the manufacture of KNIGHT Chucks.

First grade gray iron bodies and backs, steel scrolls, pinions, jaws and wrenches.

These chucks are thoroughly tested and inspected as to workmanship, position, synchronization and finish before leaving the factory.

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Nothing but Chucks and Their Accessories

FOR NEARLY 60 YEARS

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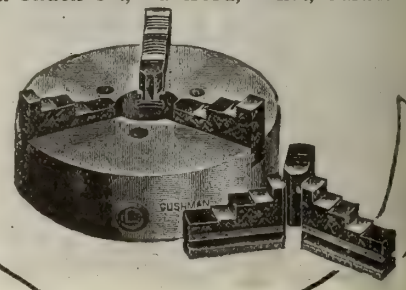
Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.
Cushman Chuck Co., Hartford, Conn., U.S.A.



Save Tapping Time

with the

BICKNELL-THOMAS Tapping-Attachment

The Bicknell-Thomas Tapping Attachment withdraws the tap without reversing the spindle — which goes ahead at full speed.

All the operator does is raise the drill spindle when the tap has reached the proper depth—an internal gear drive reverses automatically at twice the tapping speed.

This attachment is durably made of steel—all parts subject to wear being hardened—and may be equipped with the Bicknell-Thomas Friction Chuck.

Two sizes—For taps from 3/16" to 3/8" and 5/16" to 3/4" respectively. Let us send details.

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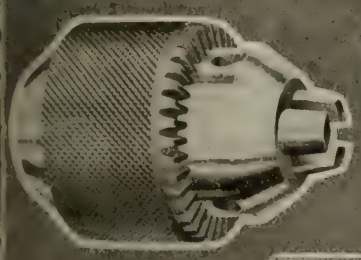

World Famous

The secret of their success is no secret at all, it merely their Superiority

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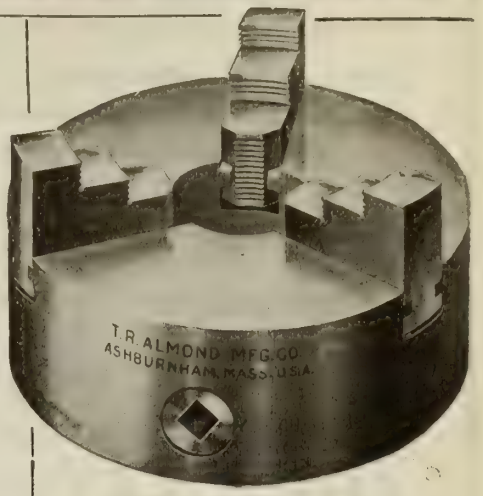
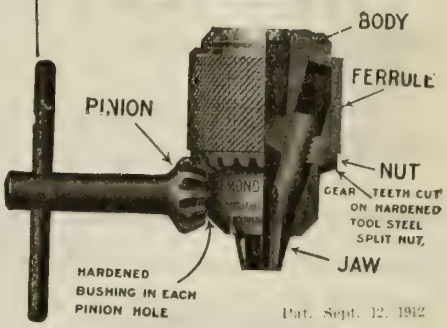
ALMOND CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".



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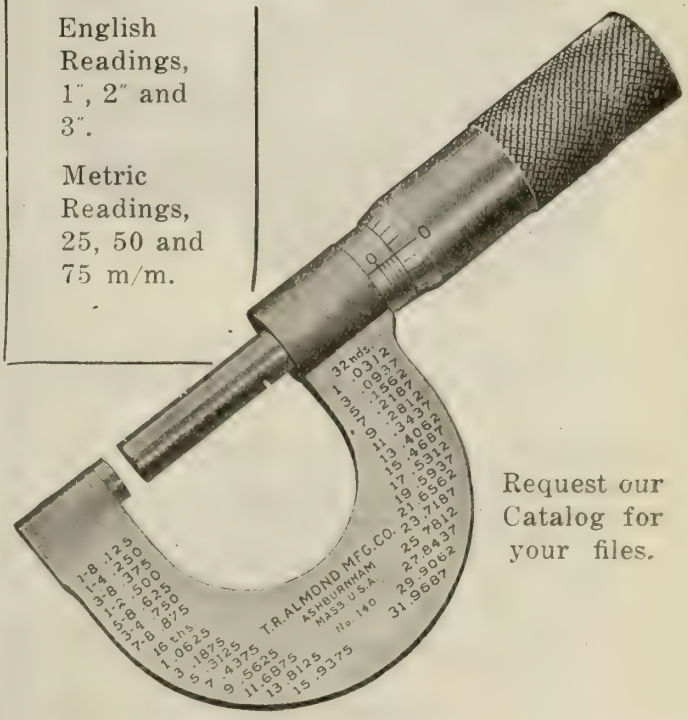
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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NAMCO AUTOMATIC SELF-OPENING DIES

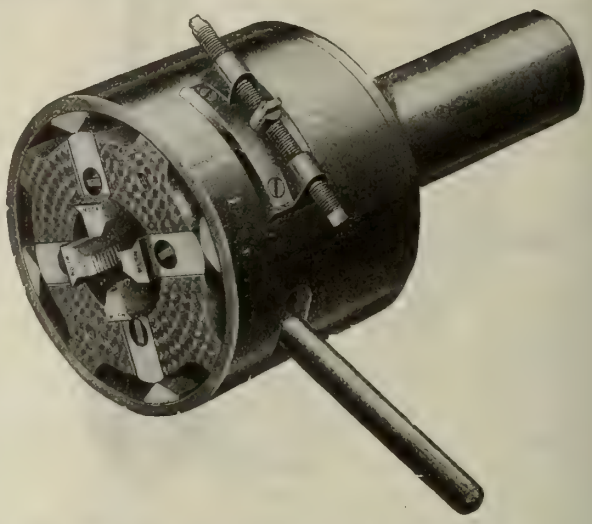
Cut threads rapidly and accurately.

Strong construction of head, correct chasers, positive opening action mean continuous production.

Time saved in threading means increased output of finished pieces.

Quotations on YOUR work?

Send for catalogue T-D.



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NEW ENGLAND PLANT
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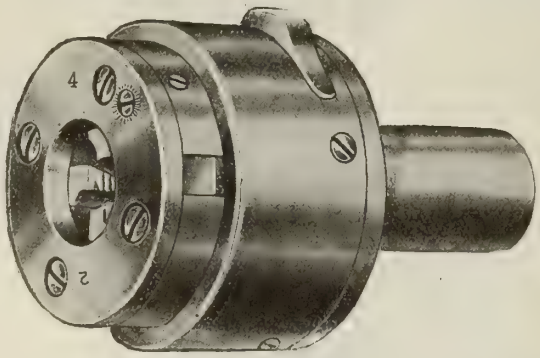
Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, O.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

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Eastern Machine Screw Corp.

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CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

That means a lighter and stronger machine—a machine built to take a lot of punishment. **Write for Catalog P/S-16**

Canadian Blower & Forge Co., Ltd.
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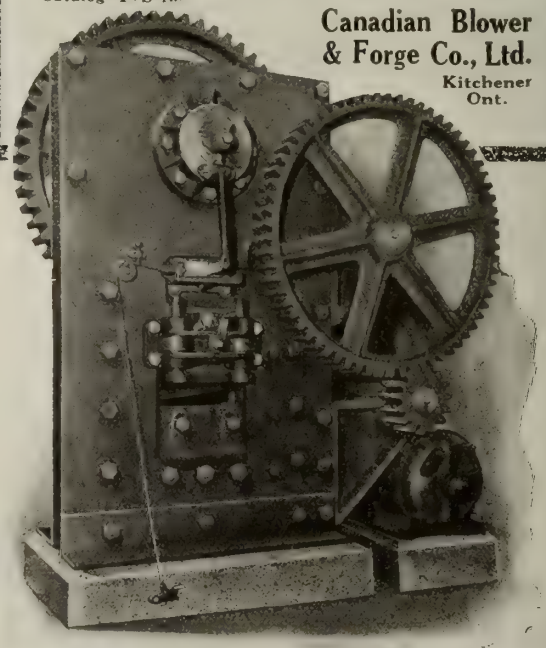

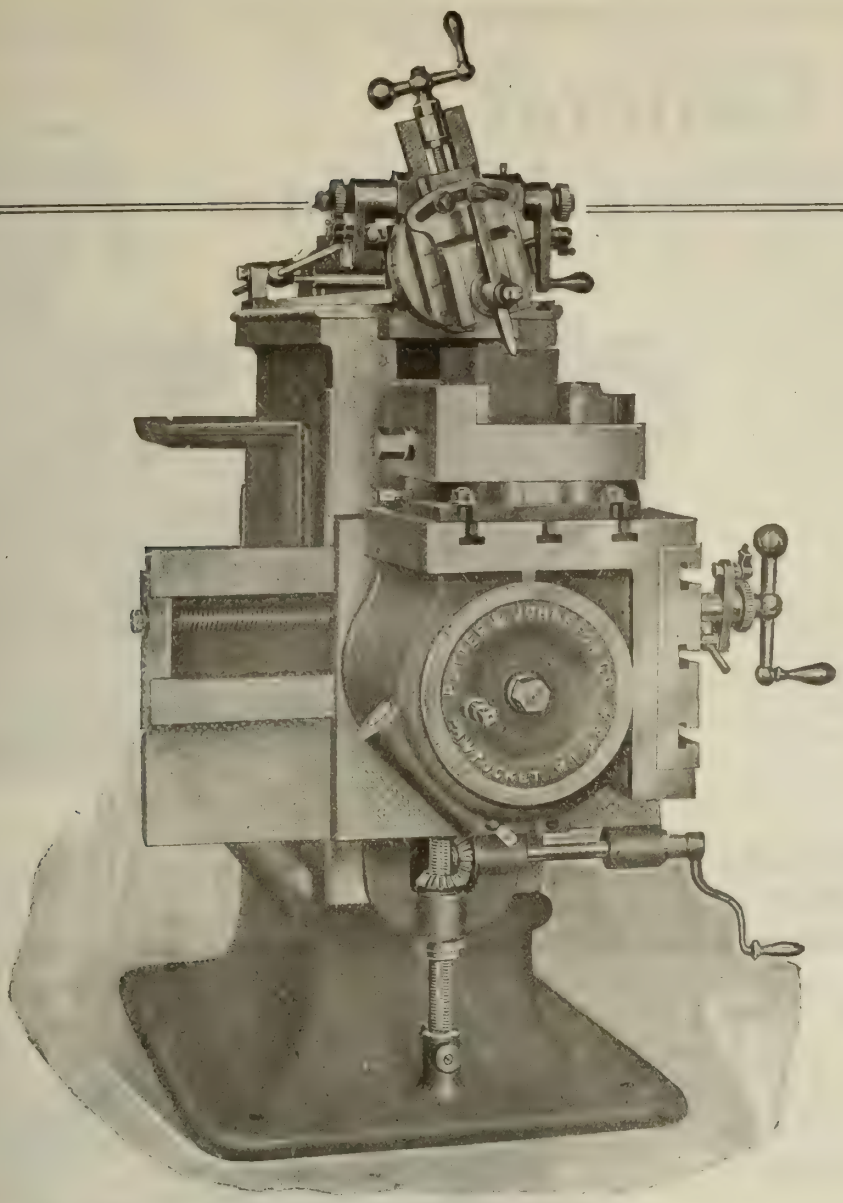

Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

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Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA

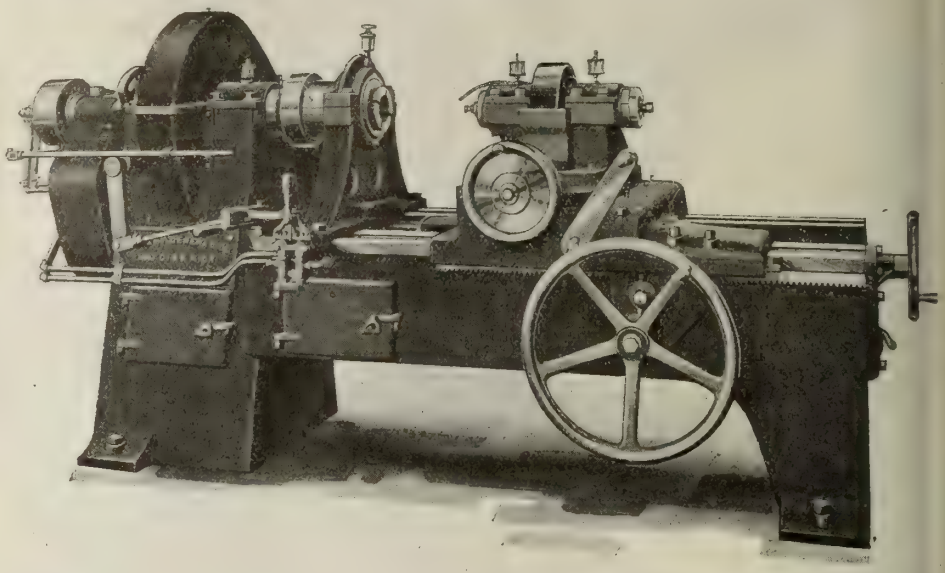
Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.



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Smalley General Co., Inc.

BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

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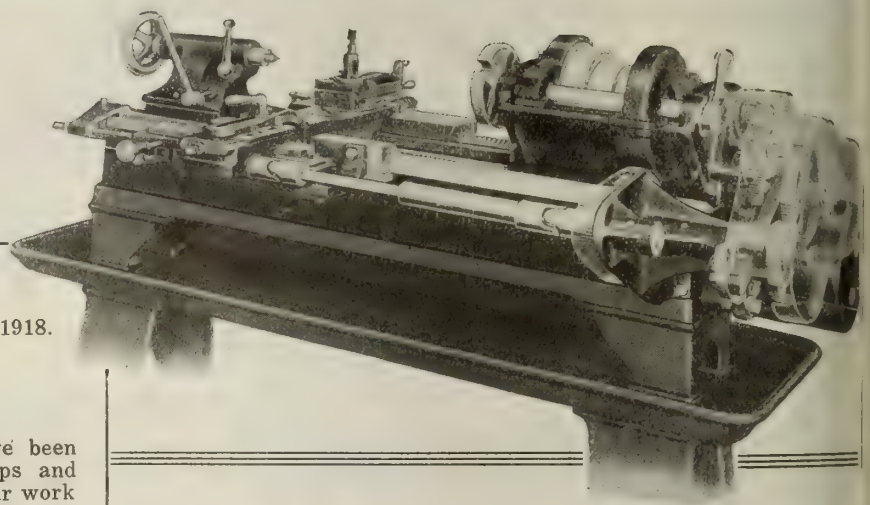

B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th, 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

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This is the Kind of ACCURACY for Your Tool Room Work

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MULLINER QUICK CHANGE LATHE

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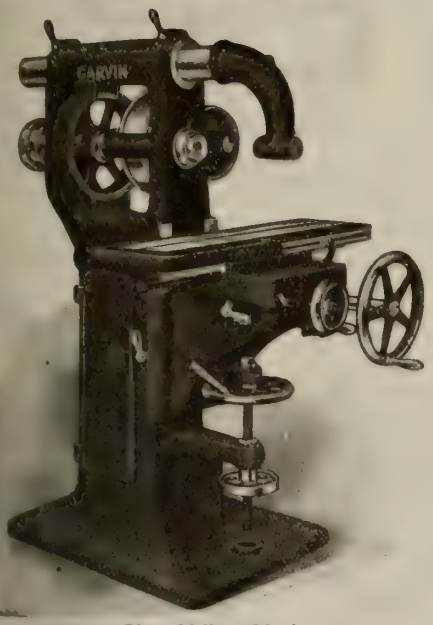
SYRACUSE, N.Y.

GARVIN No. 11 Plain Milling Machine



No. 11 Plain Milling Machine
Use Code . . . . Abode

Adapted to the lightest kinds of small milling and light manufacturing and suitable for jewelers, makers of electrical goods, brass workers, sewing-machine manufacturers and others.

The Features of the Machine Are:

Telescope Arm.
Hardened and ground Tool-steel Bearing for arbor in arm.
Spindle Bearing Taper, with adjustment.
Power Feed driven by vertical worm shaft inside of column, which drives a worm gear clutched to the pinion shaft in the knee.
Feed Works located and protected inside of column.
Quick and sensitive movement of Table by Adjustable Lever and Rack Pinion.
Micrometer adjustments of Knee and Saddle.
Oil Pan around table.
Elevating Screw does not pass through the floor.

Power Feed of Table	12½ in.
In and Out Adjustment	4½ in.
Vertical Adjustment	10 in.
Net Weight, Skidded	600 lbs.

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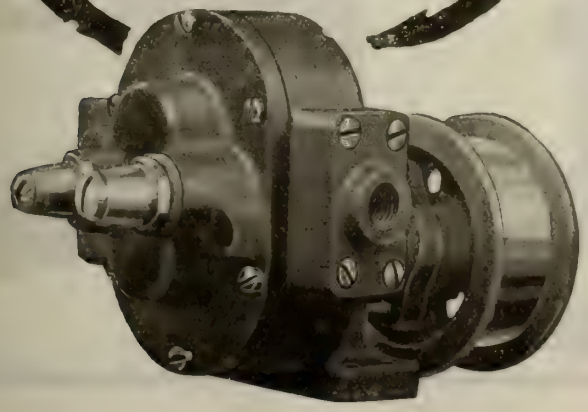

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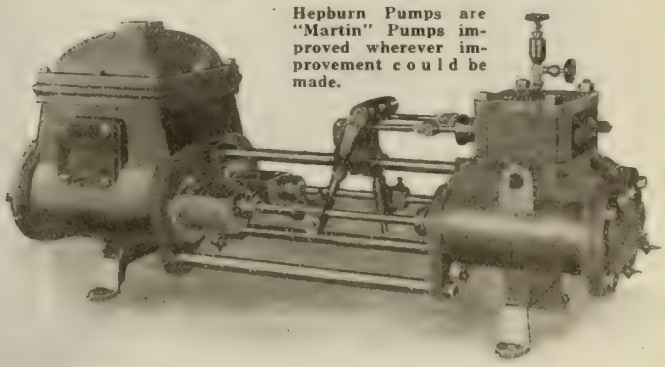
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



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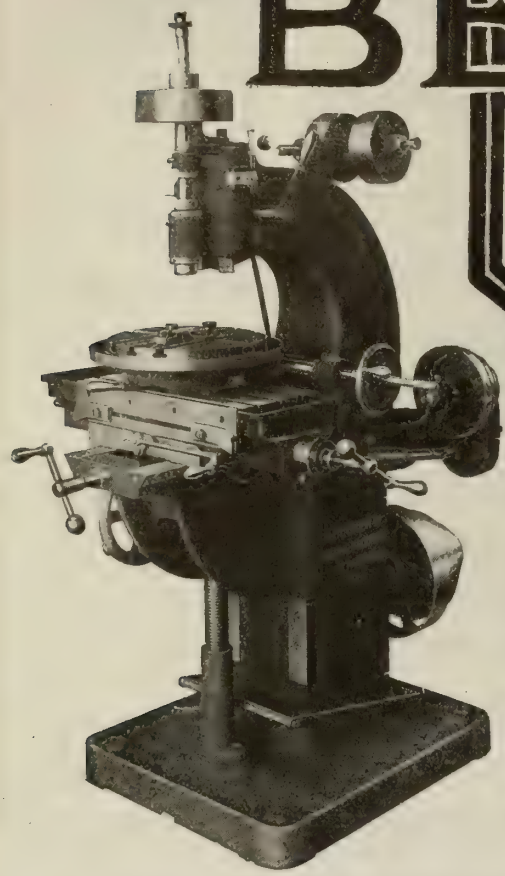

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Becker Milling Machine Co.

Hyde Park, Boston, Mass.

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Becker Belt-Driven Millers
The Machines that Give the Smooth Finish

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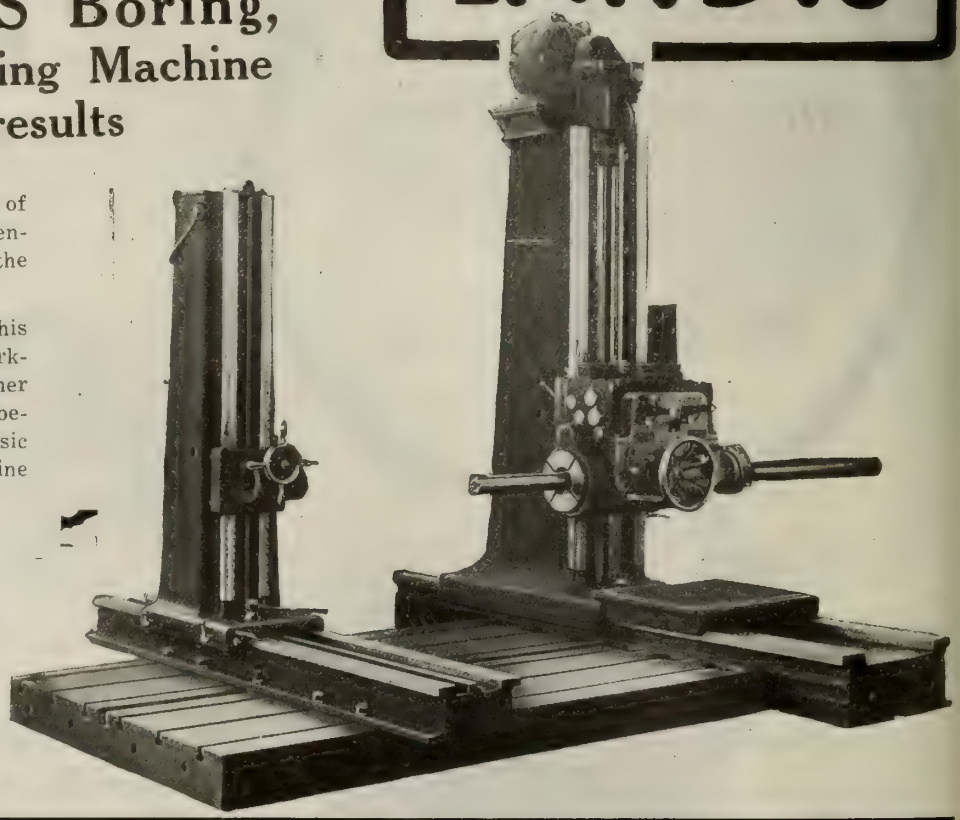
Wherever installed, The New LANDIS Boring, Milling and Drilling Machine produces results

LANDIS



and does it easily, with the minimum of time and labor. That is why superintendents, foremen and operators all like the LANDIS.

Many features of design make for this admirable ease of handling. The remarkable versatility of the machine is another powerful factor in its popularity. We believe this machine can perform more basic operations than any other type of machine tool.

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Waynesboro, Pa.

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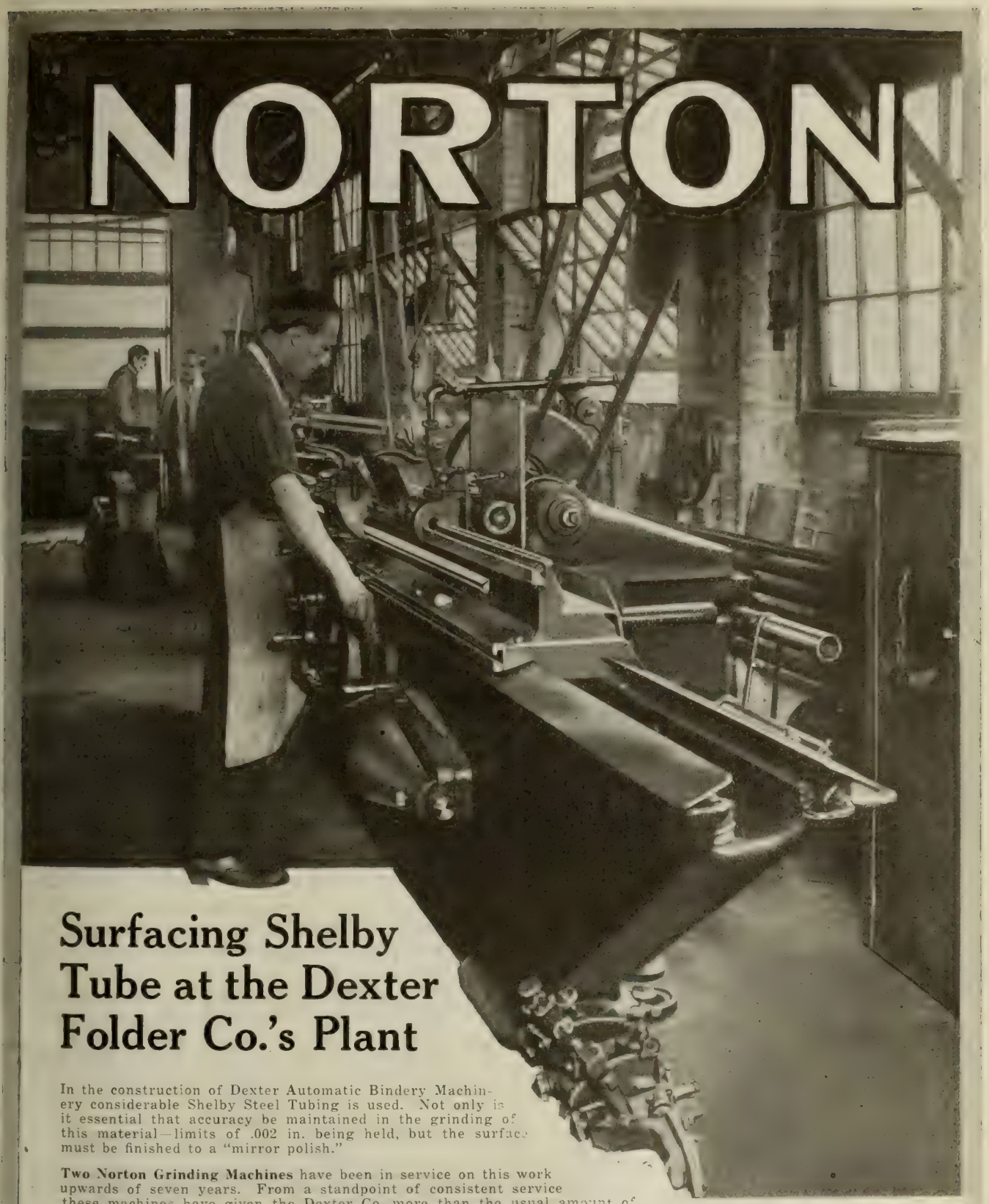
Agents:
Dewstoe Machine Co. Birmingham, Ala; Harron, Richard & McCone, San Francisco and Los Angeles.



Surfacing Shelby Tube at the Dexter Folder Co.'s Plant

In the construction of Dexter Automatic Bindery Machinery considerable Shelby Steel Tubing is used. Not only is it essential that accuracy be maintained in the grinding of this material—limits of .002 in. being held, but the surface must be finished to a "mirror polish."

Two Norton Grinding Machines have been in service on this work upwards of seven years. From a standpoint of consistent service these machines have given the Dexter Co. more than the usual amount of satisfaction—the maintenance expense has been practically nothing and their productive output has always been above par. **Let us send you the Norton Set of Bulletins—the entire line is described. Write us.**

NORTON GRINDING COMPANY, Worcester, Mass.

Chicago Store: 18 North Jefferson Street

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St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 12A

Polishing

Some of the points brought out by recent successful trials with Alundum grain in polishing may be of interest to the readers of this "Notes on Grinding" series. Glue, for example, represents many interesting problems in the modern polishing department.

Experience has taught that it is best to become familiar with each incoming shipment of glue. This is no reflection on the glue manufacturer, but conditions and mistakes in ordering entirely beyond his control may make two lots of glue quite different and it is always safest to examine each new shipment before using.

Many people are still guessing at the amount of water used to make a solution. A cold water soak, however, is the only sure way of determining this factor.

If the glue pot is cleaned out every evening, the reward will be well worth the labor. Dried or overheated glue left in the pot contaminates the fresh solution. Also, no more glue should be made up than can be used in one day. A glue that has been allowed to stand for 10 hours, then cooled over night and reheated in the morning is of practically no value.

Be sure and keep the glue pot covered. Evaporation tempts the operator to add fresh water during the day which is detrimental to the entire solution.

When setting up a polishing wheel, it is important that the abrasive be heated before the glued wheel is rolled in it, because if the abrasive is cold it has a chilling effect on the glue, reducing the sticking qualities. After the wheels have received the application of glue and abrasive, they should be dried for at least 10 hours before using.

NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

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Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

Canadian Fairbanks-Morse Co., Limited

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WHY P.H. and IMPERIAL FILES?

Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

Because they are processed entirely by the most expert workmen in this highly specialized trade.

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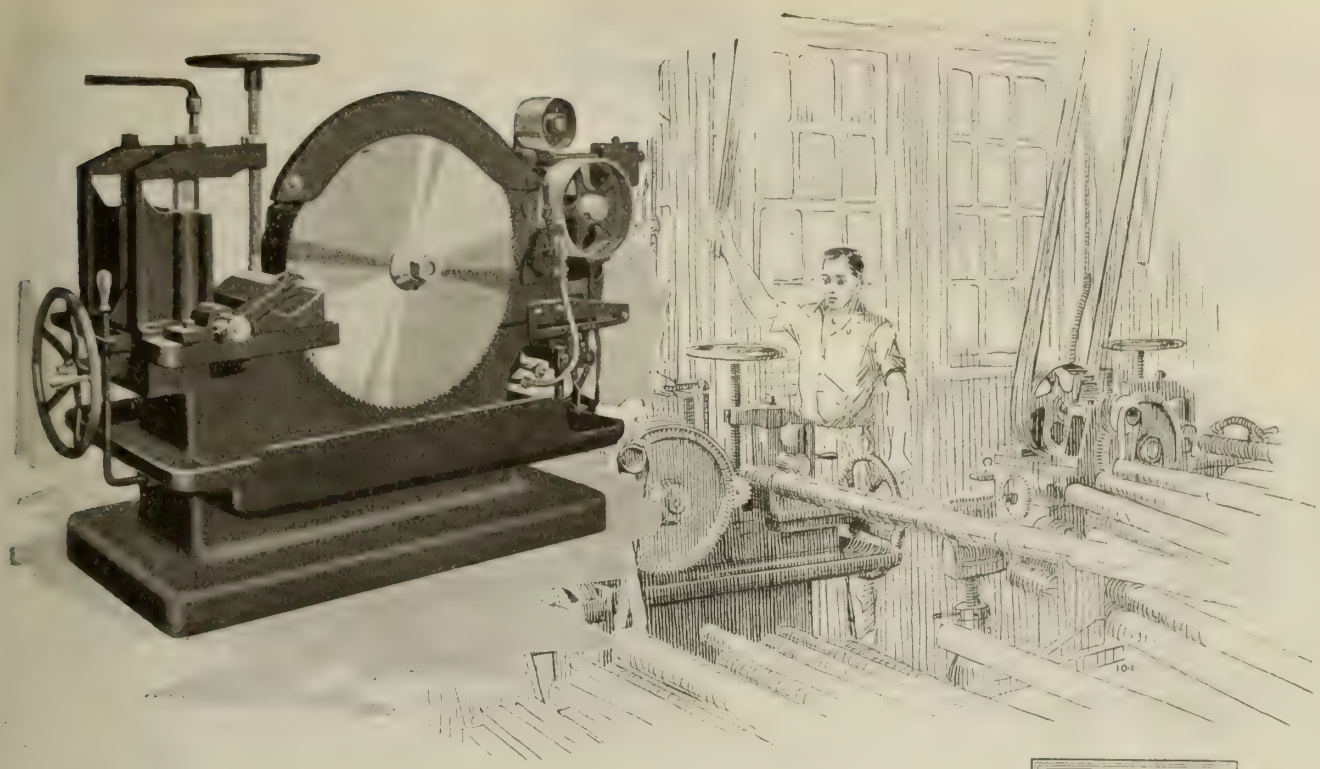

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The use of Nutter & Barnes Automatic Metal Cutting-Off Saw Machines in the steel shed effect a real economy in steel.

These machines fully described in Machine Tool Catalog No. 39

Got yours?

These high-powered machines drive an exceptionally small, narrow saw, considering their capacity. Consequently the wastage of steel is reduced to a minimum.

On the other hand, they are big producers. Nutter & Barnes Cold Saws are used by some of the largest shops in the world. *They can help you!*

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Taps and Dies
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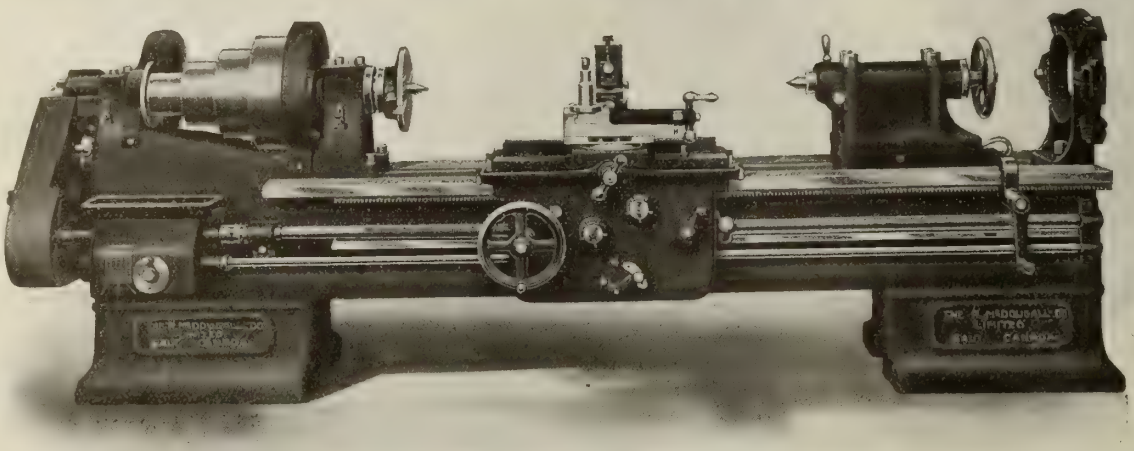
And every feature is proof of our aim to produce a machine of unusual merit.



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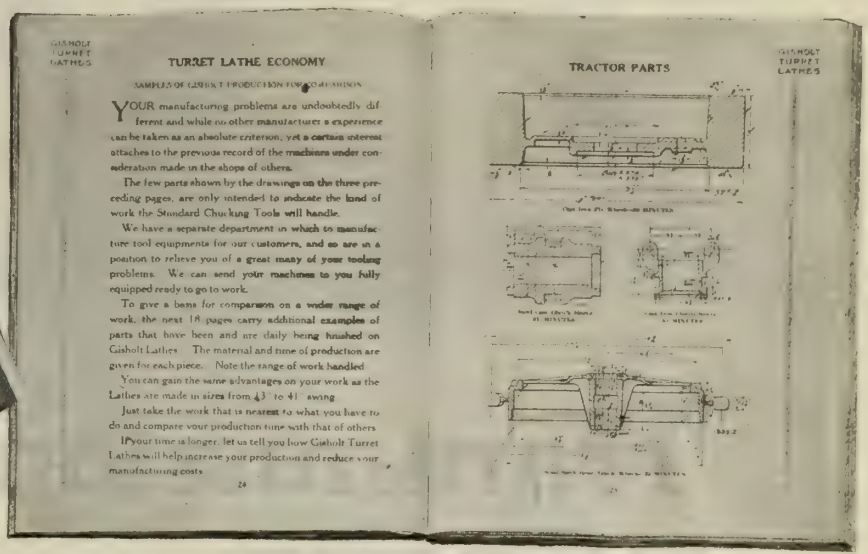
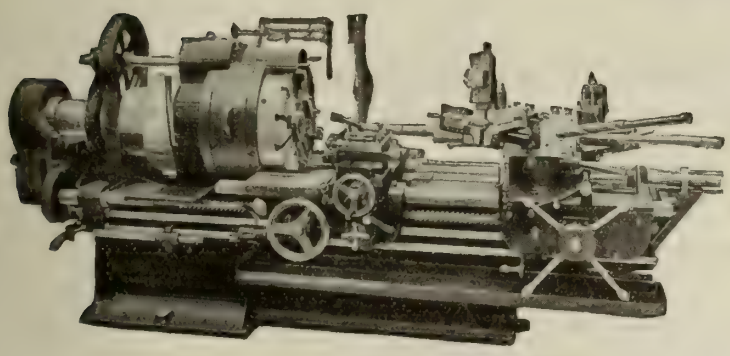
GISHOLT





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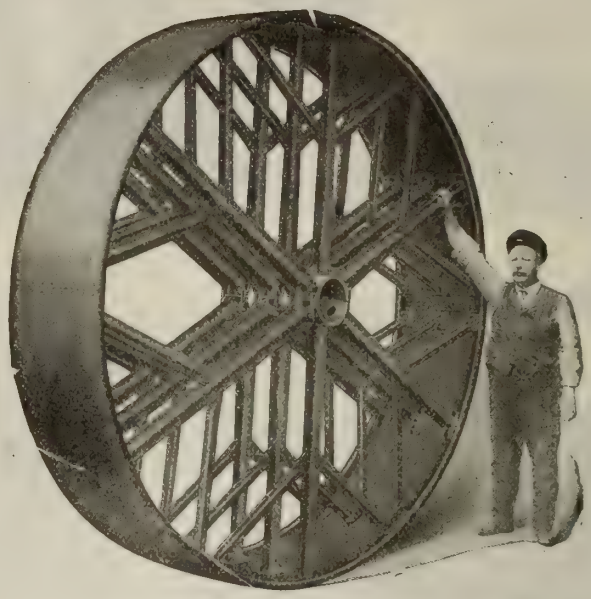

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Fairbanks-Morse Transmissionfor any given purpose means the appliance that will deliver the most power at a minimum loss. Fairbanks-Morse pulleys, shafting, hangers, bearings, belting, friction clutches, binders or electric motors guarantee the fullest satisfaction to the user.

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Vol. XXI. No. 11. March 13, 1919

The New Home of the Ford-Smith Co., Ltd.

Describing the New Plant at Hamilton, Canada, Which is Specially Equipped to Manufacture High-grade Machine Tools, With Millers as the Feature—Safety Lines and System of Power Interchange Are Worthy of Attention

By J. H. MOORE, Associate Editor Canadian Machinery

TO undertake the manufacture of such an established machine tool as millers, requires courage of no mean order, but on top of this to establish a miller business in four years that is recognized as a proven line is a distinct achievement.

Yet that is exactly what the Ford-Smith Machine Company, Limited, of Hamilton, Canada, have accomplished. Not only have they become known as manufacturers of first-class millers, but their increase in business has been so great, that to meet with the new conditions it was necessary that they move into larger quarters.

The Result

It was at this point that P. Ford-Smith, the president of the concern, decided on an entirely new plant, built with the idea of making it an up-to-date shop in every particular, specially arranged and equipped to manufacture milling machines in a broader sense than ever before.

The outcome of the new move was the building of the spacious plant as shown in the accompanying photographs, and a general description of the building itself follows in order to give readers an idea of its general proportion and equipment.

General Data on Size of Plant

The building measures 352 feet by 60 feet, and is of one storey construction, yet so arranged that at any time an additional storey can be easily added. One feature especially that strikes the visitor on entering this plant is the splendid supply of light, for the place is practically a mass of windows, yet no glare is noticeable as the windows are made from mottled material which diffuses the light so that inside the plant it is practically as bright as outside in the open air. While speaking of the light problem, it might be well to mention that individual drop lights are strung for work after dark, each light having a late design of shade which spreads the light in such a manner as to overcome as far as possible the shade problem. In addition to these individual lights, there are placed at regular intervals larger and stronger lights, up nearer to the ceiling. At night the plant presents a very bright appearance, aiding the workmen to carry out their work without undue eye strain. There are also large lights placed down the centre aisle, in fact one cannot help but see that the lighting problem, both by day and night, has been fully gone into.

The Main Office

No expense has been spared in the equipping of this end of the plant. Every up-to-date office necessity has been installed, including dictaphone, adding machine, etc. A special filing system to handle all cuts used for advertising purposes is also in operation, and a brief description of the method employed may help readers in like difficulty.

Each cut is given a number. The artist work of such cut is also given the same number. Page proofs are received, of approximately twelve different machines to a sheet, and the number given to each machine is marked directly underneath its photograph. When desiring to make up an advertisement, these sheets are looked over, the cut desired is easily secured by tracing it from the number underneath, when, on shelves where the cuts are stored, one can in a moment obtain the cut required. Should same not be on shelf, a card will be in its place, showing where the cut has gone, and when it should be returned.

There is also an upper filing system

directly above the toilets. This platform, together with file rack, is used for correspondence, etc., which is not often referred to. A stairway placed at one corner of the office leads to this filing portion.

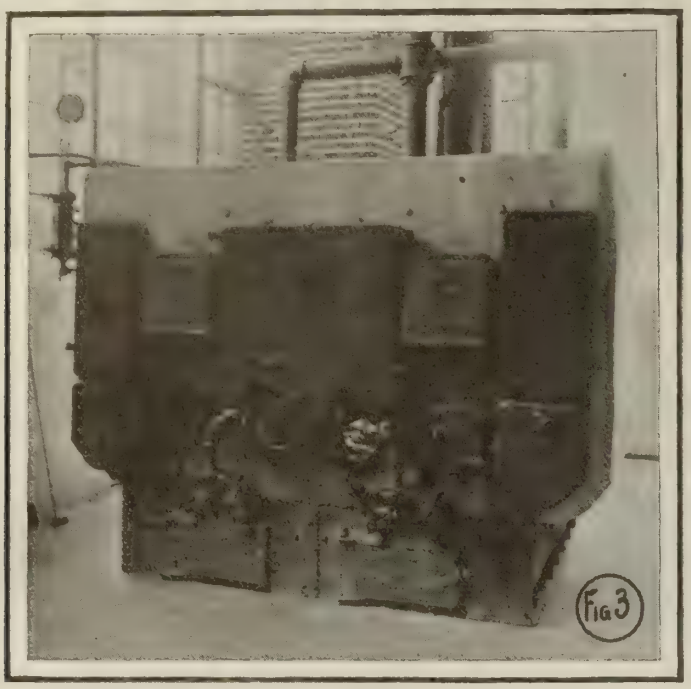


FIG. 3--BOILER ROOM TO THE RIGHT OF THIS PICTURE, AND LOWER THAN FLOOR LEVEL, IS PLACED THE AUTOMATIC ELECTRIC WATER FEED PUMP.

The layout of the plant is such that one can go directly form the main office into the plant, or vice-versa, a passage leading between these two points.

Wash and Clothes Room

The view Figure 7, clearly illustrates that the wash basins are, if anything, slightly larger than the usual style, in fact each basin is used by four men. Clothes cupboards are built all around the wall, and in these the workmen have ample room to hang their apparel.

Drawing Office

Directly above the wash room, and entered into by a special stairway is the drawing office. Once more the splendid lighting scheme is noticeable to a marked degree. Six large windows supply the light for this department. The result is a room bright, and cheerful to work in, something which helps to bring out the best efforts of their designing staff. Separate toilet is also part of the equipment, and three large radiators supply the heating arrangement.

Pattern Storage and Stores Department

Close attention is called to the photograph Figure 4, showing the method of keeping track of store supplies. As will be noticed all parts are stored in separate shelves, and by means of a card system, the store attendant can tell just how his stock stands.

In this way they are assured of keeping their stock up-to-date in all particulars, without any overlapping of orders.

Combined in this room is the pattern storage department. The same system applies to this work. Special shelves and sections are devoted to each style and size of machine. By this means it can be told instantly if pattern required is at foundry, and when it went. Should a change of pattern be necessary, by this means, it becomes a simple matter to know exactly at what period of manufacture such change occured.

General Machine Shop

Entering the machine shop, it is easily seen that system has been used to good effect. Running down the centre of entire length of the building is a crane runway on which are installed three travelling cranes, one of these, three ton capacity, the other two of five ton. All cranes are hand power.

On each side of the shop for a distance of 100 ft. are placed monorail cranes of two ton capacity, these being used for assembling purposes. There is also a three ton hand power travelling crane in the casting cleaning department, so it can be easily realized, the lifting problem has been thoroughly gone into.

The Tool Room

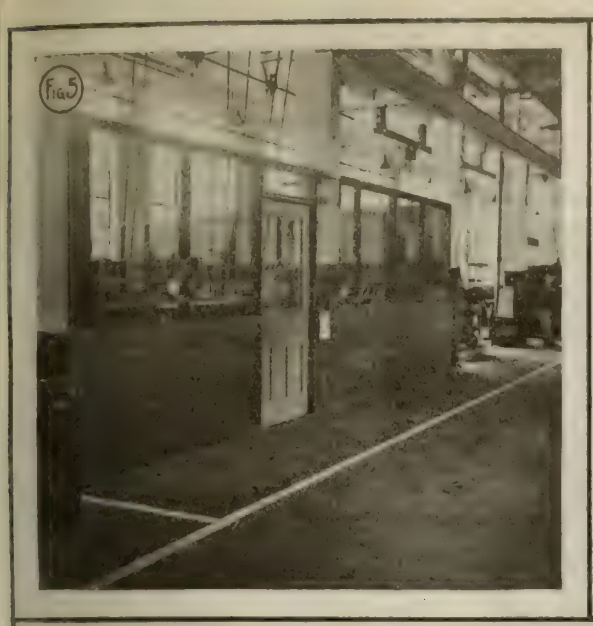
Half way down the shop is the tool room. Figure 5 gives a good idea of its general appearance as it appears from the main aisle of shop. One side of the interior of this room is devoted to the lathe department, tools, etc. Here arbors, dogs, tool holders, and other necessary lathe attachments are to be found systematically arranged.

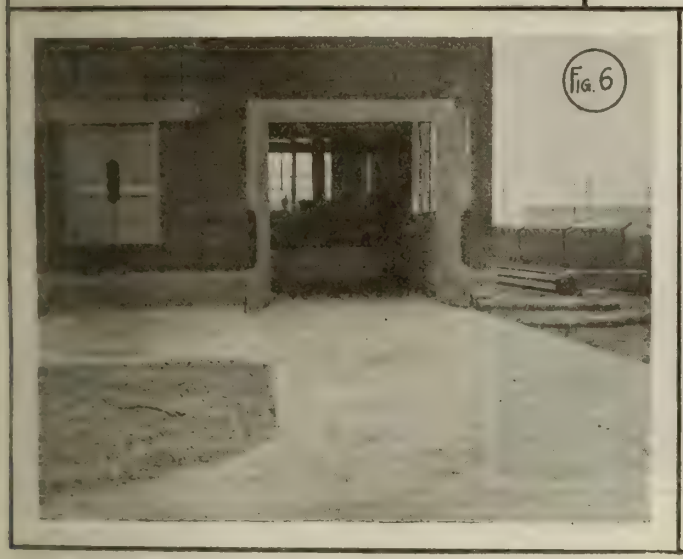
Another wall takes care of the drilling department, all necessary drills reamers, and other required tools being placed in separate shelves and sloping racks. The front wall of tool room is arranged with the usual type of wicket opening, while the fourth and last wall is devoted to a bench, on which all tool repairing is accomplished. A drill grinder, sensitive drill, and universal cutter, and reamer grinder completes the tool equipment.

Shipping Facilities

At the extreme end of the building there is a large shipping platform, made of concrete, with scale bedded in the same. Double doors open directly from

FIG. 4 STOCK STORAGE RACK. NOTE THE SYSTEM OF CLASSIFYING THE VARIOUS ARTICLES.





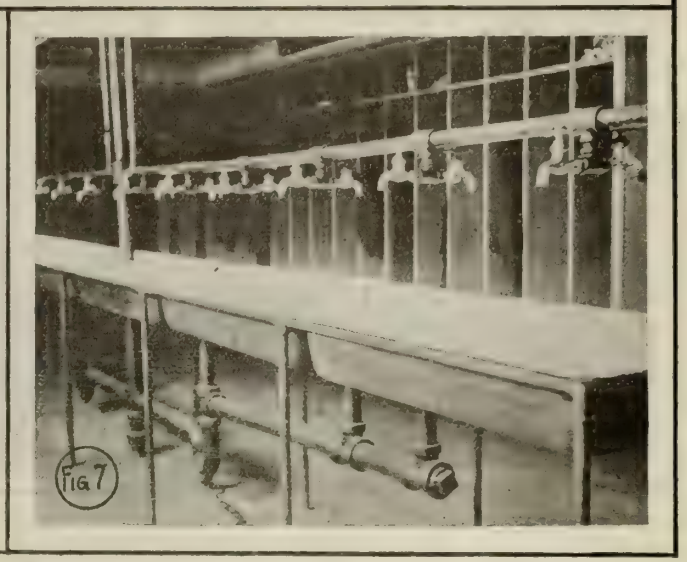


FIG. 5—TOOL ROOM, AS IT LOOKS FROM MAIN AISLE OF SHOP
FIG. 6—GENERAL APPEARANCE OF SHIPPING DEPARTMENT, LOOKING FROM THE OUTSIDE

FIG. 8—CASTING SHED AS IT APPEARS FROM AN OUTSIDE VIEW
FIG. 7—EMPLOYEES' WASH AND CLOTHES ROOM

FIG. 9—A GENERAL VIEW OF LATHE DEPARTMENT

FIG. 10—GENERAL VIEW OF MAIN AISLE OF SHOP. TAKE PARTICULAR NOTICE OF SAFETY-FIRST LINES

this platform to the railway siding, while another set of doors open to the street, to allow teaming, and trucking to enter. The photo , Figure 6 shows clearly the view of the latter mentioned entrance as it appears from the street. Readers will notice the smaller door, for the light delivery waggons.

Heating Arrangement

Figure 3 illustrates the heating system, the same being a Spencer boiler, with automatic water feed electric

pump. The automatic feature of this pump is well worthy of attention.

About 10 ft. from the floor on a post near the boiler are placed two lights, the lower one being white, the upper red. These are connected as follows: The lower light must at all times keep burning, it being connected to the shop system of power. The fact of its being lighted illustrates that the power line is O. K.

The upper red light, if the pump is operating properly, should light every 7 minutes, and stay lighted about half a minute. Should it stay alight for more than this time, it shows that there is too much water in the boiler, on the other hand if it don't light every seven minutes there is not sufficient water in the boiler, and of course a great danger of the tubes burning out. The idea of the upper light being red, is in order that it can be easily noticed from any part of the plant, for immediately on its lighting the red glare in contrast to the white below is clearly noticeable.

The whole system is electrically controlled, a clapper box being also attached to the same post as the lights. The pump itself is placed in a pit, underneath the floor, and covered in with special hinged cover, so no obstruction is placed around the boiler whatsover.

Directly outside the boiler section, are constructed the coal sheds, which make it very convenient for the engineer. Radiators are hung all along both the east and west walls of the factory.

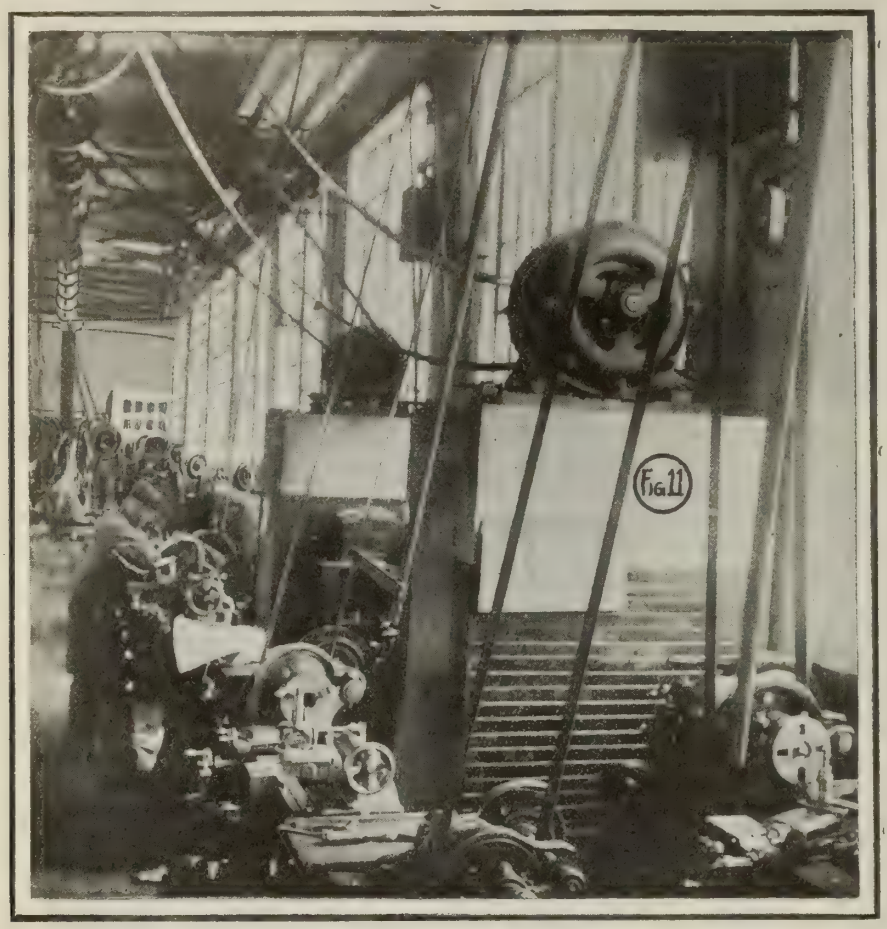


FIG. 11—VIEW SHOWING THE MOTORS OF BOTH HYDRO AND CATARACT POWER. NOTE, THE ONE BELT IS NOT IN OPERATION

Lathe Department

Another noticeable feature is the system of machine grouping adopted, and this is noticed particularly in the lathe department, Figure 9. Here are placed complete batteries of lathes, but not haphazard as unfortunately is usually the case. System has been used to splendid advantage in this work, for each lathe has its proper position in relation to the operations, as they follow through the shop.

The turret lathes have their special corner, while the various type of lathes, as used, each have their proper place, and work to do. Such an idea as this is well worthy of more attention than is usually given by manufacturers starting up a new plant. Before a machine was ever moved into this building, there was drawn up a plan view of the building. Each machine was measured to see what floor space it would occupy. Small pieces of cardboard were cut to suit the shape of machine, on the same scale as the drawing was made. When all machines had been accounted for each piece of cardboard was marked what particular machine it represented, for all machines have what is known as a shop number. Next an ordinary pin was placed in each machine outline, and the juggling commenced.

For over a week, each executive head had a shot at the scheme, all moving the machines around as a new thought struck them, after which a discussion started as to why the change had been made. Its advantages or disadvantages over th former position were properly threshe cut.

The result of course was a foregon conclusion, namely that at the finish the had an ideal arrangement, each mach ine being in its best possible positior True some time was spent on this idea but it's much easier to move a piece o cardboard than a machine, countershaf and all, so readers, especially if consi ering a new plant, will do well to thin this idea over carefully.

The Floor

Another point worth while is the con struction of the floor. A cement bed ding is provided, with hardwood strip about 2 in. to 3 in. width on top of thi cement. Such a floor stands up wel under use, and is easy on the workmen' feet. At each radial drill is a large pit cemented all around, and covered whe not in use by a trap door, with run attached, so that to lift the door up i the matter of a moment's work.

Toilet Arrangement

This usually neglected portion, has i this case received special attention. Th sanitary feature has been kept to th fore. All toilets are of a one piece por celain design, the complete bowl being i one piece only,—with no wooden seat Each toilet is a separate compartment and all necessary attachments are pro vided. Automatic flushers are also par of this portion of the plant.

Yard and Its Uses

To the west of the building is a larg spacious yard, which is used for genera storage purposes. It is here that th larger castings are placed and seasoned before they are allowed to be machined In this yard are also built the cutting-off department, the forging department and the small carting storage racks and shed.

The Cutting-Off Department

In this building are placed hack saws of various. The material used is stored in special racks for the purpose, each size being in its own particular rack. Their method of handling this work is also worth the reader's attention. The operator of this department, receives instructions for sufficient steel for some particular size of miller, suppose for example we say the No. 2 size, and that there are twelve machines on the order.

He has special steel cutting specification sheets, which show him all the steel pieces used on this size of miller, also their length and size. He simply multiplies this by twelve, and goes ahead and cuts off all his material as required. It is then tagged before going out to the shop.

At Figure 8 is shown the small casting shed with the storage racks in the foreground. It will be noted that this building is of corrugated iron construction. In here are racks, and shelves to aid the storing of these smaller castings, so that when required they are easily obtained. The method of arranging them will be taken up in a later article in CANADIAN MACHINERY.

Continued on page 257

Shop Arithmetic—Underlying Principles

The Beginning of a Course in Practical Mathematics For the Mechanic and Those Learning the Machinists' Trade—The Present Article Deals With the Principles Upon Which Arithmetic is Based

By J. H. RODGERS

IN the present day of remarkable industrial progress it might be surprising to know that a very great number of the mechanics that are directly responsible for these achievements are, to a large extent, non-conversant with the elementary requirements necessary for their successful attainment. Many present-day workmen are relatively well informed regarding the more practical side of their daily mechanical duties, but a comparatively small number have a very wide conception of the fundamental essentials that are prime factors in the ultimate evolution of mechanical movements. It may be true that modern manufacturing methods eliminate, to a large extent, the necessity of the average workman acquiring the technical knowledge that forms the foundation of the engineer's position, but it is this very condition that adds to his dependency and prevents him from grasping the opportunity that might present itself if he was better acquainted with some of those technical details, which to him are frequently a source of annoyance owing to his lack of understanding.

An indisputable fact that is quite evident in present day industrial life, is the large number of workmen, some of them expert mechanics, that are unfamiliar with the mathematics pertaining to the work that they are called upon to perform daily. It may be said that a knowledge of such details is not necessary for the workman in order that he may be able to perform the duties in hand. This may be perfectly true—for him—but nevertheless that very knowledge is the keystone that maintains the equilibrium of every mechanical accomplishment. Without it work may be performed, but of a character remote from engineering practice, for even the most insignificant detail of mechanics might well be considered an impossibility if disassociated from what is termed the technic of the profession. Virtually, no part of mechanical enterprise is possible of accomplishment without the application of figures or calculation, in some form or other. Higher mathematics are not essential for the average workman, but it is highly desirable that every apprentice and mechanic should become familiar with the elementary theoretical principles and the calculations that underly the actual performance of the work.

In the preparation of a course in practical shop arithmetic it will be necessary to start at the beginning and gradually advance through the preliminary stages so as to make the student familiar with those elementary principles that are essential to the solution of every shop problem that may in any way require the application of figures for its successful completion. In the compilation of this series it is the intention of the author to deal with the matter in such a manner that the average workman will be able to follow the studies with comparative ease as the examples will, as far as possible, be confined to the solution of practical problems that are continually met with in every-day machine shop practice. In connection with this series of instruction papers it is also intended to provide a number of charts that will contain in condensed form the actual data and formulae that are required for the solution of all the problem of a like character to those dealt with in the course. These charts will be of uniform size so that they may be cut out, if desired, and kept in a suitable file for ready reference, making as it were, a loose-leaf text book.

It is supposed that the student is quite familiar with the rudiments of mathematics, such as the four elementary stages, namely, addition, subtraction, multiplication, and division. These details therefore will not be dealt with in their entirety, but in order that the course should leave nothing to be guessed at, a brief summary of these fundamentals will be given.

Every whole (integer) number will have one or more characters (figures) and the value of these figures depend upon the position they occupy in the number. Numbers are divided into groups of three figures each, each group having a term to signify its vadue. These groups are units—thousands, millions, billions, trillions, etc. Each group is subdivided into units, tens and hundreds of its respective term, as shown in Chart 1. The lower line of small figures in this chart represents the position of each term in the number. The portion of a number to the left of the decimal point is called the integer or whole number, while the portion to the right is termed the decimal part of a unit of which the number is composed. The treatment and disposal of the decimal part of numbers will be taken up later. In reading a number (termed numeration) that has been expressed in figures, it is well to divide the number into divisions as shown in the chart, commencing at the right or unit position, and having three figures in each division. This can be done mentally and quite accurately after the student is accustomed to large numbers, but it is advisable for the beginner, and in fact at all times, to make some significant mark to distinguish the value of the number. After marking the number off into divisions, start at the left and express the figures indicated as though they were units of the primary division and then give them their proper term value; continue this process until the number is finished. Thus:

87423

which would read, eighty-seven thousand, four hundred and twenty-three. Or:

306028

would read, three hundred and six thousand and twenty-eight.

The integral portion of the number in Chart 1 would read: Six hundred and fifty-four trillions, three hundred and twenty-one billions, nine hundred and eighty-seven millions, six hundred and fifty-four thousands, three hundred and twenty-one.

The simplest form of calculation, apart from the actual notation and numeration of the figures, is the process of addition —or finding the sum of two or more numbers. To reduce the amount of work in all mathematical problems, the adoption of certain signs and symbols have been of material assistance in solving questions more rapidly and accurately. In order that accuracy be assured it is advisable to maintain a systematic arrangement of the figures when calculations are being carried on. This is imperative in the case of young students to prevent mistakes that may frequently occur from the irregular placing of the figures when working out a problem. In addition and subtraction extreme care should be taken to place the figures under each other and in the position so that digits of the same power value will be in the same vertical line; units under units, tens under tens, etc. It is difficult to state any fixed rule for addition, as accuracy and speed are only acquired by constant practice and application. In adding up a column of figures it is often of advantage to group the figures in the process. This can be done mentally.

Subtraction is the process of finding the difference between the two numbers and is so simple that further explanation here is unnecessary.

Multiplication is the process of adding a certain number to itself a stated number of times, but it is not performed in the same manner as ordinary addition. For instance, suppose we desire to find the total weight of 18 shafts, each weighing 55 lbs. this could be done by placing 55 down eighteen times and adding, but it is quite evident that the process would be very tedious and entail considerable

effort. When multiplying extract numbers, the lesser of the two is usually taken for the multiplier, as

```
 426        3
  23        5
 1278   3 x 5 = 15   6
 852
 9798       6
```

but with concrete numbers it is good practice to arrange the numbers so that the product and the multiplicand are of the same denomination. For example, in the above problem, where it is desired to find the weight of the 18 shafts, the question would be arranged thus:

```
55 x 18  or   55 lbs.
              18
             440
              55
Total Weight 990 lbs.
```

The same would apply in the case of finding the circumference of a pulley 22 inches in diameter, as it is inches that is required. However, the process of multiplying can be reversed to shorten the work, thus:

```
4          2.2          in.
6          3.1416
           62832
4 x 6 = 24
6          62832
6          69.1152
```

in which the constant 3.1416 is multiplied by the number 22. The constant 3.1416 is the ratio of the circumference to the diameter of a circle.

Division is the reverse of multiplication and is the process of finding how many times one number is contained in another. Division is usually performed by one of two methods—short or long division—the first generally adopted when the divisor contains one digit only. A bar 11 feet 4 inches long is to be divided into eight equal pieces; what will be the length of each piece? The solution is as follows:

```
 11'   4"      8)136 in.
 12                17 in.
132
  4
136 inches
```

Suppose, however, that 38 uniform castings have a total weight of 1,824 lbs., and it is required to find the weight of a single casting. In this case it would be necessary to use the method known as long division:

```
      2   6   3
38)1824(48
   152
    304
    304
(2 x 3) + 0 = 6
```

COURSE IN PRACTICAL SHOP ARITHMETIC
CHART I.

1.

Trillions.			Billions			Millions.			Thousands			Units											
Hundreds of	Tens of	Units of	Hundreds of	Tens of	Units of	Hundreds of	Tens of	Units of	Hundreds of	Tens of	Units of	Hundreds of	Tens of	Units of	Decimal	Tenths	Hundredths	Thousandths	Ten Thousandths	Hundred thousandths	Millionths
6	5	4	3	2	1	9	8	7	6	5	4	3	2	1		1	2	3	4	5	6
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		1	2	3	4	5	6

An **abstract number** is one that makes no reference to a quantity or object— as three (3), eight (8), fifty-six (56), etc.

A **concrete number** is one associated with an object to designate its value—as three (3) days, eight (8) pulleys, ninety-four (94) feet, etc.

Notation is the practice of expressing numbers or terms by means of figures, letters or symbols.

Numeration is the science of reading numbers or terms that have been expressed in figures, letters or symbols.

A **whole** number is called an **integer** number.

The value of a figure depends upon its position in the number.

When standing alone it has a **unit** or **simple** value.

When part of a number the value is **local** or **relative** and is determined by its position.

The extreme right hand figure of an integral number is in the unit position; each position to the left increasing the relative value ten times that of the position immediately to the right.

Addition is the process of adding together two or more numbers.

Subtraction is the process of finding the difference between two numbers.

Multiplication is the process of multiplying one number by another, or adding one number to itself a certain number of times.

Division is the process of finding how many times one number is contained in another, or subtracting a number from itself a certain number of times.

2.

ARITHMETIC.

Addition — Proof.

```
 986245   34   7
  70231   13   4
   8206   16   7
  98320   22   4   26   8 (a)
  56035   19   1
   2874   21   3
1221911   17      8 (b)

a = b
```

Subtraction — Proof

```
8305624   28   10   1   (a)
 596258   35    8      (b)
7709366   38   11   2   (c)

If (a) is less than (b) add 9 to (a)
a - b = c  or  c + b = a
```

Multiplication — Proof

```
 468235   28   10   1 (a)
  42791   23    5   (b)
 468235
4214115
3277645        5 x 1 = 5
 936470
1872940
20036243885   41   5   (c)

a x b = c
```

Division — Proof.

```
21  3 (a)   26  8 (b)   22  4 (c)
6285)4327091(688
     37710
      55609
      50280
       53291
       50280
        3011   5 (d)

(a x c) + d = b
```

The letters a-b-c-d, in every case, represent the final remainder after extracting the "nines".

Signs and Symbols

+ (plus) = (equals)
13 + 8 = 21
13 plus 8 equals 21

```
 7254   0
  386   8 } 13   4
 1490   5
 9130       4
```

Explanation of the proof:—
Add the digits in each number
Extract the nines
Add the figures thus found.
Extract the nines
Rem (b) should equal rem. (a)

− (minus)
42 − 18 = 24
42 minus 18 equals 24

```
minuend      86754   3 } 7
subtrahend   24836   5
remainder    61918   7
```

Add digits and extract nines

Remainder (a) minus rem. (b) should equal rem. (c)

× (times)
4 × 8 = 32
4 times 8 equals 32

```
multiplicand   8251   7
multiplier       23   5
              24753
             16502     5 x 7 = 35 · 8
product     189773 . 8
```

Add digits & extract nines

Rem. (a) multiplied by rem (b) should equal rem. (c)

÷ (divided by)
18 ÷ 6 = 3
18 divided by 6 equals 3

```
        dividend
5                1
divisor 23)864 0 (37 quotient
           69
           174
           161
4           13 remainder
```

Add digits & extract nines

Rem. (a) x (c) added to rem. (d) should equal rem. (b)

CHART 2

In what has been explained so far, and in fact in all calculations, the accuracy of the work depends very largely on the concentration of the student and the knowledge and speed he has acquired in the mental use of the addition and the multiplication tables. However, the work on many mathematical problems can be readily checked to test their accuracy. Probably the most simple and effective method is that of "casting out the nines." In the case of addition the digits in each number are added and the sum divided by 9, the remainder being placed to the right of the number, as shown in Chart 2. This is done with each number in the sum and the remainders added together, and this sum again divided by 9, the final remainder being placed to the extreme right. The same process is followed with the answer and the remainder should correspond with that previously found. If not, the addition is incorrect.

Subtraction may be proved by adding the subtrahend and the remainder, or by casting out the nines as shown in the chart.

In multiplication the final remainder (by cross addition and subtraction) of the multiplicand and the multiplier, are multiplied, and the "nines" extracted; the remainder should correspond with that found in the product.

In division the proof is found by adding the remainder in the remainder to the product of those found in the divisor and the quotient; the result, after extracting the "nines" should coincide with the remainder as found in the dividend.

This process of proving calculations may seem long and complex, but once the student is familiar with the method, the time required is insignificant. As a matter of fact, the application of the proof can be greatly simplified by a mental process of extracting those digits that have nine or a power of nine for their aggregate sum. For instance, in the multiplication problem in Chart 2, it will be seen that, in the first line, 5 and 4, 6 and 3 can be eliminated, leaving 8 and 2, which will leave 1 after extracting the nine. In the second line, 9, 2 and 7 can be eliminated, leaving 4 and 1, that total 5. The same with the product 3 and 6, 2, 4 and 3, 8, 8 and 2 can be eliminated, leaving 5. The two remainders being equal proves the correction of the work.

PERFECTION IN DISINFECTANTS

It is stated that since the New York Department of Water Supply added a small amount of chlorine to the water not a single case of typhoid fever has occurred which could be traced to the city water. A far more remarkable achievement in water purification, however, is presented by the equipment devised by British chemists for the use of the army in France. It was so perfect that an equipment on a barge could pump foul water from a canal and deliver it in large quantities purified for drinking purposes. In view of the New York success, it is proposed that chlorinated water be used for sprinkling the streets to prevent the spread of infection. This proposal has been anticipated to some extent by the Poplar Borough Council in the east end of London which for many years has provided, under the direction of the Medical Officer of Health, free supplies of such disinfectant produced by an electrical process. It is freely used for public baths and washhouses, for cleaning hospitals and other public institutions, for flushing drains, and for other sanitary purposes. Electricity is passed through a solution of certain salts, converting the liquid into an effective non-poisonous disinfectant which can be stored unimpaired for long periods.

PREVENTING DISTILLATION

It is highly important, in burning soft coal, to avoid distilling off its volatile constituents so that they can pass out through the stack without burning. Some coal contains enough tarry or oily matter of this kind to give it an almost greasy character. Coal gas is produced by heating such coal in a closed space or retort; and by reflecting upon this fact some idea may be had of the cost of distilling the volatile portions of such coal wastefully in a boiler furnace. To avoid losses of this kind so far as possible, care should be taken to feed the coal into the furnace in small quantities, to keep the fire fairly bright at all times, and to see that sufficient air is introduced to permit the volatized constituents to be properly consumed. When these volatile constituents escape unburned, they are usually accompanied by smoke; and the rich yellowish color that is often seen at the top of the chimney when burning bituminous coal is a sure indication of their presence in considerable amount. The yellow hue is often masked, however, by the dense black smoke that may be given off at the same time. In a rough way it may be said that freedom from yellow or black smoke shows that no very large quantity of volatile matter is being distilled unburned; for while this test is not altogether accurate, it is good enough to be of material help to the fireman in bad cases.

A NEW SYSTEM OF ELECTRIC PLOUGHING

Several methods have been devised for applying electric haulage to ploughs, and the latest is a British invention which shows great originality and ingenuity. It serves three purposes, ploughing, drainage and transport.

An inventor proposes that overhead tracks shall be erected on A-shaped steel or ferro-concrete frames so as to form parallel lines on opposite sides of ground to be cultivated. On each track is an electric traveller with a winding drum which hauls on an endless rope to which the plough or other implement is attached. By making the implement double-ended it can be hauled backards and forwards without turning at the end of each journey. Underneath the line of A-shaped frames is constructed the main concrete drain; and the digging of mole drains leading into the main drain can be carried out by a draining machine hauled in the same way as the plough. By extending the system of overhead tracks they may be used to carry materials and produce between the field and the farm or the main road. Where the ground is undulating the level of the track is preserved by making the supports longer or shorter as required. Although this equipment may seem costly, it is not so in effect, as it includes drainage and transport and renders hedges, ditches, and roads unnecessary. The use of electric power also cuts out the necessity of carting fuel or water for field operations. For intensive cultivation on modern lines this well-thought-out invention should have a most interesting future.

THE NEW HOME OF THE FORD-SMITH CO.

Continued from page 254

Figure 10 illustrates the general appearance of the centre portion of the shop, looking from the shipping platform end. While at this view it will not be amiss to call reader's attention to the Safety First lines marked plainly in white, for the entire length of the shop.

All castings or material of any sort must be kept clear of these lines, so that at all times there is a clear, safe passage down through the plant. This same system of clear space lines apply to all doorways, for an ample space is marked at these points also, and there is trouble if the workmen don't keep up to the agreement of keeping spaces clear. If a workman carelessly leaves his casting over the mark, it is easily traced to him, and a call down is in order.

Another special feature, is their novel method of playing safe as regards the power question. Hydro, and Cataract power are both procurable, and as it sometimes happens that one or other is out of order, they have a double motor system, so that should either of the powers give out, there is the other motor to fall back on, which merely means that one belt is knocked off, and the other placed on. Figure 11 clearly illustrates the scheme as both motors can be plainly seen, and it will be noted that one belt is at present off, while the other is in operation. The heading of this article illustrates the general appearance of the plant as it looks from the main thoroughfare.

The entire Ford-Smith plant is erected with the idea of equipping, especially for the manufacture of high grade machine tools, with their millers as the feature tool and in a further article in CANADIAN MACHINERY we will take up the subject of Ford-Smith Millers, their construction and method of manufacture.

WELDING AND CUTTING

Characteristics of Oxy-Acetylene Welds

The Author, in a Paper Recently Read Before the Institution of Mechanical Engineers, Gives Some Valuable Data Gathered From His Own Experiments Regarding Physical Properties of Welds

By J. H. DAVIES, Central Technical School, Leeds

IT IS well known to every one who takes an interest in autogenous melting and welding processes, that the existing opinion as to the value of the processes, and the practical results obtained differ widely. The chief ground for the uncertainty that exists in regard to them lies in the fact that these new processes have only recently been introduced in industrial practice, and rest entirely upon empirical bases. Although oxy-acetylene welding is now extensively practised and is of great theoretical and practical interest, it has never been made the object of systematic and exhaustive research.

The author has had eighteen years' experience in the welding process and has made exhaustive tests and long studies, not only of what is being done in this country, but also of the progress made, both in the United States and Germany, the latter country being far more advanced than Great Britain in the oxy-acetylene process. They have carried out systematic and exhaustive researches, their operators are scientifically trained, they are taught metallurgy and chemistry, including the chemical compositions and melting points of all metals and oxides; they make test-pieces for experimenting with chemical and mechanical tests, and by microscopic and macroscopic examinations, both of the melted zone and the neighboring parts. Their welding as a rule is very neat as they are not allowed to execute commercial work until they have become fully proficient and competent.

The author has undertaken many investigations in the oxy-acetylene processes on autogenous welding of various metals in general use; in doing so he has endeavored to adhere as closely as possible to conditions which accompany ordinary works' practice. The oxy-acetylene processes when properly worked possess numerous marked advantages over all others. In the first place, the operating flame can be easily controlled, and the temperature attained at various zones can be readily regulated.

In the second place, the work can be readily accomplished owing to the high temperatures reached (3,500° C). The appliances are easy to handle and reliable in operation.

The most important conditions for securing good results are:

(1) The use of the purest acetylene possible.

(2) The use of a blow-pipe so designed as to ensure accurate adjustment in the proportion of the mixed gases, and to secure their exit at a velocity capable of maintaining the metal sufficiently fluid without the melting flame being too rigid.

(3) The use of an absolutely pure welding-rod.

(4) The provision of an absolute neutral zone in the melting flame, neither oxidizing nor reducing.

(5) The edges must be free from all impurities, and if over 33-16 inch thick the edges must be bevelled; if over ⅜ inch the edges must be bevelled on both sides.

(6) The use of deoxidizing agents eliminating the oxides in view of unavoidable oxidation of the metal subject to the melting process. It is necessary to bear in mind the relation between the melting points of the oxides and that of the metal itself, which is a most important matter.

(7) Rapidity in melting in order to avoid excessive heating which will not only alter and deteriorate the original structure of the metal, but would even favor the occlusion of gas, particularly hydrogen), and so occasion the formation of blow-holes in the melted zone.

In addition to these considerations, care should be taken to see that no sudden cooling takes place. The conditions may have to be modified on account of the conductivity and specific dilation of the material, as well as to the relation to thickness, size, and shape of the pieces operated upon.

These precautions were observed in the author's experiments, and particular attention was given to the changes in chemical composition and mechanical properties, by careful examination of the melted zone, and the structure of the welded material was compared with that of the original. Experiments were, moreover, carried out on molten metals both before and after subjection to mechanical stresses, in order to ascertain to what extent, if any, the various constituents are influenced by the process. The researches were further carried out on the mechanical properties of various steels when subjected to the strong heat of the flame, without being melted, and for the same period of time as might be required for the autogenous welding of the same sized pieces.

The first experiments were carried out on boiler plate 0.393 inch thick, of which the chemical composition was as follows:

	Per cent.
Carbon	0.105
Manganese	0.510
Silicon	0.024
Phosphorus	0.025
Sulphur	0.053

The welding-rod used was pure Swedish charcoal iron, ¼ inch diameter, practically free from sulphur and phosphorus.

After the samples were welded, some were cooled in air, others went under special heat treatment and mechanical operations, finally mechanical tests were made on rough unmachined samples; before and after mechanical tests a piece of metal was taken from the melted zone and from the neighborhood of the weld for microscopic examinations, Table 1 as follows:

A second series of the same nature were carried out on round bars of mild steel. The chemical compositions were:

	Per cent.
Carbon	0.119
Manganese	0.620
Silicon	0.023
Phosphorus	0.666
Sulphur	0.062

The welding-rod was of Swedish charcoal iron wire ¼ inch diameter. The experiments were carried out as for the first series, except that for mechanical tests the pieces were machined to 0.472 inch diameter, this being done to compare the quality of several welds. The results are given in Table 2.

A third series of experiments were made on medium-carbon steel, using 1.022 inch diameter, machined to 0.475 inch diameter bars, whose chemical composition was as follows:

	Per cent.
Carbon	0.700
Manganese	0.930
Silicon	0.190
Phosphorus	0.049
Sulphur	0.057

Welding-rods were used containing 0.600 per cent. carbon, and during the welding a deoxidizing and descorifying powder was used, consisting essentially of sodium carbonate, Table 3:

TABLE I

Sample	Orig. Thick.	Mach. Thick.	Thermal Treatment.	Break Stress	Elongation on 2 inches	Metal	Welded Zone.	Cold Bend.	Notes.
				Tons per sq. in.	Per cent.	Per cent	Per cent.		
1	0.393	0.236	(Heated and cooled) in air.	23	16.6	....	....	....	(Subject to high temp. of flame. Not welded.)
2	0.393	0.236	(Heated and tempered to 900° C. for 20 mins.)	23	19.7	....	....	....	Do.
3	0.393	(Not mach.)	Welded only.	19	5.8	(C. 0.125 Mn. 0.40 Si. 0.047	C. 0.07 Mn. 0.32) Si. ....)	....	(Broke through weld) (Grain coarse.)
4	0.393	0.236	Do.	....	....	....	....	(180° without trace of flow.)	....
5	0.393	(Not mach.)	(Not hammered, weld slowly cooled.)	23	13.5	....	....	....	(Broke at weld. fine.) (Slightly fibrous structure.)
6	0.393	0.236	Do.	22.8	14	....	....	(180° without trace of flow.)	....
7	0.393	0.236	(Welded and air-cooled.)	....	....	....	....	(160° flow at weld.)	....
8	0.393	0.236	(Tempered 20 mins. to 980° C.)	23.4	10.5	....	....		(Broke at weld. Grain Coarse.)

TABLE II

Sample.	Thick. Orig.	Thick. Mach.	Thermal Treatment.	Break Stress.	Elongation on 2 inches	Metal. Per cent.	Weld Per cent.	Cold Bend.	Notes
				Tons per sq. in.	Per cent.				
1	0.786	0.472	(Tempered to 900° C. for 20 mins.)	28.7	30	....	....	....	Not welded.
2	0.786	0.472	(Heated to incipient smelting of surface.)	27.4	28.5	....	....	....	Do.
3	0.786	0.472	Slowly cooled.	26.2	1.3	(C. 0.125 Mn. 0.40 Si. 0.0	C. 0.08) Mn. 0.29) Si. ....)	....	(Broke at weld.) (Rough granular structure.)
4	0.786	0.472	(Heated and hammered slowly. Cooled in air.)	24.6	10.0	....	....	....	(Broke at weld.)
5	0.786	0.472	(Annealed 900° C. for 40 mins. Cooled slowly.)	27.0	29.0	....	....	....	(Inner, fine. Outer, coarse grains.) Broke outside weld.
6	0.786	0.472	(Hammered hot. Annealed 900° C. for 40 mins.)	27.4	26.3	....	....	....	Do.
7	0.786	0.472	(Preheated and hammered twice. Two consecutive anneals. Slow cooled.)	27.4	29.2	....	....	....	Do.

TABLE III

Sample.	Orig. Thick.	Mach. Diam.	Thermal Treatment.	Break Stress.	Elongation on 2 inches	Weld	Metal.	Cold Bend.	Notes
				Tons per sq. in.	Per cent.	Per cent.	Per cent.		
1	1.022	0.473	Heated and cooled.	54.3	13.6	....	....	....	(Subjected to high temp. of flame. Not welded.)
2	1.022	0.473	(Heated and tempered to 900° C. for 20 mins.)	55.9	16.1	....	....	....	Not welded.
3	1.022	0.473	(Slowly cooled after welding.)	37.8	2.1	....	....	....	(Broke at weld. Rough grain structure.)
4	1.022	0.473	(Heated and hammered after welding. Cooled in air.)	36.2	0	(C. 0.60 Mn. 0.91 Si. 0.20	C. 0.28) Mn. ....) Si. 0.10)	....	Do.

Summarizing these observations on carbon steel shows that:

(1) The violent heating and the sudden melting undergone by the metal profoundly alter its quality.

(2) The alteration in the mechanical qualities (tenacity and elasticity) cannot be remedied by simple hammering on the melted zone which often proves to be most injurious to high-carbon steels, but must be coupled by proper thermal treatment, such as annealing carried on for thirty or forty minutes; further quenching has also the greatest influence on high-carbon steels.

(3) A remarkable influence on the mechanical properties is to be attributed to cooling processes, the slowest cooling being the best and most efficient.

(4) Apart from the alteration in mechanical properties, very important modifications take place in the chemical constitution; these changes consist chiefly in diminution in the percentage of carbon, silicon, and manganese, but the author thinks that this defect may be modified by using a welding-rod with a higher percentage of these oxidizable elements.

For those familiar with the oxy-acetylene welding and cutting process, it is not difficult to appreciate its varied applications and important advantages, especially in time of war, and the author feels quite justified in saying that the present war has given a stimulus to oxy-acetylene welding, which ten years' ordinary industrial progress would never have done.

The ease and rapidity with which experienced welders can carry out repairs *in situ*, and the portability of the plants, make the process valuable, if not indispensable, at the front. The service rendered by this process in the many workshops attached to the armies is particularly valuable, where the welding of articles of all kinds is a daily necessity.

The oxy-acetylene process occupies a leading place in the aeroplane and airship industries; it has the advantage over all other systems of joining, in diminishing the weight of parts, so that parts previously made from wood or aluminum castings are now made both

lighter and stronger from sheet and steel tube. The frequent repairs to engines and other details, including the repair of cracked cylinders and broken aluminum crank and gear cases further emphasize the new power the process offers to the aircraft industry. Further, the value of cutting with this process has no rival whatever, and the ravages of warfare open up an extensive field for it, both during and after the termination of the war. The demolition of bridges and steel structures blown up by the Allies or enemies is an important application of this process. The cutting of armor plates again emphasizes its unique field of usefulness.

The oxy-acetylene flame has recently been applied to the case-hardening process, and some firms are using this on a large scale. It is well known that the flame containing an excess of acetylene is a very energetic carbonizer. If the flame is held for a period of two minutes on the white-hot surface, a hardness equal to that obtained with the most energetic case-hardening mixtures is obtained; if this is prolonged from five to ten minutes, it will penetrate to ⅛ inch depth.

The many advantages oxy-acetylene has over other processes may be summarized as follows:

It can be applied to almost any class of work; it can weld 30-gauge steel or 1½ inch thick boiler-plate; it can cut mild steel up to 24 inches thick, and it will weld any commercial metal such as cast-iron, aluminum, copper, bronze, lead, zinc, etc.

In the repair of broken machinery and parts, it has no rival, the repairs can be executed quickly, and many repairs may be executed without dismantling, the cost in many cases is infinitesimal, compared to the cost of a new part.

It can now be used with advantage, in the manufacture of safes, tanks for oil, caustic soda, or other solutions, the jointing of pipes, steam-superheaters, metal casks, petroleum barrels, artistic ironwork, adding metals to parts worn by friction, filling up holes or parts of new structures cut away in error, welding of tool-steel ends to common steel bars for turning and cutting tools, the welding of copper, brass or iron tubes.

The equipment is extremely portable and can be used within a few minutes of being loaded, the power of the heating flame can be far more accurately regulated than electric current. The flame can be used for preheating, hammering, and annealing after welding, thereby insuring a uniform soft metal, a method not practicable in the electric process.

In the welding of light sheet steels it has an unrivalled field; with 24-gauge metal, 45 feet per hour can be welded, with a consumption of only 4 cubic feet of oxygen and 3 cubic feet of acetylene. On the other hand, when the metal reaches ⅜ inch thick or over, electric welding has the advantage both in speed and cost.

When the process of oxy-acetylene welding was first introduced into this country, its apparent simplicity led many engineers wrongly to assume that welding appliances might be regarded as general workshop tools, which any inexperienced but handy man could operate with success; consequently much work has been condemned wholesale because of defects in the weld, but the author would emphasize that this is not the fault of the process, but of inefficient workmen. To-day the business has grown beyond the limit of personal supervision, and the necessity for organized instruction of operators is becoming more and more obvious, both in the interests of workmen and employers.

Welding schools are now established in various centres, and a stream of fairly qualified welders is already flowing from these schools into workshops. They teach the students under practical conditions of the kind of flame for different work, the principles under which the blowpipes are constructed, the way to handle them, and a variety of practical and technical points which are bound to be most helpful to them in their subsequent career. No man should be regarded as a competent operator until he has a clear and intelligent understanding of all points appertaining to the process; he should be a fair metallurgist and chemist, and know the melting points of all metals and oxides and chemical compositions, and be conversant with mechanical and thermal tests.

There are estimated to-day to be not less than 30,000 employees in this country working the process of oxy-acetylene welding; 20,000 of these entered the field since the war began. Of the total number 90 per cent. are not fully skilled, that is, they are incapable of executing satisfactory welds on all metals, being mostly employed on sheet steel work for war purposes. The impetus that has been given under war conditions should stimulate employers at the conclusion of hostilities to investigate and exploit this revolutionary process, whose vast possibilities have no obvious limits.

In the shipbuilding trade this process can be utilized a hundredfold more than at present; for instance, in making of knee-brackets, stays and frames, these can be all cut and welded by blow-pipes, with present costs reduced, and output increased; a blow-pipe only requires one man, but an angle-smith, when welding a knee-bracket requires two or three assistants. The author only mentioned this one item, but there are dozens of others; most shipyards have plants, but they are not often utilized to advantage, for they must either employ skilled welders or call in an expert to advise.

This process is not being neglected in some works, and those who have grasped its possibilities consider it a unique labor-saving tool. The author personally knows of a locomotive shop, where twenty welders are employed, and 6,000 feet of piping have been installed for carrying gases to all the shops. They have more than 400 locomotives in use with welded fire-boxes, and 500 welded engine-frames, and they have reclaimed in one month 157,082 bolts, thus saving £400 compared with new ones. Repairs to the shop tools, machinery, etc., are common, and excellent results obtained; the housing for a large roll was repaired by this process, welded in a day and a half; a new housing could not be obtained under six weeks. A planer broke whilst operating on a cylinder of an engine; a new part could not be got under ten days, but with the blow-pipe the part was welded and the planer at work in two hours and forty-five minutes. These examples might be multiplied considerably.

AUTOMATIC TELEPHONES IN GREAT BRITAIN

Before the war the British Post Office had embarked on the conversion of several telephone exchanges from manual to automatic working. The substitution of machinery for the telephone girl proved so successful that the Department is certain to continue its interrupted programme. The automatic principle is also being used for intercommunication telephones in large factories, business houses, hospitals, and so on, and a number of British firms are fully equipped for the production and installation of the apparatus. Australia House, the headquarters of the Commonwealth Government, is equipped with automatic telephones which give a rapid and secret service equal to that of a public exchange in miniature.

BRITISH ELECTRIC BATTERY LOCOMOTIVES

Extensive use is being made in Great Britain of electric battery locomotives in factories, goods yards and other places where a considerable amount of shunting has to be done. The Ministry of Munitions ordered a large number of these machines for expediting the handling of large quantities of materials in Government works. There are many objections to the use of steam locomotives in or near factories; the noise and the emission of steam and smoke are the chief drawbacks. Where explosive or inflammable goods are stored there is also the danger of fire. Further, a steam locomotive is using power even when it is idle, and it involves a lot of time and trouble in connection with coal, water, and the disposal of ashes. The electric battery locomotive cuts out all these faults and dangers. Its equipment consists simply of secondary cells, controllers, and driving motors. The cells are charged during the idle night hours, so that the loco is ready for work in the morning. It runs quietly and can be easily driven by an ordinary workman after a short training. As it can be built with a very short base it can negotiate sharp curves with ease. The designs produced by British engineers have proved so successful that a large development of this mode of point-to-point haulage is expected.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

Is the Engineer a Business Man?

The Status of the Engineer, Particularly in Production Work, is in Many Cases That of a Business Man, and His Advice in Many Cases Determines the Success or Failure of New Enterprises

By D. A. HAMPSON

IN a great many concerns, the engineer is considered in purely a professional light, a necessary adjunct to the factory force—not a producer and not a man of business. His work has to do with measurements, materials, and efficient production viewed solely from the standpoint of getting more out of the wages paid to the workmen; a work that is partly conservation and preparedness and that saves thousands of dollars here and hundreds there, yet because these savings rarely appear on the books the engineer gets very little credit for them—not as much credit as the collector who turns in some hitherto bad account, which is "just like finding money."

The engineer is not considered a "business man" for the savings he effects—in fact, he is apt to be classed with the inventor and the minister as deficient in a financial sense. The directors, the manager, the clerical and sales forces—they constitute the business end of the organization, in their own opinion at least, while the engineering staff belongs to another realm where wheels have no connection with dollars and cents. But in reality, economical plant operation or an original tool design may be more of a factor in multiplying sales, through lower costs, than the work of the sales department itself. Then, how many businesses have prospered because of mechanical foresight, how many have failed for lack of it or because the ill advice of enthusiasts has been followed instead of the engineer's judgment?

Final proof or business ability is its effect on the bank account and after a survey of various phases of engineering activity, one is forced to award the engineer a prominent place alongside his colleagues of the main office and of the road. Two recent instances that occurred in a manufacturing business will serve to illustrate. It is necessary to explain briefly some points in modern printing practice to show the relation of engineering ability to business as brought out in this case.

Is the Engineer a Business Man?

All of us have visited printing establishments of some sort and have noticed there electrotype "plates" mounted on blocks of maple or cherry; these have been usually illustrations for advertisements or "cuts" of celebrities. When the "form" is made up, these are locked in the surrounding metal frame, or "chase," along with type, linotype and stereotype matter, and other cuts.

On account of the inaccuracies of wood, such a mounting for plates is disappearing with the tremendous strides being made in the printing art and in its place has come the metal "base" or "block" which is accurate to a thousandth part of an inch and stays so and which is used over and over again, the plate being temporarily clamped on the base for its particular "run." Almost all commercial work is now handled in this way—books, advertising, maps, magazine covers, newspapers, etc., etc. The plates form one of the most valuable, tangible assets of a publishing house and the equipment for mounting and holding the plates is of equal importance with the presses themselves.

The drawing shows a typical mounting of a plate. In this case the base is of the sectional unit system with "hook" units of the same size inserted wherever necessary to properly confine the plate. Other systems employ a full size, one-piece base with continuous slots for the hooks, running either at right angles or diagonally. With almost all systems, the plates have a 60 deg. bevelled edge that causes the hooks to draw the plates down as they hold.

It is generally admitted that the perfect plate mounting system for all general classes of printing has yet to be marketed and that there is a fortune in it for the firm who does produce such a system. Naturally the field has been a prolific one for inventors with the failures far outnumbering the successes. The space limitations are such that it is extremely difficult to get a hook tightening mechanism that is strong and ser-

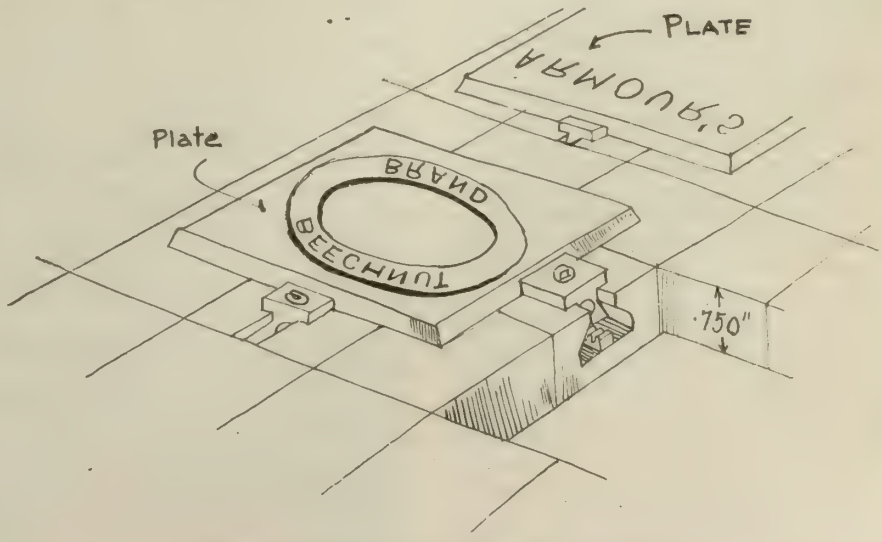


PLATE MOUNTING SYSTEM UNDER DISCUSSION

viceable without cutting away so much of the containing base as to make it weak in locking up the form and without having a slot so wide that the plates sink in it under the printing impression. These conditions are emphasized by referring to the drawing, by knowing that at modern press speeds standard screws will loosen unless locked or tightened to the breaking point, and by considering the time element which demands that high priced labor and expensive equipment be made as quickly operated as possible and the "make ready" time be unusually short.

The F. Wilson & Son Mfg. Co. had built up a good business for their own plate mounting system, but as it had its limitations, they were like other manufacturers in being constantly on the lookout for a better system or one that would round out their line to make it applicable to all classes of printing. As soon as the armistice was signed they took up the matter of purchasing the patents on two systems that had been developed and offered them during the war.

A mechanical engineer prominent in another field had designed the first system considered. His analytical mind had sized up the weak features of existing products—with outline diagrams, he had shown the salient points of them all and his notes called attention all too loudly to the weaknesses; these had been neatly bound as the first pages of a blue print folio which included complete details of the new system in all its phases and such explanation as are needed to grasp the import of a device both novel and radical. The matter was so presented as to carry conviction—the conclusions were undeniable. Actual signing of necessary papers was held up for a few minutes to arrange some legal detail and during the wait, the prints were sent in to the firm's engineer for the first time, with a request for the date on which production could begin.

Quite naturally the engineer made a hasty review of the processes and tools required for the job. One of the claims in connection with a major part was that it could be turned out very rapidly on automatic screw machines; the engineer weighed this claim against his experience with like parts as they had to be made for other plate mounting systems and his judgment told him that it was a slow automatic job at best and that no automatic would produce that work with the accuracy needed to separate light and shade in printing. As the part and its connections were built around screw machine work, this was a serious drawback.

Then the hook itself with mechanism for making it travel in the slot and tightening on the plate came in for examination. All this was shown to an enlarged scale, but the number of parts put into small space was such that only a person thoroughly familiar with deciphering line drawings could comprehend the construction. The business department of F. Wilson & Son had taken the designing engineer's word for it that the hook was simple and strong "as per the B. P. enclosed." It was simple, as compared with a watch, and strong, if seldom used and then by careful hands, but it was too light for hurried everyday use by rough hands and too complicated for competitive manufacturing.

For his own assistance, the engineer made some pencil sketches in perspective of these delicate parts and a perspective of the assembly. For the benefit of the "firm," he took these sketches down to the office, along with the conclusions. Suffice it to say that the "business men," in the vernacular, "saw the light," and the deal did not go through. A perspective conveys an idea to anyone not a draftsman, and the sight of hooks as they would appear in cold metal told at once to men familiar with small manufacturing that the scheme was not a financial success, and a general knowledge of the failure of other delicate constructions in the same field warned against another of that kind. In this case, the designer lacked only a knowledge of the actual use of such devices, and in that lack had produced an attractive system; the members of F. Wilson & Son had that knowledge, heartily agreed with the designer's conclusions, and had based their acceptance of the designer's claim for a practical article on his known reputation in another field by their passing over what was to them a closed book.

Another instance occurred in the same office a short time after. This time everything was presented in the form of models, so that it was not considered important to call in the engineer. A novice could see how this plate mounting system worked, a few months' industrial experience would qualify anyone to pass on the parts as rugged, and easy to manufacture. In fact, it looked as if the perfect system had been invented at last, and, like so many perfect things, it was ridiculously simple, and "a wonder nobody ever thought of it before."

One of the Wilson salesmen had seen the system in use in a couple of plants in the West, but had made no inquiries other than to learn that it was very simple and well liked. The inventor openly explained that he had spent all the money he could raise on experiments and the few installations he had made, moreover, as the parts had been made of steel, casehardened, the cost was too high for any sale. His proposition was to make certain parts of cast iron which would so reduce the cost as to make the sale assured. In fact, he had already had bonafide orders for ten thousand dollars' worth if delivery was guaranteed.

Wilson's system used cast iron parts extensively with all success. Also it was very much like the new one except for the mechanical movements employed. It was not hard to agree on a royalty, and the house of Wilson was to assume all responsibility for sales and manufacture. The similarity in sizes and shape prompted the thought that a substantial saving would follow through the use of existing tools and to verify this the engineer was sent for.

The latter verified the tool situation at once but asked for half an hour's time to make sure. In reality he spent the time in drawing some skeleton diagrams of the movements and in making certain calculations in strength of materials. He reported back on time as follows:

"Gentlemen. I didn't want to consider the tool situation, I wanted to study this movement, which is so simple as to be suspicious. I have found the hitch. In holding a plate, this screw must be tightened, but the screw is so placed that only one-fourth of the power applied is available for plate holding, neglecting friction which must be high; the thrust of the remaining three-fourths is lost, it goes to stress the containing parts. No wonder so large a wrench is required to operate the hook. Considering that a workman applies but ten pounds to the wrench (which is very little) this body is stressed way over to the breaking point of cast iron, and would not stand up a minute. I doubted if the steel sample retained it size, and proved it by micrometering it, which showed a strain of several thousandths at the point of stress. Furthermore, there are two places where abrasion will take place with the cast iron, quickly destroying serviceability; this did not take place with the glass-hard steel surfaces, but their cost is prohibitive."

F. Wilson & Son are as shrewd as their competitors and as other business men. Probably now they would admit what they would never have done before, that their engineers are really business men as well as technical professionals. In their unheralded labors of advising men of business, of saving or making money by not spending it, they unconsciously answer the question and place themselves in the class of super-business men.

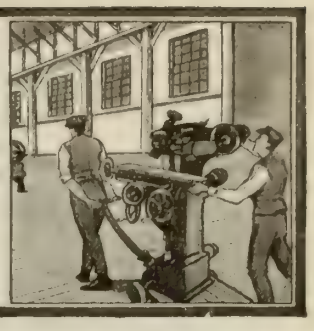
AN EXTRA TURN

At a rest camp somewhere in France the men of a certain famous Scotch regiment were holding an impromptu concert. Presently there drifted into the tent, lured by the sounds of revelry, a sturdy Cockney motor driver of the A.S.C. For some time he listened appreciatively to the music, then he suggested that he would oblige with a Scottish tune. Advancing to the edge of the platform, the A.S.C. man with the inimitable Cockney accent, sang:

"Scots wha hae on porridge fed,
Scots wha's hair is awful red,
Scots wha suffer frae swelled head—
Gang and wash yer knees!"

He made escape in good time, and so far has not been caught, but a whole regiment of kilties, mad with rage, are still on his trail.

DEVELOPMENTS IN SHOP EQUIPMENT



Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

THE illustrations show bar stock rack arms recently placed on the market by the Kent Machine Co., Kent, Ohio.

The bar stock rack arms for long stock are made in single sectional units, which may be spaced any distance apart to accommodate the length of stock to be held. Each of these units is made up of a number of interlocking sections so that any number of arms and any height of unit may be obtained.

The base of the unit is heavy and projects out beyond the longest arm, thereby giving each unit stability and keeping the centre of gravity of the load within the area of footing. As will be seen from the illustration, the base is provided with a protection in order that it may be used as an arm for holding stock. The weight of this stock also adds to the stability of the unit.

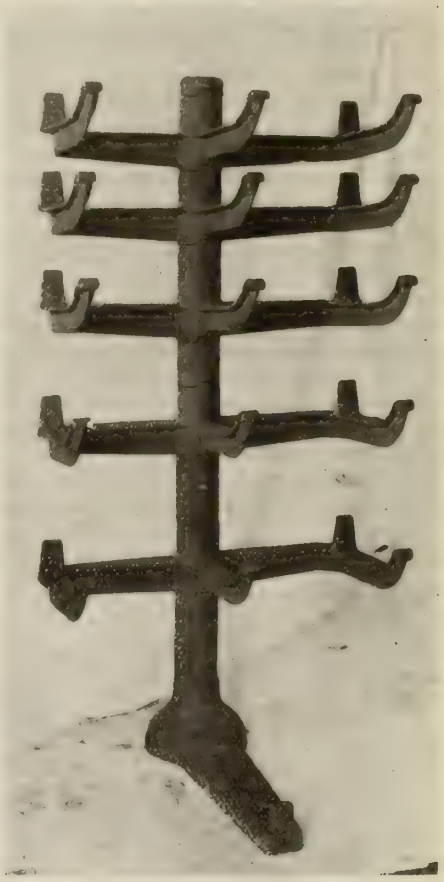
The spacing of the arms may be varied by using the interlocking space collar and large spaces may be obtained for light yet bulky material, such as tubing, etc. All arms and spacing collars interlock with the base and no set screws or holding devices are required in the assembly. The hole in the sectional pieces of the arms is bored to fit the vertical spindle and the interlocking devices are fitted so that there is practically no lost motion.

With the combination of adjustable spacers, these racks may be adapted to any material and enough arms may be placed on the vertical spindle to provide for a proper classification of the material stored.

The second illustration shows a three arm sectional interlocking unit, complete in itself, for storage of short lengths of stock. The short length in the long bar rack is always annoying, causing considerable difficulty in removing the longer lengths of stock. To avoid this difficulty the short length rack arm has been designed to be used in connection with the longer units.

The spacing of the arms of this device may also be varied by the use of interlocking spacing collars, so that any type or size or material is well provided for.

The material of construction is cast iron. The arms have been tested to carry all the material that can be stored on them.



STOCK RACK FOR SHORT STOCK.

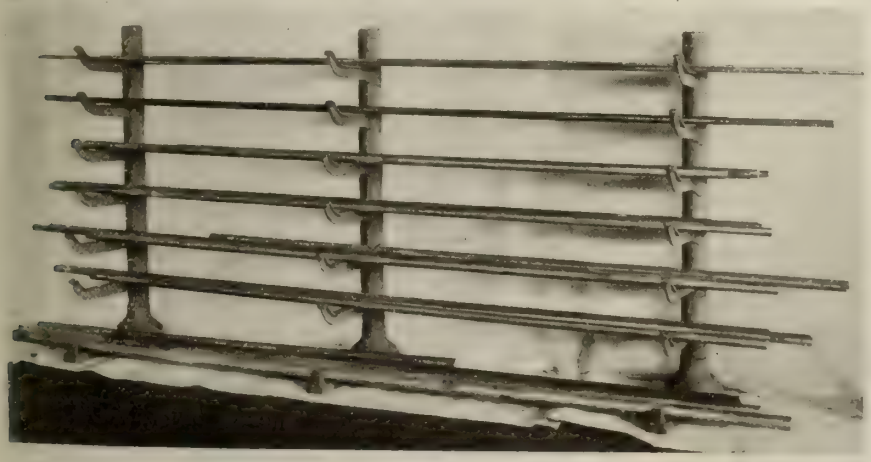
HOB AND FORM CUTTER GRINDING MACHINES

The H. E. Harris Company, of Bridgeport, Conn., have placed on the market what are known as their precision automatic hob and form cutter grinding machines.

These machines have a grinding head, which carries the wheel spindle. This spindle is mounted in ball bearings, and provided with micrometer adjustment, horizontally and vertically. This is accomplished by means of carefully fitted slides, and the micrometer screws are all graduated in .001-in. divisions. The slack of the wheel spindle belt is taken up by an idler, which ensures a smooth running wheel.

The wheel itself is covered with a guard, to which is fed the lubricant by the spout of the forced lubrication system. This guard not only safeguards the wheel, but at the same time it prevents the scattering of dirt, and confines and directs the lubricant to its proper place. The lubricant, after it has once been used, drains from the wheel and the work, directly into the pan surrounding the table. This pan is cast integral with the table, and the lubricant is fed back from this pan into the column. In this way the lubricant is used over and over again.

The work is carried between centres, upon a reciprocating table. The mechanism for controlling the stroke of same is contained underneath this table in the



BAR STOCK RACK FOR LONG STOCK

column of the machine. The table carries the necessary means for setting and holding the work, and also carries the indexing mechanism which directly indicates and clamps the hob or form tool in position for each double grinding stroke.

The operating mechanism for the indexing is contained in the column below the table. This is so timed to co-ordinate with the mechanism for the table movement.

The mechanism operating the table is driven by an independent belt through the means of a worm or worm wheel. The automatic feature can be instantly disconnected if desired, or connected, through the means of a positive clutch operated by a handle at the right of the front of the machine.

The table carries a set-up stop, which when not used drops out of the way. It is by means of this stop that the hobs or form tools can be accurately set up, so that the machine will start grinding the proper amount. The lubricant is contained in a tank in the back portion of the machine column and is easy of access.

All bearings, ways and bearing surfaces are large and ample in surface, and proportionate strength has been provided for throughout the machine. Owing to this rugged design, the resulting ground surfaces are of a high quality and afford cutting edges which will stand up a good deal longer than the rough surfaces as ground by a machine of light design, and fitted with improper wheels.

All wearing surfaces are provided with easily accessible adjustments, so that wear or play can be quickly taken up. Every surface is protected from the action of abrasive or metal particles, which tend to cause them to deteriorate, and ample provision is also made for the lubrication of these various surfaces.

The machine is also so designed that all back lash between the hob or form cutter and the wheel is taken up automatically, as the machine operates, thus preventing unequal grinding, dragging, or gouging of the wheel into the work. The indexing is done at the end of each double stroke, during a pause in the movement of the table.

All necessary adjustments for changing over from one type of form cutter, or hob, to another, have been carefully worked out with a view towards simplicity, the result is that to change over from one type to another becomes a very easy matter.

The machine will grind any form cutter or hob within its range, including radial mills, fluting cutters, gear cutters, irregular form cutters, hobs for hobbing female thread gauges and threading dies, taps, hobs or cutters for milling threads, hobs for worm wheels, and hobs for gears. expeditiously and accurately. Narrow cutters may be mounted on suitable arbor, and a number of these can be ground collectively.

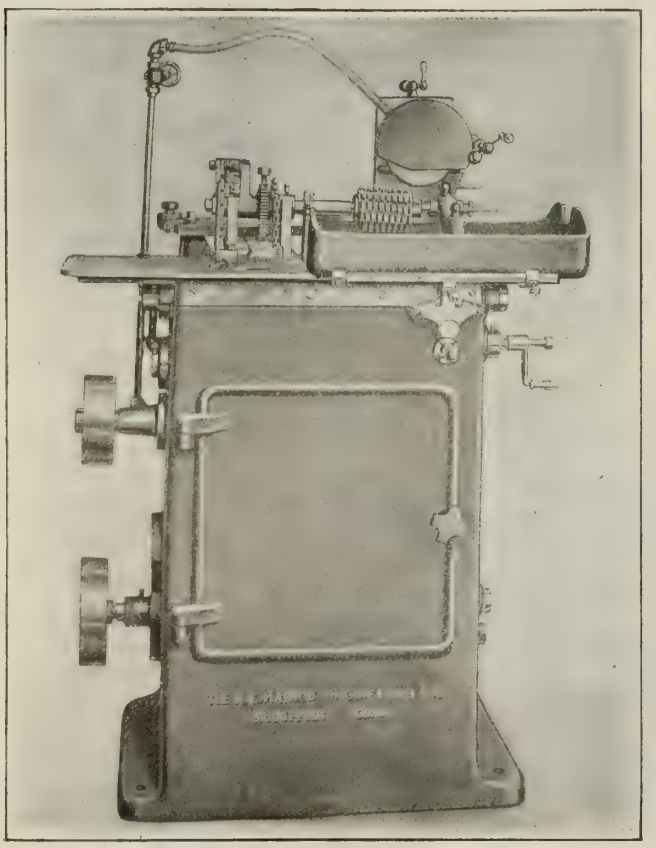
Special Requirements Cared For

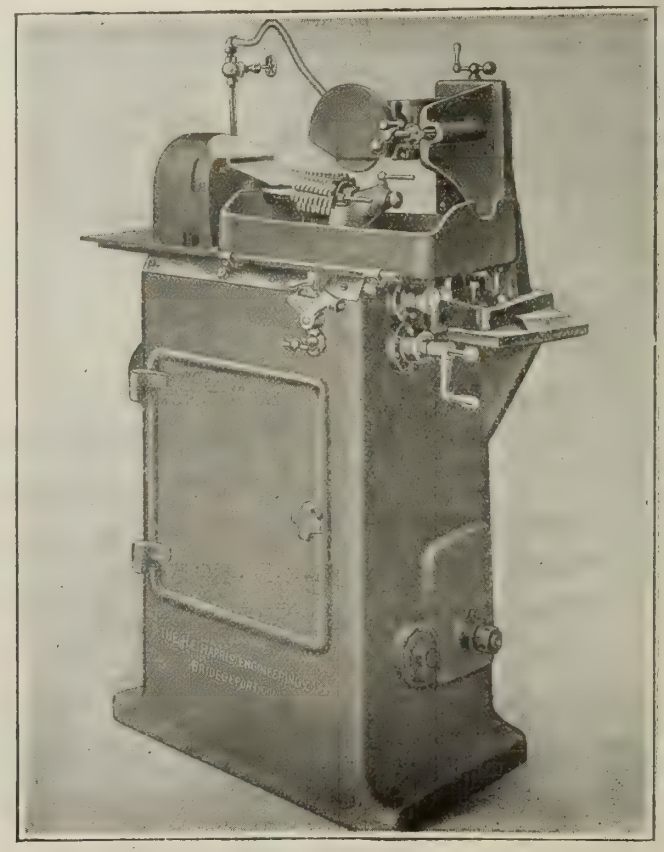
As the range of work which this machine will cover is very much diversified, there is a limit to the variety of work that any machine can take. It is customary to submit blueprints, or specifications of the different hobs, or cutters that machine is required to grind, when if necessary the machine will be modified to meet these special requirements.

The machine as described by the builders, is what they term a high-grade precision tool, built to their usual Harris standard of workmanship and material. As they state, this is a new machine developed to meet a great necessity, for at the present only 25 per cent of the rural production is secured by the usual method of grinding. Salvaging milling cutters, by regashing the teeth can be done on this machine to the best advantage. With the automatic index, one operator is enabled to attend to several machines. At all times there is a heavy flow of lubricant flowing on the work which prevents the possibility of burning the work.

General Specifications

	Straight Flutes Mach. No. 1	Universal Mach. No. 2	Straight Flutes Mach. No. 3	Universal Mach. No. 4.
Table travel	6"	6"	10"	10"
Diameter of work to be ground	6"	6"	8"	8"
Length of work to be ground	3½"	3½"	10"	10"
Number of flutes	From 4-up	From 4-up	From 4-up	From 4-up
R.P.M. of wheel spindle	3000	3000	3000	3000
R.P.M. of the table pulley	155	155	320	320
Horizontal adjustment of wheel each side of centre	¾	¾	1¼	1½
Diameter of wheel	6"	6"	6"	6"
Size of hole	¾" hole	¾" hole	¾" hole	¾" hole
Shape of wheel	Saucer	Saucer	Saucer	Saucer
Floor space	29" x 24⅝"	29" x 24⅝"	24" x 50"	24" x 50"
Weight	552 lbs.	632 lbs.	882 lbs.	909 lbs.
Weight boxed	621 lbs.	713 lbs.	952 lbs.	979 lbs.





TWO VIEWS OF THE HARRIS PRECISION HOB AND FORM CUTTER GRINDERS.

Do You File Away Technical Information?

Various Methods Are Used, But the Best System Must Depend Largely on the Way in Which Material is Printed — Some Suggestions For Carrying on This Class of Work

At no previous time in the history of industrial development has such a vast amount of technical literature been placed before the students of engineering trades and professions, plant executives and mechanics, as that of the present progressive age. It has been truly said that, "the trade papers of to-day are the text-books of to-morrow," and in very few instances will it be found that the material appearing in the latest text or reference book is of a virgin character, for the fact, that such hand-books are invariably a compilation of data that has been previously published in mechanical, trade, or other technical periodicals. It will generally be conceded that a great deal of the subject matter of the average technical journal is of transient interest only, but it will likewise be admitted that a large portion of the editorial contents is of considerable and likewise permanent value.

Developments in mechanics and engineering enterprise is progressing so rapidly that, apart from the fundamental or elementary essentials, the contents of a text-book a few years old may be very much out of date. For this reason the practice of preserving current periodical literature is a commendable one, as it enables a person to keep in touch, constantly, with the advancements and improvements that are continually being made in connection with any particular line of work in which the reader is especially interested.

Much has been written and considerably more has been said regarding the various methods that have been adopted, or suggested, for keeping track of material published in this way, so that the same could be readily located when occasion required. Indexing, filing and binding systems, by the score, have been tried out with more or less success, the more efficient necessitating considerable concentration to insure their satisfactory operation. Doubtless, there are quite a number of readers of many magazines that make a practice of retaining certain articles for future reference. This may be done in either one of two ways—keeping on file the entire volume, or cutting out the specific data or material.

The first is a very cumbersome method and requires much space if many periodicals are to be the basis of the records. It, however, provides a very efficient means of reference if the index to the contents are properly arranged in a systematic order and the subjects cross-indexed, so that the material can be readily located from several angles of approach. The latter practice of extracting and keeping articles is probably the method generally resorted to by those accustomed to the preservation of such material. However, it is quite safe to say that the percentage of readers of technical papers who make an attempt to gather this information is relatively small and even those that do are frequently at a loss to locate the desired material when the same is required.

The Best System

The basis of any successful record system is proper filing and indexing, and these two fundamentals must be closely allied to each other. An elaborate file would be practically useless without some reliable means of indicating what the file contained. Uniformity is one of the keynotes of efficiency, and office systems would be of little value if haphazard methods were adopted. Standardization is rapidly being recognized as an essential factor in the economic production of manufactured articles. Years ago nearly everything was made on the fit-and-try method, but to-day the practice is to produce articles, or parts, so that the same will be interchangeable, every similar piece being of the one type and pattern and virtually identical in every minute particular.

From time to time readers of technical or trade papers are confronted with articles relating to the filing or preservation of material contained therein, and in general the method propounded is of considerable interest and would be of ultimate value if persistently carried out. Invariably, the keystone of many of these suggestive treatises is uniformity. The cards used for indexing, if a card system is adopted, are of one size for convenient reference. The folders or binders that contain the articles referred to in the index, are likewise of a size. The basic factor, therefore, of any successful filing system must be standardization. This standard will no doubt vary according to the ability or the initiative of the party keeping the records, but is there any reasonable argument that it should do so?

Other Considerations

The variation in the methods of preserving technical data, is due, largely, to the character of the material published and the position it occupies in the paper. It will be immediately recognized that it is virtually impossible to publish editorial matter after the same principle used for advertising, where a certain space is devoted to the purpose, but could not some sort of compromise be made whereby the material as published would be more uniform in character? It is not intended that the writer should advocate a radical change in the set-up of the editorial section of technical papers, but it is his belief that the data on certain matters could be rearranged to be of exceedingly more value to the reader who may be interested in that particular subject. In connection with page articles or those of greater length, little material change could be made, as present practice is sufficiently efficient for the requirements of the reader. It is more in relation to those short articles that appear in the section devoted to shop methods, subjects for practical men, methods and devices, etc., with which this article has to deal.

In a great many instances the value of these articles are of such a character that many readers, especially the mechanics in the shops, make it a practice to preserve the text for future reference. In cutting these out, however, it is frequently necessary, owing to the distribution of the material about the page, to destroy what is equally valuable on the adjoining page. It is seldom that any two of such articles occupy the same space; frequently a brief description of a jig or fixture, a solution to a shop problem, or other interesting data, will commence on one page, extend for a column and a half on the next, and yet not occupy a full half page for its entire treatise. Looking in a scrap book, or a folder, of a man that has accumulated considerable data on some subject, what do we generally find? Usually a jumbled mass of papers that are very difficult to sort over when looking for a specific article.

More System Needed

In the opinion of the writer publishers of technical papers could enhance their value by adopting a more systematic method of compilation of those short articles that are of special value or of general interest. Technical papers are published from week to week—with no variation in size. Office records of the publishing house are kept in a systematic and uniform condition. Articles are frequently published outlining some simple or elaborate system of filing material for reference. Yet little attempt is ever made to compile the editorial text on a comprehensive record system. Articles are often placed in the paper in a haphazard manner, irrespective of where they start or finish, and not infrequently to the confusion of the reader. It would seem possible that these articles, that range from a half column to a page, would be more

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The Shortage of Apprentices

THE superintendent of one of the largest printing offices in Toronto remarked a few days ago: "I want compositors, linotype operators and make-up men. We are handicapped because we can't get them. While this is the case we have applications every day in the week for every laborer's job that turns up around the place."

There is something to think about in that. It means that there are not enough skilled men in the printing business. Wages are good, working conditions are satisfactory and approved of by the men's union.

Why are there no apprentices coming along? This same question can be asked in connection with almost any trade that might be mentioned. There is something radically wrong with the young men of to-day. Is it possible that they are willing to slide along and at last be willing to slip into that great class called unskilled labor, whose only means of making a living is selling himself into a market that has a tremendous amount of competition nearly all the time by reason of its overcrowded condition?

Nearly all lines of work have reported a marked tendency for a number of years toward the weeding out of the apprenticeship system. The young men and lads want to get money right away. They do not want to put in their four years at small pay. They do not see the need of training, and apparently they have passed out from the influence of anyone older than themselves who would see this thing for them.

The printing trade, like many another trade, will have to make a move in self-defence if from no higher motive. It must be made certain that sufficient apprentices are entering the lists to have a supply of skilled men later on. The life of a skilled mechanic is interesting, it is full of possibilities, and in the meantime it has reached a stage where a man who is master of his trade can command decent wages and good conditions.

The Italians' Good Move

THE *People's Journal*, Welland, an Italian paper, is to be enlarged and the scope of the business extended. The new plans call for the printing of a page of material in the English language, so that, as the management says, "Canadians may be given an opportunity of acquainting themselves with the viewpoint of Italians in this country."

It looks as though the Italians were taking the step that should have been taken by the English-speaking element of the community long ago. As a matter of fact we have not been mindful as a people of the responsibilities placed upon us by the coming of thousands of these people to our country.

Foreigners are tolerated because they will often do a class of work that we do not fancy doing for ourselves. We are not particular whether they get ahead or not as long as they can be drawn on to do work that no person else will touch.

To be sure, we make laws for them to go by. They don't understand them, but that is not our fault. They are not interested in our views, but that is no particular concern of ours. We make the laws and that is about all we have to do with it. No, there is one other thing that is done. We have officials to go and visit these people every now and then and chase them into the police court, where they are invited to part with some of their money or spend a few days in jail.

But apart from that, have we made a real serious effort to get at these people? Have we made an honest try to Canadianize them? Do we do anything to make them understand that it is to their advantage to become citizens of this country in the real sense of the word?

If the Canadian people want to be quite honest in the matter they will have to acknowledge that their attitude to the Italian or any other foreigner has, for the most part, been that of a party approaching him with a ten-foot pole. It may be that the Italians with their English page will blaze the trail to a better understanding.

War Stories Need Shaking

THE war is surely digging deeply into the minds of the writers of fiction. New plots have been hatched overnight. By noon they have taken on form, while by evening they have wandered into the offices of the publishers.

It is strange, but true, that romance seems to stalk through all the plots that are reared up and clothed for purposes of printing. In years gone by the writer of fiction had few choices. He could have the beautiful daughter of a millionaire bathing. Of course she would go beyond her depth and be rescued by an apprentice in her father's factory. Said apprentice would have to be poor but handsome. The changes have been tuned on this scheme until a magazine editor is ready to fall on the neck of a contributor and weep when he brings in a variation.

But the war has turned the trick. The editor of a well-known Canadian magazine is responsible for the statement that no less than 200 manuscripts have been sent in during the last year, all centred around the same thought. A young man hesitates to go to war. His lady friend hustles off as a nurse and the half-slacker decorates his shoulder with a musket and hustles to the Western front. Of course he's wounded, rushed to a hospital, murmurs and gurgles something about Tilly at home. Then he's nursed to health by said Tilly, who, of course, always happens to be in the very hospital where sick Hector is trucked.

Why can't story-writers change the plot? Surely they could just as well make the head potato-peeler of the regiment elope with the colonel's wife, or have the wife of the corporal doing the ladder act at midnight to leave with the major for parts unknown.

Shippers who are called upon to make much use of the services of existing companies are wondering how the Canadian Railway War Board has the right to make regulations governing traffic now. Recently an order was made that all parcels for express be prepaid. There are shippers who have a load every time the express wagon calls, and it is next to impossible to prepay all parcels, and the work of charging back the transportation costs where sale is made f.o.b. point of shipment is also considered. If there are regulations to be made governing such affairs, they should come from the Dominion Railway Commission and not from the Canadian Railway Board.

Training The Apprentice

THE overnight training of a vast army of laborers for the operation of single-purpose machines admirably met the most unusual conditions demanded by war munitioning, but no one can say that this training of formerly unskilled men has added much to the country's resources in the nature of skilled mechanics. Single-purpose machine operators will have an increasing value in manufacturing economics as the growth of plants making repetition products occur, but the mainstay in our industrial life, as before, will be the skilled mechanic with ability to turn his hand to anything required of him.

To build up the class of skilled mechanics a good apprenticeship system is necessary and the keen interest which this problem is arousing in English-speaking countries to-day will go far in our ability to meet German competition in the economic struggle to come.

The Canadian apprentice during the war hardly existed, but the high wages paid to the skilled mechanic and the loss of the easy income to be gained through repetition work has evidently made apprenticeship more attractive to the average boy, judging from the experiences of several large metal working industries in one of our smaller cities. These firms state that no trouble is encountered in securing the right class of youth for training.

The excellent rates paid the apprentices no doubt has much to do with this condition as the following outline of the method developed will show:

Apprentices are indentured for a four-year period, a definite number of hours' work going to make up each yearly period. The first year apprentice is paid at the rate of 9 cents per hour with a bonus at the end of the year of $15. The second year apprentice receives 11 cents per hour and a bonus of $25, the third year apprentice, 14 cents an hour and a $50 bonus, while the fourth year man gets from 18 to 20 cents an hour and a $50 bonus. In addition to this final bonus, tools to the value of $50 are also given. The hourly rates given above are the minimum rate established and a bonus system which affects the apprentice as well as the machinist, increases these rates very materially, the actual rate being about 15½ cents for the first year and 25 cents for the fourth year.

No technical school being available, night classes are run in the local Y.M.C.A., and any time spent at these classes is allowed on the four-year period. The membership fee for the Y.M.C.A. is also paid for by the firm.

Many Firms Making Tractors

ACCORDING to reports that are circulating in machinery circles in New York there are so many concerns going into the manufacture of tractors in United States, that the machine tool concerns are looking very carefully at some of the smaller people before they allow them much liberty in the way of terms of sale. They fear, evidently, that in the rush to turn out a commercially successful tractor they may be left by the side of the road.

The making of tractors is not a side-line. The firm that is going to succeed must go into the business large enough to secure something in the way of quantity production, and it must also go in far enough to establish that service to the buyer that will make it certain that the supply trade will revert to the original maker of the tractor.

There has been a lot of money spent in the way of experiments that will not be recovered. If a firm were alone in the field it might be possible to arrange the selling schedules so that there might be a gradual absorption of the money that was lavished in the periods of investigation and experimenting. As it is now there is little to hinder a firm holding back until some more enterprising concern has gone ahead and done the missionary work, found out what sort of a machine is suitable to the different countries, and then follow along and make these.

If the makers of tractors in Canada are to succeed they should have a tariff preference of at least 12½ per cent. That is not a high enactment, but it is necessary in order that this country, where a great field for tractors exists, shall have a chance to hold its own market.

DO YOU FILE AWAY TECHNICAL INFORMATION?

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in keeping with present recognized standards of efficiency, if the text matter were confined to a section the full width of the page—two or three columns wide—and extending to a depth sufficient to meet the requirements of the article. At the extreme upper right hand corner could be printed the subject matter of the article, while the title could be placed in the usual manner, the required cuts or illustrations being inserted where desired. In this way it would be possible for a reader to commence a filing system that could be kept up-to-date without an elaborate system of records.

A Concrete Suggestion

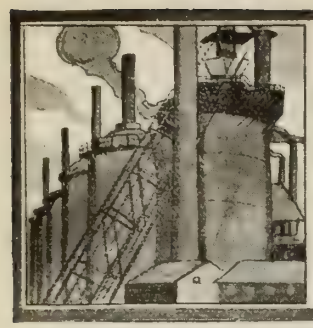
As a basis of calculations let us suppose that the smallest article treated in this way occupies approximately one-third of a page, or a depth of 3¼ inches on a ten-inch page. A filing cabinet with one or more drawers 8 inches wide and 4 inches deep would serve for the preservation of these articles. An articles that would occupy a greater depth than 3¼ inches could be folded to suit the capacity of the cabinet. Where a brief description of a jig or fixture, rule or formula, or other data, occupies less space than the 3¼ inches it might be advisable to couple up two short articles on the same subject, or use fillers pertaining to the subject of the sketch.

It might be argued that the same objection would arise from this method as from that of the one now in use, namely, the cutting into articles on the opposite page that a reader might desire to preserve. This is true, and a point that cannot be entirely overcome, but could be minimized by using discretion in the placing of the material, devoting separate pages to different subjects wherever possible.

In the compilation of long articles it is often necessary to use illustrations and formulæ for instructive purposes. An article might occupy anywhere from one to ten pages and yet the reader might only wish to preserve the essential points. It is often possible to condense such an article into a few brief paragraphs, with a chart, cut or formula, so that a reference to the same will be sufficient to recall the entire article. This could be compiled and inserted after the manner before mentioned.

Regarding articles that occupy only a small portion of a column, it would be difficult to depart from present practice, as little could be gained by spreading the same across the page. A convenient method of keeping these short articles is to select the ones required, cut them out, taking care to preserve the blank margin on the side. Secure a scrap book of ample size and divide into sections for the various subjects. Paste or glue these in, securing only about ¼ inch along the outer margin, or the lower edge; commence at the top of the page and work downwards, overlapping each article so that only the title is exposed. By this means the subject is brought prominently before the reader and anywhere from 5 to 25 pages of reading matter can be placed between two pages of the scrap book, and in such a way that ready reference is a feature.

Apart from the detail last mentioned it might appear that the suggestion here outlined is a radical departure from accepted practice of compiling technical paper data, but it is a move that the writer feels would meet the approval of many readers, and, therefore, is worthy of consideration.



MARKET DEVELOPMENTS

Are Too Many Firms Turning to Tractors

Some of the American Machinery Dealers Are Said to be Rather Suspicious of the Business of the Lesser Makers Who Want to Turn Out Tractors—Scrap Prices Are Down Again

REDUCTIONS are expected in several lines of raw material entering into manufacturing costs, and among these steel is expected to lead the way before long. There is a desire on the part of the mills to get as close as possible to the point where buyers will confidently come into the market, knowing that they are safe in making extensive purchases. The only danger is that the reduction may not be made in such a manner as to preclude the danger of a price-cutting campaign. Were this to start it might be difficult to put a peg in and stop the movement, and prices might easily be flattened to below costs. The general belief is that a new schedule will become operative about the first of April.

Machinery dealers report business as improving. The best of the war shop material has been pretty well sorted over, and when this is done the sale of new machinery will again become more active.

Scrap metal dealers have little to do these days, hence their chief indoor pastime is battering down the prices at which they will consider buying any material. One of the largest yards in the Dominion stated that during last week they did not make a single sale, the first time this has happened in a business experience of over thirty years. The future depends largely on the action of the Governments of United States and Canada in dealing with the large surplus stocks of copper and brass scrap left over from the war work shops. There are, it is believed, some millions of tons of this material in store, and if it is released at once, the market will be hopelessly glutted. Much the same state of affairs can be said to exist in regard to the various forms of steel scrap.

MONTREAL MARKET TAKING SOME TIME TO GET BACK TO OLD LINES

Special to CANADIAN MACHINERY

MONTREAL, March 12. — Industrial conditions are gradually assuming a more settled appearance, but much has yet to be done before general activity will be resumed. The period of readjustment is still in progress, and until the influence of the war is entirely removed there is little prospect of a free return to the ordinary expansion or development. This, however, is sure to come, and when conditions become more settled greater activity is looked for. The metal situation is unchanged and prices are as quoted last week. It has been announced that restrictions have been removed from tin and that it is not now necessary to obtain a license for shipments. This may shortly result in a lower tin price. Adjustment on American shell business is still in progress and plants are awaiting settlement before taking up new business. Operations in old materials are almost suspended, with prices steadily declining.

Domestic Development Deferred

Considerable interest is at present displayed in the possibility of an early revision of steel prices to enable a more general resumption of domestic activity that is, apparently, being deferred for this very reason. Dealers and others here are awaiting developments in the States to see what the outcome will be from the proposal of the Government that producers co-ordinate in the deflation of war prices. From the enquiries that dealers are receiving it would appear that considerable more business would develop but for the relatively high prices that are still ruling. Manufacturers of steel advance the argument that the adjustment of wages to lower levels will take a long period, and until this is effected it is difficult to see where any radical price reductions can take place. Dealers here are satisfied to carry more warehouse stocks but are not yet anxious to overload themselves in the face of a possible decline. The market is still influenced by uncertainty, and it is safe to say that delayed development is due to this cause. Until the atmosphere of war work adjustment is cleared away domestic enterprise will be more or less retarded. Declines in price quotations are anticipated here but at present prices ruling are the same as last week.

Settlements Awaited

Prices on machine tools are still comparatively high, but this factor apparently has little bearing on present sales. Purchasers of equipment will pay the price if they desire the tool, but unless the requirements demand it the acquisition of new equipment is carefully avoided. Existing conditions are not conducive to unnecessary expansion or replacement of machinery, and invariably the manufacturer is making the best of what tools he has or securing equipment that has seen light service. Dealers here have been doing a fair volume of business in buying up, repairing and rebuilding used machines for disposal at reasonable figures. In a great many cases standard equipment that has seen service in munition work is capable of being converted over for general purpose work by replacement of some of the parts, and a general overhaul and realignment. General supply demand is light in comparison to past reports, but under existing conditions is considered of fair volume. A factor that has some bearing on machine tool activity is the delay that is taking place in the adjustment of American shell and plant contracts. This has the tendency to keep many tools from being released for further disposal. Several plants in this district are still negotiating with the U. S. authorities for settlement.

Shell Machines for Scrap

The scrap situation offers little upon which to comment owing to continued activity and the reluctance of the dealers to show any great interest in existing conditions. Some of the local dealers

have been doing a fair business in second-hand equipment, buying shell machinery in bulk and disposing of it at a fair profit. Little can be done with special machinery other than to dismantle it and separate the various metals, thus providing a more profitable basis of selling the materials. Prices are still showing a weaker tendency, but little actual business is reported. This week's quotations are unchanged but must be considered as nominal.

BATTERING DOWN THE SCRAP PRICES

That is Becoming the Popular Pastime With Most of the Dealers Now

TORONTO.—Business moves along well in machinery lines. Larger orders are not numerous, but there is a good volume of selling going on in a general way. Dealers are quite emphatic in their statements that the outlook is much brighter than they had been courageous enough to believe at the close of the war. It is believed that with some price adjustments which will give manufacturers a little more confidence in the future levels, buying will become much more general.

Nothing Else to Do

Battering down the price list is coming to be the chief indoor pastime of the scrap metal dealers. One of the largest of these dealers stated to this paper to-day: "The only thing we can do for you to-day is announce another downward revision of the price lists. We were hoping a few days ago that we were really scraping on the bottom of the price scale, but it has not come to that yet. For the first time in thirty years," he went on, "we have gone for an entire week without making the sale of an ounce of material. That is a record that we do not want to stand very long. It is hard to believe that prices can go on down to a lower level than they are at present. A great deal rests, as far as red and yellow metals are concerned, on what the United States and Dominion Governments intend to do with the scrap metal they have in their hands at present. There are millions of tons of this material, and the manner in which it is going to be disposed of will make a great deal of difference as to the future of the scrap metal markets. If the policy adopted is simply to throw this material on the market, why it means that the situation will be glutted, and prices may stop hardly short of nothing at all. If, on the other hand, they decide to control the release of this scrap, and allow it to come out in quantities that can be readily absorbed in the trade, then matters may be much better, and a gradual recovery would be looked for by the trade. Much the same condition prevails in the other lines of machine shop scrap, and the Government can do much one way or the other to stabilize the market for this material. Until these points are decided it is hard to see how there can be anything approaching a betterment in the conditions of trade.

Dealers brought down the prices on all grades of coppers again this week, crucible, heavy and wire now being placed where dealers offer only 12¾c per pound for them. Brass cuttings and turnings, both red and yellow, are also down considerably. Perhaps the most noteworthy drop is in heavy melting steel, which sank to-day to the low quotation for Toronto yards of $9 per ton, while boiler plate comes down to $8. There is certainly nothing in any of these quotations to tempt holders disposing of their material, and dealers claim they do not want to take on anything for fear of still lower levels.

Shaving Steel Figures

As far as CANADIAN MACHINERY knows, no responsible agency made 2.90 a standing price for steel plate. At the same time it is known that this price has been offered on a rather large scale. The base price quoted by the Corporation is 3c, but this has been trimmed. In fact one manufacturer made the statement to a warehouse man a few days ago that he was taking on all sorts of plate now at 2.75. Upon this statement coming out the manufacturer was promptly informed that he had been elected as a member in good standing of the Ananias Club. When it is found that the practice of price shaving becomes general it can be taken for granted that there will be quick action on the price of the larger interests. It is known that some of the smaller independents have men going through Ontario trying to land occasional plate orders to keep the mills going. If there is anything approaching a decent tonnage they are inclined to cut rather close in order to land the business.

This is not good for the warehouse business. One firm, speaking to CANADIAN MACHINERY said: "It would be a great relief to the trade were there some definite move made in regard to these price matters. At present we have all sorts of rumors and nothing else. The trade is coming to the point where they are feeling that prices are going to be cut, and they are making up their minds that they are not going to be caught loaded up when such a thing happens. It simply means they are buying as little as possible and are not branching out. There should be some effort made as soon as possible to get a definite announcement made on the question."

Dealers do not relish a campaign of hit-and-miss price cutting. If the thing got well under way it might be rather hard to reach over and put enough sand on the skids to stop the operation. There can be no doubt that the trade looks for a downward reduction in prices, and they expect that it will be done very soon.

Machine Tool Trade

A large number of the garages in the country are taking over some of the best of the war shop equipment, provided, of course, that it is of the general purpose type and suitable for the repair work

POINTS IN WEEK'S MARKETING NOTES

At a very largely attended meeting of the steel industry held in New York last week, the prices of steel were thoroughly canvassed, and it seems to be the opinion that reductions are about due in a good many lines.

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Warehouse men are sincerely hoping that price talk will cease soon. They point out that the present uncertainty is doing more than anything else to keep the buyers out of the market in a large way.

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The Ford people, it is reported, are coming into the market with a car that will sell around the $300 mark in the United States. It is thought this is being done because a number of other firms are bringing out cars to compete with the Ford at the present selling price.

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Garages in this country are buying considerable war-shop material. They claim it suits their purpose and is cheaper than new material. The work of rebuilding this class of machinery, much of which had been stripped, is keeping several shops engaged at present.

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Scrap metal dealers have brought down the prices again at which they will consider buying. It was thought some time ago that the bottom of the price list had been reached, but no one can state that even the present lowly figures are the final word in downward tendencies.

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The New York machine tool market is showing considerable improvement, and many of the shops are reported as operating full time with some extra shifts being used as well.

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Reports have it that a price of 2.90 was quoted on a plate order in Toronto district. The chances are that this is a forerunner of a lower level.

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So many firms are starting to make tractors in the United States that dealers in machine tools are looking askance at the business of some of the lesser concerns.

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Copper and brass scrap is a drug on the market. For the future much depends on what the United States and Dominion Governments intend to do with the large volumes of scrap material they have on hand. If everything is released at once the bottom will drop out of the market.

they want to do. There is not a very great deal of this material that is useful or good. In some cases the machinery was stripped of much of the equipment before firms let go. Rebuilding has been proceeding at several points and a good deal of shell shop outfit is being rebuilt and put in shape.

The railroad shops are again in the market for more equipment. Officials of plants that have announced that they are prepared to go in for new lines have not stated what they are buying. In fact they are not quite certain, and in several cases will buy as they find their requirements calling for certain production.

The work of making adjustments following the cancellation of war contracts is getting off to a good start now, and Congress having passed an appropriation recognizing all these contracts as legal, it is expected that rapid progress will now be made in getting the adjustments made. The board for this work is sitting in Toronto. The Russell Motor Car Co. have just completed the work of making up their claims. They are for three separate contracts, the shell, fuse and adapter.

HENRY FORD TO HEAD THE RACE WITH A STILL CHEAPER MACHINE

Special to CANADIAN MACHINERY

NEW YORK, March 12.—Business in machine tools and allied equipment in the United States is developing along sound lines, and the volume of orders being placed is beyond what was expected by the machine-tool builders two months ago. The automobile and tractor manufacturing industries are the most active purchasers of new equipment, and a good deal of their buying is being done in Detroit and Cleveland. So many new tractor manufacturing concerns have sprung up that the machinery trade is watching some of the smaller makers with care. Nearly all of the principal makers of automobiles are planning to build more cars this year than ever in their history. The market for small, low-priced cars is believed to be the best, and in this connection the announcement by Henry Ford that will turn out a car to sell at $250 or $300 has been noted with interest by the machinery trade, particularly as at least two well known companies, the Willys-Overland Company and the Chevrolet Motor Co. (a branch of the General Motors Corporation) will this year bring out low-priced automobiles which will compete with the Ford car.

A Great Car Output

The Ford Automobile Company and the General Motors Corporation, as has been noted in previous reports, have bought more new equipment during recent weeks than any other interests. Both of these concerns are buying for the manufacture of tractors as well as for automobiles. The tractor plant of Henry Ford & Son, Dearborn, Mich., though separate from the Ford motor plant, is controlled by Henry Ford and his son Edsell, while the General Motors Corporation has taken over a plant at Janesville, Wis., for which equipment has been bought for making farm tractors. The Hudson Motor Car Co., Detroit, will utilize the plant built during the war for making shells to turn out the new Essex automobile, of which about 20,000 will be manufactured this year. The Board of Directors of the Hudson Company has authorized the expenditure of $1,000,000 for new machinery for this plant and the Hudson factory. The Nash Motors Company, Racine, Wis., has acquired an acreage adjoining its present factory for expansions, and will need new equipment.

There is quite a bit of activity in the Chicago market. The International Harvester Company is buying equipment for a plant at Croix, France. The Allis Chalmers Co., Milwaukee, Wis., will buy equipment for a tractor plant. The Crane Co., Chicago, will equip a plant in Canada and the necessary machinery will be bought in Chicago or in Canada.

About Export Business

Export inquiries are multiplying, but the first business of importance to be closed was last week, when the French High Commission placed several orders on a list of about 100 to 150 machines which it will purchase for reconstruction work in France. The announcement of the Industrial Board of the Department of Commerce, Washington, that a cablegram had been receved from Bernard M. Baruch, former chairman of the War Industries Board, who is attending the Peace Conference in Paris, that the French Government will permit French merchants to import up to $40,000,000 worth of American machine tools, if a year's credit is arranged, has created a decidedly more hopeful feeling in the American machine tool trade.

Some Shops Are Busy

Some of the leading machine-tool concerns are really quite busy. A few of them are working night shifts. They have a comfortable backlog of orders carried over from the war period, and have, during the last two months, received a sufficient volume of additional business to keep ther plants working at a normal rate of production.

The Navy Department is continuing the expansion begun during the war without any marked let-down. One of its new projects is a torpedo station at Alexandria, Va., for which machine tool equipment has been bought, and another is an armor plate plant at Charleston, W.Va., for which a list of 20 cranes, some of them of 100 to 250-tons capacity, has been issued at Washington. The Navy Department has new work under way at nearly all of the navy yards and equipment is being purchased.

The railroads have been buying almost nothing in the way of new shop equipment, therefore an inquiry from the New York Central Railroad for about a dozen tools was of unusual interest.

Disposing of Material

The Bureau of Aircraft Production, Washington, has announced plans for the disposal of a large quantity of surplus material, including machine tools and fixtures, electrical machinery and other shop equipment, metals, etc. Bulletins will be used from time to time containing full descriptions of the material for sale. Information may be obtained from the Bureau of Aircraft Production, Material Disposal Section, Washington.

The War Department is making rather slow progress in its disposition of surplus materials. The inventories of machinery have not been completed. Sales of equipment are being made in some instances to the companies in whose plants it was installed for war work. An airplane company purchased the complete equipment at the full original cost, and in another case 87½ per cent. of the original purchase price was realized by the Government. The division of military railroads of the War Department is negotiating with the French Government for the sale of $65,000,000 worth of railroad equipment ordered for the American Expeditionary Forces in France. This includes locomotive and car shops, locomotives, cars, rails, etc. The Emergency Fleet Corporation has also been negotiating with the French Government for the sale of shipbuilding machinery.

The Versena Iron Works, Buenos Aires, Argentina, whose representative has been in the United States for about two months, has bought about $500,000 worth of machinery, including rolling mills, rivet-making machines, electric magnets, etc.

THINK RY. FARES GOING UP TOO HIGH

Must Justify Increase Before They Can Go Ahead and Collect It

Sir Henry Drayton, chairman of the Dominion Board of Railway Commissioners, has advised the traffic department of the Toronto Board of Trade that they will require of the railways a justification of the increase in passenger rates, against which the Board of Trade have protested. On February 1 the railways revised their method of computing return fares. Prior to February the system was to total two single fares and deduct one-sixth for a return rate, but under the present system only one-tenth is deducted, which, according to the Board of Trade figures, gives the railways an annual increase of $3,000,000.

THE A. R. WILLIAMS MACHINERY Co. LTD

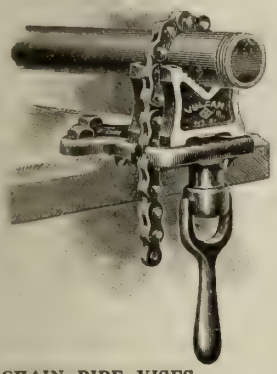
64 FRONT ST., W. TORONTO, ONT.

SALES | SUPPLY DEPARTMENT | SERVICE

Concentrated Buying an Ultimate Gain

Firms and buyers that concentrate their buying unquestionably save time and money, in obtaining greater dispatch and service receiving collective shipments, and eliminate much unnecessary office work. Thus, proving in the long run the wisdom of adopting this policy.

With one of the finest assorted supply stocks in Canada, prices equally in line, we can prove the wisdom of concentration.



CHAIN PIPE VISES

Steam Fitters and Power House Supplies

Such as Stocks and Dies of the following makes: Armstrong, Butterfield Solid, Oster, Buckeye, Jardine and Toledo. Also Stillson and Trimo Pipe Wrenches, J. H. Williams Chain Tongs and Chain Pipe Vises, Pipe Cutters in all well known makes, Torches, Fire Pots and Ladles, etc.

HINGE PIPE VISES

VALVES, PIPES AND PIPE FITTINGS

Our line of valves is quite complete, both in Brass and Iron Body, comprising Jenkins and Penberthy Disc and Regrinding Valves. We can also quote you attractivelyon pipe and pipe fittings and all steam specialties, such as Anderson Steam Traps, Back Pressure and Reducing Valves, Lubricators, Injectors, Boiler Mountings, etc.

Quotations are Given Immediate Attention

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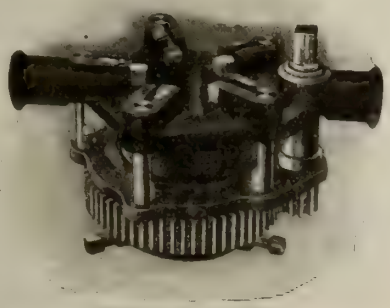
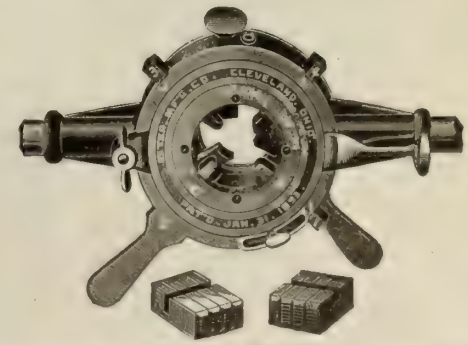


"TOLEDO" STOCKS

TORCHES



"OSTER' STOCKS

BIG STEEL OUTPUT, BUT PRICES ARE DUE TO TAKE A DROP SOON

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Mar. 13.—One of the most important events in the year's iron and steel market history occurred last Thursday, in New York, when at a meeting of 130 representatives of the industry it was unanimously decided to co-operate with the Government in its efforts to bring about lower prices for all commodities, particularly building material, in order to bring about industrial activity and facilitate the transition from war time to peace time conditions.

High Operating Rate

The steel industry did not need to reduce its prices at once for the sake of inducing a higher operating rate, for as a matter of fact its operations have been at a high rate. This is a fact that has not been generally apprehended. Apparently the majority of those who have commented upon iron and steel trade conditions have depended upon theory and not upon observation of the pertinent facts. They have observed an extremely dull, even a stagnant, market for steel products and hence have concluded that necessarily the steel mills have been operating at a very low rate, but that is not true. Undoubtedly the real fact is very difficult, if not impossible, of explanation, but that is no good reason for ignoring it. During February there were many trade reports published suggesting that the steel industry was operating at about 60 per cent. of capacity, or even less. Trade reports that sought actual facts, even if the facts did not seem to accord with observed market conditions, contended that the mills were operating at not less than 75 per cent. of capacity. Those who wrote such facts knew that in a short time the official figures, absolutely incontrovertible, would prove that they were correct. This proof has now come. The American Iron and Steel Institute's monthly report of steel ingot production is now out, covering the month of February. It shows that 29 companies, which in 1917 made 85.1 per cent. of the country's total steel ingot production, produced 2,688,011 gross tons of ingots in the month. Allowing for the number of working days in the month and year, and for the output of companies not reporting, this shows a rate of production during February of 40,930,000 tons a year. Capacity is known to be about 49,000,000 tons, so that in February the mills operated at nearly 84 per cent. of capacity. The January report showed a rate of 85 per cent. The highest rate ever attained was 95 per cent. , last September. The largest production in a calendar year was 43,619,200 tons, in 1917. The highest production before the war was 30,284,682 tons, in 1912, while the highest rate of production attained, for only a short time, was about 35,000,000 tons, in the spring of 1913.

These figures, of course, are absolutely trustworthy. They show that in February steel production in the United States was more than 15 per cent. in excess of the highest rate attained before the war. With business throughout the country so very dull, with only a few exceptions, it is impossible to explain this showing, but the fact is there just the same. Possibly the ordinary every-day needs of the country have so grown that they absorb much more steel than formerly, without making a showing of there being much demand. Then there is a good bit of Government work still in progress, while furthermore a little steel, but not a great deal, is going into stocks of producers. The last named item, however, can account for only a few per cent. of the current output, certainly not 10 per cent.

Thus the steel industry has not been in bad shape by any means, but undoubtedly it would get in bad shape in the near future, within a period of a few weeks perhaps, if something did not occur to stimulate demand.

Lower Prices Coming

While various pig iron and steel producers have made some show of not being favorable to Secretary Redfield's proposal that lower prices be arranged there is no doubt whatever that they have been greatly in favor of the project, if it could be carried through in an equitable manner. The producers knew that lower prices would be desirable, in the long run, but they have no means of regulating a decline and if they failed to adhere to regular quotations, slightly reduced as they were last December from the Government limits, there might be a wide open market with prices below cost of production and an absolute destruction of confidence on the part of buyers. Hence moderate reduction under official sanction, to prices openly stated and capable therefore of being adhered to, would prove a great benefit.

At last Thursday's meeting a committee was appointed, its personnel representing all branches of the trade, Lake Superior iron ore, pig iron, unfinished steel and finished steel products. This committee will confer with Secretary Redfield's board, which is called the Industrial Board of the Department of Commerce. George N. Peek is chairman of this board, and the producers find that he is a business man with broad judgment. Mr. Peek gives assurance that the steel industry will not, to employ popular parlance, be made "a goat" but that reductions will be sought on all building materials. The steel producers recognize that their customers buy other things than steel, and if the other things do not come down buying and construction work in general will not be materially stimulated, even if steel prices do come down, hence they want all prices to come down.

The matter of wages will probably be involved. The Government is opposed to scale. the iron and steel producers will probably propose such reductions that obviously wages ought to come down a trifle in keeping. The American Federation of Labor was offered representation on Mr. Peek's committee, but refused.

The negotiations will probably occupy considerable time, and it may be close to April 1 before the reduced prices are announced and put into effect. A rough guess would be that prices will not be higher than as follows: Pig iron, $25; billets, $35; merchant steel bars, 2.00c; black sheets, 4.20c; nails, $3.00.

While in the main the steel producers are disposed to adhere strictly to recognized market prices until there is an orderly readjustment, some of the merchant furnaces have been weakening, in recognition of the fact that buyers will not take hold at present prices, and some markets are now quotably lower. The southern furnaces, which had a $34, Birmingham, Government price, were rather slow to make the $3 reduction recommended in December, and which the northern furnaces adopted January 1, but they did come down to $31 eventually. In the past week the deadlock was broken by a sale of 500 tons for March delivery to the Standard Sanitary Company at Louisville, Ky., at $28.25, Birmingham, but this price is not low enough to be competitive with northern iron in general. Before the war Birmingham prices were $3 to $4 a ton below prices at northern furnaces. At least two Eastern Pennsylvania furnaces have started quoting on the basis of f.o.b. furnace, instead of f.o.b. Pittsburgh, as the Government regulations effective October 1, 1918, permitted them to do. This makes a reduction of perhaps a couple dollars a ton. Finally, two or three of the valley furnaces have broken loose on foundry iron and have quoted $28 or less at furnace, against the recognized quotation of $31.

CANADIAN PRICE IS NOW NEARER BRITISH

There is hope for the Canadian shipbuilding industry. The Government is in possession of information establishing the fact that at present there is not such a wide disparity between the cost of building steel ships in Canada and in the Old Country.

On the relative basis which applied during the war, a ship built in Canada cost about double what ships were turned out for by the Ministry of Shipping. This fact caused the Canadian Government to slow down on its building activities and to seriously consider the abandonment of the whole scheme.

In recent weeks, however, the situation has changed on the other side by reason of labor troubles. A much higher rate of wages being paid causes production costs to increase. The difference between what a ship can be built for here and there is relatively small, and this is likely to cause the Government to go ahead with the programme, even if it be on a modified the making of any wage reductions, but

45,000 SHOWERS

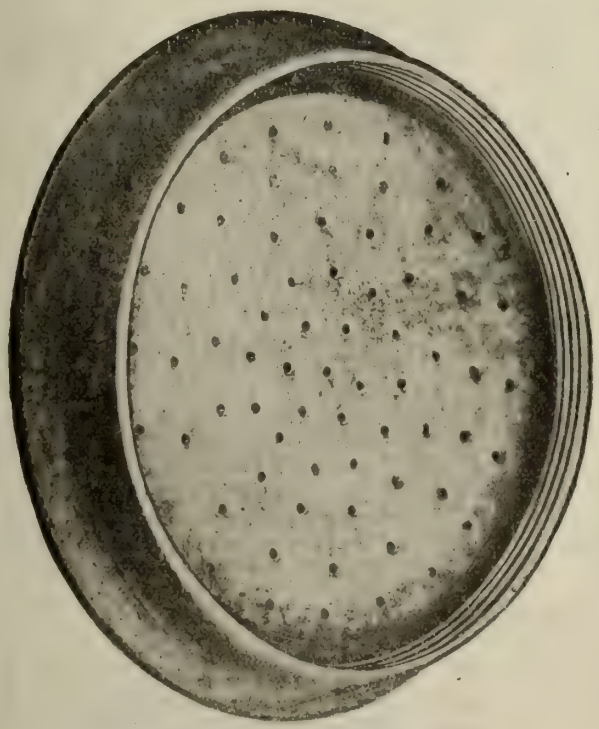
A Manufacturer Gives the Details of Filling a U. S. Government Order for 45,000 Shower Heads, Using Geometric Die Head and Collapsing Taps.

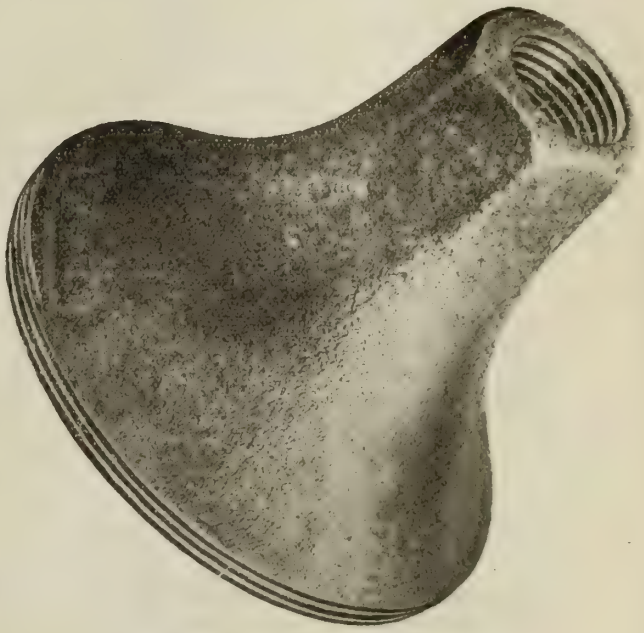
"On the main thread of the shank 3⅜"-16, we average 230 per hour, with a surface speed of about 400 feet per minute. On the pig iron end we averaged 220 per hour, with a surface speed of about 200 feet per minute. This speed may seem a little low, but we cut this down in order to get a quicker handling of the work. We handled these in air chuck, and in releasing air chuck the work automatically dropped to a box below.

"On the face, tapped 3⅜"-16, we averaged 210 per hour, with a surface speed of about 400 feet per minute.

"We were very much pleased with the Geometric tools on this work, especially with the chasers, as we completed 30,000 showers, male thread, with one set of these chasers."

Try a Geometric Thread-Cutting Die Head or Collapsing Tap on your work, and be equally pleased.





The Geometric Tool Company

New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal; The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton	.....	.....
Victoria	.....	.....

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	6 00
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 75
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	9 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Steel bars	4 75
Small shapes	5 00
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$21 00	$ 22 00
Electro copper	20 00	22 00
Castings, copper	20 00	20 00
Tin	58 00	62 00
Spelter	9 25	8 50
Lead	7 50	6 50
Antimony	8 50	8 50
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 5 50	$ 5 50
Plates, 3-16 in.	5 75	5 75

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 78
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	15 00
Copper wire	13 00	15 00
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	8 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 00	9 00
Shell turnings	6 00	6 00
Boiler plate	12 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	5 00
Stove plate	14 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd., brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

Advertising and the Salesman

By A. R. Maujer

Continued from page 2

Hence, behind a majority of stoker sales there exists a *predisposition* on the part of the purchaser to want to find it possible to buy a stoker of a given make. This predisposition is usually full grown long before the salesman makes his first call and often before a catalog or proposal reaches the scene of action. In other words, and as a stoker salesman friend of mine put it, people buy the things they know the most about.

Predisposition is developed in the following ways:

1. Personal experience.
2. Advice of friends.
3. What the man has read.

(1) Personal experience: If a man has used Jones Stokers before, has found them to fill the bill and his dealings with the company have been pleasant he is much inclined to want to find it *possible* to buy of the Underfeed Stoker Company of America again when he has more boilers to equip. His direct knowledge of Jones equipment predisposes him toward it and his lack of knowledge of others predisposes him against them.

(2) Advice of friends: Think how important one considers the advice of friends whom he admires and in whom he believes! Then, you will remember how much a good word by a mutual friend helps in predisposing a man. It matters not that the friend may have gained his own predisposition by hearsay or by reading. The predisposition is fostered just the same.

(3) What the prospect has read: When a man comes into the market for stokers he is very likely indeed to read up on the subject as extensively as possible. He'll read editorial matter, circulars, catalogs, advertisements—practically everything he can get his hands on.

In the absence of the other two, this is the only factor causing predisposition. In the presence of the other two factors it has its influence just the same.

In the case of a man predisposed against you, strong advertising tends to weaken his predisposition and makes your chance of selling him thereby greater.

In the case of a man predisposed toward you, the advertising naturally strengthens the predisposition.

And it has the same effect upon the friends with whom he may consult.

Advertising, as represented by purchased space in a magazine, is the cheapest form of providing something for a man to read and having it available to him when he wants to read it.

Advertising has still another valuable usefulness:

It helps make the stokers stay sold.

If a Jones Stoker user is constantly seeing favorable advertisements on the Jones Stoker, he is inclined to experience continued satisfaction that he bought a *good* machine. He's a little pleased with himself that he bought (what he comes to consider) a widely and favorably known machine—i.e., a well advertised machine.

But suppose he has had some little difficulty with his Jones installation. Isn't he more inclined to feel that the trouble may have been due to poor operation rather than to inherent faults in the machines themselves, if he is constantly seeing advertisements portraying the successes attained by other Jones installations?

Surely, he would be quicker to doubt if he saw few or no Jones Stoker messages and numerous convincing-sounding I. X. L. ads. He'd soon come to think: "I always knew I'd made a mistake by putting in these Jones machines."

Then, advertising can not only help to *sell* stokers but it can also help to *keep* them sold, by maintaining the confidence of the users.

In this day and age a house seems to be judged, in the absence of other positive evidence, by the advertising it does. Hence, the keenest minds in every line of endeavor are taking care that their advertising grows in proportion to or slightly more rapidly than the growth of their business, in order that that growth shall not only *continue* but *accelerate*.

Advertising has repeatedly been characterized as business insurance. If one has a million-dollar property, he carries a bigger insurance policy than he would if he had only a $100,000 investment. Then, if advertising is business insurance, the larger the business grows the more of it must be used, so that ultimately that business shall come to dominate in its field—if it possesses the goods.

I do not claim, and no honest advertising man claims, that you cannot succeed without advertising. No one would assert that you could not get from here to New York without the railroads, for you could, eventually. But, just as the railroads are large scale producers of rapid transportation, so is wisely planned advertising a large scale producer of rapid sales.

In a measure, time and money are interchangeable. If you had lots of spare time you could walk to New York. But if you had, or wanted, to get there quickly, you could exchange some money for some time saved and ride on the "Twentieth Century Limited."

Similarly, by exchanging some money for some correctly planned advertising, you can build up in a few years a volume of sales that, without the acceleration of advertising, might require a generation or more.

To my notion, there are just two elements to modern business success: The Goods and the Guts.

The Goods, that you *must* deliver if you intend, and hope, to stay in business and

The Guts to stand up in class and talk right out loud about them.

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks...list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 6 50
Sheets, black, No. 10	6 50	6 00
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head.28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$28 00	$.....
1¼ in.	32 00	.....
1½ in.	35 00	28 00
1¾ in.	35 00	28 00
2 in.	40 00	28 00
2¼ in.	43 00	30 00
2½ in.	45 00	35 00
3 in.	52 00	40 00
3¼ in.	.....	47 00
3½ in.	62 00	48 00
4 in.	70 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 4
Copper tubing, seamless	0 4

WASTE

White			Cts. per lb
XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15
Grand	18	Idea!	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .61
Copper	.38 to .41
Tin	.70 to .71
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	42 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

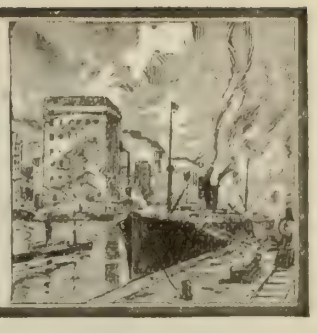
PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES



ENGINEERING

Lethbridge.—A call has been sent out for a conference on March 13 of all farmers within a radius of 75 miles of Lethbridge who are interested in the three irrigation projects designed to irrigate an additional five hundred thousand acres of land in the district from the waters of the Waterton Lakes, and the Belly, St. Mary's, and Old Man rivers.

MARINE

Amherstburg. — All Canadian light stations in the lower Detroit River will be in service by Monday night next. No ice is reported along the route to Cleveland, and only a small amount of slush ice near the Cleveland docks, so that the opening trip of the Western States is expected to be without difficulty.

Quebec.—What is considered in shipping circles as a voyage extraordinary was started from Halifax to Quebec by the Canadian Government ice-breaker, Montcalm. The vessel convoyed a vessel down the Gulf late in January, and is now on her way up the Gulf and the St. Lawrence at a date when never a ship attempted the trip.

HAMILTON.—The turbine steamer Floretta was in the bay on the afternoon of March 4, having left Kelly Harbor. The Floretta is the first boat known to the oldest residents of Hamilton to cross the bay at such an early date. Although the ice at Kelly Harbor is yet from four to nine inches thick, the Floretta had little difficulty in getting through to the open water.

Bridgeburg.—At the shipyard of the Canadian Allis-Chalmers Company the first boat of the "War Weasel" type completed in the Bridgeburg yards was launched. George W. Chase of Buffalo had charge of the ceremonies. Three boats have been under construction at the yards and the second one is nearing completion. Work on the third ship has been stopped, but officials deny rumors that the plant is to be shut down.

Mayor McBride, just back from Ottawa, says his interview with Hon. F. B. Carvell in regard to Port Dover harbor improvements left him disgusted. "The work will not be included in the estimates. It is a straight throwdown to Brantford and the other cities and towns interested." Mayor McBride stated he was going to Galt and Kitchener and Waterloo with the intentions of arranging a conference, to be followed by big indignation meetings in every city and town in the district.

Southampton.—By a vote of 242 to 8 the people of this town carried a by-law to guarantee bonds for $20,000 and otherwise aid the Sellers Kitchen Cabinet Co. of Canada. The chair factory here will be fitted up and manufacturing by the new company will commence at once.

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

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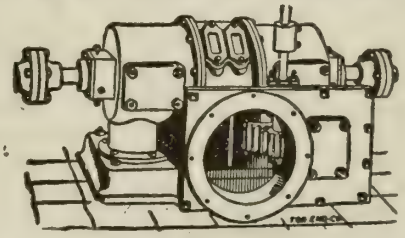
WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

Better Days Now for Galt Manufacturers

Several Plant Extensions Are Being Planned and Carried Out—How the Industries There Are Taking Care of the After-War Problem—New Machines Are Being Turned Out

GALT, Mar. 12.—Galt manufacturers are optimistic as to business conditions generally and the city's metal working industries are on a sound business footing at the present time. The various textile mills, shoe factories and other industries catering to the personal or household trades are in a more prosperous state than before the war, and extensions under way and recently completed are in some measure indicative of the business being received by these latter firms. Getty and Scott have taken over the old factory of the Crown Hat Works and are fitting it up for the manufacture of shoes, thus supplementing the capacity of their present plant. The Riverside Silk Mills have in the course of completion a new $25,000 factory and will use their old factory for some time to come. This firm incidentally are the only company in Canada exclusively engaged in the throwing of silk. The Galt Robe Co. have installed new machinery and two new additions have been completed in the last eighteen months to the Newland's factory.

Municipal Activities

New pavements are contemplated for the coming year. Paving is to be laid on West Main street and mituminuous macadam on Salisbury avenue. The Hydro-Electric system and the waterworks department have been placed under a Public Utilities Commission recently formed, the city engineer being made manager of the two systems. The Galt Hydro-Electric system is supplied from a transforming station in Preston, and the voltage of the transmission line was increased Sunday last from 6,600 to 13,200 volts. Other changes have been made in the Galt station including the installation of three 750 kv-a. transformers.

Export Business is Flourishing

The ability of the Canadian manufacturer to enter the export trade is well shown in the recent activities of a number of well-known Galt industrial establishments. The Goldie and McCulloch Co. have been building marine engines for a number of years and many of the engines turned out by this firm have been for British and foreign firms. Forty compound marine engines were supplied to the British Admiralty in thirteen weeks, complete with condensers, pumps, tail and intermediate shafting and fourteen triple expansion marine engines have also been supplied to the same interests. In small lighting engines this firm has also made quite a record, three hundred having been made for the British Admiralty, the Imperial Munitions Board and other interests. The Foundation Co. recently gave an order for fourteen 600 h.p. marine engines to the Goldie and McCulloch Co. for installation in cargo boats being laid down at Savannah, Georgia, for the French Government. Aside from the activities due to the replacement of the world's mercantile marine, other departments are showing signs of increased activity. The sale of Victory bonds has increased the average man's interest in the safe keeping of valuables and this interest is reflected in the demand on the part of the banks for deposit boxes. The Rees-Roturbo Pump for which the above firm recently acquired Canadian rights has also met with a favorable reception from Canadian purchasers.

New Building for Sheldon's Ltd.

Sheldon's Ltd. have recently completed a new pattern storage and warehouse building, three stories in height and 75 ft. by 125 ft. long. This structure is of mill construction, and is served by a railway siding for the loading and unloading of material. The present shipbuilding activity is partly responsible for the large number of Keith fan ventilating sets at present going through the shops of Sheldon's Ltd.

The Canada Machinery Corporation are employing the present release from the making of machinery for war purposes, to good advantage in the production of machinery for the export trade and in replenishing their reserve stock. Machinery has been shipped to Italy and other countries and a two-ram double-shaper is at present going through the shops for Japan.

The R. McDougall Co.

The R. McDougall Co. have brought out a new shaper and active tooling up for its production is in progress. This machine will be reviewed in the New Equipment section of CANADIAN MACHINERY shortly. The pump department is developing the manufacture of a new line which will be on the market soon, it is expected.

The Galt Screw Co. are in an excellent position to meet demands for their product owing to the care with which the factory buildings and equipment were planned during the past munitions activity.

The expected activities promised for this spring and summer in the solving of the housing problem will result in a measurable increase in the business done by manufacturing hardware and sanitary goods firms. These trades have, during the war been somewhat quiet but the enforced inactivity will only mean the catching up of four years building in the next couple of years.

WANT COMPETENT ENGINEER TO LOOK AFTER SCHOOL BOILER PLANTS

"THAT there should be greater efficiency and safety from proper inspection of the boilers in the Toronto schools is the contention of many of those who have been following the case for some time. In the schools of Toronto there is consumed about 20,000 tons of coal per year, and the contention is that by proper inspection there could be a very material saving. In fact one of the trustees who is going into the matter very thoroughly makes the statement that it would be possible to pay $3,000 per year to an engineer to act for the board and then show a saving of $7,000 per annum, as well as having a greater margin of safety in the operation of the plants. The Toronto branch of the C.A.S.E. have taken the matter up and have assumed Trustee Bell that he will have their sympathy and support in the matter.

The case, as stated to CANADIAN MACHINERY by one of the Toronto engineers, is as follows: At present, those in charge of the plants have nothing in the examinations they have to pass to show for efficiency, that is, proper combustion and general economy in the boiler room. The caretakers in most cases are paid so much per room for cleaning, etc., but in most cases they have to engage a fireman or engineer to run their heating plant during the winter months as they have no time to look after it themselves. Of course they are out to engage a man for as little as they can get him. In case the plant runs under 20 pounds pressure or is under 50 horsepower, any person can be taken on without papers, but above that size papers are required for the man who fires the boilers. The engineers contend that there should be a competent engineer to superintend these plants. The papers that are set at present have some twenty-four questions, and they cover only the rudiments of boiler and plant operation. In regard to the attitude of the C.A.S.E. in the matter, one of the officials of this organization stated to CANADIAN MACHINERY:

"We have no axe to grind in the matter. We are interested because the matter comes directly into our field and because many of us are ratepayers with children attending school. The matter was discussed at one of our meetings and we decided that we would back up Trustee Bell because we felt that he is

right in this matter. We would urge the appointment, and ask simply that it should be made on the merits of the case and entirely removed from any political or ulterior influence. It would also be well to have such an inspector of boiler plants acting separately from any other official, and he should be allowed to make his report directly to the Board of Education."

A committee from the C.A.S.E. is going to inspect several of the city schools in the near future, and they will after that appear before the Board in support of the contention of Trustee Bell who is urging that proper inspection is most necessary.

PERSONAL

Capt. S. H. E. (Harry) Mitchell, son of Mr. and Mrs. D. T. N. Mitchell, of Collingwood, recently returned from overseas where he spent two years in the auxiliary service of the Royal Navy, the greater part of the time mine sweeping on the east coast of Scotland. During his service he saw a number of German subs, two or more of which were put out of business, while on one occasion his trawler was blown up, all the crew except one officer and himself being lost. This was off the coast of England and in a fairway to cross the channel.

TENDERS

HALIFAX.—Tenders will be received by L. Fred Monaghan, city clerk of Halifax, up to March 19, for the work of the various trades required in the erection of a Hospital Building on the Geizer Property at Dutch Village, Halifax, under the following headings: 1, excavating, concrete, masonry, plastering, car-

THE LARGE PART PLAYED BY THIS COUNTRY IN SHELL MAKING

The splendid part which Canada played in the production of munitions during the war was the subject of a paper read last night by Mr. H. H. Vaughan before the Montreal branch of the Engineering Institute of Canada. This review of the munitions industry of Canada which the chairman, Mr. Walter J. Francis, characterized as the most complete that has been made, was profusely illustrated by excellent lantern slides showing plants and processes. The Quebec Arsenal, the lecturer said, was a great asset in assisting manufacturers at commencement of the war, as the arsenal was actually producing ammunition, and knew how it was to be done. The original specifications called for acid open hearth steel, but through the efforts of Col. Carnegie, basic steel was accepted by the British War Office. The Nova Scotia Steel Company did useful pioneer work in obtaining the exact grade of steel required. The heat treatment had proved a troublesome problem, but it was overcome largely through the efforts of Mr. W. A. Peterson, of the C.P.R., and Mr. C. S. Winslow of the Ingersoll Rand Company.

Mr. Vaughan referred to the arrangement whereby the work was subdivided instead of the contracts being let for the manufacture of the shell complete, and he claimed that this proved a vital factor in the rapid production of shells. He traced the steps by which the output was increased and orders for various kinds of shells were placed with Canadian firms. As instances of what these plants were able to turn out, he stated that the total output of 18-pounder shrapnel was 34,078,301; of 18-pounder high-explosive shell, 5,682,834; and of the 4.5 high-explosive shells, 12,607,091. The manufacture of cartridge cases presented a novel problem which was satisfactorily solved; the cases being turned out in very large quantities. A yet more difficult problem was the production of cordite, generally known as T.N.T., also fuses, but the resources and energy of Canadian manufacturers proved equal to this dangerous work. The result was that Canada was able to make big shipments of shells at a time when they were badly needed, and at the close of the war special letters of thanks had been received by the Imperial Munitions Board from both Premier Lloyd George and Winston Churchill, Minister of Munitions acknowledging what the Dominion had done in this respect. The speaker said that the difficulties of the work of the Shell Committee and the ability with which it was carried out had not been as generally recognized as was deserved. That committee had devoted much earnest, hard work and shown much ability in the execution of the task entrusted to it.

Cost of Shells

With regard to the prices paid for shells, Mr. Vaughan declared that liberal prices were a necessity in order to enable a manufacturer to spend money freely so as to secure his output and increase his plant. The great end in view at that time was the fulfilment of the specified deliveries, and subsequent events proved that the policy adopted by the Shell Committee not only brought quick results but obtained them more cheaply than could have been done in any other way. The committee returned to the War Office $34,000,000 out of a total of $340,000,000 which they were authorized to expend.

Consequent on the reorganization of the Shell Committee the work developed to still greater proportions, and orders for six, eight, and 9.2-inch shells came, the value of the first-named being greater than any other size. During 1917 Canada manufactured 55 per cent. of the 18-pounder shrapnel, 42 per cent. of the 4.5-inch, 27 per cent. of the 6-inch, 20 per cent. of the 60-pounder, 15 per cent. of the 8-inch, and 16 per cent. of the 9.2-inch shells supplied to the British Government. The Munitions Board were also responsible for the production of 2,921 aeroplanes and thirty flying boats. Altogether the Board produced 67,000,000 shells at a cost of twelve hundred million dollars, and this represented the output of over 450 plants. This production required two million tons of steel, 18,000 tons of copper, 25,000 tons of spelter, and 138,000 tons of lead, and in addition, twenty-seven million dolars' worth of shell boxes and similar material.

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Fire Bricks
And Other Grades
CUPOLA BLOCKS
FIRE CLAY
Prompt Shipment
From our Stock at
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HARBISON-WALKER REFRACTORIES CO.
OF CANADA, LIMITED
Office and Warehouse:
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METAL STAMPINGS
We are manufacturers of stamped parts for other manufacturers.
We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.
We can finish steel stamping in Nickel, Brass or Copper.
Send us a sample order.
W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

You Know How Greatly it Increased

Production

You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

Hawkridge Brothers' steel for every commercial requirement is just such production-increasing steel as proved this "Hawk" D. Chrome Vanadium. We make

Steel of Every Description

Hawkridge Brothers Company

303 Congress St., BOSTON, MASS.
U. S. A.

'Barnes-Made'
Springs

are unusual in service and wear.

They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-Made" Springs are the best buy.

Established 1857
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U. S. A.
Man'frs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

GRAPHIC PRODUCTION CONTROL
Increases Output
Write —
Anderson's Efficiency Service
380 Queen St. West Toronto, Canada

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works
Allentown, Pa., U.S.A.

Machine Tools for Iron & Steel Works.
We shall be glad to hear from firms contemplating improvements or complete installations.

BERTRAMS LIMITED
SCIENNES EDINBURGH

PLEWES Limited
WINNIPEG
For All
Machinists' Supplies

CASTINGS
Medium Weight Grey Iron, Brass, Etc.
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BLACK DIAMOND OVENS
OVENS
Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal.
Kernchen Siphonage Ventilators, Bakers' Ovens, trucks, casters, etc.
Write for Booklet.
Brantford Oven & Rack Co., Ltd.
Brantford, Canada.

pentry, iron work, roofing, tile work, etc; 2, plumbing; 3, painting; 4, electric wiring and elevator; 5, heating.

TRADE GOSSIP

An Important Point.—Holding that the attachment of a piece of machinery securely to the wall of a building did not make that machinery a permanent part of the building and as such an "immovable" under the law; that an indispensable condition to thus changing a piece of machinery from a "movable" to an "immovable" was that the machinery and the building should at one and the same time be the property of the individual making the change, Mr. Justice Mercier in the Superior Court at Montreal, maintained a seizure made by the Matthew Moody & Sons Company, upon certain machinery and effects in Francois Xavier's mill at St. Anicet, Huntingdon County, and ordered the defendant Dupuis to return the machinery to plaintiffs or pay its value.

OTTAWA.—The nationalization of the port of St. John N.B., is now the subject of conference between the Government and representatives of that city and it is probable that the Government and representatives of that city, and it is probable that the Government will take over the harbor and shipping facilities and make it a national port. Mayor R. T. Hayes and T. H. Bullock, Commissioner of Harbor, Ferries and Lands, of St. John, have been in Ottawa since Sunday attending conferences with members of the Government arranged by R. W. Wigmore, M.P., for St. John, and, and, according to information gained, the Government will take over the operation of the port in the near future.

ALL RECORDS BROKEN ON HAMILTON TRIP

Macassa Got Away For the Season's Run on the Sixth Day of March

Breaking all records for navigation out of the port of Toronto, the steamer Macassa left Saturday afternoon for Hamilton with a mixed cargo of package freight. This is the earliest reported sailing from the port and is only rivalled by the year 1906 when the same steamer left the port on March 11, but was forced to discontinue sailings on account of ice after making several trips.

The Macassa is under the command of Captain G. J. Corson, who has with him Chief Engineer E. A. Prince and Purser J. Beckton.

The Toronto to Hamilton ship Macassa is a veteran of the Great Lakes and enters to-day her 31st season since she was built on the banks of the River Clyde in Scotland and crossed the Atlantic ocean under her own steam to enter the lake navigation service.

This time last year there was three feet of blue ice in Toronto bay and it was not until March 30 that the Macassa left on the first trip to Hamilton.

Navigation Openings

The following table give the opening of navigation for the past ten years with the first ship to arrive in port:

1909, Maple Leaf, March	31
1910, Macassa, March	28
1911, Macassa, March	30
1912, Macassa, April	9
1913, Dalhousie City, April	12
1914, Dalhousie City, April	2
1915, Dalhousie City, April	1
1916, Dalhousie City, April	4
1917, Macassa, March	30
1918, Macassa, March	30
1919, Macassa, March	6

The Parade Failed.—"It's all off. There's not going to be any demonstration as there is no use in our claiming that thousands are out of work and go to the Parliament Buildings with only a few hundreds to make a demonstration on the unemployment situation in this city," said Mr. William Storey, business agent of the Plumbers and Steamfitters, at the Labor Temple. A demonstration was to have been arranged in which thousands in the city reputed to be out of employment were to go to the Legislature with a view to impressing that body with the necessity of doing something to provide work for men out of jobs. A meeting was called to make all arrangements for the demonstration, which was to take the form of a parade, but the meeting lacked enthusiasm.

Unemployment Figures.—The Employment Service of the Department of Labor reports that for the week ending February 22, employment returns were received from 1,561 firms in Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. The total number of persons on the payrolls of these firms February 22 was 168,137, and the number of persons anticipated to be on the payroll on March 1 was 166,806, a reduction of 1,331, or .791 per cent. Reports from trade unions for January 31 which have been received by the Employment Service indicate that while there was a considerable volume of unemployment on that date—3.9 per cent.—the country is still far from the hard times of the winter of 1915, the percentage of trade union members reported unemployed on December 31, being 8.7.

A Peculiar Case.—Ex-Ald. Thomas Roden and a deputation of the Canadian Manufacturers' Association waited on the Toronto Board of Control to record their objection against the city's interference in the trouble between the Gutta Percha Rubber Company and the residents of West Lodge avenue, who complain of the incessant vibration of machinery on the plant. Mr. Roden, who was the spokesman of the deputation, stated that all the manufacturers of the city were concerned over the action of the Health Department in summoning the offending company to the police court for maintaining a nuisance. Industries, he said, should be encouraged to come here. "The street railway runs 24 hours a day," he claimed further. Mayor Church reminded the deputation that the people in that district were unable to sleep at nights. To Controller Maguire Mr. Roden admitted that no members of the association had been to visit the plant, but the stoppage of the machinery that caused the noise would throw 1,500 men out of work.

BOOK REVIEWS

Electro-Metallurgy. Electrolytic and Electro-thermal Processes. By Eric K. Rideal, Bailliere, Tindall and Cox, London.

The rapid development of applied chemistry in recent years, accelerated by the recent war, has brought about a revolution in all branches of technology. A series of books, of which the present publication is one are being prepared by the publishers as an aid to the further development of industrial chemistry throughout the British empire. This series will give a general survey of the particular portion of the science dealt with and each volume is complete in itself. The present volume is divided into eight main sections dealing with electrolysis in aqueous solutions; electrolysis in fused electrolytes; the electrolytic preparation of the rare metals; electro-thermal processes; carborundum and oxysilicides of carbon; the carbides; electro-thermal nitrogen fixation by metals and metallic compounds, and iron and the ferro-alloys.

In an introduction to the above sections the problems relating to the ample supply of power necessary for electro-metallurgical operations are dealt with and interesting figures relative to comparative costs of power production by present methods, hydro-electric, coal, gas and oil are given. In Great Britain, where waterpowers are scarce and coal plentiful, the cost of producing power by the latter would seem to be sufficiently low to warrant the establishing of electro-chemical plants using it as fuel. The metalliferous resources of the British Commonwealth are also dealt with in the introduction.

In the section devoted to electrolysis in aqueous solutions the winning and refining of copper is thoroughly taken up and special mention is also made of the use of colloid addition agents in electrolytic work. The other metals treated of in this section are zinc, cadmium, gold, silver, nickel, lead, antimony, bismuth, tin, cobalt and cobalt nickel alloys. In general this section may be said to be an exhaustive summary of present day practice.

In the section devoted to fused electrolytes, the preparation of sodium potassium, lead zinc, aluminum and other metals is dealt with. A portion of the book which is of considerable interest deals with the preparation of the rarer metals which are finding increasing application in modern industry. The section on electro-thermal processes deals with the smelting of and reducing of the metallic elements from their ores and also with the preparation of graphite and other electric furnace products.

Carborundum, carbides and the fixation of atmospheric nitrogen are also considered and an important part of the contents is related to the iron and steel industry.

As a reference aid to the metallurgist engineer or chemist interested in electro-metallurgy this publication should find considerable usefulness and the excellent bibliography which is incorporated at the end of each section is of considerable assistance to those wishing to make further investigation.

The value of the work is greatly enhanced by the incorporation of much material in the nature calculations as to energy requirements for electrolytic and electro-thermal processes.

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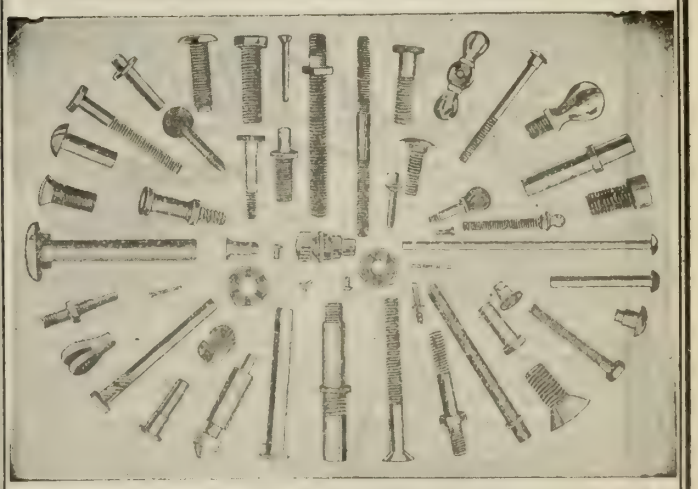

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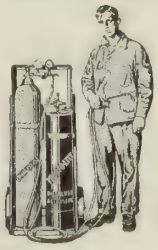

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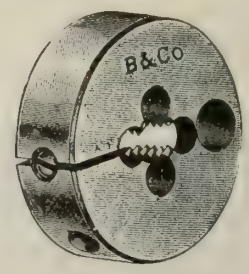

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Do High Prices of Machine Tools Hinder Sales?

THE question asked of a considerable dealer in Toronto by THE FINANCIAL POST is answered by him in THE POST of March 8th, in part, as follows:

> "New lists that are coming out do not show concessions in prices. As long as firms can sell at the present prices there is not much chance for a lower level of values."

The rest of that article in THE POST is interesting, and here are some other extracts worth noting from POST items of this week:

Implement Manufacturers May Unite for Export Trade

"Representatives of the implement manufacturers have been at Ottawa in consultation with the Canadian Trade Commission to arrange for the pushing of their export business. What is likely to be proposed to them is that they should work in concert, and their orders abroad should be placed through a central selling body, the expenses of conducting which should be maintained by a pro rata tax on each member of the association. They will provide their own credits from a common fund, which can be created by contributions gauged according to the respective interests involved."

Steel Market Is Still Unsettled

Big American Interests Co-operating in Secretary Redfield's Plan

The talk of lower prices for steel continues in the market. It is a fact that the "set prices" of the war period have, in many ways, spoiled the trade for what has followed. When prices were fixed, buyers and sellers knew their ground for the coming three months. Not only so, but they were quite certain that when changes would be made they would not be radical, and would be in keeping with the cost of material and labor entering into the output.

Last week a number of prominent steel producers were meeting in New York, and according to the authorized version they "discovered" that George N. Peek, recently named by Secretary Redfield as chairman of "The Industrial Board of the Department of Commerce" was in town, and accordingly they invited him in to explain Secretary Redfield's plan for the deflation of war-time prices. Indications are that the steel producers are going to make a show of resisting the movement, but will gracefully yield at the last moment.

Above is part of a front-page news item in THE POST of March 8th.

Latest Activities of Steel and Iron Using Interests

Stove Manufacturers Out For Export Trade

"The Canadian stove and enamelled ware manufacturers are making an aggressive effort to develop export business and to secure orders from Europe, Australia, New Zealand and South Africa. A. M. Smith, sales manager of the McClary Manufacturing Company, will, on behalf of the manufacturers, make a personal investigation of European prospects."

New Ship Repair Plant For Vancouver

"Seattle men propose to build at Vancouver, B.C., a steel dock of 25,000 tons, capable of handling the largest ships which make the Port of Vancouver. Embraced in the enterprise will be a shipbuilding and repair plant, the whole to cost in the neighborhood of $4,000,000."

New Iron Industries For Border Cities

"Plans are being made for the location of a large malleable iron corporation with extensive connections in the United States, on the Windsor industrial site. Negotiations to this end have been pending for considerable time. Altogether, 12 large manufacturing firms with headquarters across the border are negotiating for sites in the Border Cities."

Business Building News Items Appear Each Week in *The Financial Post*

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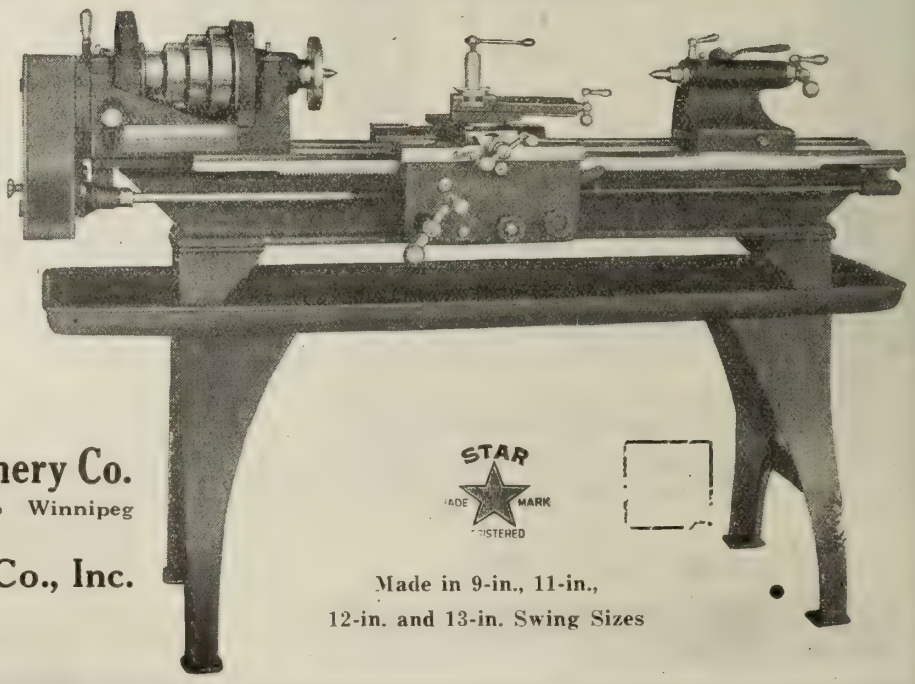

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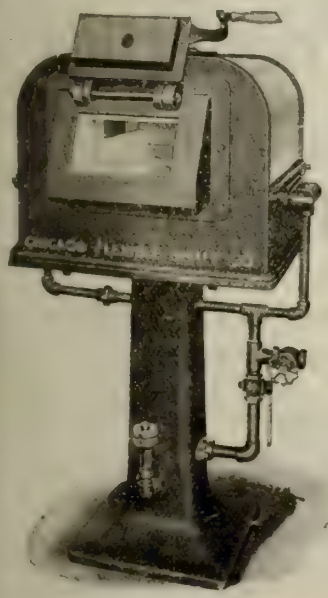

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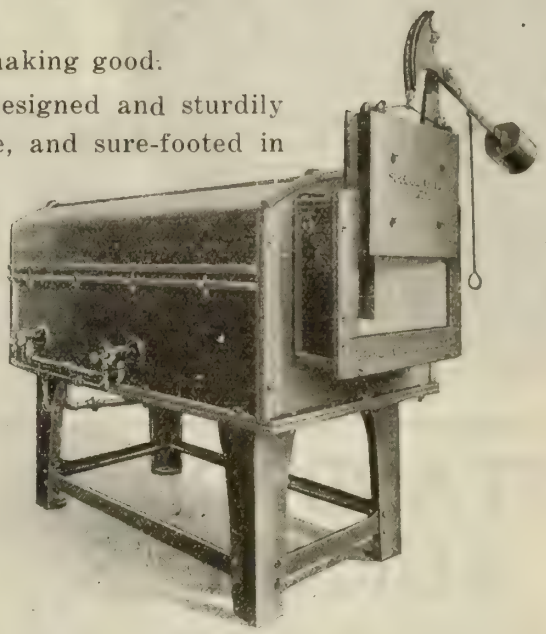

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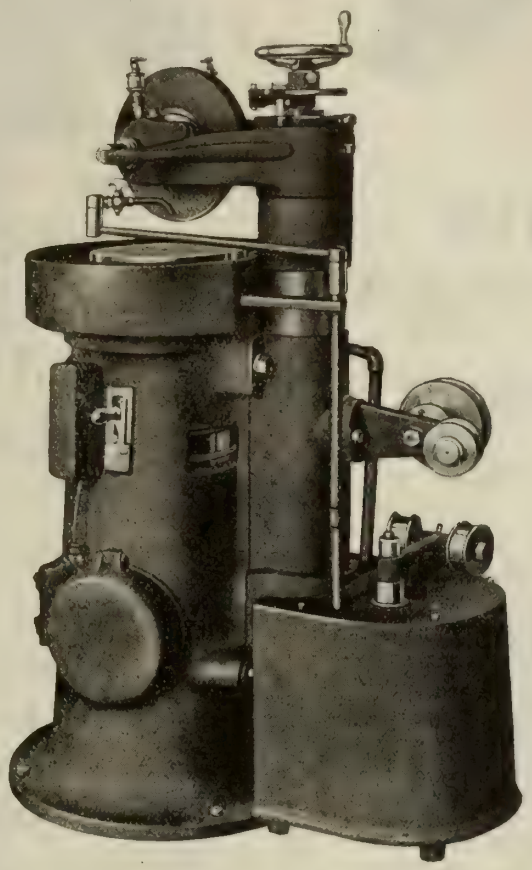

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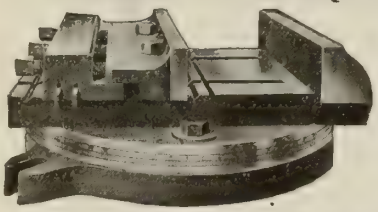

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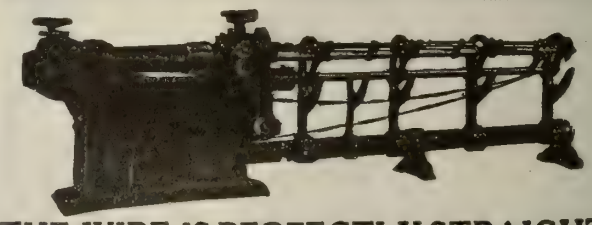

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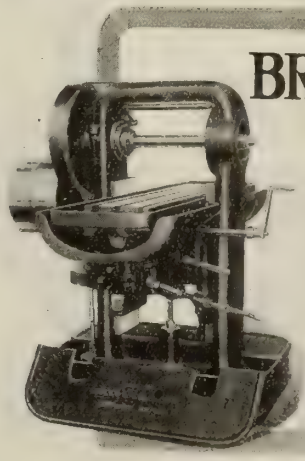

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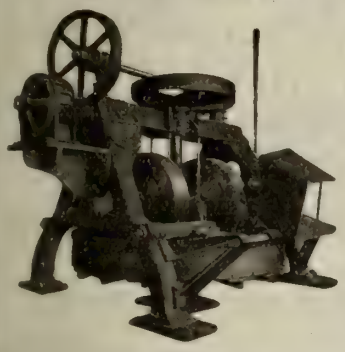

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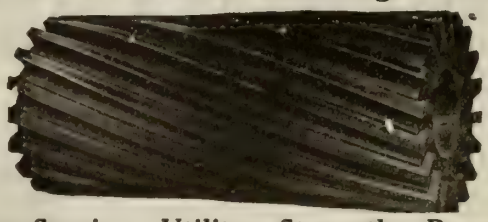

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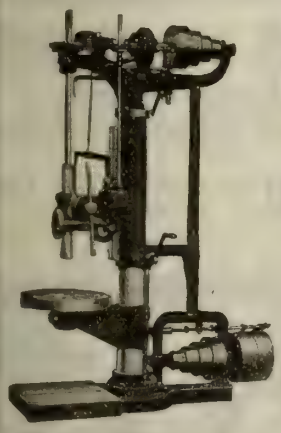

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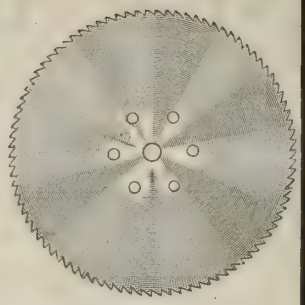

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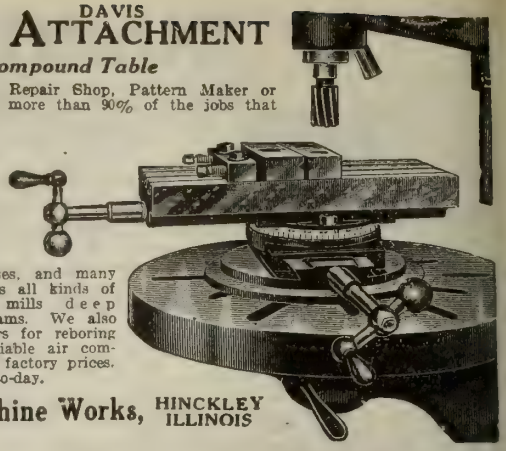

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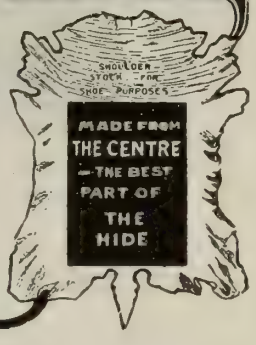

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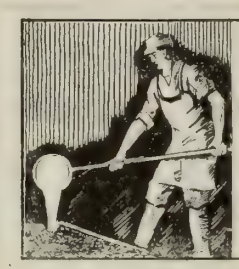

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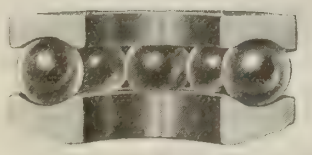

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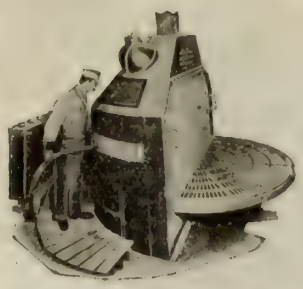

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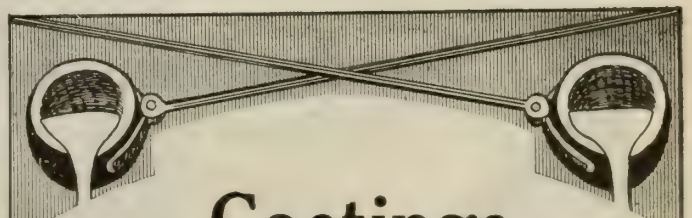

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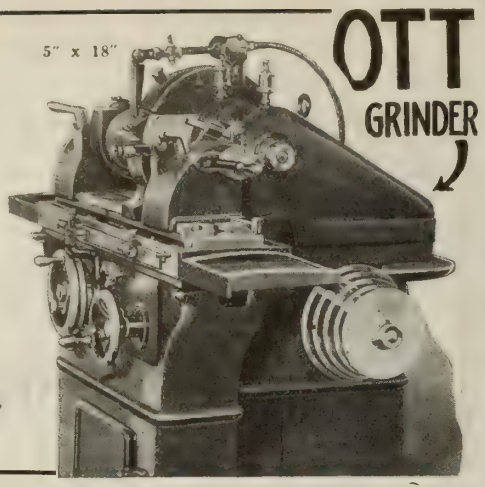

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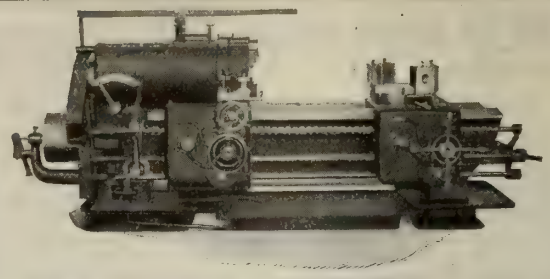

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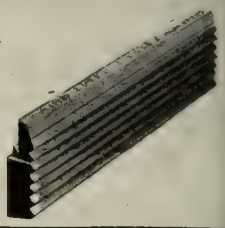

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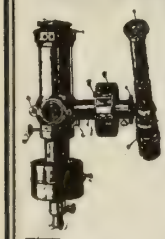

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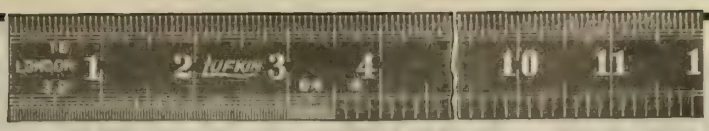

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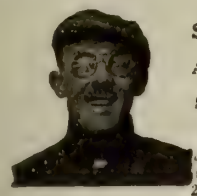

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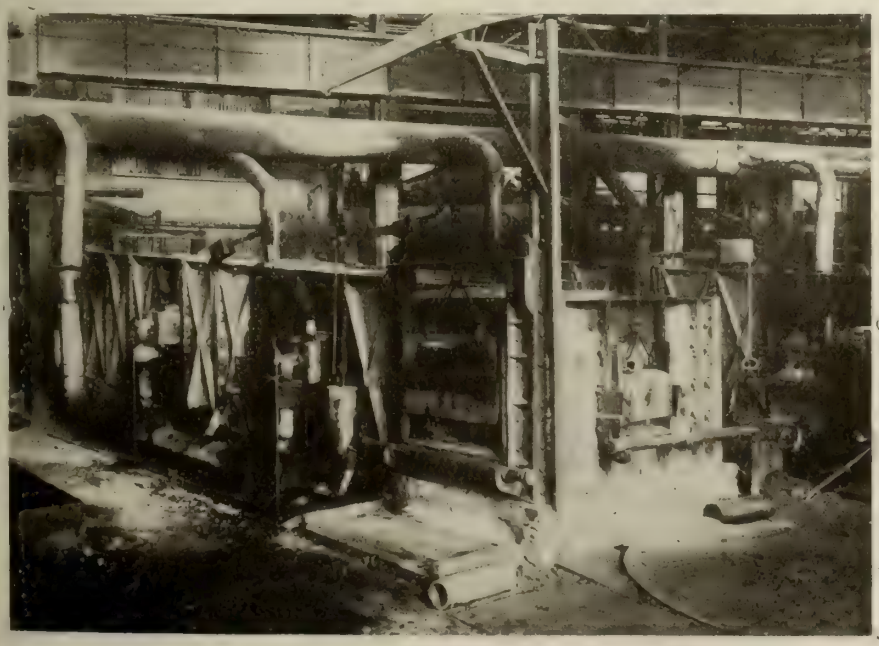

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CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
Fittings, Ltd., Oshawa, Ont.
International Malleable Iron Co. Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Burkhart, Rogers Mach. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

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Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
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Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Limited, Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES, FRICTION AND PULLEY
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Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Williams & Wilson, Limited, Montreal, Que.

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Sleeper & Hartley, Inc., Worcester, Mass.

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Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

COKE AND COAL HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

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Hardinge Bros., Inc., Chicago, Ill.
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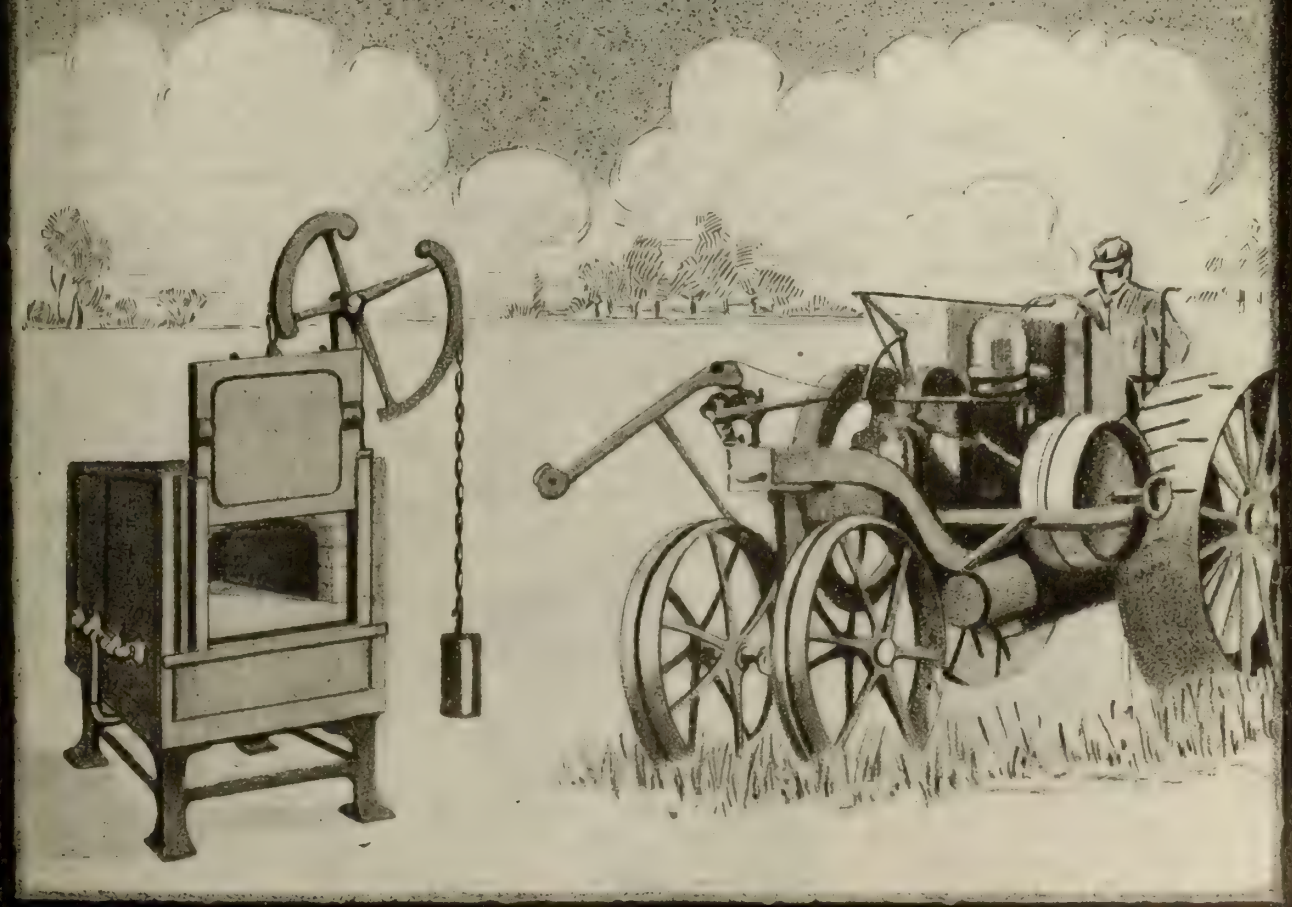

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Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Welland Motor & Machine Co., Welland, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Foster Machine Co., Elkhart, Ind.
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Northern Crane Works, Walkerville.

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MacKinnon Steel Co., Sherbrooke, Quebec.
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Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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CRUSHED STEEL
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Sheldons, Ltd., Galt, Ont.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

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Bowser & Co., S. F., Inc., Fort Wayne, Ind.

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Williams & Wilson, Limited, Montreal, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

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Davidson Tool Mfg. Co., New York, N.Y.
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Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
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CYANIDE AND LEAD BATH POTS
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CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
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Kelley Reamer Co., Cleveland, O.

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Dominion Bridge Co. Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal, Que.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

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Williams & Wilson, Limited, Montreal, Que.

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Wells Brothers Co. of Canada, Galt, Ont.

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Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
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Modern Tool Co., Erie, Pa.
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National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
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Rickert-Shafer Co., Erie, Pa.
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Landis Machine Co., Waynesboro, Pa.
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Wells Bros. of Can., Galt, Ont.

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Garvin Machine Co., New York.
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Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
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DIE HEADS
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Worth Engineering Co., Toronto, Ont.

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Landis Machine Co., Waynesboro, Pa.
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Murchey Machine & Tool Co., Detroit, Mich.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
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A TRYING-OUT IN YOUR FACTORY. WE ARE SURE FROM THE EXPERIENCE OF OTHERS THAT YOU WILL BE PLEASED WITH THE RESULTS YOU GET.

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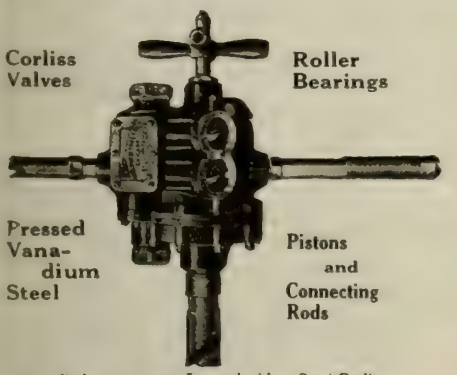
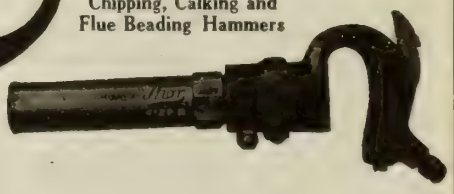
Piston Air Drills and Reamers



our cylinder type, two on each side. Semi Corliss valve close to each pair of cylinders gives greater efficiency and power, saves clearance losses and allows air to enter cylinders at full pressure of the pipe line.

Chipping, Calking and Flue Beading Hammers



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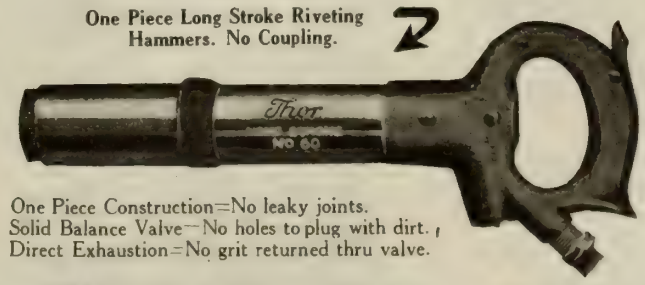

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One Piece Construction=No leaky joints.
Solid Balance Valve—No holes to plug with dirt.
Direct Exhaustion=No grit returned thru valve.

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CANADIAN OFFICES: 334 St. James St., MONTREAL; 32 Front St., TORONTO; 123 Bannatyne Ave. E., WINNIPEG; 1142 Homer St., VANCOUVER

Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

DRILLING MACHINES, WALL RADIAL
Lynd-Farquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont
Williams & Wilson, Ltd., Montreal, Que.

EARTH HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

EFFICIENCY ENGINEERING SERVICE
Anderson's Efficiency Service, Toronto, Ont.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRY CLEANING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELEVATOR MACHINERY
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Baxter & Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Trueing Tool Co., Windsor, Ont.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES
Brewster Co. ,Wm., New York, N.Y.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL
J. F. A. Comstedt, New York City, N.Y.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont.
United Brass & Lead, Ltd., Toronto.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

FENCE, IRON AND FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

FILLING STATION EQUIPMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind
Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

FIRE BRICKS
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

FITTINGS, MALLEABLE AND CAST IRON
Fittings, Ltd., Oshawa, Ont.

FIXTURES
Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

FORGINGS, STEEL AND IRON
Can. Foundries & Forgings, Ltd., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE

FORGING AND WELDING
Victoria Foundry Co., Ottawa.
Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Williams & Co., J. H., Brooklyn, N.Y.

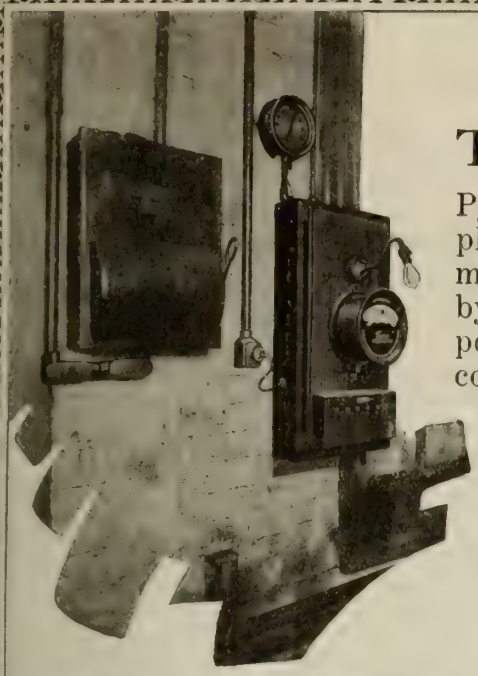
FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

FORGINGS, SPECIAL
Armstrong, Whitworth of Canada, Montreal, Que
Canada Foundries & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING
Can. Consolidated Rubber Co., Ltd., Montreal.

FUEL OIL SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Gilbert & Barker Mfg. Co., Springfield, Mass.



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Cleveland AIR TOOLS

Announcement

Our Montreal Friends and Customers will doubtless be pleased to learn that we have opened an Office, Warehouse and Service Station at 337 Craig Street, Montreal, Quebec, where a large stock of Cleveland Air Tool, Appliances, Sundries and Repair parts will be carried in stock for immediate delivery. Prompt and efficient service is the "Keynote" of our organization and guaranteed to all alike.

C. D. GARNER
MANAGER

Cleveland Pneumatic Tool Co., *of* Canada, Ltd.
84 Chestnut St., Toronto, Ont. 337 Craig St., Montreal, Que.

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Bellevue Furnace Co., Detroit, Mich.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical Engineering Co., Three Rivers, Que.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

FURNACES, BLAST
Belleview Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

FUSE BOXES, STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.

GAUGES, MANUFACTURERS, LIMIT, THREAD
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

GALVANIZING PLANT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE TANKS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GAUGES
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

GAUGES, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford
Normac Machine Co., St. Catharines, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, VACUUM AND PRESSURE
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GEAR BLANKS
Can. Steel Foundries, Ltd., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

GEARS, CUT, MORTISE, ANGLE, WORM
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

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Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GENERATORS, MOTOR
MacGovern & Co., Montreal, Que.

GERMAN SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLASSES, SAFETY
Strong, Kennard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
Aikenhead Hardware, Ltd., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.

GOGGLES
Consolidated Optical Co., Toronto, Ont.
Standard Optical Co., Geneva, N.Y.
Strong, Kenard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS
Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (SEE LUBRICANTS)

GRINDERS, AUTOMATIC KNIFE
W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH
Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co. Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, DIE AND CHASER
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

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Aikenhead Hardware Co., Toronto, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
United States Electrical Tool Co., Cincinati, O.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, PORTABLE, ELECTRIC, HAND, TOOL POST, FLOOR AND BENCH
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, ROTARY SURFACE
Bristol Machine Tool Co., Bristol, Conn.

GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
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What is known about the onions is told by Lieut. J. Vernon McKenzie in the course of an article, "Raiding the Rhineland," in MARCH MACLEAN'S. It is an intensely interesting article, telling all about the great reprisal campaign which implanted the fear of war in the German civilian heart.

"NO HOPE FOR THE WETS"

"Already the temperance forces are lined up to stop any possible break in the prohibition dam," writes J. K. Munro, in discussing what is going to happen at the coming session at Ottawa. He predicts that Union Government will hold together, but that the habit it has contracted of promising everything asked is going to make a lively session. He expects:

Dry legislation at the earliest possible moment.
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No change in the Divorce Law.
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The March number, in fact, is full of live, up-to-the-minute features.
The famous Canadian Ace, Lieut.-Colonel W. A. Bishop is on the cover.

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Lend Me Your Title—By Onoto Watanna.
A Shady Deal—By Archie P. McKishnie.
The City of Lost Laughter—By Mary Josephine Benson.

The Voice of Canada Interpreted

A new department starts in this number given over to summarizing and presenting opinion in Canada on outstanding topics, as reflected in the press. In this issue the department is given over to a careful compilation of opinion on the problems of the returned soldier.

Events of the World in the Remaking

Germany Ready for Trade War
Three-Year Marriages in France
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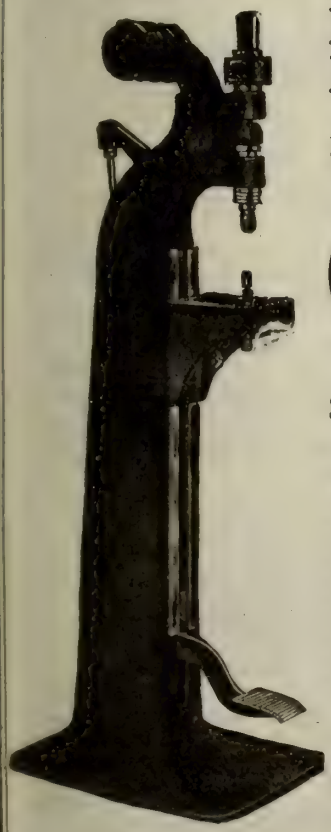

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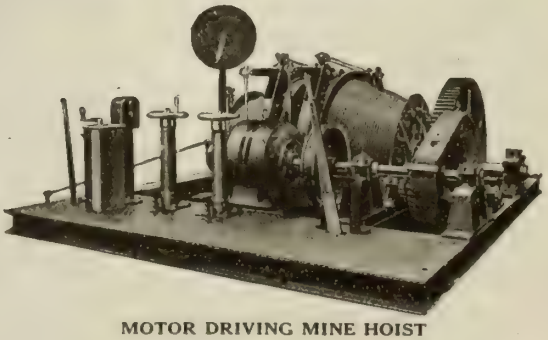

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J. H Williams & Co., Brooklyn, N.Y.
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Williams & Wilson, Limited, Montreal, Que.
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A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
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Matthews, Jas. H., & Co., Pittsburgh, Pa.
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Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.
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Pratt & Whitney Co., Dundas, Ont.
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Bowser & Co., S. F., Inc., Fort Wayne, Ind.
MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.
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Toronto Testing Laboratory, Ltd., Toronto.
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Simonds Mfg. Co., Fitchburg, Mass.
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Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
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Frost Mfg. Co., Chicago, Ill.
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Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
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Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
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Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.
MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.
MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.
MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Steptoe Co., The, John, Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.
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Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
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Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
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Steptoe, The John Co., Cincinnati, Ohio.
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Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.
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Geometric Tool Co., New Haven, Conn.
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Sheldons, Ltd., Galt, Ont.
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New Britain Mach. Co., New Britain, Conn.
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MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
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Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
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J. F. A. Comstedt, New York City, N.Y.
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Williams & Wilson, Limited, Montreal, Que.
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National Machy. Co., Tiffin, Ohio.
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A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
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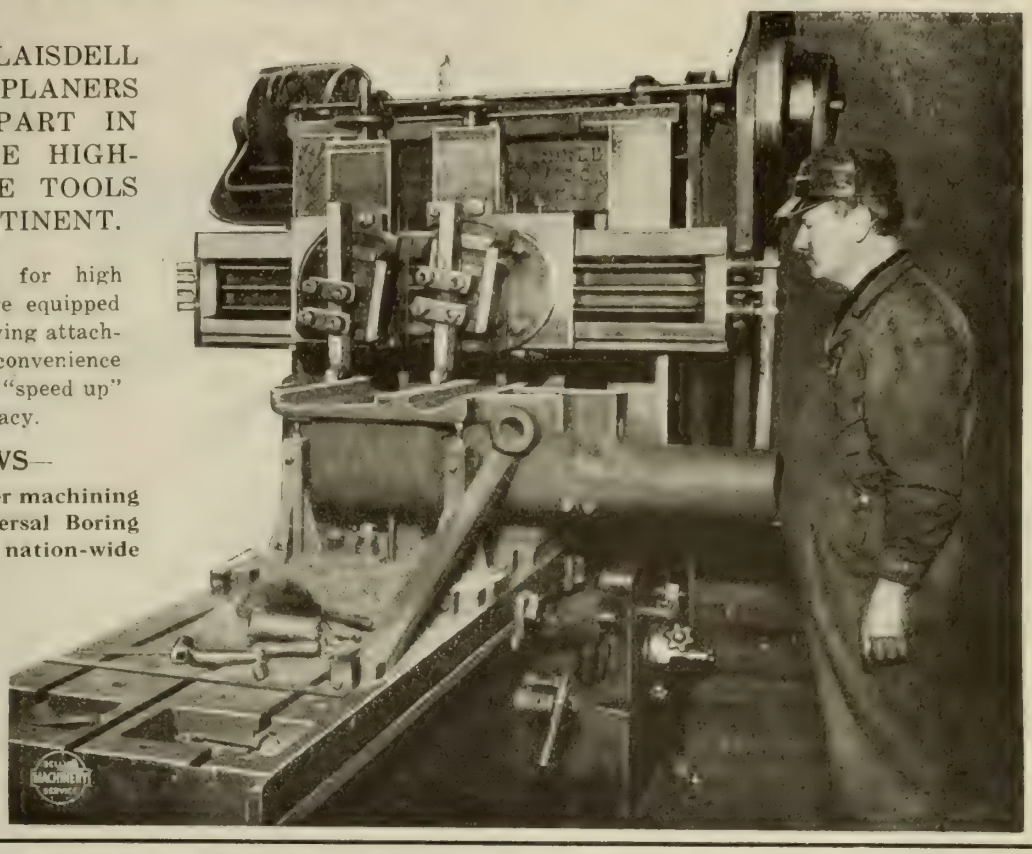

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Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
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Toledo Machine & Tool Co., Toledo.
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Carlyle Johnson Mach. Co., Manchester, Conn.
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Johnson, Carlyle, Mach. Co., Manchester, Conn.
Williams & Wilson, Limited, Montreal, Que.

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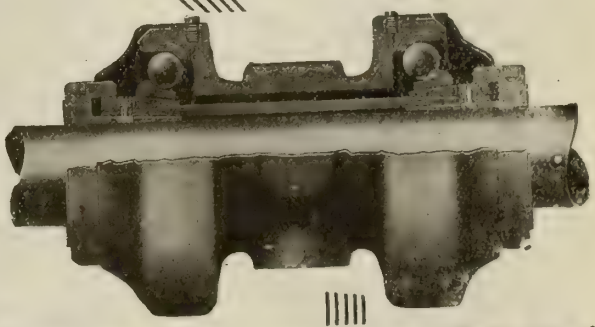

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Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPROCKETS, CHAIN
Can Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CHILLED THREAD
Katie Foundry, Galt, Ont.

SQUARES
Peck, Stow & Wilcox Co., Southington, Conn.

STAYBOLT TOPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

STAIRS, IRON
Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont
Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

STAMPINGS, METAL
American Pulley Co., Philadelphia, Pa.

STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.

STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL BALLS
Rochester Ball Bearing Co., Rochester, N.Y.

STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y
Illingworth Steel Co., John, New York, N.Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Canada, Montreal, Que
Boker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Latrobe Electric Steel Co., Latrobe, Pa
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S
Swedish Crucible Steel Co., Windsor, Ont.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal
Union Drawn Steel Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co. Montreal, Que.

STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que

STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.

STELLITE, HIGH-SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.

STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.

STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que
Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STOCK RACKS FOR BARS, PIPING, ETC
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
New Britain Machine Co., New Britain, Conn.

STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain, Conn.

STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.

STRAND
Page Steel & Wire Co., Adrian, Mich.

SUPPLIES, CONTRACTORS'
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

STRUCTURES, STEEL BUILDINGS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

SYSTEMS, REMOTE CONTROL FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

STORAGE AND HANDLING SYSTEMS FOR DRY CLEANERS, AND NAPHTHA
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, RECLAIMING, FOR OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, RAILWAY OIL, STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, PAINT, OIL STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, OIL STORAGE AND DISTRIBUTING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.

TABLES, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

TACK (DOUBLE POINT) MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

TAPPING MACHINES (PENUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto

TANKS, GASOLINE, KEROSENE AND OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.

TANKS, LUBRICATING OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANKS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANKS, STEEL, WATER PRESSURE
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.

TANKS, UNDERGROUND STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.

TANKS, WHEEL, FOR LUBRICATING OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.

TAPPING MACHINES AND ATTACHMENTS
Bertram, John, & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Niles-Bement-Pond Co., New York
Rickert-Shafer Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

TAPES—MEASURING, STEEL AND WOVEN
Lufkin Rule Co. of Can., Windsor, Ont.

TAPES, POCKET
Lufkin Rule Co. of Can., Windsor, Ont.

TAPS, ADJUSTABLE
Barter Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.

TAPS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, GUN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, STAYBOLT, "MAX" TAP
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, TAPPER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, DIES AND WRENCHES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Geometric Tool Co., New Haven
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

TAP EXTENSIONS
Allen Mfg. Co., Hartford, Conn.

TAP EXTRACTORS
Walton Co., The, Hartford, Conn.

THERMOMETERS, INDUSTRIAL
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, ENGRAVED
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, TEMPERATURE AND PRESSURE
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, RECORDING AND INDEX
Bristol Co., Waterbury, Conn., U.S.A.
Taylor Instrument Co., Rochester, N.Y.

TESTING INSTRUMENTS METALLURGICAL
Shore Instrument & Mfg. Co., New York City.

TESTING LABORATORIES
Toronto Testing Laboratory, Toronto.

THREAD-CUTTING MACHINES
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

THREADING TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

THREADING MACHINES FOR BOLTS, NUTS AND PIPES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

THREAD MILLING MACHINES
Taft-Pierce Mfg. Co., New York, N.Y.
Smalley-General Co., Inc., Bay City, Mich.

THUMB SCREWS AND NUTS
Canada Found'ls & Forgings, Ltd., Welland, Ont.
United Brass & Lead Ltd., Toronto.
Williams & Co., J. H., Brooklyn, N.Y.

TINSMITHS' TOOLS
Brown, Boggs & Co., Hamilton, Can.
Williams & Wilson, Limited, Montreal, Que.

TIRE BENDERS
A. B. Jardine & Co., Limited, Hespeler, Ont.

TIRE SETTING MACHINES, HYDRAULIC
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.

TOOL CASES
Rice, Lewis & Son, Toronto, Ont.

TOOL HOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Armstrong Bros. Tool Co., Chicago.
Deloro Smelting & Refining Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL POSTS, LATHE
Armstrong Bros. Tool Co., Chicago.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL ROOM PARTITIONS
Canada Wire & Iron Goods Co., Hamilton.

TOOL STEEL
Armstrong, Whitworth, Ltd. of Canada, Montreal.
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Deloro Smelting & Refining Co., Toronto, Ont.
General Steel Co., Milwaukee, Wis.
H. A. Drury Co., Montreal.
Firth & Sons, Thos., Montreal, Que.
Hammond Steel Co., Inc., Syracuse, N.Y.
Harvey & Co., Arthur C., Boston, Mass.
Hawkridge Bros. Co., Boston, Mass.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

TOOLS, BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

TOOLS, BLACKSMITHS'
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.

TOOLS, ADJUSTABLE BORING
The Kelly Reamer Co., Cleveland, O.
Williams & Wilson, Limited, Montreal, Que.

TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago, Ill.
A. R. Williams Machinery Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
United States Elec. Tool Co., Cincinnati, O.

TOOLS, FORMING
Davidson Tool Mfg. Co., New York, N.Y.

TOOLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

TOOLS, LATHE, PLANER, SLOTTER
Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y.

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind.

TORCHES, STEEL
Armstrong, Whitworth of Canada, Ltd., Montreal
Prest-O-Lite Co., Inc., Toronto, Ont.

TRACK, PORTABLE STEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

TRANSFORMERS
MacGovern & Co., Montreal, Que.

TRANSMISSION MACHINERY
American Pulley Co., Philadelphia, Pa.
A. R. Williams Machinery Co., Toronto.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

TRANSMISSION POLES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

TRANSMISSION ROPE
Jones & Glassco, Montreal, Que.
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Wilson & Co., J. C., Belleville, Ont.

TRANSMISSION TOWERS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Dominion Bridge Co., Montreal, Quebec.
MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton

TRANSVEYORS
Cowan Truck Co., Holyoke, Mass.

TROLLEYS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

TRUCKS, FACTORY, FREIGHT, ETC.
Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing Co., Toronto.
Cowan Truck Co., Holyoke, Mass.
MacKinnon Steel Co., Sherbrooke, Quebec.
Rice, Lewis & Son, Toronto, Ont.

TRUCKS, LUMBER AND KILN
Sheldons, Ltd., Galt, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS & COPPER
Standard Tube & Fence Co., Woodstock, Ont.
Tallman Brass and Metal Co., Hamilton, Ont.

TUBING COILERS, FLEXIBLE METAL
Almond Mfg. Co., T. R., Ashburnham, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.

TURRET MACHINES, LATHES
Brown & Sharpe Mfg. Co., Providence
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Tap & Die Corp., Greenfield, Mass.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

TUNGSTEN FILAMENT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.

TURBO GENERATOR UNITS
MacGovern & Co., Montreal, Que.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.

TURNBUCKLES
Canada Foundries & Forgings, Ltd., Welland, Ont.
Rice, Lewis & Son, Toronto, Ont.

TURNTABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

UPSETTING AND BENDING MACHINERY
John Bertram & Sons Co., Dundas
Brown, Boggs Co., Ltd., Hamilton, Canada.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.

VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.

VENTILATING APPARATUS
Brantford Oven & Rack Co., Brantford, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

VISE STANDS, PORTABLE
New Britain Machine Co., New Britain, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

VISES, BENCH
Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
New Britain Machine Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

VISES, PIPE
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

VISES, PLANER AND SHAPER
Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn
Williams & Wilson, Limited, Montreal, Que.

WASHER MACHINES
National Machy. Co., Tiffin, Ohio.

WASHERS
Barnes, Wallace, Co., Bristol, Conn.
Graton & Knight Mfg. Co., Worcester, Mass.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WASTE
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wood Turret Machine Co., Brazil, Ind

WATER-INTAKE SCREENS
Can. Link-Belt Co., Toronto, Ont.

WATER TOWERS
Toronto Iron Works, Ltd., Toronto.

WELDING, ELECTRIC, SPOT, BUTT, ETC.
St. Lawrence Welding Co., Montreal, Que.

WELDING MASKS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

WELDERS, ELECTRIC, SPOT, BUTT, ETC.
Tabor Mfg. Co., Philadelphia, Pa.

WELDING RODS AND WIRE
Page Steel & Wire Co., Adrian, Mich

WELDING, WORK AND SUPPLIES (Autogenous and Oxy-Acetylene) see OXY-ACETYLENE

WHEELS, SPROCKET AND TRACTION
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

WHEELS, PRESSED STEEL
American Pulley Co., Philadelphia, Pa.

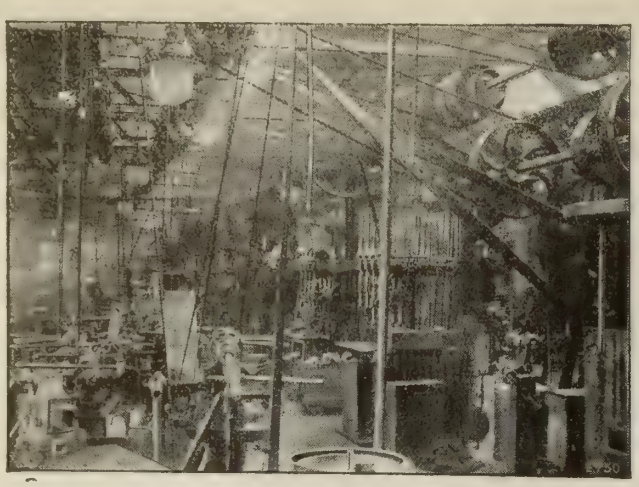
WHEEL TRUEING TOOLS
Anderson & Co., of Canada, Geo., Montreal, Que.
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal, Que.

WINCHES
John H. Hall & Sons, Brantford.
Kennedy & Son, Wm., Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

WIRE COILING AND POINTING MACHINERY
Baird Machine Co., Bridgeport, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

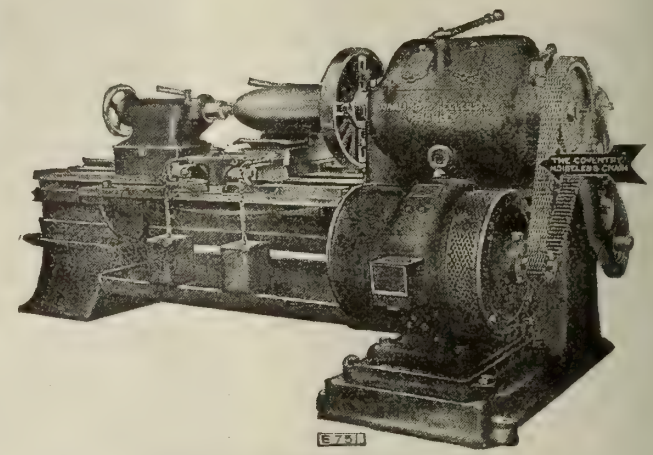
WIRING MACHINES
Quickwork Co., St. Marys, Ohio.

WRENCHES, PIPE, POWER
Peck, Stow & Wilcox Co., Southington, Conn.



THE OLD WAY

Notice the space occupied by belts, pulleys and shafting, which darken the workshop and throw shadows on the work.



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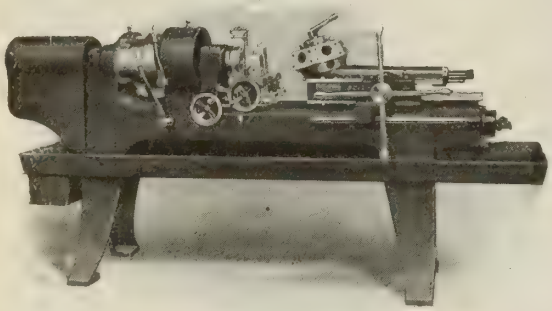
A CLEAR TRACK FOR THE STOCK



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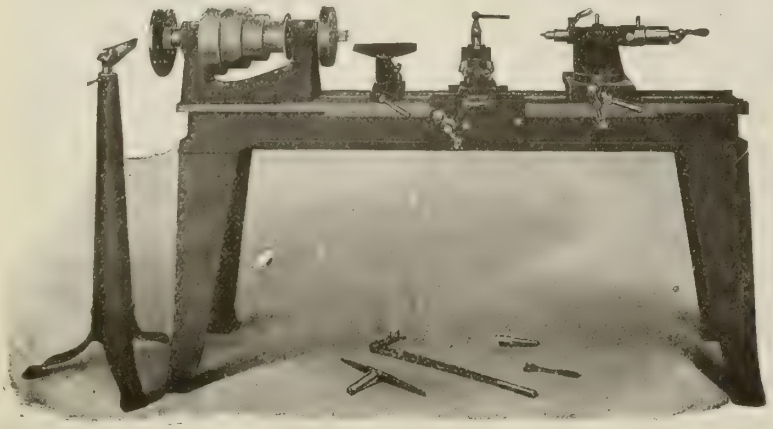

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FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

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CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI. TORONTO, MARCH 12, 1919 No. 11

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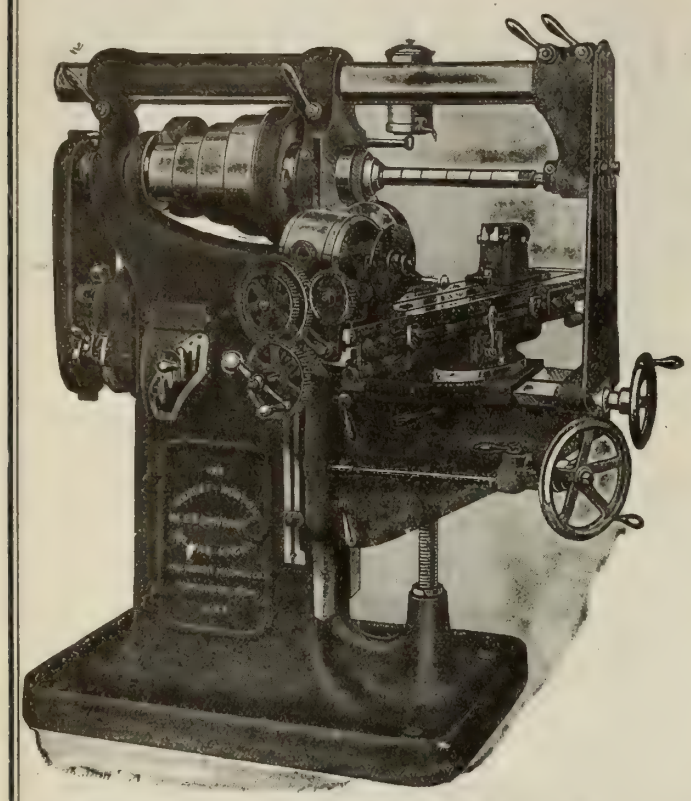

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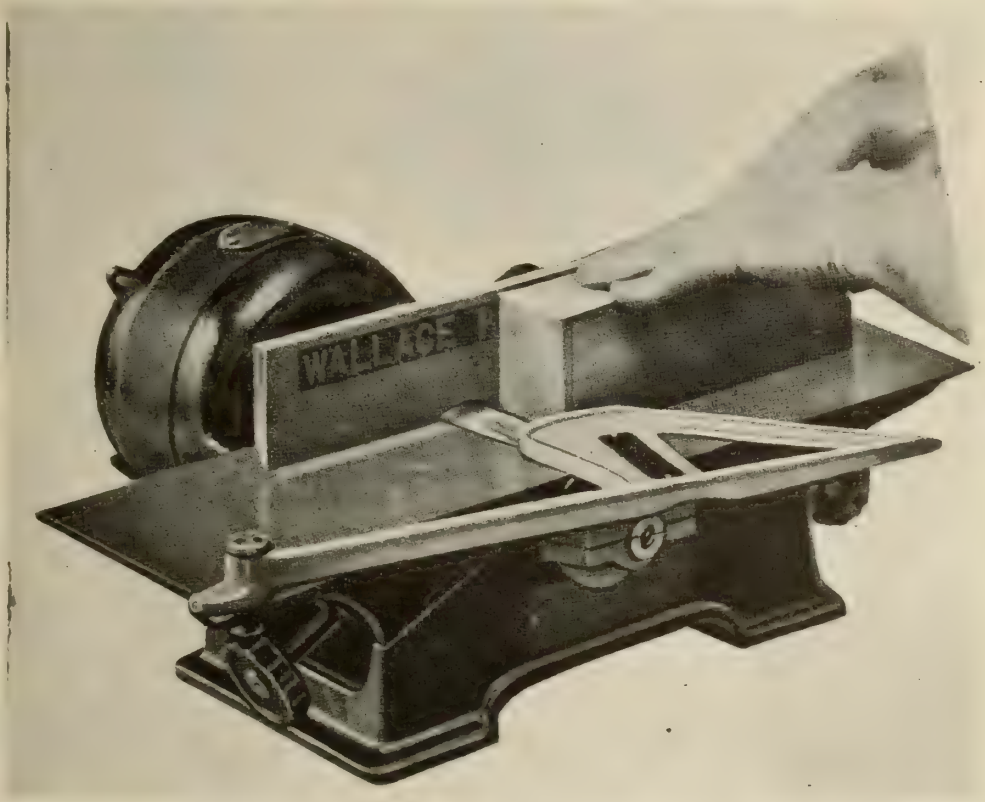
The Wallace Bench Planer

Speeds Up Production
- - - Cuts Costs - - -

THE bulk—or about 70 per cent.—of your fitting, trimming, jointing or surfacing is on work less than 4 feet long and 4 inches wide. For lack of better facilities you have had to **do** all this work by hand—at an enormous cost. If every operation were as costly you'd close up shop. You can't afford to run to the big stationary jointer with each piece of work —yet that cost must be cut.



THE Wallace Bench Planer was designed especially for small work. It is the quick action machine you need to turn out that bulk of your planning, surfacing, beveling, jointing and fitting efficiently—economically. That's why it's busy in the General Electric, Westinghouse, Reaser Furniture, Long Furniture, Brunswicke-Balke-Collender, National Malleable Casting, Pierce-Arrow, Jackson Sash and Door, and hundreds of other shops, from the biggest to the "one man" cabinet, pattern, carpenter shops, etc. In many shops it takes care of **all** the work.

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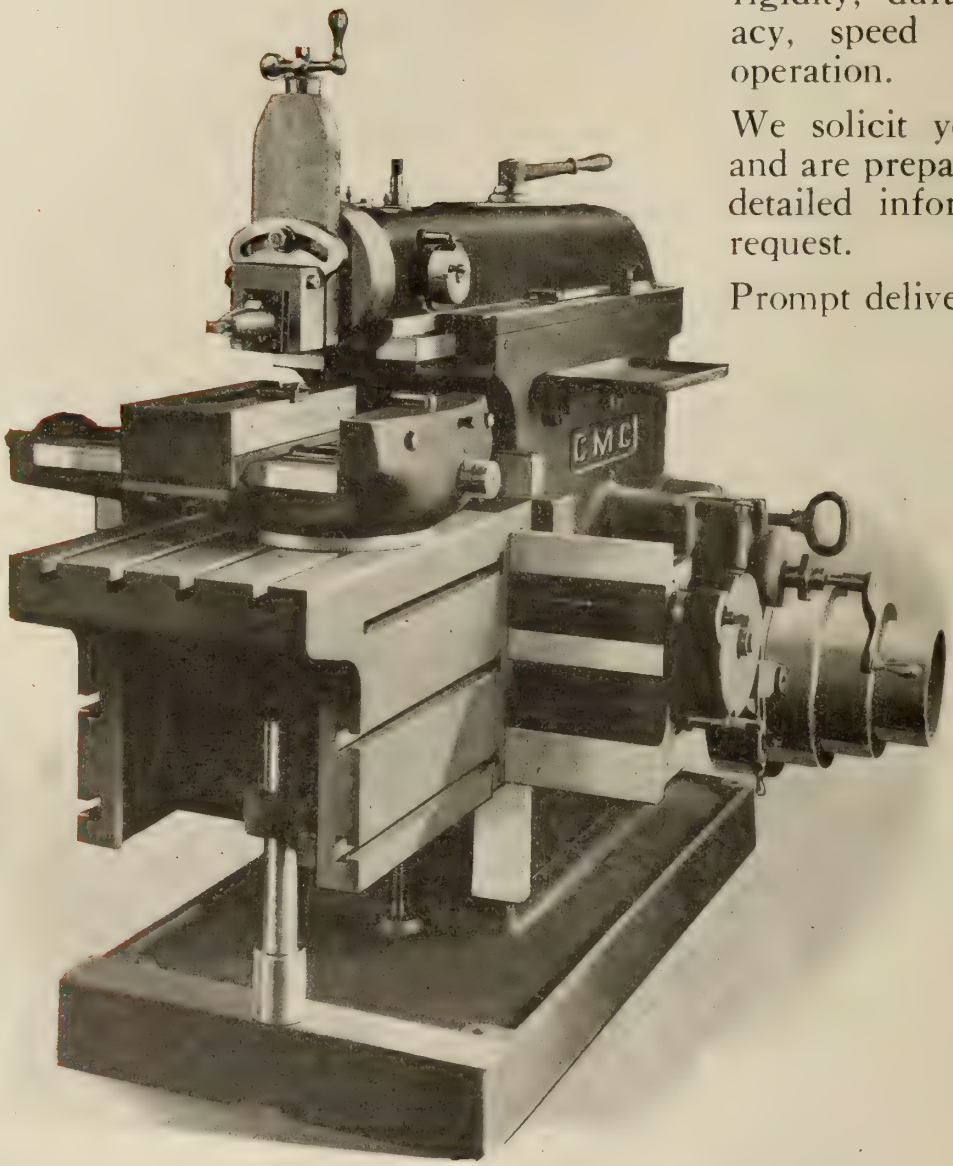

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26″ x 30″
and
20″ x 22″

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CANADIAN MACHINERY AND MANUFACTURING NEWS

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Published by the MacLean Publishing Company, Limited, Toronto, Canada.

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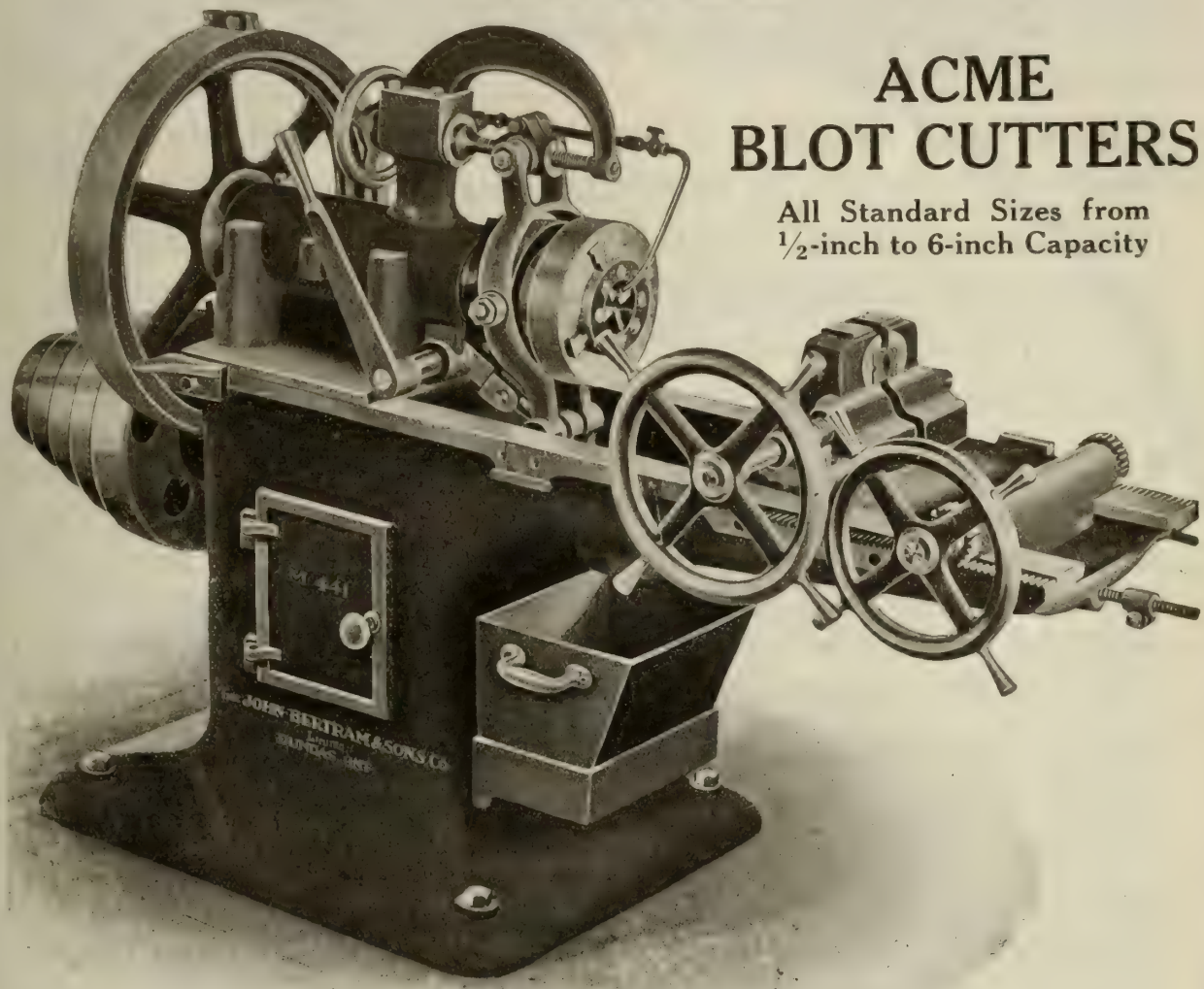

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The Publisher's Page

TORONTO MARCH 20, 1919

COMPETITION

¶ It has been said that "Competition is the LIFE of trade." Just what is meant by that is obvious; but to many a business "Competition" has meant death to trade; to a great many more it has meant death to well-deserved profits. In such cases it resolves itself into the abominable practice of price-cutting and the sacrificing of quality.

¶ But, Competition can be so understood, accepted and acted upon, as to be an ideal, which when applied to one's business is a sure guarantee of "success." It means setting one's self to the task of making the product measure up to the highest standard; eliminating every little thing that would lessen that standard, incorporating every feature that will contribute to its excellence. In other words, making a *better* article.

¶ This is *real* Competition—the kind that rings right, that stands the acid test, costs a little more, is worth a little more, that promotes *real* Good-Will.

¶ This is the one true spirit of Competition—the feature that works itself into the Character of the manufacturer, into the character of the employee; into the finished product in such a way as to establish that substantial renown which will insure for it a lasting market.

Ten minutes more time spent on a certain product in the finishing room of a well-known factory guaranteed the sale of three times as many of a similar article put on the market by a rival concern.

Of course, this high quality product was a well advertised line of goods.

"Success or failure are not chosen for us; we choose them for ourselves."—Mabie.

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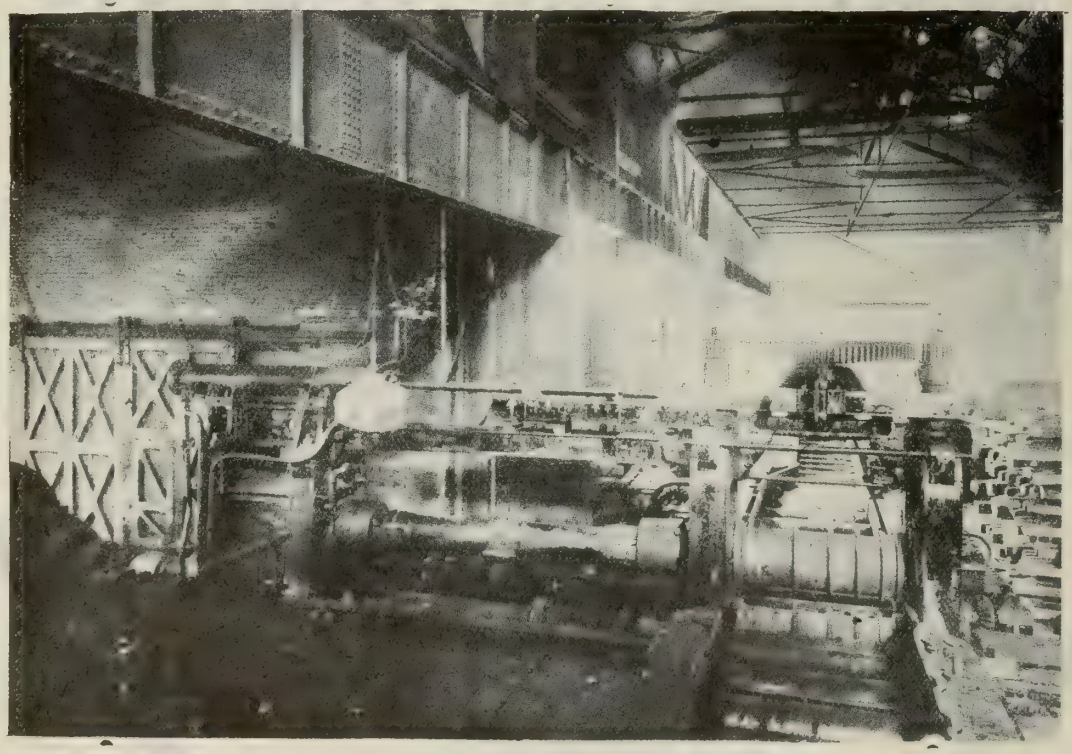

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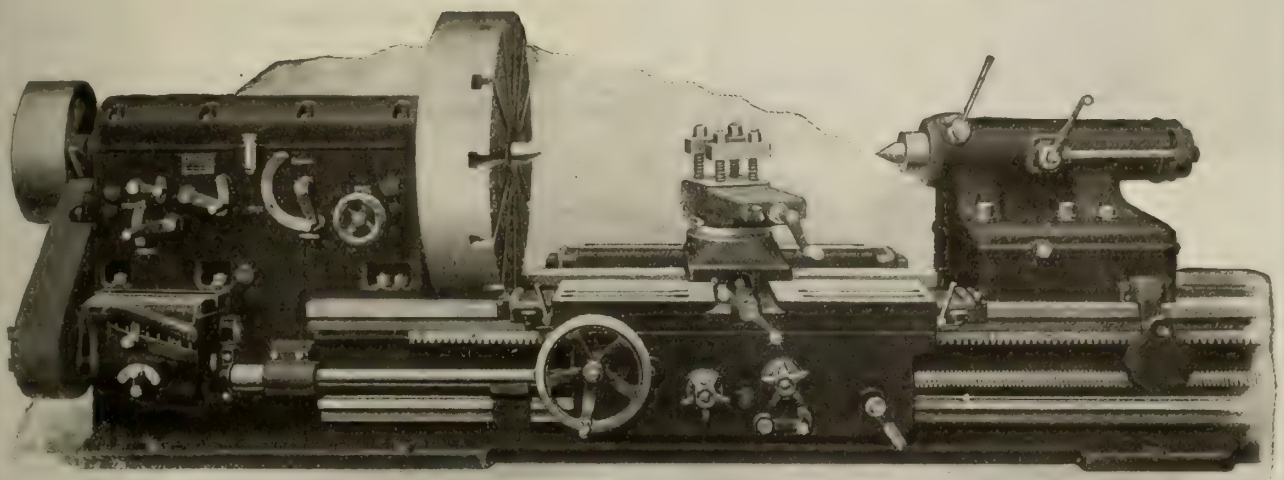

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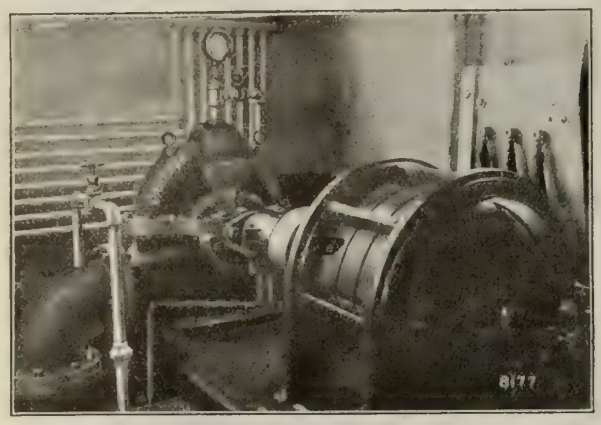
The Cameron Double Suction Centrifugal Pump



Bulletin 7150

Did you read about "Old Man Specific" in CANADIAN MACHINERY for Feb. 27?

Here are some SPECIFIC facts about the Cameron "DV" centrifugal pump:

Spherical self-aligning ring oiling type bearing.

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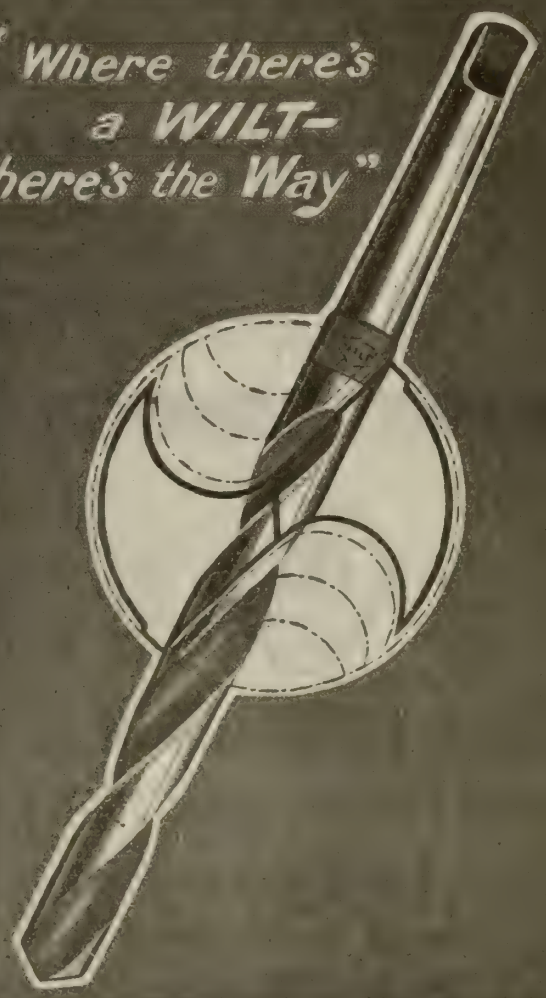
—THEY REPRESENT QUALITY THROUGH AND THROUGH. Raw materials are selected with particular care, and only those materials that pass the most exacting inspection, based on the highest standards, are used.
—THEY ARE EFFICIENT AND ECONOMICAL. Their quality promotes long life under severest service, and the speed and accuracy with which they can be driven cuts the cost of production.
A trial order will prove their merits.

"Where there's a WILT— there's the Way"



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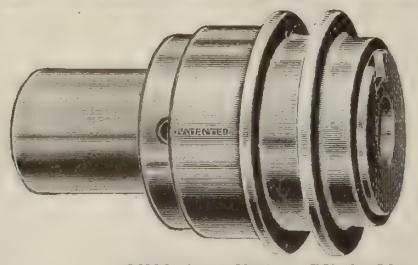
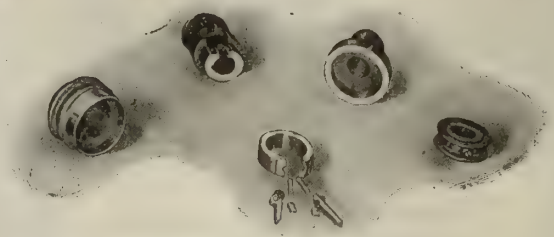
THE JOHNSON FRICTION CLUTCH



SINGLE CLUTCH—EXTERIOR



HAS FEW PARTS

each being interchangeable. Did you ever see a clutch with so few parts? The Johnson friction clutch is simple, small, compact, round, smooth and powerful. It is the clutch you have been looking for. For the overhead shafting, line shafts or countershafts it gives perfect satisfaction. As a part of the various machine tools on the market it is an important actor. Study the construction of the Johnson Friction Clutch. What are your requirements? Get our booklet, "Clutches as Applied in Machine Building." It shows what the other fellow is doing. Also

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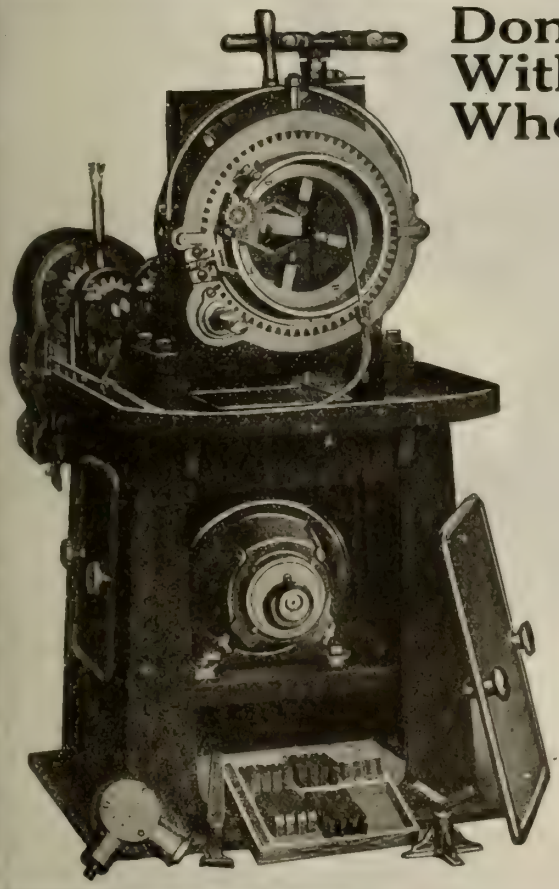

Don't Talk Man Shortage With Six Men on Pipe Work Where There Should be One

Don't let urgent work lag for the want of men while you employ a gang of men instead of one man and a

Forbes Pipe Cutting and Threading Machine

on your pipe work.

The old-style stock and die method of cutting off 15-in. pipe required six men. It can now be done with one man and a Forbes Machine.

The motor-driven type follows the pipe-fitting work wherever an electric wire can be run. No hauling of heavy pipe to and from a stationary machine.

In the Forbes Machine the dies revolve. The pipe remains fixed in the self-centering vise. And the threads cut! They're the kind that make tight joints, because they're clean, accurate.

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24" x 19" x 7½"	25" x 17" x 8"	34" x 20" x 10"	30" x 19" x 10"

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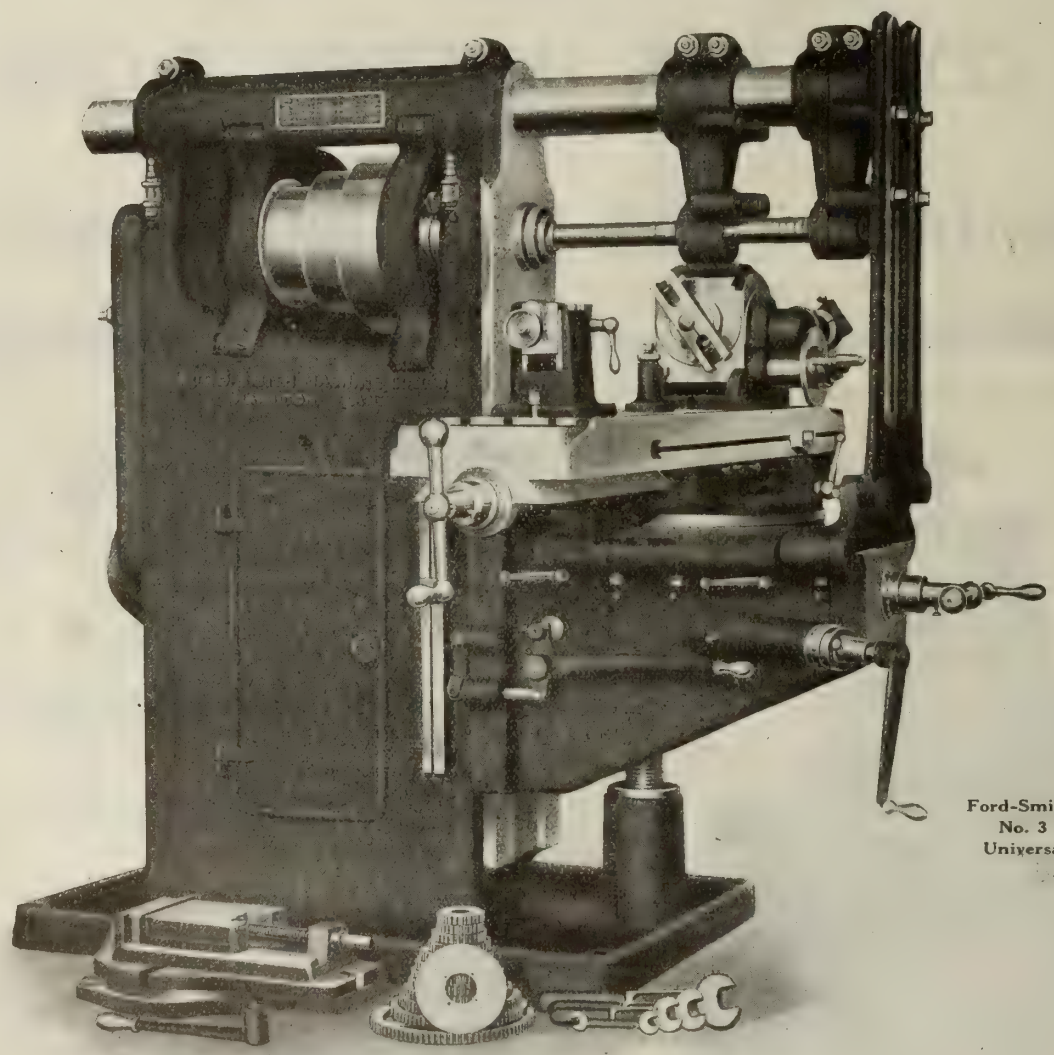


Ford-Smith No. 3 Universal

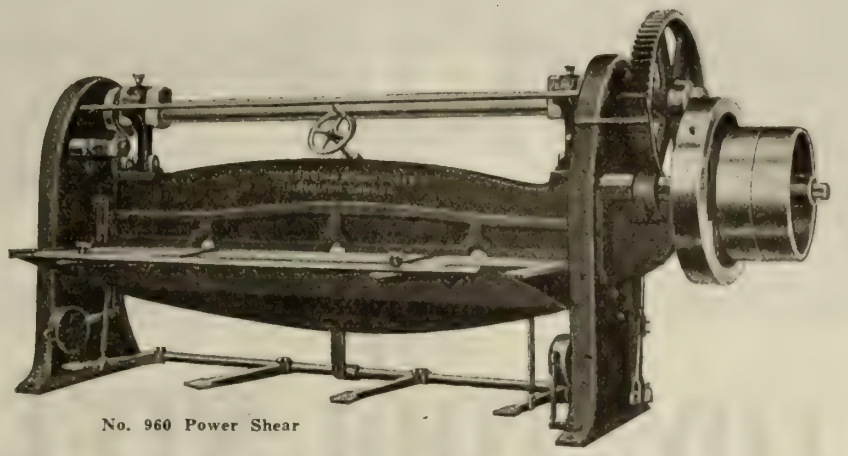
MANUFACTURED BY

THE FORD-SMITH MACHINE COMPANY, LIMITED

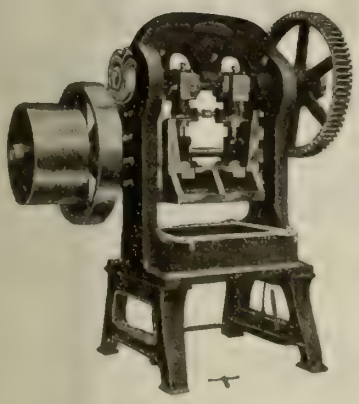
HAMILTON, CANADA

Foreign Agents: W. E. Storey, 3 Arundel St., London, Eng. Alfred Herbert, Limited, 54 Dey St., New York, United States, America.

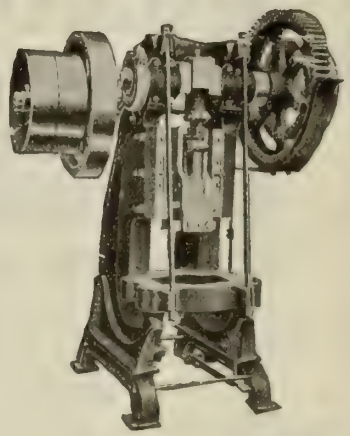
Stood The Test



No. 960 Power Shear



No. 20½ Power Press



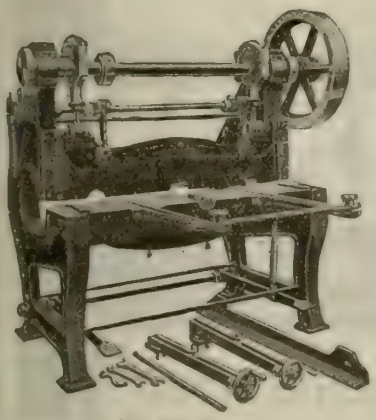
No. 215 Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

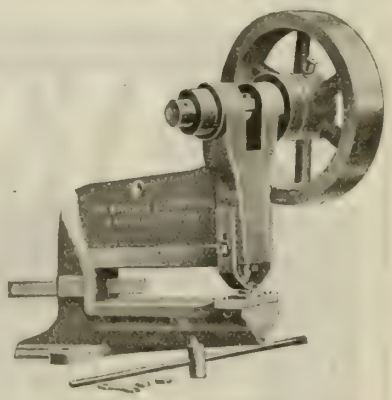
Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 404 Shear



No. 100 Power Punch

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Hamilton, Canada

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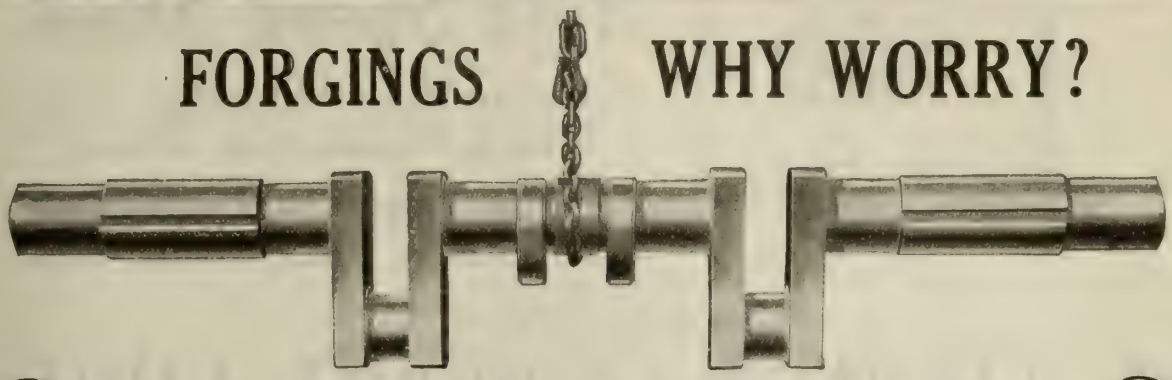

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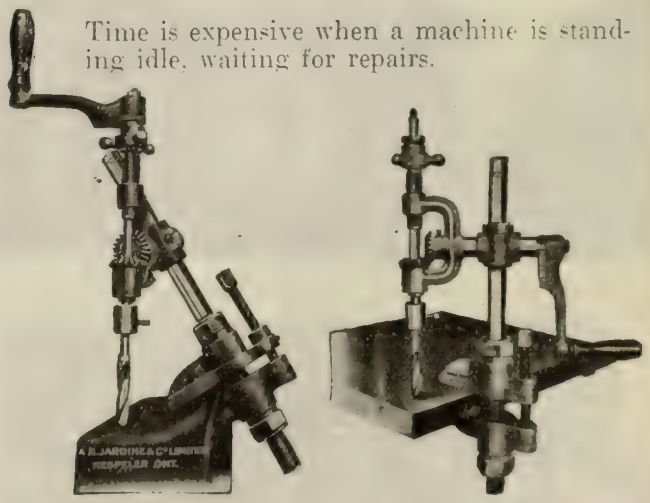
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

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"Double Waco" Quality—for Quick Production Work

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During the war, although our capacity was taxed to the limit in supplying STELLITE to Great Britain and France, as well as helping to keep Canada in the forefront as a producer of Munitions, we did not raise our prices, notwithstanding the fact that our costs increased enormously and are still up.

Let us help you to economize and at the same time secure maximum results.

Consult our Engineering Department.

We are, Sirs,

Yours respectfully,

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WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

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HIGH SPEED STEEL

Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

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ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

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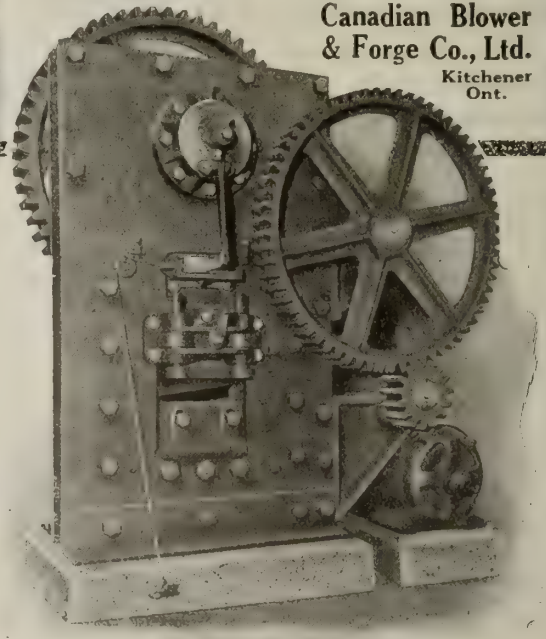

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New Glasgow, Nova Scotia, Canada

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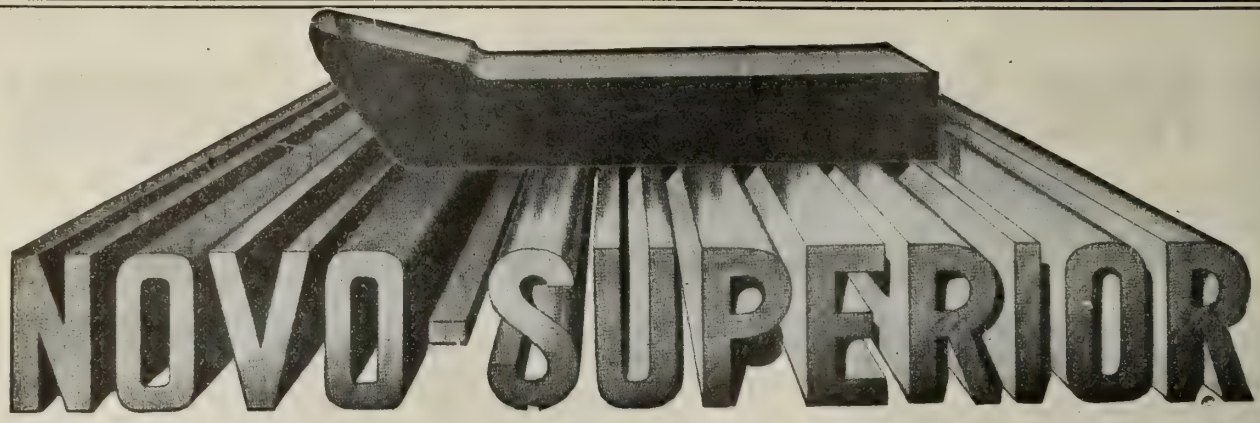
The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.



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Tool Steel for Every Purpose

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Circular Saws—for wood and for hot or cold metal cutting
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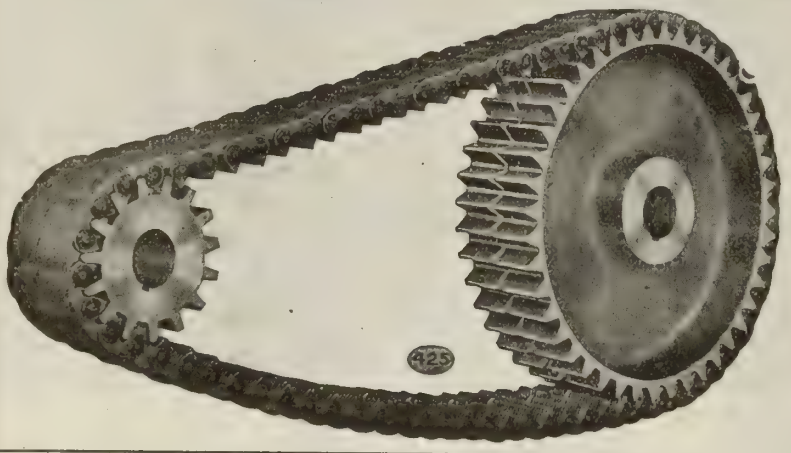

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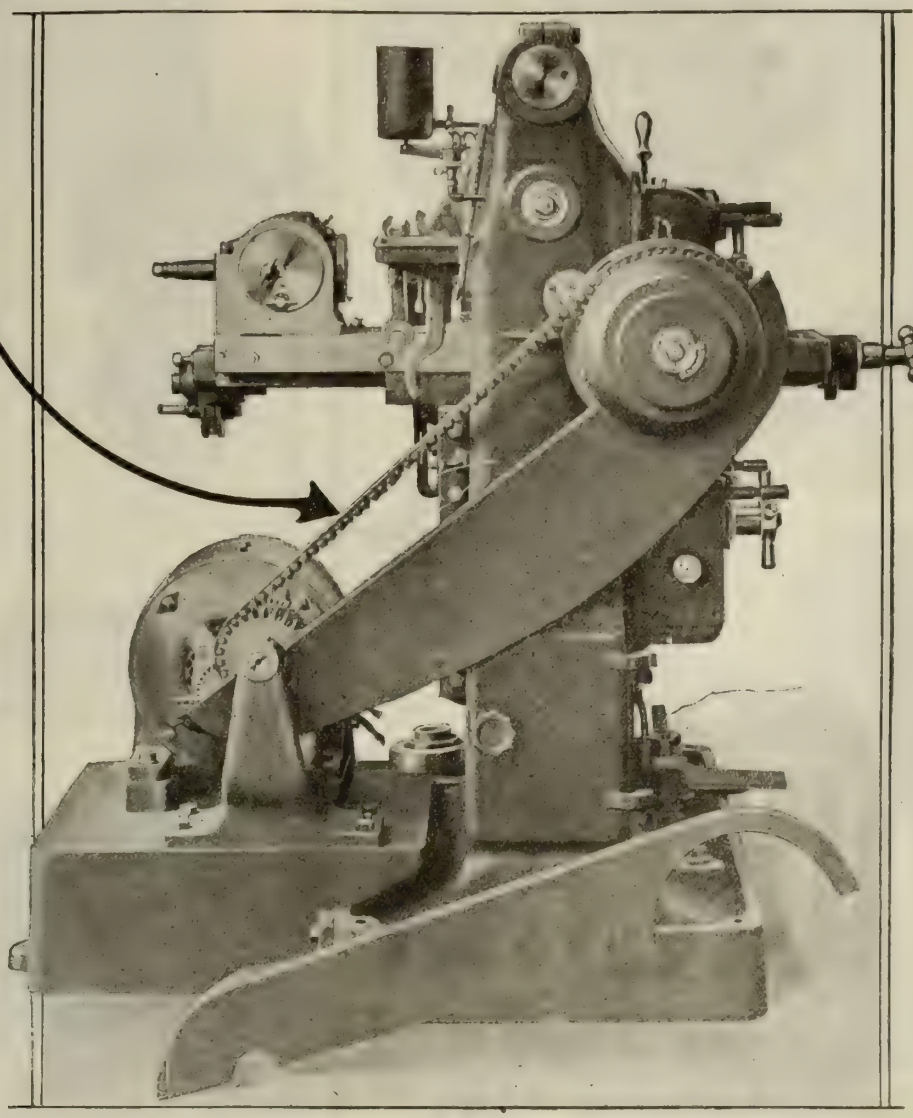

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The drive that will do the most work, the steadiest work, the best work. Made for every purpose from ¼ H.P. to 5,000 H.P. Adopted by engineers as durable, simple, unaffected by heat, cold, oil or moisture. Let us have your general layout and design your drives to suit your special conditions.

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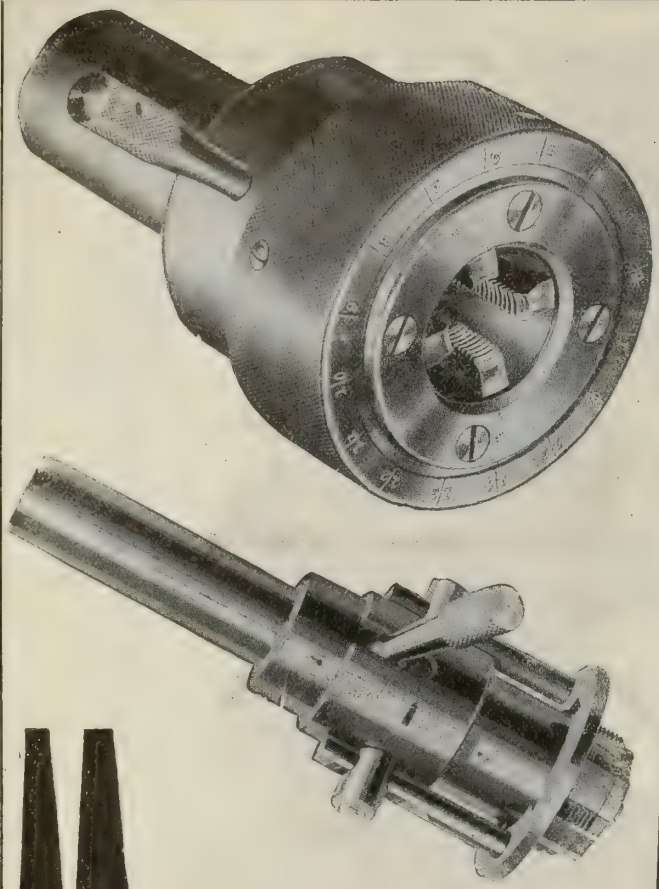

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Collapsing Taps and Self-Opening Dies

No reversing—no stripping; no need of taking the shell out of one lathe and putting it in another machine.

Fifty per cent. faster and more accurate than solid tools. No chance of work getting off centre.

Murchey Machine & Tool Company

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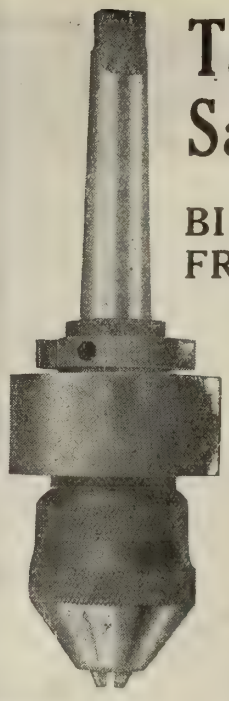
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.



Tap Chucks that Save Tap Costs

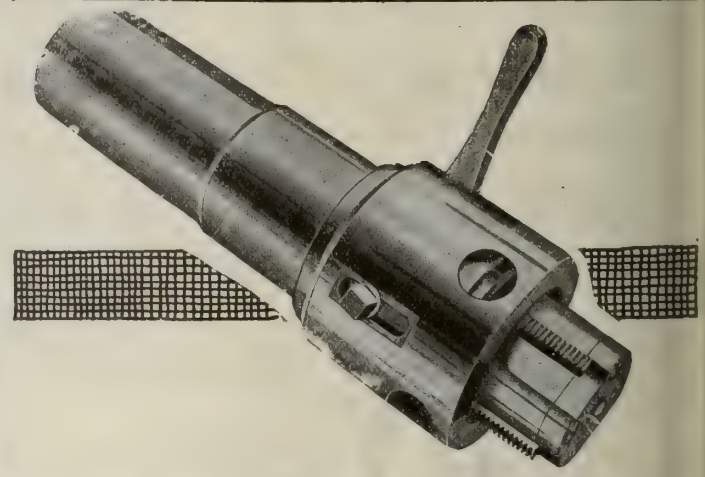
BICKNELL-THOMAS FRICTION CHUCKS

reduce tap breakage to the vanishing point. These chucks will hold the tap to the limit of its endurance, but a sudden strain sufficient to break the tap will cause the grip to loosen instantly. They are particularly adapted for tapping to the bottom of blind holes, for special work and —owing to their compact design—for use on multiple spindle machines.

Made in four sizes—one-eighth to one inch. Straight or Morse taper shanks.

BICKNELL-THOMAS CO.

GREENFIELD, MASS., U.S.A.



You have seen threads torn and roughed—the result of a tap clogging with chips when backing off. You have seen threads that no mechanic would call smooth and clean. But never have you seen anything but perfect threads in shops using Victor Collapsible Taps. Sizes 1¼" to 12". Moreover, Victor Collapsible Taps save fully half the time on threading operations.

Write for Time Estimates.

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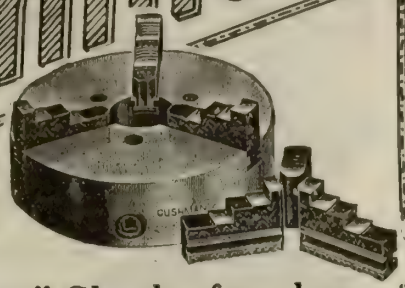


The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

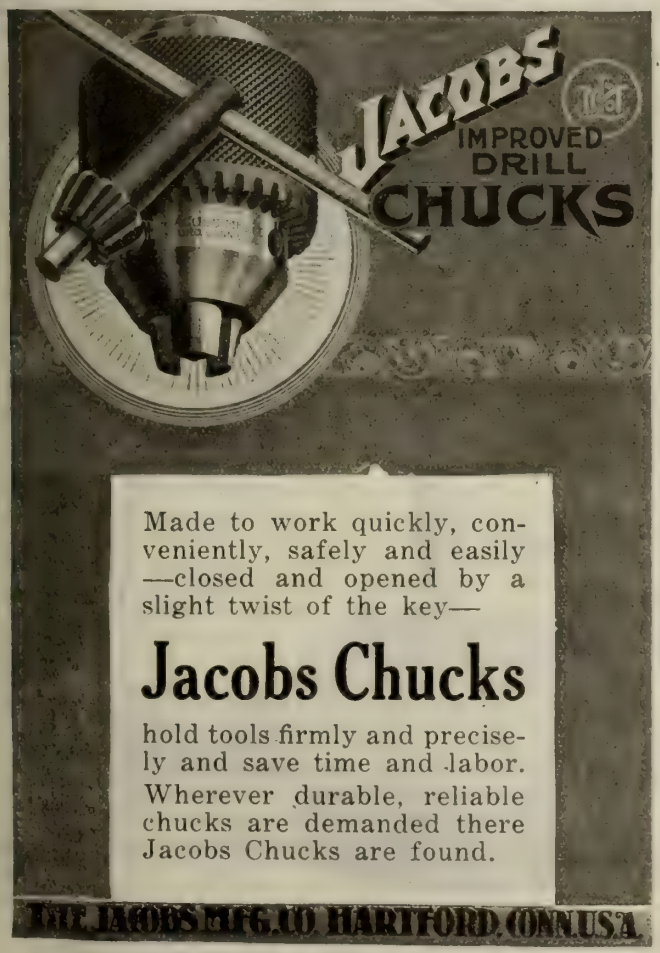
And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

CHUCKS



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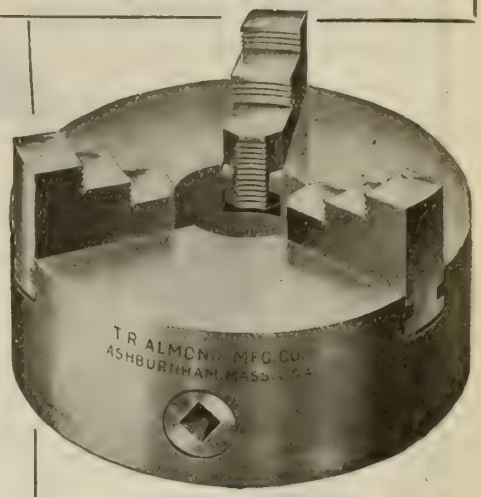
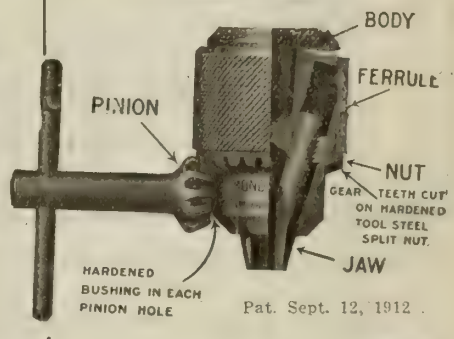
Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".



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English Readings, 1", 2" and 3".

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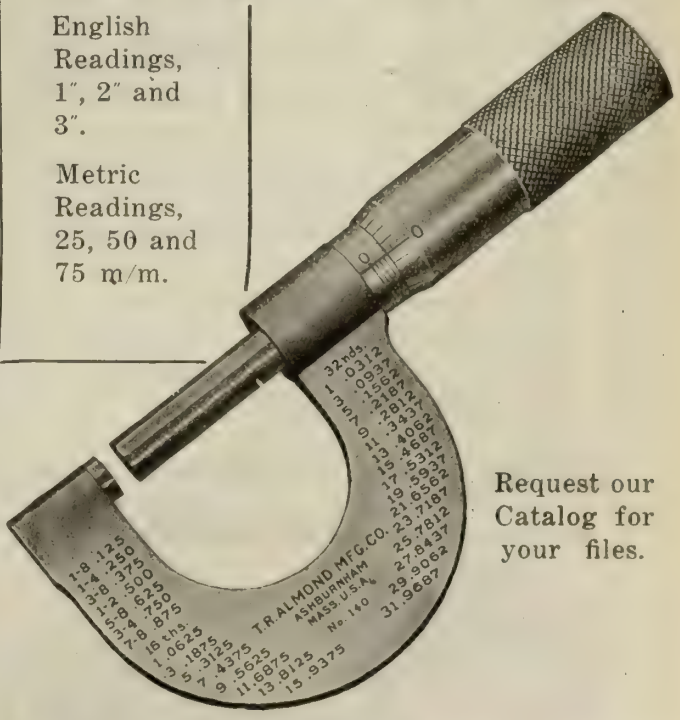

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6 Maple Avenue, Ashburnham, Mass.

Look at this again —closely

and read what we have to say below

WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
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Wire Cloth

of every description

We make **Machinery Guards** of all kinds.

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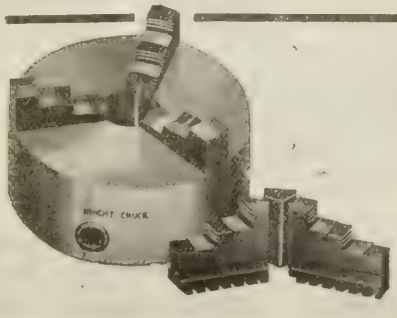
Any Cut a Machine Can Pull or a Tool Stand, the "Knight" Chuck Can Hold

The "Knight" Three-Jaw, Universal Geared Chuck is solidly constructed, its properly proportioned jaws are exceedingly powerful, and the scrolls are very strong.

Characteristics, ease of control, prompt adjustment, adaptability and great gripping power.

Knight Metal Products, Limited
119 Adelaide Street West - TORONTO, ONT.



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Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

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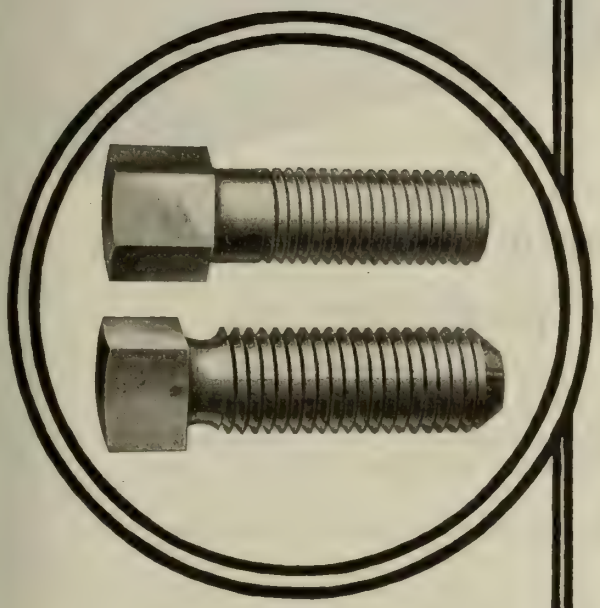
Eastern Machine Screw Corp.
New Haven - Conn.

SCREW MACHINE PRODUCTS

STANDARD OR SPECIAL



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Cap - V-U.S.S.-S.A.E.
Set - - V-U.S.S.

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Plain - - S.A.E.
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Special screw machine products made to your specifications.
Sizes up to 2¼" diam., 10½" long

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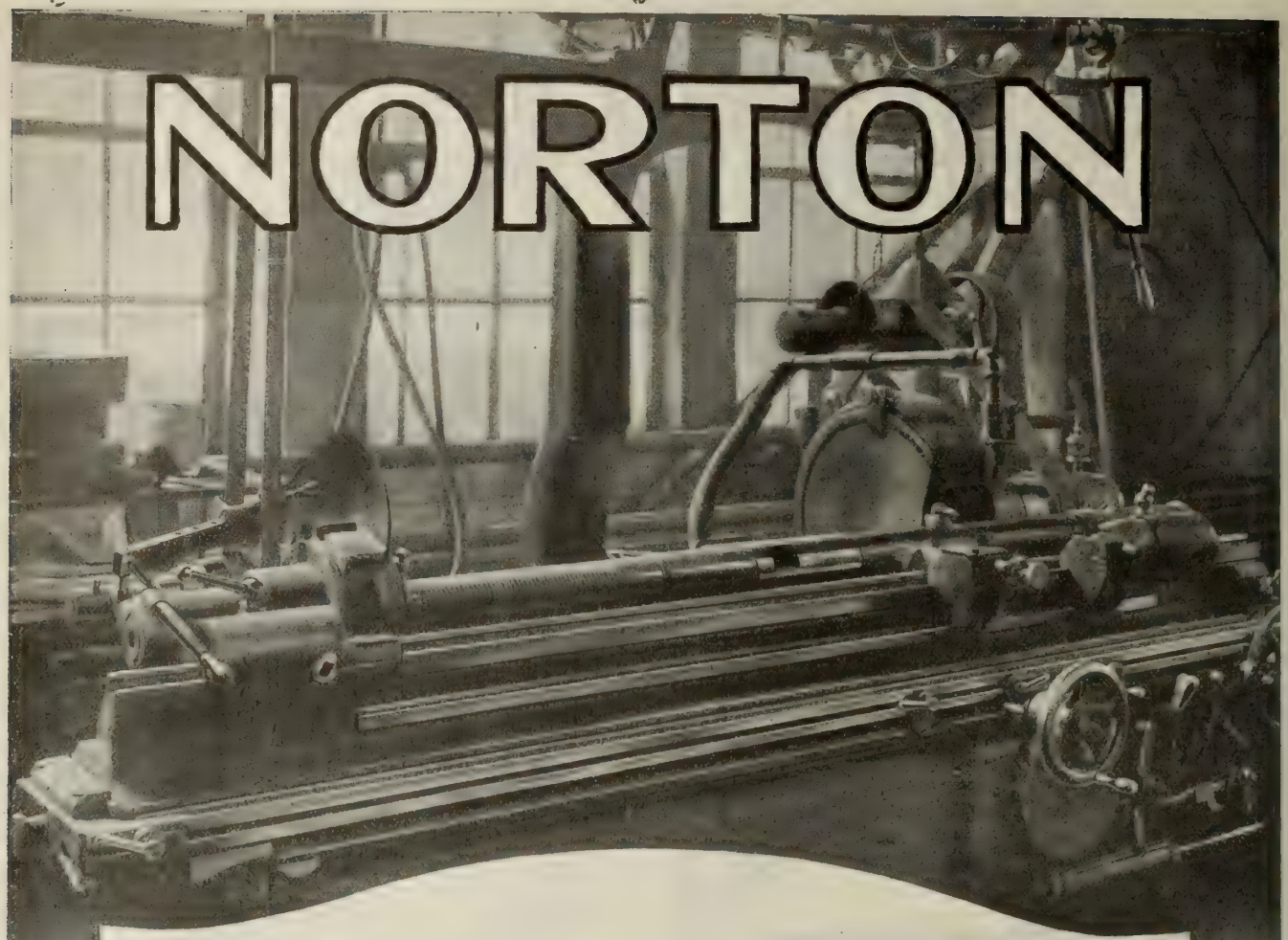

In these days of gigantic demand Nortons everywhere keep production up

Here's a grinding job up in Vermont at the Jones & Lamson plant. It's a Drum Drive Shaft for a J & L Turret Machine. The material is machine steel and its rough size is 1 9/32 in. x 1 17/32 in. x 1 25/32 in. x 1 13/32 in. The finished size is 1¼ in. x 1½ in. x 1¾ in. x 1⅜ in.

A limit is set of .0005 in.—and maintained at the rate of 28 complete shafts per day.

Isn't an installation—in a plant so thoroughly well known in the quality field as Jones & Lamson—an endorsement for Nortons that you can't afford to overlook when you are ready for grinding machines?

Norton Grinding Company, Worcester, Mass.

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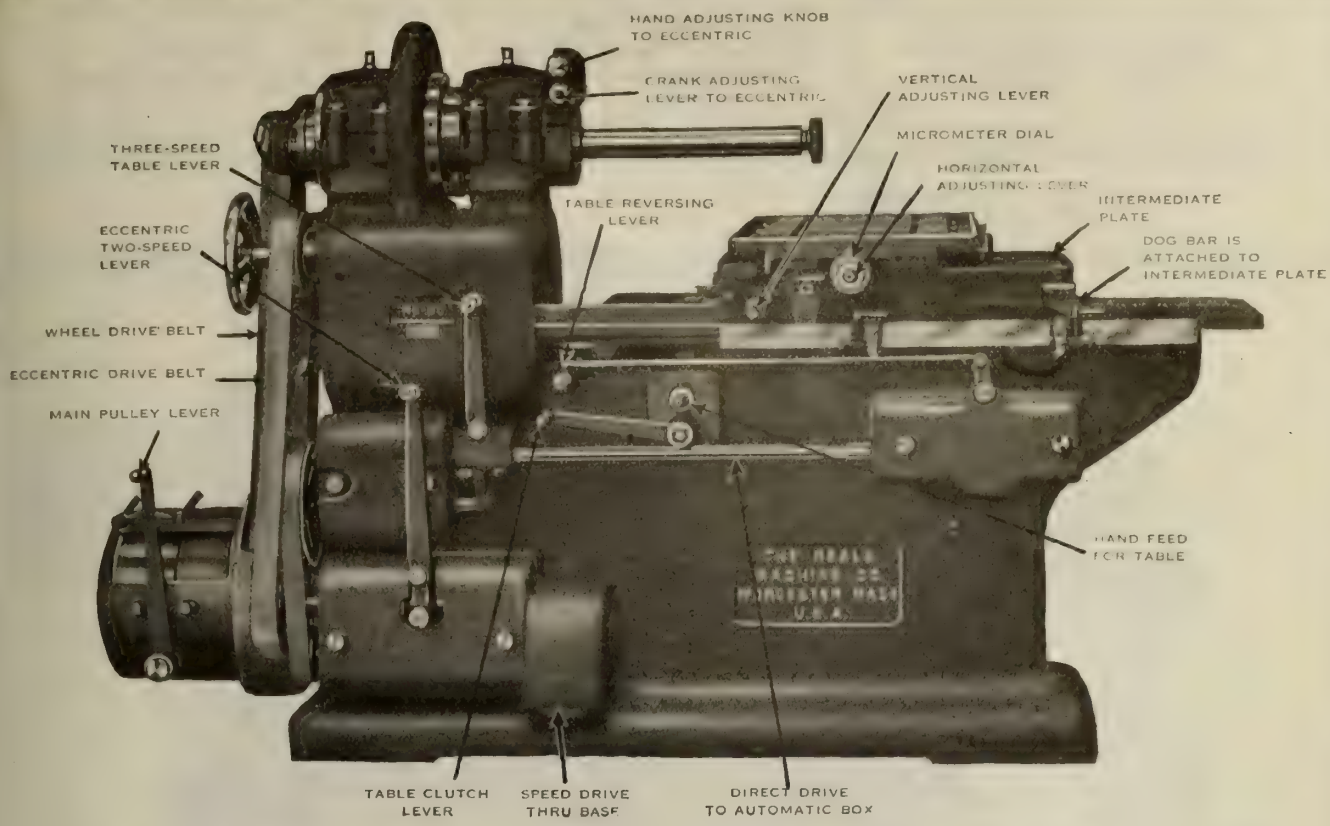

A Production Proposition

The New Heald No. 65 Cylinder Grinding Machine

It does not need an arrow to point out its massiveness and rigidity. A glance will show a production machine which is of vital interest to all manufacturers. The work table and grinding spindle are supported from the same solid base casting, which is wide enough so that when a large casting, such as a six-cylinder en bloc is being ground, it will not overhang to any great extent.

Notice that it is entirely self-contained, all drives being taken from a single unit on the rear.

Ample vertical adjustment is obtained for all manufacturing purposes by an inclined slide located between the main and cross slide table. Movement of this slide in either direction parallel to the main table raises or lowers the cross slide table and work.

By a very unique design the relation between the dogs, work and wheel always remains the same when a vertical adjustment is made. It is brought about by having the dog bar attached to the intermediate slide. This feature alone saves hours of the operator's time when grinding castings with more than one hole.

The drive of the wheel spindle pulley is through a flexible idler, one belt connecting with the idler and another belt transmitting motion to the grinding spindle. The tension of these belts is maintained automatically through a simple arrangement of levers and springs. Equal tension on the spindle pulley is particularly desirable, as it keeps the bushings from being pounded out of round.

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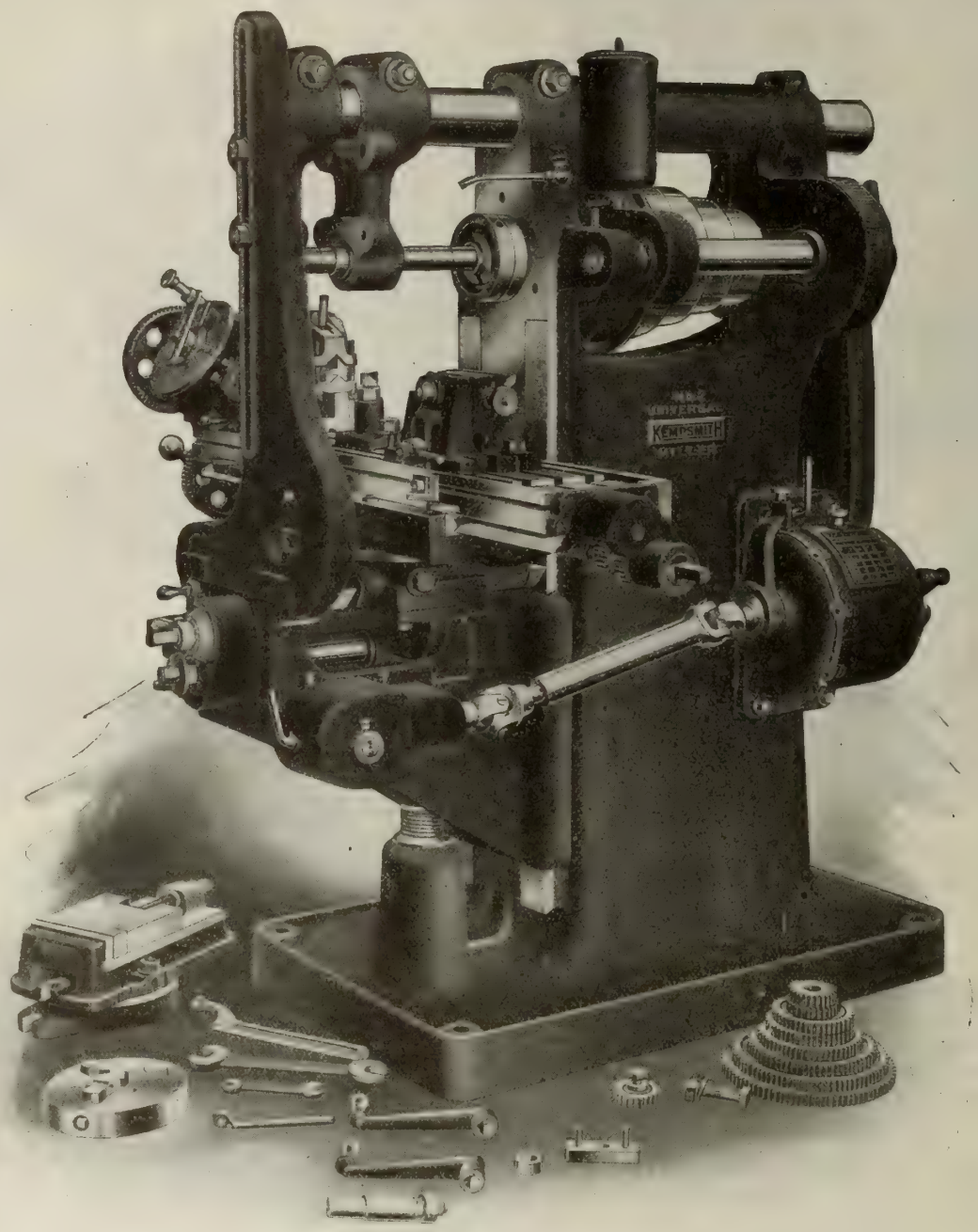

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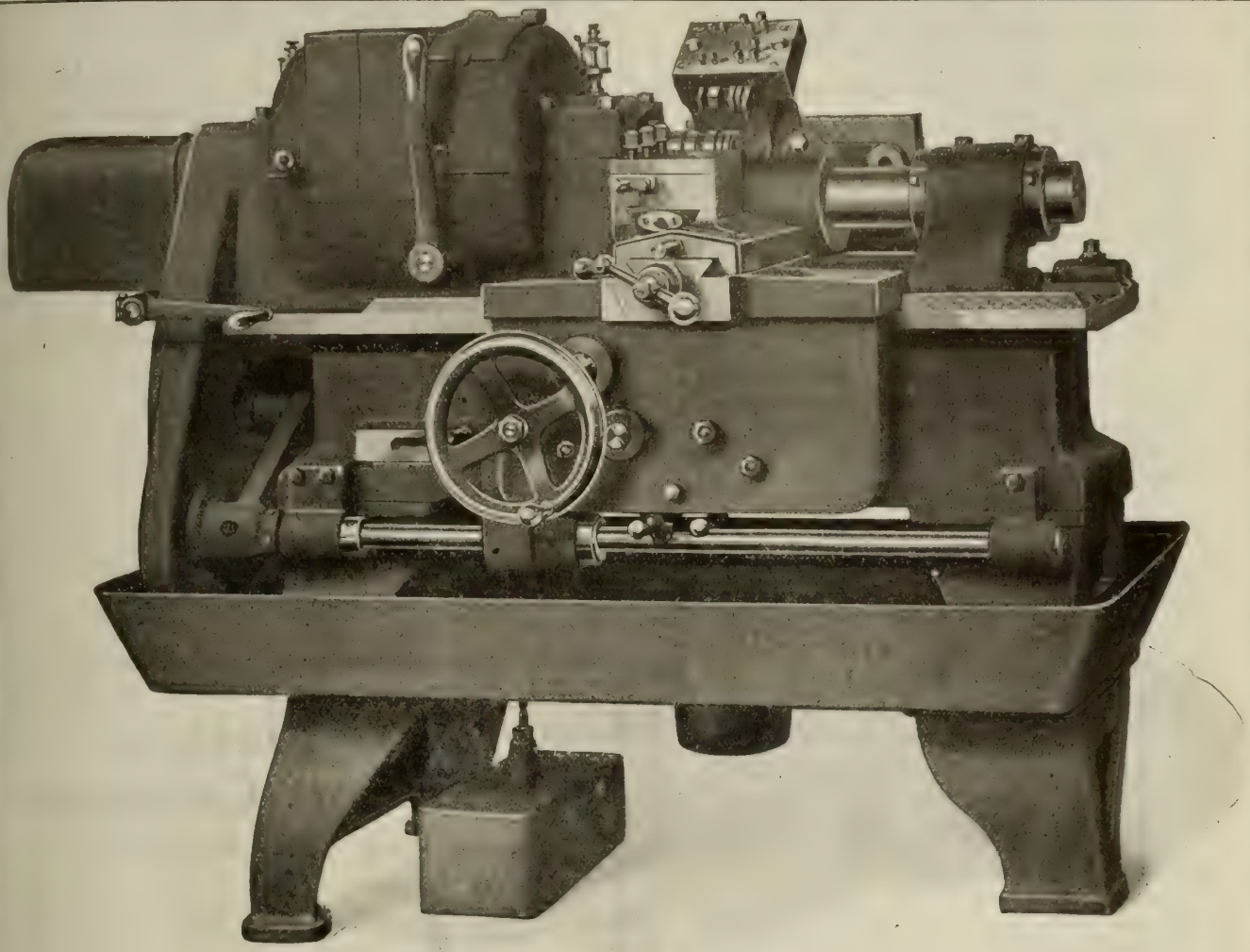

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THIS MACHINE IS TOOLED FOR THE FINISHING OPERATION.

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THE FRONT TOOL BLOCK, MOUNTED ON THE CARRIAGE, HOLDS THE TURNING TOOLS, WHICH ARE SET TO GIVE THE CORRECT DIAMETERS OF THE PISTON.

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Don't attempt to grind round work with a wheel that is out of balance. You should try the wheel for balance as it wears down. One balancing is not sufficient to insure a wheel remaining in balance throughout its entire life.

Don't try to grind without chatter marks when all the belts on the machine are uneven in thickness and bumping every time they pass over the pulley.

Don't try to grind work in your machine which is beyond the capacity of the machine both for length and swing.

Don't remove the wheel spindle of your grinding machine just for examination of the bearings.

Don't expect perfect bearings in the box of the wheel spindle, for such a thing is impossible and unnecessary.

Don't press the point about the bearing in the wheel spindle box, because if the spindle is round you will get perfectly smooth rotation in a box, even if it only bears at three points. Our machines are made to grind round and perfect work—not as exhibitions for scraping in the wheel spindle boxes.

Don't say that chatter marks are caused by imperfect scraping of wheel spindle box bearings. Scraping never was and never can be the cause for chatter marks.

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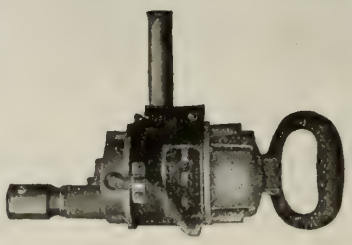

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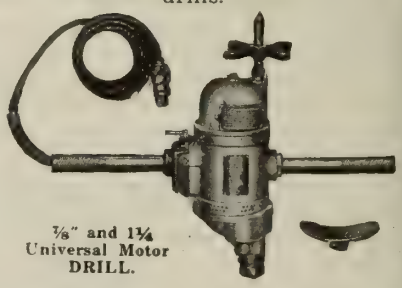

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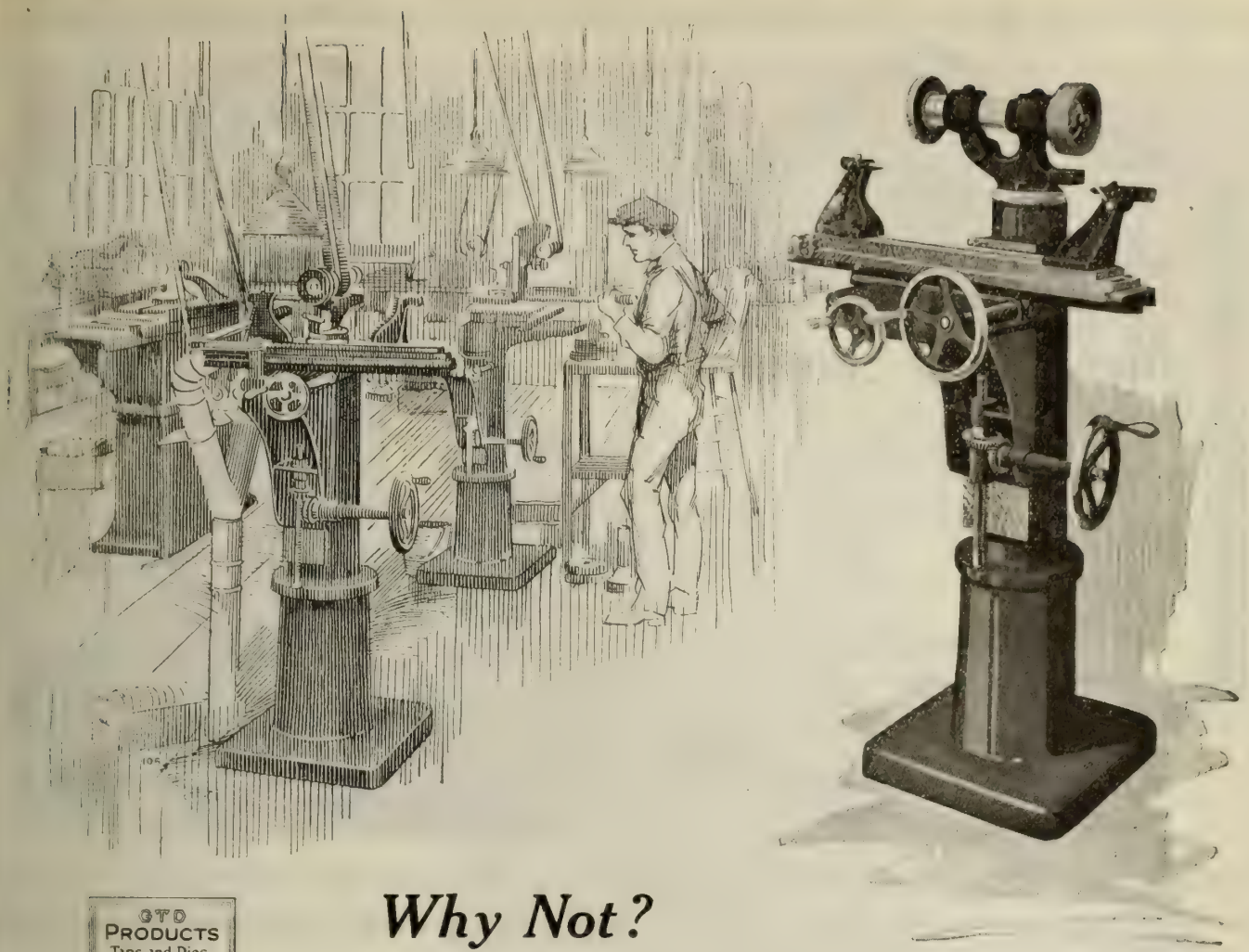

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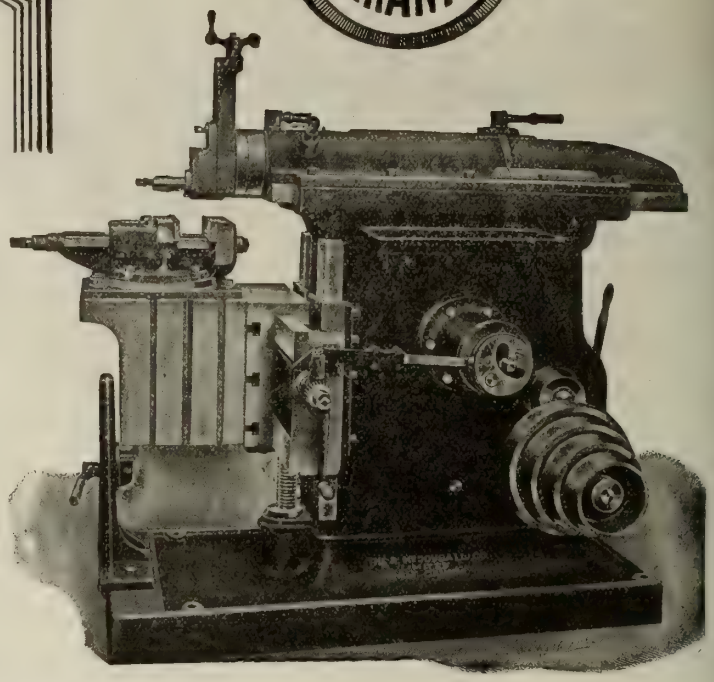

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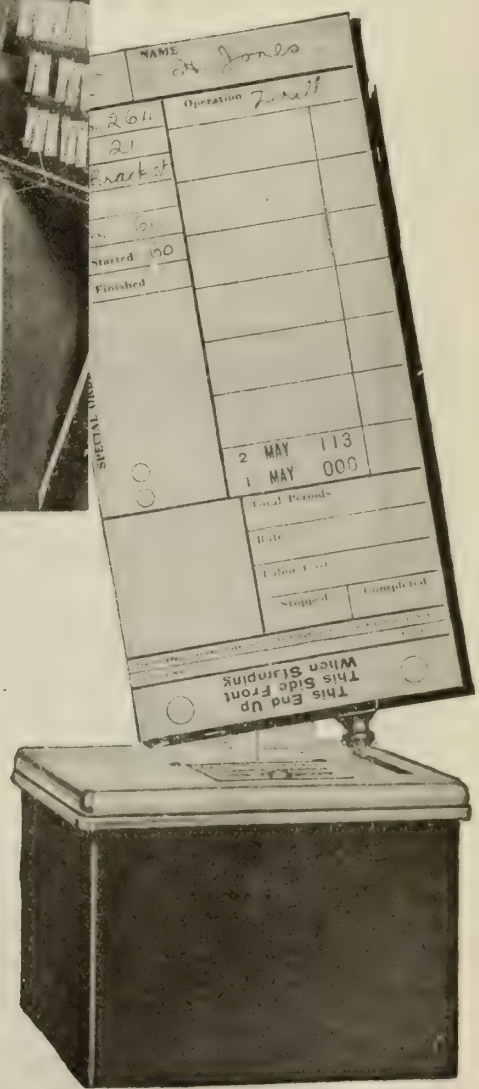

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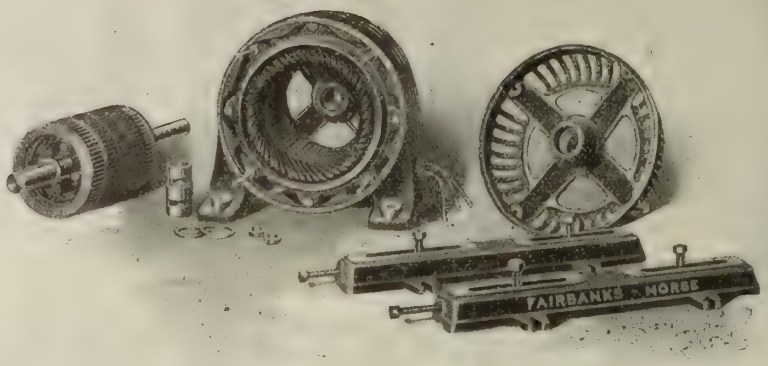

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Vol. XXI. No. 12 March 20, 1919

Manufacturing the Ford-Smith Miller

An Article Regarding the Manufacture of Millers and the Inspection Methods Involved—These Are the Only Millers Built in Canada, and For This Reason the Article Should Prove of Special Interest

By J. H. MOORE, Associate Editor Canadian Machinery

THE plant of the Ford Smith Co. was described in CANADIAN MACHINERY last week and in this article additional material is presented dealing more particularly with the building of the Ford-Smith Miller. Its manufacture from the rough casting right up to the finished product will be described, and since the casting is perhaps the first item with which we are concerned, the method this firm uses to take care of its casting problems will first be described.

All castings from the largest to the smallest are carefully cleaned, the larger ones, with brash and portable grinder, the smaller usually by the tumbler barrel route. Fig. 4 illustrates one of the workmen at work on a base casting, using the portable grinder. He is removing a fin which sometimes gathers at the flange shown on photograph. All due care is taken to see that these castings are in proper condition before becoming a part of the finished product.

Fig. 3 represents the method of storing and keeping tab on small castings.

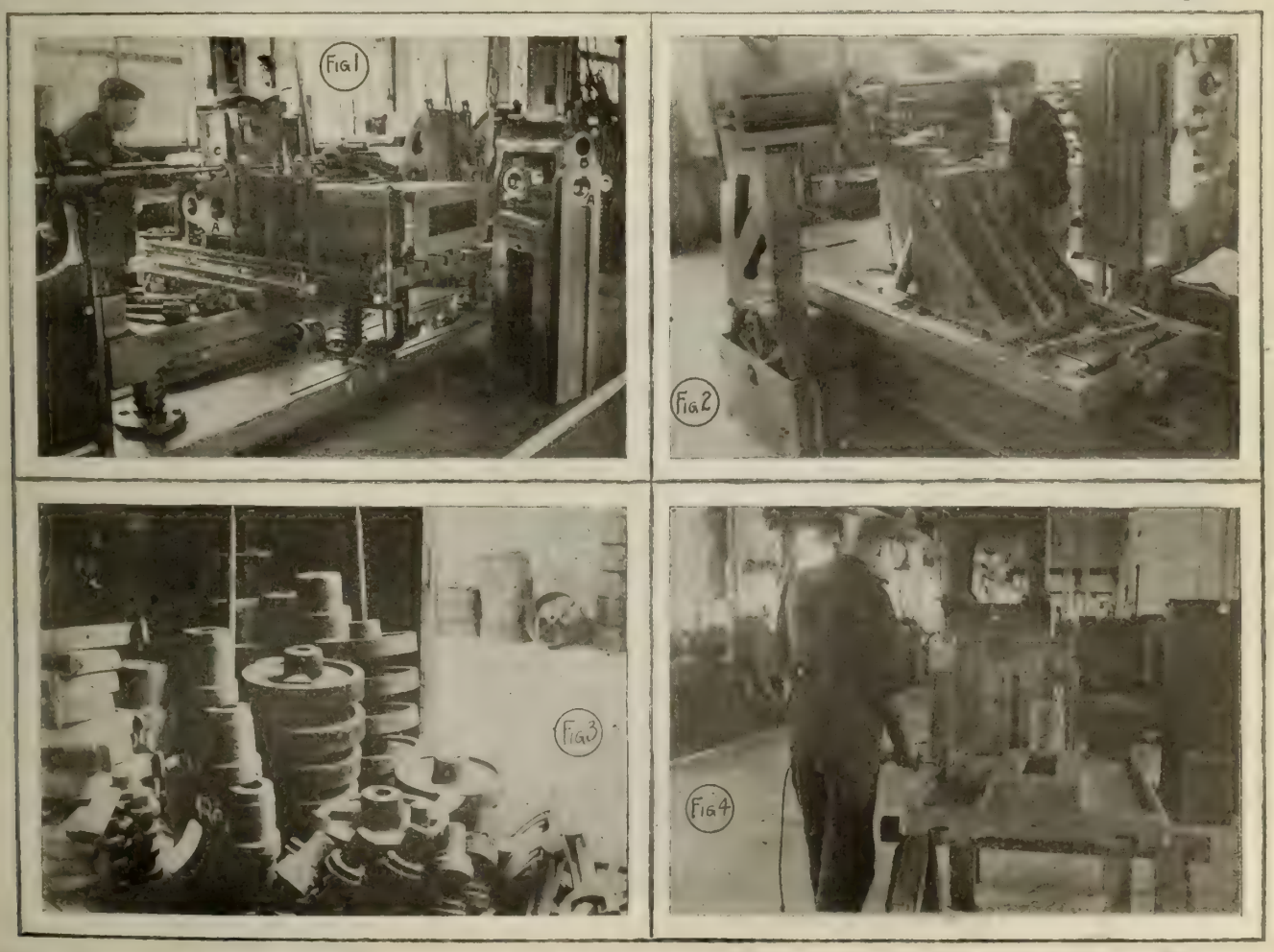


FIG. 1—BORING THE COLUMN. FIG. 2—PLANING THE KNEE. FIG. 3—METHOD OF STORING SMALL CASTINGS. FIG. 4—CLEANING CASTINGS WITH PORTABLE GRINDER

These castings are stored in a shed, either in racks, shelves, or bars, but for convenience in photography, the ones shown were moved near the doorway. All castings are tagged and plainly marked as to their proper symbol number, for it is a rule throughout this plant, that all pieces even to the smallest steel piece must have a symbol number. By such a method these castings can at any time be sent out to the shop without confusion or overlapping of operation.

The Base

Starting from the floor the first portion dealt with would be the base of the machine, but as this piece is strictly planer work, with a few holes to be drilled later on, no special mention of the operations on this part are necessary.

Next in order is the column. The various operations connected with it will be gone through in sequence.

First the column is placed on the planer, where the bearing surface for the knee is machined. The work is then turned completely over 180 degrees, and the back portion, that is, where the gear guard fits on, is planed to size.

The column is now swung crosswise on the planer bed, and the gear box pad is machined, while the bottom of the column is also finished at the same set up, by means of a special extension tool holder.

The column is then taken to the boring mill as shown at Fig. 1, and goes through the next operations. First, the main spindle hole A is bored and reamed, after which the table of machine is moved, until the overarm hole B comes into boring position. This hole is then bored and reamed. Lastly on the same set up, the back gear spindle bosses C are brought into position when they are drilled and reamed. Some of the various tools used in these operations are shown in the photograph.

The column is now moved to the drill press, and the various holes down the back of the column are drilled. As these holes accommodate studs on which run the gears of the feed gear train, it is important that they be absolutely correct. Fig. 5 illustrates this operation, the jig used, and its construction.

First, and most important of all, the jig is located from the main spindle hole, and also butts up against the gear box pad. In this way the holes are always sure to be in the same relative position to the spindle and gear box. The other general drilling operations on the column, are hardly of such importance, so no special mention is made of these minor operations.

The Knee

Next in importance comes the knee. This casting is first planed for the slide on column, as shown in Fig. 2. The work is then turned over 180 degrees and the portion where cross feed handle thimble goes, is machined for size.

The cross feed slide is next machined, after which all portions are tested for alignment and accuracy.

Next the knee goes to the drill press, where various operations are performed, one of which is shown on Fig. 6. In this operation, the two holes for feed shafts are being drilled, and it will be noted that these are located from the cross slide, making sure not only of alignment, but at the same time accuracy of centres, and correct height from slide. Numerous tools as used are shown in the photograph.

All other drilling operations on the knee are jigged carefully, with the exception of the knee elevating shaft hole. This portion is laid out by hand directly from the centre location of the elevating screw hole, and same is carefully marked and drilled to secure absolute accuracy. While being drilled the knee rests on a special jig plate which holds it at the proper angle.

The Saddle

Next in sequence comes the saddle, and this piece combines both planer and lathe work. First the slide for knee is planed, after which the piece is placed in a special fixture suitable for such class of work. The face of saddle is now turned, at the same time boring the centre hole.

Saddle Swivel

This casting is also a combination of planer and lathe work. The slide for the table is first planed, after which a lathe fixture on the same principle as used for the saddle is adopted. The bottom of the swivel is now machined and bored, after which the rim of swivel is graduated on a special graduating attachment for the purpose. This operation is completed on the milling machine.

The Table

The slide of table is first rough finished as shown at Fig. 7. This is strictly a straight clamping proposition, so no further comment is necessary. The table is then turned completely over, and placed on two cradles, similar to the one shown at A (see the photograph Fig. 7). The slide rests on these cradles, and is held in position simply by means of two set screws, with a stop clamp in front to take up the thrust of tool on the work. The top of table is now machined, including the tee slots, at this same set up.

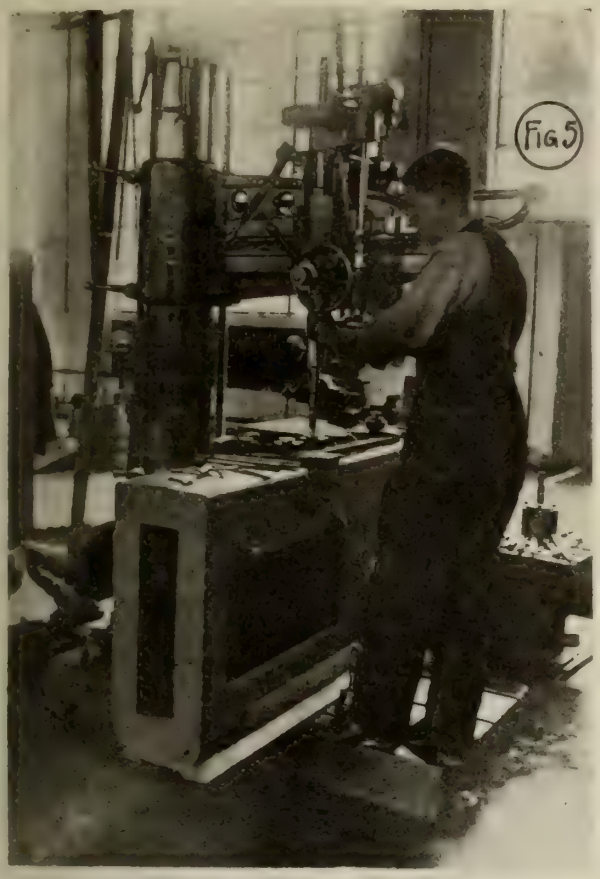
The idea of holding the table in such a loose manner, is in order to ensure that all spring is taken out of the castings. After the top has been completed, table is once more turned over, and the slide is now finished up complete, this concluding the planer operations. Photo, Fig. 7, illustrates one table only in place, but usually these are planed in lots of six. One was set up especially for the photographer, in order to show the operation.

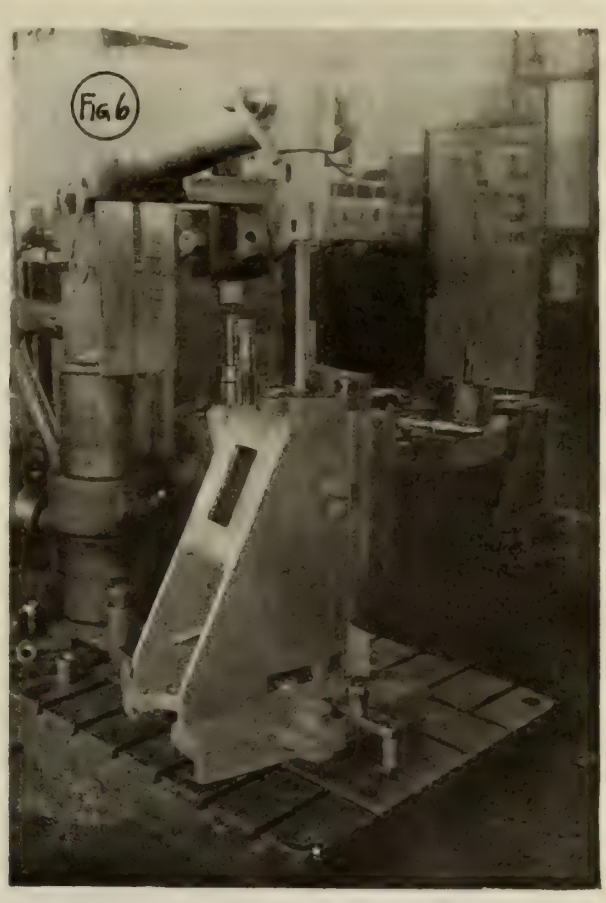
The Spindle

The operations on this important position of the miller are carried out with great care. First the front end of spindle is bored and reamed, but only drilled about half way through the spindle. This operation is carried out with the aid of the steady rest, the carriage of lathe being between the rest, and the headstock.

A test bar is now placed in the taper hole in the front of spindle. This bar is about 20 inches long. The work is now tested for concentricity, and after assured on this point, a short portion about two inches long, close to the chuck, is turned on the spindle.

FIG. 14—MR. WITHERSPOON, GENERAL SUPERINTENDENT OF PLANT.





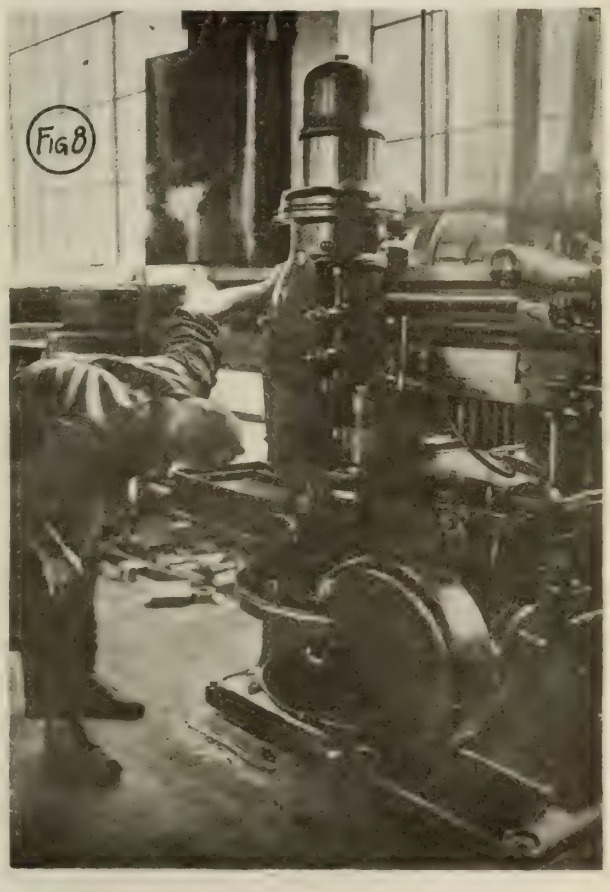


FIG. 5 SHOWING THE HOLES IN BACK OF COLUMN BEING DRILLED. FIG. 6 OPERATION OF DRILLING CROSS FEED HOLE IN KNEE. FIG. 7—FIRST ROUGH PLANING OPERATION ON THE TABLE. FIG. 8 GEAR CUTTING OPERATION.

The work is now switched around end for end, the two inch finished portion being placed in the steady rest. After chucking correctly, the balance of the hole through the centre of spindle is completed.

The work is now finish turned on centres, and the taper portion is machined by a special fixture attached to lathe. This fixture was designed by W. Witherspoon, the superintendent of the plant.

Other General Details

As regard the other numerous details, it is noticeable to a marked degree that, wherever necessary, all portions are carefully jigged, but as the general operations are of the usual nature found in the average machine tool plant, no special description is given.

Fig. 9 as illustrated is merely a view given in order to show readers the various parts used in the making up of the feed gear box. The casting of gear box, toward the back of photograph, is carefully jigged, drilled, reamed, then bushed, with high grade bronze. The gears are all constructed of material suitable for the particular use for which they are intended, and of sufficient size and pitch for strength.

Wherever necessary, these gears are cut on a No. 6 fellows gear shaper, ensuring perfect teeth, and ease of mesh. This is particularly true of the gears which slide into mesh, and to further facilitate this shifting problem, the gear teeth are all carefully rounded at the edges. Gears also go through a form of inspection, and, since coming to and mentioning inspection, we will follow up the rigid system as practised throughout the manufacture of these machines.

Inspection Methods

The system of rigid inspection as adopted by this firm is a study in itself. From the very drop of the hat as it were, the various foremen throughout the shop are responsible for the

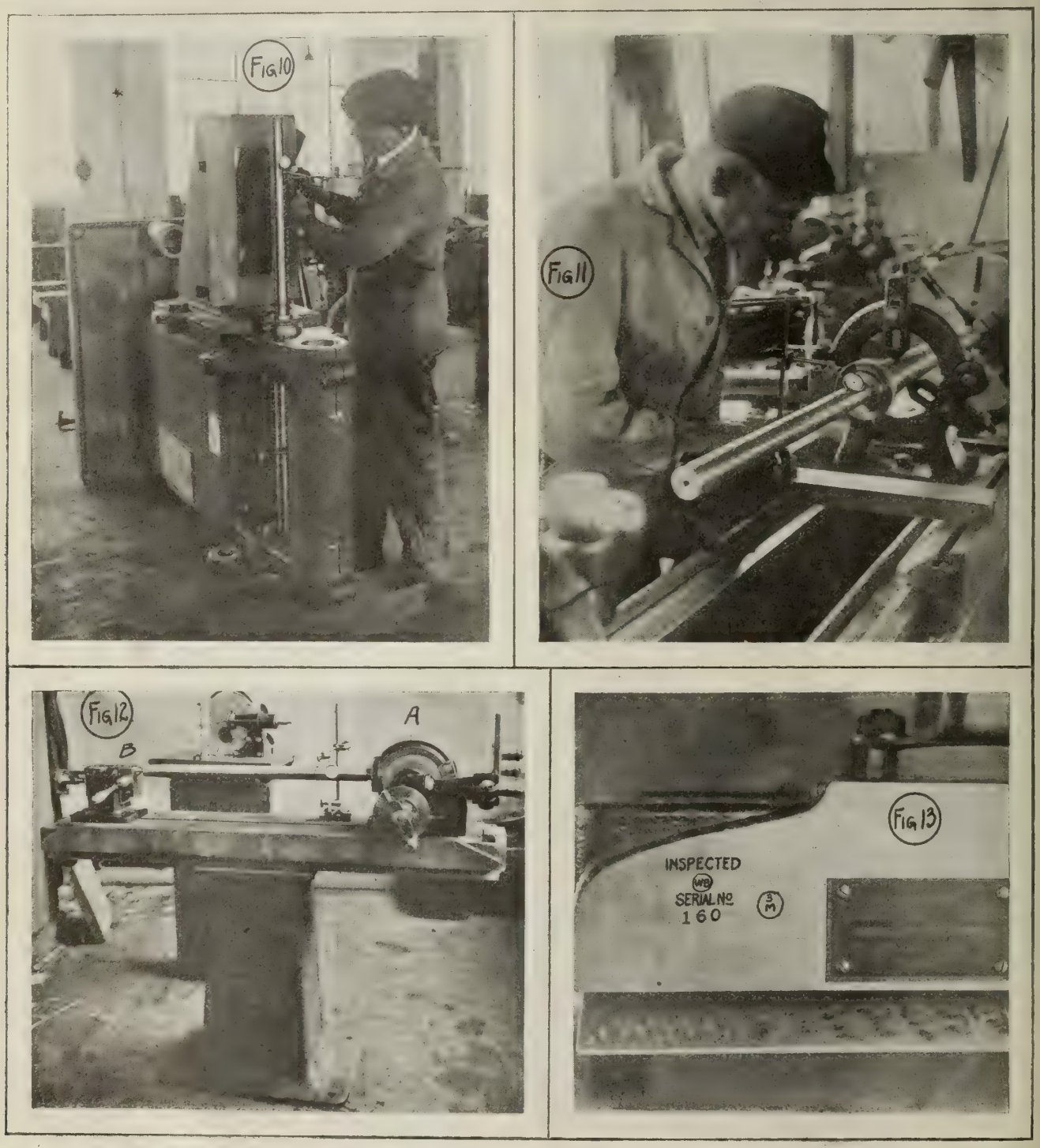


FIG. 10—TESTING THE KNEE FOR ALIGNMENT, IN RELATION TO COLUMN. FIG. 11—TESTING THE SPINDLE FOR CONCENTRICITY. FIG. 12—TWO TESTS ON DIVIDING HEADS. FIG. 13—INSPECTION SYSTEM OF STAMPING AS APPLIED TO TABLE.

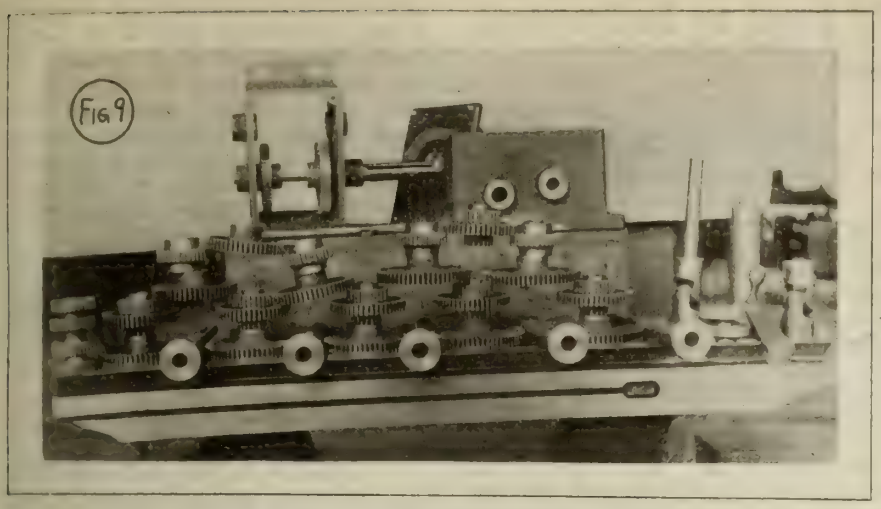


FIG. 9—A GROUP OF GEARS

operations being carried on, and after each sequence of operations they must carefully inspect the work, and place their stamp of approval on same. Should at a later operation some error be found in this piece, it becomes a simple matter to trace its source, for the stamp placed by the foreman places the blame where it belongs. To show all the stamps that are used is not possible in an article of this length, but a very good example of such a stamp is shown at Fig. 13.

It will be noticed that this is the table which has been stamped, and that the reading of same is as follows: "Inspected W. B. serial No. 160." To the right of this mark readers will notice a smaller stamp marked 3M. The latter stamp denotes the size of miller that table is used for, namely No. 3 size, the M designating the foreman's initial.

The same system applies to all parts of this miller, from the smallest pieces up to the largest. No work is allowed to pass except in first-class shape, for naturally the foreman has no desire to receive a call down for poor work passing through his hands. The final stamp of approval on the miller after completion and test run, is given by the assistant superintendent personally, so as readers can readily see strict inspection, in the truest sense of the word, is this firm's motto, which by the way would be a fine thing for Canadian tool builders to adopt in general.

Regarding other tests relative to the actual assembling of the machine, it is impossible to illustrate all these schemes but two are shown at Figs. 10 and 11. At Fig. 10 we have the test of alignment of knee in relation to the column. To obtain this test the operator proceeds as follows. He first places a special test bar in the spindle hole, then places the knee, with its bevel gib side up against the column way of similar shape. He now takes the test instrument, which is of similar construction to a surface gauge and tries at various portions of the bar to ascertain how much, if any, the alignment is out. A small dial at front of instrument shows clearly in thousandths of an inch the error, and of course, should there be an error in this regard it is quickly rectified.

Fig. 11 represents the test to main spindle after completion. A parallel bar is placed across the ways of lathe, and the same instrument as before is used. A special test bar about 20 inches long is placed in the front hole of spindle. Lathe is then started, and instrument is moved along the shaft to test concentricity.

Dividing Heads, Etc.

In addition to their millers, this concern manufacture all necessary attachments, usually found on such machines. Vertical attachments, universal milling attachments, etc., etc., are all built with the same painstaking care, but perhaps the most important of all is that of the dividing head. Two of the tests on this head are shown in Fig. 12 for illustrative purposes.

In the foreground of the photograph a pedestal is seen, on which is permanently mounted a miller table complete in all details. All tests are made on this table, the particular one as illustrated being to determine if the head A and the centre block B are in correct alignment as to height.

A test bar is placed between the head centre, and centre block, when the instrument already spoken of is placed on the table, and trials made at various points along the bar. Should any error be shown on the test dial, it is at once corrected.

ELECTRICALLY HEATED CLOTHES

The British aeroplanes-de-luxe which were used for carrying officials connected with the Peace Conference between London and Paris were equipped not only with electric light in the cabin but also with electric circuits for heating the clothing of the pilots and passengers. The clothing contains a network of electric resistance wires in the arms and legs, and when these wires are connected to the electric circuits they become warm. It was a British engineer who first worked out the quantities of electricity needed to keep the human body comfortably warm when applied in this way to the extremities. The amount is surprisingly small, being only about as much as is taken by an electric lamp of one hundred candle power. In a little while we may find the same system used by Arctic explorers for their sleeping bags, by look-out men, and steersmen on board ships in cold latitudes, and also by motorists and others exposed to strong winds and low temperatures. Medical applications also readily suggest themselves. It was on a British ambulance, by the way, that electric radiators were first fitted to the stretchers to keep the wounded warm and prevent collapse on the way to the hospital.

COL. CARNEGIE

On Monday evening, March 3rd, Colonel Eben. Carnegie, president of the Electric Steel & Metals Co., Ltd., and managing director of Electric Steel and Engineering, Ltd., invited the staff to dinner at the New Dexter Hotel to meet Geo. C. MacKenzie, B.Sc., of the Mines Department, Ottawa, who has been appointed general manager of the company.

After dinner, Col. Carnegie, in introducing Mr. Mackenzie, reviewed the operations of the company, pointing out that it was one of the first in Canada to manufacture munitions, and right up to the signing of the armistice was actively engaged on this work. The speaker spoke of the loyalty, co-operation and support he had always received from the staff, and stated that although he was resigning from the active management of the company, to return to England, he was still to remain a director of both companies, and hoped to visit Canada from time to time.

Mr. MacKenzie, in replying, expressed his pleasure at having the opportunity of meeting the staff under such favorable conditions, and assured them that he was determined to do his part to make the company a success, but that could only be accomplished by the co-operation of everyone.

Mr. F. Birley, secretary of Electric Steel & Metals Company, expressed the regret of the staff at Col. Carnegie's retirement from the management, and on behalf of the staff assured Mr. MacKenzie of the same loyal support which had been given to Col. Carnegie.

The Welland orchestra was in attendance, and everyone spent an enjoyable evening in dancing and the selection of songs rendered by Mrs. Buckley and W. Burkinshaw.

CHANGES ANNOUNCED

The Canadian Ingersoll-Rand Company, Limited, has recently absorbed the Jenckes Machine Company, Limited of Sherbrooke, Que., thus putting them in possession of two plants, the "Jenckes plant," and the "Rand plant." The products of the "Jenckes plant" will continue to be those familiar to customers of the Jenckes Machine Company, manufactured to the latest designs. Briefly, these are: structural and plate work; tanks, penstocks, etc., mining machinery and equipment, ore crushers, cars, cages, etc., and pulp and paper equipment such as barkers, grinders, water wheels, etc. The headquarters of the Canadian Ingersoll-Rand Company are at 260 St. James St., Montreal.

The Adaptability of Oil Fuel to Industrial Purposes

In 1917 the largest quantity of oil fuel used for furnace purposes was for heating billets in connection with the manufacture of shells, while in pre-war times the principal consumers were glass bottle manufacturers and makers of rivets, bolts and nuts. For forging or drop stamping wrought-iron materials the metal must be heated up to about 2,500 deg. F. This temperature was formerly obtained by placing iron bars in a coke furnace of the type used by the wayside smith, though of improved construction and larger dimensions. Till gas and oil fuel were introduced the process was rather a slow one, but since oil has been used in an intelligent manner the output of each new or converted furnace has been trebled. Further the size of the furnace is reduced by 30 per cent. The working area occupied by a furnace and its adjacent machines is only about 50 per cent., more area has to be occupied by a stack of coal and behind it by the resultant ashes. With oil fuel these spaces can be used as furnace pitches.

In recent years many metal-melting manufacturers have either scrapped their coke-fired furnaces or converted them to gas or oil. Of these two gas is probably to be preferred, except that its calorific value in any town may vary hourly while that of oil is constant. The principal metals melted at present are aluminium and 70/30 brass. The former is usually melted in "lift out" crucibles, the melted metal being carried to the moulds, whereas brass is melted in tilting furnaces, to which the moulds are brought. For liftout furnaces melting low fusion metals the average oil-fuel consumption is about 15 per cent., and for tilting furnaces about 10 per cent. of the metal melted; that is, for every 100 pounds of metal melted the former would consume about 1½ gallons and the latter 1 gallon.

In the early years of this century a French engineer took up the case of oil as an auxiliary to coal. Several evaporative trials were made with the boiler of a French Navy ship burning coal alone at the rate of 18.8 lb. per sq. ft. of grate per hour and burning coal and oil in different proportions at the rate of 21.3 and 21.7 lb. of mixed fuel per sq. ft. When a mixture containing 45 per cent. of petroleum was burned the evaporation showed an increase of 25 per cent. over that with coal only, and when the proportion of petroleum was 64 per cent. there was an evaporative increase of 56 per cent.

About four years ago power-station engineers began to take an interest in the subject, on the theory that in conjunction with oil fuel a poorer class of coal could be used than could be burnt satisfactorily under the boilers. Poor coals tend to cake on the links of the chain grate stokers, preventing the quantity of the air necessary for complete combustion from being drawn in; hence a smouldering mass travels along the bars and is dumped into the ashpit only partly consumed. But with oil fuel the argument was that, owing to the almost perfect combustion obtained, the combustible gases rising from the coal fuel bed would be quickly ignited and would cause the mass to become much more incandescent, thereby tending to aerate the bottom mass, which would then allow sufficient air to be drawn through to complete the combustion of the rest of the poor coal. Tests were carried out under a coal-fired Stirling water-tube boiler. One burner was placed on each side, about 25 per cent. from the back of the grate, and oil gravitated from an overhead tank to the burners, which were of the Kermode steam-jet type, working with steam at 25 lb. pressure. In the first test a nutty slack having a calorific value of 10,400 B.T.U. was employed, and a boiler efficiency of 69.25 per cent. was obtained; the temperature of the combustion chamber was 2,648 deg. F., and of the uptake 660 deg. The last of the tests was carried out with a nutty slack of 10,300 B.T.U., and Mexican fuel oil of 18,750 B.T.U., the proportion of oil to coal being 8 per cent. on a B.T.U. basis and 4.96 per cent. on a weight basis. A boiler efficiency of 74 per cent. was obtained, and the temperature of the combustion chamber was 2,850 deg., and of the uptake 628. With coal at 20s. 10d. a ton and oil at 50s. a ton, the cost of a ton of water evaporated with coal only was 2.8s. as against 2.62s. with coal and oil, the money saving with the latter thus being 6 per cent.

CAN NOW SHIP TO OLD COUNTRY MARKET

Announcement Made That All the Restrictions Have Been Removed

Ottawa.—All restrictions on imports from all parts of the British Empire to Great Britain have been removed. This announcement was made to the House of Commons by Sir Thos. White in reply to a question by Hon. Charles Murphy. Mr. Murphy quoted a statement in a newspaper by Mr. F. H. Jones of Montreal, just returned from Great Britain, where he had been acting in an advisory capacity to Sir Robert Borden, to the effect that import licenses discriminated against Canada. Mr. Murphy also quoted from a cable despatch showing that the matter had been discussed in the British Parliament.

Sir Thomas White said he was glad to say that he was in a position to satisfy the House that there had been no intention to discriminate against Canada. He read two cables as follows:

From Lloyd Harris of the Canadian Trade Commission in London: "In reply to question in House this afternoon's Parliament, Secretary Board of Trade says: 'The Government had decided no import restrictions shall be or continue to be imposed on goods coming from any part of the Empire, without the assent of the Cabinet, which shall not be given unless some unforeseen necessity arises. It is not possible at present to remove all restrictions on all imports from foreign countries because of the state of exchange, but all raw materials will be free from import restrictions.'"

From the Canadian Trade Commission in London: "Board of Trade announced yesterday removal of all restrictions on imports from British Empire."

LESS ICE IN LAKES THAN ONE YEAR AGO

Reports From Various Points Along the Route on the Great Lakes

There is less ice in all the lakes than was reported last year at this period, according to the first of the 1919 reports of ice conditions on the lakes, issued in Detroit by the Marine agent of the United States Weather Bureau.

Reports from regular and display stations of the Weather Bureau and Meteorological Service of Canada indicate there is less ice in all the lakes this winter.

In Lake Superior there is a small field along the south side of Minnesota Point, which extends about eight miles along the Wisconsin shore, anl also a small field off Portage Canal, and some slush ice from Point Sable east to Whitefish Point. Whitefish Bay has no ice.

In St. Mary's River the ice is reported 16.5 inches in thickness. In Green Bay the ice is 16 inches thick at Escanaba, with open water at Green Bay.

In Lake Michigan there are no fields reported, except some slush ice in the extreme southwest portion and at the Straits of Mackinac, where icefields are light and broken and drifting with the winds.

In Lake Huron there are small fields of slush ice reported over the northern portion, but none over the southern portion. In Lake St. Clair icefields are broken and the lake is practically open. Detroit River is open to Lake Erie. There are no fields reported in Lakes Erie or Ontario

IRON MINES AT BRIEY ARE IN GOOD CONDITION

PARIS.—Most of the iron mines in the rich Briey coal basin are in good condition and can be worked again as soon as arrangements for employing men are made, according to the report of a commission which has been making a study of the mines. But nothing remains of the gigantic manufacturing organization allied with the mines in pre-war days. Factory buildings, which it is said will take years to reconstruct, were razed by the Germans and the machinery was destroyed or removed.

Notes on the Process of Case-Hardening

The Following Article is Reprinted From "The Machine Tool Review," Through the Courtesy of Alfred Herbert, Ltd., Coventry —Information of Value is Given Regarding Case Hardening

By J. R. HANDFORTH, M.Sc.

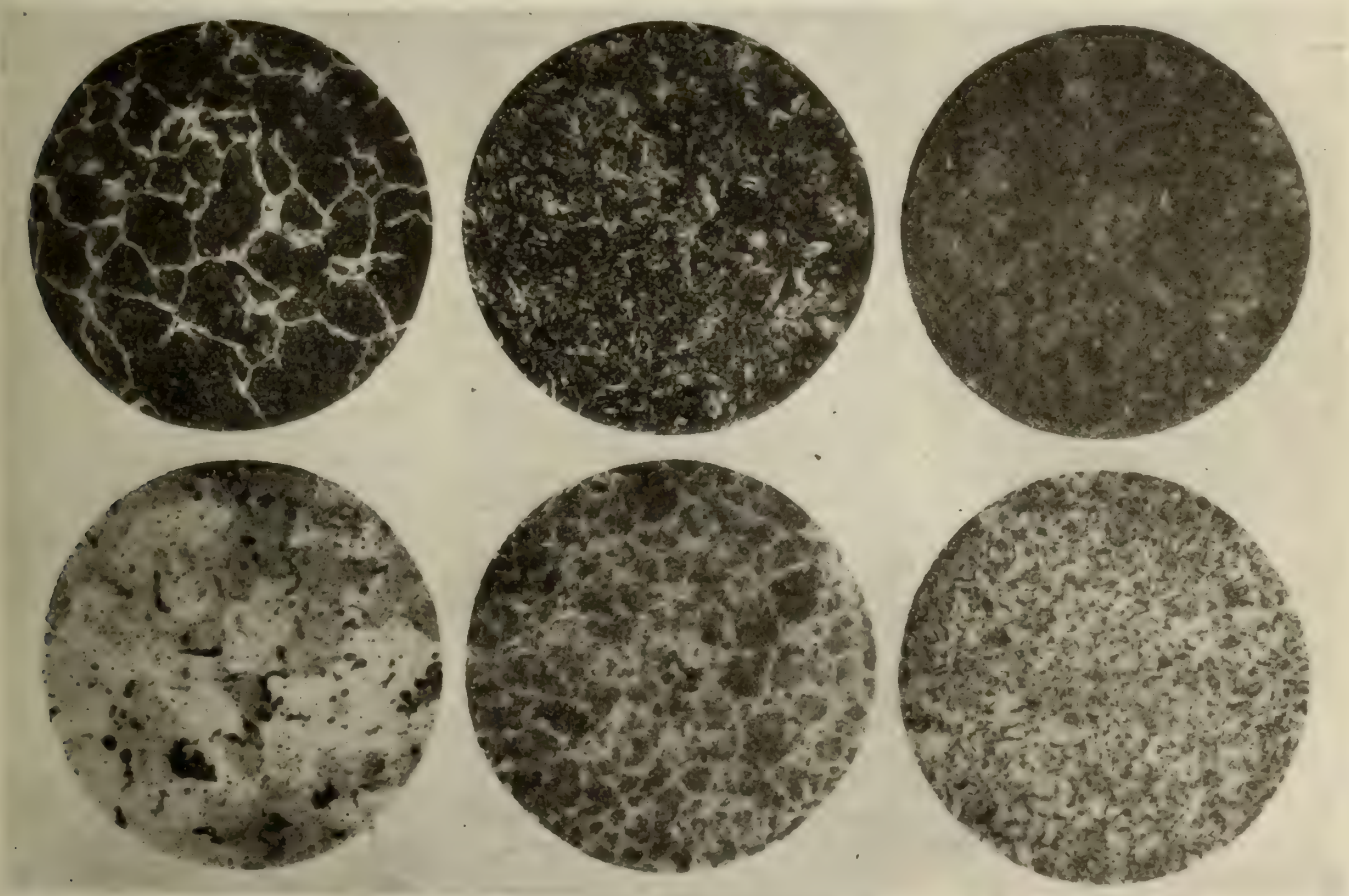
THE process of case-hardening has for its primary object the production of a surface of steel which is exceedingly hard and able to withstand wear and deformation. This surface may be a few thousandths of an inch deep as for the heads of screws, to prevent burring under the action of a spanner, or it may be upwards of an inch thick, as in the hardened face of armor plate, or it may be any intermediate depth, as for plug gauges, ball races, roller bearings, etc.

The modern process consists essentially in inducing a penetration of carbon into a selected steel, by heating this steel for a pre-determined time at a high temperature in contact with some carbon-conveying body, which is known as the cement, and which may be either solid, liquid, or gaseous. Usually, but not universally, this operation is followed by a refining treatment, the object of which is to restore the fine crystalline grain of steel which has been destroyed by the prolonged heating at the high temperature. Finally, the carburized object is hardened by quenching in oil or water from the lowest temperature which will produce a surface of the requisite hardness.

The three main essentials for consideration are the steel used, the heat treatment, and the cement.

As the final treatment in the production of a hard surface must be some form of quenching and in the majority of cases it is requisite that the object must have some degree of toughness as well as hardness, the choice of steels is quickly reduced to those of low carbon contents; in other words, to the steels which, when quenched in their natural state, will harden only to a limited degree. Generally speaking, therefore, a case-hardening steel should not contain more than 0.10 to 0.15 per cent. of carbon. In the best steels for this purpose the sulphur and phosphorus contents are kept very low because these elements tend to produce irregular cases with soft and shelly spots. Some doubt still exists as to what is the most advantageous amount of manganese to have present. Some experienced hardeners refuse to accept more than 0.40 per cent. of manganese, whereas others, equally well known for the excellence of their work, will not use a steel with less than 0.70 per cent. of manganese. Allowing for these differences of opinion, we may take it that an average suitable steel should contain the

*Illustrations. The microphotographs figures 1 to 7 inclusive and figure 10 are from specimens prepared in the laboratory of Alfred Herbert Limited, Coventry, under the direction of the writer of the article. Fig. 8 is a diagram used in a number of books and articles—the author is unknown. Fig. 9 is based on data taken from D. K. Bullen's book on Steel and its Heat Treatment.



MICRO-STRUCTURES PRODUCED BY CASE HARDENING
Micro-photographs enlarged 75 diameters
The upper figures show the cases and the lower figures the cores

FIG. 1
FIG. 2
AS TAKEN FROM CASING BOX AFTER SLOW COOLING.

FIG. 3
FIG. 4
AFTER FIRST REHEAT TO 950 DEG. C. AND QUENCHING IN WATER.
MILD STEEL BAR CONTAINING 0.15 PER CENT. CARBON.

FIG. 5
FIG. 6
AFTER SECOND REHEAT TO 760 DEG. C. AND QUENCHING IN WATER.

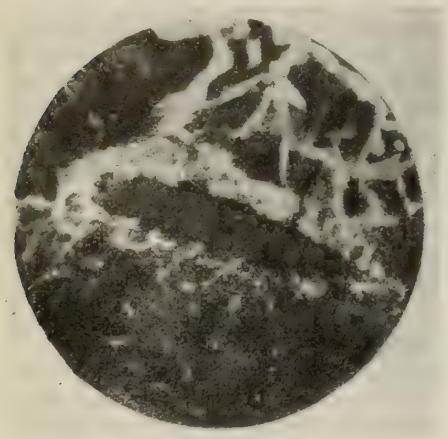
TABLE I

Composition and Physical Properties of Cores of one inch round bars case-hardened and water or oil hardened as stated from quenching at 760 degrees centigrade.

	A	B		C	
Carbon	0.14	0.15		0.12	
Silicon	....	0.17		0.12	
Manganese	0.79	0.47		0.15	
Sulphur	....	0.043		0.035	
Phosphorous	....	0.039		0.042	
Nickel	....	3.31		4.78	
Yield point, tons per sq. in.	26.4	27.0	34.8	35.2	42.4
Max. stress, tons per sq. in.	38.4	39.9	47.8	42.0	55.6
Elongation, per cent.	28.0	28.6	22.4	26.0	17.0
Reduction of area, per cent.	53.44	46.4	40.2	49.7	39.2
Impact Izod.	57	57	45	94	85

following (percentages): Carbon 0.1 to 0.15, silicon 0.1 to 0.2, sulphur 0.05, phosphorus 0.05, manganese 0.25 to 0.8.

Assuming this to be correctly used, the



MICROPHOTOGRAPH ENLARGED 100 DIAMS. FIG. 7—DEFECT IN CASE. PATCH OF MANGANESE SULPHIDE.

final treatment will be to quench it in oil or water from about 760 deg. C. Under such treatment a 1 in. diameter bar of this material will have the composition and physical properties stated in column A of Table 1, and may be taken as representative of plain carbon case-hardened articles of this size.

To meet the more rigorous specifications of the automobile and airplane industries considerable improvements have been made upon the simple, straight carbon steel (A in Table 1)—in fact, from being the out-cast of the steel trade, the case-hardening steel has become one of the finest products of the steel maker's art. Of the newer steels for this purpose, the three per cent. and five per cent. nickel steels are in great demand. By the addition of nickel the tensile strength of the core is increased without reducing its toughness: with the addition of both nickel and chromium, a further increase in the tensile strength is obtained with very little sacrifice of toughness, and at the same time the hardness of the case is increased. Apart from the fact that such steels require a slightly longer time to carburize, the introduction of these elements gives rise to no serious difficulties in the operations, and, as with the plain carbon steels, the final treatment will be some form of quenching from a temperature of about 760 deg. C. Typical compositions and physical tests obtained from two of these materials are given in columns B and C of Table 1. It will be seen that these tests are a decided improvement on those obtained with the plain carbon steel in column A.

Until a few years ago it was largely believed that any kind of low carbon steel was suitable for case-hardening, and it must be acknowledged that much excellent work is turned out from cheap, basic open-hearth and Bessemer steels, whose only qualification as case-hardening steels is their low carbon content. As, however, the study of the process has progressed, it has been found that these steels have defects inherent in the processes by which they are manufactured, which makes them unsuitable for the highest class of case-hardened work. Steels produced by these processes almost inevitably contain larger amounts of slag and foreign inclusions than similar steels made in the open-hearth, crucible or electric furnace.

The illustration, Fig. 7 (Figs. 1 to 6 will be referred to later), shows very clearly the manner in which such impurities may occur and the trouble they are likely to cause. The large patch of manganese sulphide shown across the centre occurs in the case and cannot itself be hardened, while it prevents regular penetration of carbon in its vicinity. Further, it is brittle and liable to cause shelliness and flakiness, two serious difficulties. Such impurities are particularly objectionable when, as in this example, they occur near the surface of the article, for they are often not discovered until all operations have been performed and, in the production of a complicated article like a cam shaft, much time and labor may be wasted. Such a defect as this would be particularly fatal, for example, in a ball race, where it would quickly grow into a hole and cause the balls to jump and eventually break down the race.

The heat treatment in case-hardening embodies nothing out of the ordinary but it has caused some confusion of thought because of the variations which can be introduced according to the nature of the article which is being produced. Generally speaking, the operations may be summarized as follows:

(1) Heat the article to be hardened for a predetermined time at a high temperature, in contact with the carburizing mixture.

(2) Refine the grain of the steel which has been destroyed by the prolonged heating, and harden the article by quenching it in oil or water.

The aim of the first treatment is to cause a transition of carbon from the cement to the steel and in most cases this is accomplished by heating the steel surrounded by the cement in a closed box, at temperatures from 870 deg. C to 950 deg. C. It is experimentally possible to induce some carbon penetration at lower temperatures than these, but for general work the penetration at lower temperatures is too slow and irregular. There is a minimum temperature, dependent on the carbon content of the steel being used, below which carburization should not be attempted. These temperatures for steels of various carbon contents are shown in the diagram figure 8.

If this diagram is correct, and it has been found so by many experiments, it follows that the claims that certain carburizing agents will case-harden at dull red heat are not correct; but it does not follow that some mixtures are not more effective than others at given temperatures, for, as will be shown, this is quite a fact. When the correct temperature for the first operation has been determined, the penetration of the carbon, other things being equal, will be in some measure proportional to the time during which the casing operation is continued.

Having, let us suppose successfully, carried out the first operation—that is, obtained a penetration of carbon to a required depth, it remains to determine what shall be the subsequent treatment of the article to produce the best possible result, and it is on this subsequent treatment that successful practice largely depends. The various alternatives have been admirably summarized as follows by the Society of the American Testing Association:

"(1) When hardness of the case only is desired, and lack of toughness is unimportant, the carburized objects may be quenched directly from the boxes into oil or water. Under these, conditions both the core and the case are coarsely crystalline.

"(2) To reduce the danger from cracking and distortion, the objects may be removed from the box and allowed to cool to about 800 deg. C. before quenching. This also leaves both the core and the case coarsely crystalline.

"(3) If the object is cooled from the box to below 700 deg. C. and reheated to 760 deg. to 800 deg. C., followed by quenching in oil or water, the case will be refined, but the core will remain coarse.

"(4) To refine both the core and the case the objects should be cooled slowly

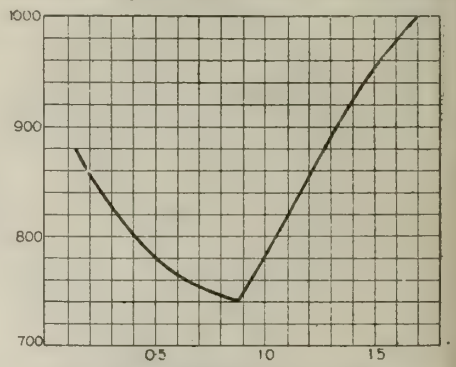


FIG. 8—EQUILIBRIUM DIAGRAM VERTICAL LINES INDICATE CARBON CONTENT (PERCENTAGES) OF STEELS. HORIZONTAL LINES INDICATE TEMPERATURES IN DEGREES C

to below 700 deg. C. and then:

"(a) Reheated to 900 to 950 deg. C. and quenched in oil or water, and

"(b) Before they have cooled below 100 deg. C. they should be reheated to

760 to 780 deg. C. and again quenched in oil or water.

"(5) To reduce hardening stresses and to impart a further degree of toughness, they may be tempered by reheating to 200 deg. C."

We shall now endeavor to explain the fundamental principles on which the above summary is based. To do this, it will simplify matters considerably to get an accurate mental picture of the condition of the article at the end of the first process. We started with, let us say, a mild steel bar containing 0.15 per cent. of carbon. Surrounding this, and more perfectly connected to it than by the most ideal weld, we have placed a thin layer of high carbon steel, similar in carbon content to the steel used in the manufacture of taps or reamers, and finally, these have been soaked together for a number of hours at a very high temperature and allowed to cool slowly. Anybody with the slightest experience of hardening practice can picture the type of coarse fracture which would be obtained from a high carbon steel when broken after soaking in a furnace for six to nine hours at 900 deg. C. This is exactly the type of fracture which is obtained if an article is broken as it is taken directly from the box, or if, as recommended in paragraph (1) of the above summary, it is quenched without further treatment. The coarseness of the grain structure of such articles is shown by the microphotographs (Figs. 1 and 2). Fig. 1 shows at 75 magnifications the high carbon case with the large cell structure of hard and brittle membranes

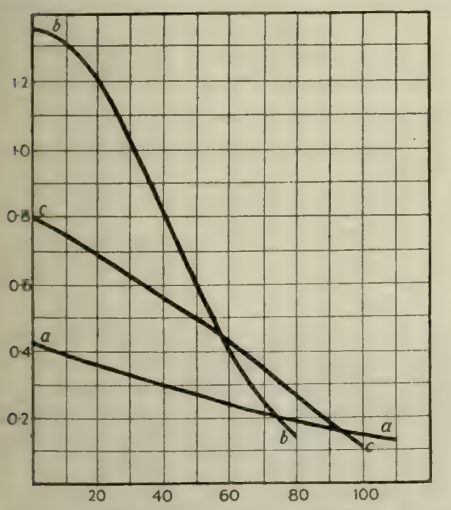
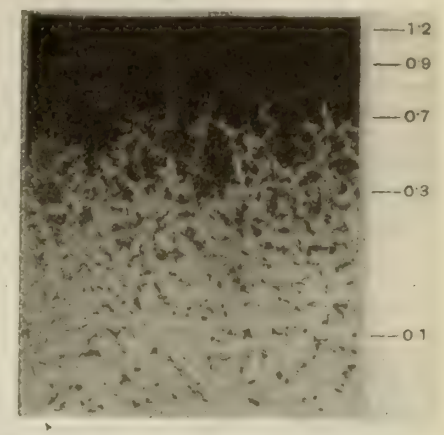


FIG. 9—DIFFERENT TYPES OF PENETRATION OBTAINED WITH DIFFERENT CEMENTS. Vertical lines indicate depth of penetration, the figures at foot representing thousandths of an inch: i.e., 0.020-in. to 0.100-in. Horizontal lines indicate the percentage of carbon in the case at the various depths.

of cementite as they occur in a specimen cooled in the box. Fig. 2 shows at the same magnification the structure of the core in which the various constituents are gathered into large, irregularly distributed masses. The problem of refining the structure of such an article is complicated to some extent by the fact that we have to deal at one and the same time with steels of high and low carbon content, which would, if treated separately, be refined at different temperatures. This difficulty is most effectually surmounted by using the method of "double quenching," in which the grain of the mild steel core is first refined and afterwards the grain of the high carbon case is refined. To refine the mild steel core, the carburized object is heated for about ten minutes to a temperature just above that at which it was case-hardened and it is then quenched in oil or water. By this reheating, the large crystals which were formed by the long soaking of the previous treatment are broken down into a great number of smaller ones, and the pearlite of the core, which was previously segregated into large masses, is now uniformly distributed through the steel, and held in this condition by quenching. The change which takes place in the core can be seen in Fig. 4, remembering, of course, that the steel is now being viewed in the quenched condition, not in the slowly cooled condition as seen in Fig. 2.

It will immediately strike the observer that the treatment for the core is not suitable for the case, as no sane hardener would suggest quenching 1.0 per cent. carbon steel from 920 deg. C. in water. This high temperature, however, has a beneficial effect on the case as well, as will be seen from Fig. 3, which is again a photograph of the case. In practically all commercial case-hardening, unless special precautions such as those indicated below are taken, the case always contains more than 0.9 per cent. of carbon, and has therefore a considerable portion of free cementite. This is for the white substance shown in Fig. 1. It is glass hard and glass brittle, and on slow cooling it separates in the steel into dangerously thick cell walls, which are not destroyed at the usual temperatures for the ordinary hardening of 0.9 to 1.0 per cent. carbon steel. These membranes are, however, largely broken down by reheating to 920 deg. C., which causes them to pass into solution in the steel, and the sudden cooling retains them in this condition. The hardness of the case can, to a certain extent, be regulated by the amount of free cementite which is allowed to remain in the massive form, provided, of course, that its distribution is properly arranged so as to ensure freedom from the danger of flaking. In Fig. 3 a considerable proportion has been left in this form, but it is evident that its distribution is now much more uniform, and that the case in this condition is considerably safer than in that shown in Fig. 1.

Having refined the core and partially improved the case, a final treatment is necessary to give the case its finest possible grain size. This is done by reheating to 760 deg. C. and quenching again in water or oil as desired. The same principle is again involved, i.e., that reheating the high carbon case to 760 deg. C. breaks down the large grain produced in the case at 920 deg. C., and the quenching retains the steel in this desired structure. Fig. 5 shows a portion of the case after this treatment, and it is interesting to compare it with Fig. 1 and note the refinement which has taken place. This final treatment has practically no effect on the grain size of the core, but owing to a change which takes place in the nature of the constituents of the core the steel is left in the very tough and fibrous condition shown in Fig. 6. In objects where toughness is not a primary requisite, the second treat-



MICROPHOTOGRAPH ENLARGED 100 DIAMS. FIG. 10—THE FIGURES AT THE SIDE INDICATE THE PERCENTAGES OF CARBON AT VARIOUS DEPTHS OF CASE

ment, by which the grain size of the core is refined, may be omitted without detriment. In such practice, however, precautions should be taken during carburizing to prevent the formation of large membranes of cementite, which, as shown above, require the high temperature quenching for their removal. This can be done by ensuring that the carbon content of the case is not allowed to exceed 0.9 per cent., for under such conditions no free cementite will separate, and the one simple low temperature quenching will give a fine grained case free from the danger of flaking. The factors responsible for the production of cementite in the case are the temperatures at which the carburizing operation is carried out and the cementing mixture which is used in the process. These factors are obviously controllable, and as they are interdependent they will be considered together in a general discussion of case-hardening compounds.

As the first essential of case-hardening is to induce a penetration of carbon into a steel, it would be thought that the cheapest way of doing this would be to heat up the steel along with some form of carbon, such as charcoal, coke, or graphite. Cementation can indeed be carried out in this manner, but it is very quickly found that carbon in its simple forms is one of the least efficient of the many substances which can be used, and the penetration obtained from it is remarkably small. Another fact which has been proved time after time, but which is not sufficiently realized by many case-hardeners, is that the penetration of carbon is much more dependent on the gases which are present in the box than on the actual contact of the steel with the cement. An article may be completely buried in sand, but, provided there is plenty of cement in the box, and the box is well luted to prevent the escape of gases, it will be carburized almost as efficiently as if it were packed round with the cement itself. The modern mixtures, therefore, are more or less complex carbonaceous substances, which, on heating to high temperatures,

evolve carbon-containing gases. Of the substances to be found in such mixtures we might mention wood-charcoal, burnt leather, burnt bones, barium-carbonate, organic residues from dye works, spent charcoal from sugar refining, soda ash, heavy oils, etc.

In studying such mixtures there are three well known ways in which we may obtain an idea of their nature and value. The first and simplest of these is to carburize a bar under standard conditions with the mixture under test, and from this bar turn successive layers of a definite depth, say one thousandth of an inch, and have these turnings analyzed for carbon. If the figures so obtained are plotted in the form of a curve, as in Fig. 9, we get an impression not only of the amount of carbon which has entered the bar, but also of the manner in which this carbon is distributed in the bar. Thus, two mixtures A and B, under identical conditions, might give us the results illustrated by the curves (a) and (b). These show that mixture A has carburized the steel to a greater depth than mixture B, but that the penetration falls off slowly and regularly, while mixture B causes a high concentration of the carbon at the surface, but there is a rapid decline in the concentration of carbon from the exterior to the interior of the bar.

This method is valuable, but it is slow and laborious, and we can get a quicker idea of the depth of penetration by examining the fracture of a case-hardened bar after it has been refined at 760 deg. C. This, however, does not show us the distribution of the carbon in the steel, which for many purposes is as important as the depth of penetration. If, however, a section of the fractured bar is polished and examined under the microscope a perfect picture of the distribution of the carbon can be obtained showing depth and concentration, and a photograph similar to Fig. 10 would give a permanent record.

The importance of the evolved gases has been emphasized. If the amounts of these gases which are liberated at 870 to 950 deg C. are measured, they give another excellent indication of the value of the cementing mixture. This is quite a laboratory job, and even then it is long and tedious. It serves, however, two very useful purposes. It puts out of the field the mixtures containing large amounts of water or heavy oils. Both these substances are detrimental from the fact that they take additional fuel to heat them, and they give off copious amounts of gases at temperatures below which casing can occur, and by so doing they destroy the luting of the boxes and allow the escape of the useful gases which are evolved at higher temperatures. This method can also be used with effect to test those mixtures which are said to be regenerative and to give the same penetrations at the third or fourth time of using.

From careful experiments made upon these lines, especially from experiments made on cementation by gases, it has been possible to divide case-hardening compounds into two broad groups. These are the "gradual" or carbon monoxide type and the "sudden" or hydrocarbon type. The difference between the two is illustrated in the curves (a) and (b), Fig. 9. In the "gradual" type of cement the maximum amount of carbon in the case is low but the penetration is deep, and the concentration falls off progressively. With the "sudden" or hydrocarbon cements, of which ethylene is an example, the carbon content at the surface is high, but the concentration rapidly falls away and the penetration is not deep. Each type of case has its advantages. In gaseous cements, and to some extent in solid cements, the resulting type of case can be controlled at will. Thus, by the addition of a small amount of ethylene to carbon-monoxide, a penetration like that shown in curve (c), Fig. 9, can be obtained which combines the advantages of both types.

The majority of solid cements belong to the sudden or hydrocarbon type. Potassium cyanide, which is used as a molten bath or in the form of a "sprinkling powder," to give cases a few thousandths of an inch deep, is an excellent example of a "sudden" cement. Of the "gradual" solid cements, wood charcoal is perhaps the most effective, especially if deep penetrations, which can be obtained by long soaking, are required. Animal charcoal belongs to the "sudden" class on account of the hydrocarbons it evolves when heated, so that mixtures of wood and animal charcoal can be used with some success to control the type of case desired. The standard mixture of barium carbonate and wood charcoal may be either a gradual or a sudden cement according to the temperature at which it is used. At low temperatures it gives low carbon concentration and somewhat thin cases, whilst at high temperatures it gives thick cases and high carbon concentration, so that by varying the conditions this cement can be made to serve different purposes. This is a valuable property in a cement, but it is not necessarily good practice to have to raise the temperature to increase the depth of the case.

A somewhat frequent trouble which arises from the use of a poor cementing mixture is the occurrence of soft or shelly spots in the case, probably due to high sulphur and phosphorus contents. Cements which contain large percentages of these elements sometimes contaminate the steels with the above results. Barium carbonate mixtures, for example, may contain free sulphur or barium sulphate, while mixtures containing burnt bones inevitably contain a large amount of phosphorus in the form of calcium phosphate, which, at the high temperatures of the casing operation, is quite capable of passing on some of its phosphorus to the steel.

From these considerations it will be seen that the selection of a case-hardening mixture allows room for a considerable amount of discretion. When a definite type of case is required a definite type of cement can be chosen, and when these have been decided upon the requisite heat treatment can be readily found by application of the principles outlined above.

CANADIAN PLANTS WILL HAVE A VOTE

International Harvester Co. Has Plans Out For Starting a Novel Scheme

Chicago.—The International Harvester Company announced lately that its 30,000 employees will take a secret ballot on Wednesday on the question of adopting an "industrial council" plan giving the workers an equal voice with the management in shaping company policies pertaining to working conditions, wages, and all other matters of mutual interest.

In announcing details of the plan, which provides that no employee shall be discriminated against because of "race, sex, political or religious affiliation or membership in any labor or other organization," the company stated that the underlying object is to establish relations between worker and management "upon a definite and durable basis of mutual understanding and confidence."

Each of the 17 American and three Canadian plants will vote on the question and the plan will become operative at plants where it receives a majority vote. Under the plan, a "works council" will be established at each plant composed of not less than five representatives nominated and elected from the ranks of the employees and a like number appointed by the management. The two groups will have equal voting power on all questions; they will vote separately and according to the unit rule.

GUELPH INDUSTRIES ARE GROWING NICELY

GUELPH.—From present indications Guelph is in for an industrial boom which bids fair to exceed all former records, as several new industries have already decided to locate here, and there are prospects for several other good ones.

At the meeting of the Directors of the International Malleable Iron Company here this week, it was decided to proceed at once with the erection of a new factory three stories high, 160 by 60 feet, in addition to their already large plant. The new building will be used for the manufacture of pipe-fittings for the foreign and domestic trade, and will provide employment for at least 100 men to start. The work of construction will begin as soon as the plans are confirmed and the contracts let.

Another new industry which will start at once is the Lang Machinery Company, which has leased the large factory building on Suffolk street owned by the city for a period of five years, and will carry on a general machinery business. The company is capitalized at $100,000, of which $40,000 is paid-up.

Some Recent Applications of Arc Welding

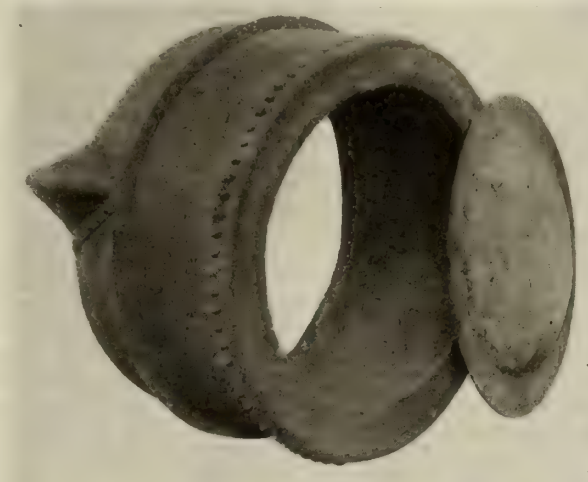
Various Methods in Use—Explanation of Process—Building Up Worn Surfaces—Cutting Risers Off Castings—Some Illustrations of Work Done by the Aid of the Arc Welder

By FRANK C. PERKINS

THE term "Electric Arc Welding" in its present day sense is a general term applying to three more or less distinct processes, after the men who are generally credited with developing them, namely Bernardos, Slavianoff and Zerener. The Bernardos process is the best known and the most extensively used, and is especially adapted for large and heavy work. It consists of drawing the arc between the work and a single carbon or graphite electrode and is, therefore, commonly known as carbon electrode welding. The arc is drawn by touching the electrode to the work and withdrawing it to the proper distance in a manner similar to the action of an arc lamp when starting.

It is of interest to note that the temperature of the arc is approximately 3,500 deg. C. and the heat is confined to a comparatively small place directly in contact with the arc. The intense heat of the arc, on striking the filling metal, causes it to melt rapidly and flow into place, and as the arc is moved over the work the filling metal and the molten metal of the work unite in an intimate mixture or weld. The use of a small electrode with low current values allows the use of this process in welding comparatively light material, but the principal use is with larger electrodes and heavier currents for heavy work.

In welding by this process attempts were made at first to use the carbon electrode as the positive terminal and the work as the negative. This was found to be unsatisfactory because particles of carbon from the electrode were carried into the weld, making it exceedingly hard, and therefore difficult to machine. Consequently it is now considered advisable to always connect the work to the positive side of the circuit and the electrode to the negative. An additional fact in favor of this method is that the greater portion of the heat of an arc is concentrated at the positive terminal.



COMPOUND KETTLE AND NEW BOTTOM PLATE READY FOR WELDING

DEFECTIVE GEAR CASE READY FOR WELDING

The Slavianoff process is commonly known as metallic welding since it consists in using the work as one electrode and a piece of filling-in material as the other, the latter being held in a suitable holder similar to that used for the graphite electrode. The arc is drawn by touching the work with the metal electrode and drawing it away as previously described, but the filling-in is accomplished by the melting away of the electrode itself. In general this method will make a softer weld than the Bernardos process, since there is no tendency for carbon to be carried into the weld, because of the action of the arc in carrying the metal from the electrode to the work, it is possible to weld on a vertical wall or overhead. This method of operation is largely used in such work as overhead repairs in the firebox, and welding flues in locomotive boilers in railroad shops, and is of great value where repairs must be made in place.

DEFECTIVE BOTTOM PLATE IN COMPOUND KETTLE

The Zerener process consists of an arrangement of the positive and negative carbon electrodes in a holder so that they form a "V," the arc being between the poles of a powerful electro-magnet which forces the arc toward the work. This causes the arc to act in a manner similar to the flame of a gas torch, but because it is sensitive, inefficent and complicated, this process is not used as extensively as the Bernardos and Slavianoff processes. This process is used to a limited extent for comparatively small work in steel and brass and for welding small corners in tubes and tanks.

The direct current arc is practically steady, the temperature obtained is high (approximately 3,500 deg. C. at the positive electrode), and the heat generated at the positive terminal is approximately 75 per cent. of the total heat generated n the arc. Modern welding by means of the electric arc is accomplished by fusing the surfaces to be welded by means of the high temperature of the arc and then filling in with additional material which is also melted. This in effect is really a method of casting and unlike other forms of welding, the use of mechanical means in causing the parts to unite is unnecessary.

In some instances the joint is hammered while hot, but this is only for the purpose of increasing the ducility of the metal. When the carbon electrode is used, the filling metal is fed into the arc by the operator at a rate depending on the work being done. On the other hand the metallic electrode itself forms the filling material, being melted away and deposited on the work in the form of minute fluid particles.

BADLY WORN STEEL MILL ROLL REPAIRED BY ELECTRIC WELDING

In every instance the metal on which the welding is to be done is connected to one side of the circuit and the electrode by means of a suitable holder is connected to the other. Of course the controlling equipment, including protective and regulating devices must be included. The electrode is connected to the negative side of the circuit and the work to the positive for the reason, previously given, that the greater amount of heat is generated at the positive terminal—this prevents a too rapid consumption of the electrode. Furthermore, carbon from a graphite electrode is prevented to a great degree from being carried over into the work, and thus hard welds are largely eliminated. The fact that the greater part of the heat is liberated at the positive electrode means that the work directly in contact with the arc is quickly brought to a high temperature and locally to a state of fusion, which makes possible very rapid welding by this means.

In this form of electric arc welding the arc is established by momentarily touching the electrode to the work and then withdrawing it a short distance, in a manner similar to the operation of an arc lamp in starting. Practice is necessary in order to manipulate the electrode so as to maintain an approximately constant length of arc while welding. This point is important as variations in the length of the arc cause corresponding variations in the current, which in turn cause variations in quality and uniformity of the metal in the weld.

The carbon is considerably longer than the metallic arc and is, therefore, more stable and less liable to break. The metallic arc is extremely short, being only from one-eighth to one-fourth of an inch long. After the arc is established it can be moved about over the work by merely moving the electrode. The carbon electrode can be used to preheat the work, extending the heating to a distance from the weld by keeping the electrode moving rapidly enough to melt the work. In the working with the graphite electrodes there must be a potential across the arc of from 35 to 50 volts, depending on the current being used. The current varies from 200 amperes up, depending on the type of work being done. In light work, small electrodes and current values less than 200 amp. can be used. The average type of welding done by this method will require from 300 to 400 amp.

Cutting

The electric arc cuts very rapidly, because the heat is concentrated on a small area. To cut more rapidly, all that is necessary is an increase in current on the circuit being used. By using the graphite electrode and 400 to 600 amp., a 4 in. by 4 in. riser on a casting can be cut in four minutes at a cost of only five cents. In welding with the carbon electrode, the operator holds the electrode holder in one hand, and feeds a rod of filling material into the arc with the other. This filling material is melted into the weld and mixes with the molten metal of the work, forming a homogeneous mass of metal in the weld.

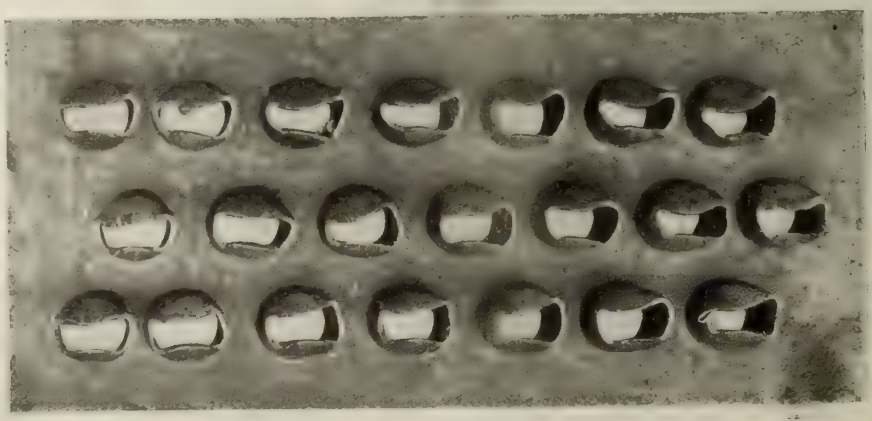
This method is largely used for building up worn surfaces, owing to the rapidity with which a large amount of metal can be built up. Welding with the metallic electrode requires much lower current values than those used with the carbon electrode. Currents as low as 15 amp. are used and the upper limit is about 200 amp. The voltage at the arc is only from 20 to 25 volts. The metallic electrode can be used on much lighter stock than can the carbon electrode. It requires greater ability on the part of the operator, however, on account of the shortness of the arc and the consequent difficulty of maintaining it.

The arc is more unstable than the carbon arc, and the operation is somewhat more difficult to master, but this is compensated for by the fact that certain classes of welding that are possible by this method cannot be done by any other process. Among these is welding overhead or on vertical surfaces previously mentioned. Further, there is no possibility of carbon being carried into the weld. Cast and malleable iron can be successfully welded by the electric arc provided certain precautions are taken. For this type of welding the work should be preheated either by the use of the carbon electrode or by means of gas, coal or oil fires.

It is held that the work should be brought up to a red heat and the heat carried well back from the weld or cooling strains and probably cracks will follow. The work should be kept hot during the time the weld is being made. Flux is of great assistance in welding cast iron. One commonly used consists of a mixture of borax and red oxide of iron. The borax should be heated to drive out the water of crystallization before using the flux. This mixture is supposed to prevent carbon entering the weld, and also to keep the surface of the metal in the weld clean and so permit a better union of the metal.

Very thin sheet metal can be welded by using the metallic electrode with low current values. The cost of welding seams in ¼ in. plates by the electric arc method would be 5 cents per foot and eighteen feet of seam can be welded an hour.

Regarding the welding equipment, any direct current source can be used for arc welding, but the voltage must be reduced to the values previously given of from 10 to 50 volts. This is done by inserting resistance in series with the arc to absorb the excess voltage. This is plainly a very inefficient method of operation as the voltage absorbed by the rheostats is energy wasted. If the supply circuit is 250 volts and the arc requires 50 volts, it is obvious that four-fifths of the energy taken from the



TWO-INCH TUBES ELECTRIC ARC WELDED INTO ¼-INCH BOILER PLATE, SHOWING BATTERED TUBES. NO OIL LEAKS PRODUCED.

mains is wasted in the rheostat. If, now, the supply circuit is 550 volts and the metallic arc is being used at 10 volts, the energy used is only a very small fraction of the energy taken from the line.

In order to avoid these losses a number of firms have developed a line of special low-voltage generators and a method of control, which give the maximum of efficiency, combined with flexibility and protection. That made by the General Electric Co. has a generator wound for a voltage of from 60 to 75 volts and in no case is it necessary to

BROKEN TAPS REMOVED BY ARC WELDING

have a generator of higher voltage than this for welding. Lower voltage may occasionally be used with very low current values. The generators are usually furnished as part of a motor-generator set, although they can be furnished for belt drive if desired. The motor-generator set is the most desirable equipment for several reasons. It is self-contained unit, does not demand constant attention when running, and the maintenance cost is low.

The welding circuits and the shop circuits should be electrically independent so that short circuits in the welding circuit will not seriously interfere with the shop circuits. The voltage on the welding circuit can be regulated to suit the work in hand by adjustment of the generator field rheostat. The control consists of a main generator panel and a separate panel for each operator. Double-circuit panels can be provided so that two operators can work from the same panel through separate equipments. If the circuits are duplicates a set of switches can be provided for connecting the entire capacity of both circuits to one electrode. This can be used for carbon electrode welding.

A convenient type of switch has been devised for adjusting the resistance in series with the arc and providing a number of steps in changing the current. If an operator leaves his electrode in contact with the work longer than necessary to start the arc, a relay on his panel operates and introduces additional resistance in series with the electrode, thus reducing the current to a low value. To restore these circuits to the normal condition and to resume working, it is necessary only to remove the electrode from the work and break the circuit. By this means, a large number of operators can work from the same machine, since trouble on any one operating circuit is localized and does not affect any other.

It may be of interest to consider some of the advantages of arc welding. The electric arc provides a very high temperature which may be confined to a small area. By this means the work is brought to a fusing temperature before the heat can be carried off through the metal of the work by conduction. Provision for the storage of gas, carbide, or other material of that nature, is unnecessary.

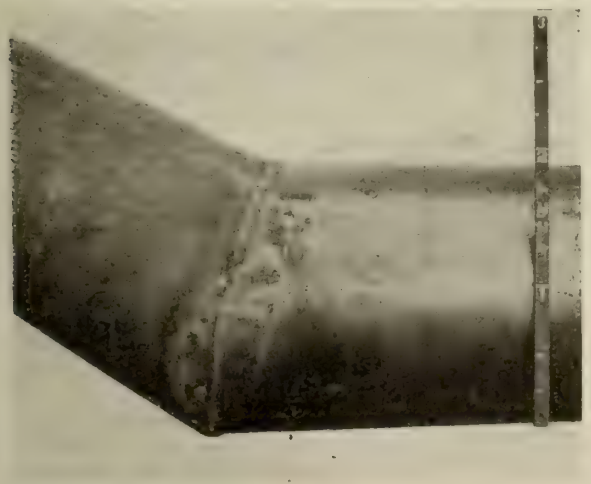
The electric arc equipment is simple and is easily understood by the operators. Since no combustible or explosive material is used in this process, there is practically no danger of explosion or fire. The use of the metal electrode permits of overhead welding, which is impossible with other processes. The equipment is very flexible since various kinds of work can be done with no change in equipment.

As most large steel plants generate their own electric power, and since the current consumption by an electric welding outfit is comparatively small, it will readily be seen that compared with gas or resistance outfits for welding, the cost of operating an electric outfit will be very low and will result in a considerable saving.

Some of the special applications of arc welding in steel mills, foundries, and machine shops may be of interest. Steel companies having electric arc welding equipment have found that much of the material formerly scrapped, such as cracked shafts, rolls with worn wobblers, rolls worn in the passes, cracked spindles, cracked ladles, cracked rolling mill machinery, etc., can be successfully welded and rendered practically as good as when new. The welding of annealing boxes with the electric arc is not only successful but is the cheapest method for making those boxes; furthermore, they withstand the expansion and contraction more successfully than boxes welded either by hand or by gas.

Strong and homogeneous welds are successfully made in large sections, such as locomotive frames, driving wheel spokes and the welding of flue sheets, fire boxes, etc. Repairs and welds in the steel work can be quickly made by this method. Welded joints can safely be substituted for riveted joints in tank cars, etc., and in passenger and freight cars, practically any of the metal work can be repaired by the arc. This includes repairs to the bolsters, trucks, framing, piping and air brake equipment. The use of steel cars is becoming more general throughout the country, and the repair of frames, siding, roofs, piping and trimmings, as well as the heavier parts, is best accomplished by the modern electric arc welding process.

It is possible to weld pipes into complicated forms and to obtain great strength in the joints. Special pipe fittings with the attendant leakage are eliminated and a better appearance and arrangement can often be made in an extensive piping system by the use of such welded pipe.



3-16-IN. PLATE SMOKESTACK ELECTRIC ARC WELDED JOINTS

ANNEALING BOX SHOWING BURNED IN CORNER, RIVET HEADS BURNED OFF AND PLATES SPRUNG APART AT JOINTS, BEFORE WELDING.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

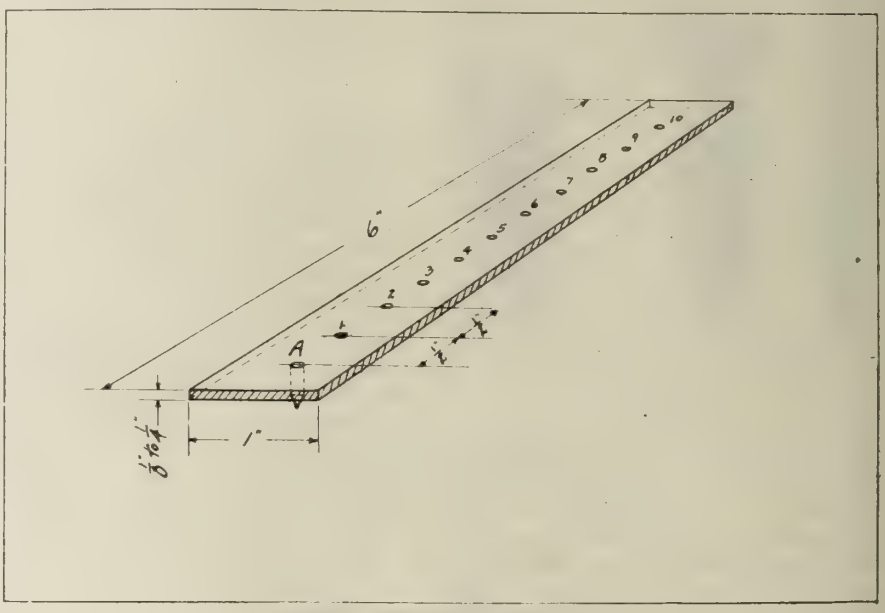
WOOD-WORKING KNIFE GRINDER

By J. H. M.

IT sometimes happens that in passing through a shop of any kind, one can rest one's eye on a fixture, that at first glance looks too simple to be worthy of a second glance, yet the more it is thought over, the more apparent it becomes that the very simplicity of the idea was its greatest asset.

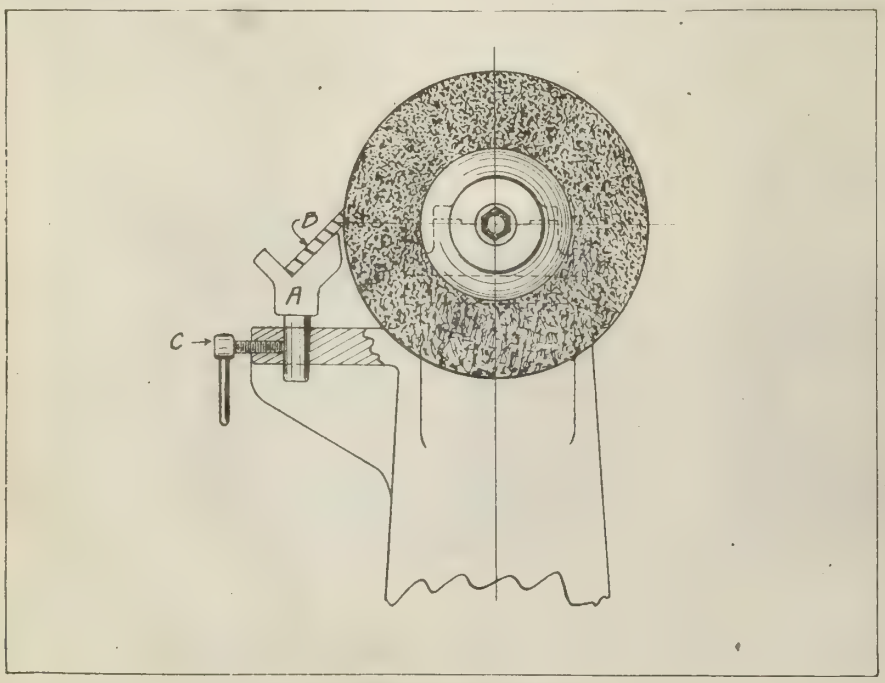
The illustration accompanying this article, denotes just such a case. At first glance the simplicity looks a drawback, then, on second thought, its simple design makes it the more useful. The operation is the regrinding of knives for wood-working machinery, the machine used for the operation being an ordinary floor grinder with a wheel about 18 to 20-in. diameter.

The holder A is shaped at correct angle to suit the angle desired on the knife edge. Knife is then placed on this holder in the manner shown on sketch, and run over the wheel until edge is of desired kenness The binder screw C holds the portion A in place by the round shank made to suit the particular size of hole on rest of the grinder used on operation.



CIRCLE SKETCHING SCALE

B represents the blade in place, and as the rest of the operation is so self apparent no further comment is made, except to say that for very slight cost one can grind one's own wood-working blades, or others of similar design. Naturally it is imperative that wheel be kept in good condition to complete such work satisfactorily, but this is an obvious point, for no good work can be accomplished with a poorly-dressed wheel.



WOODWORKING KNIFE GRINDER

CIRCLE SKETCHING SCALE

By J. H. M.

How often has the draftsman, yes and even the machinist, not to speak of the humble apprentice, wished for some simple method to draw circles without the aid of a compass! Its hardly necessary to say quite often, for we have all been of the same opinion at times, when just as we wished to make a sketch, and did not have a pair of compasses handy, oh what a circle we made! I'll bet in some cases it looked more like a octagon than a circle.

The writer decided such a state of affairs must stop, and he got busy thinking up the matter with the result shown on accompanying sketch.

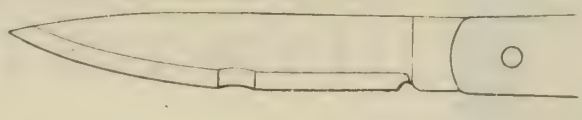
Making a board of 3/16-in. thickness, one inch width, and six inches long, he proceeded to drill small holes every half-

inch right down to centre as shown. He made these holes just large enough to allow the point of a pencil to go through.

At the first hole, namely A, he inserted permanently a graphophone needle, but left all other holes free. In use this board, or scale as we might call it, is indispensable, for to draw a circle, all that is necessary is to place the needle on the paper, place your pencil through the hole desired, and revolve the scale around. Result is a splendid circle at a moment's notice.

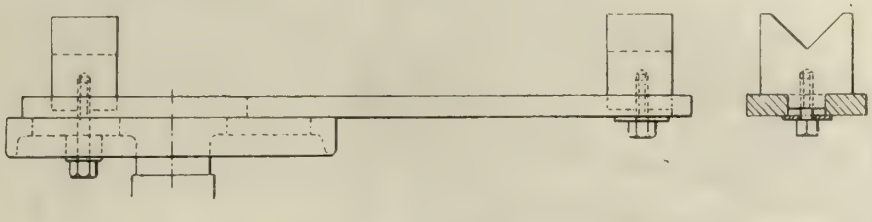
For example, we will suppose it is desired to draw a circle 5-in. diameter. Place pencil in hole No. 5, namely 2½-in. from the needle, revolve the scale, and there you are with your required circle in short order. Readers will do well to make one of these scales, for they can be carried in the vest pocket with no inconvenience, and are a handy thing to have around.

DRAFTSMAN'S KNIFE WITH DUAL FUNCTION

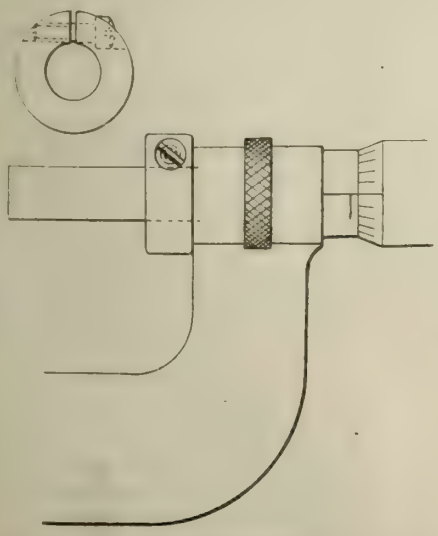


WHEN a knife is used for erasing, its edge needs to be kept in the finest condition in order to scratch out the lines with the minimum removal of material and risk of damage to the drawing or tracing. A device for securing this end is seen here, and consists in marking the halves of the blade by grinding out a slight concavity in the middle, and then using the outer half of the blade for erasing, and the inner half for sharpening pencils, etc. The concavity can also, if wished, be used for putting the finishing touch on the points.—FRED HORNER.

EXTENSION TABLE FOR SENSITIVE DRILLING MACHINE



THE extension table shown is designed to carry long spindles and shafts on the small round table of a sensitive drill, so that these can be held and steadied by the hand in the vee-blocks, without any necessity to clamp them down. It is necessary to do so if the weight of a spindle overhangs the table sufficiently to cause tipping. The extension consists of a slotted plate, carrying the vee-blocks by tongues in the slot. The outer block is secured at any desired position by the set-screw and washer, while the other block is held with a screw that also serves to hold the table down to the main one.—FRED HORNER.



STOP-COLLAR FOR MICROMETER SPINDLE

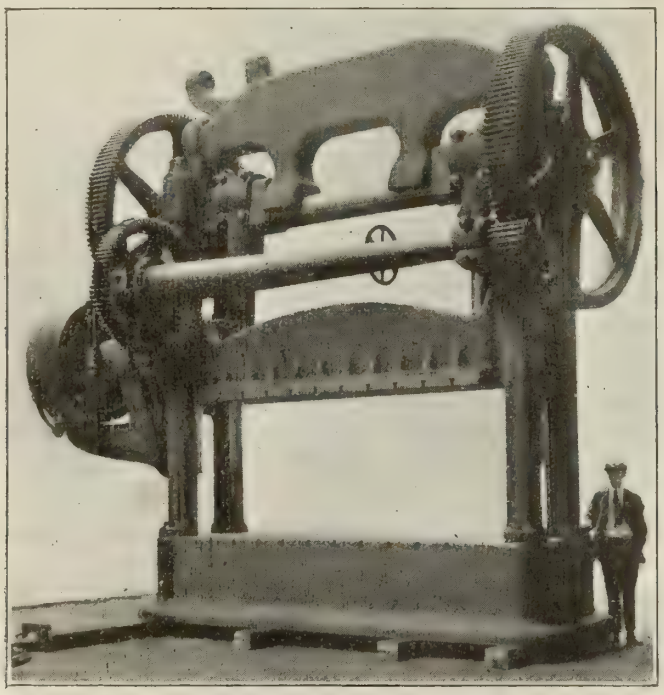
A GOOD deal of time is wasted when making repetition tests of mike dimensions, by the user turning the thimble back much too far each time, so wasting time and giving the eyes trouble in working back to the desired graduations. A means of avoiding this waste may be observed from the figure; a fibre collar is turned up and fitted with a screw to draw it tight round the spindle. This acts as a check after the thimble has been turned back three or four thousandths, and keeps it within sensible limitations.—FRED HORNER.

DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

LARGE PRESS

THE Ferracute Machine Company of Bridgeton, New Jersey, has built the press shown in the accompanying illustration. The machine is what is known as Press S507, designed for pressures up to 500 tons. The tensile stresses are taken by four 5½-inch steel rods that are shrunk in the cast iron columns. The ram has a vertical motion of 18 inches and makes between five and six strokes per minute. The distance between columns, right to left, is 148 inches, and from bed to ram at top of stroke and adjustment, 60 inches. Power is applied through the medium of a combined friction-clutch and brake, by means of which the operator is given complete control of the action, it being possible to start or stop the press at any part of the stroke—or, to run continuously—or, to have ram stop automatically at top of stroke each time.



LARGE POWER PRESS

Provision is made for attaching a motor-shelf at the top of the press.

Attention is called to the tapered back shaft, a construction which the manufacturers believe to be unique. The reason for having this shaft a large diameter at its driven end is to equalize the torsion so that both the large gears will be driven with equal pressure, tangentially, upon their teeth. This is accomplished by the short part of the shaft at the left being elastically twisted only to the same degree of rotation as is the long part at the right, which, if the shaft were parallel the whole length, would of course twist much more on account of its length than would the short section. As the torsional deflection of a shaft under stress is inversely as the fourth-power of its diameter, the proper amount of taper required to produce the desired result is easily calculated.

A method formerly used to insure equal pressures at the ends of the back-shaft was to place the driving gear in the middle of the shaft, but this involved a somewhat unwieldy outrigger or bracket to carry the journal box of the clutch-shaft and required great care in the mechanical operations when the press was under construction, it being essential that all the journals of the clutch shaft should be exactly aligned. Placing the gear at one end and giving scientific proportions to the shaft, obviates the objections mentioned. It also enables the clutch-shaft to be much shorter than by the old design, and uniformly of standard length.

The total weight of the press is about 137,000 lbs.

A POWERFUL ELECTRIC ROTARY SHEAR

The accompanying illustration shows an electric rotary shear, developed at St. Marys, Ohio, which does in one operation with one handling of the material work that has heretofore required several machines, some hand work and all the consequent handlings of material.

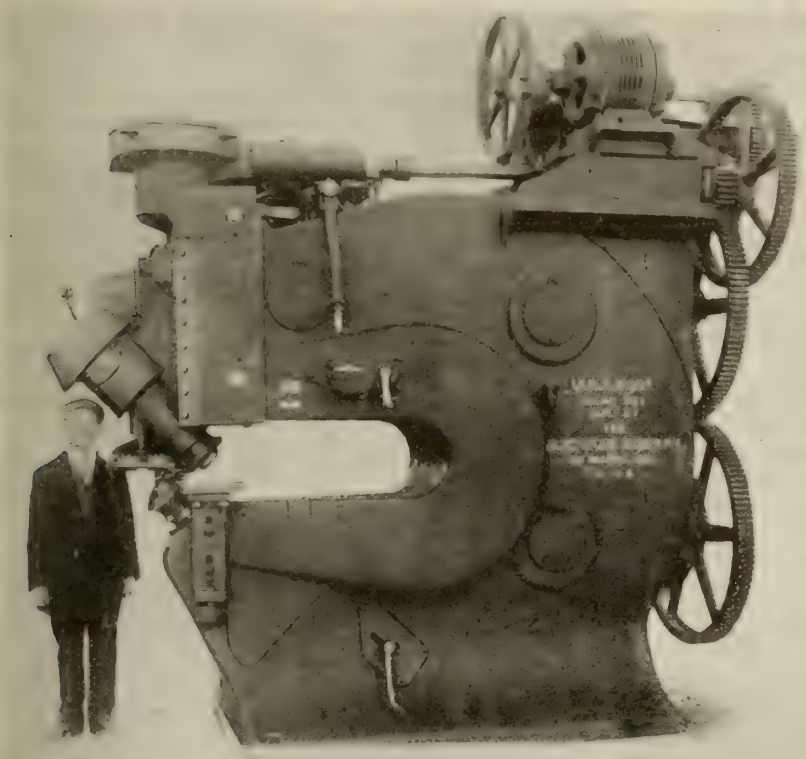
It is pointed out that no class of industries have grown and developed so rapidly as those using plate and sheet metal, but machines and methods for handling this class of work have not been correspondingly developed. The first and most important operation in the working of plate and sheet metal for any purpose is the cutting of it to the required sizes and shapes, and the ordinary methods of cutting are so slow, crude and inadequate that the need for improvement in cutting machines has become acute.

It is claimed that this electrically driven machine requires less metal, fewer men, and makes it easy and profitable to do work that it is not practical to cut by any other means excepting blanking dies in a press.

Metal is saved because in cutting a number of small parts from a large sheet, the parts can be scribed close together on the sheet, and the lines cut, the parts being finished at one passage of the metal, no allowance being made for roughing off and consequent wastage preliminary to making the finished cut as is necessary with old methods.

It is held that it will shear straight lines in a plate of steel quicker than older methods excepting a long-bladed squaring shear or gate shear that cuts the full length of the sheet at one stroke. As compared with cutting with the ordinary types of horizontal shaft vertical cutter rotary shears, attention is called to the fact that such shears

are almost universally made with but one speed and run very slowly. Curved lines can not be cut with them, and the cutters being large in diameter and straight-faced, it is extremely hard to guide the sheet on a straight line. If it is started the least bit out of line it is difficult to get back on the line and stay there, but with these electric shears



ROTARY SHEAR

the operator easily controls and guides the sheet, thus being able to cut rapidly and accurately.

It may be stated that each machine is provided with three different speeds, any one of which may be had instantly by the mere movement of a lever.

In cutting irregular work of very difficult pattern in large sheets merely throw the change speed lever over to low speed; gears are changed as quickly as gears are shifted in an automobile. In cutting work of medium character use the medium speed, and in straight work or easy curves use the high speed. In addition to the enormous advantage in cutting straight lines, it cuts serpentine and the most irregular zig-zagged shapes. It cuts openings of any shape without cutting it from side of sheet, and will cut an opening in one end of the sheet when the other end is too long to swing through the throat of the shear.

It will be seen that the sheet or plate to be cut does not have to be fed into the machine by a gang of men pushing and shoving as is necessary under old methods. Both cutters are driven, and the sheet is automatically drawn rapidly and continuously through the machine, cutting a square, true edge in one passage of the metal.—F.C.P.

NEW HEAVY DUTY GRINDER

The Grinder illustrated shows a new line of heavy type machine being put on the market by the Ford-Smith Machine Company, of Hamilton, Ontario. The machine and countershaft are equipped with Hyatt roller bearings, and the loose pulley is fitted with S. K. F. ball bearings.

The Ford-Smith Company have fitted ball and roller bearings in grinders for some time with great success. The saving shown against the renewal required in babbitted bearings more than warrants the extra first cost. There is a further and continuous saving in abrasive or polishing wheels from the fact that no looseness develops in the bearings as in the case of regular bearings, causing vibration and rapid and untrue wear of the wheel.

Over and above these considerations is the accuracy and rapidity of grinding on a close-fitting, true-running abrasive wheel. Specifications os the machine shown include, wheels size 20 in. diameter and up to 4 in. face, spindle 2 3-16 in. in bearings, distance between abrasive wheels 37 in.

The Ford Smith Co., of Hamilton, Ont., are also manufacturing a line of ball bearing polishing machines for both large and small work.

NEW HEAVY DUTY GRINDER

THE ELECTRIC WORKSHOP REPAIR TRAIN

Everybody has heard about the wonderful system of light railways which the British constructed for military transport in Flanders, but only now has information been made available about the repair trains which travelled backwards and forwards on these lines for the purpose of effecting repairs. There were six of these trains, each consisting of six vehicles, carrying electric generating plant and all necessary machinery. The cars were lit and heated by electricity. Owing to the narrowness of the gauge—just under two feet—the sides of the vehicles containing the generators and machines were divided longitudinally and hinged at the bottom and the top so that the lower half might form a platform and the upper part a canopy when the train was "in action." During bad weather tarpaulins were fixed to the canopies and completely screened the men from wind and rain. Excellent service was rendered in many parts of the front by these workshop trains.

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The Reasonable Plan

MEETINGS are being held at a number of points throughout the country trying to put into practice in Canada the provisions of the Whitley plan used in the Old Land to bring about better conditions in industrial life.

Hamilton has had several of these sessions, and those attending them are well pleased with the results. Of course, it is hard to measure these results until the time comes when they are put to the test of whether they will stand or not.

The idea is simple. There is no elaborate machinery necessary before going ahead with the work. It simply means that representatives of the employers and employees come together with the idea of becoming better acquainted with the business of each other.

At a meeting of employers there are apt to be statements made that are wide of the mark, and likewise at meetings of employees there will be addresses that exaggerate conditions to a great extent. But when the employers know their men are going to hear all that is said, and that they are certain to be checked up where they are wrong, and when the employees realize that the employers are going to be aware of what they have to say the chances are that they will be sure of their ground. It is a splendid method of putting the damper on wild statements that do much to excite anger and shove reason in the background.

The more the man in the office knows about the man in the shop, about his financial problems, about his aims and hopes, the more interest he is going to take in him. If such is not the case then that man should not be an employer of labor. On the other hand it is only natural to suppose that the more the man in the shop knows about the affairs of the firm, about the load that has to be carried and the risk assumed, the greater is going to be his interest in the affairs of that concern. Its success is going to mean his success, and its hard times will mean his hard times.

Fortunately the days are slipping away when we can read of firms that refuse to meet with a deputation from their shops to hear any grievances adjusted. Too often such deputations have been informed: "There is nothing to arbitrate or discuss." The inevitable result was a strike of a lockout.

Getting together should be able to establish the fact that the man in the shop is not running around all the time trying to get his hand in the boss' pocket, and it should also make it certain that the man in the office is not out to road roller the employee and squeeze him down to the last end. The idea is right and good.

More power to the scheme and more success to the men who are getting this sane and reasonable view of the relations that should exist between the employer and his men.

The Future Fuel

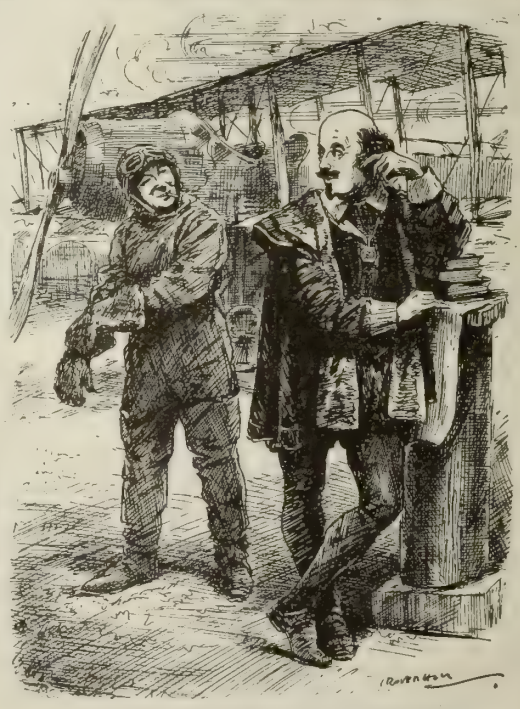
A COUNTRY rich in water power will have an enormous advantage over those not so fortunate when coal becomes scarce in the distant future, but waterpowers in themselves will not be able to supply the demand for energy and other sources will have to be called into play. The power of the wind and tides might well be used and greater than these, solar energy. The deserts of the tropics will become vast power generating areas and possibly manufacturing centres drawing their raw materials from the near-by countries.

One other form of energy which may become available in the dim future exists in all matter and the possibilities latent in the atom made known to us through radio-active substances are vast indeed but almost hopeless in accomplishment so far as the present is concerned.

The problem of the world's future supply of energy is a fascinating one in many ways and it is altogether likely that before a great many years it will become more serious than fascinating.

The coal resources of the world are by no means inexhaustible and in fact are being rapidly depleted in many areas at the present day. Our present methods of using coal are wasteful in the extreme and it is only a matter of a few years probably until enormous steam plants are established at the mines in conjunction with coking plants wherever possible. Our methods of heating will likely undergo considerable modifications also and the central heating plant will likely be quite common. This plant will also squeeze the last mite of power out of the fuel before turning the steam into heating mains. The present trend in steam power plant design clearly indicates that much higher steam pressures will be in common use before long, that is pressures ranging from 300 lbs. to 750 lbs., or even higher.

PUNCH, OR THE LONDON CHARIVARI.—JANUARY 22, 1919.



THE NEW COMMERCIAL TRAVELLER.

PUCK, R.A.F. (to SHAKESPEARE). "YOUR IDEA OF A GIRDLE ROUND ABOUT THE EARTH IN FORTY MINUTES IS A BIT TALL; BUT YOU BET YOUR IMMORTALITY WE SHALL GET AS NEAR IT AS WE CAN."

Too Much Discussion

THE amount of talk that is going on regarding the bringing down of prices of basic materials is not doing any good as far as immediate business is concerned. For some weeks the United States authorities have been discussing the Bedford plan for moving to lower levels.

It is openly stated that lower levels for iron and steel will come. The result is so plain that it hardly needs to be stated. Buyers are staying out of the market until the promised reductions are made. If they are buying at all it is only for immediate needs and because they see a chance to pass on the higher priced material to the consumer.

It is a serious matter to delay and discuss too long about these matters. If price reductions are to be made they should be made definitely and for a period of some reasonable duration.

The market at present lacks assurance, and until that is given purchases will be made on a stingy basis.

Discussing this matter, one of the best informed steel men in the Dominion stated to CANADIAN MACHINERY:

"Confidence is all we need to start a buying movement; and such a condition was being slowly created until Redfield started his movement along the lines of lower prices. This immediately created a mental attitude lacking confidence, and it matters not what price they may now set, it will again take a period of time before confidence is sufficiently established to bring out any business. In other words—a new mental attitude must be created.

"Instead of preaching lower prices, we should be prosecuting a campaign of education along opposite lines. In other words—it is up to all public men, editors and politicians included, to preach the logic of present conditions, and try to establish in the minds of the buying public that a return to old-time conditions is out of the question; that present prices are the logical ones, as they are in keeping with the wages being paid and demanded, and along these lines we have not reached the limit by any means. Wages are not going to be reduced before being still further advanced. This will be brought about chiefly through a reduction in working hours.

"Prices at present on all commodities, while appearing high, are no higher in proportion than they formerly were. All things are relative, and after all is said and done, it is the buying power of the dollar that is the real basis of the argument. What difference does it make if my living expenses are $10,000 and I earn $10,000.00, as against a living expense of $5,000.00 if I only earn $5,000.00? In the former I at least have the satisfaction of spending a greater amount.

"The man to-day who is howling for low prices is a one-eyed individual, the other eye being blind to his own interests and, in consequence, is trying to bring about an impossible condition. In other words—he wants low prices to apply on that which he has to purchase, but he is not willing to accept, neither does he anticipate, a lower income. If he would only open his blind eye and give the matter a little serious consideration, he would realize that all things being relative if prices of commodities are extremely low, these low prices must be based on a low cost of production, and as wages represent a very large proportion of the cost of production, they must necessarily be reduced, which would be bound to affect his income. The low-price exponent—in my judgment—is a pest and, worse still, he is selfish, and this he reflects in the breadth of his vision, which does not extend any further than the brim of his hat. He can be found in high positions, often in the capacity of an official buyer, who howls from the housetops like a parrot, "Your prices are too high." He makes this statement without rule or reason, and his limited vision fails to carry him to the point of realizing that we who are trying to maintain the present price level are really holding an umbrella over his head and protecting millions' of dollars' worth of stocks that at present are lying in his and other warehouses all over the world. In other words: if we were to comply with this type's wishes and establish a price on iron and steel products about where he, with his limited vision, would consider buying possible, it would automatically establish a price, which would determine the value of iron and steel stocks all over the world, and he, among others, would have to take their losses. It is amusing to know that when you point this out to some of them, they crawl into their shell."

How Much Has Living Increased?

IT may be that no good purpose is served by references to the high cost of living. The joker has tried to explain some of it away by referring to the cost of high living. Well, allow for all that and you will find that there is still a big gap that has not been accounted for. There are individuals and families with very conservative tastes, and they find that they cannot stretch the family purse to meet the demands that are being made upon it.

The National Industrial Conference Board of United States has issued a most comprehensive resume on "Wartime Changes in the Cost of Living." Conditions are much the same in the United States and Canada, and findings made there will have a very direct bearing here.

Taking the matter of food prices, the board states, "The National Industrial Conference estimated that between July, 1914, and June, 1918, the cost of food to the average wage-earner had gone up 62 per cent. Starting with an average of 100 per cent. for the year 1913, the highest increase is found by comparing November of 1913 with November of 1918. By months it looks like this:

	1913	1918
January	98	160
February	97	161
March	97	154
April	98	154
May	97	158
June	98	162
July	100	167
August	101	171
September	102	178
October	104	181
November	105	183
December	104	...

The matter of rents, etc., show large increases, but conditions are so different in this respect that it is not possible to draw comparisons that serve any good purpose.

In wearing apparel very careful budgets have been made up, and the results are well worth noting. Taking the man's budget, for his outfit in 1914 and 1918, the finding is that in the former year he had to spend $58.70, while in 1918 he would have to pay $111.70 for the same articles. Women's clothing is treated in the same way, and in 1914 the cost was $58.15, while in 1918 the cost of these same articles had risen to $109.40, or an increase of 88.1 per cent.

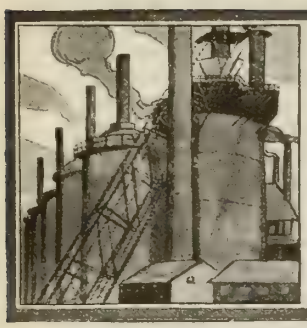
Under the heading of fuel, heat and light, a number of tables are presented, but the result of all can be gathered in the statement, "The increase in the cost of fuel, heat and light combined, between July, 1914, and November, 1918, is placed at 55 per cent."

Summing up all the findings, the Board puts its seal of approval upon the following estimates of increases:

Food	80 %
Shelter	20 %
Clothing	93 %
Fuel, heat and light	55 %
Sundries	55 %

Bringing the above to an average, the figure found is 65.9%, which can be taken as accurate.

Our idea of ambition is a chap with no ear for music commencing to instruct himself on the use of that implement commonly referred to as the trombone.



MARKET DEVELOPMENTS

Price Reduction Talk Having Bad Effect

It is Causing Prospective Buyers to Stay Out of the Market—Something Definite in the Matter of Price Cuts is Expected to Come Out About the First of April

THERE is a belief in certain sections of the steel and iron trade, and it seems to be fairly well founded, too, that the talk about price reductions coming is being carried on at too great length. It can have only one effect, that of holding back purchasing. There are firms to-day who would order one hundred tons of plate, for instance. They have the work to guarantee it. Instead of making it in one purchase, however, the policy is to let the mills have only twenty or so tons at a time, in the hope that at least a large portion of the order will get the benefit of whatever reductions may be made. It is also worth noting that as low as 2.85 per pound has been quoted at an American point for a fairly large sized order of plate. April 1 seems to be the date at which all agree something is liable to come out in regard to a new schedule of prices.

The scrap metal market continues dead. Dealers apparently have not the heart to come out and batter down the price lists to any lower level, although they could apparently do it. This market, it is expected, will improve when iron and steel come to levels where buying will commence. The two markets are very closely allied, as the scrap is needed as soon as the foundries begin taking on any very large tonnages of pig for actual use. As soon as price matters are settled there should be a lot of business moving in Canada, as stocks are low and demands will be heavy.

Many of the machine tool dealers are now getting stocks that have been off the market for some time, owing to the factories that made them being engaged on munitions. Some of the builders also find that they have in their shops the "makings" of very heavy machines that were used primarily on certain operations in gun work. Very large gap lathes, for instance, are being offered direct from the mills at a considerable reduction on the usual price, and as one of these machines is apt to be an $8,000 undertaking, a discount of ten or fifteen per cent. runs into some real money.

The bulk of the business that has been passing in machinery since the first of the year has been in rebuilt material. Some of the men in the business are showing considerable ingenuity in remaking war shop machines. In one place by a very simple contrivance a cutting-off machine, purely a war shop proposition, has been remade into a turret lathe.

Although there is nothing positive to go by, the rumor persists that higher prices will be asked for drills, taps, reamers, etc.

SOME ADJUSTMENTS HAVE ALREADY BEEN ALLOWED TO MONTREAL SHOPS

Special to CANADIAN MACHINERY

MONTREAL, Que., March 20.—Readjustment is gradually taking place among the industries in this district, and some of the plants that were engaged in the making of munitions for the American Government have had a settlement of account, while others are nearing the point where final adjustment will be made. Much of the machinery that has seen war service has been disposed of, considerable going to buyers in the States, while others have been dismantled and utilized as scrap. Plants having a foundry in connection with the business have used much of this scrap for the making of new castings. A large quantity of equipment, however, is still piled in parts of many of the old shell shops. General machine-tool business is not active but a steady trade is being carried on and dealers appear satisfied with the present demand. The metal situation shows little change and business is steady but light in character. Steel business is rapidly returning to a competitive basis but poor demand is still a factor. Old material is particularly quiet and weakness is a feature.

Marking Time in Steel

Interest in steel circles is still centred in the probable outcome of the conference to be held this week between the producers and the American Government representatives, when it is expected that action will be taken, through which the basis of steel operations will be adjusted to meet the desires and requirements of general business. The feeling appears to be that some concessions will be made whereby reduced prices will be established for some of the leading lines, but nothing definite will be announced until after the meeting. Present production costs, as stated by a dealer here, will be an important factor in adjustment to lower levels, and if reductions are the outcome, steps will undoubtedly be taken to adjust wages to meet the new conditions. Dealers here are marking time, intimating that revisions will likely follow any price changes in the States. Business here is steady, immediate requirements absorbing the bulk of the demand.

Further Decline in Metal

Trading in metals is still of a very quiet character, little activity being reported. Dealers intimate that copper is showing slight improvement in the States but believe that it is only of a transient kind and that weakness will follow. The poor demand here has resulted in a lower scale of prices, and the quotation of 19 and 20 cents shows a decline of 1 cent per pound. There has been little extra demand for tin, but trading is fairly steady but comparatively light; price is maintained at 58 cents per pound. No improvement is shown in spelter and consumers apparently are

not interested; this week's quotation of 9 cents represents a decline of ¼ cent per pound. Conservative buying is reported in lead, with prices firm at 7½ cents per pound. Antimony is quiet on poor demand and prices are slightly shaded, the quotation this week being 8 cents per pound. Aluminum is quiet and unchanged.

Better Inquiry Developing

It cannot be said that operations in the machine tool trade have shown any greater activity, nor can it be said that dullness prevails. Demand is not marked, but business is of a steady character, considering present unsettled conditions. Some dealers report a better inquiry and intimate that new departures are contemplated by some firms, but what lines are under consideration are being kept comparatively secret. It has been stated that one large firm here is going into the manufacture of farm tractors, but they are still negotiating with the U. S. Government respecting settlement of munitions contracts. Several inquiries are announced regarding certain tools for this particular firm. Disposal of used equipment is still a factor here, and there are few firms in the district but what have tools for sale, but no extraordinary effort is being made to force these on the market. Sales of second-hand machine tools, suitable for general purpose work are still being made to small buyers for use in country repair shops. Supply demand is well maintained and is a substantial factor in stabilizing a period otherwise remarkably quiet.

Scrap Trading Almost Stopped

"The market has been very quiet during the past week; in fact there has been practically nothing doing whatever. The prices you now quote might be shaded a little but they may as well stand as they are, as we are not anxious to take any more material into the yard unless we are assured of an immediate sales for the same, and with the demand almost negative, this is very improbable." This statement from a dealer here sets forth the stagnant condition of the situation, and few will advance an opinion as to the early future prospects.

"Industrial developments are taking place slowly and demand for old materials is contingent on business expansion," remarked one dealer; "we are in hopes that prices will remain firm, but the tendency is for further weakness." Prices here are not changed and could be considered as figures the dealers are willing to pay for material, delivered.

POINTS IN WEEK'S MARKETING NOTES

American steel mills are trying to keep their rollers going at a high rate to keep production costs down. Meanwhile some of the sales managers are beginning to face a real problem in what to do with the stuff.

—

The business of price-deflation is going to be gone ahead with as soon as the details can be worked out. The last meeting of the steel interests was interfered with by the absence, through illness, of Judge Gary, of the Corporation.

—

The belief becomes more general that were a good-sized order for pig iron to come into the market in the big centres that the price would be reduced to meet the situation. Some No. 2 foundry iron has been sold at $28, which is $3 under the recognized level of the market at present.

—

Opinion seems to be growing that there is going to be no glutting of the labor market for a long time to come. Many foreigners are already going back to Europe, and there was a large exodus of them before and during the war. Added to this there is a decided tendency on the part of the United States and Canada to restrict immigration.

—

Dealers in Toronto hear that a price as low as 2.85 has been given for a good-sized tonnage of steel plate and there is a decided tendency now to order very close to the actual needs until something definite develops.

—

Machine tool builders are in a position now to give a much better delivery than formerly, and they are coming into the market again with lines that have been off since the manufacture of munitions was started.

FEEDING ORDERS OUT IN SMALL LOTS NOW

Because it Seems Likely That Lower Prices are Coming Around April 1

TORONTO.—Dealers in machinery are of the opinion that they are approaching the state where the sale of new machine tools will commence. For some weeks past there has been, in the metal working industries, a fair demand for equipment, but it has been drawn largely from the used machinery classes, and there have been some good purchases made. This class of trade has been good.

The scrap metal market is just in the same stagnant position. There are no sales worth recording. Rumors are still going around to the effect that higher prices are certain on machine supplies, especially for such material as high-speed taps, reamers, cutters, etc.

Holding Back Now

Customers are not buying any more material than they have to from the steel people. They are feeding out their wants in very small lots and they are not going to be budged from this attitude until some very definite announcement is forthcoming regarding the future prices. It is almost certain that no announcement will be made before the first of April. In fact mills that handle a lot of Canadian business have given their agents here every assurance that they will not make any move until the first of April. That may apply in a broad sense, but it is known to a good many in the business that shading in prices has been going on for some time, especially if there is anything that looks like a fair-sized tonnage on the horizon. Advices from some of the American markets bear out this same thing, one of the items being that this week a price of 2.85 has been quoted on plate, which is a departure in itself of $3 per ton from the recognized figures of the market.

Some of the mills know very well, too, that warehouses and large buyers are not sending on their usual stock orders. They are holding them back. Here is how it works out in the case of one of the large boiler shops that is busy now. They have an order in for about one hundred tons of plate and depend on the warehouses to get the best possible treatment for them. In order to keep the shipments coming that they must have, an allotment of 25 tons has been placed at 3c, while the rest of the order is being held up until the first lot is worked out. In this way it is expected that they will be able to get the advantage of a rate under 3c on at least half of this business. Mills at United States points are anxious to get business now. They want to keep going in order that their overhead charges shall not run away with them. To do this they are willing to take on Canadian business now and give the buyers the advantage of any reductions that are made on or around April 1. Warehouses look for a lot of business soon. One of the dealers stated the CANADIAN MACHINERY: "As soon as things settle down a little more there should be a lot of good business moving. The material is wanted and the stocks are very low. We are looking for better times in the weeks to come."

The Machine Tool Trade

Makers of machine tools are clearing out their stock after the rush of war work is over. They find in many cases that they have material in hand for turning out machines on quick delivery, naming a shipment date in many cases of not over two weeks from the time of order. For instance, one well-known firm have the "makings" on hand for ten big lathes, 42 in. x 34 in. There is of course a limited demand in this country for such machines, and the chances are that they were undertaken in the first place for gun work. Other machine tool builders were forced to drop certain of their lines during the period of the war. Circulars coming to Toronto dealers this week announce that bevel gear-turning machines which were popular with one firm, are again to be had. They are particularly applicable for the manufacture of differentials for auto use.

There are signs of an active campaign being undertaken on the part of several large firms making machine tools looking to more rapid selling of their product. The firms are working for the

most part on stock, and actual business placed is rather light.

The supply departments have no intimation of change in prices, but it is persistently rumored that higher figures are going to be asked for high-speed lines of reamers, drills, cutters, etc. The claim is made that right now these are being sold in Canada for prices below those prevailing in the United States.

The Scrap Metal Market

Dealers have no changes to suggest in the price lists this week. Apparently they have not the heart to get out and slug the values again or attempt to beat them to any lower levels. On the other hand there is nothing to indicate that lower levels will not be reached. The one thing that can help the situation is a period of buying, and that is not likely to take place until manufacturers come heavily into the market for pig iron as well as scrap.

The American market at the present moment is not of much use as an outlet for material that gets piled up in the yards on this side of the line. In fact it is a long time since there has been any success attending the efforts to trade across the line.

SALES MANAGERS WONDER WHERE THEY CAN DISPOSE OF THE OUTPUT

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., March 20.—As noted in last report the steel industry in February operated at the surprisingly high rate of about 84 per cent. of capacity. Operations have of course been tapering off, but they may be estimated this week at fully 75 per cent. of capacity. Some of the plants are aiming to run full, so as to keep down overhead and operating conditions prove so favorable that tonnages are large. This is advantageous from the cost standpoint but it is somewhat embarassing, particularly to sales managers. The only mills that can do this, of course, are those that are in position to stock a portion of their output, but some mills that have storage facilities do not use them.

Steel Corporation Obligations

It is strongly intimated in well posted quarters that the Steel Corporation, whatever may be the case of the independents, is fairly well fortified to run at a moderate rate for several months to come, on its old orders. It is asserted that all the cancellations necessary by reason of the war ending have now been made and that the monthly report of "unfilled tonnage" will no longer reflect any such cancellations. If all is true the corporation is in distinctly stronger position than the independents. Its last report showed that at the end of February there was 6,010,787 tons of unfilled obligations on books. There had been a decrease in three months from the 8,124,663 tons reported at the end of November, or a trifle over 2,000,000 tons. One would have supposed, last November, that the ending of the war would cause the cancellation of about one-quarter of that tonnage, but such a tonnage would represent approximately the total decrease that has since occurred. If one accept such a view, therefore, he has to admit that the new bookings in the three months were about equal to the shipments, which may be estimated at 3,500,000 tons. That any such high rate of booking actually occurred, however, is very doubtful, considering how very dull the market was reported to be during much, if not all, of the period.

Meeting Postponed

The trade has expressed much regret at the postponement of the meeting that was to have been held March 13 between the Industrial Board and the general committee of the iron and steel industry. Hopes had been entertained that at this meeting a basis for price deflation would be reached so that the iron and steel trade, buyers and sellers, would have an opportunity to go ahead. The postponement was due to Judge Gary's illness, his presence being regarded as absolutely essential on account of his recognized fairness and his ability to detach himself from personal and immediate trade interests. The Industrial Board, however, has evinced no impatience at the delay, and indeed has made the statement that it expects to get through with its price deflation work in 60 to 90 days, this including lumber, brick and various building materials, besides iron and steel.

Markets Dull

The pig iron, unfinished steel and finished steel markets have been particularly dull in the past week and indeed in the past fortnight. It seems that while all buyers had previously been pursuing a hand to mouth policy in buying, they were able to display fresh powers of waiting when it became apparent that prices would probably be reduced, and materially reduced, by April 1 if not sooner.

In the case of pig iron there is not enough inquiry to test the market, as a rule. In many quarters it is believed that all that is needed to bring down the price of a given grade of pig iron in any district is for a fairly good sized order to be offered to producers, whereupon one or another would cut the recognized price. Such inquiry, however, is lacking, save for occasional exceptions. As noted in last report, some valley furnaces had quoted $28 or less at furnace for No. 2 foundry iron, or $3 a ton under the previously recognized price, and making foundry iron quotable at $28, valley. Meanwhile, however, nothing has occurred in Bessemer or basic in the local market, and these grades are still quotable nominally at $32.20 and $30 respectively, at furnace. Reports from Chicago, however, are to the effect that a sale of a good sized tonnage of basic iron was made at $25, Chicago furnace, or $5 a ton under the previously recognized price. The story is that the buyer is a wire interest, with steel mill but no blast furnaces, so that it was able to offer an order of tonnage importance.

In finished steel products there is not enough business going to test prices, but it is commonly assumed that the mills, save in exceptional cases, would not cut prices in order to obtain business, as such a procedure might interfere with the price deflation program that is to be carried out in connection with the Industrial Board at Washington. Naturally it is greatly desired that when prices are reduced the new reduced prices shall hold well. There are of course some exceptions, it being reported, probably correctly, that plates have sold at $2.85, Pittsburgh, that being $3 a net ton under the recognized quotation.

Improving Sentiment

While steel producers are usually quite blue when they are not effecting large sales and the mills are not falling behind in deliveries, there is a greater note of hopefulness among producers, and as to buyers they are not pessimistic by any means. Some are now found who assert positively that they are prepared to place good sized orders if there are reasonable reductions in prices. It is now felt in many quarters that the bearish sentiment has run altogether too far, that the country has been disposed to cry out before it was really hurt, and that with a moderate amount of readjustment in prices business can be resumed on a good scale. One impressive fact is that the country has been taking so much steel since the armistice was signed, when apparently there was little consumptive demand. If so much steel is required when there is little activity there ought to be much more needed when business conditions are really good.

There is much less talk than formerly about the necessity for wage reductions and indeed it is far from probable that there will be any general wage reductions in the next few months. Indeed, the idea in some quarters is that by reason of four years' cessation of immigration already, with no prospect of its being resumed and rather with prospects that possibly a few hundred thousand workmen will leave the country to join the new republics being set up in the interest of their races in Europe, labor will be able to command very high rates right along. It is admitted with somewhat more frankness than formerly that manufacturers' war time profits will have to be greatly reduced.

As to labor, furthermore, there has been a great improvement in that labor is much more efficient. Better work is being secured for a day's pay, and various frills, premiums, etc., are being cut off here and there, so that while general wage rates have not been reduced, labor costs have shrunk very materially at many plants.

AMERICAN FIRMS ARE SHADING PRICES

And There is a Gradual Improvement in the Machine Tool Market Now

Special to CANADIAN MACHINERY

NEW YORK, March 20.—There is a gradual but steady improvement in machine tool business. In fact, the amount of business being placed in some lines is quite surprising, even to the machine tool builders, who had not looked for any great amount of activity by this time. Some of the leading plants have a great deal of work on hand. A company making milling machines, for which there has been an exceptionally good demand, is working a night shift. Builders of gear cutters and gear shapers have also had a good business.

Prices on machine tools, traveling cranes, locomotive cranes and other machinery are being reduced, some lines showing more of a reduction than others. Builders of planing machines have announced a formal cut of about 20 per cent. Concessions of various kinds are being offered by tool builders to get business even where formal quotations have not been changed. On traveling cranes there have been reductions from a war basis of from 25 to 50 %, and on locomotive cranes the reductions vary from 20 to 25 per cent.

Doing Buying Now

New business is coming along in fair volume in the New York market, though general conditions are and have been for some weeks better in Chicago, Detroit and Cleveland than in the East. A Swiss concern has issued a large list of equipment, 100 or more tools, for a plant to be built in the East for making knitting machinery. The Crucible Steel Co. of America has bought a list of machine-shop equipment for machining forgings at its Harrison, N.J., works. The E. W. Bliss Co., Brooklyn; the New Jersey Zinc Co., New York, and the F. L. Schmidt Co., New York, are in the market for some new equipment.

The Navy Department is continuing its policy of expansion and is calling for bids on about 50 tools for the Norfolk Navy Yard. Bids will be opened in Washington, March 25.

War Tools Coming Out

The machine-tool trade has been waiting with interest and some apprehension the release upon the market of large quantities of new and second-hand tools from war plants. In the middle West the equipment of several plants has been absorbed by dealers and put on the market without a great deal of disturbance to general business in new tools. The first really large list in the East has been issued by the International Arms & Fuse Corporation, Bloomfield, N.J., which was engaged in shell and fuse work during the war. This list consists of hundreds of tools, many of them practically as good as new. They are being offered to dealers and others. Other lists of tools are being offered by the New York Air Brake Co., Watertown, N.Y., and the H. H. Franklin Mfg. Co., Syracuse, N.Y. The latter concern had just concluded a large contract for airplane engine crankshafts when the war ended and had a great deal of new equipment on hand, some of which has never been uncrated. The Franklin Company bought this entire equipment from the War Department at 60 per cent. of its invoice price, and is now reselling such tools as it does not require for its own plant.

The New York Air Brake Co. has announced that it will manufacture motor trucks for another company. Its present equipment will be suitable for this work.

The French High Commission has placed a number of orders in New York for tools to be shipped to France for reconstruction work. Its list calls for about 150 tools, which will all be bought within the next two or three weeks.

The National Machine Tool Builders' Association will hold its annual spring meeting at Atlantic City, N.J., on May 12 and 13.

LOWER IRON PRICES WILL HELP THE SCRAP METAL SITUATION IN U.S.

ALTHOUGH a great deal of difference has not resulted, there is a feeling in many points in the United States that the scrap metal situation is very much improved. In several of the leading lines there is a shortage at present and it requires only a very little demand to start the prices on the upgrade. The Canadian conditions are no better than reported last week. The following reports show how they are standing at present:

CHICAGO.—The feeling is noted in the market here, and several dealers who have had to apply sales on orders that were booked for quick delivery find that they must pay the advance price to obtain the necessary material. Right now No. 1 cast scrap is scarce and is selling much higher than heavy melting steel, which is a most unusual situation.

NEW YORK.—Prices here are holding steady and several dealers report that sellers are much less inclined to accept offers for their holdings than for many weeks past. A big sale of cast steel shells was put through a few days ago, the deal amounting in all to 1,300 tons of the 12 inch kind.

PITTSBURGH—A very small amount of cast scrap has been offered and probably on account of this the price has started to go up, particularly as there is a better demand for it just now.

PHILADELPHIA.—The purchases of iron and steel scrap continue to be very small. There seems to be a feeling around the market here that the prices have gone down as far as possible but of course there is nothing to indicate this to any degree of certainty.

CLEVELAND.—A rather unique way of looking at the prices of iron and steel has been advanced by some of the dealers in the scrap market here. They hold that as soon as reductions are made in the price of pig iron that there will be better times ahead for the scrap metal markets. The reason they advance for this is that price reduction will stimulate buying of iron and of course that will mean more scrap needed to use in mixing purposes. Cleveland's scrap prices have not changed during the week and many of the dealers state that it is not possible for them to go any lower.

BUFFALO.—There is a decided improvement in the tone of the scrap metal market here this week, and the view is taken that as soon as there is a reduction in the price of pig iron that matters will be much better. In fact the belief is common here that if buying is resumed with pig iron selling around $26, the price for heavy melting steel should reach from $19 to $20 per ton.

ST. LOUIS.—One thing that is holding up the trade here at present is that the Steel Mills are not in the market as purchasers. In fact many of them are seeking to cancel the contracts they have already made. Some of these mills have very large accumulations of material in their yards at the present time, and they are not desirous of stocking up with material that is liable to go to a lower value.

CANADA LOSES BY NOT HAVING SHIPS

Ships Transferred During the War Should be Returned to This Country

London.—It is not probably appreciated in Canada that just about one-third of the fifty million dollars credit established for Canadian supplies to France and Roumania will go to British shipping interests. In transferring goods from Canada to these countries, pointed out E. M. Macdonald, former member for Pictou, in an interview, this great proportion of the profits will be lost to Canada through our not having ships. With Mark Workman, president of the Dominion Steel Company, Mr. Macdonald is in England trying to secure five of the eight ships belonging to that company which were taken by the British Ministry of Shipping during the war. Three have already been returned.

U. S. Gets Our Trade

Before the war the Nova Scotia coal mines had the whole of the St. Lawrence market shipping, amounting to two and a half million tons a year. When the ships were given over the United States mines supplied this market and are still supplying it.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00
Toronto price:—	
Silicon ..2.25% to 2.75%	$37.00 to $40.00

Government prices

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	6 00
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 75
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	9 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Steel bars	4 75
Small shapes	5 00
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$20 00	$ 22 00
Electro copper	19 00	22 00
Castings, copper	19 00	20 00
Tin	58 00	62 00
Spelter	9 00	8 50
Lead	7 50	6 50
Antimony	8 00	8 50
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 5 50	$ 5 50
Plates, 3-16 in.	5 75	5 75

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	15 00
Copper wire	13 00	15 00
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	8 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 00	9 00
Shell turnings	6 00	6 00
Boiler plate	12 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	5 00
Stove plate	14 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	**10**
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd. brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

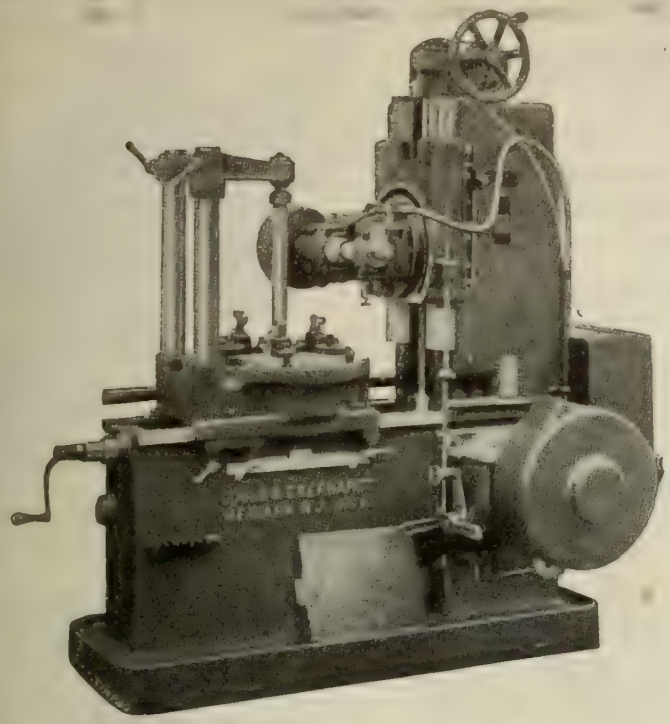
Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net



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For cutting Spur, Helical and Worm Gears up to 120" dia. Also

Multiple Spindle, Continuous Operation Automatic Roughing Machines for large production.

Put your gear-cutting problems up to us. Catalog on request.

Write for prices and deliveries.

A. R. Williams Machinery Company, Limited

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If It's Machinery, Write Williams"

64 W. FRONT STREET
TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

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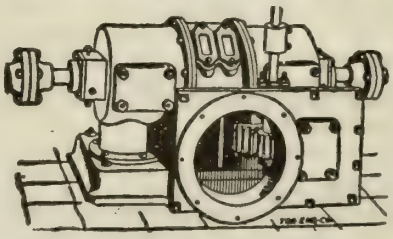
WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 6 50
Sheets, black, No. 10	6 50	6 00
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$28 00	$.....
1¼ in.	32 00	.....
1½ in.	35 00	28 00
1¾ in.	35 00	28 00
2 in.	40 00	28 00
2¼ in.	43 00	30 00
2½ in.	45 00	35 00
3 in.	52 00	40 00
3¼ in.	.....	47 00
3½ in.	62 00	48 00
4 in.	70 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

White			Cts. per lb.
XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

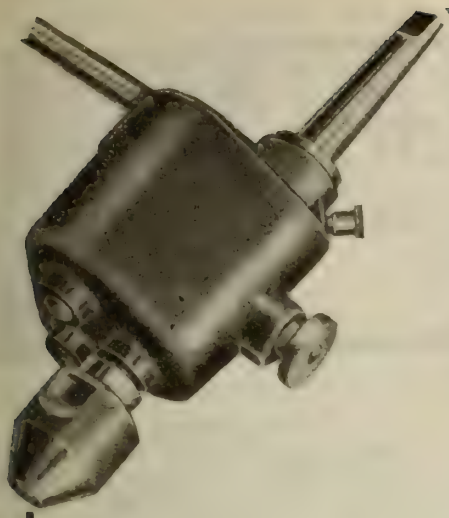
	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$10 25
Sheets, 3½ lbs. sq. ft.	10 00	10 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	9 75

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.



Something New in a Tapping Device

The only Tapper that has the Oscillating Motion, Imitating the Hand Motion, but 10 times as fast.

Now mecanical tapping is a demonstrated success. In hundreds of plants slow and costly hand-tapping is a thing of the past, for used in these plants is this

Wahlstrom Attachment

Aikenhead's

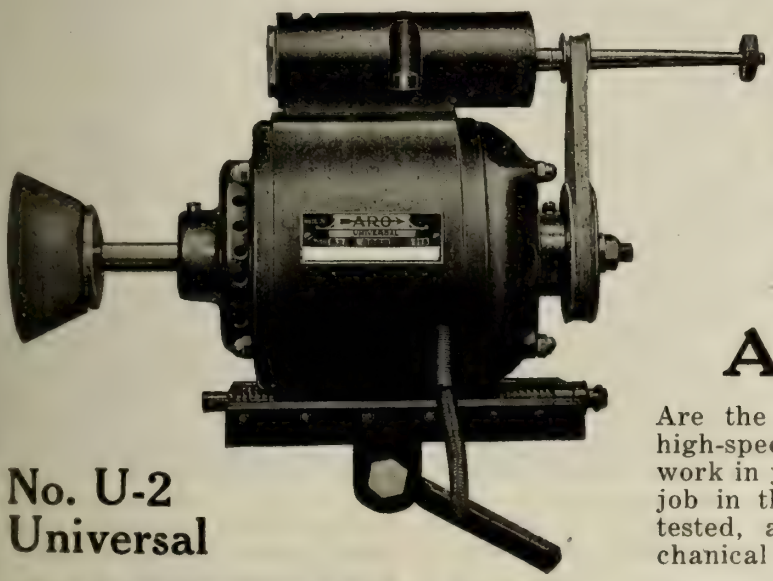
This Automatic Wahlstrom, attachable to every type of drill press, will tap holes as squarely as they could be drilled. Controlled by the average operator, it will tap 10 times as many holes as an expert hand-tapper. Its mechanically obtained oscillating movement imitates hand-tapping at 10 times hand-tapping speed—and it actually reduces tap breakage.

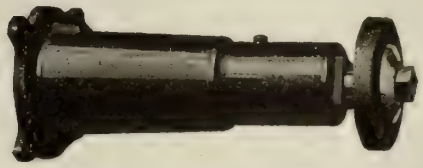
Nothing about this Attachment can get out of order. Parts are hardened and ground steel. It takes taps of all sizes up to ½-inch.

Send to-day for Bulletin.

AIKENHEAD HARDWARE LIMITED

17, 19, 21 Temperance Street - - Toronto, Canada





Aikenhead's

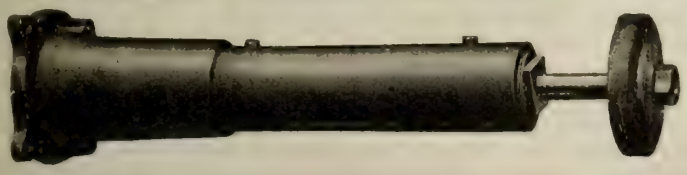
Aro Grinders

Are the most powerful, dynamically balanced, high-speed Tool Post Grinders you could put to work in your plant. They will handle almost any job in the largest shop. Thoroughly tried and tested, and absolutely guaranteed against mechanical and electrical defect.

In Aro Grinders you will never find either end play or vibration. The use of an Aro with Extension Arm Attachments would both improve and speed the work of your tool room.

No. U-2 Universal

Making ring and plug gauges, all styles of limit gauges, this Grinder accomplished what more than one user has designated "wonders." Used for lapping and finishing purposes it has proven itself to have no match.
It develops 1/3 H.P. and has an Armature speed of 10,000 R.P.M. and an "A" Arm speed of 30,000 R.P.M.

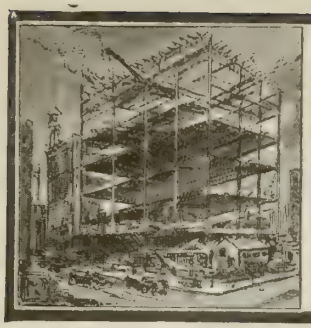


Just send for Bulletin.

Aikenhead Hardware Ltd.

17, 19, 21 Temperance Street

TORONTO



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

THE INDUSTRIAL NEWS OF MONTREAL

War requirements have materially assisted in the development of the mining industry of the Province of Quebec. It is very well known that the province is not a favored mineral region, but necessity knows no law, and the past four years has shown substantial increase in general production. The general run of mineral ores are low in grade or in small or isolated deposits, that their extensive development is not at present profitable. The three leading products are asbestos, copper and sulphur ore, and cement. The total value of minerals mined in 1918 was nearly 19 million dollars, this representing an increase over the year 1914, of upwards of 50 per cent.

The International Metal and Trading Co., of Montreal, have opened offices in the McGill Building, to carry on an extensive export and import business. The complete organization of the new company will be consummated in a short time. Further announcement will be made in next week's issue.

The planning for the establishment of commercial air routes is proceeding apace. The latest report in this connection is to the effect that B. C. Howard, of B. C. Howard and Co., which has extensive lumber interests at English Lake, has recently purchased a "bus" from the United Aircraft Corporation, for the inauguration of an air route between Sherbrooke and English Lake.

The Canadian fleet patrol, which has been stationed at Halifax during the period of the war, has been acquired, by purchase, by Messrs. Hayes and Anderton, of New York. This firm is extensively engaged in the production of fish oil, fish scrap and fertilizer, and by the acquisition of these boats will be in possession of seven of the fastest steam propelled fishing craft in the world. These vessels have a speed of fifteen knots, and were formerly owned by Peters, White and Co., New York, and Wilcox Fertilizer Co., of Mystic, Conn.

The Montreal Pattern Works has opened offices and factory at 242 Clarke St., Montreal, Que. Operations are now in progress, and the firm is prepared to manufacture patterns of any description and for any purpose. Mr. Geo. Underwood is the managing-director.

Included in the estimates that the Government will have to consider at the coming session is the appropriation of about 80 million dollars for work on the Canadian National Railways, and about 30 millions for the shipbuilding program. Many other smaller appropriations will also require consideration.

Kayser, Ellison and Co., steel merchants, are enlarging their Montreal warehouse by taking in the adjoining store on Craig St.

The Cornwall Board of Trade, in cooperation with the Town Council, are taking steps to send a delegation to Montreal to interest the authorities in the construction of bridges over the Ottawa River at Ste. Anne and Vaudreuil.

Williams and Wilson, of Montreal, are moving from their old location on St. James St. to their new offices and warehouse at 84 Inspector St.

The Beaver Engineering Co., of Montreal, are offering for sale their entire plant equipment.

P. M. Draper, of the Trades Congress of Canada, has returned from Europe, after about four months' activities in connection with the Peace Conference. In the opinion of Mr. Draper the affairs of labor will be conceded a more important place in the world's politics than ever before.

ENGINEERING

Niagara Falls, Ont.—Water for the first time has been turned into the new Hydro thirteen and one-half foot water main through Victoria Park, which will give the Hydro fifty thousand more horsepower.

Montreal.—There is a persistent rumor that the Canadian Pacific Ocean Services may shortly purchase the whole fleet of an important English steamship line which controls a large proportion of trade between Great Britain and the East.

London.—The Board of Education will call for tenders at an early date for the erection of a new eight-roomed building on the Collegiate Institute grounds, in which commercial classes will be accommodated. The Collegiate has outgrown its present quarters. It is expected that the new building will cost in the neighborhood of $50,000.

Niagara Falls, Ont.—At a meeting of engineers of Niagara district at Lafayette Hotel, Niagara Falls, a branch of the engineering institute in Canada was formed with these officers: C. D. Blanchard, of Hydro Canal, president; N. P. Near, City Engineer, St. Catharines, vice-president; P. Johnson, St. Catharines, secretary; N. R. Gibson, Niagara Falls; W. H. Sullivan, St. Catharines; A. J. Grant, St. Catharines; H. W. Balfour, Welland, and H. L. Burke, Niagara Falls, executive.

TRADE GOSSIP

Want Canadian Plant.—F. C. Austin Co., Inc., 609 Railway Exchange, Chicago, Ill., advise CANADIAN MACHINERY that they want to make arrangements with some firm in Canada with a view of having their line of machinery manufactured and sold in Canada for the Canadian market. The line consists of excavating machinery, trenching machines, concrete mixers and concrete roadmaking machinery, multipedal farm tractors, etc. Those interested should address the firm at the address given above.

Australia's Attitude.—Government officials at Washington were seeking an official explanation of the report that Australia had prohibited the importation of all except British products. Inquiries from American manufacturers who expected to expand their trade in Australia, flooded the Department of Commerce. In the absence of official information, commerce officials were inclined to doubt the accuracy of the report. But they have instituted an investigation through trade and diplomatic channels to find whether the Australian orders limit importation to British manufactured goods.

In New Premises.—Williams and Wilson, Montreal, are now entirely removed into their new building on Inspector street, and within a short time expect to be completely settled. The finishing touches are now being placed on the interior finishing. Every facility has been acquired to economically carry on their largely increasing business.

Changes Made.—The third reading has been given to Hon. Mr. Mercier's bill to amend the Quebec Mining Act. One of the amendments provides for the fixing of the duration of the scope of mining licenses for the territory known as "New Quebec," together with the terms on which they are to be issued and renewed. Changes affecting royalties have likewise been made so that now there will be no allowance for the cost of extraction. Previously, this cost was deducted from the value of the minerals.

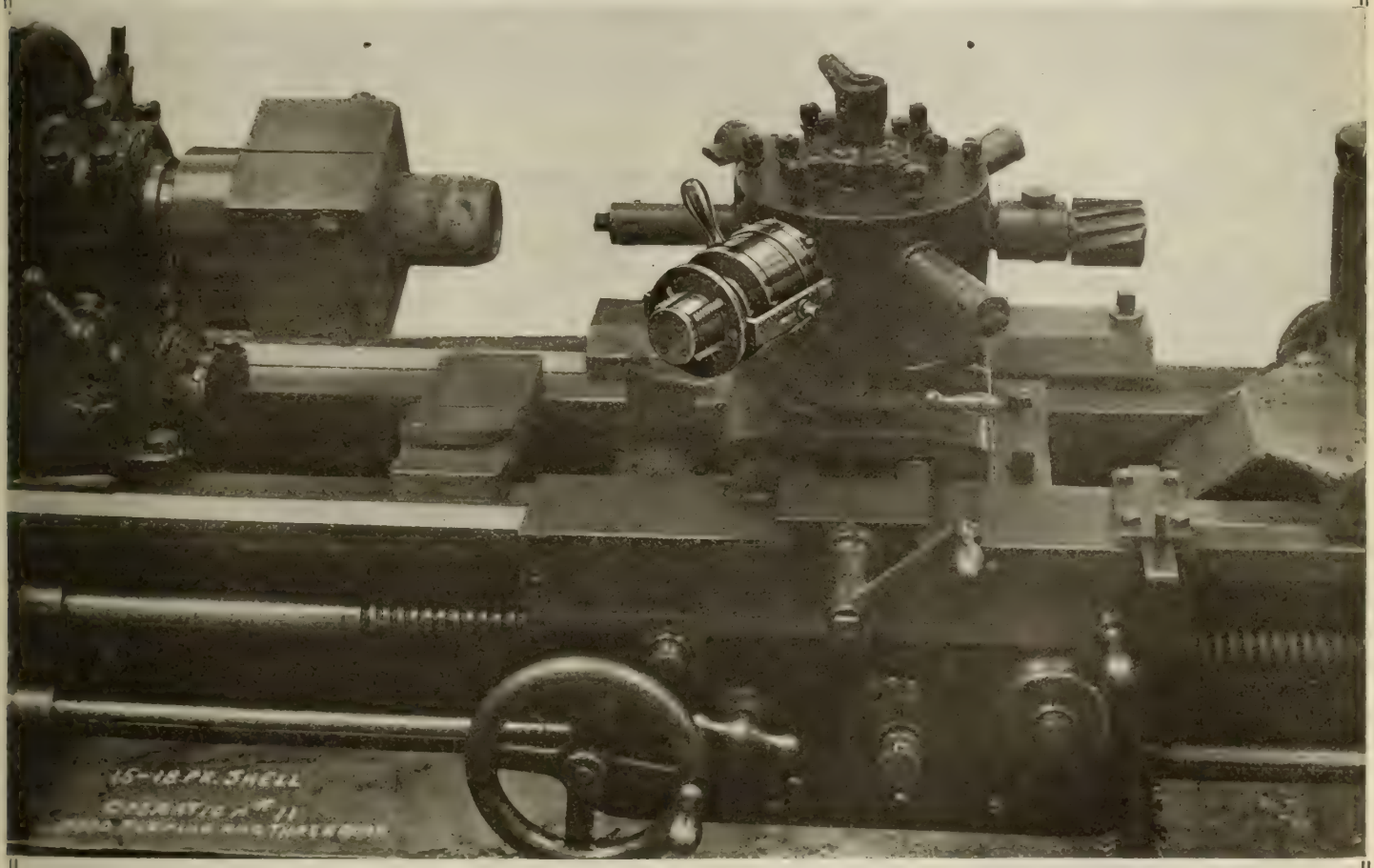
ANOTHER GEOMETRIC FEAT

DESCRIBED IN A LETTER FROM CANADA

Messrs. Geometric Tool Company,
New Haven, Conn., U.S.A.

Gentlemen:—

"The engine lathe shown in the photograph which we are sending you commenced work on shells within four months of the start of the war, when methods were in course of development, and special machines were unknown. Material and labor were both frequently unsatisfactory. Rejections due to poor threads were



frequent troubles with shell makers. Despite many adverse conditions the contract was successfully completed, and the Geometric Tap used on this lathe (fitted to cross-slide on carriage) was an important contributing factor in the good work done in the early strenuous times."

Very truly yours,

Whether yours is a tapping or threading job, or both, you would be satisfied with the Geometric way of doing it.

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal. **The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.**

Two Offices Opened. — The Betts Machine Co., Rochester, have established branch offices at New York and Chicago. The New York office is located at 50 Church Street, with F. C. Severin in charge, and the Chicago office at 549 Washington Boulevard, with A. W. VanBuren in charge.

The Gwilliam Company, New York City have sent out a new catalogue descriptive of their ball and roller bearings. This catalogue lists the various types of ball bearings made by this firm, and also features a pressed steel line of which the Gwilliam Company are the patentees. Roller bearings are also shown.

Foundry Sold.—Mr. W. B. Cochrane of Vienna has purchased the Tilsonburg foundry and machine shop, which has been closed for several months. He is now putting it in shape and will reopen next week. Mr. Cochrane served his time with the late H. F. McCrae and is therefore familiar with both the shop and territory. He purposes doing a general line of repair work and castings, and will employ a staff to meet requirements of the business.

Sarnia Industry.—The H. H. Robertson Company of Canada, capitalized at $200,000, has purchased the plant of the Sarnia Metal Products Company at Sarnia, Ont., and plans to commence operations about May 1 on the manufacture of asbestos covered steel roofing and siding; also ventilators, gutter and down pipes, skylights and asphalt paint. The officers of the new concern are: President, H. H. Robertson, Pittsburgh; vice president, Jas. Playfair; secretary, R. I. Towers; Treasurer, N. S. Gurd; managing director, C. McKenzie. The new managing director was formerly with the hardware firm of Mackenzie, Milne & Co., Limited, of Sarnia.

Cannot Compete.—The statement made through the press recently to the effect that the immense soda ash products plant of the Brunner, Mond Company, at Amherstburg just approaching completion, would not for some time at least, begin operations because of uncertainty regarding the Dominion tariff, received further enlightenment at a meeting of the Chamber of Commerce at Windsor, when the matter came up for discussion by the industrial section of the board. It was explained that the ending of the war had greatly lessened the demand for soda ash, and that the Amherstburg concern admitted its inability successfully to compete with the many similar plants now in operation in the United States, because the latter are able to ship almost unlimited quantities of ash into this country duty free except for the 7½ per cent. war tax. It was suggested in the form of a resolution that the Amherstburg concern should be offered some measure of relief by the Dominion Government in order that they might be able to begin work. The Amherstburg plant was built at a cost of several million dollars, and was expected to provide employment for several hundred men.

Niagara Falls, Ont.—A new radio compass, the invention of a Niagara Falls, Ont., man, William Lorenz, a jeweler, is now in use for the first time in the United States navy. It was first used on the George Washington, conveying President Wilson to France. Mr. Lorenz invented a device in 1916 for the detection of the presence of submarines. In a fog if another ship should come within the radius of the President's ship its presence will be indicated by the ringing of a bell.

AIM TO SAFEGUARD MERCHANT MARINE

Legislation to be Asked Covering Many of the Points Now in Dispute

At the meeting of the executive of the Canadian Merchant Service Guild the reports showed the institution to be in a first-class condition financially.

After a short address by the chairman, Capt. R. D. Simpson, of Owen Sound, it was decided to place the following legislation before the Parliamentary Committee:

(1) That the Government be asked to create a fund which will give seamen free hospital attention when necessary, the same privilege to be extended to fishermen and lighthouse-keepers.

(2) That all bridges across Canadian rivers and canals be provided with suitable signals to inform those in charge of a vessel that such will be opened before approaching close enough to endanger life and property.

(3) That every Canadian vessel be officered by Canadians, and that every such vessel leaving port be in charge of a certified person.

(4) That every Canadian vessel of 500 tons or over be provided with a master, first officer and second officer, and that every Canadian vessel less than 500 tons and operating more than 12 hours per day, with the exception of vessels employed solely in fishing, shall be provided with a master and one officer, these officers to be recognized as such by the Government.

(5) That every Canadian vessel be manned as may be found necessary to the safety of public life and property afloat.

(6) That Canadian coastwise trade be reserved solely for vessels truly and without fraud owned by the communities of Canada.

(7) That our Canadian Shipping Act be revised to conform to the necessities of our mercantile marine.

(8) That every master, pilot and officer who considers himself not fairly dealt with by our courts of enquiry shall have the privilege of appealing to the Admiralty Court for final decision.

(9) That a ruling be given regarding the articles supplied to our coasting vessels, as it contains the insignia of the British Empire, and at present people do not seem to understand its importance.

(10) That our Government be asked to introduce legislation which will give all seamen of Canada the use of their franchise.

(11) That Otter head light, on the north shore of Lake Superior, be immediately put into commission, and a fog signal installed at that point.

(12) That our Government without further delay take up the matter of installing life-saving stations equipped with wireless, more especially along the north shore of Lake Superior.

It was decided that the nautical school in Collingwood be put under the auspices of the Canadian Merchant Service Guild, and that such educational institutions be inaugurated throughout the Dominion as soon as the progress of the institution will allow.

Capt. D. J. Stitt, Capt. A. McIntyre and Capt. A. Bakter were appointed as an Advisory Board for the year 1919.

THE TORONTO YARDS LETTING MEN OUT

No Contracts in Sight and Reductions in the Staff Have Been Made

The Polson Iron Works and the Dominion Shipbuilding Co., both of which employ large numbers of returned men, are gradually reducing their staff because of the lack of orders on hand and no promise of further contracts in the immediate future. The Polson Iron Works released 150 men, and Col. J. B. Miller said that when the present contracts on hand were completed, more men would have to be let out.

"It is quite true," said Col. Miller, "that we are letting 150 men out today. We have got to have orders ahead of us to continue our organization and two berths will be empty in April with nothing in prospect to go on with." Col. Miller stated that the company had received no orders from the Dominion Government at any time during the war, and that such orders as had been filled were placed by the Imperial Munitions Board and Norwegian interests.

"Several weeks ago," said Mr. A. C. McMaster, of the Dominion Shipbuilding Company, "a number of us went down to Ottawa to get the Government, if possible, to do something to keep 4,000 men employed in shipbuilding operations in this city. After five weeks we arrived at the point last Saturday when we had to let 150 men out, whereas, if we had had any assurance that contracts were coming to us we would have put these men on work in anticipation."

Toronto.—Mr. Justice Hodgins at Osgoode Hall gave an important Admiralty judgment in the action by the Carow Trading Company, of Cheboygan, Mich., to recover against the barge "Ed" the charge of towing the barge from Sault Ste. Marie to Calcite, Mich., and back again. The point at issue was whether the contract entered into by telephone was made in the United States or in Canada. The plaintiffs telephoned from Cheboygan to Captain Climie at Sault Ste. Marie, who accepted their terms. His Lordship decided that the contract was made in Ontario and was half carried out in Canadian waters.

The Specifications Call For .0001±

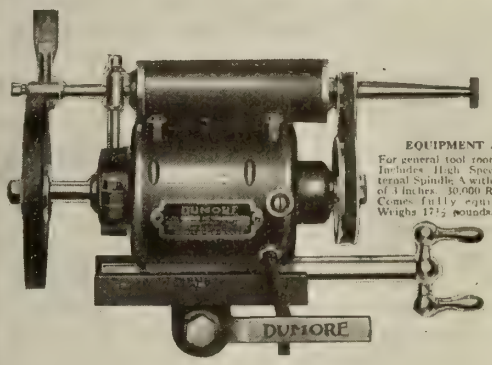
SUPPOSE you were studying the specifications for a big job—one that called for making new and expensive tools—would your present tool-room equipment let you handle it? There are only two kinds of tools—the good and the poor—there's no half-way mark. And the quality of your output is fixed by the degree of accuracy you can obtain in your tool-room.

Accuracy in grinding depends upon correct cutting speed and perfect running balance. That is why the **DUMORE** grinder has been given speeds ranging from 10,000 to 50,000 R. P. M., along with a dynamically balanced armature. With this tool in your shops you can eliminate chatter, taper or bell-mouthed grinding. Then, too, the **DUMORE** is portable, easily carried to all parts of the shop and quickly set up in any machine ready for use.

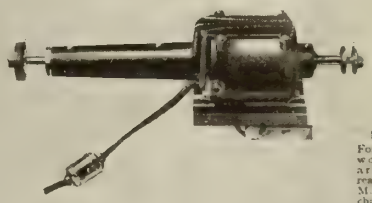
If you are interested in obtaining only the best tools, ask your dealer about the **DUMORE** grinder. If he doesn't carry it, write us for literature and prices.

WISCONSIN ELECTRIC CO.

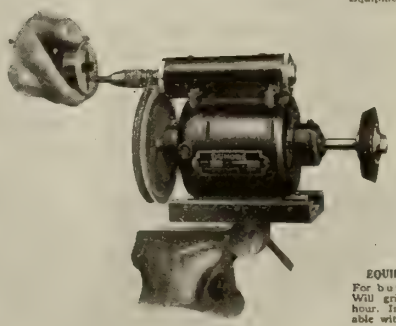
2909 16th St. RACINE, WIS.



EQUIPMENT A
For general tool room use. Includes "High Speed" Internal Spindle A with reach of 3 inches. 30,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.



EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS

TALK OF PIG IRON BEING CHEAPER IS HOLDING UP BUSINESS AT PRESENT

HERE has been so much talk at United States points of reducing the price of pig iron from $31 to $28 that very few sales are being made. Purchasers are using only what they need and are not going into the market buying for their future requirements, fearing that they should be caught between the $31 and the lower prices. There is a feeling in a good many places that the discussion of the lower price levels is being carried on too long, and that an announcement should be made at once with something definite covering a period of months. The reports from some of the producing points are as follows:

PITTSBURGH—One curious result of price shading has come to light here in a deal that has just been finished. One producer offered to supply pig iron as low as $28 per ton. It was thought that such a figure would produce considerable business, but instead the buyers who were approached on this scale stated that if the price were brought to $28, they would rather stay out for a while until the next cut had been made, so apparently they anticipate that the price may go even lower than that figure.

PHILADELPHIA. — Cost of production at various points is being discussed to a very great extent here, and some of the figures furnished are as follows: Pittsburgh District, $23 to $25; Buffalo, somewhat higher; Eastern Pennsylvania, $25 to $28. It will be seen from these figures that if any action is taken toward bringing prices to a very much lower level, it will mean that a good many of the furnaces will be blown out as it will be impossible for them to operate.

NEW YORK.—The fixing of prices seems to be the chief item in the market here at the present time, and although nothing definite has come up, there seems to be a general feeling that $25 will be the price agreed upon. In one case where customers desired to cancel orders from an eastern furnace they had to pay the difference between the contract price and the present market price before the business of cancellation was agreed to.

CLEVELAND.—The demand here at present for iron is very poor, and in some cases there has been a call for tonnage on the road to be held up, as it only means further piling in the foundry yards. Several of the buyers report that they have received concessions from some of the makers, bringing the price down to $28, against the $31, which has been prevailing for some time.

BUFFALO.—One of the large producers of pig iron here had his furnace down recently for re-lining but this interest now finds that the other two stacks that are in operation can take care of all the business, and it is unlikely that the third furnace will be put in operation for some time.

CHICAGO.—The coming into the market of the railroad shops would bring orders for supplies, would do a very great deal to help the market along at the present time, but apparently the roads are not going to come in until a lower price has been reached. That seems to be the general consensus of opinion here. It would be quite correct to say the pig iron market price is absolutely dead.

ST. LOUIS.—The producers of pig iron in this district are not going to pile any more material in their yards. That announcement is taken to mean that they are going to produce only as much as they can sell. When sales are not sufficient to keep the yards moving they will shut down. The reason for this is that they fear a lower level is coming in prices and they do not wish to go ahead and produce material that is going to cost them more than they can sell it at. Another stack in this district has gone out and before the end of the month it is likely that two others will follow suit.

RAPPED CANADIAN PATENT OFFICE

Montreal Speaker Said That It Imposed Nothing More Than a Tax on Brains

A strong criticism of the Canadian Patent Office, and suggestions for remedying defects, were contained in a paper read by H. A. Budden, A.E.I.C., at the meeting of the Montreal branch of the Engineering Institute of Canada.

Up to the present, said Mr. Budden, nearly 4,000,000 patents had been issued in the world, Canada issuing 188,000, Great Britain issuing 515,000, and the United States issuing 1,292,000. Unlike Great Britain, the United States and France, Canada did not classify her patents, he said; neither did she print patent specifications, and the cost of a typewritten copy of a patent was exorbitant. Mr. Budden pointed out a number of instances where, he said, the patent office could improve its procedure so as to afford greater and clearer information to the public, thus making the record as useful and complete as possible.

The financial position of the Patent Office was curious, he said. For the year ended March 31, 1918, there was a balance of receipts over expenditure of $101,520—and, said he, it was an injustice from a public point of view that the patent office should make a large annual profit out of the fees paid by inventors. It was merged in the ordinary revenues of the country and was a veritable tax on brains. The strain of protecting and maintaining patents was proved by the frequency with which patents were dropped merely in order to save renewal fees. The Canadian Patent Office had in the past been a milch cow supplying the Government with a large amount of funds, he said. The Patent Office could be made a more useful institution than it was at present, it being now chiefly occupied in granting monopolies to others than Canadians. Last year only 973 patents out of 7,238 were granted to Canadians.

NEW STEEL TO BE MADE AT WELLAND

Company Claims to Have a Process That Is Better Than Nickel Steel

Welland Telegraph.—A new industry is starting to Welland that in some respects will revolutionize the manufacture of nickel steel. The concern is the Nicu Steel Corporation, Limited, with offices in Toronto and New York. H. A. Morin is the local manager and W. Burkinshaw is the sales manager.

Originally nickel steel, which is used for armor plates, guns, safes, etc., is made by adding nickel to the steel in a molten state. Under the Colvocoresses patent, which this concern will operate, the nickel ores are mined at Sudbury and roasted to get rid of the sulphur. The ore is then shipped to Welland and smelted by an electric furnace, and run into pig form, which will be a combination of iron, nickel and copper. This pig metal is then remelted with steel turnings in another electric furnace and nicu or nickel copper steel is produced. This is then cast in the form of axles, shafting, gears, automobile parts. Orders are on hand now for export shipment.

Hitherto copper in steel has always been considered a great detriment to its strength. By this new patent process the copper is used to enhance the strength and durability of the steel. In this sense it's a radical change in nickel steel.

The Electric Steel and Metals plant will be used to make nicu steel for the present.

The company at present is making preparations arranging the plant suitable to the process. Fifty men will be employed and a great many more as business increases.

Yarmouth, N.S.—An ideal launching took place from the shipyard of Capt. Omer Blinn at Grosses Coques, Digby Co., when a handsome stern schooner of 440 tons net was put afloat for Mr. F. K. Warren, of Halifax. This splendid vessel is most thoroughly built and fastened to comply in every particular with the French Veritas in which she is classed for twelve years. Her cabins are beautifully finished in ash and are most modernly equipped with every convenience for the comfort of her officers and crew. As the vessel slid down the ways she was christened Maid of Scotland by Mrs. Haughn, wife of Capt. Wallace Haughn, of La Havre, who will command her. Capt. Blinn's yard has been a busy centre all through the present boom in shipbuilding and promises to be for some months to come, as he is already making preparations to build a 700-ton barkentine for Mr. Warren.

PERSONAL

A. R. Williams Co., of Montreal, are expecting to take possession of the building on St. James St., recently vacated by Williams and Wilson, on or about the first of May.

E. N. Davey has been appointed tool room foreman of the Montreal plant of the United Shoe Machinery Co. During the war Mr. Davey held a similar position with the Dominion Bridge Co.

David A. Gordon, ex-M.P., of East Kent, and prominent manufacturer of Wallaceburg, died at Braithwaite, La. He had been associated with the Wallaceburg Cooperage Co., Sydenham Glass Works, Wallaceburg Brass Works, Dominion Sugar Co., in addition to extensive other interests.

One of the most widely-known mariners of the Great Lakes, Captain Edward Robertson, passed away at the Alexander Apartments at Sarnia in consequence of a stroke of apoplexy suffered about two weeks ago. For about thirty-five years he was associated with the old Beatty Line and the Northern Navigation Co., and was master of many well-known steamers of those times. He had been living retired for the past few years.

Alf. J. Roberts, engine foreman of the G. T. R. at Turcot roundhouse, Montreal, was killed last week by an Italian, who had been discharged a short time before for inefficiency. Mr. Roberts had been in the employ of the Grand Trunk for many years, serving his time in Stratford, and holding the position of gang boss and erection foreman for several years.

MARINE

Toronto.—The freighter General Morrison was added to the Canadian mercantile trade when the formal launching ceremony was held in the Dominion Shipbuilding Company's yards at the foot of Bathurst street. This boat, which is named after Brig.-General Morrison, one of Canada's returned soldiers, is part of a fleet of eight ships to be built for the Canadian trade. The freighter has a length of 261 feet, and has a carrying capacity of 3,550 tons. The christening ceremony was performed by Mrs. Louis Dahlgren, wife of the vice-president of the company.

TENDERS

Peterboro.—Tenders will be received by Alderman Harry Phelan, Chairman Board of Works, City Hall, Peterborough, Ontario, up to 5 o'clock p.m., of Tuesday, April 1st, 1919, for the construction of a reinforced concrete bridge of eleven arches, with approaches, etc., over the Otonabee River, at Hunter St., Peterborough, Ontario. Proposals will be considered either upon a lump-sum basis or upon cost plus a lump sum basis. Plans and specifications may be seen at the office of R. H. Parsons, City Engineer, Peterboro, or at the office of Frank Barber, 40 Jarvis street, Toronto

Toronto.—Sealed tenders will be received until 12 o'clock noon Tuesday, March 25, for the train filling and concrete work on the Muskoka Subdivision between Mileage 130 and 149 (Parry Sound). The construction of concrete piers at the Seguin River Crossing on the Industrial Spur, Parry Sound, and the train filling and concrete work on the Sudbury Subdivision between Mileage 0 (Parry Sound) and 30, all of the work being in connection with bridge filling and ballasting. Drawings and specifications may be seen and forms of tender obtained at the office of the Engineer Maintenance of Way, No. 7 Adelaide St. East, Toronto; A. F. Stewart, Chief Engineer Eastern Lines, Canadian National Railways, 27 Wellington St. East, Toronto.

MUNICIPAL

Halifax.—The city Board of Control opened tenders for furnishing to the city an aerial fire ladder truck and a salvage wagon, both motor driven. The American La France Fire Engine Co. offered to furnish a 75-foot, 105 h.p. ladder truck at $17,909, or 65 foot at $17,200, f.o.b. Halifax. The Seagrave Co., through Austen Bros., offered to furnish a ladder truck at $17,210, f.o.b. Halifax. The Union Supply Co. offered a 75 foot ladder truck for $13,600 f.o.b. at Grand Rapids, Mich., the city to pay duty and freight. The offers to furnish a salvage wagon were: Robinsons Ltd. (Reo), $4,400, $4,500 and $4,175; White and Co., $5,500 and $8,850; American La France, 75 h.p. at $8,250, and 105 h.p. at $9,750; Seagrave Co., $9,805 and $10,370. The tenders were referred to Controller Hines, the city engineer, and the fire chief for tabulation and report.

CATALOGUES

Forging by John Jernberg, The American Technical Society, Chicago

The art of blacksmithing is an ancient one and for centuries was the only method-working profession. Very little improvement has been effected in it up to comparatively recent times. In the last few years the adoption of new types of steel has made considerable advancement necessary in the art of forging and also in the allied art of heat-treating. The author states that this book was written for the bringing up to date of the machinist's knowledge concerning the art of forging in its more modern aspect. One chapter describes mechanical details, materials and equipments, and goes into the various types or forges, furnaces, annealing ovens, and power tools which are used. Forging operations are next taken up and the major portion of the book is devoted to this particular subject, welding, up-

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setting and other forging operations being all dealt with. Heat treatment and its effect on the physical properties of steel is an important subject and is covered in a simple and able manner.

The Crouse-Hinds Company of Canada, Limited, Toronto, have issued a four page folder called "Condulet Suggestions 64." This folder describes the use of their condulets and the arranging or the charging of storage batteries on the train lighting sets. In the installations the condulet is mounted on a concrete pedestal which both facilitates a plugging and insures against the condulet being frozen in or covered with snow during the winter.

The Graton and Knight Manufacturing Company, Worcester, Mass., have issued a very complete catalogue descriptive of the lines of belting, which they manufacture. The first few pages are taken up in the description of the plant and of the various portions of the hides which go to make up the finished belt. The various grades of belting are taken up next and each one of the different classes manufactured by the Graton and Knight Company are described in detail. Various types of belt drives are treated of and much valuable data is given regarding the proper calculation of belting problems and the care of the belts themselves.

Buckeye Products Company, Cincinnati, Ohio, have issued their general catalogue number 7. This book contains 400 pages and is a reference work on foundry tools and appliances. Practically everything which is necessary to the successful operation of a foundry may be found in the pages of this book, and a list of reference books is included which may be purchased through the Buckeye Products Company.

The Morse Chain Company, Ithaca, New York, for which Jones & Glassco, Montreal and Toronto, are the Canadian agents, have issued publication Number 16, entitled "A Chain of Evidence." This publication is one of the series and deals particularly with a small power drive. The book is replete with illustrations and is of interest and of useful reference for those who have to deal with the transmission of small amounts of power.

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— a man who can give his entire time to selling a widely advertised power house device. An intelligent, convincing talker, a man not afraid of work, a man who expects good pay for good work, is the man we want. We will respect your confidence. In the first instance, write fully to Box 564, Canadian Machinery.

c 14 m

The American Roller Bearing Company, Pittsburgh, Pa., have issued a catalogue descriptive of the Roller Bearings for all purposes. It deals particularly with the type C roller bearing manufactured by this firm which has been designed and manufactured in response to a large demand of high grade roller bearings at a moderate price.

BURNING WASTE

Waste of the most unpromising character can often be burned with success and utilized in the generation of steam but special forms of furnaces are usually necessary in order to carry out the operation properly. Shavings, sawdust, bagasse, and spent tanbark are among the commoner forms of waste that are put to use in this way, and many cities are also generating steam by utilizing their refuse as fuel. The most important thing to do in burning waste, especially when it is damp or wet, is to handle the fires so that an abundant supply of air shall always be present, and a large surface exposed, over which the combustion can extend, and from which the water that the fuel contains can be evaporated. It is of prime importance, in handling wet material, to see that it becomes dried at least as fast as it is consumed for if this condition is not fulfilled the dry part will burn up and the fire will then go out. In starting a fire that is to burn waste, it is usually necessary to run with some other kind of fuel until the furnace has become thoroughly heated. The waste can then be added a little at a time, until the mass has become well ignited and a considerable part of it has become dry. Furnaces for burning waste are preferably detached from the boiler itself, the combustion taking place in front of the boiler, or below it, in a separate furnace from which the heated gases are led to the boiler by means of suitable fire-brick passageways. By conducting the operation in this way, it is possible to feed the fuel through openings in the top of the furnace—which is far better than introducing it through the doors in the front of the setting, as in firing with coal. The fuel should be thoroughly stirred up and worked over as it dries out and burns upon the grates, so that fresh portions of it may be continually brought to the surface. It is often best to handle the waste by a conveyor of some kind, the form of which will naturally depend upon the nature of the material itself. Blowers are used with good effect for handling shavings and dry sawdust. Considerable skill is required in order to burn wet waste effectively, and men cannot be expected to obtain first-class results until they have had the necessary training and experience.

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Financial Post
THIS WEEK

"THE wiping out of the handicap which Canadian products met in the British market, and the granting of what is equivalent to a preference for Canada temporarily, at least should result in a great impetus to our immediate trade with the mother country. If permanent, as it is almost certain to be, if we keep men of the Borden, Lloyd Harris capacity on the job, it means tremendous immigration and the settling of millions of acres of farm lands. It means the extensive development of present and the establishment of numerous new industries in Canada, to take advantage of the preference; bringing in hundreds of thousands of mechanics and mine and forest workers. For example, the Canadian subsidiary of the U.S. Steel Corporation, which has been marking time, will, in all probability, now go ahead energetically with their twenty or thirty million-dollar plant development here. In fact, it is quite probable that within a week plans will be completed and action taken for the immediate erection of about 1,500 workmen's houses at Ojibway, Ont. As we go to press we read in cables to U. S. papers that scores of American manufacturers and other business developers who have been in Great Britain are returning home feeling that there is now little hope of overcoming the handicaps of prohibition of imports and preferences unless they establish branch plants in Canada or the United Kingdom."—"The Financial Post."

Besides the important article from which the above quotation is made, THE POST this week deals with the following amongst
OTHER SUBJECTS OF INTEREST

F. P. Jones Speaks of Embargo Removal
Steel Trade is Now Waiting for Definite Prices
The Waging of the Hydro War at Hamilton
Already West is Talking of Coming Crops
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CLEANING FIRES

Cleaning the fire of a hand-fired boiler is a somewhat elaborate operation, and it is performed in much the same manner, whether the coal is soft or hard. The present section describes the cleaning of a soft-coal fire, but it applies to hard coal also, save for a few changes that will readily suggest themselves.

The frequency of cleaning that is best adapted to any given plant should be determined by experience, because it will vary with the character of the fuel and with the rate of combustion per square foot of grate area. As a rule, a soft-coal fire needs cleaning oftener than a hard-coal one. The cleaning should be done rapidly, to avoid chilling the boiler unnecessarily, and the damper should be nearly closed, to prevent the entrance of large volumes of cold air through the fire doors. The fire should be allowed to burn low before cleaning.

The free, live, upper part of the front half of the fire, consisting mainly of good coal, should first be worked well back toward the bridge wall. The clinkers, thus left exposed on the front half of the grate, should then be loosened by pushing a slice bar under them, and removed from the furnace. When a dumping grate is used the clinkers are dumped directly into the ash-pit; but if the grate is a stationary one the clinkers must be drawn out through the fire doors and dumped on the floor, where they should be kept well away from the front of the boiler. If hauled out upon the floor, the hot mass should be immediately wet down, preferably with a hose, and special care should be taken to avoid spattering the water against the boiler front, or against any pipe or fitting containing steam or hot water. The bared portion of the grate should next be thoroughly cleaned, for if any lumps are left clinging to the bars the fire will clinker up again more quickly than it will if all such lumps are removed. The spaces between the grate bars should also be cleaned out as well as possible, because if obstructions are left there the flow of air will be correspondingly impeded, and the bars are likely to become warped and burned. The entire live, active part of the fire should next be pulled forward to the front half of the furnace, and the cleaning operation repeated upon the back half of the grate with the same care as before. If a dumping grate is used, the clinkers are dumped from the back of the furnace into the ash-pit; but if the grate is a stationary one they must be hauled (or "jumped") out over the fire and through the doors. When the entire fire has been cleaned, it should be evenly distributed over the grates and covered with fresh coal. If the furnace has a double door, one side of the fire should be cleaned and allowed to burn up again before the other side is cleaned.

The method of cleaning described above is the one ordinarily employed in American stationary practice; but if the coal clinkers badly it is better to shift the fire sidewise instead of pushing it back.

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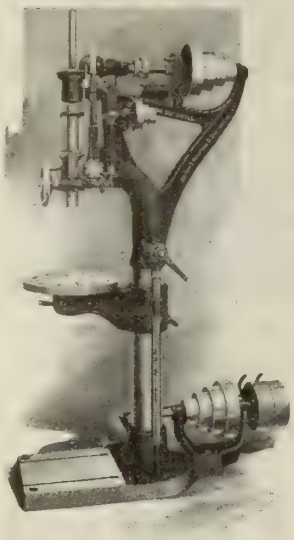

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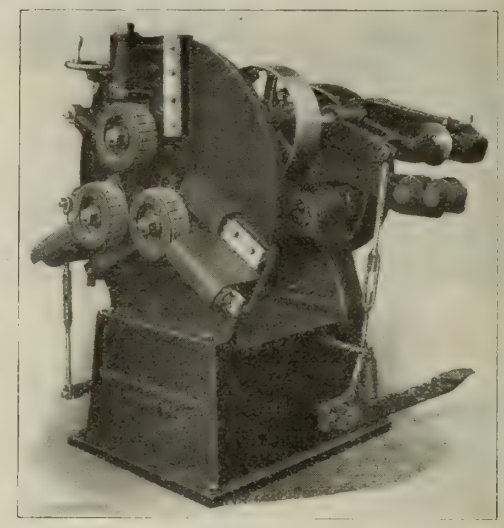

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a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY

Classified Advertising Section

143-153 University Avenue TORONTO, ONT.

Free Tool Grinding Chart

Grind your cutting tools in exactly the right way to get best results—and you save time. That's obvious. It is precisely that that this Tool Grinding Chart enables you to do.

It has been adopted as standard by many firms that found it a long way better than guess work.

CANADIAN MACHINERY would like to see this Chart in every shop in the Dominion. Mail the coupon below for your copy to-day.

Shows at a glance Correct Clearance and Rake Angles for Cutting Tools

CANADIAN MACHINERY,
153 University Avenue, Toronto.

Please send me/us free, one of your tool grinding charts.

Signed.....

Firm Name.....

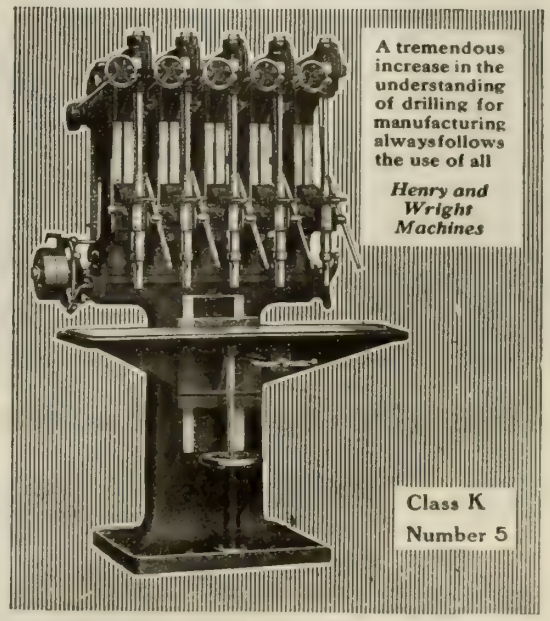
St. Address.....

City.....

Prov. .....

HENRY & WRIGHT

Drilling Machines



The Henry & Wright Mfg. Co.

Hartford, Conn.

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.

SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

ELLIOTT & WHITEHALL MACHINE & TOOL CO.
GALT, ONT.

SPECIAL MACHINERY
JIGS AND FIXTURES PUMPS
GAUGES GASOLINE ENGINES
GEAR CUTTING

ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

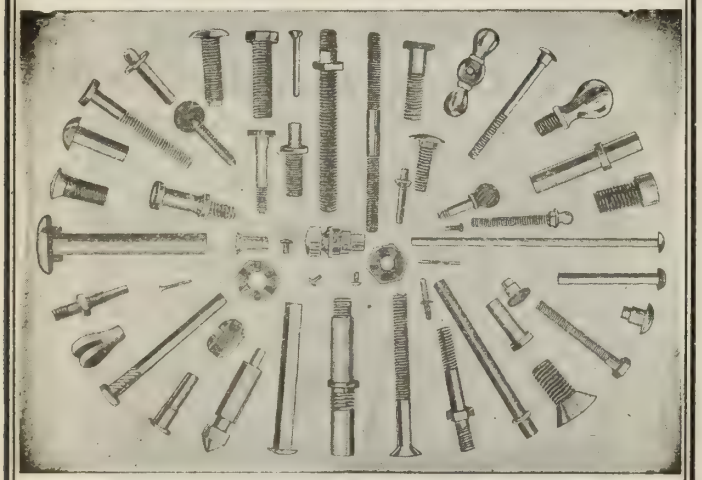
Portable Welding

Electric, Thermit and Oxy-Acetylene

With trained and skilled mechanics always available for immediate dispatch in case of Breakdown in your Plant. We're always ready.

USE THE PHONE
We do the rest

THE
ST. LAWRENCE WELDING CO., Ltd.
A. M. BARRY, Managing Director
138-140 Inspector Street MONTREAL, Que.
Long Distance Phone Main 5779
Nights: Westmount 3483
Maritime Branch:
HALIFAX, N.S.
3



Automatic Screw Machine Products

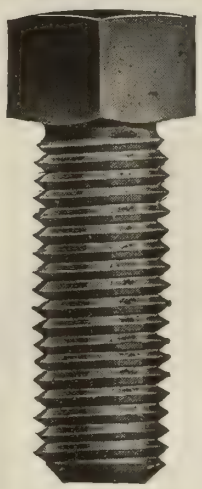
ACCURACY QUALITY

Our Mechanical Engineers are at the service of our Clients.

United Brass & Lead, Limited
St. Helen's Avenue, - Toronto

W. L. TOBIAS, *Superintendent*
Formerly Superintendent National Cash Register Co.

ACCURACY



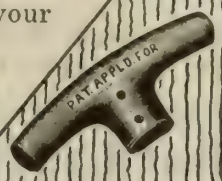
When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

THE
GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company Limited, 49 Common St., Montreal, Que.

TOOLS & STAMPINGS

We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.



HOMER & WILSON
Stamping and Tool Works
1-5 Lancaster St. HAMILTON

IN STOCK HERE

National High Speed Side Milling Cutters

6	Only	3½	x	⅝	x	1"	4	Only	5	x	1	x	1¼"
6	"	4	x	½	x	1"	2	"	6	x	1	x	1"
2	"	4	x	⅝	x	1"	4	"	6	x	1	x	1¼"
2	"	4	x	¾	x	1¼"							

National High Speed Slitting Saws

9	Only	2½	x	3/64	x	⅞	4	Only	5	x	3/32	x	1
10	"	3	x	1/8	x	1	1	"	6	x	1/8	x	1
20	"	4	x	1/8	x	1	4	"	6	x	3/32	x	1
12	"	4	x	1/16	x	1	12	"	6	x	3/16	x	1
6	"	4	x	3/16	x	1	6	"	6	x	3/16	x	1¼
6	"	4	x	5/32	x	1	2	"	7	x	1/8	x	1
20	"	4	x	3/32	x	1							

J. A. M. Taylor MACHINE SHOP SUPPLIES
M. 786 318 Stair Bldg., Toronto

GAUGE MAKERS TO THE TRADE

You need special tools—we need your work. Send us your blue prints for estimates on following:

Gauges, Tools, Dies
Special and Rolling Mill Machinery

High-grade workmanship and accuracy on all work guaranteed.

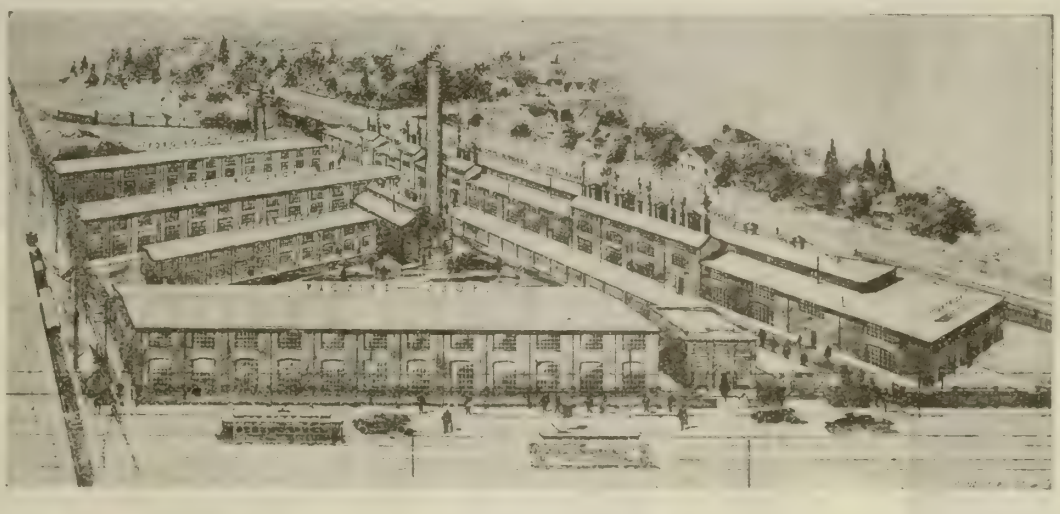
RELIANCE MOTOR & TOOL CO.
LIMITED
427 Queen St. W. - Toronto, Canada

We are Growing

When our plans are completed, "HISCO" will be the largest plant of its kind in Canada.

Two big new electric furnaces are being added to our present large equipment. And cleaning and annealing department measuring 300′ x 100′ is about to be completed.

This will place us in a position to handle orders big and small with unequalled facility.



Specify "HISCO" Products

Quality and Service Guaranteed

Steel, Chrome, Manganese and Nickel Steel Castings
Annealed and Unannealed

Cement Mill and Mining Machinery Castings, Stamp Mills, Crushing Plants, Excavating Outfits, Steel Car Wheels, Locomotive Driving Wheels and Frames, etc.

GEARS Machine Moulded, any size up to 18 feet, without Patterns

HULL IRON & STEEL FOUNDRIES, LTD., HULL, QUE.

Grey Iron Castings

We are in an excellent position to give quick delivery on high grade castings up to 10,000 lbs. in weight. Send your Blue Prints for quotations.

Our up-to-date Pattern Shop can handle your Pattern Work expeditiously and well

Welland Machine & Foundries, Ltd., Welland, Ontario

STEEL PLATE CONSTRUCTION

Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

We invite your inquiry.

THE TORONTO IRON WORKS LIMITED

HEAD OFFICE: ROYAL BANK BLDG. TORONTO WORKS: CHERRY STREET

PUNCH PRESS WORK

What Can You Save?

By Using Parts Made in the Punch Press

Look over your standard parts, Mr. Manufacturer, and see what parts can be made (or could be made by slight change in design) by this process.

You will be surprised at the saving you can effect.

We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

A Battery of presses is also available at our plant to manufacture parts for you with the understanding that you pay only for good parts made. Our facilities ensure prompt deliveries at right prices.

W. H. BANFIELD & SONS LTD.

370-386 PAPE AVE., TORONTO.

At Your Service

Let Us Quote on Your Contract Work

Our Staff is always available for Consultation.

PATTERNS
CASTINGS
FORGINGS

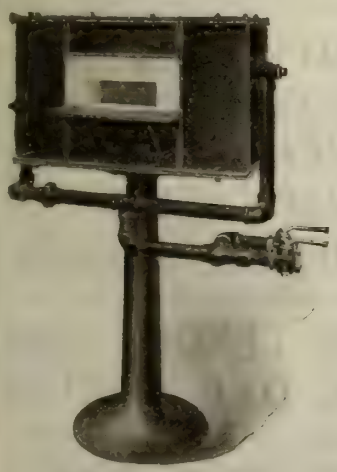
And Machine Work of all Kinds

VICTORIA FOUNDRY CO., LIMITED
OTTAWA - CANADA

STANDARD FURNACES

OIL or GAS

Immediate delivery on all tool room types.



Oil Tempering Furnace

For

Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
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Furnaces built for special requirement

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For Welding Cutting and Lighting

HIGHEST GAS YIELD
IMPERIAL CARBIDE
MADE IN CANADA

Manufactured by

Union Carbide Co. of Canada, Ltd.

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Large Stocks maintained at convenient distributing centres throughout Canada

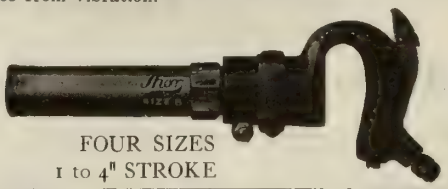
Thor

CHIPPING HAMMERS

Drilling in concrete with a size D hammer with a hexagon nozzle. Will drill a hole one inch in diameter, at the rate of one inch per minute.

Thor Predominates wherever chippers are used because:

1st. The main valve is large in size and durable, being of the balanced type and having a bearing surface of three square inches.
2nd. Two square inches of the bearing surface retain the lubrication constantly, as no air passes over to blow the oil off.
3rd. The handle is equipped with a self-seating throttle valve, which eliminates all leaks.
4th. The barrel and all working parts are hardened and ground and the hammer is practically free from vibration.



FOUR SIZES
1 to 4" STROKE

Riveting Base Plates with size B hammer. Let our service engineer call at your plant and explain the various uses to which these hammers can be adapted, and how to obtain the best results on your particular work.

Independent Pneumatic Tool Company

General Offices: **600 West Jackson Blvd., CHICAGO, U.S.A.**

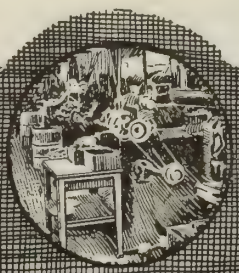
CANADIAN OFFICES: 334 St. James St., MONTREAL; 32 Front St., TORONTO; 123 Bannatyne Ave. E., WINNIPEG; 1142 Homer St., VANCOUVER

SPECIAL TOOLS

Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems

Toronto Tool Company

516 Richmond St. West Phone Adel. 1181



MARTEN MACHINE COMPANY HAMILTON, ONT.

TOOLS

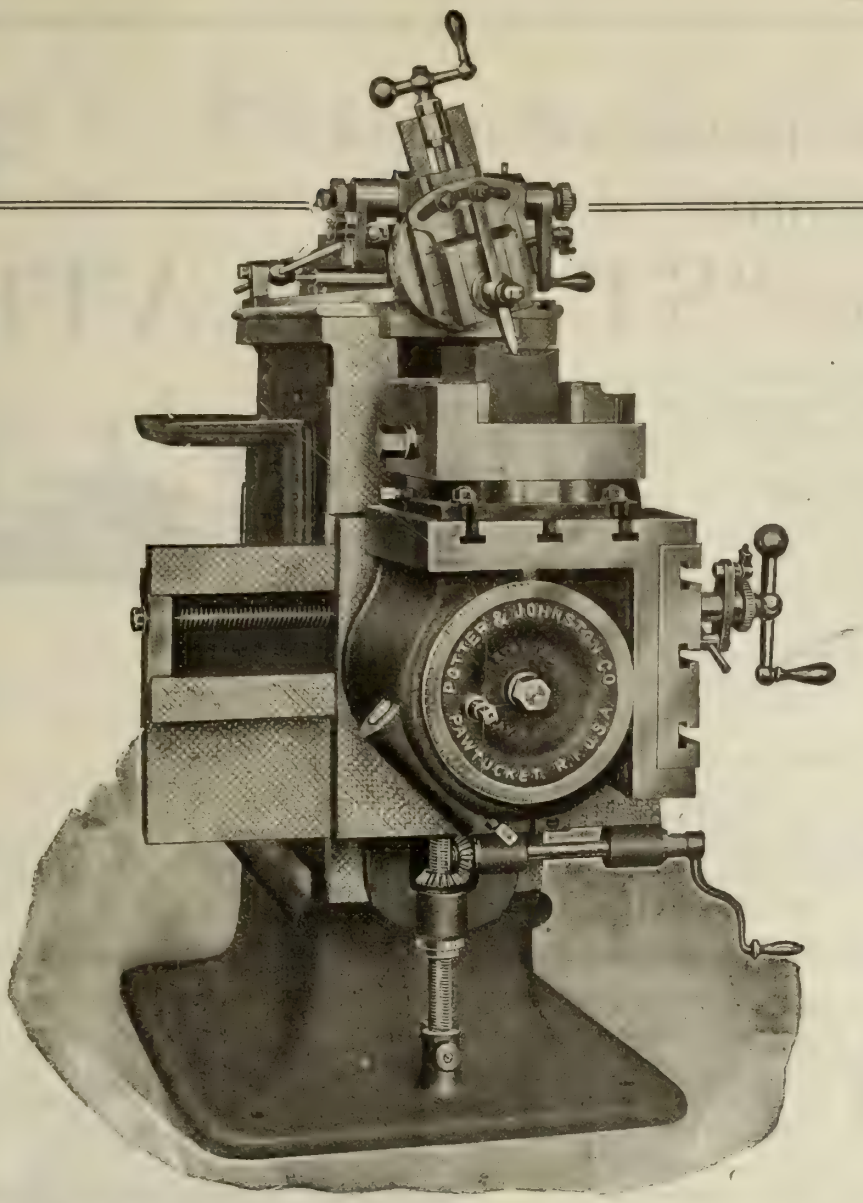
ACCURACY---RELIABILITY

OUR REGULAR PRODUCTS:
THREAD GAUGES
SNAP GAUGES
CYLINDRICAL GAUGES

WE ARE GENERAL AND SPECIAL TOOL MAKERS

Let us quote you on your requirements, and have your tools made as you want them made.

WOOD PATTERNS **METAL PATTERNS Hand and Machine**



Potter & Johnson's 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnson Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA

YOU are protected against possible price decline— *if you buy* "STAR" LATHES

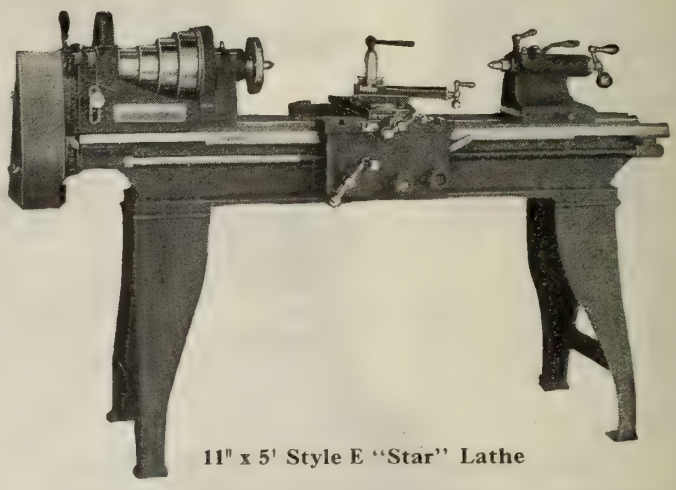
When you purchase "STAR" Lathes you receive a certificate guaranteeing you a refund equal to any possible reduction in price in 1919. Should prices go down for any reason, you are protected.

"STAR" LATHES HAVE BEEN MADE FOR THE PAST 35 YEARS BY A CONCERN KNOWN FOR ITS RELIABILITY, EXCELLENT MANUFACTURING METHODS and superior products. Thousands of machine shops, factories and garages as well as Government plants, operate "STAR" Lathes for high quality work and low operating cost. These lathes perform the work of heavier and more expensive machinery and give excellent satisfaction.

Buy now—remember, you are protected

The Seneca Falls Mfg. Co., Inc.

366 W. Falls St. SENECA FALLS, N.Y.



11" x 5' Style E "Star" Lathe

"Star" Lathes are made in 9-in., 11-in. and 13-in., swing sizes with full line of attachments available.

HOYT METALS

"Frost King" "Trojan" "Nickle Genuine" BABBITTS

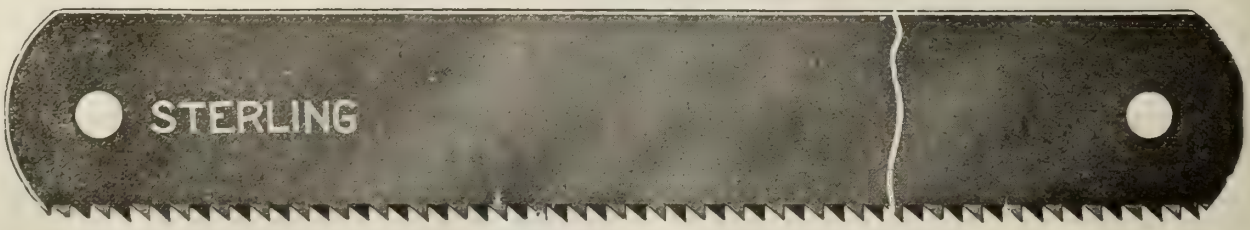
Hoyt Metals have been used with great success for over
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.

Annual sales over $5,000,000.

Hoyt Metal, Co. Toronto

New York, N.Y. London, Eng. St. Louis, Mo.

HACK "STERLING" SAWS



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DIAMOND SAW & STAMPING WORKS -:- BUFFALO, N.Y., U.S.A.

Don't Buy a CISCO

Don't waste your money, your time, your comfort. Don't put in your shop a lathe that won't satisfy.

BUT

remember this—a CISCO Lathe will satisfy; it will relieve you of all shop worries; it will save you time; make you money.

WHY?

It is the only lathe with the pull. The only lathe of simplified accuracy.

Made in 14", 16", 18", 24" sizes.
Cone Driven, Motor Driven, Geared Head, Motor Driven Geared Head

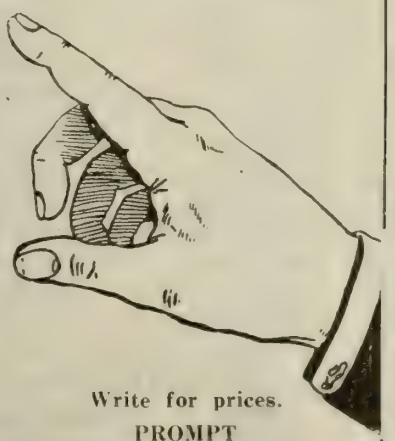
MADE BY

THE CISCO MACHINE TOOL COMPANY
Cincinnati, U.S.A.

Structural Steel and Steel Plate Work of every Description

Smoke Stacks, Storage Tanks, Pressure Tanks, Boiler Breachings, Bins, Hoppers, Feed and Fresh Water Tanks, Cranes, Uptakes, Shaft Bearing Seats, etc.

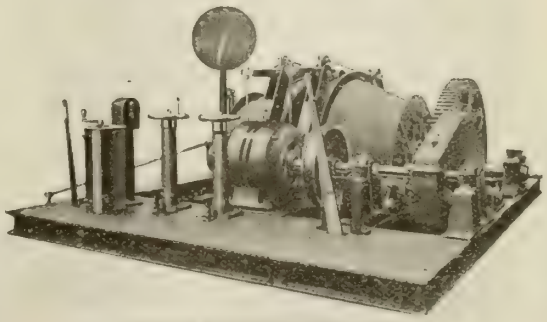
MacKinnon Steel Co. Limited



Write for prices.
PROMPT DELIVERIES

Sherbrooke, Que.

LANCASHIRE MOTORS
HAVE WORLD WIDE REPUTATION FOR
"RELIABILITY"



MOTOR DRIVING MINE HOIST

Specialists in Motor Manufacture and Application

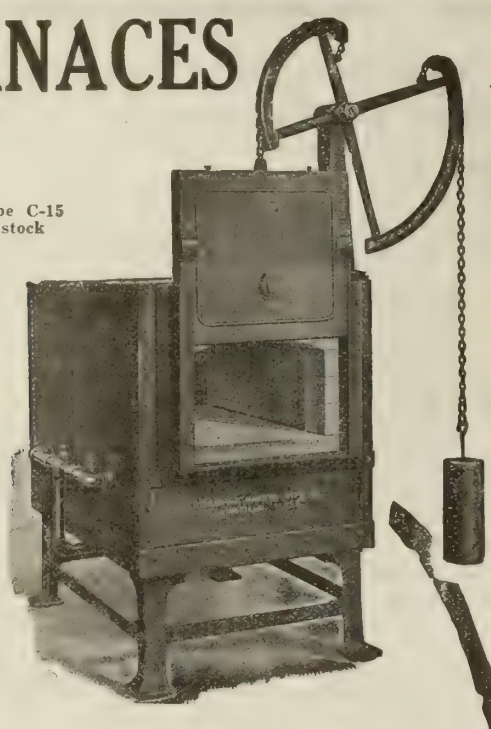
SEND YOUR ENQUIRIES TO

The Lancashire Dynamo & Motor Co., of Canada, Limited

Head Office and Works
45 NIAGARA ST.
TORONTO

Branch Office
602 NEW BIRKS BLDG.
MONTREAL

GILBERT & BARKER FURNACES



Type C-15
in stock

Shipped on Receipt of Order

If additional proof was required of the efficiency of Gilbert & Barker's heat treating furnaces, this proof was generously supplied during the World War. Industrial plants throughout the United States and Canada engaged on war contracts covering the manufacture of munitions, ordnance, airplanes, motor trucks, tanks, etc., found it necessary to secure on short notice a thoroughly efficient furnace. As designers and builders of heat treating furnaces for a period of more than 50 years it was quite natural that the demand for G & B equipment should be heavy.

You don't have to pay for experience nor do you have to take chances on inefficient heat treating furnaces. G & B furnaces can be depended upon for accuracy and efficiency, plus low operating cost.

There is a G. & B. furnace for every heat treating requirement. Tell us your problem and we will promptly tell you the type of furnace best suited to your needs, but first send for Bulletin 24. Today is a better day than tomorrow—write.

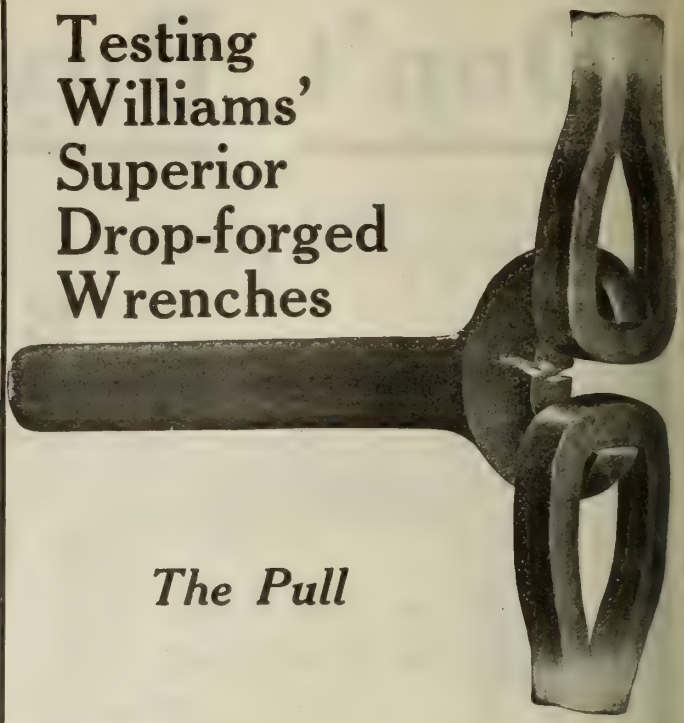
GILBERT & BARKER
Manufacturing Company
West Springfield, Mass., U.S.A.

New York Office: 26 Broadway

Canadian Agents:
WILLIAMS & WILSON, LIMITED
Montreal, Que.

GILBERT & BARKER MFG. CO. G&B SPRINGFIELD MASS. U.S.A. EST 1865

Testing Williams' Superior Drop-forged Wrenches



The Pull

Wrenches in stock, all designed for specific purposes.

Box — Hex. and Square
Cap Screw— Hex. & Square
Car
Carriage Makers'
Check Nut (Thin)
Construction
Engineers'
General Service
Heavy
Machine
"S"
Set Screw
Short
Socket
Spanner
Straight
Structural
Textile Machine
Tool Post
Track
Triple Head

Limited drop-forging knowledge and skill didn't make these wrenches *Superior.*

Nearly half a century ago when this company launched the first standard line of Drop-forged Wrenches, milled with curved-base openings, it caused little comment, *but the Williams' curved base line lived!* It removed the starting point for breakage incident to all wrench openings with angles at the base — to-day the curved base is copied generally.

Later, when we designed and made "Heavy" Wrenches for extreme service it was found that 100 per cent. greater "pull" in the testing machine was required to destroy them, than was needed to completely rupture the ordinary wrench.

40 patterns in about 1,000 sizes with widths from 3-16 to 7 5-8 inches. Ask for Booklet

The A. G. Low Co., Ltd., 45 Pacific Ave., Saskatoon, Sask., Agents for Manitoba, Saskatchewan, Alberta and British Columbia.

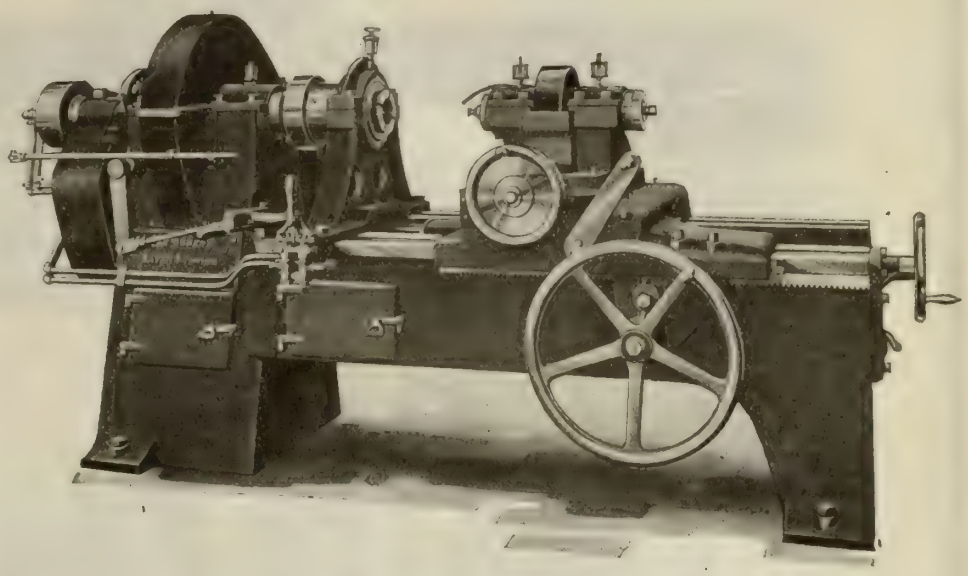
Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.



Write for Bulletin.

Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

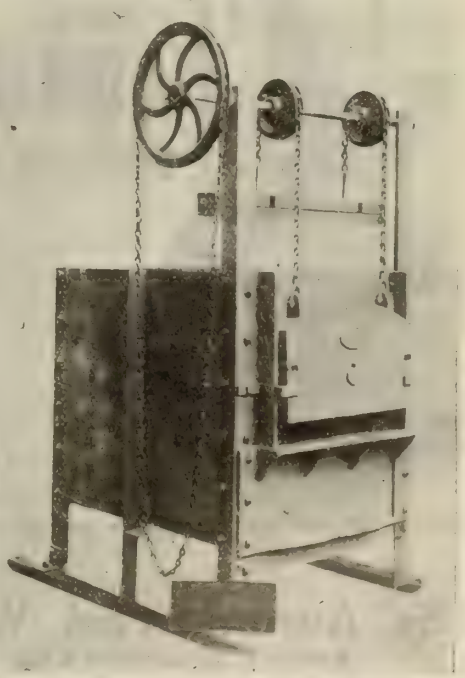
Do These Advantages Appeal

To Your Sense of Economy and Efficiency?

OIL FURNACE
VERSUS
COAL FURNACE

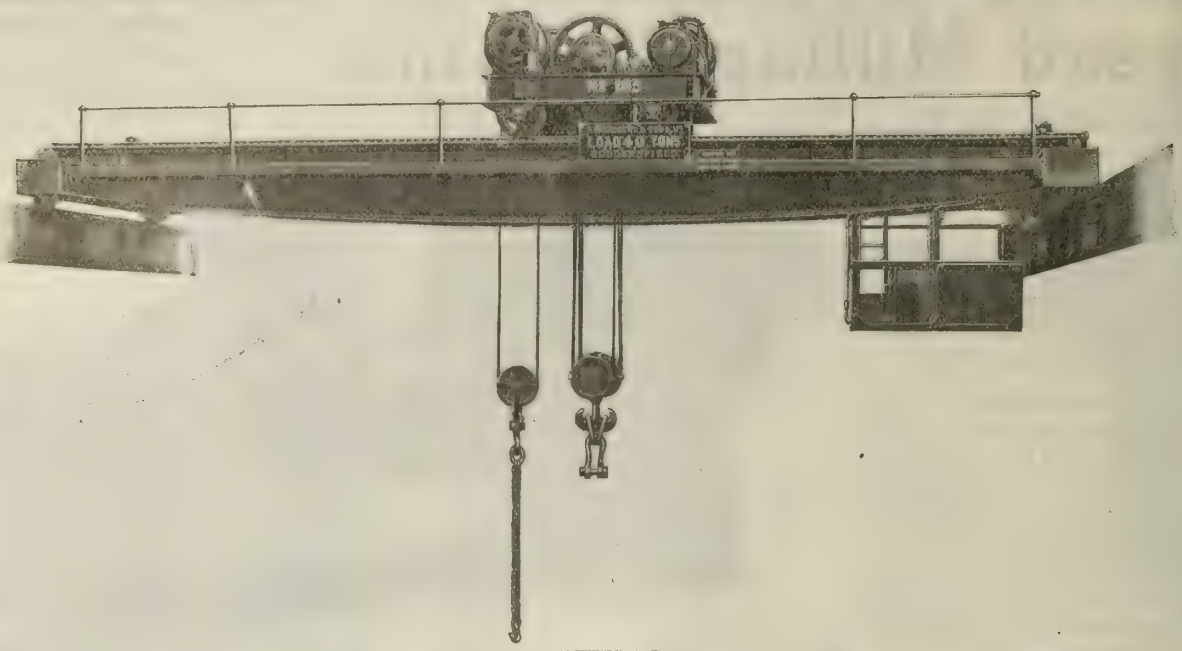
It's economy — requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. *Can you afford to lose the Advantages of this oil Furnace?*

Write To-day for Full Particulars.



Mechanical Engineering Company,
Limited
Three Rivers, Que., Can.
Cable Address: *"Mecol"*

ELECTRIC CRANES & CAPSTANS



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THOMAS BROADBENT & SONS LIMITED
HUDDERSFIELD
ENGLAND

CODES
A. B. C. LIEBER A. 1.

Production of Rare Quality at Lowest Labor Costs

There is unusual strength, accuracy, speed, convenience and range in

AURORA
Drilling Machines

You can use them to great advantage on any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.
Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works
AURORA, INDIANA, U.S.A.

The BARNES DRILLS

TRADE MARK

Complete line. 8-inch to 50-inch swing
Gang Drills.—Horizontal Drills.
SEND FOR CATALOG.
W. F. & JOHN BARNES CO.
104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

Adapted to all kinds of Rapid Manufacturing

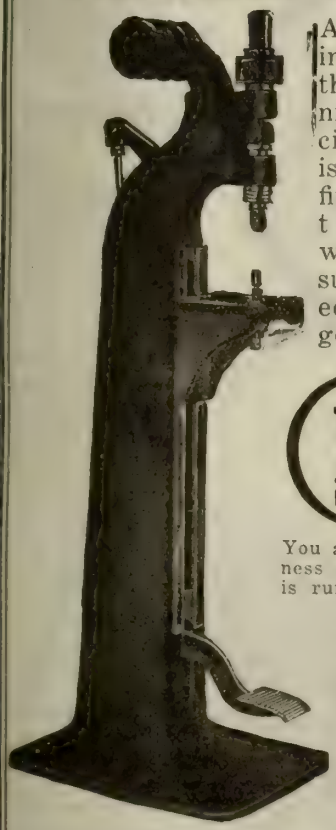
WHETHER your lathe requirements must suit the rapid manufacture of intricate parts or versatile demands of modern tool room practice, one of the Whitcomb-Blaisdell Line will fit exactly your individual needs.
When you buy a Whitcomb-Blaisdell Lathe you get a big measure of service in return for every dollar invested. The entire line of W-B Lathes is distinguished for superior design, workmanship and material.
Rigid inspection and thorough working tests in our shops are your assurance of accuracy and dependability.

Whitcomb-Blaisdell Machine Tool Co.
WORCESTER, MASS., U.S.A.

Write To-Day for our lathe Catalog which describes our complete line.

Whitcomb-Blaisdell LATHES

No Skill Required



Anybody with ordinary intelligence can operate this Rotary Rivet Spinning Machine. No special skill is required. It is a tool that perfectly fits labor conditions as they exist to-day. A woman can operate as successfully as the skilled mechanic who has gone to the front.

The GRANT is Noiseless

You are assured of perfect quietness wherever the **Grant Rotary** is running. And it spins a perfect polished rivet head every second without breaking or marring the casting. Rivets tight or loose. Write for details.

GRANT
Mfg. & Machine Co.
BRIDGEPORT, CONN., U.S.A.

W. D. Anderson's Engineering Efficiency Service

TRY THIS

Why not call in our Production Manager for a **one-day consultation** and talk to him about your manufacturing troubles?

He will make an expert survey of your production methods and show you where the trouble is and how to remedy it.

It's the Cheapest Way.
Others are doing it.

TRY IT.

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Anderson's Efficiency Service
PHONE ADELAIDE 221
380 Queen West Toronto, Canada

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

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Marshalltown, Iowa
U. S. A.

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FOR TRUEING GRINDING WHEELS

QUALITY SERVICE SATISFACTION

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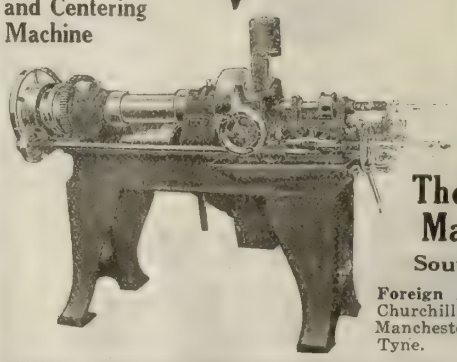
Formerly Geo. A. Joyce Co. Ltd.
NEW YORK LONDON

One Cuts Up
Another Cuts Down
and
They Both Cut
at Once

Hurlbut, Rogers Cutting-off and Centering Machine



Here's Real Economy!

This patented Hurlbut, Rogers Cutting-Off and Centering Machine embodies two cutting-off tools—one cutting up and the other cutting down; each holding the work against the other. What is the result?—**the production is doubled and the cost is cut in half.** Further, the centering operation goes on at the same time. Doesn't this appeal to you as real economy in production?

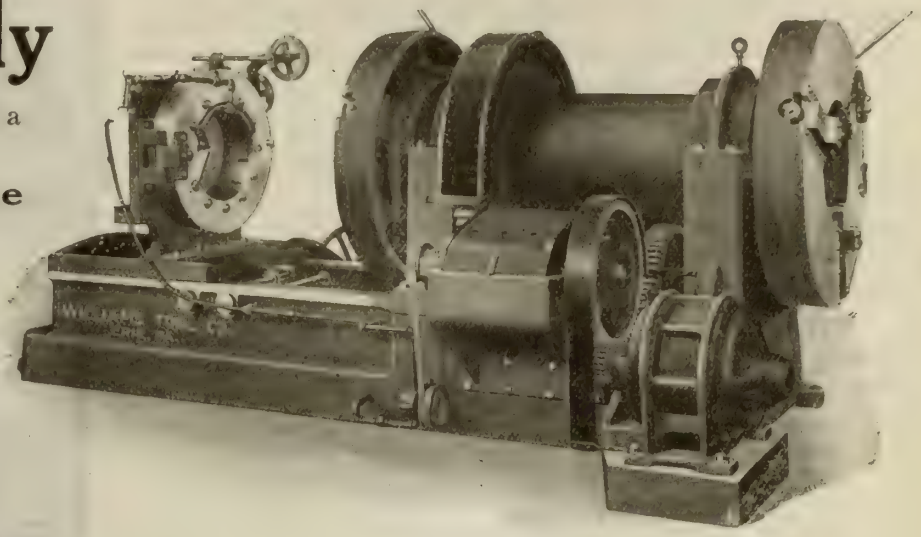
When you are assured of such good-paying results why hesitate to adopt this machine? Soon pays for itself.

Let us hear from you and we will give you the full story of its ability.

The Hurlbut, Rogers Machine Company
South Sudbury Mass.

Foreign Agents — England: Chas. Churchill & Co., Limited, London, Manchester, Glasgow, Newcastle-on-Tyne.

Wherever Pipe is Cut or Threaded Economically



The probability is two to one that it's a

Williams Pipe Machine

that's on the job.
For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.
It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.
The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.

Write

Williams Tool Company

Erie - Penn. - U.S.A.

Canadian Agents:
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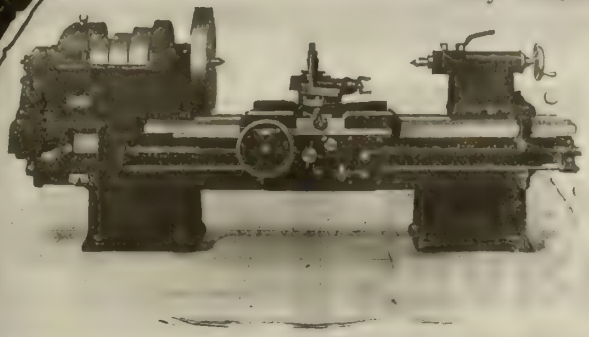
SIDNEY

For SERVICE

Heavy Duty Lathes

The 25-inch Heavy Duty Quick Change Sidney shown below is the last word in lathe construction. Every possible improvement will be found in this late model. Bed lengths available are 10, 12, 14, 16, 18 and 20 feet. Also built with a 27-inch swing.

Easy Masters of Big Jobs



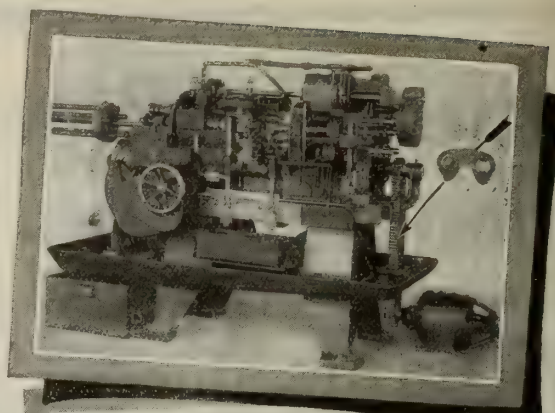
Regardless of the severity of work, dependence put on Sidney Lathes has never been misplaced. The Sidney line has made good—with a vengeance. New Bulletin just issued on 25-inch machine. Write to-day!

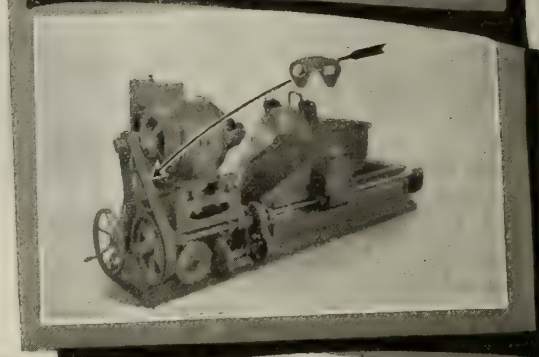
The Sidney Tool Company

SIDNEY, OHIO

CANADIAN AGENTS:
The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

Makes Every Machine Tool A Bigger, Better Producer





NO matter what the nature of the machine tool may be—Link-Belt Silent Chain Drives should increase its production and better its product.

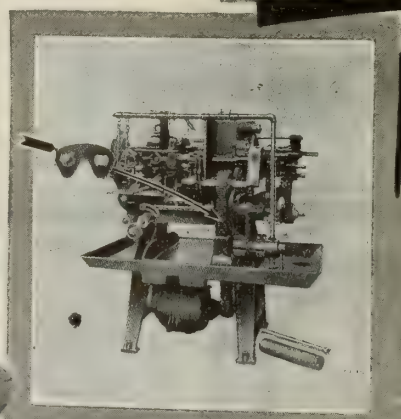
The power is transmitted gently, yet positively. There is no slippage as with leather belts. And yet the sudden application of power on heavy cuts is thoroughly cushioned. For Link-Belt Silent Chain Drives are "flexible as a belt—positive as a gear—more efficient than either."

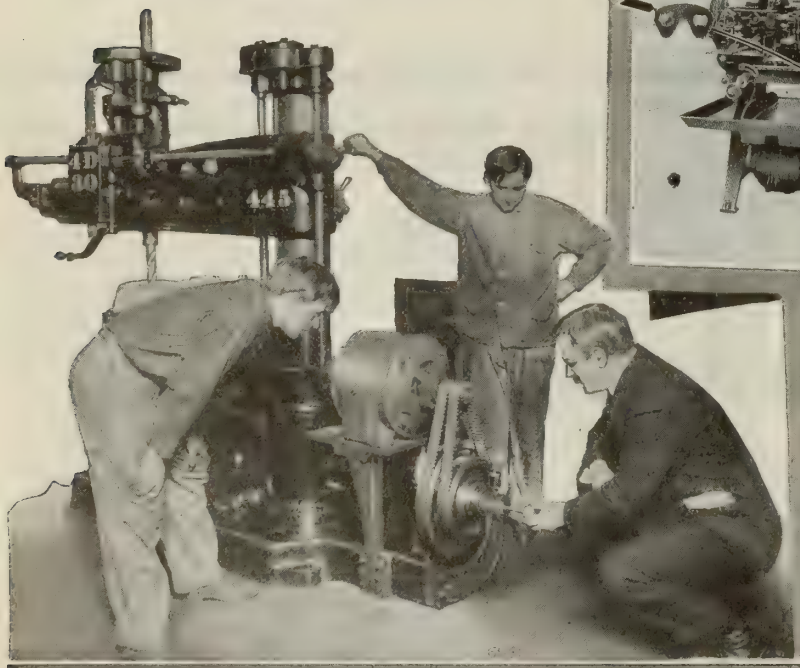
They permit short center drives, convenient location of driving parts and any speed reductions desired. They are 98.2% efficient—proven so by actual tests.

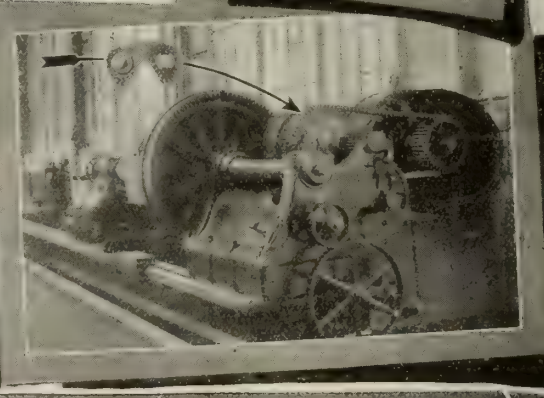
Our Machine Tool Book No. 312 gives details. Send for a copy.

200

CANADIAN LINK-BELT COMPANY
LIMITED
Wellington and Peter Sts.
TORONTO







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SILENT CHAIN DRIVES

We Also Make

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No. 12 Plain Milling Machine-Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....18 x 6 x 15 in.

For Further Information ASK YOUR DEALER or WRITE US DIRECT

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Spring and Varick Streets (*Visitors Welcome*) **50 Years New York City**

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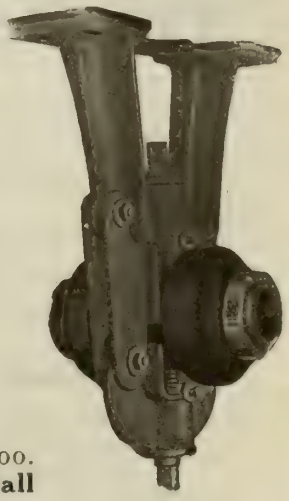

Double Ball Bearings

CONSERVE POWER! There is too much power going to waste the world over. This fact has been noted by the British Government and sweeping reforms are contemplated in Great Britain.

Canada also wastes much power. A reform is necessary here, too. Babbitt bearings are being used too often where **Chapman Double Ball Bearings** should prevail. The adoption of Chapman Double Ball Bearings, wherever an axle or shafting needs support in the transmission of power, results in a saving of 75% of friction loss.

Now in use in over 2,000 Canadian factories. Fit any adjustable hanger. Adopted by Canadian and United States Governments.

Write for full story of their efficiency.

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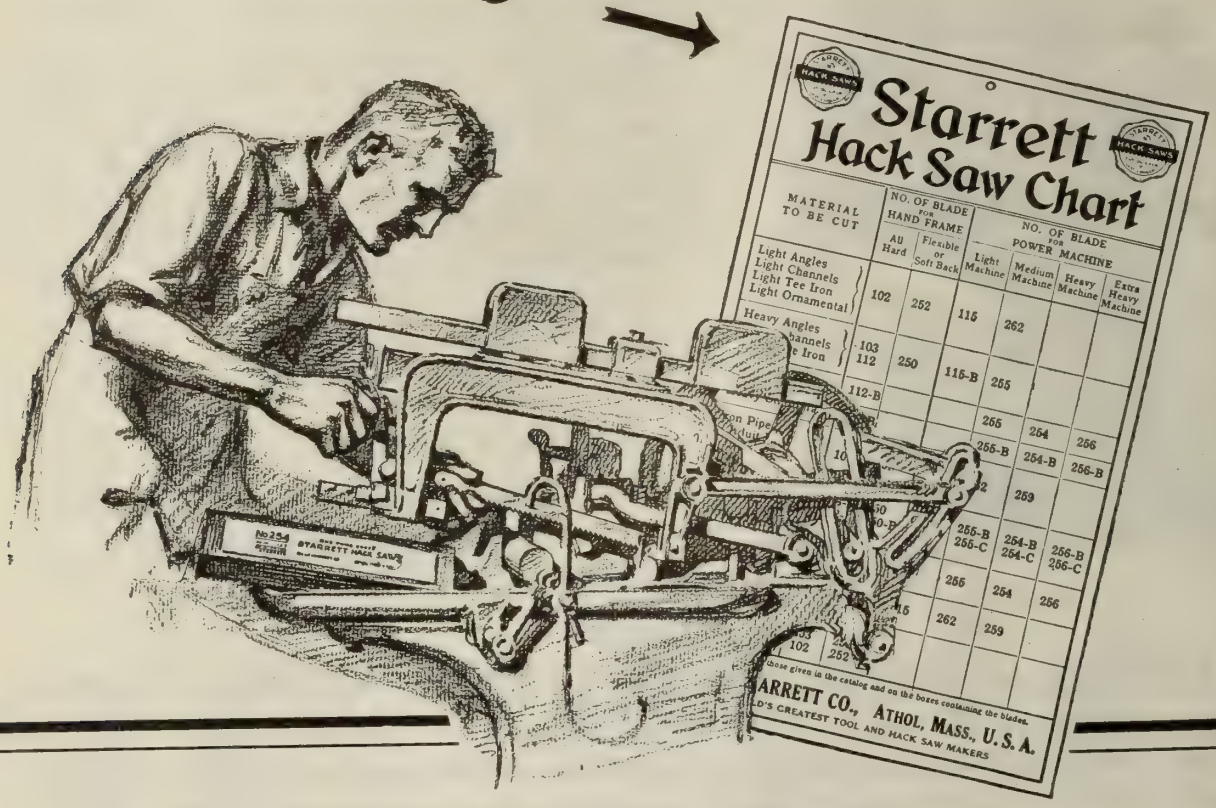
Room 408 Shaughnessy Bldg., Montreal. 339-351 Sorauren Ave., TORONTO, Canada.
Transmission Ball Bearing Co., Inc., 1050 Military Road, Buffalo, N.Y.

Your Metal Cutting Problems Solved if you use the



Cut Down Your Metal Cutting Cost

The Starrett Chart enables **you** to select the **proper** blade for **your** particular requirements, and was produced only after the most severe tests had been made on all classes of materials, being cut under various conditions.

Any one "Hack Saw" blade cannot be successfully used in cutting off Structural Steel, Iron or Brass Pipe, Cast Iron, Tool Steel or Sheet Metal. If that were practical, we would have made such a blade years ago.

Increase the Efficiency of Your Cutting-Off Department

Your cutting costs will never be reduced until you select the proper blades for your particular requirements. The Starrett Chart 3 gives you that information and you can **depend** upon its reliability.

State your mental cutting problems to us, our service department will conclusively prove the above statements to you.

Starrett Hack Saw Blades
Manufactured by

STARRETT HACK SAWS CUT QUICKER & LAST LONGER

The L. S. Starrett Company Athol, Mass., U.S.A.

The World's Greatest Toolmakers
Mdnufacturers of Hack Saws Unexcelled

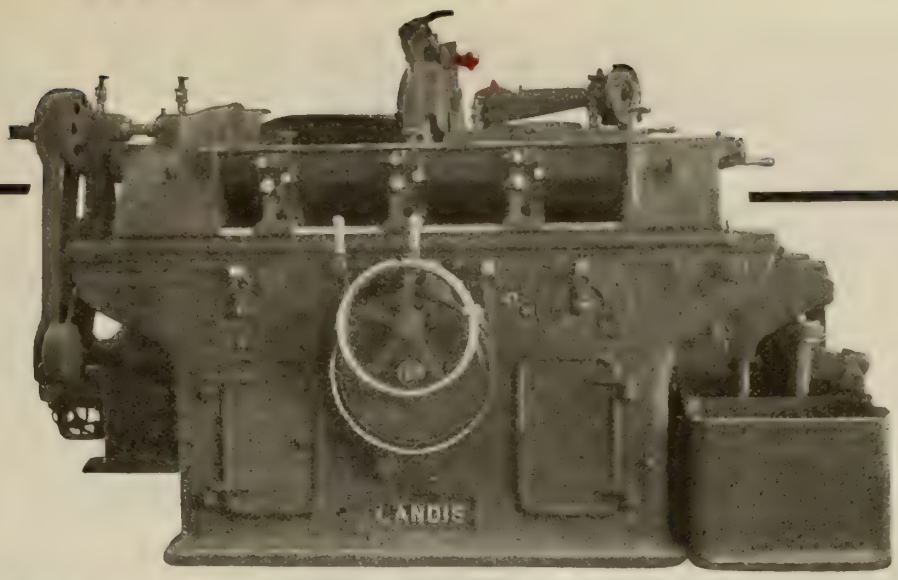
NEW YORK LONDON CHICAGO

STARRETT HACK SAWS CUT QUICKER & LAST LONGER

12-9.7

LANDIS

Plain
Self-contained
Grinding
Machine



You Can't Afford to Overlook These LANDIS Features

Work Table Stationary. The Landis principle of having the work table stationary secures it firmly on the bed.

Overhang Eliminated. The Landis Grinding Wheel Head, in its travel, never goes beyond the length of the bed. The Landis Grinding Wheel Head is directly above the carriage and supported between the wide, well set apart, carriage ways.

Downward Belt Pull. The wide, powerful, endless grinding wheel belt pulls directly back and down from the wheel spindle, tending to secure the base with the bed.

Our catalog gives complete data and specifications of various types of Landis Grinding Machines.

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50 Church Street, New York City

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Sole Canadian Rights to Manufacture the

"HYDE"

Anchor-Windlasses

Steering-Engines

Cargo-Winches

Which have stood the test of 50 YEARS

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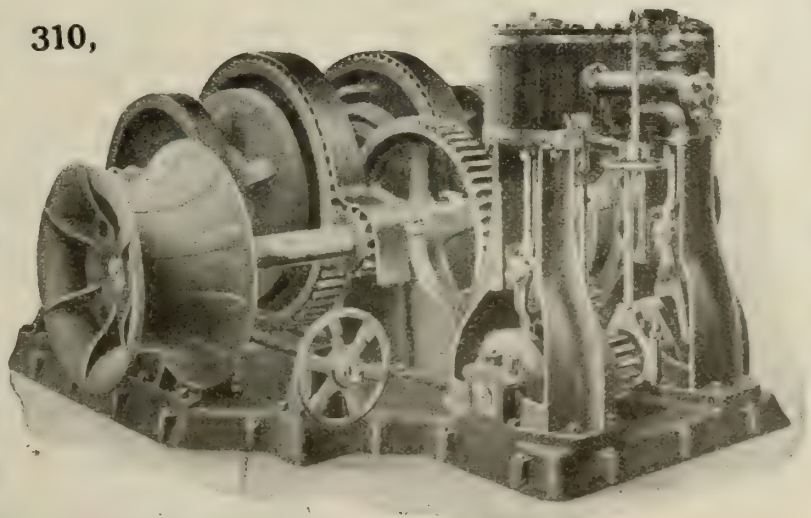

The "HYDE" Spur-Geared Steam Windlass

Propeller Wheels

Largest Stock in Canada.

Heavy Gears,
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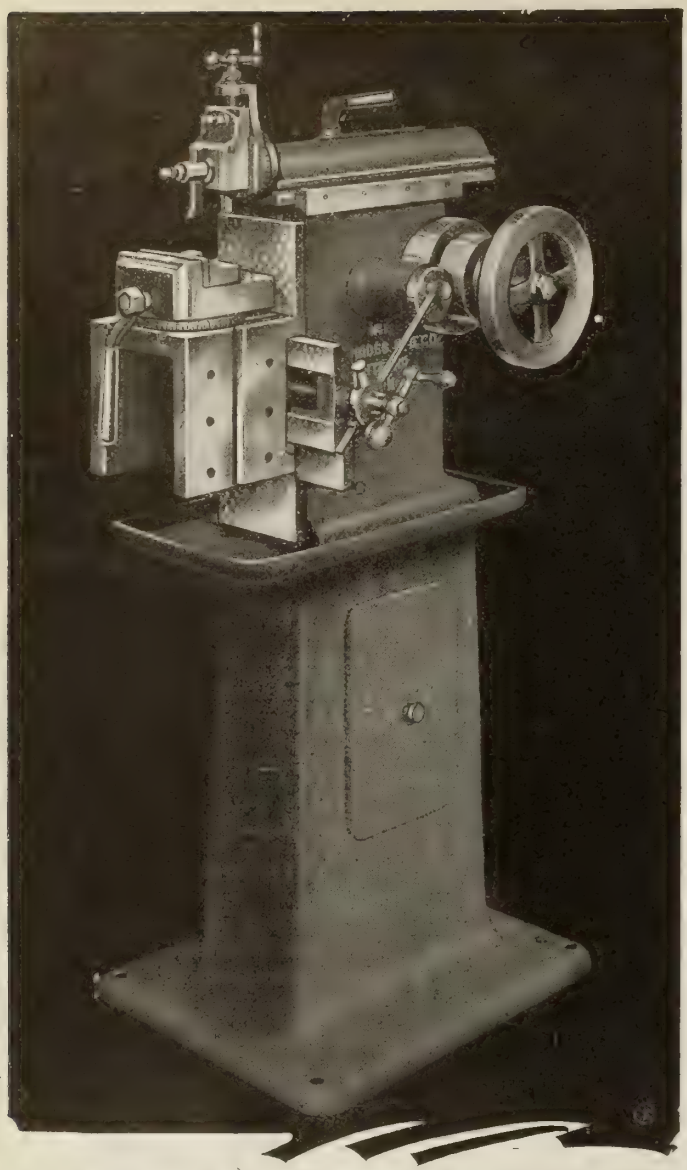

RHODES

Vertical and Horizontal Shaper Gives Maximum Efficiency at Minimum Cost

Don't do your shaping and slotting, tool-making, die-making, modeling and other classes of light work on big and expensively-operated machines when all this work can be done more accurately, quicker and cheaper by far, with the RHODES Machine. Being introduced all over the world on their cost-cutting merits.

They will increase your profits. Look into the matter. Write for description of various types—do it now.

The Rhodes Mfg. Co.

Owned and operated by the JACOBS MFG. CO.
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Don't Let Your Men Work with Dull Files

Tell them to turn them in when they have passed their "efficient point."

By doing so you will get more and better work from the men. You will save money because labor is more costly than material and your men will be better satisfied because no man likes to work with poor tools.

The files that give the longest efficiency are the "Famous Five."

Specify Them When Ordering.
They Are:

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GREAT WESTERN
AMERICAN
ARCADE
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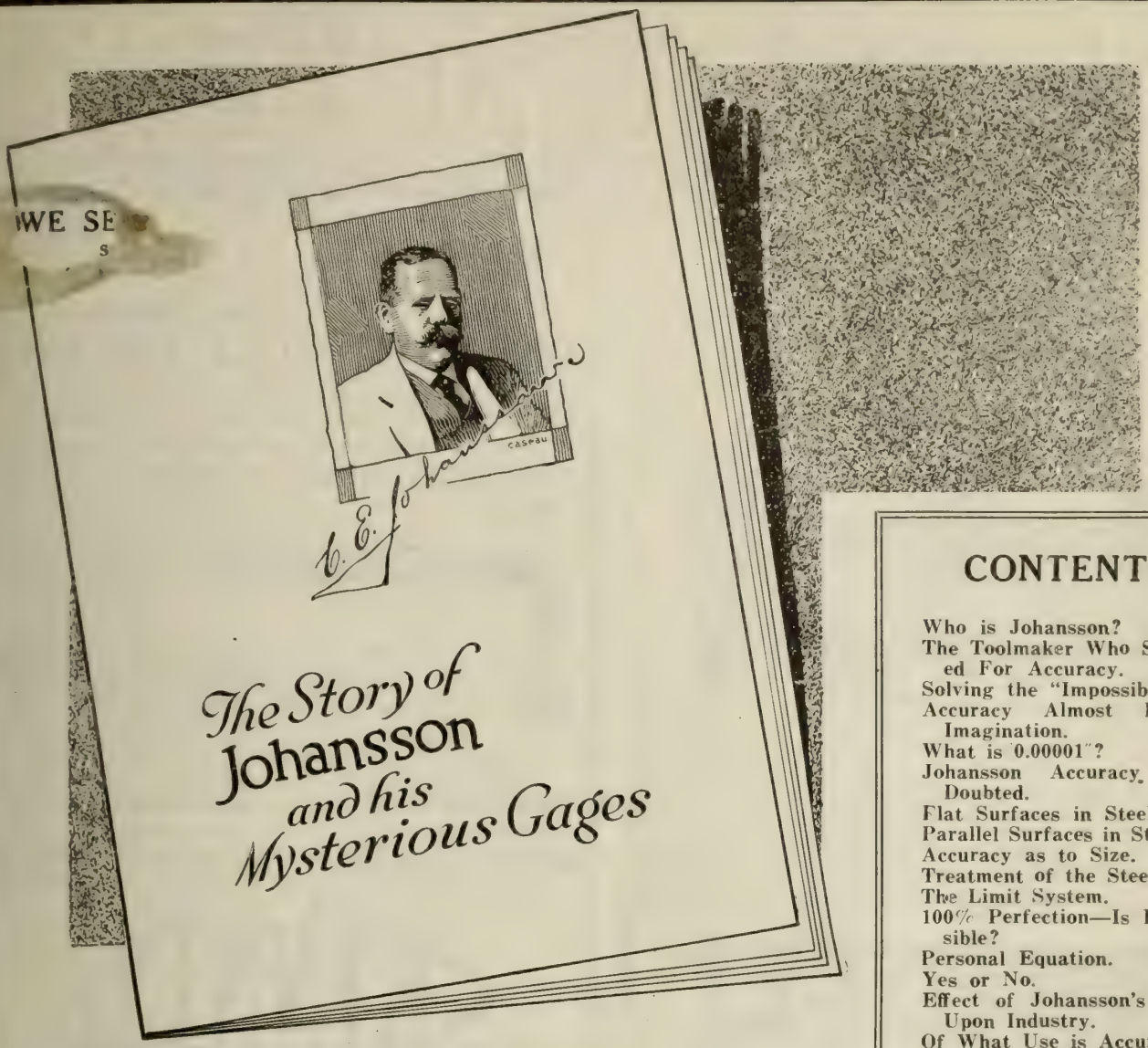
Made in Canada by



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Solving the "Impossible."
Accuracy Almost Beyond Imagination.
What is 0.00001"?
Johansson Accuracy Once Doubted.
Flat Surfaces in Steel.
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Accuracy as to Size.
Treatment of the Steel.
The Limit System.
100% Perfection—Is It Possible?
Personal Equation.
Yes or No.
Effect of Johansson's Work Upon Industry.
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Thousands of shop men will get a real evening's pleasure from this Johansson story, because it is about a subject which has been surrounded with mystery.

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Machinery 3-19

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Clean cut socket holes, free from chips. Accurately threaded to standard gauges. Test them where great strength is desirable.

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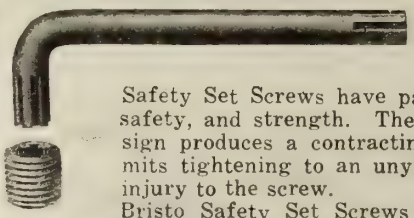
BUILDERS OF MACHINERY
WHAT SET SCREWS DO YOU USE?



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Safety Set Screws have passed every test for safety, and strength. The patented fluted design produces a contracting effect which permits tightening to an unyielding grip without injury to the screw.

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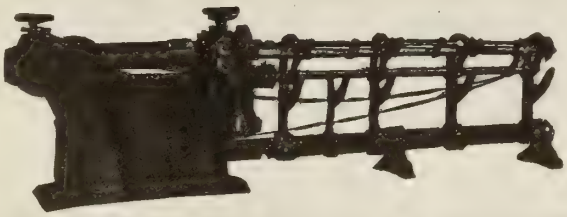

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and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

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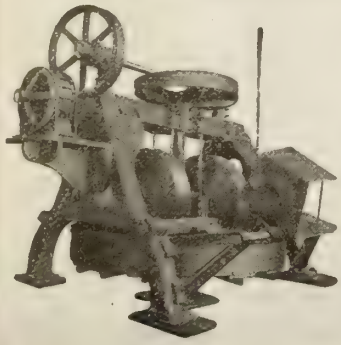

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Unloading Device
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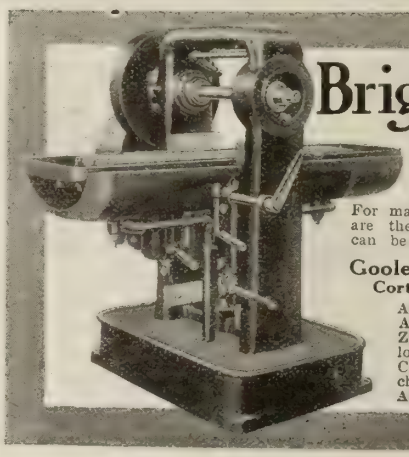

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Briggs Millers are wide range manufacturing machines, capable of heavy cuts and high speeds.

For many classes of work they are the most economical that can be installed.

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Trade Mark Reg. U. S. Pat. Office

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Catalog No. 6.

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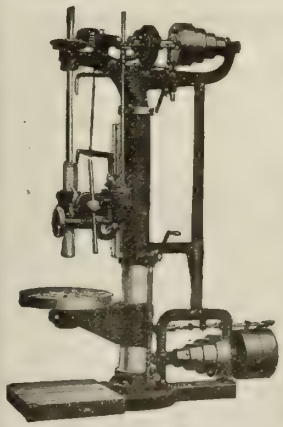

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For 64 years these upright Drilling Machines have served well in the States and Canada.

Write for full description of our 20" and 25" sizes.

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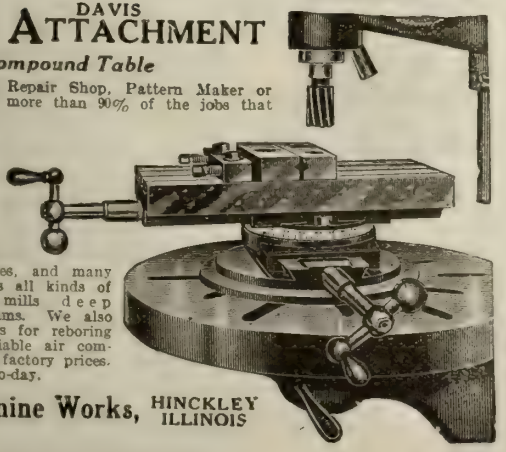
and Compound Table

For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.



For any Drill Press 14" to 42" swing. For Economy — Big Convenience— Small Price. It relieves your large millers, comes in handy spotting castings, milling ends of bosses, and many other odd jobs. Cuts all kinds of keyseats perfectly; mills deep grooves, slots and cams. We also make cylinder reamers for reboring Ford car, and a reliable air compressor—all at special factory prices. Write for circulars to-day.

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"MADE IN CANADA"

"Type D" Electric Hoist

Electric Travelling Cranes, Hand Cranes, Electric Hoists, Air Hoists, Foundry Equipment, Cupolas, Ladles, etc., etc.

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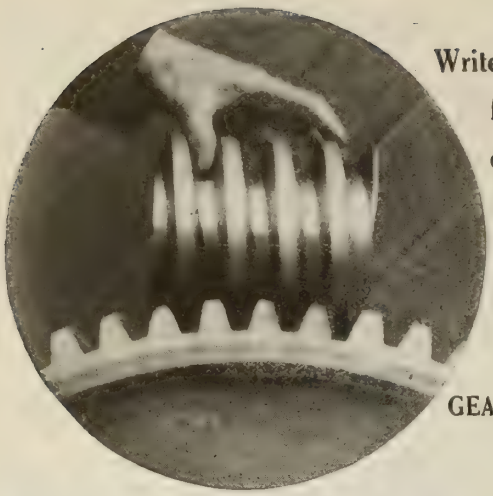
WALKERVILLE, ONTARIO



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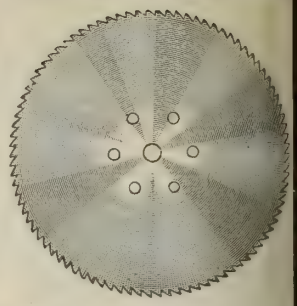

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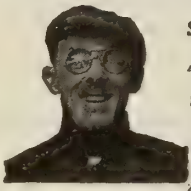

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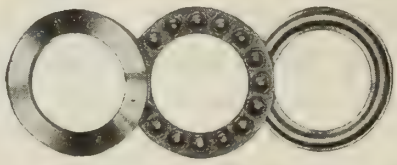

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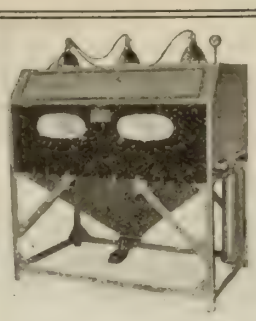

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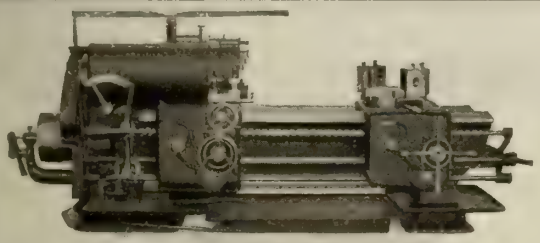

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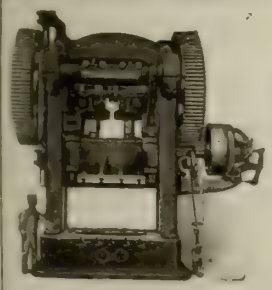

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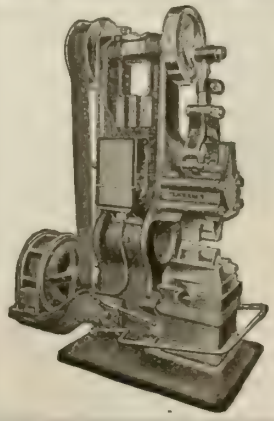

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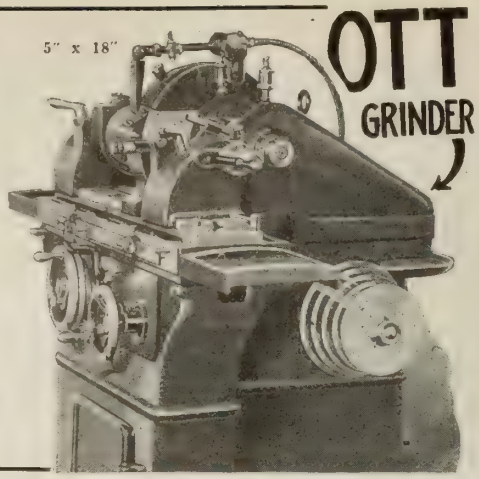

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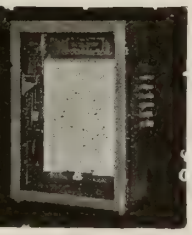

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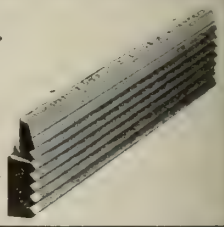

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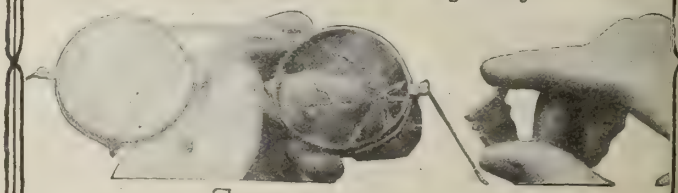

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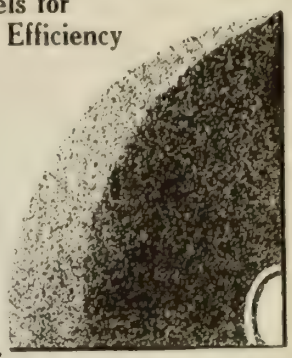

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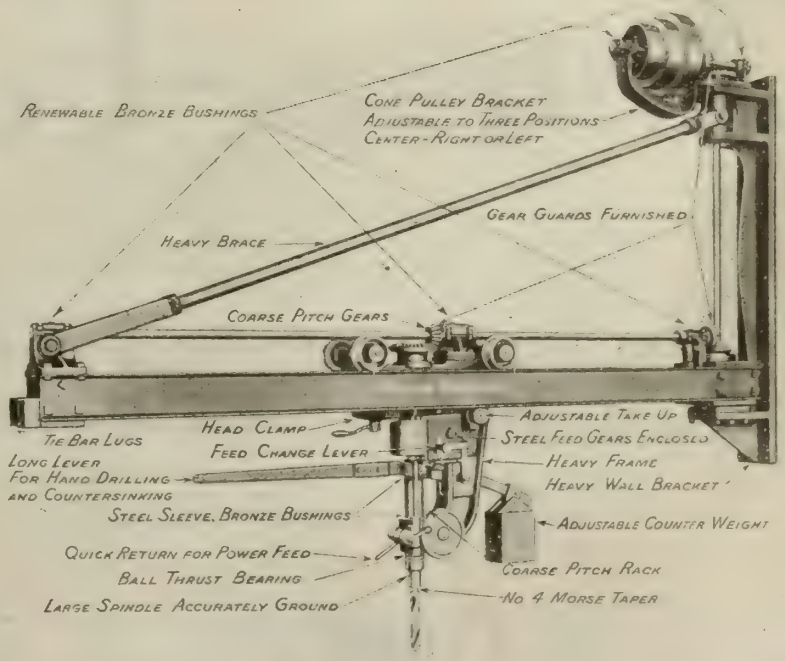

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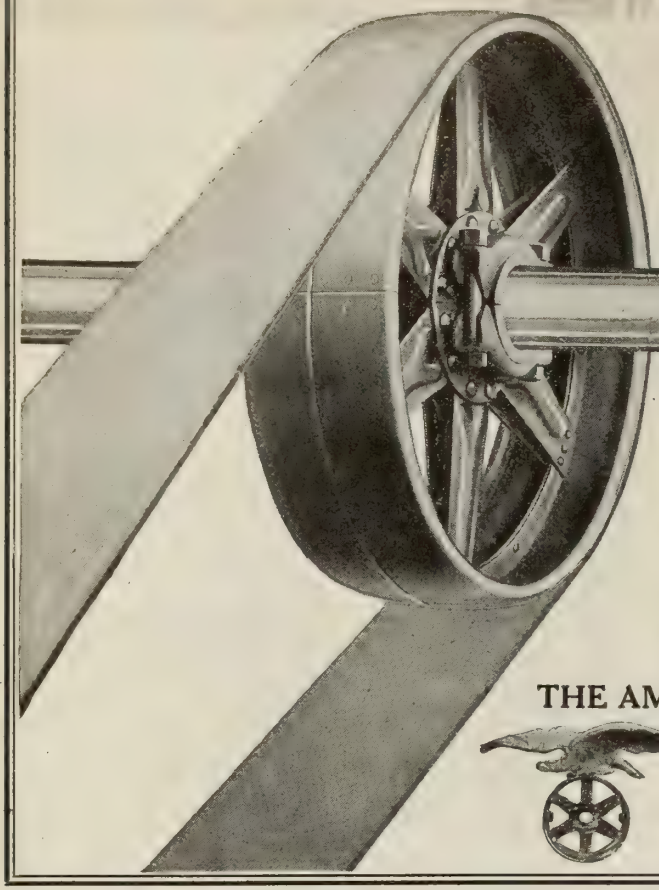

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Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BLOW PIPES AND REGULATORS
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Prest-O-Lite Co., Inc., Toronto, Ont.

BLUE PRINTING MACHINERY
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Mulliner-Edlund Tool Co., Syracuse, N.Y.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que.
Joyce, Koebel & Co., Inc., New York.

BOLT CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Riverside Machinery Depot, Detroit, Mich.

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Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BOLTS, SPRING SHAKLE
Can. Winkley Co., Ltd., Windsor, Ont.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich.
Williams Machinery Co., A. R., Toronto
Williams & Wilson, Ltd., Montreal, Que.

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Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
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Swedish Crucible Steel Co., Windsor, Ont.

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Gardner & Son, Robt., Montreal.
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Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Fittings, Ltd., Oshawa, Ont.
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Wilson & Co., J. C., Belleville, Ont.

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Gisholt Machine Co., Madison, Wis.
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Knight Metal Products, Ltd., Toronto, Ont.
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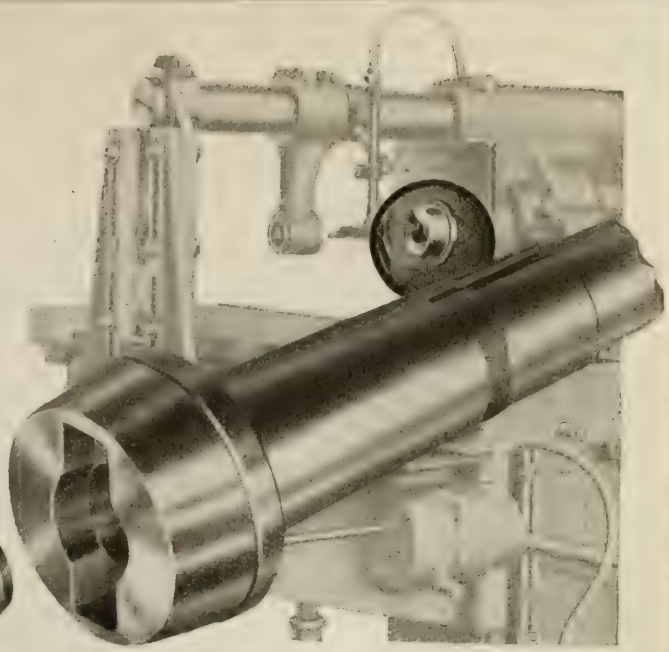

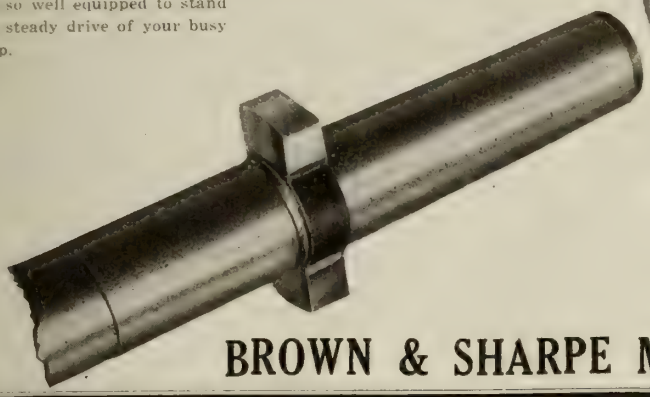

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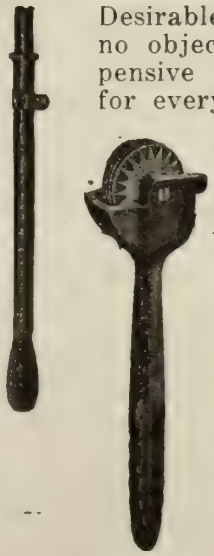

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Williams & Wilson, Limited, Montreal, Que.

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Bertram & Sons Co., John, Dundas.
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Garvin Machine Co., New York.
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Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
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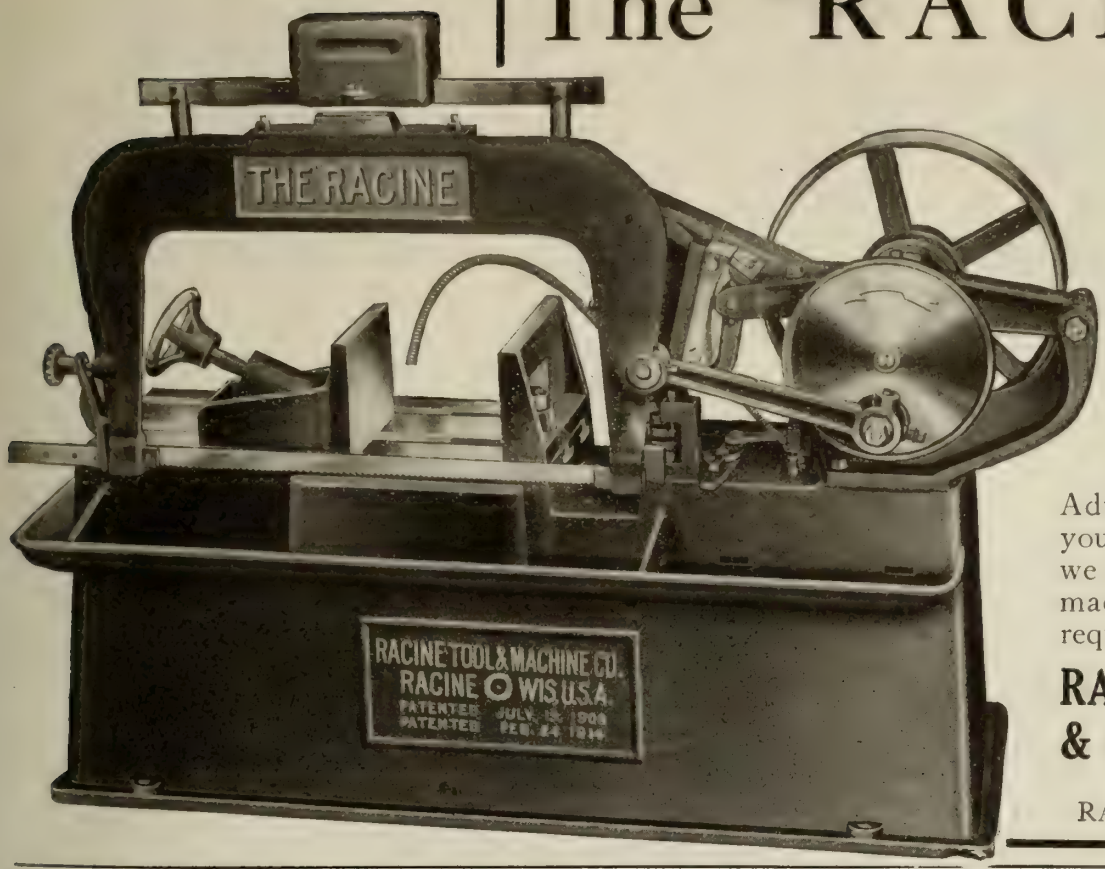

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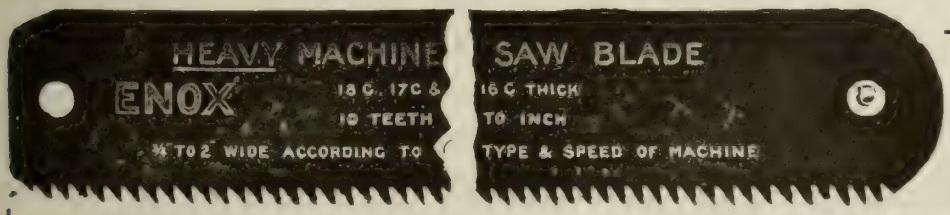

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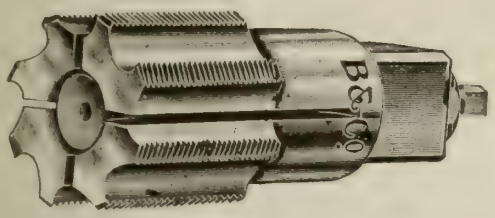

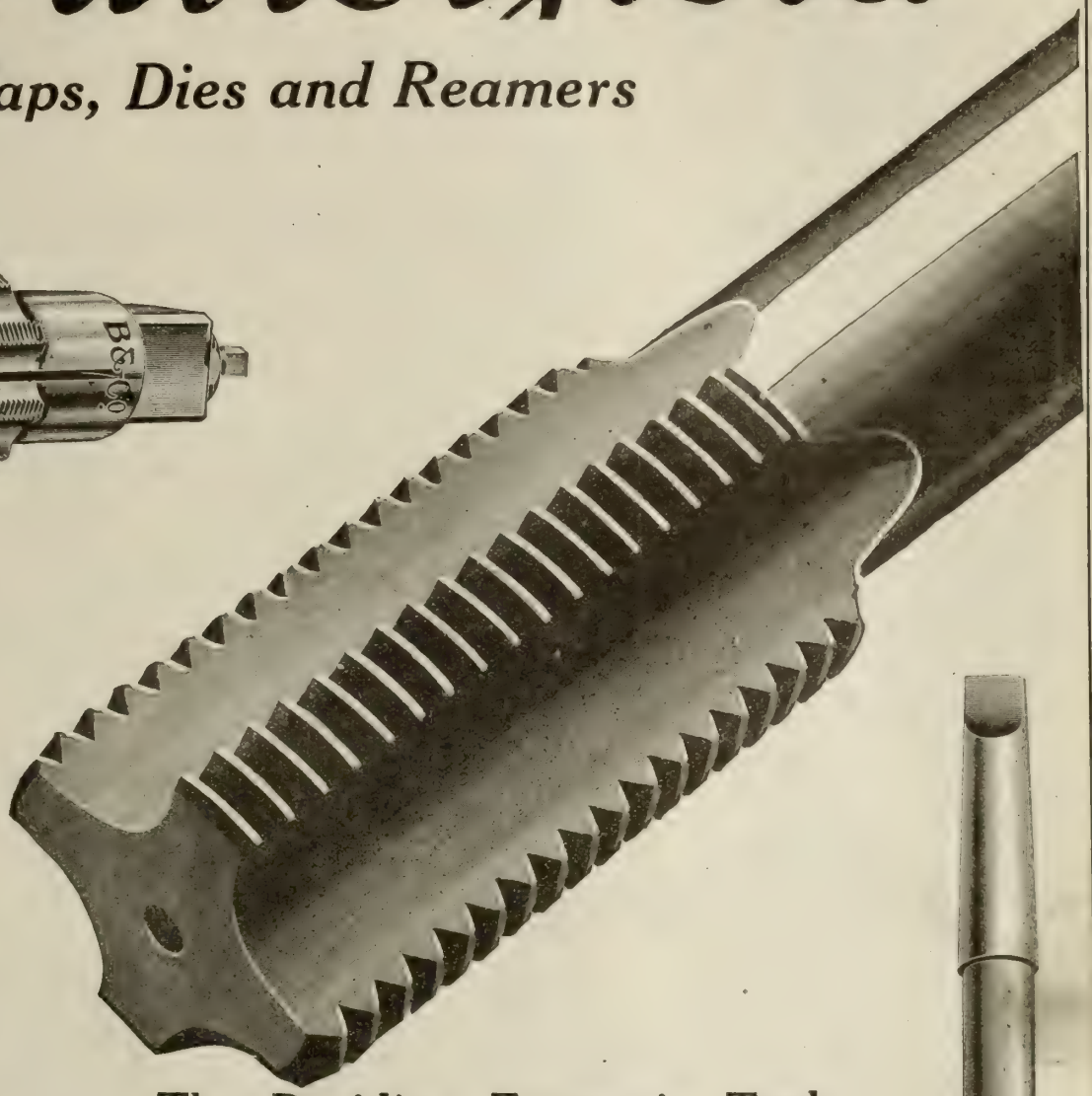

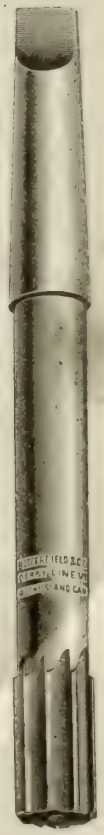

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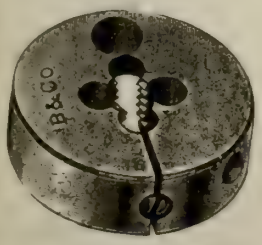

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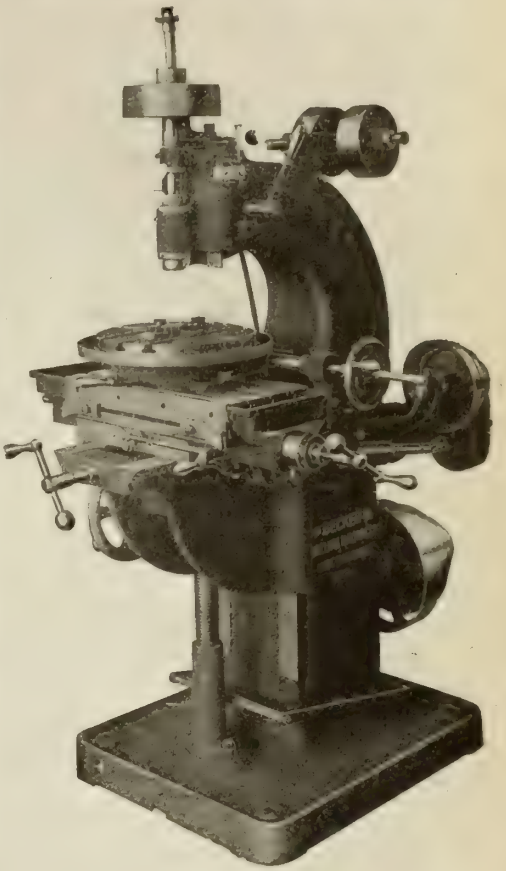

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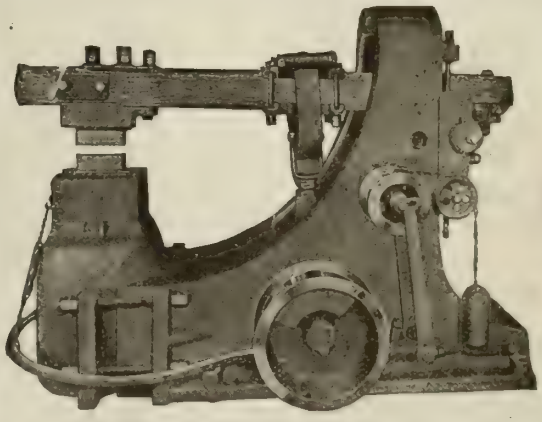

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INDICATING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

INGOT METAL
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
United Brass & Lead Ltd., Toronto.

INGOTS, STEEL
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

INSTRUMENTS, ENGINEERING
Consolidated Optical Co., Toronto, Ont.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

IRON SAND
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

IRON, WROUGHT, ROLLED AND PIG
Swedish Steel & Importing Co., Ltd., Montreal.

IRREGULAR CUTTING SHEARS
Quickwork Co., St. Marys, Ohio.

JACKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK
Canadian Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

JAWS, FACE PLATE
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JIGS, TOOLS, ETC.
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt.
Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.
Normac Machine Co., St. Catharines, Ont.

JOURNAL WEDGES
Canada Foundries & Forgings, Ltd., Welland, Ont.

KEY SEATERS
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

KEYS, MACHINE
Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

KILNS
Can. Blower & Forge Co., Kitchener, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

LABELS AND TAGS
Matthews, Jas. H. & Co., Pittsburgh, Pt.

LABORATORIES, INSPECTION AND TESTING (SEE CHEMISTS)

LADLES, FOUNDRY
Northern Crane Works, Walkerville.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

LAMPS, INCANDESCENT AND NITROGEN
Can. Laco-Philips Co., Toronto, Ont.

LAMPS, TUNGSTEN
Can. Laco-Philips Co., Toronto, Ont.

LATHES, CHUCKING
Acme Machine Tool Co., Cincinnati, Ohio.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHE CHUCKS (SEE CHUCKS)

LATHE DOGS AND ATTACHMENTS
Armstrong Bros. Tool Co., Chicago.
Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

LATHES, AUTOMATIC AND SEMI-AUTOMATIC
Gisholt Machine Co., Madison, Wis.
Wood Turret Machine Co., Brazil, Ind.

LATHES, AXLE
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, BORING
Bridgeford Mach. Tool Wks., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, PRECISION, BENCH
W. F. & John Barnes Co., Rockford.
Blount, J. G., & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, BAND TURNING
Roelofson Machine & Tool Co., Toronto, Ont.

LATHES, BRASS
Acme Machine Tool Co., Cincinnati, Ohio.
Hardinge Bros., Inc., Chicago, Ill.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, ENGINE
Acme Machine Tool Co., Cincinnati, Ohio.
John Bertram & Sons Co., Dundas.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Lathe & Tool Co., Cincinnati, O.
Cisco Machine Tool Co., Cincinnati, Ohio.
Wickes Bros., Saginaw, Mich.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
Kennedy & Sons, Wm., Owen Sound, Ont.
R. McDougall Co., Galt.
Miles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
Smalley-General Co., Inc., Bay City, Mich.
Sidney Tool Co., Sidney, Ohio.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blasdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

LATHES, HORIZONTAL
Wood Turret Machine Co., Brazil, Ind.

LATHES, METAL TURNING
Cisco Machine Tool Co., Cincinnati, Ohio.
Fittings, Ltd., Oshawa, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, JOURNAL TRUEING
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, PATTERNMAKERS'
J. G. Blount Co., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Wood Turret Machine Co., Brazil, Ind.
Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, POLISHING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SINGLE PURPOSE
Baxter & Co., Ltd., J. R., Montreal, Que.
Bertram, John, & Sons Co., Dundas Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Plessisville Foundry, Plessisville, Que.
Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SCREW CUTTING
Bertram, John, & Sons Co., Dundas, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPEED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPINNING
Bliss, E. W., Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.
Williams & Wilson, Limited, Montreal, Que.

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Cisco Machine Tool Co., Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TURRET, HAND, HORIZONTAL
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Bertram, John, & Sons Co. Dundas Ont.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
H. C. Dodge, Inc., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

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Standard Optical Co., Geneva, N.Y.

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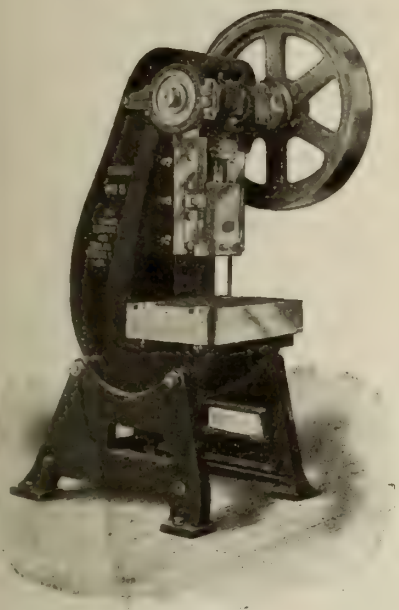

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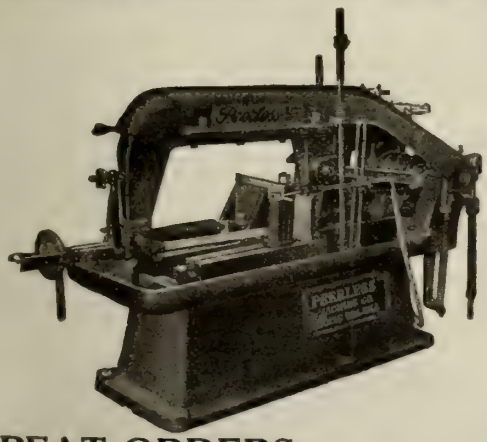

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Here we are talking about repeat orders again, but if you could see the way they come in you would pardon our dwelling on that subject.

The one striking feature about our repeat orders is that so many of them come from large concerns who had been reasonably satisfied with other standard makes before they put in their first PEERLESS High-Speed, and since then they have sent us order after order for more and more of our machines.

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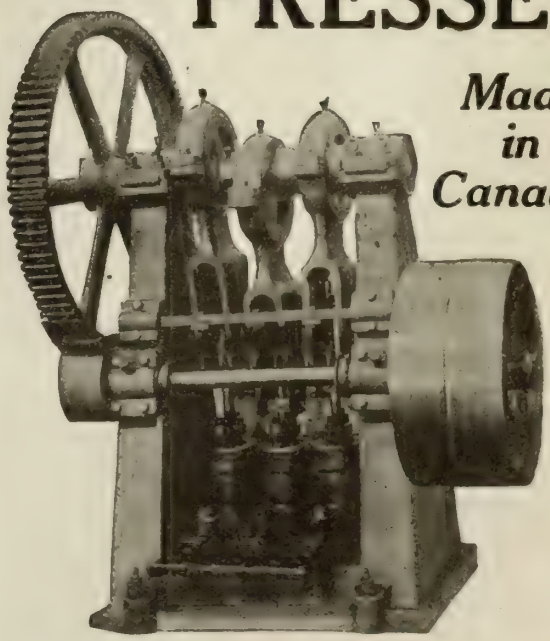

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Garlock-Walker Machy. Co., Toronto, Ont.
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Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.

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Prest-O-Lite Co., Inc., Toronto, Ont.
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Williams & Wilson, Ltd., Montreal, Que.

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Norton Grinding Co., Worcester, Mass.

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MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Williams & Wilson, Limited, Montreal, Que.

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Morse Twist Drill & Mach. Co., New Bedford, Mass.
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Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

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Taylor, J. A. M., 518 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

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Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Steptoe Co., The, John, Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
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Ford-Smith Mach. Co., Hamilton, Ont.
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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
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Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

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Sheldons, Ltd., Galt, Ont.

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Can. Fairbanks-Morse Co., Montreal.
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A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
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Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

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Williams & Wilson, Ltd., Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.

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Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

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NAILS
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Pritchard-Andrews Co., Ottawa, Ont.

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Wilkinson & Kompass, Hamilton, Ont.

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National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

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Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Elm Cutting Oil Co., Toronto, Ont.

OILS, DRAWING
Elm Cutting Oil Co., Toronto, Ont.

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Sheldon's, Ltd., Galt, Ont.

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MacKinnon Steel Co., Sherbrooke, Que.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
Brantford Oven & Rack Co., Brantford, Ont.

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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

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New Britain Mach. Co., New Britain, Conn.

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Gutta Percha & Rubber, Ltd., Toronto, Can.
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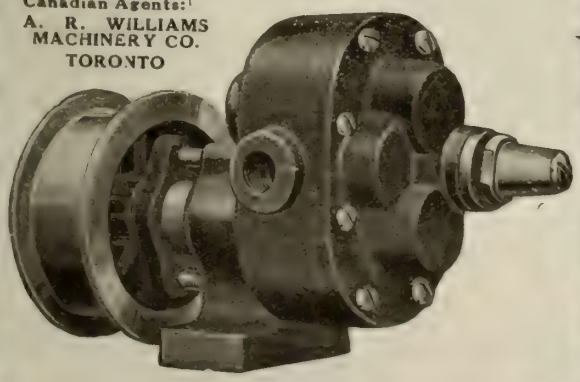

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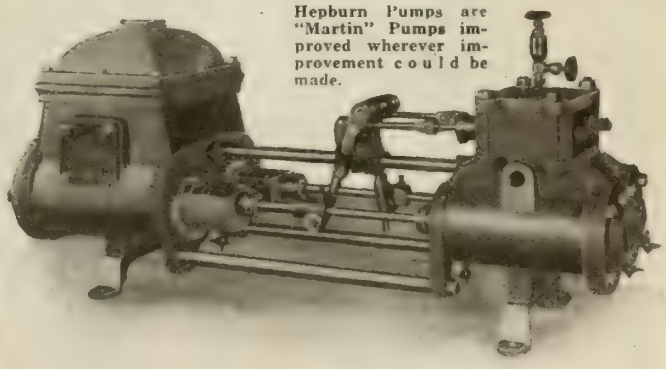
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



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Greenfield Tap & Die Corp., Greenfield, Mass.
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E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
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Hydraulic Machy. Co., Ltd., Montreal, Que.
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Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.

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Smalley-General Co., Inc., Bay City, Mich.

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Niles-Bement-Pond Co., New York.
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Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

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William R. Perrin, Ltd., Toronto.
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West Tire Setter Co., Rochester, N.Y.
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Consolidated Press Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
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Toledo Machine & Tool Co., Toledo.
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Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
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Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto.
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn.
Williams & Wilson, Limited, Montreal, Que.

PULLEYS, BELT
American Pulley Co., Philadelphia, Pa.

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MacKinnon Steel Co., Sherbrooke, Que.

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Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Trahern Pump Co., Rockford, Ill.

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Metalwood Mfg. Co., Detroit, Mich.
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Williams & Wilson, Limited, Montreal, Que.

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EYE SAFE

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SHATTER-PROOF LENS

SAFETY GOGGLES

ANY glass goggle lens will break under a sufficiently hard blow. The wearer and his employer are primarily interested in what happens when the lens breaks—whether the splinters are driven into the eyes of the wearer or stay in the frame.

That's where the Stoco **Celoglas** shatter-proof lens saves the day. Even though it may be fractured by a flying missile, the lens will remain intact in the frame and no particles of glass can fly in the eyes.

Stoco Safety goggle frames with **Celoglas** lenses are the ideal eye protection. The Stoco frame is the strongest ever made for eye protection purposes. It protects around and **between** the eyes, and is so sturdily constructed that it will ward off any ordinary missile without inconvenience to the wearer. Light in weight and extremely comfortable in use. Lenses may be changed without the aid of special tools.

Made with easy cable ear-bows, as illustrated, or elastic head-bands, at the same price.

Price with CELOGLAS shatter-proof lenses $115.00 per hundred pairs

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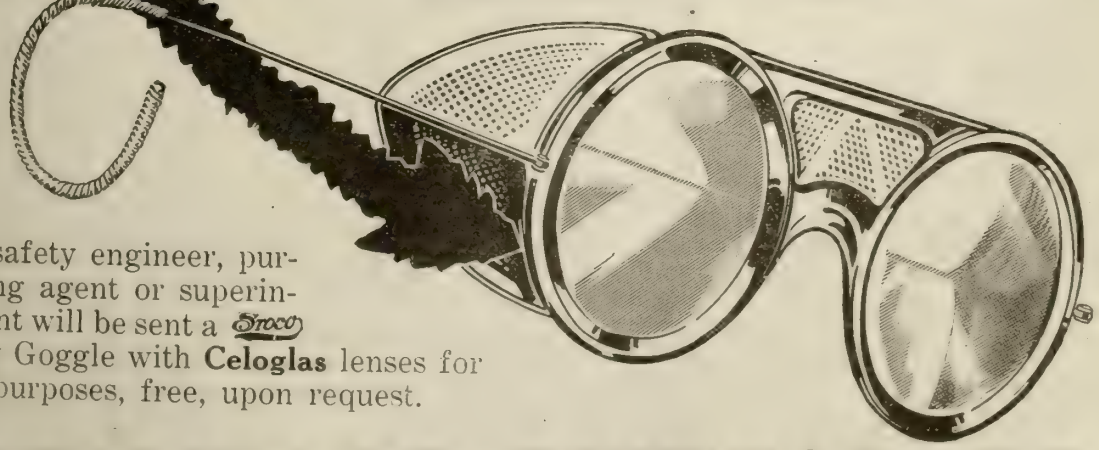
Stoco **Celoglas** lenses are earnestly recommended for all extra hazardous occupations.



Any safety engineer, purchasing agent or superintendent will be sent a Stoco Safety Goggle with **Celoglas** lenses for trial purposes, free, upon request.

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Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Wells Bros. of Can., Galt, Ont.

REAMERS, PIPE, SHELL
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Taylor Instrument Co., Rochester, N.Y.

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Steel Co. of Canada, Ltd., Hamilton, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada Ltd., Hamilton, Ont.

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Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

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Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.
F. B. Shuster Co., New Haven, Conn.

ROAD BUILDING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

RODS
General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich.

ROLLER CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Limited, Montreal, Que.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont.

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

RULES, STEEL, STRAIGHT AND FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOXWOOD, FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOARD AND LONG
Lufkin Rule Co. of Can., Windsor, Ont.

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

SAND BLAST MACHINES
Pangborn Corporation, Hagerstown, Md.

SAND BLAST SUPPLIES AND ACCESSORIES
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
Pangborn Corporation, Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SASH WEIGHTS AND WRENCHES
Fittings, Ltd., Oshawa, Ont.

SAWS, CIRCULAR METAL
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAW SHARPENERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

SAWS, SLITTING
Taylor, J. A. M., Stair Bldg., Toronto, Ont.

SCALES, MECHANICS'
Lufkin Rule Co. of Can., Windsor, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCREENING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

SCREW MACHINE PRODUCTS
Galt Machine Screw Co., Galt, Ont.
Knight Metal Products, Ltd., Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

SCREW MACHINES, HAND, AUTOMATIC
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
H. C. Dodge, Inc., Boston, Mass.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que.

SCREW MACHINES, AUTOMATIC MULTIPLE SPINDLE
H. C. Dodge, Inc., Boston, Mass.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.

SCREWS
Can. B. K. Morton, Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SCREW SLOTTERS
Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Williams & Wilson, Limited, Montreal, Que.

SEPARATORS, MOISTENERS AND OIL FOR COMPRESSED AIR
Pangborn Corporation, Hagerstown, Md.

SELF-OPENING DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

SEPARATORS, SAND
Pangborn Corporation, Hagerstown, Md.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn., U.S.A.
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Rhodes Mfg. Co., Hartford, Conn.
Stentoe Co., John, Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

SHAFTING
Algoma Steel Corp., Sault Ste. Marie, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Jones & Glassco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

SHARPENING STONES
Norton Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas
Bertrams, Ltd., Edinburgh, Scotland
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

SHEARS, POWER
John Bertram & Sons Co., Dundas
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
A. B. Jardine & Co., Limited, Hespeler, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

DODGE PRODUCTS

Turret Lathes

We are manufacturers of a line of Turret Lathes embodying original features which have been tested and not found wanting by *time* and *hard* and *varied* uses.

The Dodge Features, Etc.

The Dodge features—only in our lathes—minimize floor space—cut out long and superfluous belting—reduce shafting, hangers and pulleys—stimulate the operator—increase production—reduce manufacturing costs.

Our line of lathes, made in several sizes, we recommend to all shops making products from bar stock, castings or forgings. For duplicating work they are unexcelled for quality and quantity production.

Printed matter will be mailed you promptly upon request.

Screw Machine Products

Under our roof, as a separate department, supervised by its own superintendent, and operated by another force of men, independent of the lathe business, we have two of the largest batteries of screw machines that can be found in any shop. One battery consists entirely of automatic screw machines, the other is wholly hand-operated turret lathes. With this equipment and organization we are in a particularly good position to manufacture hand and automatic screw machine and metal products *in volume, with precision* and *on time.*

Send us samples, prints, sketches, or a rough description of any work you have of this character and we will quote you or have our representative call, if desired.

H. C. DODGE, INCORPORATED

Machinery Manufacturers

Hand and Automatic Screw Machine Products

BOSTON—32 to 46 Alger Street—MASS.

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.
SHEET METAL ROLLING MACHINES
Peck, Stow & Wilcox Co., Southington, Conn.
SHEARS, SPLITTING
Peck, Stow & Wilcox Co., Southington, Conn.
SHEET METAL MACHINERY
Peck, Stow & Wilcox Co., Southington, Conn.
SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.
SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Peck, Stow & Wilcox Co., Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.
SHEETS, CRUCIBLE, CAST
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
STAMPING
Canadian Cartridge Co., Ltd., Hamilton, Ont.
SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont
SHELL BANDING MACHINES, HYDRAULIC
Garlock-Walker Machy. Co., Ltd., Toronto, Ont
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y
SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.
SHELVING, STEEL
Dennis Wire & Iron Works, London, Ontario.
SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.
SHIPBUILDING
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
SHOP FURNITURE
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal
Williams & Co., J. H., Brooklyn, N.Y.
SILENT CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilkinson & Kompass, Hamilton, Ont.
SLEDGES, CAST IRON
Katie Foundry, Galt, Ont.
SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.
SMOKESTACKS
Canadian Welding Works, Montreal, Que
MacKinnon Steel Co., Sherbrooke, Quebec.
Marsh Engineering Works, Belleville, Ont.
SNIPS, TINNERS AND SHEET METAL WORKERS'
Kearney & Trecker Co., Milwaukee, Wis.
SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Que. Lewis & Son, Toronto, Ont.
SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn.
SOIL PIPE FITTINGS, CAST IRON
Katie Foundry, Galt, Ont.
SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto
SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead, Ltd., Toronto.
SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
SPIKES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
SPLICING CLAMPS
Peck, Stow & Wilcox Co., Southington, Conn.
SPRINGS, MACHINERY
Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont
Jas. Steele, Ltd., Guelph, Ont.
SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.
Banfield, W. H., & Sons, Toronto.
Beaver Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont
Elliott & Whitehall Mach. & Tool Co., Galt, Ont
Ferracute Mach. Co., Bridgeton, N.J
Ford-Smith Machine Co., Hamilton, Ont.
Garlock Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
Katie Foundry Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Mulliner & Edlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co. Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont.
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.
SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.
SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
SPROCKETS, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.
SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.
SPROCKET WHEELS, CHILLED THREAD
Katie Foundry, Galt, Ont.
SQUARES
Peck, Stow & Wilcox Co., Southington, Conn.
STAYBOLT TOPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
STAIRS, IRON
Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.
STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont
Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.
STAMPINGS, METAL
American Pulley Co., Philadelphia, Pa.
STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.
STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.
STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.
STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec
STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
STEEL BALLS
Rochester Ball Bearing Co., Rochester, N.Y.
STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y
Illingworth Steel Co., John, New York, N.Y
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Canada, Montreal, Que
Boker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Latrobe Electric Steel Co., Latrobe, Pa
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL, CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S
Swedish Crucible Steel Co., Windsor, Ont.
STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.
STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y
Latrobe Electric Steel Co., Latrobe, Pa
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.
STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.
STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.
STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.
STELLITE, HIGH-SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.
STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que.
Drury, H. A., Co., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
New Britain Machine Co., New Britain, Conn.
STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain, Conn.
STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.
STRAND
Page Steel & Wire Co., Adrian, Mich.
SUPPLIES, CONTRACTORS'
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
STRUCTURES, STEEL BUILDINGS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
SYSTEMS, REMOTE CONTROL FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
STORAGE AND HANDLING SYSTEMS FOR DRY CLEANERS, AND NAPHTHA
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, RECLAIMING, FOR OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, RAILWAY OIL, STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, PAINT, OIL STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, OIL STORAGE AND DISTRIBUTING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.
TABLES, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.
TACK (DOUBLE POINT) MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.
TAPPING MACHINES (PENUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto
TANKS, GASOLINE, KEROSENE AND OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
TANKS, LUBRICATING OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANKS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANKS, STEEL, WATER PRESSURE
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto
TANKS, UNDERGROUND STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto
TANKS, WHEEL, FOR LUBRICATING OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.
TAPPING MACHINES AND ATTACHMENTS
Bertram, John, & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Niles-Bement-Pond Co., New York
Rickert-Shafer Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

TAPES—MEASURING, STEEL AND WOVEN
Lufkin Rule Co. of Can., Windsor, Ont.

TAPES, POCKET
Lufkin Rule Co. of Can., Windsor, Ont.

TAPS, ADJUSTABLE
Baxter Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.

TAPS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, GUN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, STAYBOLT, "MAX" TAP
Greenfield Tap & Die Corp., Greenfield, Mass.
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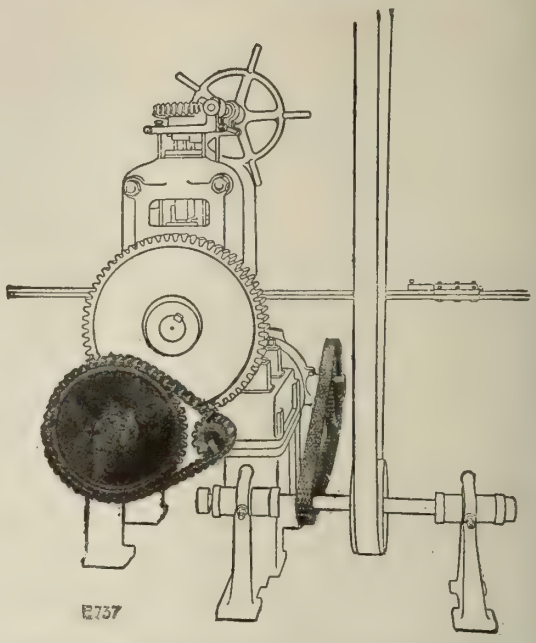

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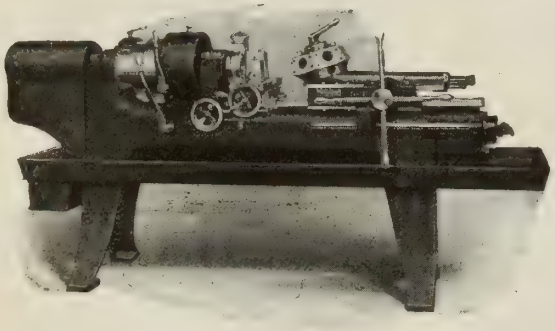

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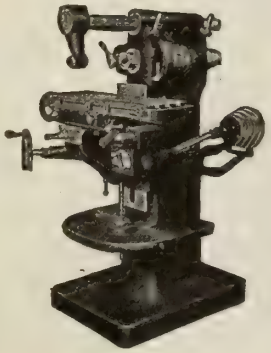

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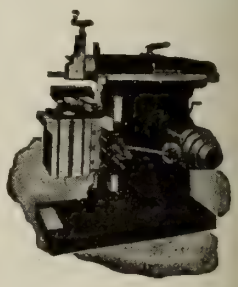

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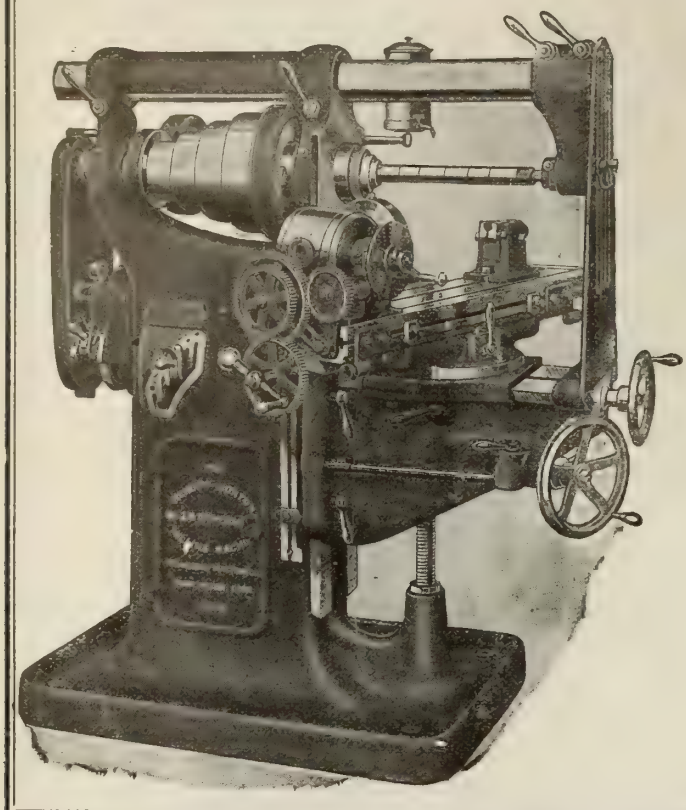

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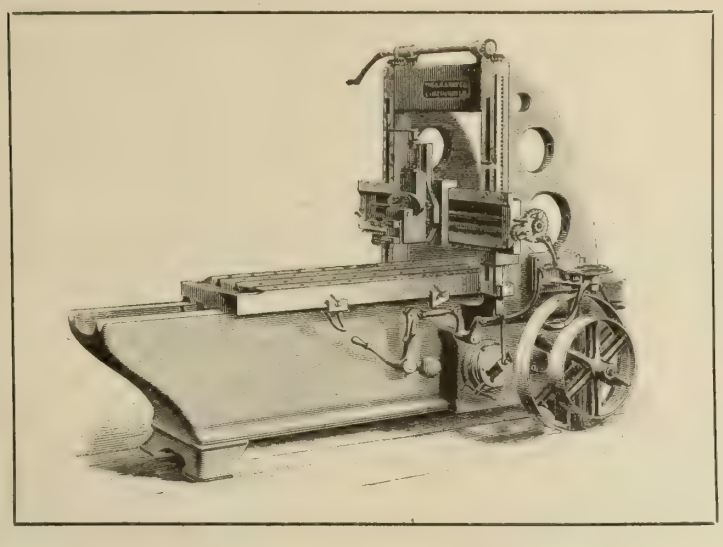

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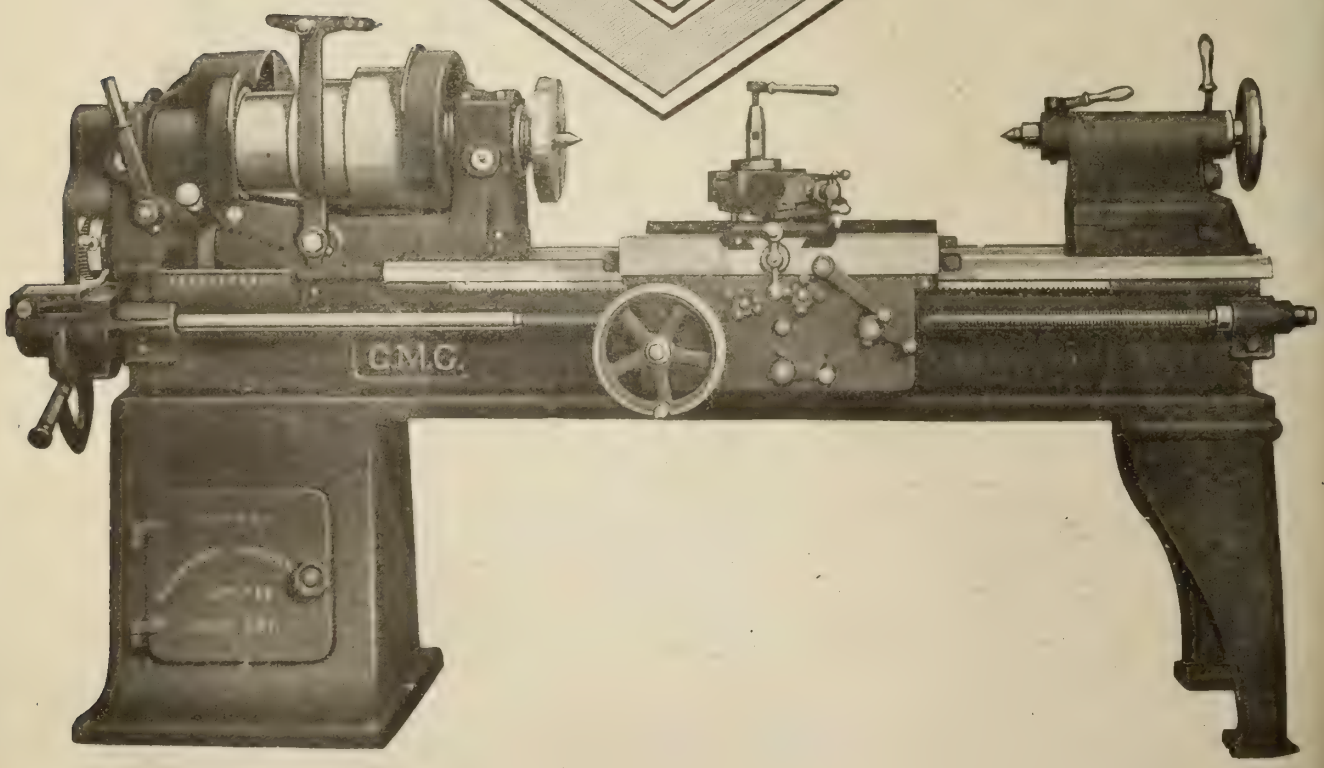

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 13. Publication Office: Toronto, March 27, 1919 Subscription Price $3.00 per Year

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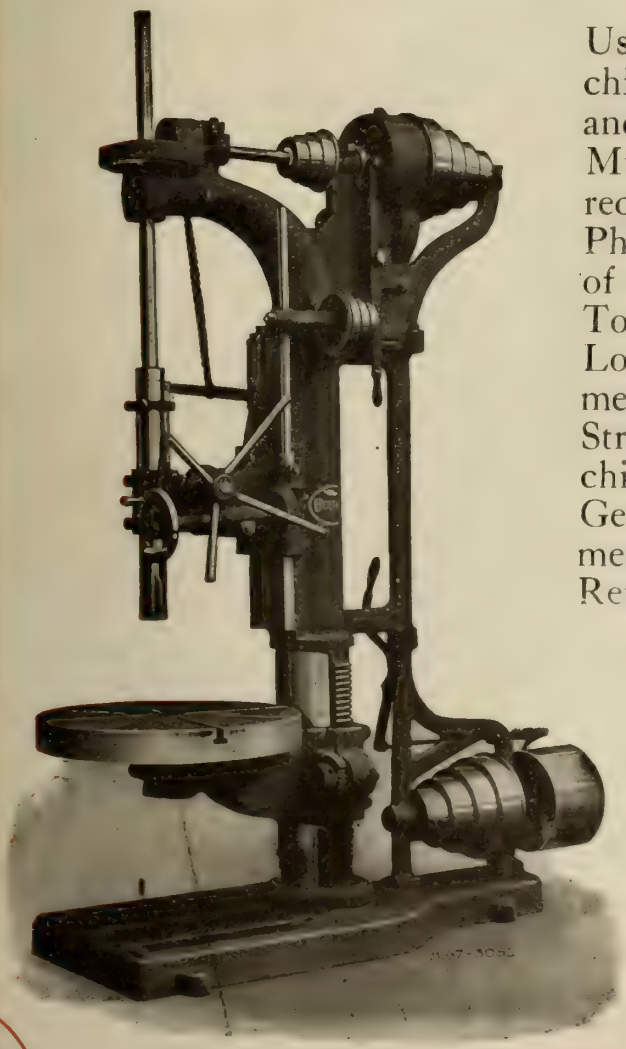

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Equip Your Tool Room With

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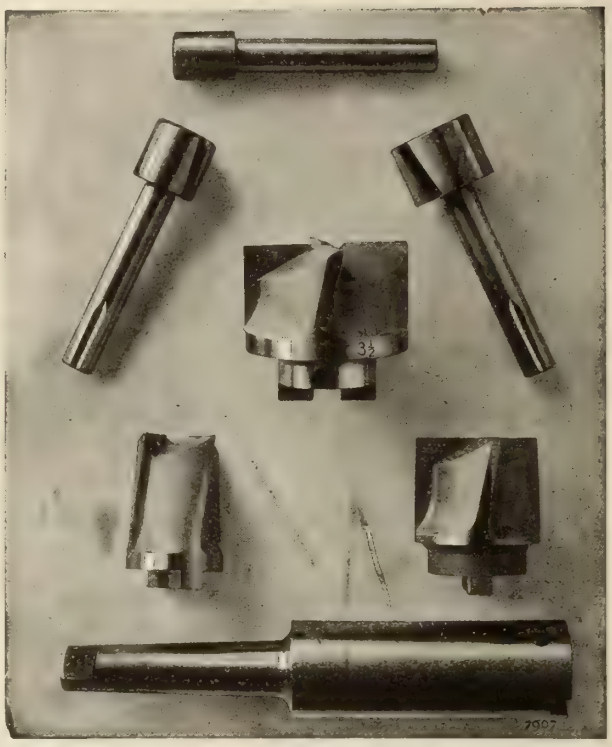

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is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

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HOLDER, CUTTER and GUIDE

With this combination you can immediately make the right combination for every counterboring job.

HOLDERS

End of holder is milled to receive the driving lug of the cutter, and there is also a hole and set screw to accommodate the shank of the guides.

GUIDES

Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

CUTTERS

Can be furnished of either carbon or high-speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face, and the guide is simply pushed further in the hole after grinding.

Holders, Cutters and Guides are furnished in a wide range of sizes.

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For Structural Bridge and Shipbuilding Plants

Modern in design and built for heavy service, our line embraces a varied equipment of Punches, Shears, Bending and Straightening Rolls, Coping Machines, Rotary and Plate Planers.

The assistance and advice of our engineers are yours for the asking.

Double Punch and Shear.
Capacity—
Shears 8-in. by 1½-in. plate.
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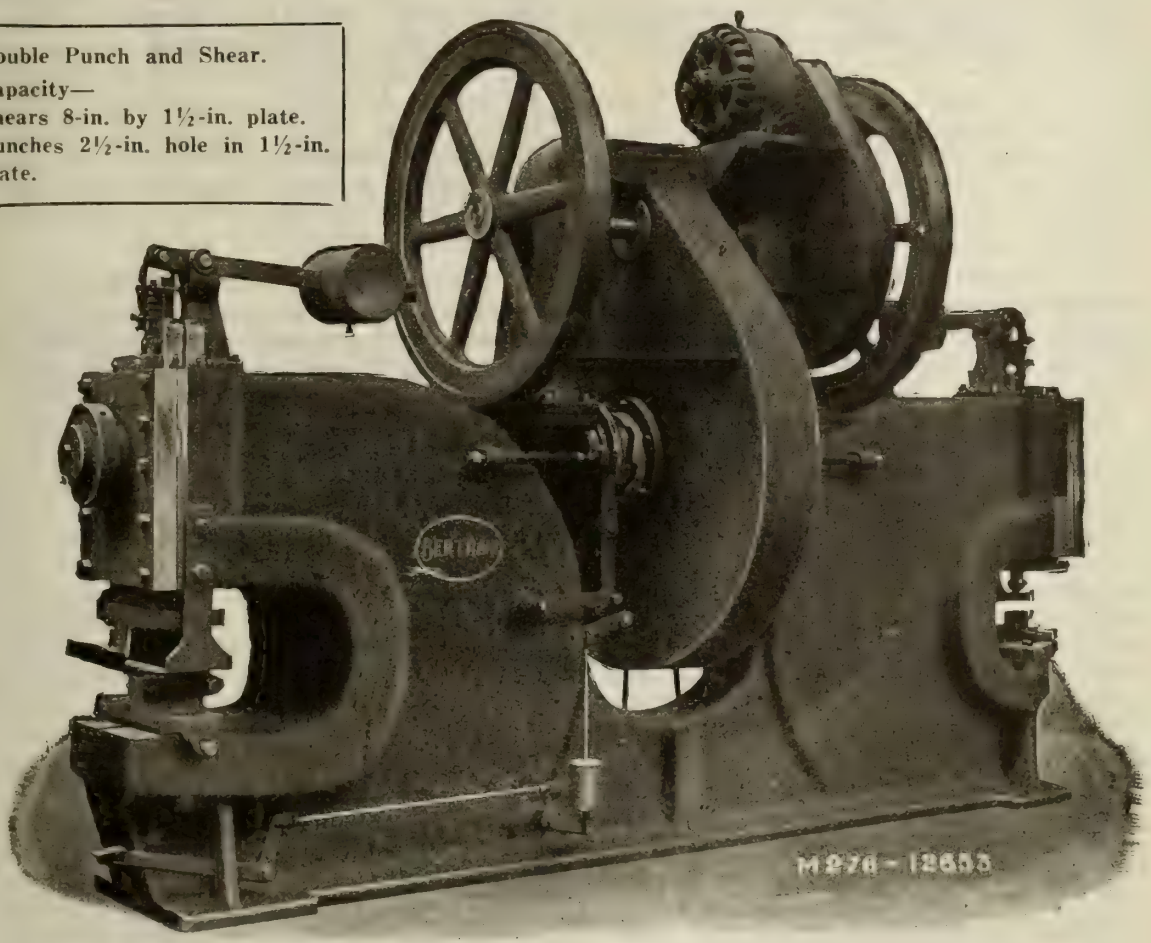

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The Publisher's Page

TORONTO MARCH 27, 1919

Flying Men Are Certainly Farsighted

Airplanes to Be Nationally Advertised

REGARDING the present as the right moment for advertising airplanes—even though markets are yet to be created—the Curtiss Aeroplane and Motor Corporation has commenced a campaign in national magazines to "sell" the idea of flying, both for commercial and passenger transport, says Printers' Ink.

Mail is now carried between New York and Washington via airplane. Service between New York and Chicago is next to be established and aerial mail will soon be delivering letters to such faraway places as Alaska and Honolulu.

It is expected that within a month American passenger aerial lines will be started; a giant flying boat capable of carrying five tons has already made a flight with fifty passengers and pilot.

Plans are under way for the construction of a fleet of dirigibles which will "sail" between New York and Chicago, carrying a passenger list of twenty-five and a crew of ten. The ships will be of the Zeppelin type, rigid housing and multiple compartment. Helium gas will be used, removing the danger of inflammability. Transatlantic flights are promised, a syndicate has been formed for aerial transport service between Buffalo, Cleveland, Toledo and Detroit, and a coast-wise service from New York to Miami is shortly to be launched.

In more spectacular fields, plans for airplane progress are maturing rapidly. San Francisco now has its aerial fire boat. It is planned that New York harbor shall be patrolled by aircraft, and airplanes are already being mentioned for guarding the forests against fire, preventing smuggling on the Mexican and Canadian borders, inspecting oil wells in Wyoming and Texas, and exploring the Brazilian interior for mahogany.

But as far as the press and general public are concerned, while realizing the accomplishments of aircraft in wartime, they do not seem to appreciate that airplane transport will soon become an integral part of our commercial life.

The Annual Aeronautical Exposition just held at Madison Square Garden, New York, and the publication of the Annual Aircraft Year Book represent the first organized effort of the Manufacturers' Aircraft Association to popularize flying. Working together in commendable harmony, members of the Association hope to impress upon the public consciousness the fact that the days of flying are near at hand.

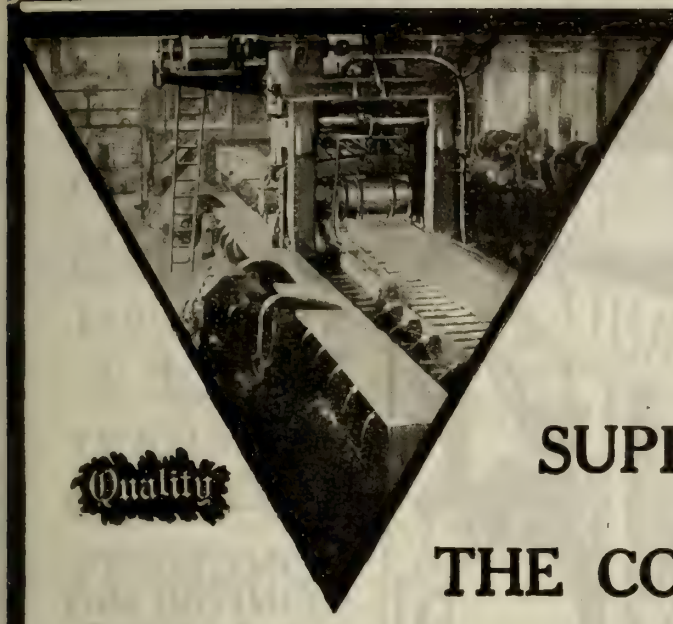
Curtiss First to Take the Plunge

The campaign just commenced by the Curtiss Corporation is an independent step of the largest airplane organization in the world to speed up things. While the Curtis people do not expect immediately to cash in on conditions to the extent that they are investing in advertising, they feel, they say, that it is a part of their individual responsibility toward the entire industry to take an active part in the public education. Commanding space will be taken in national magazines, airplane publications, motor papers, etc., which will be supplemented by smaller units discussing details. Particular attention is being paid in advertising to the boys, indicating a keen foresight of future conditions.

War has given a tremendous impetus to the construction of airplanes, and if the plans of the aircraft makers are successful, the experience gained during the past years will be turned to commercial use. Co-operating with the Government, independent manufacturers have built up immense organizations, erected mammoth factories and trained engineers and mechanics. In addition there are perhaps 17,000 pilots trained at a cost of between $25,000 and $30,000

(*Continued on page* 67)

Canadian Machinery and Manufacturing News, March 27th, 1919, Vol. 21, No. 13. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



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THE COUNTRY

THAT SUPPORTS YOU

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PURCHASE THE PRODUCTS
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A Canadian Dollar
is Worth One Hundred Cents
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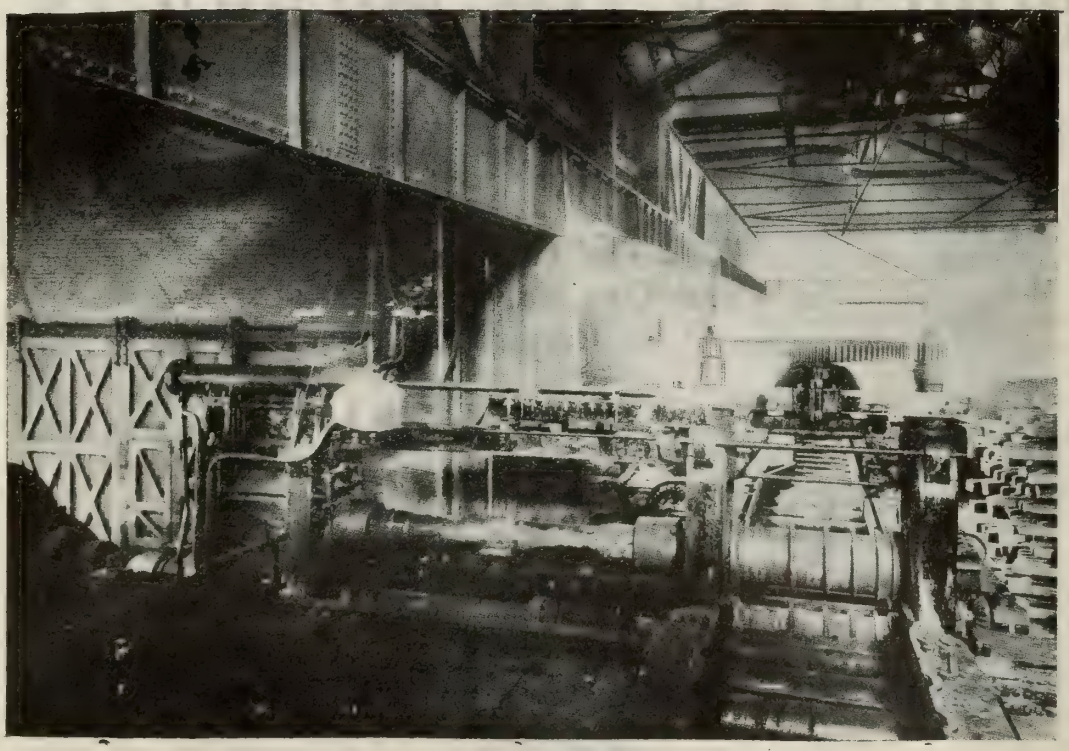

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Heavy Duty Machine Tools

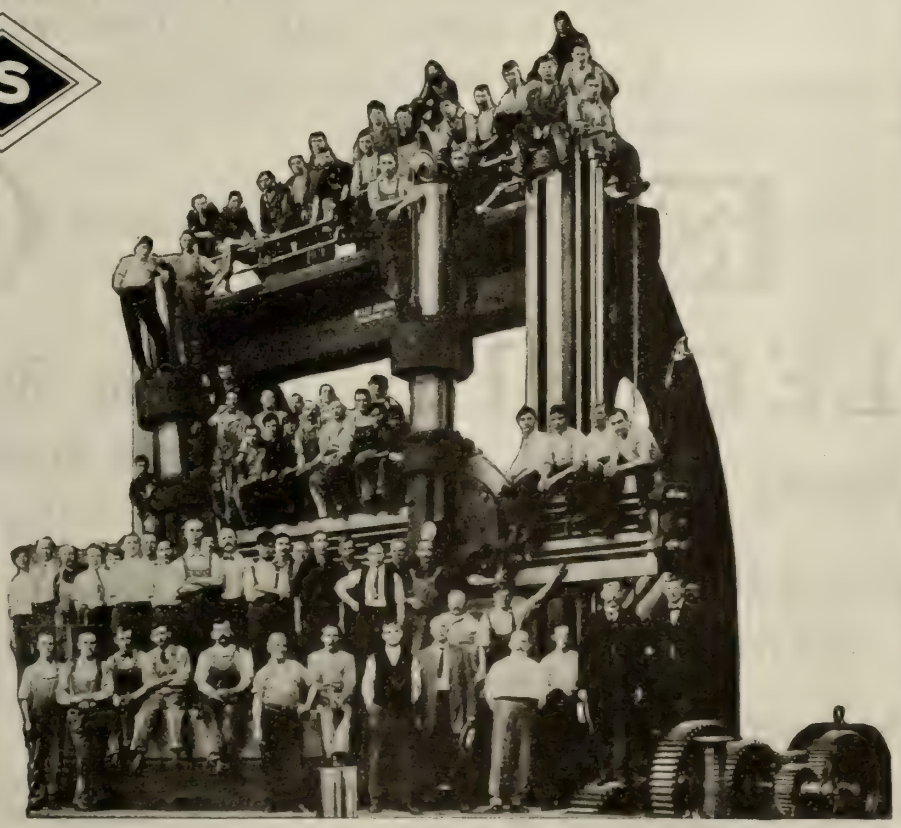
enjoy an enviable reputation for simplicity of design, durability, rigidity and accuracy. This is the result of fifty-eight years of concentrated effort to produce the best tools that mechanical genius can devise.

Betts heavy duty machine tools have kept pace with the demand for increased production and are to be found in practically all of the leading locomotive works, railroad shops, steel mills, shipyards, forge shops, navy yards, electrical shops, rubber factories, etc.

The machine illustrated below is a 20-foot boring mill. A general idea of its massiveness may be gleaned from the fact that there are 75 men standing or seated on its structure, and it weighs 374,000 lbs. This machine is as uniformly accurate as the 5-foot and increasingly larger sizes.

Our entire organization is at your service. Send for detailed specifications, quotation and delivery on any Betts tool.

HEAVY BETTS DUTY



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Boring and Turning Mills

Horizontal Boring, Drilling and Milling Machines

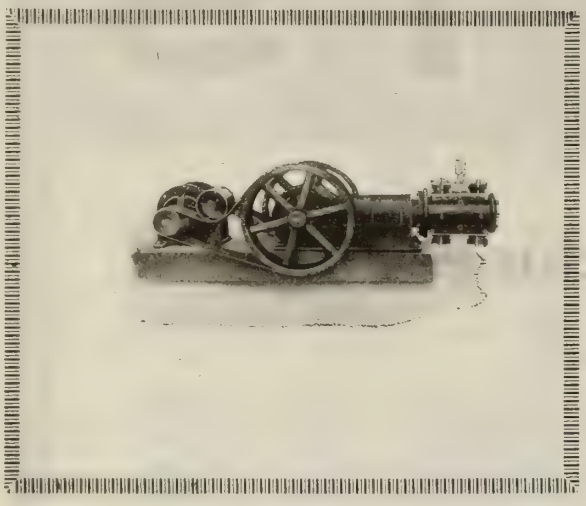
Tire Turning Mills

Car Wheel Borers

Crank Slotters

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.

The Short Belt Drive For Compressors Saves Space



Have you been wondering how you can fit that compressor into your power house? Here is the solution—the short-belt drive.

We build both single-stage and two-stage machines—straight-line and duplex with this type of drive.

Less floor space
Less belt expense
No belt stretching
Capacities up to 2,000 ft. per min. with short-belt drive.

Send for our booklet on how to apply the short-belt drive to the best advantage.

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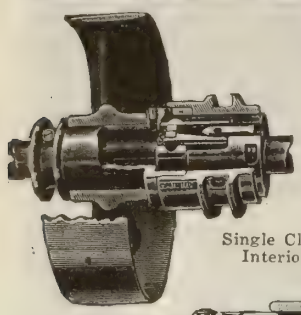
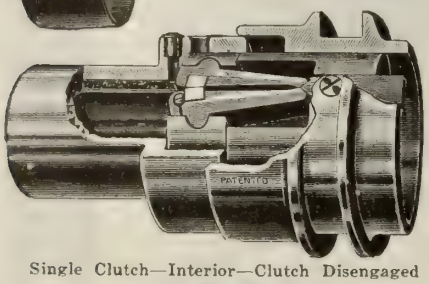
"Where there's a WILT, —there's the Way."

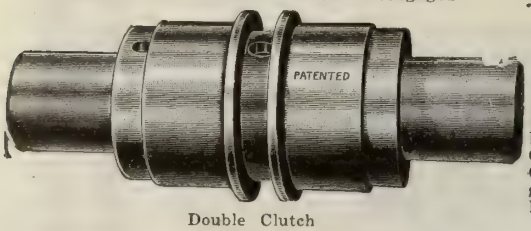
THE JOHNSON FRICTION CLUTCH



Single Clutch Pulley Mounted
Interior—Clutch Engaged



Single Clutch—Interior—Clutch Disengaged



Double Clutch

THE CLUTCH THAT CLUTCHES

starting your machines without grating noise or jar. It is the Acme of Simplicity and is being adopted by the leading machine tool builders as a part of the machine tools they manufacture, and the Johnson Friction Clutch adds another talking point. Our booklet, "CLUTCHES AS APPLIED IN MACHINE BUILDING," is of interest to you and a copy will be sent on request. For countershaft or line shaft work the JOHNSON FRICTION CLUTCH gives the service you are looking for.

Our Yellow Data Sheets describe the Johnson Friction Clutch in detail. Write for them to-day.

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We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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Hamilton, Ont., Canada

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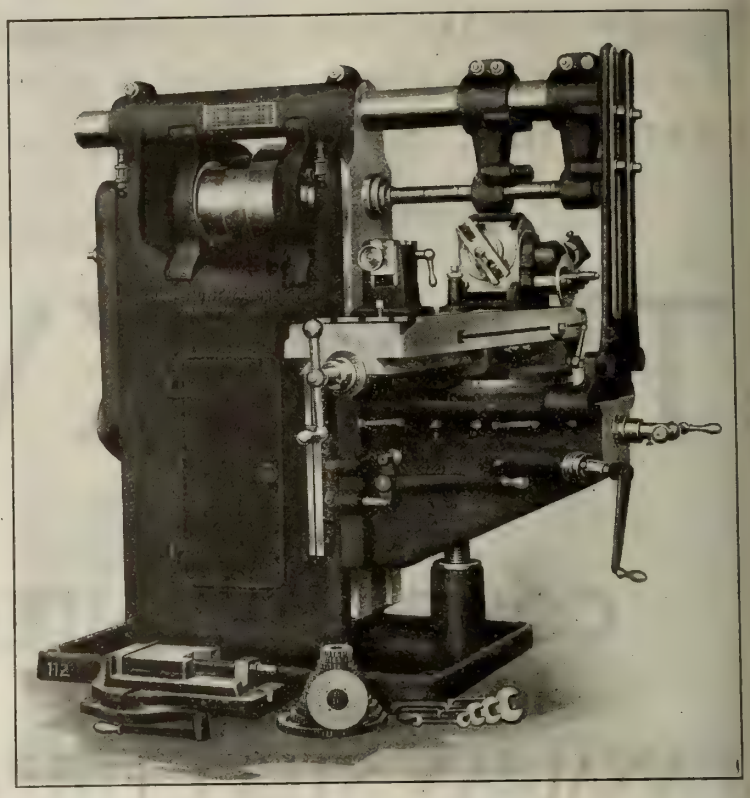

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IMPERIAL GENUINE BABBITT METAL

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THE TILTED TURRET

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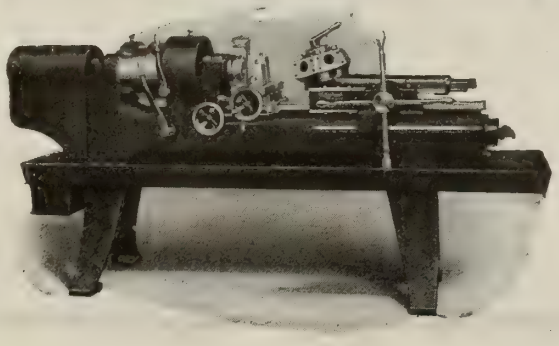

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Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

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by the
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Machinery Maufacturers should equip their machines with

TRAHERN
Rotary Geared Pumps

They are easily attached and add to the attractiveness and value of the machine. Operate with equal efficiency and economy in water or oil. Automatic Relief Valve permits supply being cut off at discharge without stopping pump.

Get in touch with us about prices and samples

TRAHERN PUMP COMPANY
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Canadian Agents:
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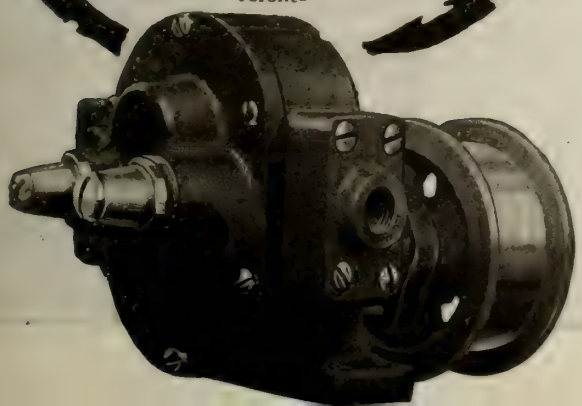
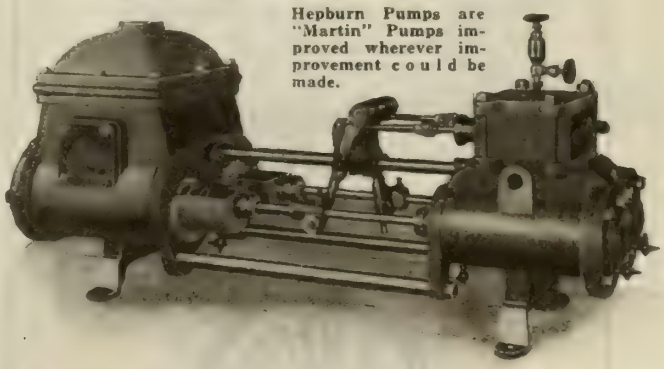
Toronto



Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED
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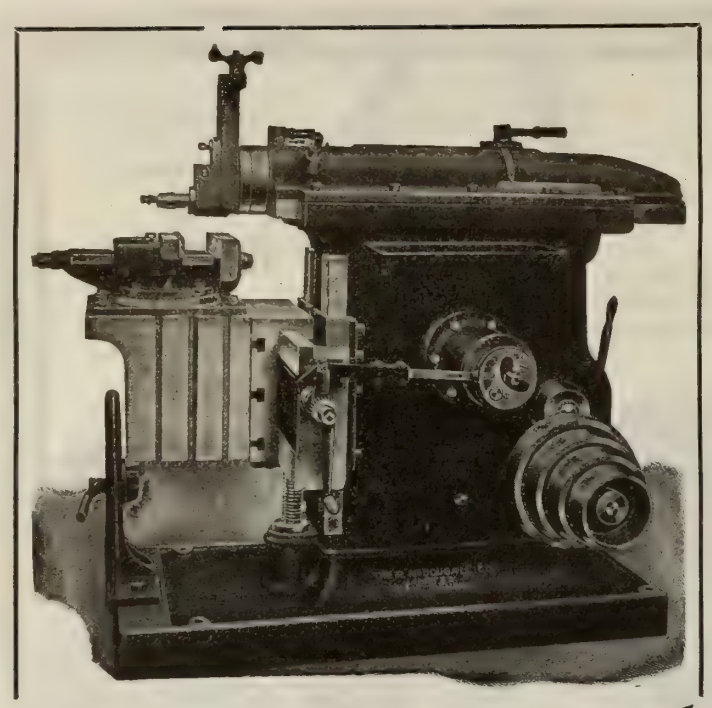

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Combine the best features of all machines which have hitherto been placed upon the market, and nothing has been included, except those points which experience has shown to be essential.

An examination of the construction will reveal features that make for increased production, ease of operation and accuracy.

Write for descriptive literature.

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Direct representatives of foremost Swedish mills: makers of

Tool Steels

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PROMPT SHIPMENTS from large stock

A Keen Cutter

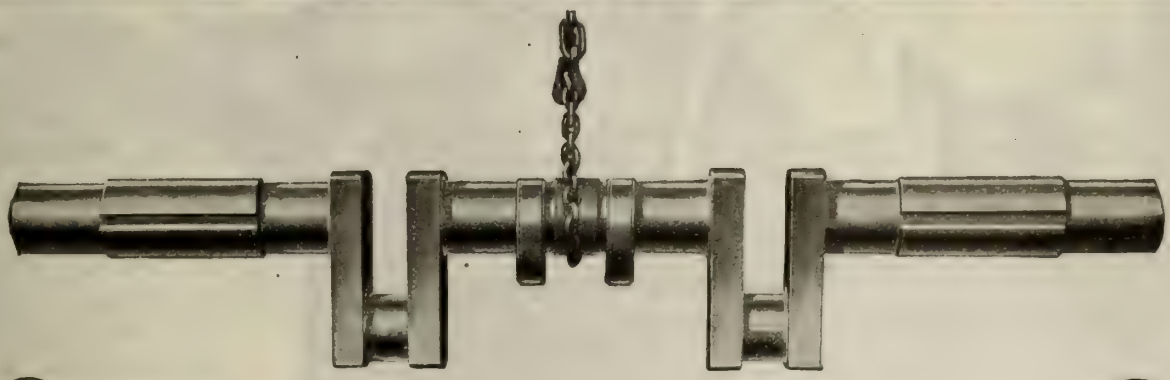
WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO. ESTABLISHED 1900 Aliquippa Pa: U.S.A.

Represented in Canada by Messrs Norton Callard & Company MONTREAL QUE.

Strong in the Neck

CANADA FOUNDRIES & FORGINGS LIMITED



Why Worry? Bring It To Us If It Is a Forging.

Canadian Billing & Spencer Plant

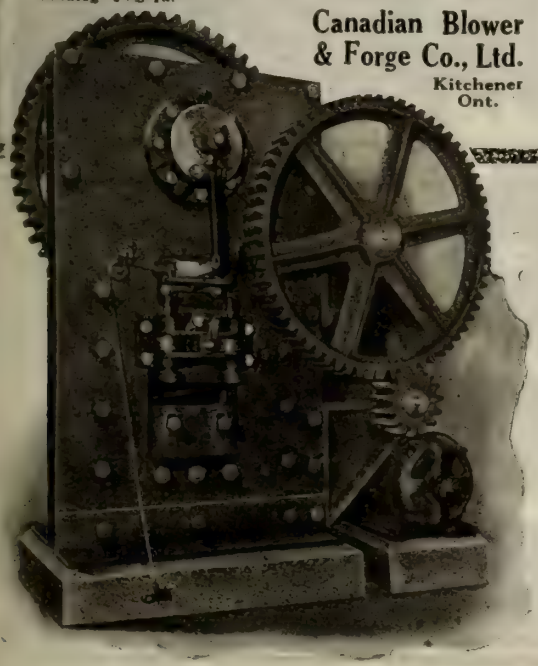
Welland

CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

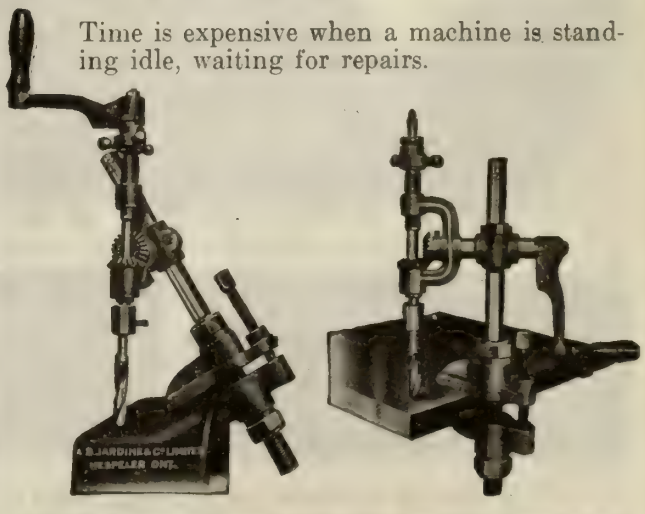
That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

Canadian Blower & Forge Co., Ltd.
Kitchener Ont.



Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited

HESPELER, ONTARIO

The "RACINE"

For Speed

For Accuracy

For Quantity Production

For Saving in Blade Costs

For Saving in Material

Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

RACINE TOOL & MACHINE CO.

Melbourne Avenue

RACINE, WIS., U.S.A.

SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

ST. JOHN MONTREAL VANCOUVER

HEAVY MACHINE SAW BLADE

ENOX 18 G. 17 G. & 16 G. THICK 16 TEETH TO INCH

½ TO 2" WIDE ACCORDING TO TYPE & SPEED OF MACHINE

ENOX

Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

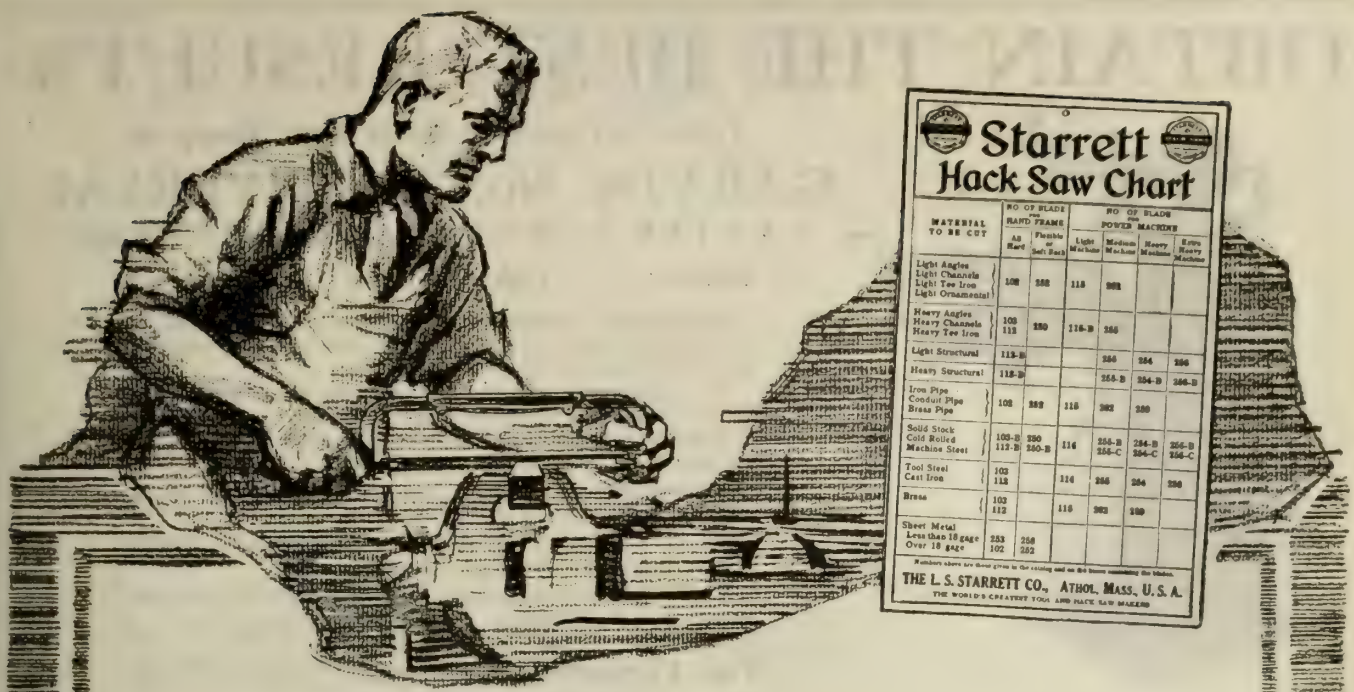
ENOX LIGHT MACHINE BLADE

ENOX HAND SAW BLADES

Agents for Canada, East of Fort William:

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.



Starrett Hack Saws meet—EXACTLY—any cutting requirement

From the standpoint of efficiency and economy you can readily understand the importance of being able to get the *right* saw for any cutting requirement.

Starrett Hack Saws

are made in a number of styles and sizes—each saw for a certain class of work—tested and "set" to be the most efficient for that given material.

Our Starrett Hack Saw Chart tells you at a glance which saw to use for your type of work. Also ask for our Catalog No. 213. It shows 2,100 styles and sizes of fine precision tools and hack saws.

The L. S. Starrett Company

The World's Greatest Toolmakers.
Manufacturers of Hack Saws Unexcelled.

ATHOL, MASS.

STARRETT HACK SAWS CUT QUICKER & LAST LONGER

New York London Chicago

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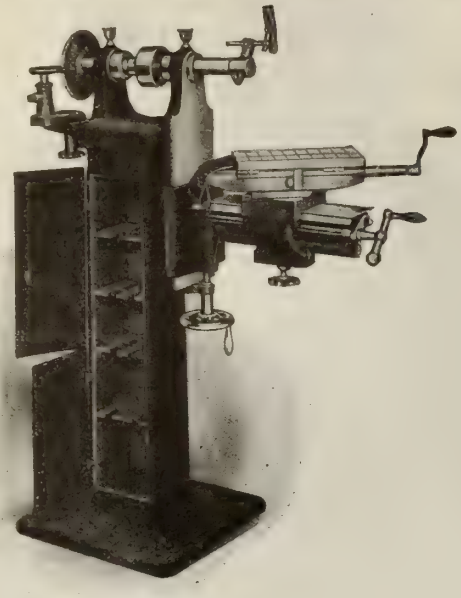
OBTAIN THE BEST RESULTS



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL

CUTTER AND SURFACE GRINDERS

Simple Light Running Accurate

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriege is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets ***(Visitors Welcome)*** **50 Years New York City**

Chapman Double Ball Bearings

Pay You to Adopt Them

Sectional view of Chapman Double row ball bearings.

One of the many types of frames we fit.

Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball Bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.

Chapman Double Ball Bearings practically eliminate friction, and they require lubrication only once or twice a year—therein lies the secret of their ecenomy.

Chapman Double Ball Bearing Company of Canada, Limited

339-351 SORAUREN AVE., TORONTO
Room 408 Shaughnessy Bldg., Montreal; Transmission Ball Bearing Co., Inc., 1050 Military Rd., Buffalo, N.Y.

Have you received a copy of Catalog 3-G? Pay to send for one if you haven't.

STELLITE

"Not Steel but its Master"

The Progressive Mfg. Co., Ltd.
Canada.

Gentlemen:-

We beg to advise that in spite of the rise in price of imported High Speed Milling Cutters, you can still secure a Canadian product at pre-war prices.

During the war, although our capacity was taxed to the limit in supplying STELLITE to Great Britain and France, as well as helping to keep Canada in the forefront as a producer of Munitions, we did not raise our prices notwithstanding the fact that our costs increased enormously and are still up.

Let us help you to economize and at the same time secure maximum results.

Consult our Engineering Department.

We are, Sirs,

Yours respectfully,

DELORO SMELTING & REFINING CO., LTD.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

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315 Craig Street West

HEATING and VENTILATING

"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

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Toronto (Canada) Office: 609 Kent Building

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AGENTS:
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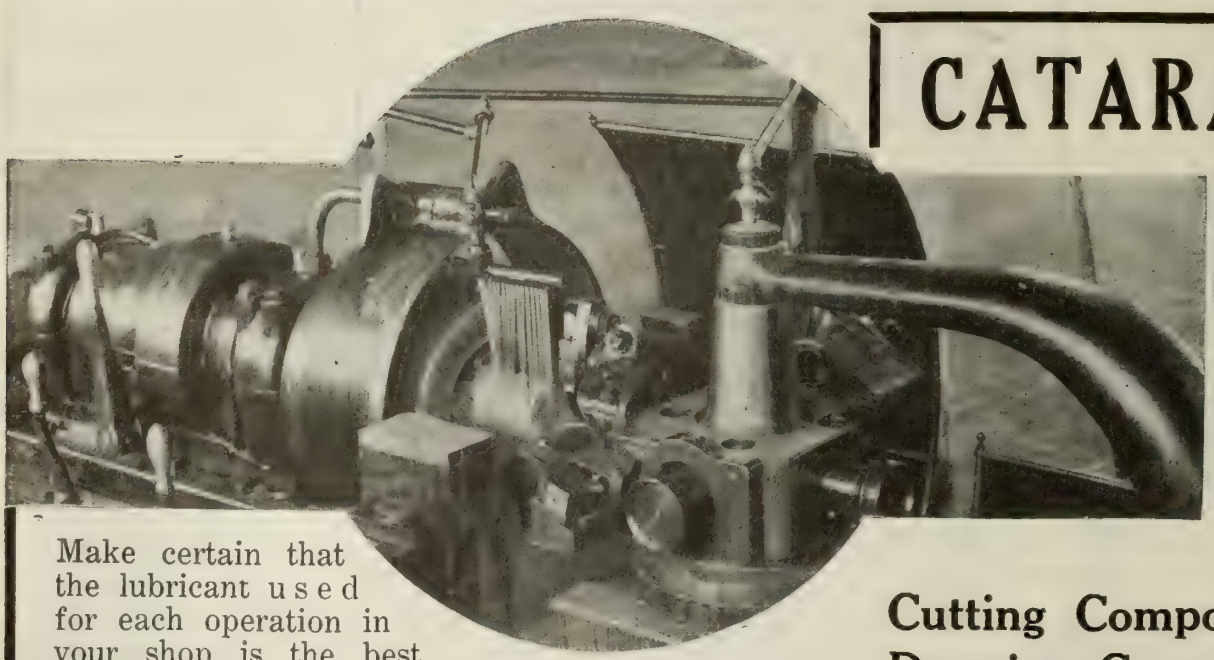
Messrs. Robert Hamilton Co., Ltd., Bank of Ottawa Bldg., Vancouver, B.C.



CATARACT

ACME MYSTIC SPECIAL

Make certain that the lubricant used for each operation in your shop is the best obtainable for the purpose. Otherwise your men and your tools and your machines work at a disadvantage.

Write us to-day that we may demonstrate how Cataract Lubricants can increase production and reduce cost in your plant.

Cutting Compounds
Drawing Compounds
Cutting Oils
Quenching Oils

Cataract Refining Company, Limited - Toronto, Ont.

DODGE PRODUCTS

Turret Lathes

We are manufacturers of a line of Turret Lathes embodying original features which have been tested and not found wanting by *time* and *hard* and *varied* uses.

The Dodge Features, Etc.

The Dodge features—only in our lathes—minimize floor space—cut out long and superfluous belting—reduce shafting, hangers and pulleys—stimulate the operator—increase production—reduce manufacturing costs.

Our line of lathes, made in several sizes, we recommend to all shops making products from bar stock, castings or forgings. For duplicating work they are unexcelled for quality and quantity production.

Printed matter will be mailed you promptly upon request.

Screw Machine Products

Under our roof, as a separate department, supervised by its own superintendent, and operated by another force of men, independent of the lathe business, we have two of the largest batteries of screw machines that can be found in any shop. One battery consists entirely of automatic screw machines, the other is wholly hand-operated turret lathes. With this equipment and organization we are in a particularly good position to manufacture hand and automatic screw machine and metal products *in volume, with precision* and *on time.*

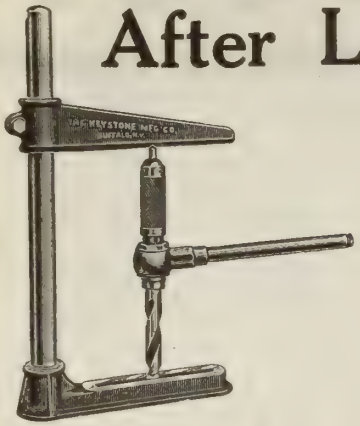
Send us samples, prints, sketches, or a rough description of any work you have of this character and we will quote you or have our representative call, if desired.

H. C. DODGE, INCORPORATED

Machinery Manufacturers
Hand and Automatic Screw Machine Products

BOSTON—32 to 46 Alger Street—MASS.

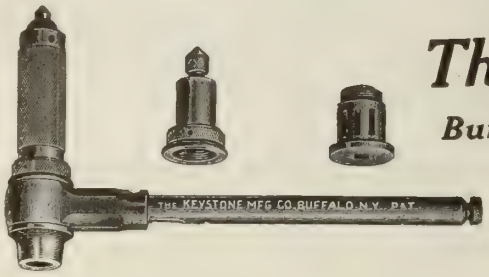
"Keystone Quality" Will Still be There After Long Use Has Worn Away The Name



We like to think of that.

We like to think that the reputation of Keystone Tools is built upon a foundation of service with **Quality** the Keystone rather than a copyrighted name. For it is conceivable that imitators, or even the whims of courts, might rob us of our copyrighted name. But who could take "Keystone Quality" from Keystone Tools?

Write for name of nearest dealer.



The Keystone Mfg. Company

Buffalo, N.Y., U.S.A.

TERRY

a washer for every want

For PEACE delivery

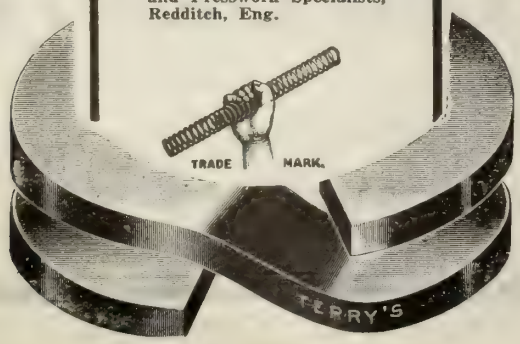
NOW that export conditions are such that we can be of service, we can arrange for peace-time requirements.

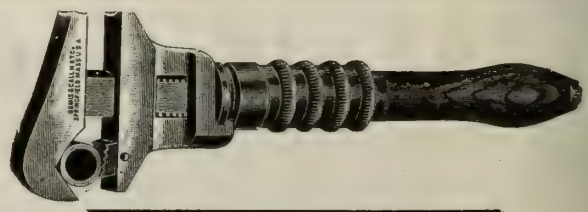
Our service can meet every washer need. We welcome correspondence.

HERBERT TERRY & SONS, LTD., the Spring and Presswork Specialists, Redditch, Eng.

Established in year 1855.

Codes, A. B. C. 5th, Liebers and Western Union.





USE B. & C. WRENCHES

At the top is a combination nut and pipe wrench, with head, bar and shank, a one-piece forging of great strength. The lower illustration shows our adjustable "S" wrench, whose sliding jaw is a steel drop forging. All parts of each wrench are interchangeable.

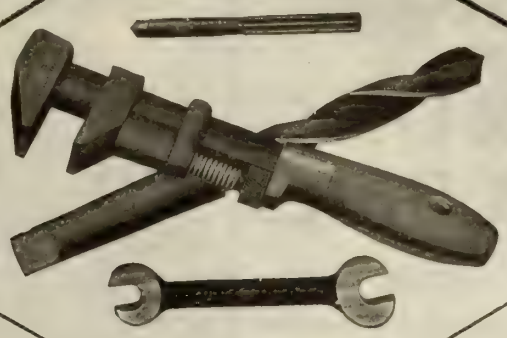
Write For Catalogue

BEMIS & CALL HARDWARE & TOOL CO.
SPRINGFIELD, MASS. - - U.S.A.

WHITMAN & BARNES

Reamers
and
Twist Drills

Screw and Drop
Forged Wrenches
Hammers



W B CO

Special
High Grade
Drop Forgings

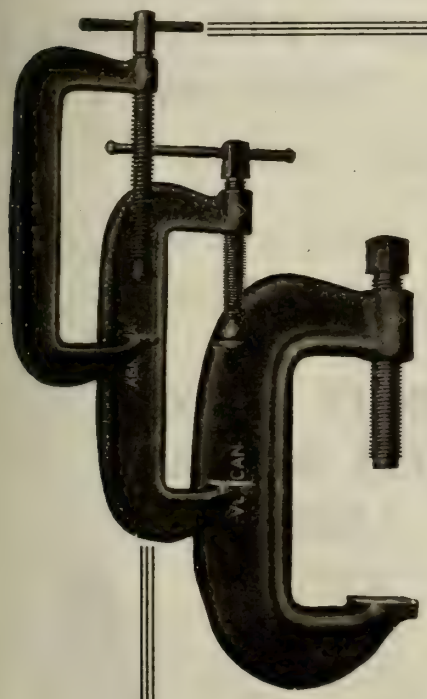
Cotters
Chisels
Punches, Etc.

Users recognize "W & B" Tool Quality, backed by 64 Years' Uninterrupted Experience. If your Jobbers and Dealers cannot supply, write us and we will see that you are supplied. Send for Catalog No. 90.

THE WHITMAN & BARNES MFG. CO.

ESTABLISHED 1854

CANADIAN OFFICE AND FACTORY - - ST. CATHARINES, ONTARIO



Williams' Superior Drop-Forged "C" Clamp

"THEY STAND THE STRAIN"

Both economy and convenience follow the use of tools designed for specific classes of work. Williams' line of Clamps provide something to meet the requirements of the individual job—or any combination of jobs. "There's a Williams' Clamp for every purpose."

If it's general utility—without the need for maximum strength—Williams' "Light Service" line will fit the case. 8 sizes, 2 to 12" capacities.

If it's stability and utility—medium service—Williams' "Agrippa" line offers the solution. 7 sizes, 4 to 18" capacities.

If it's extreme strength and heavy service—Williams' "Vulcan" line provides both. 11 sizes, ¾ to 12½" capacity.

All are made of a special high grade steel. After forging they are submitted to a refining process or "heat treatment" which increases their stiffness and strength and reduces the liability of springing.

Machinists' Tools booklet on request.

J. H. WILLIAMS & CO.

"The Drop-Forging People"

45 Richards St. Brooklyn, N. Y.

The A. G. Low Co., Ltd., 45 Pacific Ave., Saskatoon, Sask.
Agents for Manitoba, Saskatchewan, Alberta and British Columbia

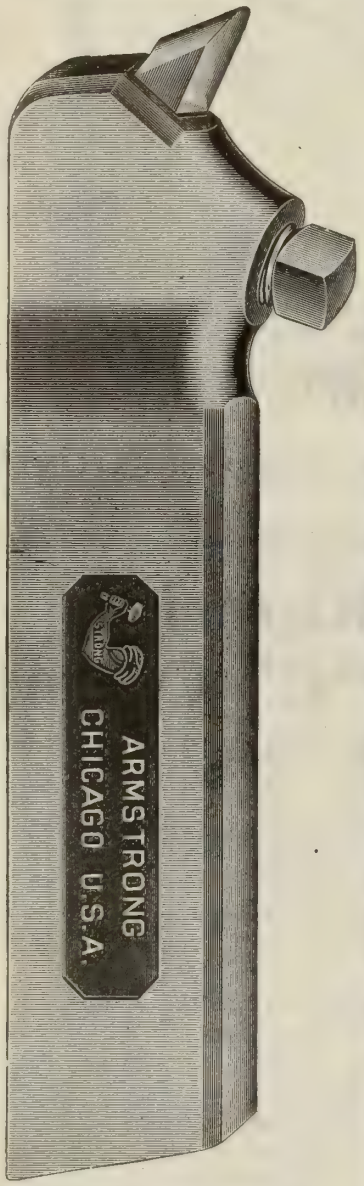
The Only Grand Prize for TOOL HOLDERS

Awarded separately and independent of other lines exhibited at the

PANAMA-PACIFIC EXPOSITION

WAS WON BY

ARMSTRONG TOOL HOLDERS



HIGHEST AWARD

at 4 World's Expositions.

Paris - - -	1901
St. Louis - -	1904
Liege - - -	1905
San Francisco -	1905

THEY ALWAYS MAKE GOOD

They Are Saving Millions of Dollars in High Speed Steel

CATALOG FREE

Armstrong Bros. Tool Co.

"The Tool Holder People"

306 N. Francisco Ave., CHICAGO, U.S.A.

The Panama-Pacific MEDAL OF HONOR was also won by ARMSTRONG Drop Forged Wrenches, Ratchets, Clamps, Lathe Dogs, Etc.

AWAY WITH DULL FILES

One hour's work with a dull file will cost you more in wasted labour than a new file.

Tell your men, therefore, to turn in files the moment they have passed their efficient point.

But to get files that give the longest efficiency, specify "famous Five" when you order.

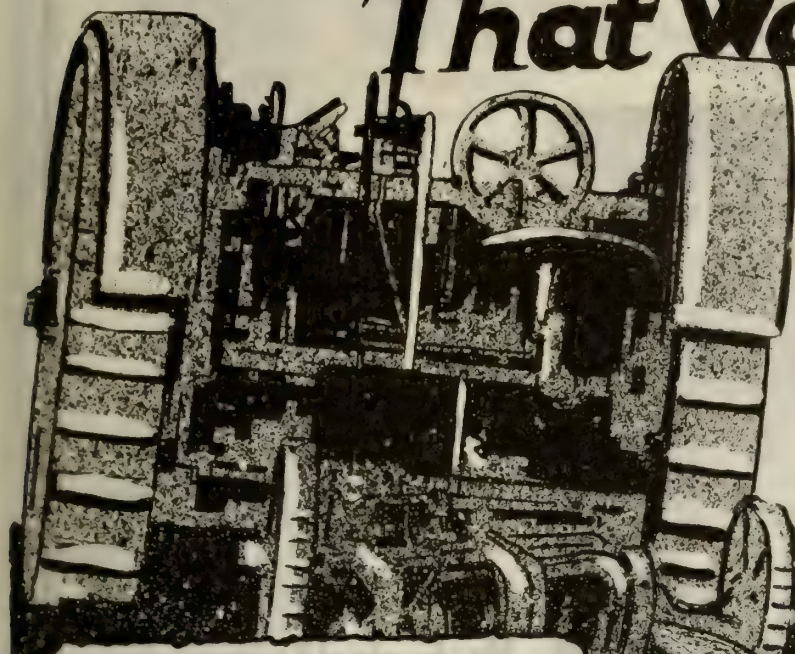
They Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by

PORT HOPE
ONTARIO

-And I Always Thought That Was A Good Tractor-



Some little part gave way and his Spring plowing was delayed for a couple of days. His good opinion of your tractor is gone forever; others will hear his tale and your distributor in that territory will fall two or three short of selling as many of your tractors as he would have sold if it hadn't been for that defective part, defective because it was improperly heat-treated.

It makes no difference whether you manufacture tractors or other machines or machine parts, unless you have the **right** heat-treating furnace the reputation of your product is in constant jeopardy.

You Cannot Afford to Take Such Chances

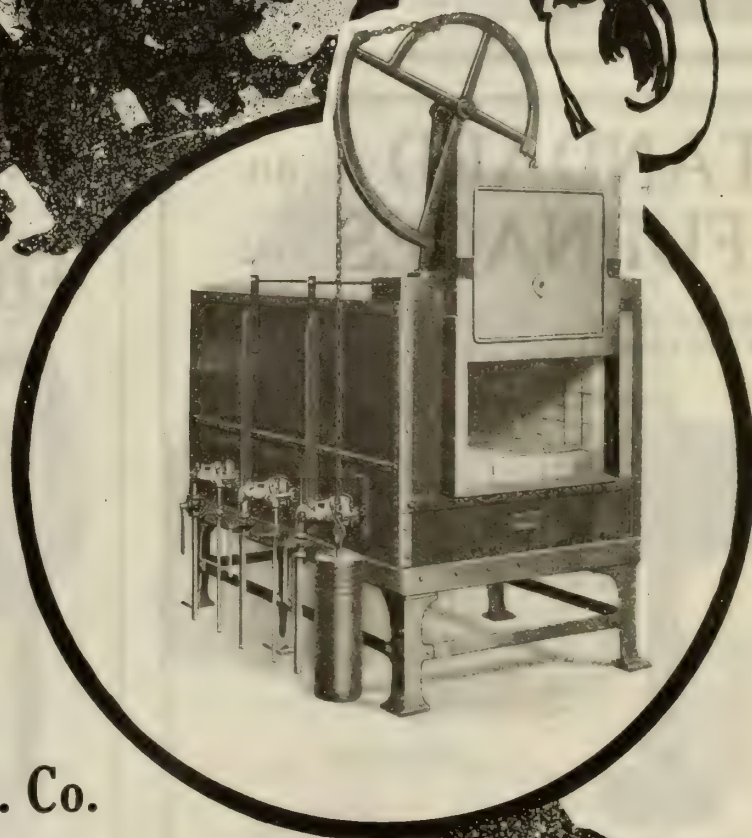
GILBERT & BARKER
Heat-Treating Furnaces

insure uniform high quality of product because they are designed right and built right. The combustion in a G. & B. Furnace is 100% efficient, temperature control is one of the big features, the heat is uniform **always**, the result is a finished product of maximum tensile strength which will stand up under the hardest usage.

The operating cost of G. & B. Furnaces is extremely low.

Send for Bulletin 24. Let our Engineers suggest the furnace that is best suited to your requirements.

To-day is a better day than to-morrow—write.



Gilbert & Barker Mfg. Co.

Established 1865

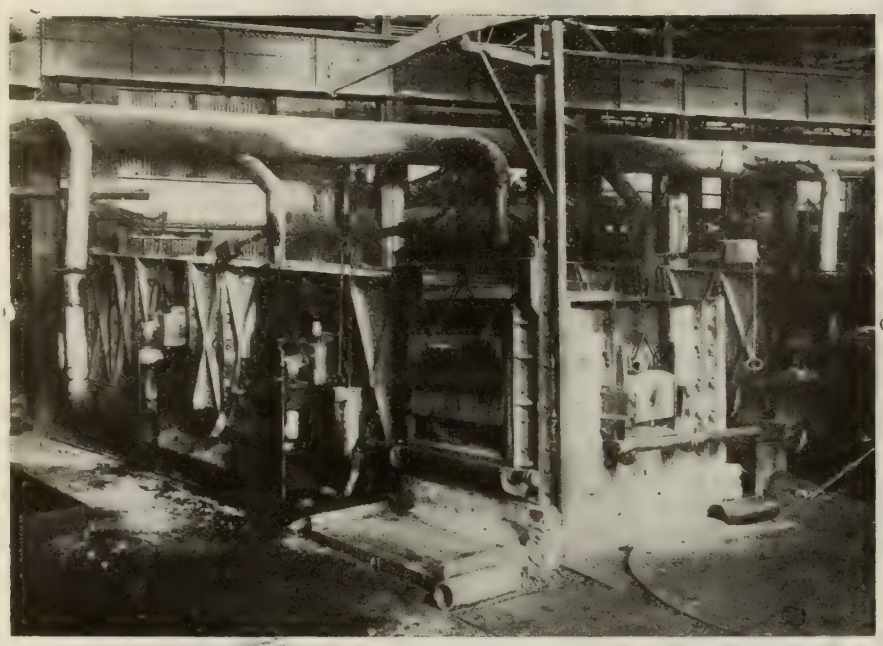
SPRINGFIELD, MASS., U. S. A.

AGENTS:—Neidow & Rayson, Madison Terminal Bldg., 9 South Clinton St., Chicago. Detroit Office: Garfield Bldg., 870 Woodward Ave. Pittsburgh Office: Room 501, Manufacturers' Bldg. Philadelphia Office: 703 Lincoln Bldg.

GILBERT & BARKER MFG. CO. G&B SPRINGFIELD, MASS. U.S.A. EST. 1865

Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering
Company, Limited
Three Rivers, Quebec, Canada

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.

Rivet Heater

For

Annealing
Carbonizing
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High Speed Steel
Lead and Salt
Oil Tempering
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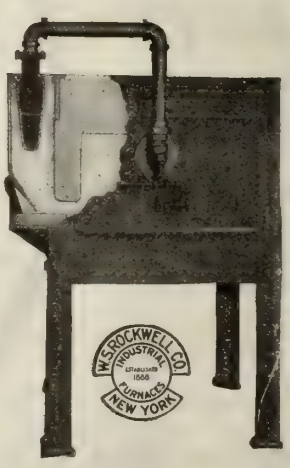
Cool Shop This Summer

If You Use

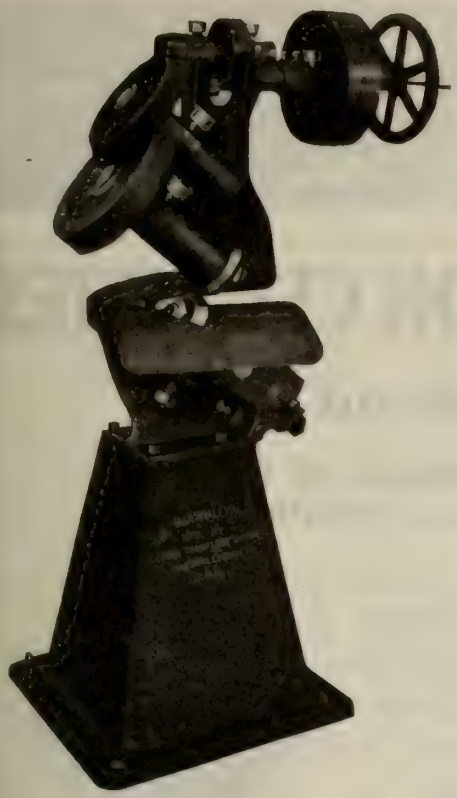
EONOMIZER FORGE



IT is economical in power; protects workmen from flames and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into forge shop.

Write to-day for catalog 34-T

W. S. ROCKWELL COMPANY
Furnace Engineers and Contractors
50 Church Street New York
(Hudson Terminal Bldg.)
Canadian Representative: R. J. McLean
128 Bleury St., Montreal, Canada.



"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

The GRANT

Spins a Polished Rivet Head Every Second Without Noise

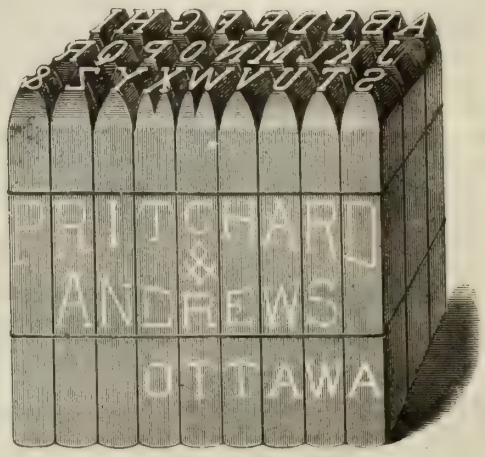
A dozen of these GRANT ROTARY RIVET SPINNING MACHINES going at full speed would not awake a light sleeper in the same room.

The GRANT is fast. In one second it will quietly spin a polished rivet head without breaking or in any way marring the casting. It will rivet tight or loose, as required. The GRANT boosts the output, cuts the cost, and turns out perfectly accurate work.

Grant Noiseless Rotary Rivet Spinning Machine.

Pleased to tell you more about it. Write..

The Grant Mfg. & Machine Co.
Holland Ave., Bridgeport, Conn.



STEEL STAMPS

FOR MARKING ALL CLASSES OF METAL WORK

We will Give You Satisfaction on all Work of this Kind.

Send for Prices

PRITCHARD-ANDREWS CO.
OF OTTAWA
General Engravers and Die Sinkers
264 SPARKS ST. OTTAWA, CAN.

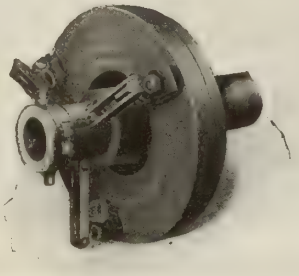
WILLIAMS & WILSON, LIMITED

Cable Address "Willwills" Montreal, P.Q. Established 1891

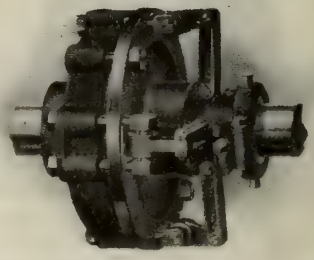
"COMPETITOR" FRICTION CLUTCHES

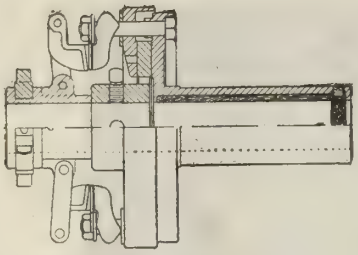
No! Don't Misunderstand Us

This is not a Competitor of other Makes of Friction Clutches. "It has no rivals." It is a competitor of the Troublesome loose Pulley.



Friction Clutches give far better results than tight and loose pulleys and are more readily operated, also more economical, as the saving in time and belting, the protection of machinery and the prevention of accidents will pay many times over during a year their original cost.



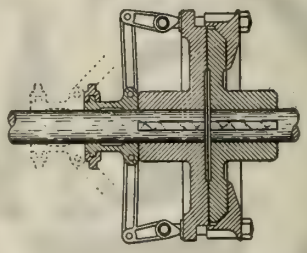


Competitor Pulley Clutch

Be Up-To-Date. Don't Install a Tight and Loose Pulley. Install a "Competitor." This will do away with tight and loose Pulley troubles and the First Cost is very little more.

By the use of friction Clutch Cut-off Couplings, sections of the line shaft or various departments can be shut down without interfering with any other portion of the plant. This is especially advantageous when it is necessary to make repairs during working hours, or to run one department when the remainder of the plant is closed.

When friction Clutches are used for driving direct to machines, the load is picked up gradually while the line shaft is running full speed. Each machine is operated independently.



Cut-off Coupling

Worrall Type

For your large, heavy Drives. The "WORRALL" Clutch has No Equal.

We carry a full line of these Clutches in Stock. In all sizes and Bores.

WILLIAMS & WILSON, Limited, Montreal, P.Q.

MARK YOUR PRODUCTS THE "MATTHEWS" WAY

"Matthews-made" steel stamps and lettering dies make easily read and durable marks on all classes of products. Matthews Champion Type Holders—for flat and convex surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years' experience.

Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

Canadian Fairbanks-Morse Co., Limited

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

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Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 37A

Significance of Grain and Grade

GRAIN

By grain is meant the size of the cutting particles, that is, the abrasive used in making the wheel. It is entirely possible to gain a clear conception of the meaning of grain. For example, 30 grain is a particle of such size as will pass through a screen having 30 meshes per lineal inch or 900 meshes per square inch.

Grain sizes have been standardized, some of the best known being 8, 10, 12, 14, 16, 20, 24, 30, 36, 46, 60, 70, 80, 90, 100, 120, 150, 180, and 200 and the flours are designated as F, 2F, 3F, 4F, XF, 65C and 65F.

The size of the wheel, amount of material to be removed and the nature of the metal usually determine very readily the size of grain which should be used. For example, heavy work, such as the rough grinding of heavy steel and iron castings, requires coarse grain, No. 10 to No. 24 being commonly employed. Numbers 36 to 80 cover nearly all tool grinding, saw gumming, and operations where precision and exact measurement is sought. Number 90 and finer are used for such work as grinding balls, fine edge work cutlery, and so forth. Finer than No. 200 are made use of in the manufacture of oilstones and glass wheels.

Numerical designations on wheels are sometimes confusing as there are certain special abrasives which also bear numbers. The designation No. 6680, for example, means that the wheel is made of a special abrasive known as No. 66 and the grain size used is No. 80. Number 3860 means that the wheel is made of No. 38 material and the size of the grain is No. 60.

GRADE

A grade is not an exact value. It is rather a range between certain limits and all wheels which come within this range are designated by some particular letter and are considered as of one grade. This, of course, is contrary to the common belief that grade is an exact value. Grade is determined by measuring the resistance which a wheel offers to the penetration of a small hardened steel tool. Let us take, for example, grade L. This does not represent an exact value, but is a range between two limits. It may be realized that a wheel marked "L" is almost soft enough to be called "K" or it may be almost hard enough to be called "M" and still come within the limits designated by grade L. This explains the statement frequently made that grinding wheel manufacturers do not exactly duplicate grade.

It also makes clear the reason why wheels of the same grade may vary quite noticeably in grinding action.

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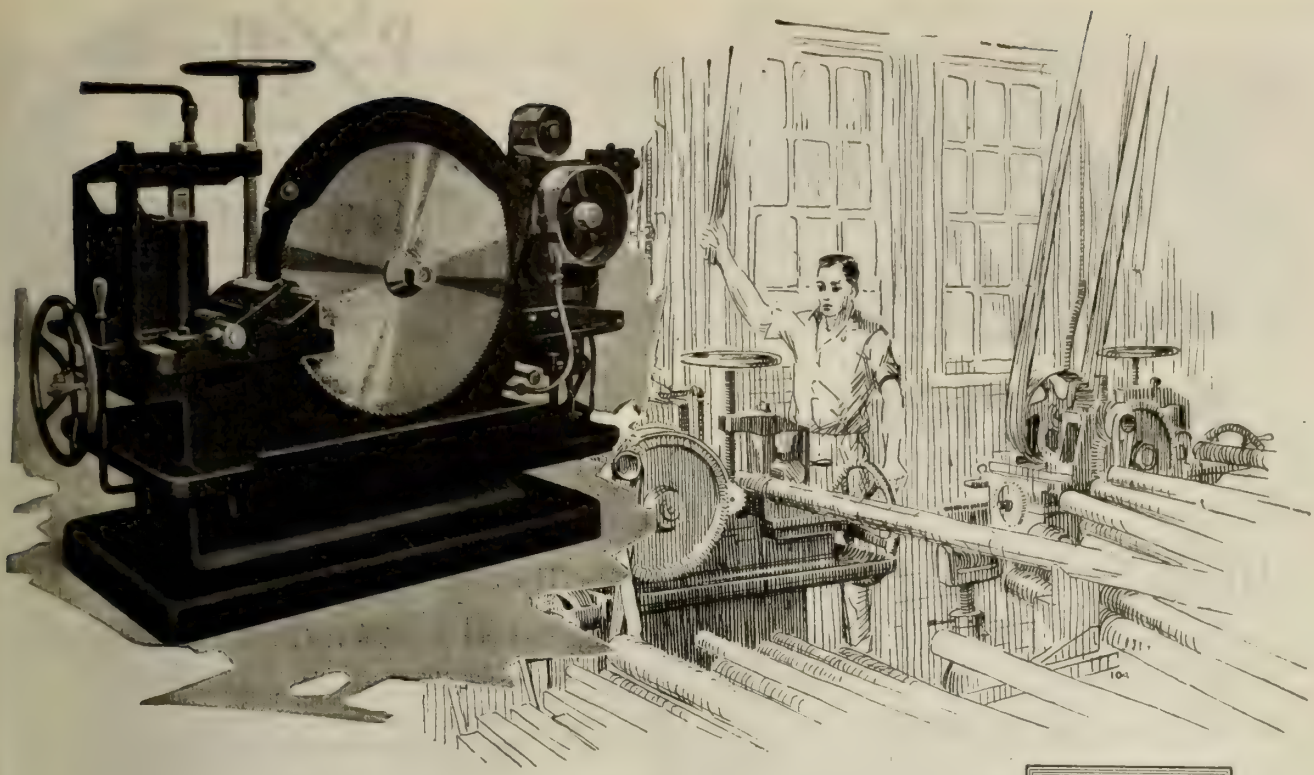

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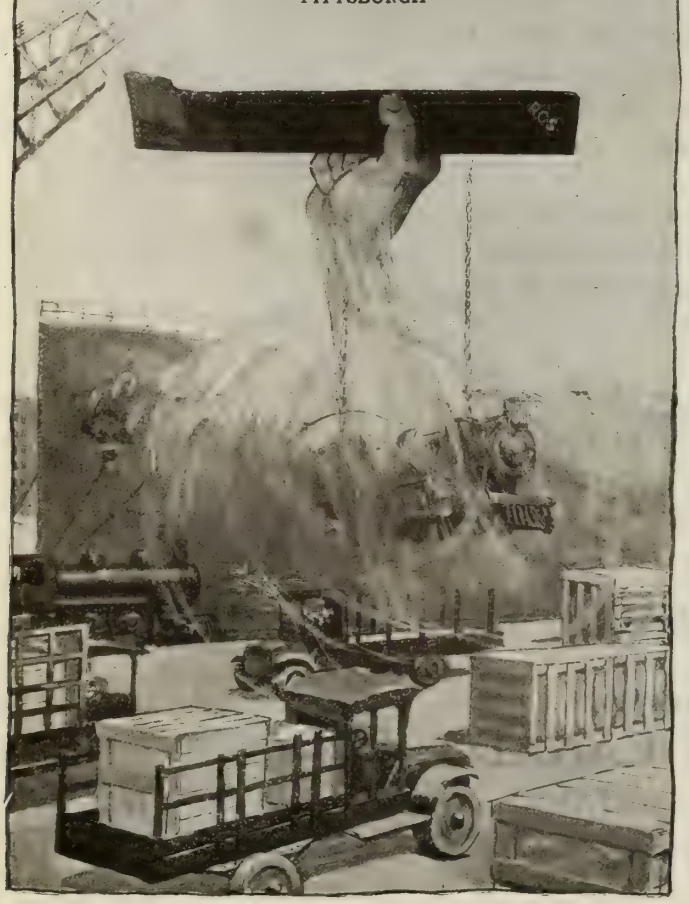

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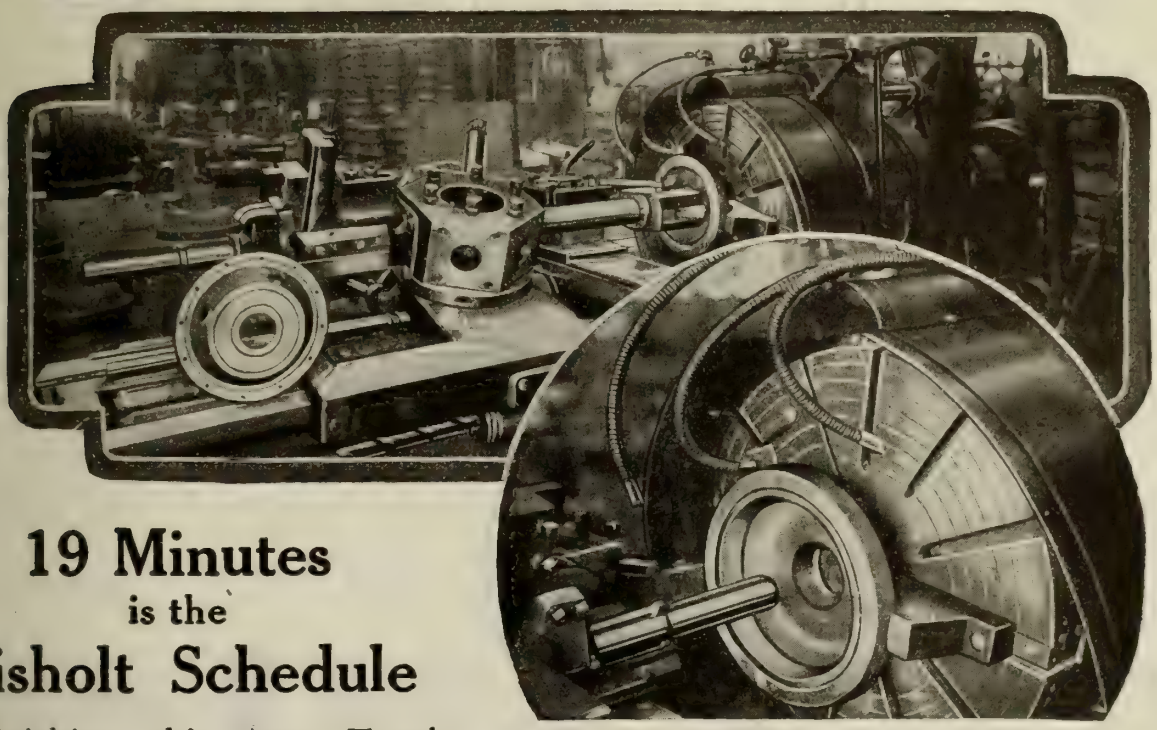

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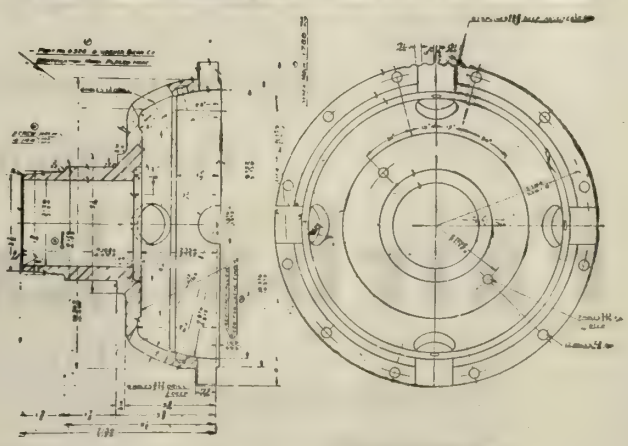

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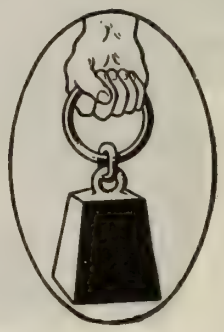

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CANADIAN MACHINERY
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MANUFACTURING NEWS

Volume XXI. No. 13 March 27, 1919

Manufacturing the Banner Hosiery Machine--Part I

These Articles Will Follow Up From Time to Time the Actual Manufacture of These Machines, and the Various Operations Will Be Illustrated With Interesting Photographs.

By ROBERT MAWSON

IT is a long way removed from the old-fashioned method of knitting stockings by means of four needles, as is well remembered by most of us, to the modern full automatic hosiery machine, which is now universally used.

Yet, if we review the subject by means of years, it is only a matter of two or three decades.

The former hand method was not only slow, expensive and tedious, but practically only one style was produced.

With the modern machine method, hose are produced from yarn as thick as the hand method down to the invisible style with the transparent effect which is considered the correct thing by the members of the fair sex.

By use of these machines, hose may be produced and shaped to the proper form, striped as desired, with the heel and toe produced without a seam, as well as the body of the stocking.

Yet the principle employed is similar to the hand method, needles being used to carry the yarn, the difference being a needle for each stitch.

The great difference, however, is the employment of a revolving cylinder which guides the needles, thus enabling the spaces between the yarn to be equal, and the result is a smoother and better appearance of the finished hose.

This was, of course, difficult by the hand method, as no matter how carefully the knitter intended to do the work, some strands of yarn would be drawn more tightly than others, and the surface of the stocking presented an uneven appearance.

Again, the revolving cylinder performs in an automatic manner the process followed by the hand method of revolving the stocking as the stitches on each needle were made with the yarn.

The Hemphill Manufacturing Co., Pawtucket, R.I., have specialized for years on the manufacture of hosiery machines, and one of the latest machines is shown in Fig. 1.

Brief Description of Machine

This machine is a 48 needle, No. 10 gauge type, and is used for knitting

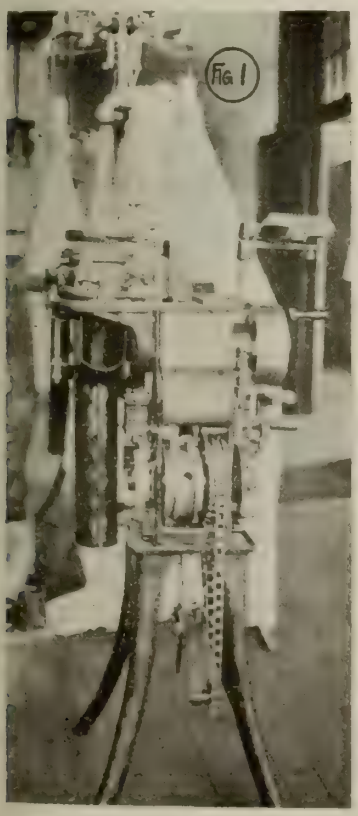


FIG. 1—A COARSE GAUGE MACHINE

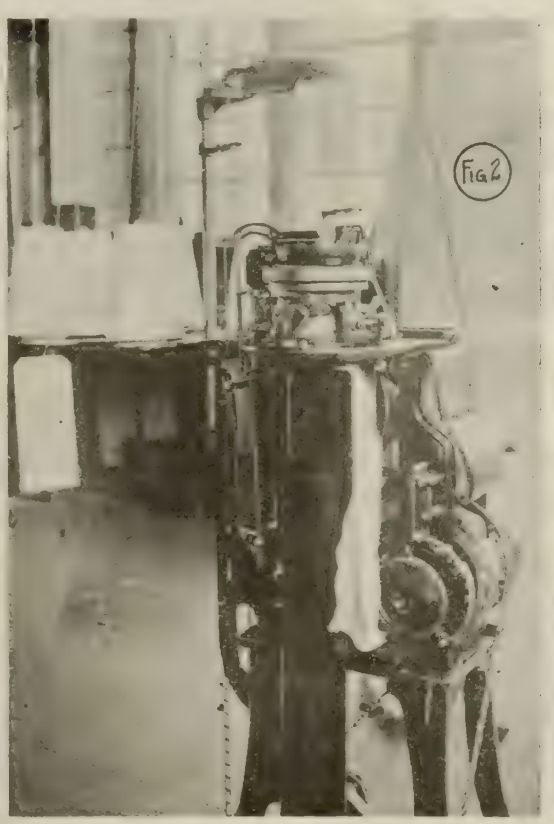


FIG. 2—A FINE GAUGE MACHINE

FIG. 3—A FINISHED STOCKING

coarse gauge hosiery, as used for the army, and men who work in the woods, and similar trades where warm clothing is necessary, as well as strong and durable goods.

By referring to the illustration, it will be noticed that the yarn is fed through several guides into the yarn levers, and from there into the needles.

The cylinder which carries the needles, revolves by means of bevel gears, driven from the pulley to the right of the machine.

The stitches are produced to make the stocking by the medium of stitch cams, which may be observed at the right hand side of the cylinder. The widening cams are on the left hand side of the cylinder, and their duty is to pick out the needles, one for each revolution of the cylinder while knitting the leg.

This operation produces the shape of the leg, which cannot be done when stockings are knit by the hand method.

This machine being fully automatic, all changes are made from the toe to the heel, and also on the leg by means of the chain which may be seen at the lower right hand side.

These various changes are obtained by means of lugs at certain predetermined positions, which raise cams which throw in or out certain needles, thus widening or narrowing the diameter of the stocking.

The number of varns which may be used is determined by the number of fingers or levers used on the machine.

The coarse gauge machine shown has only two of these fingers, which admits only two colors or thicknesses of yarn.

The fine gauge machine, which will be illustrated next, has five fingers, thus permitting five or more yarns of various colors or textures, in so much as these fingers on this machine have more than one eye, thus one finger can carry two or three strands of yarn.

It will thus be seen the fine gauge machine is designed to make the fancy hose, as is often seen in use.

In Fig. 2 is shown a side view of one of the fine gauge machines, which is used when knitting the more expensive hosiery.

A sample of the work is here illustrated as coming from the cylinder.

It may be observed here that these machines are made on the production basis, the body for each machine being the same.

When a fine gauge machine is needed, it is, therefore, only necessary to attach a fine gauge cylinder and needles, and the machine is ready for service.

A coarse gauge machine is also fabricated in a similar manner by fitting the cylinder and needles for that type onto the standard frame and body.

Sample of Hose

The half-tone, Fig. 3, shows a stocking as it comes from the machine.

It will be noticed how the leg, heel and toe are produced perfectly, leaving only a small opening at A.

This opening is closed in a subsequent operation by another special machine designed for that purpose.

The first thing which impresses a visitor to the plant here described, which is modern in every way, is the large number of special tools and methods employed for the manufacturing processes.

Apparently, wherever a tool could be used to advantage it has been designed and put into service. I have visited hundreds of plants in various parts of the country, but at the Hemphill factory one phase of manufacturing has been further developed—namely, special tooling on automatic machines to obtain interchangeable and extensive production.

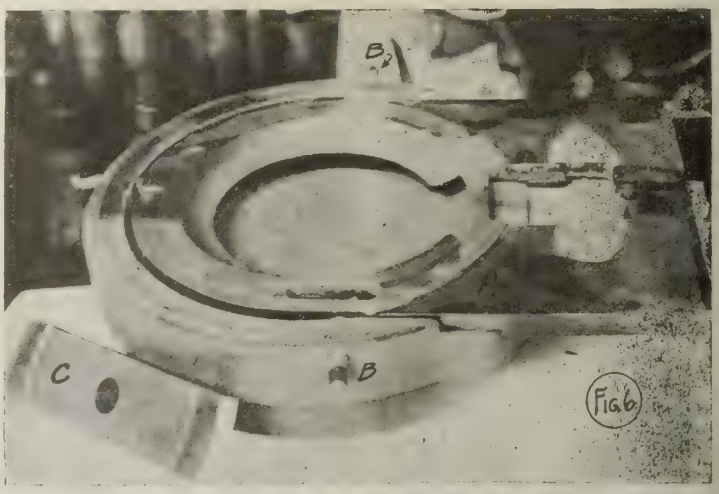
Most plants seem to neglect this factor, attention is paid to drilling machines and milling machines, and there the special tooling methods cease.

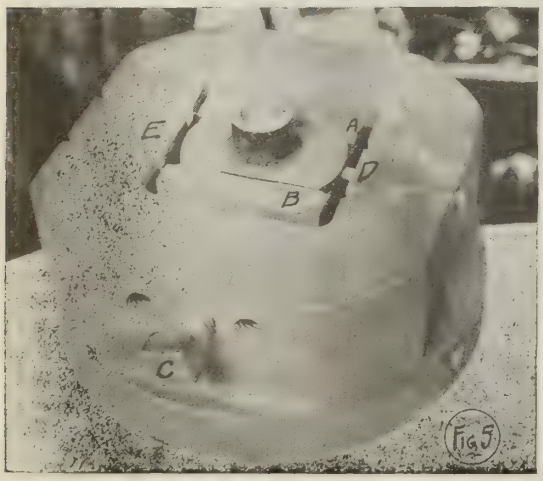
In this section of the article I shall endeavor to illustrate and describe some of these special tools used on automatics.

When machining the transfer cap two operations are necessary.

These elements are made from steel forgings, and are first held in a three-jawed universal chuck and the inside bored out to a plug gauge.

The transfer cap is then placed on the fixture shown in Fig. 4, which is held on the face plate of the Jones & Lamson automatic by means of three





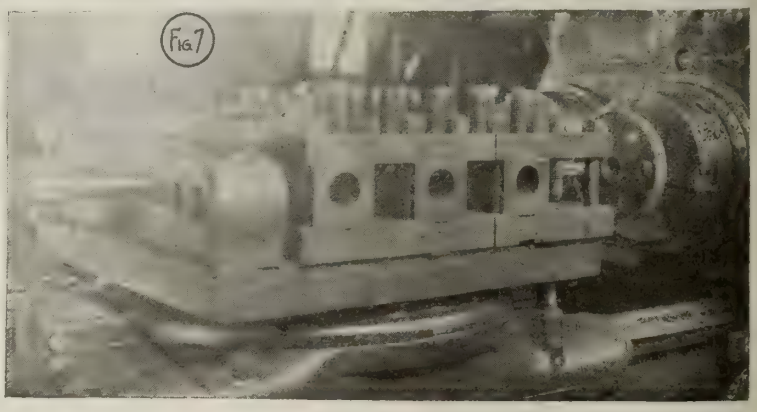
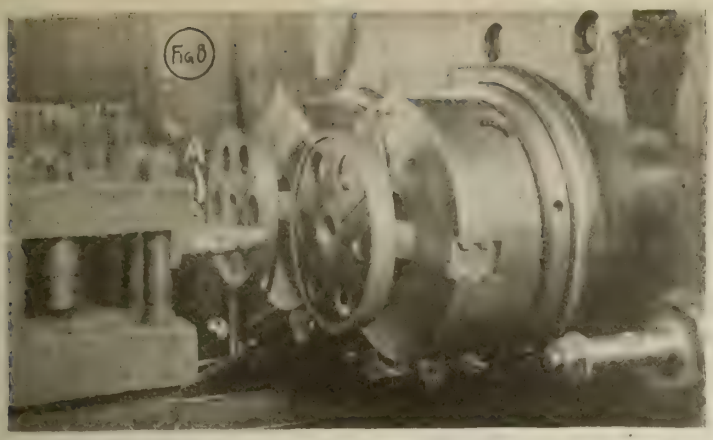
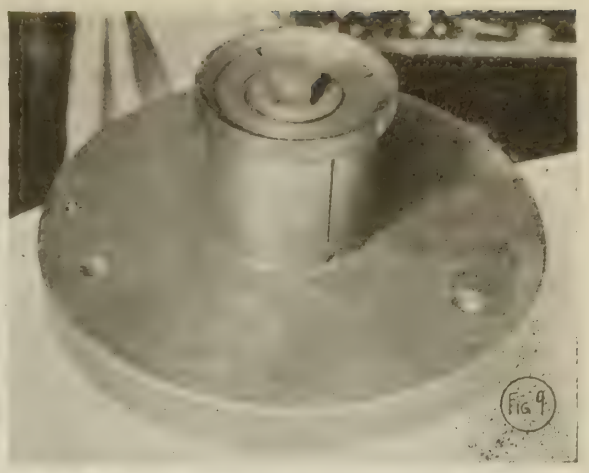


FIG. 4—MACHINING THE TRANSFER CAP
FIG. 5—MACHINING THE SHAFT BEARING

FIG. 6—MACHINING THE CIRCULAR BASE
FIG. 7—MACHINING THE MIDDLE PULLEY





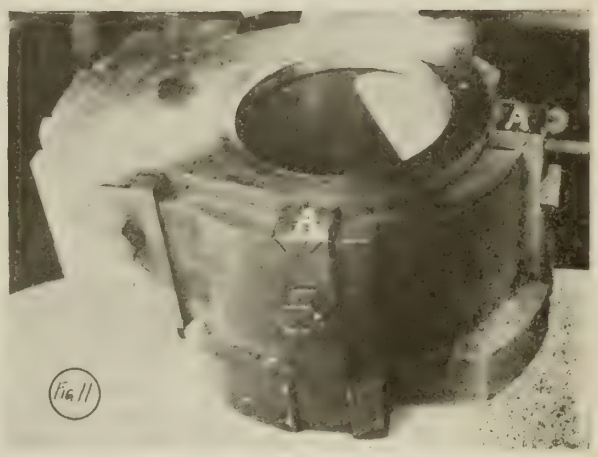


FIG. 8—CLOSE UP VIEW OF FIG. 7
FIG. 10—MACHINING THE RING GEAR BLANKS

FIG. 9—MACHINING THE STITCH RING
FIG. 11—FIRST OPERATION ON CAM PLATE

screws, and is located by fitting into a machined recess in the face plate, as may be seen from the illustration.

This fixture is of the split expanding type, and its construction is self-evident. The slots may be observed; also the cap at the outer end, which not only excludes the dirt, but also acts as a guide for the shank of the tapered expander.

As this expander is drawn out by means of the nut at the outer end, it can easily be seen that the sections will expand and hold the transfer cap in position.

The concave surface of the element is then obtained with the form tool A, which is held in the special tool holder carried in one of the positions of the turret as shown. Notice might be called to the simple construction of this form tool, it being only a short piece of rectangular high speed steel in which the correct form has been machined with a milling cutter.

When the tool requires grinding it is only necessary to remove it from the holder and grind the face to obtain a good cutting tool, the time required being only a matter of a few minutes.

The edge of the tool, it may be added, has been milled at an angle of approximately 12 deg., so that sufficient clearance, or rake, is present after each grinding operation. One of the finished machined caps is shown leaning against the face plate.

Machining the Shaft Bearing

The fixture used on the Jones & Lamson automatic when machining the shaft bearing is shown in Fig. 5.

The casting rests on a ledge machined on the inside of the fixture.

This ledge is formed on the two jaws, A and B.

The former of these jaws is stationary, being attached to the body of the fixture.

The front jaw, B, is then tightened against the casting by means of the screw C. The correct position at right angles is obtained by means of the pin D, the jaw E being screwed toward the casting, forcing the piece against this locating pin.

The fixture is held on the face plate in the same manner as previously described.

The hole in the element is then drilled and afterwards reamed; the flange and outside of hub also faced, as shown, by the part in the fixture.

All the tools used for these operations are carried in the various positions of the machine turret.

The first operation, when machining the circular base, is also performed on a Jones and Lamson automatic.

The fixture used for this purpose is shown in the next illustration, Fig. 6.

This fixture, it will be noticed, is machined with a rectangular recess to accommodate the long flange A.

A circular recess has also been machined in the fixture to suit the round section on the flange of the base.

The casting is dropped into the fixture in the position shown and the three screws, B, tightened against the flange of the casting until the circular part is concentric with the bored recess, which has been made slightly larger in diameter than the base casting.

The fixture is again held on the face plate of the machine by means of three setscrews, the turned section at the lower portion of the tool fitting into a receiving recess.

The casting is then bored to suit the ring gear bearing, and also the upper section of the flange faced.

As the bored hole must be very accurate, both regarding diameter and depth, each casting is tested with a diameter and depth gauge before removing the casting from the fixture. The gauge used for this testing operation is shown at C, and as it is only a section of a complete circle it may be easily placed into the machine-bored hole, or removed as desired.

Machining the Middle Pulley

There are many elements, the machining of which can be performed to advantage on a two-spindle Jones and Lamson automatic.

This plant uses such machines wherever possible, and the next subject

will be one of these cases, namely, The Middle Pulley.

The half-tone, Fig. 7, shows a rear view of the machine with the turret carrying the various tools for the several operations.

The work performed in their correct sequence is turning the outside diameter of the pulley facing the flange to the correct width, boring the centre hole, then reaming to size. The tools used for the last operation are shown at the left of the illustration.

A close-up view of this machine is shown in our next picture, Fig. 8.

It will be noticed that the pulley castings are held by the jaws of a three-jawed universal chuck.

These jaws hold the casting by the centre hubs, so that the tool used for facing the flange to width does not strike the jaws, but can pass down without leaving any surplus material which would have to be machined away in a subsequent operation.

The tools used for turning the outside of the flange may be seen at A, and, as will be observed, these are made of a short piece of high speed steel of a circular section, the cutting edge or face being ground flat with the necessary rake for cutting.

The turning tool is held in the holder by means of a setscrew tapped in the end of the holder and by such a medium the tools may be easily removed for grinding.

Being of round section they may be made very easily and cheaply, it being only necessary to cut the required length from a bar and grind the cutting edge as noted.

The stitch ring is made from a special bronze mixture and the first operation is boring the hole to a plug gauge.

For this purpose the casting is held in a three-jawed universal chuck, the work being again performed on a Jones and Lamson automatic. The bored ring is then placed on the fixture shown in Fig. 9, which is also of the expansion chuck type.

The construction of the fixture is obvious from the illustration and it can be readily seen that as the screw shown at the upper part of the fixture is screwed down, the centre section or plug of the fixture is also forced down. As the plug is made taper the action of forcing it down pushes outward the split section, thus gripping and holding the ring securely.

The outside of the ring is then turned and the bevelled surface produced by two separate tools held in different turret positions.

The stitch ring shown in the half-tone illustrates it as it appears after these operations have been performed.

Machining Ring Gear Blanks

On the hosiery machine quite a number of gears are used, some of these are spur and others bevel.

The illustration, Fig. 10, shows the machining of a large bevel gear, previous to cutting the teeth known as the ring gear blank.

The casting is held on an expansion chuck fixture, gripping the part by a large diameter recess. The piece is held against a faced boss of the fixture, and the operator, by tightening the screw shown at the outer end of the fixture, expands the split section of the chuck, thus holding the casting firmly in position. It might be added that this type of chuck not only holds the part, but also centralizes it in the operation.

The centre hole is then bored to 3 in. diameter to a plug gauge, a recess is also machined, the flange faced and the outside turned to the correct diameter.

The half-tone shows part of one of the finished machined blanks resting against the face plate of the machine.

Note might be called to the rather interesting type of tool used for the facing operation and shown immediately in front of the turret. This is made with a circular bar, held in the rectangular bar, which is fastened in the turret proper.

This bar is made with a head in which a short piece of high speed steel is held by means of a setscrew in front.

When the operator desires to tip the tool in any direction to provide clearance for the cutting edge of the tool, the circular bar is revolved, and by tightening the large square-headed setscrew, shown threaded in the rectangular bar holder, the bar is held rigidly in position for the machining operation. This type of tool is found to be very serviceable, and as can be readily seen, is also cheap in construction.

The cam plate is a somewhat slender casting and must be held rigidly, so that the various machining operations produce a part absolutely true to shape.

Machining the Cam Plate

The fixture used for the first of these operations is shown at Fig. 11.

This tool is made with a contour similar to the cam plate, but slightly larger in outline. The piece is then dropped into the fixture and the six clamps tightened against the edge of the flange.

The three clamps at the rear of the fixture are rigid, or fixed, and determine the correct location for the piece. The three clamps shown, two on the front side and the one at the right being tightened against the casting, force it back against the first three clamps noted, thus locating as well as holding the element securely in position. The machining operation is performed on a two-spindle Jones and Lamson automatic, similar to that shown in Fig. 7.

The two fixtures used on the machine are held and located on the face plate in a manner similar to that previously described.

The large hole in each casting is then bored to a plug gauge and the entire outside surface of the flange faced with a smooth finish.

The casting shown in the fixture is one after these operations have been performed. Note might be called to one feature in the construction of the fixture, namely, the inserted hardened tool steel blocks A, which bear against the casting.

This construction is cheaper than if the entire strap had been made of tool steel, the rest of the strap being of a low carbon steel ,and a further advantage is the comparative small cost of furnishing a new part for repairs, should it at any time be found necessary.

In the next section will be shown other tools, some of a multiple type, used on Jones and Lamson automatics.

Caustic Soda

There is only one safe and speedy method of handling caustic soda as received in iron drums. Punch two holes in the lid of an unopened drum, place the drum in a tank, cask or convenient receptacle. Send a steam jet by a pipe into one hole and open the valves. It is possible by this kink to make up 30 per cent. solution speedily and safely. To dilute is a simple matter and to duplicate strength a hydrometer is the easiest method. The weight of caustic being known and the capacity of receptacle the amount of alkali per gallon of solution is easily ascertained. The hydrometer used was graduated 1,000-1,200 and as the purpose in view involved very great dilution (about ½ per cent. being found sufficient) the solution was made up 1,200 in strength; a small measured quantity of the strong liquor being placed in a much larger measured quantity of water. Alkali, like all forms of grease, being now expensive and difficult to procure, it is thought that caustic can be substituted for milder alkali, such as soda ash, if the proper means of handling and using are set forth. As a grease shifter caustic is ideal, but it needs care and proper handling, otherwise injury may result to the experimenter unversed in its nature. A foot with strong boiling caustic liquor spilled over means painful burns and ruined foot-gear, while a spot or two drills holes in any woollen clothing; its action on wool is extraordinary and must be experienced to be credited.

RETARDING THE SETTING OF PLASTER OF PARIS

In the making up of plaster of paterns, the plaster of Paris sets too quickly for much to be done with it where water alone is used for mixing. For this reason, vinegar, or vinegar and water, should be used instead of water, the vinegar retarding the setting. Roughly, plaster mixed with all vinegar takes six hours to set, and with equal parts of water and vinegar just over two hours, the state of the plaster having something to do with the actual time taken. Usually, however, three parts water and one part vinegar gives sufficient retardation, but as the vinegar is increased so is the retardation.—M.E.

Technical Education Plus "Horse Sense"

A Short Article, Illustrating That Technical Education is Not Everything, But That Shop Experience is Also Necessary to the Machine Tool Designer

By ROBERT MAWSON

IT is not my intention in this article to belittle technical education. A man, either in the shop or office, cannot have too much.

Get all the technical knowledge connected with the engineering profession you can and it matters little whether it is obtained at a college or by burning the midnight oil.

My remarks are in connection with the idea often held by some workmen, both in shop and office, that the gaining of a technical education is the end of knowledge.

This is not so, it is only the means to an end, and to make it either useful or valuable technical education must be incorporated with experience and "horse sense." One or two instances which have come under my notice will, perhaps, elucidate the point better than any other method.

I was once in a shop where a one-operation lathe had recently been designed and made.

This machine, judging from the work it was then doing, was of good design, and, I suppose, followed all precedents as regards ample strength, etc. However, one outstanding feature showed that the designer was totally lacking in "horse sense." This was in the headstock of the lathe. In this part of the machine were located all the change gears and shifting mechanism, which is good design, but these gears and the shifting levers, etc., were all enclosed. This was very bad design. With this machine, when it was necessary to change the gears to obtain a different rate of feed or for repairs, it was necessary for the man to get under the machine and reach from the floor to the head stock of the lathe.

It is easy to judge how inconvenient this was, and more so as the man was working in the dark and could only do the work by the sense of touch.

This could have been prevented by the designer taking a walk in the shop, getting in personal touch with the machinist end of the game and using a little "horse sense."

A second example was a certain machine tool which was designed by a young man who had received only a technical education. In other words, he had never worked or spent any time in the shop.

On this machine the various speeds and feeds were controlled by rods operated by levers at the head end of the machine, which was of the horizontal type. These rods were placed about six inches from the floor and extended from the head to the tail end of the machine, a distance of about ten feet. The designer had carefully figured out the stresses on these rods and found that half-inch rods were strong enough.

I have no doubt they were of ample strength to perform the function of shifting the gears, but if anyone has seen an operator shifting gears in a hurry, and when it is remembered that their position is somewhat convenient for use as a foot rest, the obvious result can be imagined.

And this actually happened. In a very short time the rods were bent and buckled, and their designed purpose of shifting gears could not be fulfilled.

The rods were then replaced by rods of ample size, so that any possibility of distortion was removed.

Here, then, was another case where "horse sense" combined with designing training would have prevented a foolish mistake.

The third example I will take will also be a lack of judgment in machine design. The part was a cover or housing for a governor. This casting revolved and, therefore, the question of centrifugal force and its attendant stress must be taken into account.

The designer figured out this factor and found that 5-32 in. thickness of metal was strong enough.

He then designed the cover to this dimension, and it may be mentioned that on the casting were a number of bosses to hold rods and screws so that the cover could be attached to the governor stand.

The outside diameter of the cover was approximately 12 inches.

It can thus be easily seen that not only was the pattern somewhat difficult to make with such a thin wall, but, as regards the casting of cast iron, it was altogether impracticable as a manufacturing proposition.

The design was therefore changed and the wall made heavier, so that castings could be obtained with a reasonable amount of assurance that perfect parts were obtained after the machinery operations had been performed.

If this designer had only received some practical training in the foundry and machine shop, he would have seen the foolishness of designing such a piece with the thin wall noted. To summarize, after you have got a technical education, get out in the shop and foundry and see how things are made in metal; some look different than you see them on paper; and always remember that points can be obtained from the knights of the overall, as well as the college professor.

Combine "horse sense" experience and education and you are an engineer who knows how, why, and can also do things. Separate these three factors and you stunt your ability and become a mediocre machinist, of which the shops and offices are altogether too full already.

ELECTRIC METHOD OF HARDENING TOOLS

A curious method of hardening tools, but one which seems to possess practical value, has become the vogue in Germany. In the process of electricity the hydrogen generated at the cathode is heated to such an extent that the cathode itself is brought to a red heat. Advantage is taken of this phenomenon by using tools that are to be hardened as the cathode in an electrolytic bath. It is, however, necessary to protect the cutting edges of the tools, as these are liable to be raised to such temperatures that they become blunted. Methods of affecting this are protected by recent patents of the Oesterr, Ung. Elektro-Schweissmashinen Ges. of Vienna. The cutting edges of the tools are covered with a layer of non-fusible conducting material. The thickness of this coating is so chosen that the edges are protected during the heating of the body of the tool, but so that, after the coating has flaked off, the teeth are exposed for the final heating. If the parts are only to be heated for subsequent hardening the edges may be covered with graphite cement, so that the glowing tools may absorb carbon. Another method of protection consists in lowering the tool into coarse powder or sand, lying at the bottom of the bath, or the edges that are to be hardened may be protected from the influence of the current by covering the parts to be hardened with suitably shaped porcelain tubes, which are removed when the body of the tool is raised to the required temperature.—M.E.

LUBRICANTS AND SKIN DISEASES

Oil rashes are not uncommon, and may lead to complications. For instance, there may be plugging of the glands of the hair follicles, abrasion of the skin through the metallic particles in the oil, or inflammation through the use of impure oil. Cleanliness is the best safeguard. Before commencing work the hands and arms may be powdered with a mixture of equal parts of starch and zinc oxide. The hands should never be wiped on a dry or oily rag, as this may cause abrasion of the skin. Washing should be done in plenty of warm water, if possible, with an ether soap. The lubricating oils should be purified periodically. Machines must be kept clean, and persons suffering from skin diseases should be kept away from machine to avoid the spreading of infection.—M.M.

JUDGING STEEL

By M. Mark

In many factories there is a certain amount of carelessness in keeping steel stock. Labelled steel is sometimes kept in a damp place where the labels drop off, and where it is the custom to mark the quality of steel bars by painting in different colors it is an easy matter for mistakes to occur. An instance has been cited where seven grades of steel were painted in the same color. A workman consequently is often called upon to judge steel quality for himself, and as a general thing he goes by the general shape of the material, the appearance of its surface, the way in which it fractures, its weight, and "ring" when dropped, its smell, or his intuitive knowledge. At times, these fail him, and he goes by the spark, service and fire and water tests, as he calls them. If the workman possesses a high degree of skill, he can determine quality by any of these to a surprising degree of accuracy, and in regard to tool steel he seldom makes a mistake, going, as he generally does, by the appearance of the surface. It is fairly good evidence to him if the bars have a good, smooth surface, and the corners are sharp and clean. He also goes a good deal by the general shape of the stock; screw stock is always of hexagon section and octagon section steel generally means suitability for cold chisels and similar tools. As a matter of fact, smooth surfaces and sharp corners indicate work at low temperatures, whilst rough surfaces and round corners are caused by an iron oxide scale when the metal is laid down at high temperature, so that the appearance of the steel stock is not an invariable indication as to either its composition or its quality. According to this authority, however, many workmen are not prone to judge entirely by appearances. They prefer to drop the metal on a hard floor or on a heavy piece of iron. If the ring is of a sharp, clear tone it usually indicates to them that the metal is of good quality. The finer the grain the more homogeneous the structure and the harder the metal the sharper is the note given when falling. These qualities are developed by elements in the metal by working and by heat treating at a moderately low temperature. On the other hand, wrought iron will emit a dull tone owing to the presence of about 2 per cent. of slag, and the usual methods of working such metal at a high temperature. This method is not reliable or dependable because work and heat treatment will affect the tones emitted when the material is struck or dropped.

It is surprising how many expert workmen will select metal by intuition; and because of their opinion they work the tool into shape regardless of any indication in its cutting properties that the metal may be undesirable. Their mistake is usually discovered when attempting to harden the metal or when putting it into service. It is said that in one of the American manufacturing districts it is the custom for a man to nick a bar of stock with a cold chisel, break it in two and immediately smell the fracture, claiming that a good quality of steel smells like ammonia. There is no ammonia in steel, and many of the tests used by the workmen are just as unreliable.

The fracture test does not represent the true quality of metal, but rather indicates the last heating operation to which the metal was subjected. A fracture that has a coarse granular appearance may not mean that the steel is of inferior quality but that it was laid down at a high heat, and that the crystals retained the size corresponding to that heat. There are exceptions to this rule however, for many of the elements in alloy steels prevent or retard crystalization at high temperature. High-grade steel shows an unusually fine grain after being heated to a temperature of 2,250 deg. Fahr.; on the other hand, carbon tool steel heated to its critical temperature and immediately quenched shows a fine silky structure, and it is doubtful if the average mechanic is able to distinguish these metals when they are placed together for comparison. If a small piece of carbon tool steel is heated to just above its critical temperature, about 1,450 degrees Fahr., known as a dark cherry red and immediately quenched in water, it will be hard enough to resist a sharp file, and when fractured should show a fine silky structure. If a low or inferior grade of carbon steel is treated in this manner the surface may be hard enough to resist a file, but the fracture will not show a fine structure.

Many workmen, as well as the experimental engineer, select available material at hand without any determination as to quality, and then put expensive labor upon the part or tool. When finished, it will be tried out in service and if it fails something else is tried. Such failures are usually found on the scrap heap. The service test, however, has its advantages if the engineer has a knowledge of the material thus tested. This information is invaluable as it is the combination of successes and failures that gives the empirical knowledge that completes the perfect understanding of theory. The scrap heap of failures is the most instructive place about a factory.

The spark method of test is based on the action of oxygen of the air on the combustible element present in iron and in many of the alloying elements contained in the different steels which acts explosively when heated to a temperature necessary for combustion. To produce bright sparks as a result of heating finely-divided particles of metal the heat must be intense, at any rate sufficiently so as to enable the particles of metal and the oxygen of the air to combine chemically to cause complete combustion.

AN INTERESTING CHILLED CAST IRON ROLL TIRE, 79 IN. DIA., 20 IN. FACE, 7 IN. THICK, 7,625 LBS. CAST BY THE ASBESTOS FDRY. CO., INC., THETFORD MINES, QUE.

Shop Arithmetic—Underlying Principles

The Second of a Series in Practical Mathematics For the Mechanic and Those Learning the Machinists' Trade—The Present Article Takes Up the Subject of Fractions

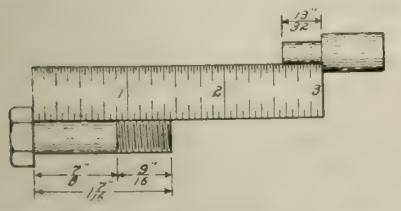
By J. H. RODGERS

IN what has gone before units or whole numbers only have been dealt with, but it is very often necessary to consider things in a lesser value than a single unit, in which case we must have some system of sub-division. Two methods are in general use for this purpose—fractions and decimals—sometimes called vulgar and decimal fractions. It is seldom that machine-shop dimensions will call for even inches, feet, etc.; therefore it is necessary to have graduations on the measuring instruments that will provide for the accurate determination of distances smaller than the unit under consideration. The ordinary units of linear measurement in this country are miles, yards, feet and inches; sub-divisions of the higher values are usually made by reducing to a lower term, or by the common fractions of ½, ¼, ⅛, 1-16, 1-32, etc., although dimensions of any desired value may be used to meet the specific requirements.

A fraction is one or more of the parts into which a unit is divided and is composed of two terms: the lower (denominator 32) denoting the number of parts into which the unit is divided, and the upper (numerator 5) indicating the number of these parts that are to be taken, the value of the fraction being expressed as:

$$\begin{array}{ll} \text{Numerator} & 5 \\ \text{Denominator} & 32 \end{array}$$

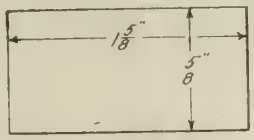
The common steel scales used in the machine shop are generally divided as stated above, and a little practice will teach more than a page of explanation. The sketch here shown will illustrate the fractional application of the unit division:



The rule in this particular instance has graduations of 16 to the inch on the lower side and 32 to the inch on the upper side, and the length of the bolt is seen to be one full inch, and 9 of the 16 divisions of the second inch, indicating that the total length of bolt, below the head, to be 1 9-16 inches. The same process is followed in the case of the small stud, where the length of the short end is shown to be 13-32 inch.

In working out questions where fractions are involved it is always advisable to keep them as simple and in terms as low as possible. A fraction does not alter its value if both terms are multiplied or divided by the same number; for instance, ½ is equal to 2-4, 3-6, 4-8, 16-32, etc., but the simplest form ½ would invariably be used. Fractions are so common in every form of calculations that a knowledge of their use and application is essential to the figuring out of many shop problems. Accurately speaking, there is only one form of fraction, called a proper fraction, in which the denominator is greater than the numerator, but the term—improper fraction—is often used where the numerator is greater than the denominator. This, however, is not really a fraction, but the method of combining a whole number with a fraction or part of a unit for the purpose of convenience, as the final equation of an improper fraction is that of a mixed number, the integer portion and the fraction, the latter being a definite part of one of the units of which the number is composed.

For instance, in the rectangle here shown, the length of the sides are 1⅝ inches, and the width of the ends ⅝ of an inch:

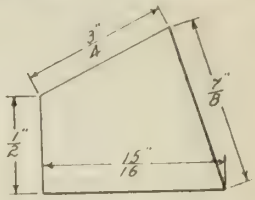


The distance around the edge would be:

$$\frac{5}{8} + 1\frac{5}{8} + \frac{5}{8} + \frac{5}{8} = 2\frac{20}{8} \text{ inches}$$

It is readily seen that the improper fraction is the outcome of the addition of the four proper fractions, but the result is rather confusing. This, then, must be changed to a simpler form: a unit would be $\frac{8}{8}$, so that it is seen that in $\frac{20}{8}$ there are two units and $\frac{4}{8}$ over, but as $\frac{4}{8}$ is equal to $\frac{1}{2}$ the value of the improper fraction $\frac{20}{8}$ equals 2½, and this, added to the previous whole number, gives the correct result as 4½ inches.

It is often much more difficult to work with fractions than with whole numbers owing to their varying denominations. In the addition and subtraction of fractions it is generally necessary to reduce the expression of one or more to a common denominator before the work can be properly performed. Suppose in the irregular figure here shown the length of the sides are as illustrated; what would be the distance around?



It is necessary to add together the four dimensions. To do this they must be changed to fractions of corresponding denominations. It has previously been stated that a fraction can be changed to a higher or lower denomination without changing its relative value by multiplying both terms by the same number; then the above question can be solved by bringing all the fractions to a common denominator, and a glance will show that 16 will be common to all, therefore:

$$\frac{15}{16} = \frac{15}{16}$$

$$\frac{7}{8} \begin{array}{c}\times 2\\ \times 2\end{array} = \frac{14}{16} \quad \frac{16}{16} =$$

$$\frac{3}{4} \begin{array}{c}\times 4\\ \times 4\end{array} = \frac{12}{16} \quad \frac{49}{16} = \frac{1}{16} \times \frac{49}{1} = 3\frac{1}{16}$$

$$\frac{1}{2} \begin{array}{c}\times 8\\ \times 8\end{array} = \frac{8}{16}$$

$$\frac{49}{16} = 3\frac{1}{16}$$

However, it is not always that fractions will come where the common denominator can be so easily determined. For instance, several sections of track have been laid, the distances being:

$$\frac{3}{8} \quad \frac{5}{9} \quad \frac{7}{12} \quad \frac{11}{20} \text{ and } \frac{5}{6} \text{ of a mile.}$$

and it is desired to know the entire mileage laid. A common denominator could be found by simply multiplying all the denominators together and converting the various fractions to that denomination. This, however, would entail much unnecessary figuring, so that the method of finding the least common denominator is more generally resorted to. To do this the denominators are placed in a row and divided separately by the lowest prime numbers, carrying down those numbers that cannot be divided evenly until the final numbers are prime numbers. The product of these divisors and final remainders will be the least common denominator (L. C. M.)

For the above question we have:

2	8	9	12	20	6
2	4	9	6	10	3
3	2	9	3	5	3
	2	3	1	5	1

$$L.C.D. = 2 \times 2 \times 3 \times 2 \times 3 \times 5 = 360.$$

To add the various fractions they are converted to a similar value, but with the denominator 360 common to all. This is done by dividing 360 by the denominator of the fraction and multiplying the result by the numerator of the fraction for a new numerator. Add the various numerators and reduce to a mixed number with the fraction in the lowest terms.

$$\frac{3}{8} = \frac{135}{360} \qquad 8\,\overline{)360} \quad 45 \times 3 = 135$$

$$\frac{5}{9} = \frac{200}{360} \qquad 9\,\overline{)360} \quad 40 \times 5 = 200$$

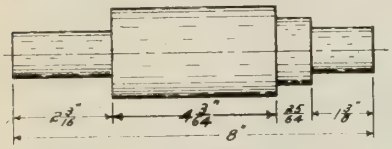
$$\frac{7}{12} = \frac{210}{360} \qquad 12\,\overline{)360} \quad 30 \times 7 = 210$$

$$\frac{11}{20} = \frac{198}{360} \qquad 20\,\overline{)360} \quad 18 \times 11 = 198$$

$$\frac{5}{6} = \frac{300}{360} \qquad 6\,\overline{)360} \quad 60 \times 5 = 300$$

$$\frac{1043}{360} = 2\frac{323}{360} \text{ miles.}$$

The subtraction of fractions calls for a similar process as that explained for addition, the denominator being the same before the work is performed. A shaft 8 inches overall has one end turned down to 2 3-16 inches in length, and the other end has two steps of 1⅜ and 25-64 inch long; what is the length of the middle portion?



$$2\frac{3}{16} + \frac{25}{64} + 1\frac{3}{8} = 2\frac{12}{64} + \frac{25}{64} + 1\frac{24}{64} = 3\frac{61}{64}$$

$$8 - 3\frac{61}{64} = 7\frac{64}{64} - 3\frac{61}{64} = 4\frac{3}{64} \text{ inches}$$

It is probable that the multiplication and division of fractions will be required to a very great extent in the solution of many shop problems, so that a knowledge of their application is very necessary. When multiplying fractions the answer is obtained by multiplying the numerators together and likewise the denominators. When mixed numbers are involved it is well to change them into improper fractions. To find the circumference of a pulley or any circular object, the diameter is multiplied by the constant 3 1-7—this being the ratio of circumference of any circle to its diameter. A wheel 15 inches in diameter would be:

$$15 \times 3\frac{1}{7} = \frac{15}{1} \times \frac{22}{7} = \frac{330}{7} = 47\frac{1}{7} \text{ inches.}$$

A shaft 4 8-10 feet long requires ⅝ of it cut off; how long is the piece?

$$4\frac{8}{10} = \frac{48}{10} \qquad \frac{5}{8} \text{ of } \frac{48}{10} = \frac{240}{80} = 3 \text{ feet.}$$

In future examples, problems like the following will frequently be met with, so it is good practice to become familiar with the method.

$$\frac{60 \times 24 \times 11}{88 \times 30} = \frac{15840}{2640} = 6$$

In the above solution the multiplication has been carried out in detail, but this is seldom the practice in the actual working out of a problem. Cancellation is invariably used as it shortens the work considerably and likewise reduces the possibility of error. Cancellation is the process of elimination of such factors as are common to both numerator and denominator. A factor is one of the even divisions of a number; 4 is a factor of 8, 12, 16, etc.; 7 is a factor of 14, 21, 28, etc. To clearly illustrate the use and advantage of cancellation, take the above problem:

$$\frac{6\cancel{0} \times \cancel{24} \times \cancel{11}}{\cancel{88} \times \cancel{30}} = \frac{6}{1} = 6$$

Ten is common to both 60 and 30; 3 is common to both 3 and 24; 8 is common to 8 and 88; 11 is common to both numerator and denominator, leaving 6 on the top and 1 on the bottom, or an answer of 6, the same as in the previous case.

Divisions of fractions like that of whole numbers is the reverse of multiplication, and from this we learn the fact that to perform the operation of division, all we require to do is to invert the divisor and proceed as in multiplication, thus:

$$\frac{7}{8} \div \frac{3}{4} = \frac{7}{\cancel{8}_{2}} \times \frac{\cancel{4}}{3} = \frac{7}{6} = 1\frac{1}{6}$$

In many formulae the expression is often made in the nature of a compound fraction but the operation can be simplified by applying the same rule as is done in common fractions by remembering that the numerator is always divided by the denominator. For example, in the problem below, the arrangement can be altered to conform with the simple method.

$$\frac{\frac{35}{64}}{\frac{7}{8}} = \frac{35}{64} \div \frac{7}{8} = \frac{\overset{5}{\cancel{35}}}{\underset{8}{\cancel{64}}} \times \frac{\cancel{8}}{\cancel{7}} = \frac{5}{8}$$

It occasionally happens that complex problems will be met with like that below, and the same process of conversion is followed, thus:

$$\frac{\frac{3}{4} \text{ of } 25}{\frac{7}{8} \text{ of } 1\frac{1}{2}} = \frac{\frac{75}{4}}{\frac{21}{16}} = \frac{\frac{75}{4} \times \frac{16}{21}}{8} = \frac{\frac{100}{7}}{8} = \frac{100}{7} \times \frac{1}{8} = 1\frac{11}{14}$$

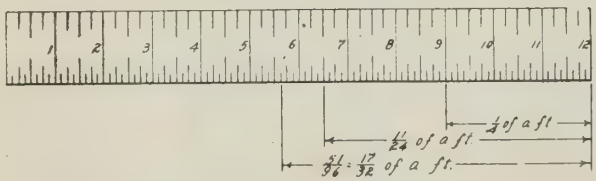
$$6 \div \frac{3}{4} \qquad 8$$

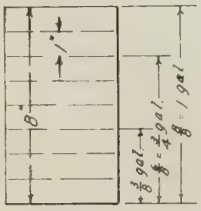
or

$$\frac{\frac{3}{4} \text{ of } 25}{\frac{7}{8} \text{ of } 1\frac{1}{2}} = \frac{\cancel{3}}{\cancel{4}_{2}} \times \frac{25}{1} \times \frac{\cancel{8}^{4}}{7} \times \frac{\cancel{2}}{\cancel{3}} \times \frac{1}{\cancel{6}_{2}} \times \frac{\cancel{3}}{\cancel{4}} = \frac{25}{14} = 1\frac{11}{14}$$

$$6 \div \frac{3}{4}$$

In such cases as this the question resolves itself into a number of simple fractions, the main division line being indicated by additional thickness. This means that all the work above the heavy line is to be divided by all that comes below. Further explanation of practical problems like this will be given later in the course.



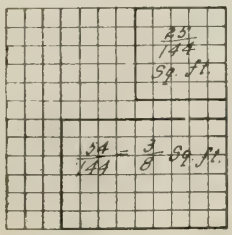


Fraction $\frac{17}{32}$ $\left.\begin{matrix}\text{numerator}\\ \text{denominator}\end{matrix}\right\}$ terms

$$\frac{1}{2} + \frac{3}{8} + \frac{5}{6} + \frac{5}{9} + \frac{7}{10} + \frac{5}{16} = \frac{2359}{720} = 3\frac{199}{720}$$

2	2	8	6	9	10	16
2	1	4	3	9	5	8
2	1	2	3	9	5	4
3	1	1	3	9	5	2
	1	1	1	3	5	2

$$L.C.D. = 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 2 = 720$$



$$\frac{3}{4}\,\overline{)3.0}\ (.75$$
$$\underline{28}$$
$$20$$
$$\underline{20}$$

A *fraction* is one or more of the parts into which a unit is divided.

The *terms* are the *numerator* and the *denominator*.

To find the *L.C.D.*—Place the denominators in a row and divide by prime numbers until the remainders are prime numbers. The product of the divisors and the remainders will be the L.C.D.

To *reduce* a fraction to its *lowest terms*—divide each term by the same number.

A fraction does not alter its value if both terms are divided or multiplied by the same number.

To *change* a fraction to a decimal—divide the numerator by the denominator.

The Bessemer Process of Steel Manufacture

How Steel is Actually Made in the Bessemer Mill—The Story Told in Such a Way as the Stranger to the Steel Mill Can Understand

By P. N. CASE

A FEW weeks ago "CANADIAN MACHINERY" published the first of a series of articles by P. N. Case, who edits *"The Dragon,"* published by the Fafnir Bearing Co. Mr. Case was formerly mixer-foreman in the Bessemer mill of the Lackawanna Steel Co.

Synopsis of First Chapter

In Chapter 1 of this article, which was printed in the last issue of *"The Dragon,"* we observed: (1) that, generally speaking, the manufacture of steel is a refining process, in which the excess of impurities, such as carbon, silicon and manganese, are removed from the pig iron; (2) that in the Bessemer Process those impurities are "burned" out of the pig iron by means of an air blast; (3) that the "burning" or, strictly speaking, the oxidation of those impurities is very rapid and generates all of the heat necessary for the process; (4) that the oxides of the impurities thus formed, being lighter than metallic iron, make a layer of slag on the surface of the metal, from which they are subsequently separated; and, finally, that to the virtually chemically pure iron (containing only the original phosphorus and sulphur, and traces of other elements) which is left, the proper amounts of carbon, silicon and manganese are added to impart to the finished steel the desired percentages of those elements.

Making Steel

When a blast furnace which is supplying the Bessemer—in the vernacular of the mill, the Bessemer Plant is invariably spoken of simply as the "Bessemer"—with pig iron has been tapped, the man in charge "calls-up" the mixer-foreman and states the estimated percentages of carbon, silicon and sulphur contained in the metal. This estimate is based on the appearance of the fractured surface of a small sample run-off into sand and quickly chilled, and is, therefore, only approximately correct. If the estimated percentages are within the somewhat flexible limits, the mixer-foreman at the Bessemer replies, "send it to the mixer." Otherwise, he orders the blast furnace foreman to send a sample to the laboratory. An indication of the speed with which these operations are carried out may be had from the fact that a sample can be sent to the laboratory and a report giving the exact chemical analysis received within 20 minutes.

If the analysis proves satisfactory, the mixer-foreman orders the pig iron sent to the "mixer," otherwise, he has it sent to the "pig machine," where it is cast into "pigs" (bars) of iron. A "mixer" is a large vessel having a capacity for from 50 to 300 tons or more of pig iron, and is used to store the metal from the time it is tapped at the blast furnace until it is sent to the converter. Furthermore, the mixer contains so large a quantity of metal that it greatly facilitates keeping it at a sufficiently high temperature to preserve the molten condition. Ordinarily the heat in the metal is sufficient, but if the supply of metal in the mixer happens to become greatly diminished, the mixer is heated by burning a tar-like mixture which issues forth from a jet. In addition to this, as the name implies, the mixer serves to mix together into a uniform mass the products of several taps from different blast furnaces which, naturally, are not quite alike in composition. It is one of the duties of the mixer-foreman to keep account of the average chemical composition of the pig iron in the mixer, making due allowances both for additions of metal and for that which is withdrawn. This is of great importance to the "blower," since it gives him an indication of the amounts of the various impurities contained in the pig iron.

At Lackawanna there were two of these mixers which are located at a high elevation in the mill. A locomotive pushes the trucks bearing the ladles of pig iron into position below the mixers. By means of two cranes the ladles are hoisted up to, and a little above, the level of one of the mixers into which their contents are poured. It is of considerable importance into which mixer the iron is poured—the purpose being to keep the composition of the contents of each mixer as nearly uniform as possible—and the decision in this matter rests with the mixer-foreman.

Moreover, this work is one of the dangerous operations at the mill. Molten metal is frequently spilled with serious results; and if—as has been known to happen—an entire ladle is overturned, it is almost certain to burn to death the man who "hooks-on" the ladles down below. Moreover, the flames are very apt to leap up and incinerate the crane men who are 75 feet or more overhead. Of course, the mixer-foreman keeps at a safe distance—at least he did when I was on the job.

Thus it will be appreciated that the mixers afford a surplus stock or reservoir of pig iron which may be drawn off as needed and charged into the converters. At Lackawanna, there are (or were, when I was there) four 12-ton converters. When one of these vessels is ready to receive a new charge, a definite weight—depending on the character of the steel to be made, but usually about 20,000 lbs.—of pig iron is poured from one of the mixers, which can be tilted for that purpose, into a transfer ladle mounted on a truck which stands on scales. By first weighing the truck and ladle empty and later loaded, it is easily determined when the proper quantity has been poured. This operation takes place on the opposite side of the mixer from that at which the metal is received from the blast furnace. Furthermore, it takes place at a higher level in the mill—known as the "vessel floor."

In order that the reader may better appreciate the subsequent operations, it will be well, before proceeding further, to describe briefly the construction of the Bessemer converter, or "vessel," and the means by which it is manipulated. The vessel consists of a steel shell, riveted together, and shaped somewhat like an egg, flattened at the ends, with the upper end open. Moreover, the vessel is mounted on two trunnions. One of these trunnions is hollow, and is utilized as a pipe for conducting the air blast from the blowing engine to the wind-box at the bottom of the vessel. On the other trunnion there is a pinion which meshes with a rack. The rack is connected with an hydraulic piston of sufficient length to permit the vessel to be rotated through an angle of approximately 270°. The vessel is lined with a refractory acid material, consisting of bricks of a substance known as "ganister." The upper end of the vessel is entirely open, and the bottom is pierced by about 20 tuyeres, which are clay tubes, each of which is sub-divided into 12 to 18 holes, through which the blast enters the vessel in a fine spray and with sufficient pressure to support the weight of the overlying metal.

Moreover, because it is in such intimate contact with the air blast, the lining of the bottom is corroded more rapidly than that of the sides of the vessel. For this reason, it is customary to secure the bottom to the vessel by means of links and keys, so that it can easily be detached and a new one quickly substituted. In attaching

a new bottom, it is pushed on a low truck directly under the vessel and raised into place by means of a hydraulic press. A layer of clay is placed around the rim of the bottom which, when compressed, makes a tight joint. Occasionally, it becomes necessary to reline the entire vessel, which involves considerable delay, since the vessel must first be allowed to cool off sufficiently to permit men to get inside of it and break up the remains of the old lining with sledges. This is about as hard and as hot a job as one can imagine, and one in which a man certainly earns his pay envelope—this work has no place in a mixer-foreman's life!

Now let us resume the story. One of the vessels has been revolved into an horizontal position, and is ready to receive the charge of pig iron which has just been poured from the mixer into a transfer ladle. With a great deal of puffing, a dinky engine pushes the ladle of iron from the mixer through the mill, coming to a stop directly in front of the white hot cavern formed by the vessel's yawning mouth. Moreover, the locomotive might just as well be run automatically, since I found one night, as I jumped from the track in the nick of time, that the engineer wasn't worrying about obstructions on the "right of way." Afterward, I was calmly told that that engine already had two "notches" on its bumper. The contents of the ladle are then charged into the vessel by a crane man who drops a hook into an eye on the far side of the ladle and tilts it by hoisting with the crane.

Next the blast is turned on while the vessel is still in an horizontal position, and the deluge of sparks and flame which shoots across the entire width of the mill creates quite a spectacle for the uninitiated and spells woe for him who is caught napping—I remember once having seen a Pole, who had a tremendous shock of curly blonde hair, run to cover when a few stray globules of molten metal landed on his mattress-like head of hair. Finally, the vessel is revolved into a vertical position, and the "blow" is on.

It is interesting to know why the vessel is charged while lying flat. This is essential in order to prevent the molten metal from running into the tuyere openings in the bottom and freezing. By "lowering" the vessel, the metal is contained in the deep belly or side of the converter and does not come into contact with the tuyeres until after the blast is turned on. Then it doesn't matter, because the air pressure is sufficient to sustain the column of metal. The vessel is then revolved into a vertical position, as stated above.

The operation of the vessels, as well as the entire "blow," is controlled by the "blower," who is usually a man who has literally grown up in the mill. So much depends upon his skill and judgment that it is scarcely too much to say that he is the man who "makes" the steel. The blower and his several assistants are stationed on a platform, called the "stage," which is situated on the opposite side of the mill at a point directly in front of the vessels. On either side of the blower, there are a number of long levers, by means of which his assistants manipulate the vessels, raising and lowering each at the beginning and end, respectively, of the blow. Furthermore, the blower has a large chart in front of him, called the "blow sheet," on which he keeps a complete record of the blows. This is essential, since there are often three and sometimes four vessels in operation at once. Moreover, it may be that soft steel (low in carbon) is being made in one or two vessels and high carbon steel in the others.

The sequence of chemical reactions which occur with startling rapidity inside of the vessel, as well as the visible phenomena attending them, are both interesting and complicated. It is through observing these phenomena that the blower is enabled to distinguish each successive stage of the process. Moreover, the consummate skill exercised by the blower in controlling and regulating the blow from beginning to end is little less than uncanny, and is acquired only as the result of years of experience combined with exceptional aptitude for the work. In fact, the entire process hinges on the blower. However, more about this interesting personality, as well as a description of the blow, will be reserved for the succeeding instalment of the story.

Current Events in Photograph

The photo shows one of the British "K" class submarines, the largest underseas boats in the world. This one, which is 350 feet long, ran ashore in a fog on the coast of Lancashire. It was refloated and proceeded on its way undamaged next day. This type of boat, it will be noticed, carries a four-inch gun fore and aft as well as an anti-aircraft gun amidships.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

CONVERTING THE SHELL LATHE

By G. BARRETT

To make a boring lathe, from an old shell lathe, sounds rather far fetched, but by following the sketches accompanying this article, readers can see how this was accomplished. First an addition was made to back shaft A, Fig. 1. This shaft was driven by a train of gears on the headstock (see Fig. 2). The regular handwheel of tailstock was replaced by a gear, which in turn meshed with pinion B (Fig. 1). This pinion has a sliding key to accommodate adjustment for different work, and drills, also to allow the pinion to be pulled out of mesh, by hand, when winding the spindle back after the work has been bored.

Fig. 1 illustrates a wheel blank, which is cast on a plate pattern in large numbers, and varying so little in diameter

The rest D (Fig. 1) has a bush inserted to receive drill, and is made a slide fit, but kept from turning by a pin which is shown in the section of the bush. The that the face plate is counterbored to suit the same, then held in place by the clamps C.

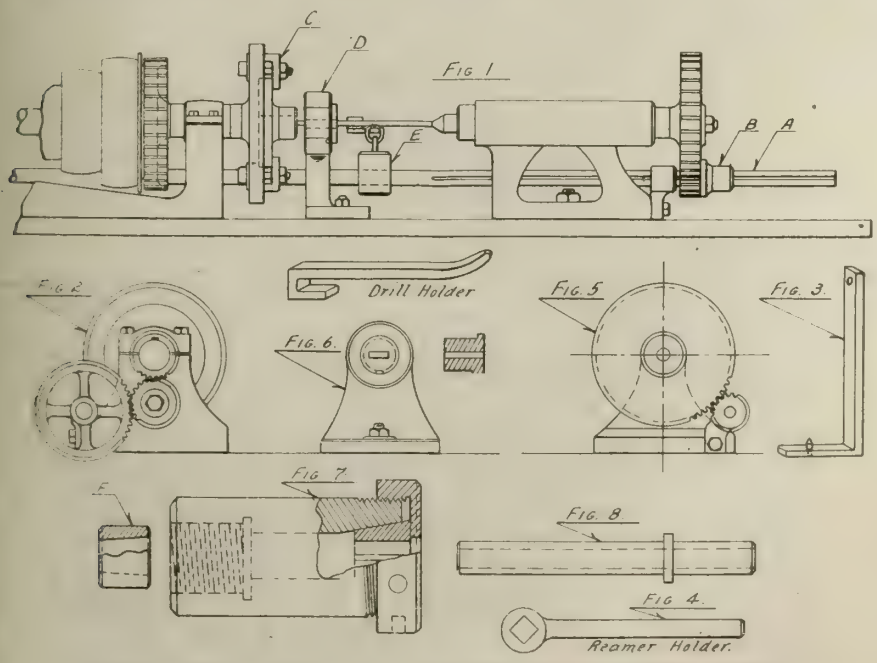
These blanks are cored out, and flat drills are used for roughing, and finishing, but the hole is finally reamed with hand reamer.

drills are kept steady with the holder and weight E (Fig. 1). In order to bore a straight hole the drill tester (Fig. 3) was made. This is just a flat piece of iron bent at right angle. The small centre shown receives the centre of the drill. The flat portion is covered with chalk. The cutting corners of drill are made to scratch a line, and drill is ground till both corners are equally distant from the centre.

The drill bush D is removed for reaming, and replaced with one that has a hole suitable to the size of reamer. Reamer is held by the holder shown at Fig. 4, and is pushed through by hand. Fig. 5 illustrates the end view of tailstock, and Fig. 6 the steady rest, and drill holder.

At Fig. 7 is shown a chuck used on this machine for boring out the long tube shown at Fig. 8. This tube is 12" in length, and one end is centered by the bush F, which is bored taper to allow for variation of castings, and made to fit the spindle of lathe. The front of tube is held by the collet seen in section at Fig. 7, the boring being done in the usual manner.

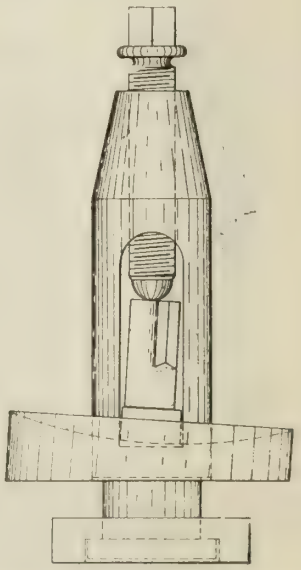
Such a converting of shell lathes will prove worth while, for these boring operations have been carried out with good success, and rapid production at the same time.



HOW A SHELL LATHE WAS CONVERTED INTO A BORING LATHE

SPECIAL TOOL-POST COLLAR

The setting of tools for thread chasing in the lathe is frequently a difficult task for many young mechanics. Good work in this respect depends very largely upon the abality of the operator to adjust the tool so as to accomplish the best work. The idea here illustrated was tried out by the writer and proved very successful. The collar that supports the tool shoe was faced off at an angle on the lower side, so as to permit of tilting the cutting tool to the angle desired for any particular thread. The tool was ground to shape without any lead, this being accomplished by revolving the concave collar to the required position, the height of the cutting point being adjusted in the usual way. This method provided for a wide range of pitches with a very few tools.—H. M. Bogart.



SPECIAL TOOL POST COLLAR

DRAFTING ROOM KINK

By J. H. M.

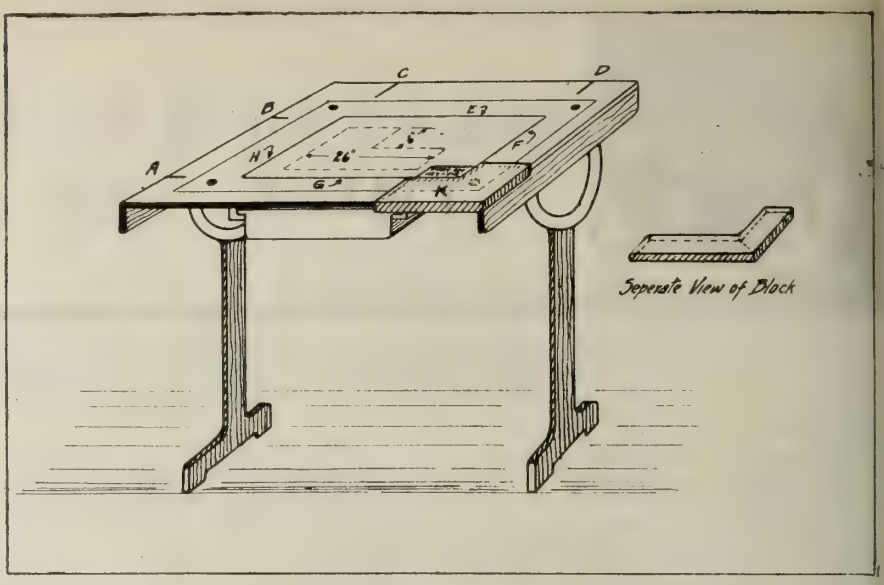
The following idea, as illustrated on sketch accompanying this article, will be of interest to the meek and lowly draftsman in particular. Any scheme to aid him in his daily grind, should be appreciated, so in this spirit the article is proceeded with.

Referring to sketch, the lines A, B, C, D, are the first noticed, so these are explained to start with. Depending on the size of sheet as adopted by the drawing office, these lines are marked permanently and plainly on the board. In this way no measuring of border lines is necessary. Simply project from these lines, the result being the border lines E, F, G, and H.

Last, but not least, comes the block K. This block is shown on separate view to the right of general view, and denotes shape plainly.

Resting the block, against the lower right-hand corners of the board, we can now place the stamp pad against the inside edges and be assured that not only is the stamp in its proper place, but it will be square with the border lines.

Another advantage the writer has found is that by this plan, he is assured of always working at the same relative position on the board, and as this position is comparatively near the bottom, no undue pressure against his body and the board are necessary to reach his work. On the sketch shown, the sheet in use was 18 x 30-in., a very convenient size in use at present in quite a few drafting offices.



DRAFTING ROOM KINK

WASTED FUEL IN FACTORIES

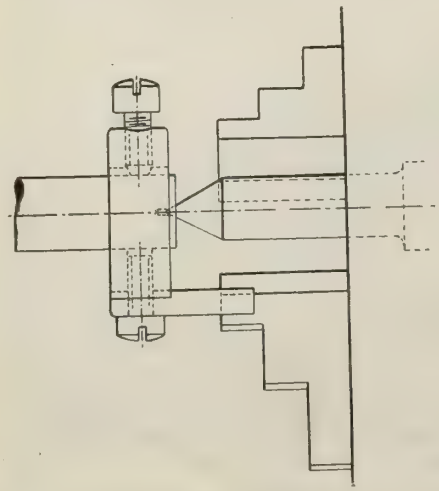
In most factories the ashes and waste from boiler and other furnaces carrying a variable amount of usable fuel is either taken to a common dump, or is carted away without any attempt at recovering the useful parts, sifting even not often being done. In this way loss of fuel occurs, and it would seem that there is room for treatment of both factory and domestic fuel wastes. Probably a combination of dry and wet separation would give the best results, the material being graded and to some extent separated dry by means of revolving screws as in a coal washery, and afterwards separated in wet jigging or other machines so far as the heavy waste is concerned, the light stuff, metals, and other material over perhaps rejections from a 2 in. mesh screeen being hand sorted. Fine stuff below that passing a ¼ in. mesh screen could also be left untreated, and the result of treating the grades between the ¼ in. and 2 in. would be fuel and waste.—M.M.

LATHE DOG FOR FINE WORK

LATHE DOG FOR FINE WORK

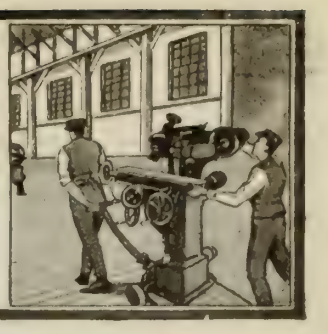
A DOG for driving delicate work may be conveniently made of hardwood as shown herewith. It is clamped on the work by a split and a screw with nut sunk into the wood. Such a dog does no harm to the work, however delicate (such as tubing or plated pieces), and can be cheaply made.—Fred Horner.

LENGTHENED CENTRE FOR EMERGENCY WORK



IN using a lathe for general work and odd jobs where changes of chucking are frequent, the hint given in the accompanying sketch is of use. The idea consists of being able to do centre work without having to remove the jaw chuck, as the work may only last for a minute or so, a job of reduction, chamfering, grooving, filing, polishing, etc. In place of the ordinary centre, another is made with a lengthened end, to reach just outside the jaws, so that a carrier or a driving collar can be accommodated and driven from the chuck jaw.—Fred Horner.

DEVELOPMENTS IN SHOP EQUIPMENT



NO. 10 JACKSON DUPLEX TYPELESS DIE SINKER

THE Jackson Machine Tool Co., Jackson, Mich., have recently placed on the market a new size of typeless die sinker, known as the No. 10 machine.

This machine is designed to reduce the cost of machining drop forge dies, ranging in size from the smallest up to those weighing four to five thousand pounds each.

Owing to the features of strength and rigidity of parts, together with ease of operation, accessibility, and range of cutting speeds and feeds, the makers claim that work can be machined on this machine which would otherwise be prohibitive because of the excessive cost. With this machine intricate shapes are finished with little or no hand labor. Semicircular depressions with straight ends are easily and quickly made by one cutter of peculiar construction. The makers claim that a saving of 50 to 75 per cent. can be made on dies for automobile crank and cam shafts.

The main parts of the machine are the base, column, and head. On the base is carried the cross rail, which in turn carries the table. To the base is also bolted the column, which in turn carries the head. Cross-rail, table and head have both hand and power feeds in all directions, so that a die block bolted to the table can be brought under any of the cutting tools.

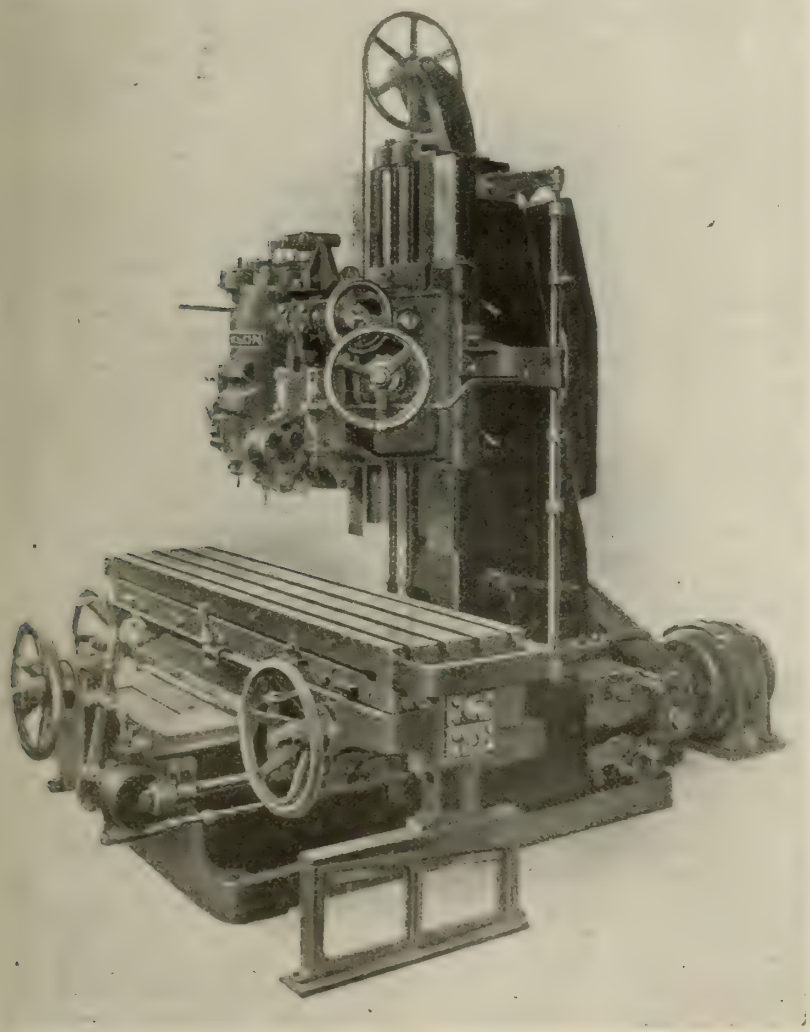
There is also a rapid traverse power feed in all directions, with an automatic disengagement of power feed when rapid traverse is thrown into operation. An interlocking device prevents the rapid traverse being thrown in the same direction as the feed. This safeguards the possibility of breaking the cutter or spoiling the work.

All speed changing, reversing mechanism, etc., are assembled each on separate brackets.

The cutting tools for die sinking are carried in two spindles. The large spindle centrally located in the lead carries the larger cutters and has a range of nine speeds ranging from 80 to 826 r.p.m.

At the right of the large spindle is the cherry tool and mechanism. It is this tool and mechanism that gives this machine its decided advantage. Narrow or wide semi-circular depressions with straight ends can be quickly and accurately made. The range of cutters run from ¼ in. to 4 in. diam., each cutter making a semi-circular depression equal to its own diameter, and a width equal to its thickness.

The speed-changing mechanism is contained in a box-shaped bracket bolted to the side of base. Nine changes of speed are obtained by means of sliding gears similar to the speed-changing device as found on automobiles. Rates of speed are obtained from 40 to 413 r.p.m. of the large spindle and 80 to 826 r.p.m. of small spindle, and 13 to 138 cutting strokes per minute of the cherry tool.



NO. 10—JACKSON DIE SINKER

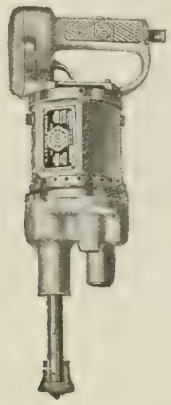
General Specifications

Vertical movement of head, 27 inches; distance from centre of spindle to face of column, 18½ inches; maximum distance (table to end of spindle), 30 inches; taper hole in spindle, No. 13 B. & S.; r.p.m. large spindle, 40, 56, 85, 110, 175, 200, 227, 248, 413; r.p.m. small spindle, 80, 112, 170, 220, 350, 400, 454, 496, 826; strokes of cherry tool per minute, 13, 19, 28, 37, 58, 67, 75, 83, 138; feeds per rev. of spindle, vertical, 9 changes, .0002 in. to .0031 in.; Feeds per rev. of spindle, horizontal, 9 changes, .0014 in. to .0187 in.; Feeds per strokes cherrying tool, vertical, 9 changes, .0007 in. to .0093 in.; feeds per strokes cherrying tool, horizontal, 9 changes, .0043 to .0562 in; cross

travel, 18 in.; longitudinal travel, 56 in.; working surface of table, 18 in. x 72 in.; net weight of machine (approximately, 12,000 pounds.

NEW BLACK AND DECKER ELECTRIC VALVE GRINDER

The electric valve grinder illustrated is a new tool made by the Black & Decker Mfg. Company, Baltimore, Md., which is of rather unusual design and construction. It is an electric motor driven device with an oscillating spindle and supplants the old laborious method of valve grinding by hand. The spindle oscillates with a long steady sweep similar to the movement obtained in grinding by hand, but many times more rapidly. The patented Black and Decker "Pistol Grip and Trigger Switch" is embodied, making it possible to operate and



ELECTRICALLY DRIVEN VALVE GRINDER

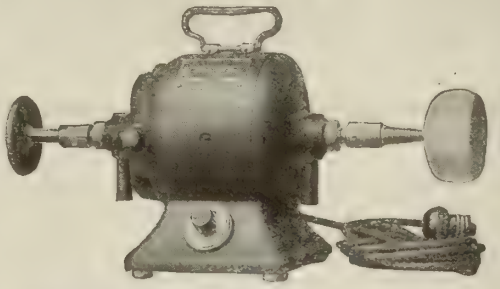
control this grinder in an unusually convenient manner. A 1-6 H. P. motor is used which is air cooled. It operates on standard power circuits either alternating current with range 25 to 60 cycles or direct current, being made for circuits of 110 volts, 220 volts and 32 volts.

The motor and gearing with reciprocating mechanism are completely enclosed in an aluminum housing, the gearing and oscillating movement being separated from the motor compartment and packed in grease. The grinding spindle runs in a ball thrust bearing. Armature shaft runs on Norma ball bearings and gears are mounted on shafts ground to size supported at both ends in long phosphor bronze bushings. Bits are provided to make the tool adaptable to various types of valves.

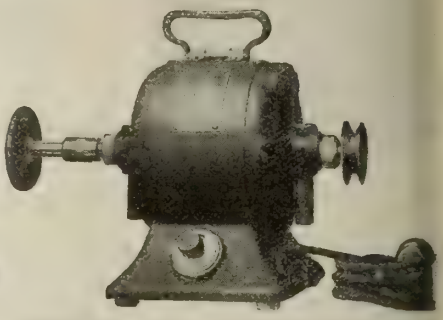
POLISHING AND GRINDING MOTORS

The accompanying illustrations show a recent development in polishing and grinding motors brought out by the Westinghouse Co. The adaptability of this machine to industrial uses is very apparent. The various chucks, wheels, drills and pulleys adapt the motor to grinding, polishing, drilling, etc.

The motor used is simple, powerful and quiet running, and the single speed feature eliminates the complications of multispeed motors and results in a simpler, more rigid and less expensive motor. A handle is provided for carrying; the motor is totally enclosed and is provided with extra long dust-proof bearings. End play is negligible. A properly designed, broad and substantial base provides stable mounting. Rubber



GRINDING AND POLISHING MOTOR WITH



GRINDING AND POLISHING MOTOR PULLEY

cushions or bumpers in the base permit mounting the motor on any surface without marring. Screw holes are provided for fastening permanently in position.

The motor is furnished with a conveniently located snap switch and 10 ft. of flexible cord.

FERRO-MOLYBDENUM

The use of molybdenum in steel manufacture on a large scale may be said to be a product of war conditions. Its action is in the main similar to that of tungsten, which makes steel self-hardening. Its ores are widely distributed but are not very plentiful. The scarcity of tungsten, particularly in Europe, and urgent war demand, have led to the manufacture of ferro-molybdenum on a relatively large scale. Its use is so recent that very little has been made known concerning it. It is said that the large German guns which bombarded Liege were lined with molybdenum steel to increase their resistance to erosion. Parts of guns, gun carriages, motors, and automobiles are also being made of molybdenum steel of excellent quality. Canada has been especially active in the manufacture of ferro-molybdenum steel, most of which is exported to Europe. Germany drew considerable supplies of molybdenite from Norway to compensate the shortage of tungsten for high-speed tool steel.—M.E.

WORKSHOP MEASUREMENTS

Accurate measurements in engineering workshops has assumed special importance now that standardization has been so largely adopted. It is absolutely necessary to ensure rapidity of production and perfect interchange ability.

The "limit" system of workshop measurement, which is quite as suitable for ordinary workshop use as it is useful in repetition manufacture. As an illustration of its adaptability to present industrial needs, it has been successfully adapted in the Manchester district, where a number of firms are collaborating in the manufacture of the same type of engine. All the parts required to be interchangeable are made to limits, and so well is the work executed that parts can be taken from any works and fitted to parts made at any other one with a minimum of fitting. This is, of course, the essence of the manufacturing system, and the advertising value of spare parts sent out which require no fitting is extremely great. The Weir feed pump is one of the striking examples of early interchangeable work, and its success is largely due to this feature. In connection with the "limit" system the terms "allowance" and "tolerance" are still sometimes confused. The tolerance is governed by the setting of the high and low limits of the snap gauge for shafts, or the "go" and "not go" ends of a plug gauge for holes. The allowance, on the other hand, is controlled by the difference between the settings of the snap and plug gauges.—M.E.

RETAINING KEYS IN PLACE

Where a wheel, lever or the like has to transmit a load, or power, in first one direction and then the reverse, some precaution should be taken to prevent the key, securing it to the shaft, from slacking back due to this back and forward motion. There are various methods of doing this. The first method is simple and effective, but cannot be considered a first-class job; there are, however, situations where it is a most practical way of overcoming trouble, and is brought about by slightly punching in the top edges of keyway close to head of key. In the second method a hole is drilled through the shaft and a bolt fitted, the head being made to fit in keyway; to prevent the nut working loose the end of the bolt can be slightly pressed over or the nut done away with altogether and a split pin substituted. Again instead of a bolt, the hole can be a tapped one and have a set screw fitted. Where the gib head comes flush with the end of the shaft the third method can be used, a hole drilled and tapped in end of shaft and a set screw and washer fitted. Where the head of the key overlaps the end of shaft, the manner of retention is practically the same as the third method, the underside of head being slotted in the fourth method, to allow for the insertion of the keep washer. Where any screwed part is used vibration of the shaft must be taken into account and guarded against. —M.E.

Study Mechanical Drawing With Us

HOW many apprentices, yes, or even machinists, can intelligently read a mechanical drawing, understanding the principles involved?

As a well-known tool designer once remarked: "I actually noticed an apprentice looking at my favorite drawing upside down, and very much puzzled to think that he could not readily grasp its details."

While perhaps this is an exceptional case, it is a well-known fact that the subject of Mechanical Drawing has not been gone into as it should have been, so CANADIAN MACHINERY intend to, as far as lies within their power, remedy this state of affairs.

Commencing the first issue in April, CANADIAN MACHINERY will begin the publication of a series of articles on "Mechanical Drawing," and will continue this series every two weeks.

This series will commence at the very beginning. It will aim to start at the point where a person with an ordinary public school education can follow all problems, or plates as shown throughout the course.

All readers, from the apprentice up, can carry on this course. Such an opportunity does not occur every day. CANADIAN MACHINERY is going to considerable trouble and expense to prepare this series, knowing that their readers will be vitally interested.

To make the series of special value to readers, CANADIAN MACHINERY will offer a prize each issue for the best plate received by their editors. These prizes will be awarded for general neatness and close following of the subject, whatever it may be. These prizes will be in the shape of a special 6-inch steel rule, on one side of which is the regular rule divided into 32nds, together with a complete list of tap sizes of drills, the U.S. standard, the S.A.E. standard, and the Briggs pipe thread all being stamped plainly on the rule. On the reverse side of rule one edge is divided into 64ths, while the decimal equivalents by 64ths are stamped in such manner as to make it exceedingly handy. These rules are well worth securing, and should prove an incentive to readers in general to get busy and get in on this work.

This series will be conducted by J. H. Moore, associate editor of CANADIAN MACHINERY. He has given a great deal of attention to the matter. He knows from his actual experience, both in the shop, and drawing office, just the sort of material that is needed. He will continue in this series certain matter that he used to good advantage when conducting a course of mechanical drafting in the plant of the International Harvester Co. some time ago. This course was for apprentice and machinist alike, and proved a decided success, and all matter presented in this series will be placed in such a manner that the apprentice can carry on easily.

The best method of following the series would be as follows: Cut out the pages as you receive your issue. Study the instructions, draw up the plate, then send to CANADIAN MACHINERY the result. Our editors will carefully go over your work, when the best one received will get the prize. Remember, that should you fail to land the prize one issue, there is always another issue coming, so stick to it, and keep sending your stuff along.

Not only will it benefit you in the drawing line, but such a series, intelligently followed, will increase your earning power.

So a final word. Watch for the Mechanical Drawing series, study them up, and above all, send us in your work. CANADIAN MACHINERY is vitally interested in the future of the apprentices who will soon become the mechanics of the country.

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Not Representing MACHINERY

THE attention of CANADIAN MACHINERY has been drawn to the fact that individuals in Toronto and elsewhere have gained access to manufacturing establishments on the pretext that they were representing CANANDIAN MACHINERY. Once in, where they could gain access to the men in the shops, it was found that they were organizing for some labor union.

It is hardly necessary for this paper to state that these men had no connection whatever with this organization. CANADIAN MACHINERY, and the other technical papers published by the MacLean Publishing Co., have a number of men on the road looking for information that is worth passing on to other manufacturers, but none of these is organizing for a labor union.

Any MacLean representative can readily identify himself, and manufacturers, if in doubt, can protect themselves with a very little questioning.

Selling Alberta's Coal Output

THE coal operators of Alberta are having troubles all their own seeking to place their product in successful competition with the American coal in the Winnipeg and Western Canada market. They were quick to make use of the shortage last fall to urge upon Western Canada the advisability of turning to Alberta for their coal supply. They had a big chance to fence off the field, but they find that the element of price also enters into the deal, and in a very pronounced way. When the Pennsylvania bituminous coal meets the Alberta product in the Western market it is found that the price benefit rests with the U.S. product to the extent of fifty cents per ton.

Basing the figures on the returns for the year 1918 it is found that some two million dollars' worth of Pennsylvania coal entered the Western market. The Alberta operators make the point that were this amount spent with them it would enable them to keep their mines going for a greater period than nine months in a year. The longer the mines work, and the greater the amount turned out, it will be seen that tonnage costs come down in proportion.

Be that as it may, the problem for the West right now is how to meet the U.S. producer on a price basis in Winnipeg. Take the two points of production, and trace the costs. Starting at a mine near Pittsburgh the coal costs, including mine labor, overhead charges and loading, are $2.60 per ton.

By the time it reaches Fort Erie, where it is loaded on the boat to be carried up the lakes, it costs $4.32 a ton.

Lake freights, customs duties and various other charges bring the cost at Fort William to $5.51 a ton.

Dock handling charged at Fort William increases the cost at that point to $6.11 a ton.

Freight to Winnipeg brings it to $9.21 a ton.

And the coal dealer who handles it, delivers it, and makes a profit out of it sells it for $12.25 a ton.

That's the story in costs of a ton of Pittsburgh soft coal put into the basement of the owner of a Winnipeg block.

The Alberta coal loaded costs between $5 and $5.25 per ton, and right here the Pennsylvania coal gets an advantage of $2.63 per ton. This is not because the Alberta miners get higher wages, but physical conditions surrounding mining in this country make the costs higher. Taking a ton of coal at the mine, for which the mine owner gets $5, and adding the freight to Winnipeg, the Winnipeg dealer finds it costs him $9.80 or 50 cents more than the Pittsburgh product. And the Winnipeg dealer sells it for $12.75 as against $12.25 for the imported product and makes nine cents a ton less than on handling the imported product, while the consumer pays 50 cents more.

Alberta has a definite job ahead of it now if it wants to fence off Western Canada as its biggest and best customer for coal. That definite job consists of wearing off that fifty cents per ton difference that now rests in favor of the U.S. producer of coal. A little more efficiency in mining and handling might go a long way toward accomplishing this end, while the freight charges might be made the subject of a very close inquiry. Flattening out this fifty cents per ton in playing for a two million dollar order looks like a worth-while proposition.

Good Will the Great Asset Here

ONE of the best minds of the Old Country has given it as his opinion that many of the biggest shops in the country are being efficiency-experted to death.

There is something in what he says, although it cannot be denied that the sane efficiency expert has done much to make conditions better all around.

But the efficiency expert can only go so far, and once he seeks to go past certain well understood bounds, he is headed for failure and also for the undoing of all the work that he might otherwise accomplish.

There are some men who would run this business to such an extreme that they seek to make the entire shop simply a set of human units. They would have them move in certain limits and stop at certain marks. In fact it is a wonder that some of these chaps have not sought to equip a man with gears, pulleys, shafting, face plate, chuck and saddle, so that he could be turned into action when the whistle blows and the power is turned on for the day.

The manufacturer who is going to get the greatest service and the greatest amount of real satisfaction out of his work is the man who goes past and beyond the field in which the efficiency expert works. He must aim to enlist the sympathy and the support of his men. Get the good will of a body of men, and you have something that no efficiency expert on the face of the earth can secure for you.

In such a shop there will be no fear that a man will make too much money. If he is worth it he will get it.

The securing of such a feeling is well worthy of a great and a sincere effort, not only on the part of the office, but on the part of the men who work in the place. Both these forces are needed to bring the conditions to pass that are referred to above. The office cannot do it if the men will not, neither can the men do much toward the desired end if the office door is bolted to their efforts and advances.

THAT member of Parliament who stated that he knew families who live, dress and buy houses on $2.50 per day must have read Robinson Crusoe three or four times when he was a youngster.

WELL KNOWN IN THE MACHINE TOOL FIELD

C. P. Archibald, a Canadian Who Has Had a Wide and Varied Business Experience

ARCHIBALD, CHARLES PERCY—of Charles P. Archibald & Co., 164 St. James Street, Montreal, general machinery dealers. Born at Antigonish, N.S., Sept. 10th, 1887, son of Charles S. and Margaret A. Archibald. Educated public schools and grammar school, St. John, N. B. Married Gertrude Beatrice Bryce, daughter of James Bryce, Montreal, formerly vice-president and general manager, Canadian Express Co. Travelled Canada from coast to coast for a number of years representing the Dart Union Co., and H. W. Petrie, Toronto, and for four years was Montreal representative of T. McAvity & Sons, St. John, N.B. He started the present business in 1917, as general machinery and railway supply dealers and acting as agents for Ottawa Car Manufacturing Co., Ottawa; Thos. Davidson Manufacturing Co., Electric Steel Foundry Division, Montreal, and other Canadian and American firms. During 1918 he spent considerable time with the British War Mission, Washington, in connection with the machinery end of the work of the Mission in the United States.

C. P. ARCHIBALD

Residence—Ritz Carlton Hotel, Montreal.

The Cutting of Prices

THE new prices that have been announced for United States steel and iron brought forth every diversity of opinion that could well be imagined. The schedule has been denounced, damned with faint praise and heralded as the forerunner of greater business activity. There is no doubt that the whole ruling has been a compromise between the two factions that were foremost in the negotiations.

It is interesting to note what effect these cots will have on the earning power of the steel concerns, based on past or present production figures. The nearer a mill can come to capacity production the smaller will be the production costs, and the farther it departs from capacity the higher grow the tonnage costs. It is impossible to get away from this ruling.

When the case of some of the larger independents is considered it does not take long to see what the average of seven dollars per ton means to them. A plant having an output of a million tons of steel will have its earning power cut off to the extent of $7,000,000 per year. Take the case of the Steel Corporation. In round figures it can be said to have a capacity for turning out 16,400,000 tons of steel per year. When $7 per ton is taken off of this amount it means a drop in earnings of approximately $116,000,000 per annum. Of course, one chance for compensation is that the lower price will create a greater demand and keep the mills operating at something approaching their capacity.

Labor costs still stand in mill production, and it is hard to reason them out of the way. There has been no move on a general scale looking toward doing away with them or pruning them down.

In the year 1918 the Republic Iron & Steel Company operated its mills to full capacity. Yet its labor cost per ton alone was $32.20, a gain of $14.90 a ton in four years. As the principal wage advances were made in the last half of 1918 Republic's labor cost per ton to-day must be close to $27. Republic is one of the lowest-cost producers in the country, and it is evident that the very high cost producers will be able to show little profit on a basis of the new price schedule. It has been estimated that it is costing many independent steel companies more than $40 a ton to produce finished steel.

The new prices are still well up from the pre-war levels. It may as well be taken for granted right at the start that prices will never return to the levels that were averaged for the ten years prior to the war. The new prices are only down 14 per cent. from war-time levels, and are still a good eight per cent. above the ten-year pre-war period. Looking at the thing from that angle, and remembering the manner in which costs have gone up and stayed up, the reader is left wondering whether the cuts were severe enough or whether the standpatters should have won out.

THE Hamilton *Times* claims "Yesterday a house was burned down because the fire wagons were bogged in one of the stree ts." But what has become of that fine brand of folks who used to climb the roof and pour salt down the blazing chimney?

* * *

THE long lists of tax sales that are appearing in some of the Western papers are proof positive that the tax papers are wearing down the financial resistance of many an Easterner. It is one trick to get in on a good thing, and quite another to get out while the thing is still good.

* * *

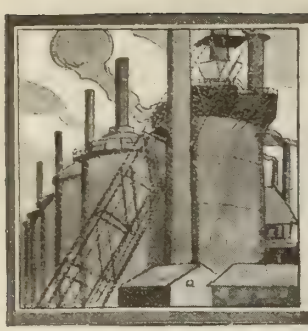
IF a League of Nations is going to come into existence, right now is the time. The reason is that there are problems that only the courage of a united civilization can meet. Once peace is signed the feeling of need for concerted action to regulate international affairs will begin to wane. Right now is the time for action.

* * *

THE Dominion Coal Co. has had, in recent months, several demands from miners for more money. Now it is faced with demands from a union of cleriial workers in the offices of the company. When a concern has to face deputations from below as well as on top of the earth, small wonder if some of those concerned go up in the air

* * *

IN the discussion that has been going on in the columns of a contemporary concerning the longest word in the English language, the latest candidate is "antitransubstantiationalistically," which easily outruns "honorificabilitudinity" and "anthropomorphologically." Such words, however, are more likely to have been used by an individual as the word "antidisestablshmentarianism" is said to have been used by Archbishop Benson, than to have got permanently lodged in the dictionary.



MARKET DEVELOPMENTS

Many Opinions Regarding Cuts in Steel Prices

They Are Still 81 Per Cent. Higher Than During the Ten Years Prior to War—Feeling That There Will Be More Buying Carried on Now—Makers of Other Lines Say Prices Will Stand Pat

THERE is a wide diversity of opinion regarding the cuts that have been made in steel and iron prices at the U.S. mills. At best the new prices are plainly a compromise arrangement brought out to try and satisfy the extremists in each group. To get a fair idea of what the new prices are, when compared to war-time and pre-war figures, take a survey of the ten-year pre-war period. Excluding rail tonnage, the levels are as follows: Average for ten years before the war, 1904 to 1913, $36; Government limit under war-time control, $76; after the reductions of December, 1918, $72; after last week's reductions, $65. Thus the prices on an average are 81 per cent. above the pre-war average, and only about 14 per cent. below the war-time level. The extremists took the following positions: There should be no cut at all, or there should have been much greater cuts.

Whatever may be the ultimate effect of the new prices, there is a feeling in Canadian trade that it will open the way for more buying than has been done for some time past. Canadian mills were quick to notify the trade that they would meet the new price list announced by the American producers, and the benefit will be immediately passed on to the consumer.

Machinery dealers report that they are handling a fair volume of trade. Although it cannot be called large, it is much more than they had expected during the first three or four months following the war. In some circles it is still contended that the actual signing of peace is needed to put things on a right basis for good business. As long as matters stand as they are at present there is room for an unsettling influence to get in its work in a way that is very hard to meet or combat.

There is still a good demand for used equipment; in fact, the bulk of the business being done is in this class of goods.

Makers of tubes, chains, wire ropes, and other lines have hastened to announce that they will not reduce prices, following the cuts in the steel market. Tubes are still much in demand, especially the two-inch kind. There is a feeling that there will have to be reductions in a good many of these lines, now that the pace has been set by the steel group. There are cases where present prices are 200 per cent. over the pre-war levels.

MONTREAL DEALERS CANNOT SEE WHERE LOWER PRICES CAN COME IN

Special to CANADIAN MACHINERY

MONTREAL, March 27.—General industrial conditions are still in a state of unrest but light is beginning to show through the fog of readjustment. Many old shell shops are anticipating early settlement with the American Government, and when this is arranged it will open the way for reconstruction on other lines; at present little can be done owing to the fact that these plants are compelled to await the finding of the committee of adjustment. Steel interests are awaiting momentous developments in the States, a feature that adds to the complexity of present conditions. Machine tool demand is quiet but inquiry is good. Scrap is dull with little demand.

Steel Developments Awaited

What the early future will develop in general industrial circles is largely a matter of guesswork. Lower price adjustments are anticipated, and this expectation has had its effect upon the sale of commodities, but any reduction on semi-finished product is dependent upon what can be arranged in regard to lowering the cost of production. There is, apparently, other factors than that of price influencing the trading in steel. Some contend that, even with lower selling prices, the demand for material would not show any great increase. Supporters of this view cite the copper situation, emphasizing the fact that the almost normal position of copper has not stimulated buying. Some of the obstacles that confront any price adjusting committee is shown in the statement made by a dealer here. "Producers, under contract," he stated, "were required to operate at capacity up to the end of the year. This necessitated the piling up of large stocks which were produced at high cost. Any radical reduction, therefore, in prevailing prices would mean considerable loss to the mills. In regard to high-speed steel the situation is virtually the same. Steel coming from England is laid down here at figures that make it next to impossible to sell at much lower prices. Labor conditions over there are such that high selling costs are essential to business." These are features that tend to keep industrial activity in a very uncertain and unsettled condition. Manufacturing requirements are invariably filled in small lots, everyone taking good care not to go too far into the future. Dealers here are awaiting developments across the line; in the meantime prices here are maintained.

Metals Moving Slowly

Little can be said respecting the metal situation other than that conditions are still stagnant with buying reported on a very conservative scale. Quotations on the different metals have been gradually sinking to lower levels but without producing any further demand—covering only for immediate requirements being the feature of every movement. Producers have been looking into the prospects for export business but dealers here do not anticipate any heavy trading in this respect, at least in the near future. Copper activity here is not pronounced but business is fairly steady with volume

light. It is announced that restrictions on tin shipments are practically all removed, but so far this has shown no effect upon the market here, and local trading is comparatively quiet, with prices unchanged but weakening. Lead is not moving to any extent, but spelter has shown slight improvement. No price changes are effective this week.

Many Tools Tied Up

"The inquiries that are coming in would seem to indicate that many are in need of equipment, but there appears to be a reluctant spirit towards buying just at present. A factor that is undoubtedly influencing the trade is the fact that large quantities of machine tools are virtually tied up through the prolonged adjustment on contracts placed by the United States Government. Not only is this evident in American plants but quite a number of Canadian firms are still negotiating for a settlement, and until this is finally arranged nothing can be done with the tools affected. In several shops hundreds of machines are held up pending a settlement. It is true that a large number of these are adapted exclusively for shell work, but about fifty per cent. of these machines are well suited for general work, and it is more than likely that many manufacturers needing equipment are awaiting the time when this equipment will be released." This statement by a dealer here sets forth in a general way the tool situation of to-day and a feature that will have more or less bearing on the demand for some time to come. On the whole, however, dealers are apparently satisfied with present sales, both on new and used machinery. Trading cannot be expected to return to normal activity until the market is free from the bulk of idle tools now held up in many of the old munitions shops.

Stagnant Scrap Conditions

Another week has passed without any feature of interest developing in the scrap situation. As stated by one dealer here, there is little to be gained by lowering prices as consumers are not in the market to buy any more than they actually need for present requirements. Dealers are taking very little interest in the piling up of material in their yards unless same can be acquired at figures that will make the purchase more than one of speculation only. As it is, many yards are well filled and dealers are not anxious to take more at any price. General business expansion is the only reliable relief to the old material situation. Prices quoted may be shaded somewhat but as a dealer here said: "Those given will do as well as any others under existing conditions."

NEW YORK WAITING FOR PRICE CHANGES

Believe That Reductions Are Almost Certain to be Made

Special to CANADIAN MACHINERY

NEW YORK, March 27.—The conference on prices of steel products and pig iron, which was held last week in Washington, had the effect of holding back buying in all metal lines, the machinery trade having suffered somewhat of a lull for a week on that account. Moreover, prospective buyers of machine tools are expecting reductions in prices, some of which have already materialized, and it is only by guaranteeing quotations against decline for a period of about 90 days that sellers are able to close orders.

A great many inquiries are before the trade, but few are being closed. Machine-tool sellers agree that something will have to be done soon on the price question to stimulate business, as prospective buyers insist that there is no justification for continuation of "war-time" prices. With a further reduction in pig iron of $4.25 a ton and lower prices for steel, agreed upon last week in Washington by the producers and the Industrial Board of the Department of Commerce, there will be a reduction in costs of production of machinery. By far the largest cost entering into the manufacture of machinery, however, is labor, but this is also coming down by gradual stages.

Considerable machine-tool buying is in prospect, but the readjustment of many war plants to a peace basis is proceeding slowly.

POINTS IN WEEK'S MARKETING NOTES

Some Pittsburgh critics state that the reductions announced are poor. The cuts should have been greater or not at all, and are believed to have been agreed upon simply as a compromise between those who wanted to stand pat on prices and those who wished to make a big cut.

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The new steel prices are only 14 per cent. below the set prices during the war, but they are still 81 per cent. on the average above prices prevailing for a ten-year pre-war period.

—

Canadian dealers in steel are following the new prices and passing them on as quickly as possible. In some cases it will mean clearing out higher priced stocks at a loss.

—

Machine tool dealers are handling a lot of used equipment, for which there is a good demand. In fact that makes up the greater part of the business now being done. Whether the high prices still asked for new machine tools is holding back trade is not definitely known.

—

Scrap metal prices are only nominal. Business moves slowly. Some held that lower prices on pig iron would help business, but others do not hold this view at all.

—

Makers of boiler tubes, chains and cables announce that they will not make any reductions in price following the cuts in steel and iron. Tubes are still 200 per cent. up as compared with pre-war prices, and the two-inch variety are very scarce.

SHIPYARDS NEED MORE ORDERS BADLY

Dominion Co. Has No Encouragement From Ottawa Government

Word has been received by the Dominion Shipbuilding Company of Toronto, that the Dominion Government has decided against placing any orders for vessels with Toronto firms. This company was represented at the recent conference at Ottawa, when Sir Thomas White and other members of the Cabinet were asked to assist the local shipbuilding concerns by placing orders for ships. In a letter to Mayor Church of Toronto, a representative of the company writes: "I am terribly disappointed to have to tell you that after all our efforts re shipbuilding industry here, I have a wire from Ottawa indicating that not an order for a single ship is going to be given. Two ships were all our clients wanted, and we had very large financing in the United States arranged, the parties placing their confidence and making the advances on the fact that the Government was expected to place an order for ships.

"This financing would have covered enough money to carry the business on securely for over a year, but since our own Government does not have confidence enough to place two ships, the foreign lenders are backing out. It is only to be expected.

"The company had to let 150 men go the other day, and they will have to let others go gradually as we see nothing else for it.

"It is particularly grievous with our returned men. One of our returned men came back just the other day. He had been wounded three times. I gave him a special letter down to the works and they took him on, but I told the man himself the position we were in and that unless the Government came through we were very sorry to say that his job and that of the others would be very temporary."

It is said that 21,000,000 yards of burlap could be saved if fertilizer dealers would abandon the use of the 100-pound bag and made use of the 200-pound bag instead. On account of the general use of burlap in shipping articles of food now being sent abroad, there is a great scarcity of burlap.

An English authority has estimated that the war has cost the countries involved no less than 12½ million potential lives; in other words, the number of births has been smaller, by this number, than it would have been if the war had not occurred

Steel and Iron Cut a Pure Matter of Compromise

Pittsburgh Feeling Was That the Trade Did Not Desire Any Such Action — Prices Still Average 81 Per Cent. Above Those That Prevailed During the Period of the War

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., March 27.—The much heralded reduction in iron and steel prices has occurred, and proves to be more or less of a farce, particularly in unfinished and finished steel products. The action is approximately what nearly everyone was saying, in advance, should not be taken. It was generally said among producers, while the preliminary discussion was on, that either prices should not be reduced at all or they should be reduced radically. A small reduction, it was held, would do no particular good and would involve a loss to producers in that they would have to adjust prices on business already on books, in finished steel products at least. While a corresponding adjustment would have to be made if there were a large reduction, there would be a compensating advantage in that consumption would be stimulated.

Nearly everyone in the trade who expresses himself has voiced decided dissatisfaction with last week's price revision and it will naturally be asked why the industry did something of which it does not approve. The explanation appears to be that there were two contingents in the general committee that decided this matter, the one holding that there should be no price reduction at this time, the other that there should be a large reduction, and a sort of compromise was reached, satisfying no one. Of course, after there had been so much talk it was necessary that there should be some reduction. The industry could not square itself with the Industrial Board without doing something, when at the general meeting of the industry there had been a unanimous vote in favor of co-operating with the Industrial Board. Nor could the producers square themselves with the buying trade, which had come to expect price reductions by April 1 as a certainty. The mills and furnaces would have been unable to adhere to the old prices and indiscriminate cutting would have resulted, perhaps winding up with an entirely disorganized market.

The arrangement concluded really represents the maintenance of prices rather than their reduction, and the support of the Industrial Board to the procedure is obtained, with likewise, apparently, the promise of the Department of Justice that it will not interfere. The "Gary dinner" movement of 11 years ago was decided afterwards to have been in contravention of the Sherman law against conspiracies in restraint of trade. Now the Sherman law has virtually been suspended in favor of the present operation, and instead of the Industrial Board seeking further reductions it has made an official statement that it "believes that a level has been created below which the public should not expect to buy during the current year." Inasmuch, however, as the new steel prices are only 14 per cent. below the Government prices during the war, but are 81 per cent. above the average prices that obtained during the ten years before the war, 1904 to 1913 inclusive, the buying public will expect what its judgment suggests rather than what the Industrial Board now suggests.

Reductions in Detail

The official agreement between the iron and steel industry's committee and the Industrial Board was that basic pig iron should be reduced $4.25 per ton, from $30 to $25.75, this being f.o.b. furnace in most cases. The industry has interpreted this to cover a $4.25 reduction on all pig iron, retaining all the differentials, basing points, etc., that were created during the war-time control. Thus the Eastern Pennsylvania furnaces, which last September were given a Pittsburgh basis, but of late have been disposed to get back to quoting f.o.b. furnace, now return to the Pittsburgh basing. The Birmingham furnaces appear disposed to insist upon the new prices at Birmingham, instead of quoting below the general basis as they had to do in the past in order to reach northern markets. The only question is how long the furnaces can maintain differentials and practices that are contrary to the practices developed under competitive conditions during all the time before the war.

Unfinished steel products are reduced uniformly $5 per gross ton, making prices as follows: 4-inch bilets, $38.50; 2-inch billets, $42; sheet bars, $42; slabs, $41, all f.o.b. Pittsburgh or Youngstown; wire rods, $52, Pittsburgh.

Finished steel products are all reduced 35 cents per 100 pounds or $7 per net ton, except that grooved steel skelp and wire products are reduced only $5 per net ton. The new prices are as follows, all Pittsburgh basis, in cents per pound; bars: 2.35; shapes, 2.45; plates, 2.65; grooved steel skelp, 2.45 universal mill skelp, 2.55; sheared steel skelp, 2.65; steel pipe, 57½ per cent. basing discount; plain wire, 3.00; wire nails, $$3.25 per keg, base; galvanized wire, 3.70; painted barb wire, 3.40; galvanized barb wire, 4.10; black sheets, 28 gauge, 4.35; blue annealed, 10 gauge, 3.55; galvanized sheets, 28 gauge, 5.70; painted corrugated, 28 gauge 4.65; galvanized corrugated, 28 gauge 6.75; tin plate, $7.00 per base box, 100 pound; terne plate, I. C., $7.05 per base box.

Price Comparisons

A weighted average, giving the price of each important finished steel product, a weight in accordance with its tonnage importance, shows prices of finished steel products in general, excluding rails, as follows per net ton: Average for ten years before the war, 1904 to 1913 $36; Government limit under war time control, $76; after reductions of December, 1918, $72; after last week's reductions, $65. Thus the new prices are 81 per cent. above the pre-war average. Copper, even at the 26 cent Government price, was only 69 per cent. above its ten-year pre-war average, while copper is now a couple per cent. below its pre war average. The copper producers deflated their prices. Report has it that it was the copper producers who proposed to Secretary Redfield that the Government attempt to deflate commodity prices in general, because the copper producers were not getting the benefit in increased sales, of their greatly reduced price, since copper as a rule is not used by itself but only in connection with other materials, and if the other materials do not come the demand for copper is restricted.

Buying Outlook

The steel price reduction will stimulate buying but will hardly stimulate consumption to any extent. While buyers had been purchasing only from hand to mouth for a long while past, they still found it possible to hold back purchases when it became probable that there would be price reductions by April 1, and this pent-up buying is now expressing itself, but this will hardly do more than arrest the decline in steel mill operations that has been especially pronounced since the first of this month. Consumption will not increase. Investors will not be moved to take hold and engage in building and other projects involving large quantities of steel. The Gary dinner movement of 1908 is being repeated, only this time with full Government approval. Whether the mills will hold together is the question. The other time the mills were nearly all of a mind. This time there seems to be quite a divergence.

All babies in Siam receive the same name at birth. This name is Dang, which means red.

The efficiency and safety of the subway traffic in New York is largely due to the use of the automatic train stop which absolutely prevents a train from running by a danger signal.

The oceans occupy three-fourths of the surface of the earth.

In the Australian high schools instruction is being given in the Japanese language, and it is also being taught at the military schools.

PASSING ON THE LOWER PRICES TO THE CANADIAN CONSUMERS

TORONTO.—Dealers, for the most part, are satisfied that they are doing as much business as they had expected for the first few months following the signing of the armistice. Although Europe and the peace conference may seem a long way removed from Canada there is a feeling, quite marked in some spots, that the actual signing of the peace documents will be necessary before confidence is fully re-established, and the business of the world brought down to a substantial basis once more.

Can't See Any Improvement

It has been stated several times that dealers in scrap at United States points anticipated that lower prices on pig iron would mean a renewal for the scrap market, as the users, once they started to take on greater tonnages of pig, would want more scrap for a foundry mixture. Canadian dealers claim that they cannot see this probability in the situation at present, stating that there are many users yet who have plenty of stock on hand. Business shows no sign of betterment. "There are no changes in the price list now, and the figures quoted are merely nominal. In fact the market is uncertain all through. You can get three or four prices mentioned on the same line of material by calling on so many dealers."

Effect of the Cuts

Canadian mills have already sent out word that they will meet the cut announced by the steel Kings of United States, and Canadian jobbers and trade generally is making an effort to pass on the lower price at once to users in the hope that it will encourage buying. There seemed to be a general opinion that the new schedule would bring out some business that has been holding back in anticipation of the announcement in regard to prices. Iron and steel bars, base, at Canadian points, have been moved down to $4.40, but the chances are that they will go a little lower than this. There has always been a difference of 25c per hundred maintained between steel and iron bars, the steel bars bringing the higher figure. Many of the dealers claim that there is no good reason why this difference should be maintained. There have been many cases where mild steel has been substituted for iron and the chances are that few people have been the wiser. The belief that there should be a difference in price is dying out, and it would cause little surprise were the new schedules that will be worked out on the new price cuts contain a flat base price at the Canadian warehouse.

One of the largest Canadian mills is practically out of the market for the present, because there is not enough business to enable it to run to capacity. It went ahead and cleaned out all the orders that were unfilled when the war closed, but in the meantime did not book much new business. As a result there is nothing in sight now to run at anything approaching capacity, and the firm has refused to tender at all on several orders that had very fair tonnages, claiming that the amount of business in the order did not warrant starting the mill going.

Some of the Canadian warehouses will be caught by the new price announcements at United States points which became operative when they were announced, March 21. One of the dealers stated to CANADIAN MACHINERY to-day, "We have material on hand that we cannot afford to sell at a price to meet the new figures, but that will be our funeral. It is useless to try and get the old war price, and the only thing is to clear it out and have the funeral over with as soon as possible."

There has been no cut on boiler tubes yet. In fact some of the makers state that they are going to stand firm. However it is not going to be an easy matter to do this when the reductions in other lines are taken into consideration. It is a fact, though, that the two-inch tube, the size more in demand than all others, is very hard to get in anything approaching the necessary quantities. The general price being secured for tubes is still 200 per cent. over the prewar values, and while there is no chance of them coming back to old prices, there is a very strong feeling that they are travelling too high now and are due for a sag. Makers of chains and wire ropes have already hastened to state that there will be no reduction in their prices. In fact the announcement of reductions by the steel group in United States seems to have started all the other concerns into forming a procession, the object of which is to announce that they have found a successful alibi to show why the cutting of prices should dodge when it comes to their particular doorstep.

One effect of the new price announcements is that quite a bit of business is going forward in the way of buying for stock, a thing that has been unheard of for some time past.

Machine Tool Trade

Rebuilding and selling used machinery is the big end of the business for machine tool dealers at present. Judging by the statements that were made some time ago it was going to be hard work to get dealers to handle this equipment. There is a fairly brisk demand for used equipment, and nearly all the firms are handling quite a bit of it. There is a feeling that the Government in making its purchases should go into the market for new equipment rather than considering taking on used machinery. In fact were some good sized buyer to come into the market for new machine tool he might succeed in making a dent in prices. There has been no chance of really trying out the market to see where matters really do stand. Prices remain high in the quotations, but they have not been subjected seriously to the strain of a buyer with the ready cash and a good sized order awaiting disposal.

LOOKING FOR BETTER DAYS TO COME FOR SCRAP METAL MARKET

IT hardly seems likely that the levels in the scrap market can go to any lower figures, and all indications seem to point to the fact that a turn for the better is to be expected shortly. In fact there are some lines where any indication of real buying would immediately run up the price. Reports of United States conditions are as follows:

Philadelphia: The Bethlehem Steel Co. finds it is more profitable to buy scrap than use hot metal from the blast furnaces, and so started buying heavy melting with the result that the price immediately responded to the demand. They were paying $13.75 for this material and by the time they had secured some 20,000 tons they were paying $14.50.

Pittsburgh.—Buyers are showing a great deal of caution in any purchases they may make. Machine shop turnings are in demand and a better price is being paid for this material.

Buffalo.—There is some buying being done here and there will be more. Turnings and borings have been in good demand and there is a fairly heavy demand for stove plate. One interest has put two more blast furnaces into operation, and mill men say that 70 per cent. of Buffalo capacity is now active.

Cincinnati.—Dealers say there is no demand for scrap, and they are not changing prices. In fact they state that quotations made now are simply nominal.

Cleveland.—Dealers here believe that with the reductions actually announced in steel and iron prices, there will be a rebound in the prices of scrap metal. As a matter of fact, the sale of any decent sized tonnage of turnings would be sure to bump the price.

Chicago.—Railroads are bringing in their spring tonnage, although it is rather small. Scarcity of cast scrap continues and there is a demand for it.

If a box six feet deep was filled with sea water, which was then allowed to evaporate, there would be two inches of salt left in the bottom of the box.

In many places, especially in the Far North, the water freezes from the bottom upwards.

PNEUMATIC TOOL EARNINGS DECLINE

Chicago Company Report Gives Net Surplus as $8.30 Per Share in 1918

The Chicago Pneumatic Tool Company during 1918, according to its annual report, fell away below its preceding year in earnings, the surplus after war taxes and charges being but $535,-833, or $8.30 a share of the capital stock, against $1,160,390, or $18.03 a share on the stock in 1917.

The net earnings as disclosed by the report, after provision for war taxes, were $1,283,213, against $1,778,698 for the previous year. Interest charges were much heavier in 1918 than in the preceding twelve months, while depreciation charges were slightly less. After the payment of dividends the surplus for 1918 was only $148,905, against $911,438 in 1917.

The complete reorganization of the Chicago Pneumatic Tool management, which took place in June, was discussed by the president, H. A. Jackson, in his report to the stockholders. He said that the direct result of the organization had been a greatly increased output, the new management having disposed of a considerable quantity of obsolete material after making a survey of the company's properties. Those items have been charged off, he said, on account of depreciation in inventories, machinery, etc., together with bad debts and shrinkages due to discrepancies in cost accounting and other items, amounting in all to $872,413.

"With the improvements and refinancing," the president continued, "the company finds itself in a most excellent condition, possessing well equipped plants of greatly enlarged capacity. Furthermore, the company has entered the year 1919 with an exceptional amount of unfilled business on its books. On account of depreciations necessary because of the transition from a war to a peace basis, the British and Canadian subsidiary companies are not showing a large return for the year. The British subsidiary was heavily involved in Russia and the unfortunate developments in that country have made necessary the setting aside of relatively large reserves on the books of that company. The physical condition of the subsidiaries is excellent and their unfilled business of satisfactory volume.

INCOMBUSTIBLE MATTER IN MINE AIR

The old method of computing the amount of incombustible matter in the air of coal mines, quarries, etc., was to proceed by analysis, arriving at differences after evaporating moisture, and burning what could be burned. In 1912, Monsieur J. Taffonel introduced his volumetric system. This has recently been severely tested by the United States Bureau of Mines. The Taffonel volumeter was found wanting in accuracy. But by enlarging the diameter of the tube from the millimetres to 8.6 mm., and lengthening it by 20 per cent., it was possible to increase the weight to be tested to 20 grammes, just double, and this gave excellent results. The volumetric method is much more rapid and cheaper. When controlled by chemical analysis, it was found that the difference was only 1 per cent. at the outside.—M.E.

DUSTY CEMENT FLOORS

For various reasons cement floors will become dusty and begin to disintegrate, and where this happens it is rather a nuisance, especially when currents of air cause the dust to rise. Where the floor is not greasy, in such cases it is a good plan to thoroughly wet them all over each evening, using a 5 per cent. solution of soluble water glass—soluble silicate of soda—applied with a fine rosed watering can as made for garden use. The action of the silicate is to cause silicification of the components of the floor and thus hold them together, dustiness soon being stopped by this means. Floors made with fresh Portland cement and clean shingle or granite chippings as an aggregate, and enough clean sharp sand as a filler, if properly mixed and laid, should not disintegrate under ordinary traffic, but a little dirt in the material will cause a lot of trouble. For a 4 in. floor such as would be laid on a rammed rubble foundation, four parts of hard stone held by an eighth of an inch mesh and passing a ¾ in. mesh sieve, two parts of sharp sand and free from clay or other dirt and one part fresh Portland cement, twice mixed dry and then wetted and placed in the position it is to occupy, would, after a reasonable time for hardening, stand any ordinary factory wear, always provided the men laying the floor understand their work. Old cement, or that which has set hard in the bags, is of no use for floor work. —M.M.

FOLDING BLUE PRINTS

There does not appear to be any hard and fast rule governing the folding of tracings and blue print copies of drawings when transmitting these to the various departments or by post; yet it is a process which should be given a little more attention than it usually gets. By doing so, a saving in time and temper, by those who have to handle them, can be affected, and, what is of more material importance, the papers are given a longer lease of life and utility. The general practice appears to be to fold with the particulars innermost, and in this blank condition they are sent out. This method certainly preserves the contents from disfigurement, but the objection is that it has to be opened out every time anyone wishes to glean their nature. Now this print or tracing may be only one of a pile, all presenting the same blank appearance, so that to ferret out any particular one becomes a matter of minutes instead of seconds. To overcome this objection, the title and number of the drawing should be written across the outside in all such cases and thus prevent the detrimental effect caused by excessive opening of the paper. Folding so that the particulars are outermost allows of these being readily determined, but has the great disadvantages of exposing certain portions, which soon become dirty, the lines get obliterated and, in the case of blue prints, the exposure to the light will gradually cause the lines and reading to become indistinct. A method much superior to the two referred to is for the print to be so folded that, whilst the important details are always inside, the title remains visible for easy reference, consequently the print need only be opened when it is actually required, thus providing the necessary protection to the plans or other information. Cloth tracings and prints may be treated in this manner, but it is a procedure which is not recommended; far better to treat the same as a cartridge paper drawing, i.e., keep them flat, or if they have to be transmitted anywhere protect them by tin, or cardboard tubes made for this purpose.—M.E.

LUBRICATION OF SHAFTING

To obtain efficient lubrication, a film of oil only is necessary, and to get this without waste the old dodge of using twisted worsted cotton yarn is hard to beat when properly used. The methods of application differ, although the principle is the same in all cases. A receptacle partly filled with oil forms the reserve supply, and in this there is one end of a loosely-spun thread of cotton or woollen yarn, the other end being in contact with the shafting or other part to be lubricated, the oil being drawn over by the capillary attraction. The rate at which the oil passes depends partly on its viscosity and partly on the tightness with which the yarn is spun, while for some purposes where distribution is required, a flat-woven lamp wick very well supplies what is needed. No large amount of oil is needed for well-balanced machinery which is not overloaded, provided high quality of oil is used, but it is necessary that the supply be continuous or lubrication will be inefficient. A flood of oil for half the day and dry bearings for the other half is almost as bad as no oil at all, and should be avoided in good practice. It is wasteful of lubricant and harmful to the plant.—M. M.

It is estimated that there are 200,000 square miles of coalfields in China.

The owl has no power of motion in its eye, the globe of which is immovably fixed in the socket by a strong, elastic, hard, cartilaginous case, in the form of a truncated cone; but in order to compensate for this absence of motion in the eye it is able to turn its head round in almost a complete circle without moving its body.

Experts state that the Mesopotamian plain, when properly irrigated, will produce a substantial share of the world's cotton crop.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

Government prices

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 40
Steel bars, base, Toronto	4 40
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 50
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Steel bars	4 40
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$20 00	$ 22 00
Electro copper	19 00	22 00
Castings, copper	19 00	20 00
Tin	58 00	62 00
Spelter	9 00	8 50
Lead	7 50	6 50
Antimony	8 00	8 50
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 5 50	$ 5 00
Plates, 3-16 in.	5 75	5 25

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 78
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	8 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 00	9 00
Shell turnings	6 00	6 00
Boiler plate	12 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	5 00
Stove plate	14 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd. brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 60%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 6 50
Sheets, black, No. 10	6 50	6 00
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$28 00	$.....
1¼ in.	32 00	.....
1½ in.	35 00	28 00
1¾ in.	35 00	28 00
2 in.	40 00	28 00
2¼ in.	43 00	30 00
2½ in.	45 00	35 00
3 in.	52 00	40 00
3¼ in.	.....	47 00
3½ in.	62 00	48 00
4 in.	70 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

White			Cts. per lb.
XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	10%	Best grades	15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$10 25
Sheets, 3½ lbs. sq. ft.	10 00	10 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	9 75

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Brantford.—A tin smelter company is being organized, with Brantford capital behind the proposition. It is proposed to get the ore from the Panama region, a representative of the company now being on the ground in that region. The question of power for smelting, and the price, will be the deciding factors as to whether the plant will be located in Brantford.

Brockville.—The Grand Trunk is now employing the 1,500 class Mikado type of Canadian Government Railways locomotive in its fast passenger service on this division, these locomotives hauling the International Limited and other express trains. The locomotives, which are a recent product of the Kingston works, are capable of attaining exceptionally high speeds with trains of moderate length.

Winnipeg.—The last gap in the Shoal Lake to Winnipeg pipe line has been closed. Within the next few days Shoal Lake water will be pouring through the big pipe and into Winnipeg for purposes of cleaning and testing, and within two or three weeks the soft water will be flowing from all taps. The great undertaking, under way since 1914, has cost in the neighborhood of $16,000,000. The line is 97½ miles long, and makes seven river crossings.

Swift Current.—Everything is being got in readiness for an active season's railway construction in the region west and north of this city by the Alberta, Saskatchewan and Hudson Bay Railway, a transportation project that is backed by strong British capital, the provincial charter for which was secured over a year ago in this province. The construction was deferred until after the war, but surveys were made by Engineer Fry a year ago last summer.

London.—A special advisory committee of the Board of Education at a special session, concluded to recommend the immediate construction of a new $60,000 eight-roomed building for commercial classes at London Collegiate Institute. The work will be proceeded with without delay. Overcrowding necessitates the construction of the school, which will be located on the north side of the Collegiate campus. It was originally thought that such a school could be provided for $40,000.

Hamilton.—It was made clear at a meeting of the Hamilton Harbor Commission that its members are reasonably sure that the Government will authorize the expenditure of $325,000 to carry on development work of Hamilton's harbor this year. Capt. George Guy reported on the cordial reception that was given the deputation which recently went to Ottawa, and he thought there was no doubt that authorization for the work to be proceeded with would be made.

MARINE

Montreal.—The Sincennes-McNaughton Co., of Montreal, has purchased from the Montreal Transportation Company the barges Augustus Condor, Dorchester, Dunsmore, Dakota, Kingston, Lapwing, Muskoka, Selkirk, Valencia and Winnipeg. This gives the Sin-Mac Company twenty-three barges for the Lake Ontario and St. Lawrence trade.

Pt. Colborne.—There is no ice to be seen off the harbor at Port Colborne and it is expected that navigation will open this year two weeks earlier than in former years on account of the open condition of the lakes. The "Sir Trevor Dawson" and the "Hagerty," two steamers which have wintered at Port Colborne, are now being fitted out for the commencement of the season, the engineers and oilers having arrived to take charge of preparations for the season.

SAYS PART OF STEAM LINE OUGHT TO BE ELECTRIFIED IN THE EAST

W. G. Gordon, transportation engineer of the Canadian General Electric, read a paper on "Main Line Electrification in Canada," with special reference to the Moncton-Halifax line of the Canadian National Railways.

"The latest heavy trunk line electrification to contribute data illustrating successful operation is the Chicago, Milwaukee and St. Paul Railroad. This line has in electric operation 440 route miles, and has let contracts for the electrification of a further 220 route miles.

Saving in Ton Mileage

On a steam operated trunk line twelve per cent. (12%) of the entire ton mileage movement of freight and passengers carried is represented in the cars and tenders required to haul the coal supply for the steam locomotive. When such a line is electrically operated from water power stations it means that the total movement for railway coal and locomotive tenders is eliminated; and, even if partially or wholly operated from steam power stations, the movement for locomotive tenders is eliminated, and the movement for railway coal is greatly decreased. The benefit is self-evident of being able to apply this ton mileage in the movement of revenue tonnage.

"The cost of maintenance of the electric locomotive is very much less than that of a steam locomotive. The steam locomotive is a power plant which, owing to physical limitations, can attain only a certain capacity and efficiency. On the other hand, the electric locomotive, itself very efficient, can draw any amount of power desired from a system fed either by hydro-electric plants or highly efficient steam electric plants.

"With regard to the 187 miles of the present steam-operated line of the Canadian National Railways, between Moncton and the Halifax Ocean Terminals, it can be shown that the electrification of this line is economically justified on the basis of sound engineering principles. In Halifax the Ocean Terminals have been laid out with a capacity of several times the present traffic, and with ultimate provision for many times the present tonnage, whereas the present line is a single track railway, with heavy grades. To increase the tonnage capacity of this line several plans may be considered, including electrification, grade reduction on the present line, double tracking the present line with grade reduction, double-tracking the present line without grade reduction, and construction of low grade single track on new locations.

"During winter conditions of extreme cold the steam engine is at its worst, owing to the dissipation of heat, while the traffic conditions are most severe. This condition, instead of being detrimental to the operation of the electric locomotive, increases its service capacity as the motors can more readily dissipate heat. Further, the tonnage traffic over the line can be largely increased, due to the electric locomotives being able to haul much heavier tonnage at higher scheduled speeds with almost an entire elimination of the failures and delays at present due to steam operation.

Welland—A second Welland fire broke out at shipyards in the evening between 7 and 8 o'clock recently. The machine shop, a galvanized iron building, with sheeting underneath, was destroyed, together with its contents, including lathes, drills, ship fittings and tools. The building was worth about $3,000. H. M. Balfour, of the British American Shipbuilding Company, states that an accurate estimate of the company's loss cannot be made at the present time, but he thinks it would be in the region of $10,000.

Vancouver.—After three hours' discussion the special meeting of the Metal Trades Council decided to accept the offer placed before them by J. J. Coughlan on behalf of the Coughlan Shipyards for the appointment of a committee of six to take charge of the yard operations. This decision of the Council is an important one, and means that the labor difficulties in connection with the Coughlan Steel Shipbuilding plant are over, at least temporarily, for in the offer made by the firm it is proposed that this committee should act for sixty days, during which time the scale of wages will be paid as prevailing in other yards operating under the Robertson agreement.

London.—In order to maintain mercantile supremacy of the seas Great Britain shipping interests are contemplating converting a large part of the British merchant ships into oil-burners. Only last Friday it was announced here that a great oil combine is being formed in which Royal Dutch and other interests will get control of the Mexican Eagle Co. One of the chief reasons why the British oil interests are seeking to gain control of Mexican and other outposts is in view of the conversion of a large part of the mercantile fleet. It was also stated that as soon as the Government releases such vessels as the Aquitania and other liners they will be converted into oil-burners. The high cost of coal and serious miners' strike issues, it is asserted, have done much to drive shipping interests to the use of oil in order to regain and hold ocean supremacy. At the present time it costs ten dollars to put a ton of coal in a ship's bunkers in British ports.

MUNICIPAL

Moose Jaw.—Tenders recently called for by the City Commissioners for the supply of a 3,000 K.W.H. turbo-generator, and the necessary condensing equipment for such, were opened at the City Hall by City Clerk R. P. Riddell and Electrical Superintendent J. D. Peters. In all three tenders were received on the 3,000 K.W.H. generator, and one on a 3,500 K.W.H. unit, and five on condensing equipment. The lowest tender on the 3,000 K.W.H. generator was made by the Canadian Westinghouse Co., of $67,040, f.o.b. Moose Jaw. The next lowest tender was made by the Canadian General Electric, of $68,525. The lowest condenser tender was made by the C. H. Wheeler Co., Philadelphia, of $18,250, f.o.b. Philadelphia, on a 5,000 square foot condenser.

PERSONAL

Mr. D. H. Fleming, of St. Catharines, has been appointed town engineer of Owen Sound at a salary of $1,800, and will take over his duties about the first of next month. Before his appointment Mr. Fleming was in Owen Sound to look over the situation, and the members of the Board of Works were favorably impressed with him. He has been on the city engineer's staff at St. Catharines.

With a loss of only two lives, the Interborough Railway Company of New York has carried a total number of passengers equal to twice the population of the earth.

DELEGATES PLAN TO TOUR CANADA

New England Mission to Make a Trip Calling On All the Centres

Manchester, N.H.—Choosing this city as the most convenient and central point for their first get-together meeting, at which time the final arrangements for the Canadian trip will be made, members of the New England-Canadian Advancement Association, composed of Chamber of Commerce officials from nearly all New England cities, with a few additional interested big business men, were in session here.

Following the election of officials, balloting for the delegation which is to tour every city in the Dominion of Canada, was commenced.

Plans for the trip, which is to be made by eleven delegates, call for the initial visit to Sydney, N.S., continuing west throughout each province, to British Columbia.

Two delegates from each state are to deliver addresses at each Canadian stop, featuring their home state and its offerings, as well as listening to that of the Canadian point, with existing conditions there.

Canada's imports during the last four years were three billions and a half, of which well over two-thirds came from the United States. While her exports for the same period amounted to nearly five billions, two billions came from this country. This, the organization believes, warrants a get-together program.

At each stop the presentation of American and the organization colors, are to be made.

Quebec stops are listed as Montreal, Quebec, Verdun, Hull, Westmount and Sherbrooke. Special interest attaches to Montreal for its numerous manufactures and educational features.

TENDERS

Ottawa.—John A. Pearson, architect, Ottawa, is calling for tenders up to April 12 for the refrigerating equipment needed in the Parliament Buildings at Ottawa.

Winnipeg.—The Department of Public Works, Ottawa, want tenders up to April 16 for the extension to power house and laundry, Military Hospital, Winnipeg.

Ottawa.— The Department of Public Works, Ottawa, will receive tenders up to Tuesday, April 1, for vault lining, doors and lockers for the Assistant Receiver General's office, Toronto.

St. Catharines.—C. T. McBride, secretary-treasurer of the Public School Board, is calling for tenders for competitive plans for two single-storey schools of eight class rooms, with accommodation for manual training, domestic science and kindergarten for this city. Closing date is April 15.

Winnipeg.—Tenders are being asked by J. Schofield, architect, Room 459, Union Station, Winnipeg, for the building of a new station for the Canadian National Railways at Moose Jaw. The tenders call for the supply of all labor and materials for the erection and completion of a station building. Particulars can be had from Architect, Canadian National Railways, Winnipeg; Agent, Canadian National Railways, Moose Jaw; District Engineer, Canadian National Railways, Saskatoon; District Engineer, Canadian National Railways, Edmonton; Resident Engineer, Canadian National Railways, Calgary.

Glasgow.—New developments in shipbuilding were discussed at the annual meeting of the British Corporation for the Survey and Registry of Shipping held here recently. The chairman, Robert Clark, in the course of his address, said: "There is a good deal of speculation as to the future of reinforced concrete ships. Only three of the considerable number of seagoing barges which were ordered to be constructed under our survey are on active service. While the results are so far satisfactory, they have not yet been at work long enough to prove their worth, or have they been built under conditions which permit judgment as to their commercial value. It would have been of advantage to shipowners if a larger number of these vessels had been sooner in service, and the same may be said of electrically-welded ships and fabricated ships, as the opportunity of fully testing these interesting experiments is not likely soon to recur."

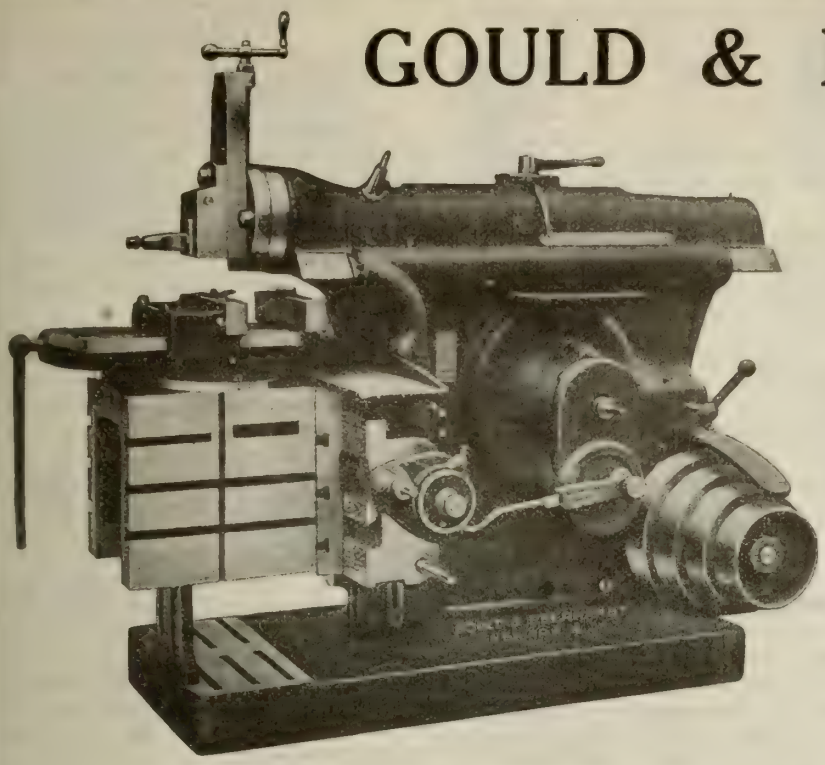
TRADE GOSSIP

Pembroke in 1918 had a fire loss of $1,086,481.

Toronto's fire loss in February was $64,054.

Ottawa will have an architect as a building inspector.

Galt raised civic laborers wages from 28 to 39 cents per hour.



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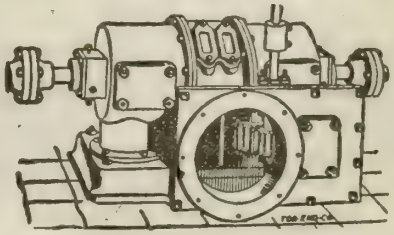


Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

Building permits in Quebec City for February were double in value the same month of last year.

It is expected that work on the Toronto to London Hydro Radial line will start soon.

Continental Oil Co. may take crude oil to a refinery to be built at Regina. An investment of a million is contemplated.

Will Get Power.—The ratepayers of Markham voted on a by-law to issue debentures to instal Hydro-Electric equipment; 108 votes were polled with only one dissenting vote. The work will commence as soon as possible. It is expected to have the power there by July 1.

After Export Trade.—Galt manufacturers are making a strong bid for export trade, and Ald. S. L. Clark, manager of the Perfect Machinery Company, has received an order from one of the largest machinery houses in London, England, for six machines, which is a trial order. Inquiries have also been received by the same firm from Australia and Japan.

JAPAN'S EYES ARE ON CANADIAN TRADE

Pig Iron Can Be Produced There at Low Rate—Cheap Labor is the Cause

Opportunities of the reconstruction era in Canada are not being overlooked by wideawake Japan. Three of that country's keenest business men have been at the King Edward since last February. All are officers of the K. Tsuda Company of Osaka, Messrs. Onoda, Kobashi and Matsuda. The Tsuda Company is the most important steel and iron concern of Nippon, something of a pocket edition of the United States Steel Trust, producing every example of the allied metals' product, from frying pans to steel rails. Mr. N. P. Onoda is the company's foreign sales manager, and largely depended upon to find profitable markets for the company's products, so that the working staff of two thousand or more need not be reduced.

"We have been kept busy on war orders until lately, and they have been profitable orders," said Mr. Onoda. "Now that the war is practically over we must find new markets or reduce production, which we hope to avoid. Consequently we come to look over the Canadian field which is more attractive to us than any other. We obtain our raw material from China exclusively, but wages, etc., there are so low and transport facilities thence so favorable, that it costs us only $1.50 a ton for the iron ore at the plant. And again, we have in our country an abundance of comparatively cheap labor and low living costs. Shipping facilities from Japan to Vancouver or Seattle are superior to those to San Francisco. There is more opportunity for great development enterprises in Canada, too, than in the United States, therefore we are hoping to work up a satisfactory Canadian export trade. We are here to study and decide how that is best to be done."

Line to Jamaica.—Kingston. — The Canadian Government has been asked to establish a direct steamship service with Jamaica, it being understood that a subsidy will be provided in case such a project is carried out. The Legislative Council has excluded shipping companies from the payment of taxes under the income tax bill which has just been passed.

Winding-Up Order.—A petition was filed at Osgoode Hall by the Toronto General Trusts Corporation against Polson's Iron Works, Limited, asking for a declaration under a deed of trust which was made in 1916 as the holder of a debenture of the company for $600,000. The petitioners ask the court for a declaration to be made that the plaintiffs, as trustee, is entitled to a mortgage and charge upon all the real and personal property of the defendant company. The usual powers of a mortgage holder, including that of winding up the company is asked for.

Big Orders.—It is announced in London that immense orders for timber have come from London for British Columbia and other parts of Canada. With many thousands of unemployed and immigrants entering Vancouver at the rate of 2,500 weekly, 425 provincial timber mills were on the point of closing down. Mr. Wade anticipates one consequential result of the renewed activity to the milling business—the immediate construction of house buildings of all kinds, thus relieving the house famine in Vancouver and other cities. A further effect should be the renewed demand for land for building purposes and a tonic influence for real estate values.

Watch the Rumors.—To prevent unjustified criticism of and dissension among the allied nations of American exporters have been warned by the American Manufacturers' Export Association to sift to the bottom all published reports of import embargoes being placed abroad on exports from the United States. This action was decided upon following the receipt here of an incorrect foreign despatch stating that Australia had seen fit to decree a prohibition of all imports except those of British origin and manufacture. The report was eventually proved to be without foundation, having originated from an official decree restricting the importation of dyestuffs.

Building In Windsor.—Construction of factories with joint capital of more than $1,000,000 will be made in Windsor this year if plans of corporations now in embryo reach maturity. Incorporation of the Canadian Collapsible Rim Co. with a capital of $500,000 was announced by Frederick Kerby, attorney for the new corporation which plans to build a plant here immediately. The main office will also be located here. The incorporators are J. H. Campbell, Oulette avenue, Windsor; Sidney Anderson, gen. manager of Sandwich, Windsor & Amherstburg Ry.; James B. Gunn, Winnipeg; A. C. Smith, Windsor, and

U.S. MUST FIND OTHER MARKETS

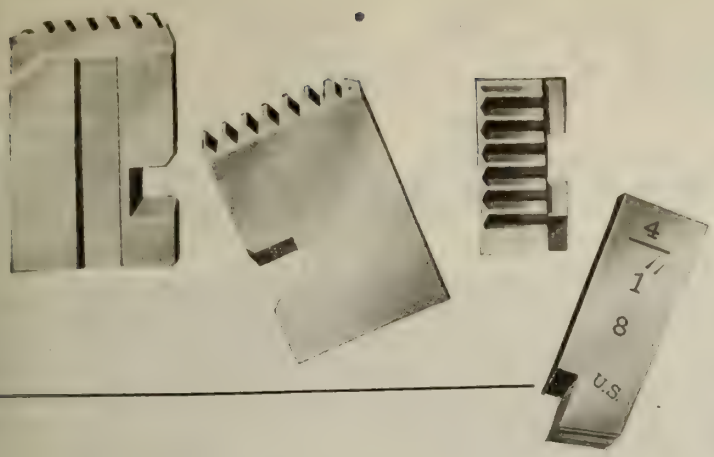
France Places Embargo on Same Lines as Adopted by Britain

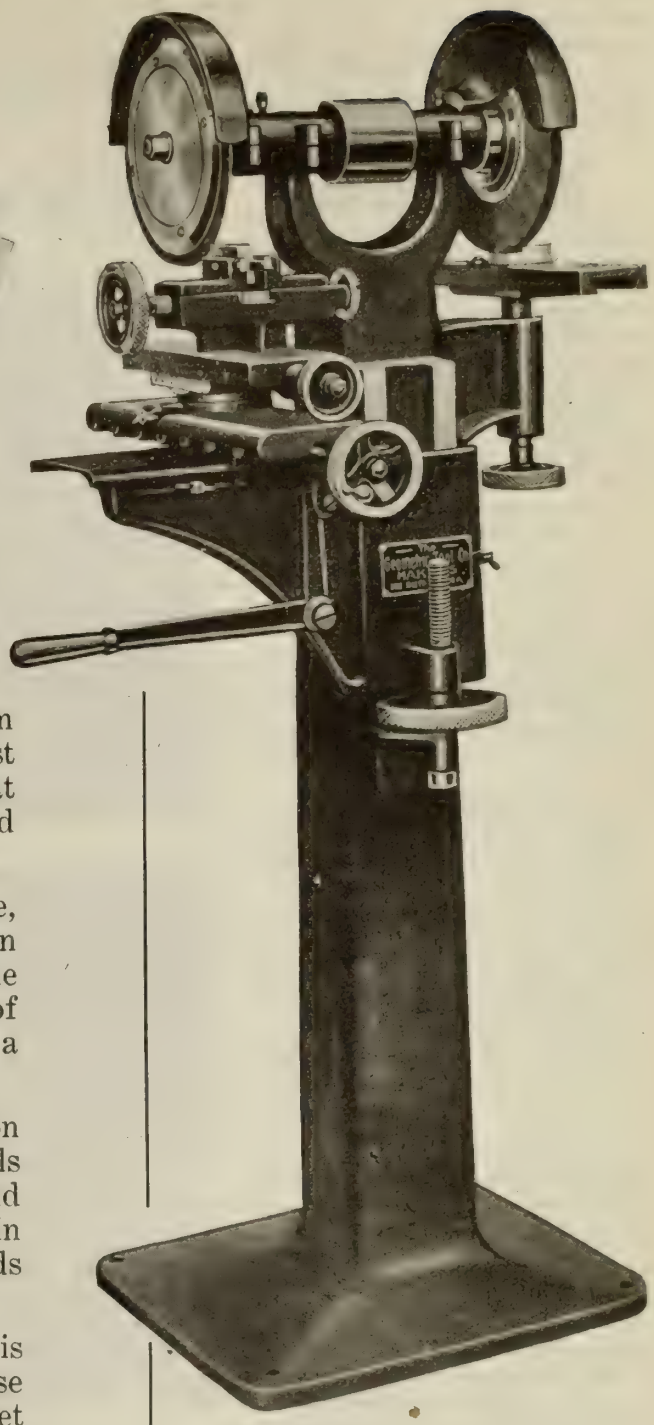
Washington. — Imposition by the French Government of an imports embargo similar to the British is regarded by Government officials here as evidence that the Allies have completed their plans for industrial reconstruction and now are proceeding to put them into effect.

Great Britain and France have established a pool in this country to control whatever purchases they need to make, and Italy is co-operating with them to a limited extent. As a result, trade experts do not think there will be much sale for American finished products in the European countries for some time to come, it being the announced policy of the Allies to do without these articles which they cannot manufacture at home. Basic materials still will be obtained in the United States and probably much machinery, into the making of which technical skill and scientific knowledge enter, but it is believed the great bulk of American goods will have to be marketed elsewhere.

Eldon B. Edmunds, Winnipeg.—Efforts to obtain tax exemption for construction of a factory on city property on Howard avenue is being made by the Auto Specialties Company, St. Joseph, Mich. The company is asking the Finance Committee to put in by-law form an exemption ruling for $50,000 for ten years.

Imperial Trading Co.—On every hand there is evidence of faith in a revival in business, and new companies and firms are being formed to participate in this larger commerce. One of the new companies recently formed is the Imperial Trading Company, with head offices at the Herald Building, Montreal. This company intends to deal in iron, steel, copper, brass, lead, spelter and other metals; in rails, railway equipment; motors, generators, transformers, and machine shop tools; wool felt, cotton waste and other textile products; also pulp mill and mining machinery. The company is also negotiating for a number of sole agencies for Canada, of important products from the Orient, including China, Japan, East Indies, Malay States, Ceylon, Indo-China, Straits Settlements, etc. The president is Major G. A. E. Bury, son of Sir George Bury. Major Bury, before joining the overseas forces, was a prominent barrister in Winnipeg. He returned to Canada recently, after over three years with the Canadian Expeditionary Force. He is a graduate of the University of Manitoba. The vice-president and general manager is Mr. E. C. Peterson, formerly district manager of the Northern Electric Company, Limited. Prior to that he was in charge of the Production Department of the Western Electric





Sharp Chasers Cut Clean Threads

Accurate, uniform threads result only from dies which are maintained in the highest state of cutting efficiency. This means that chasers must be kept sharp, and ground uniformly.

Even if just touched up from time to time, the chasers respond splendidly, with clean threads. And with this machine — the Geometric Chaser Grinder—the matter of keeping threading tools up to scratch is a comparatively simple matter.

Various makes of chasers can be ground on this adaptable machine. The two wheels permit the easy grinding of both milled and tapped chasers. In addition, the plain wheel lends itself readily to various kinds of tool grinding.

Uniform grinding of a set of chasers is purely a mechanical matter through the use of adjustments which can be accurately set to govern the grinding of an entire set of chasers.

The Catalog describing this machine is a mine of information on chaser grinding. Write for it.

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Company, Chicago, with which he began his business career in September, 1899, immediately after graduating from the Iowa State College, receiving the B.Sc. degree, both in mechanical and electrical engineering.

CATALOGUES

Rochester Ball-Bearing Co. has just issued a new catalogue superseding Bulletin No. 10, issued in 1914; this new catalogue having several unique features to commend it. The prints heading each page are from actual photographs, and give a clear idea how the bearing and balls appear when assembled. The one-piece retainer used in their Standard Type is light, flexible, and durable. The method used is to form three fingers on each side, which are closed over the balls in the assembling operation; this allows ample play for balls to adjust themselves to the pitch diameter of races, something heretofore not accomplished except by means of an oval hole.

The weight of retainers was another problem overcome by using one piece for retainer in the place of two pieces, which, when riveted together, sometimes cramp the balls, thus causing friction between ball and retainer.

The Practical Telephone Handbook, by J. Poole, 7s. 6d., Sir Isaac Pitman and Sons, Ltd., Amen Corner, London.—The present edition of this work has been completely revised and largely rewritten with the incorporation of much additional material relating to the later developments in telephone engineering. The contents have been brought in line with the British Post Office practice. The various subjects dealt with embrace the whole field of telephone engineering and the automatic telephone exchange is described in detail, great advances having been made in its use, particularly in England and on the Continent. This work is intended as a handbook for those having to do with the operation of telephones, exchanges, line construction, etc., and the subject matter has been prepared with this end in view.

The various types of telephone systems adapted to various uses including the now almost universally adopted central energy system are described in detail, together with much descriptive matter regarding the apparatus itself. The modern exchange, multiple switchboards, junction line working, trunk line working, party line working, and other systems are dealt with. The supply of power for the operation of the central energy plant is taken up in a chapter which deals with the apparatus used and its arrangement for the continuous supply of power. Pole line and underground construction are thoroughly dealt with.

One of the more recent devices which have made long distance telephony possible is the system of Pupin loading coils, which enable the inductive characteristics of the circuits to overcome capacity effects. Transmission line calculations are given in the section devoted to this phase of operation. Multiplex telephony and the use of phantom circuits are dealt with together with the use of submarine cables. As the subject of telephony needs for its elucidation at least an elementary knowledge of electrical science, and in order that the book may be of service to the general public, the author has considered it advisable to define the various electrical terms which will be met with in the descriptive matter, and to give a short sketch of the science. Telephone employees, for whom the book is chiefly intended, should find it of value and of interest from the standpoint of European practice as well.

BOOK REVIEWS

Steam Engines, By E. M. Shealy, the McGraw Hill Book Co.—This book on steam engines was written as a text book for correspondence students in the University of Wisconsin. It is the third of a series of three text books designed for those students who are pursuing a general course in steam engineering, the other two being "Steam Boilers" and "Heat." The fundamental principles underlying the operation of the steam engine are taught in as simple and non-mathematical a manner as possible. Enough of the practical features of steam engine operation has been given to illustrate the principles involved that part of the course dealing with valve gears has been made more complete than other sections because it has been found that operating engineers usually do not understand the valve gear mechanism of their engines as well as they do other parts.

Contents: Principles of the steam engine, Corliss and other engines, parts of the steam engine, heat work and pressure, properties of steam, indicators, indicated and brake horsepower, action of steam in the cylinder, steam engine testing, the slide valve, the valve diagram, valve setting, shifting eccentric and the Meyer valve, reversing mechanisms, Corliss valve gears, governors, compound engines, condensing apparatus, lubrication, steam turbines.

For the engineer who wishes to obtain a reference work or for the student wishing information on the principles and operation of the steam engine this work should prove quite welcome.

MESSAGES FROM THE OPTIMISTS

"We have every reason to believe that we will be just as busy as we were formerly."—Mr. Griffith, of Griffith & McNaughton, Knitting Firm, Arnprior.

"The plant has enough work to keep it busy for at least two years and many more large orders are expected."—An official of the British-American Shipbuilding Company, Welland.

"We are very optimistic as to the future conditions of Canada, and cannot see why any panic or slump in business should occur."—Mr. E. M. Arnold, of the Elmira Furniture Company.

"For our own part we fail to feel any doubt, even the slightest, as to the present soundness and future prosperity of this country."—Mr. M. R. Meldrum, Managing Director of the Morris Co.

"Whatever other firms may contemplate, the Anglo-Canadian Leather Company is going ahead with greatly increased production."—Mr. Heaven, Manager, Anglo-Canadian Leather Company, Toronto.

"I am very optimistic. There is no reason for being otherwise. I believe that after the period of readjustment Canada is going to be more prosperous than ever."—Mr. Geo. Philip Buck, President of the William Buck Stove Company, Limited, Brantford.

"Canada's prospects for the future are the greatest in the world. I do not know of any country that stands in a more favorable position."—Mr. W. H. Whittaker, secretary-treasurer of Goold, Shapley & Muir, manufacturers of Engines, Windmills, etc., Brantford.

Oh, we are all optimists here; there isn't any reason why we shouldn't be. As far as our firm is concerned we certainly cannot complain. There is enough business in sight to keep several firms like us busy all the time."—Mr. Geo. Day, Sales Manager M. Beatty & Sons, Limited, Welland.

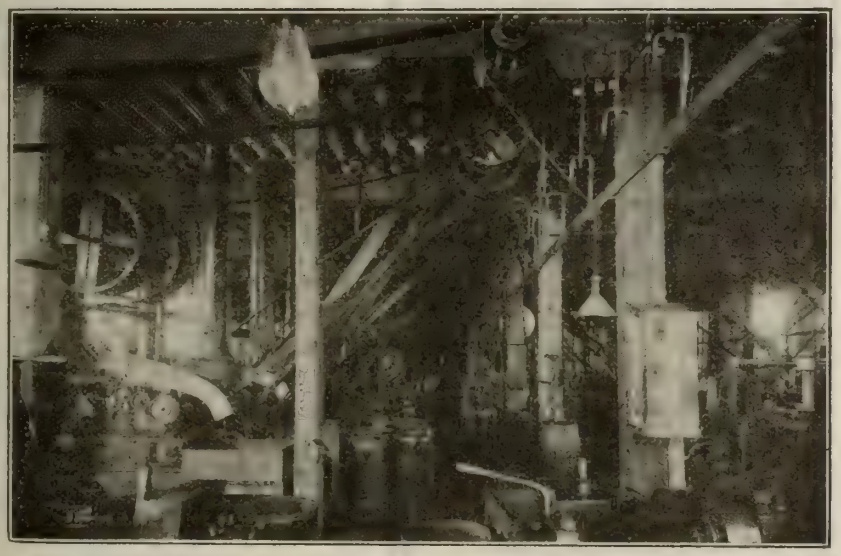
"The general situation in Canada appears very bright to me for the reason that we have a vast and valuable country that is full of raw material. I am looking for a greater development of those resources."—Mr. G. H. Waterous, President of the Waterous Engine Works, Brantford.

"I am very optimistic and I think there is no doubt as to the future of Canada. As far as our firm is concerned we never had so many requests for equipment, and the enquiries are from all lines of manufacturers."—Mr. Hollingrake, President of the A. R. Williams Machinery Company, Toronto.

"I cannot see other than prosperity for Canada, as we have all the natural resources that make for industrial development and a great country, and I think conditions are going to be brighter than ever."—Mr. J. W. Shepperson, secretary-treasurer of Ham & Nott, manufacturers of refrigerators, kitchen cabinets, Brantford.

"We are among the most optimists in Canada, and look to the future with every confidence. This country, in the next five years, will have a wonderful demand to meet, and the only thing that is worrying us is that we will not be able to meet the calls made upon us."—An official of the Billings-Spencer Company and Canada Forge Company, Welland.

Yes! These Are Scandinavia Belts



—and they are giving satisfactory service because—

They have a good surface for gripping the pulley.

They stand belt shifter work well.

Their wearing qualities are good.

They are flexible.

They have no plies to come apart.

Mr. Plant Manager:—

These belts are no experiment and we can refer to Scandinavia Belts in Canada that have been in use from 8 to 15 years and are still good. There are other solid woven belts on the market that you can buy at a cheaper price but do you not think it is money wisely invested to buy a belt that is known to last. Perhaps the belt you are going to experiment on is not going to last.

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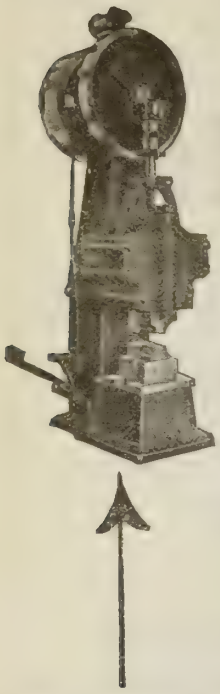

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Oil Tempered Steel Springs

—for every purpose and the best for each use.

Special styles of all kinds to order.

THE CLEVELAND WIRE SPRING COMPANY

Cleveland, Ohio U.S.A.

The W. S. Rockwell Co., 50 Church St., New York, have issued Bulletin No. 39 of Rotary Annealing and Heat Treating Furnaces.

The design of the furnace is that of a rotating horizontal cylinder with a refractory or metallic spiral lining, so that when material is charged in bulk into the charging-drum at one end it is gradually and automatically conveyed through numerous convolutions and at gradually increasing temperatures to the other end, where it is automatically discharged at the exact time that it reaches its required temperature. A concentric hood serves to automatically close the discharge opening except at the lowest point of revolution and time of discharge. The hood also serves to guide the material as it leaves the furnace. The furnace is intended to handle, either for annealing or hardening, tempering, blueing or other heat-treatment, any small pieces of like dimensions in either brass, copper, steel or other metals such as cartridge shells, eyelets, ferrules, buttons, caps, cups, coin blanks, steel balls, saw teeth, tacks, screws, rivets, rings, springs, nuts, punchings, etc.; in fact, any small pieces which will travel freely and pass through the openings without choking them. The fuel consumption in this rotary furnace is low, averaging about 250 pounds of heat-treated material to a gallon of oil. The labor cost, too, is low, as the operation of the furnaces requires observation rather than labor. The charging and discharging are both done automatically. The bulletin contains a novel heat-treatment chart.

American Manufacturer Wants Representation in Canada

Our proposition should interest an established machinery supply house now calling on steam power plants in Canada. For particulars, write Box 563, Canadian Machinery.

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PORTABLE PLANERS

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SPECIAL DRAW CUT R.R. SHAPERS

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We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

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372 Pape Avenue, Toronto, Can.

TRADE PUBLICATIONS

The United States Steel Products Co., New York and Toronto,. have issued "Tool Steels," containing data and tables appertaining to electric tool steels manufactured by the Carnegie Steel Co. The various classifications of steel are given according to its uses, proceseses of manufacture and chemical composition, together with the factors affecting the qualities of steel. The main portion of the booklet is devoted to the heat treatment of steels and especial attention is devoted to the heat treatment of alloy steels. The value of this portion is greatly enhanced by the excellent illustrations accompanying the text. Photographs of test specimens which have undergone heat treatment are shown and a color chart is given showing the actual colors together with the corresponding temperature range. Tempering is usually controlled by means of the colors produced on polished steel at various temperatures and as an aid in the controlling of this temperature a color chart and table are given for the different classes of articles usually met with. In addition to the above a list of the various tool steels manufactured by the firm together with the various uses to which they are best adapted is given.

Shawinigan Magnesium is the title of a recent publication issued by the Shawinigan Electro-Metals Co., Montreal. This booklet contains much information of value relative to the uses of magnesium. Data for this booklet was obtained from the company's own laboratory work from technical literature and from users of magnesium. A chapter devoted to foundry practice gives uses and instructions which have been of value in both the ferrous and non-ferrous foundry trades and the information given on its use as a deoxidizing agent is of int-

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TAPES AND RULES
The complete solution of your problem of accurate measurements. Their all-round fitness is in keeping with their accuracy.
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GRAPHIC PRODUCTION CONTROL
Increases Output
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Special Machinery
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CASTINGS
Medium Weight Grey Iron, Brass, Etc.
JOBBING
GREENLEAFS, LIMITED
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Machine Tool Makers.
Specialties: Patent Puncher Slotting Machines, Milling Machines, Boring Machines.
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Send for catalogue.

Machine Tools for Iron & Steel Works.
We shall be glad to hear from firms contemplating improvements or complete installations.
BERTRAMS LIMITED
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MAPLE LEAF
STITCHED COTTON DUCK
BELTING
DOMINION BELTING CO. LTD.
HAMILTON CANADA

erest. Physical and chemical properties are listed in separate chapters for the benefit of those interested in the scientific application of magnesium to other branches of industry. The final chapter contains much that will prove helpful to those endeavoring to make special alloys to suit special needs.

Ludlum Steel.—A handbook on tool and alloy steels has been recently issued by the Ludlum Steel Co., Watervliet, N.Y., and Detroit, Mich. A classification of tool steels together with directions for ordering various shapes is given and is followed by data on alloys and their effect on steel. In this section the effect of nickel, chromium, nickel chromium, chrome vanadium, manganese and tungsten on the resulting characteristics of the alloy produced is given in convenient form. The following section is devoted to the composition and heat treatment of carbon and alloy tool steels. High speed steels are next dealt with. The proper steel to use for various purposes is given together with a description of the various kinds manufactured by the Ludlum Company. This section also includes directions for the heat treatment of the various steels. Other information is divided into the following sections, ball bearing steels, magnet steels, carbon and alloy tool steel, high speed tool steel, a color chart giving heat colors with approximate temperatures and tables of useful information.

WATCHING FUEL WASTES

Sometimes the managing head of a manufacturing concern is not alive to the needs of the power plant because he does not understand the dollars-and-cents possibilities that it offers. When the engineer cannot get what he knows the plant needs, he loses interest in the welfare of the department of which he is in charge. One rather extreme case of this came to the attention of a salesman for a house that manufactures power plant supplies.

"See our chief engineer about the matter," said the general manager to the salesman. "We leave all matters of fuel economy to him."

"Leaves all such matters to me, does he?" said the engineer when the salesman called on him. "If he only did leave them to me there would be something doing. Last week I went to the office with a requisition for a feed water thermometer. I was turned down. He said we must 'economize.' I told him that was what I wanted to do and why I wanted the thermometer. I tried to explain that every 10 degrees added to the temperature of the feed water meant a saving of 1 per cent. in fuel.

"What do you think he said to me? He asked me if the thermometer would make the feed water any hotter!

"I told him that I could not heat water with a thermometer, but that the particular thermometer I wanted would tell me where I was 'at'—which was more than I knew at present. Did I get that

You Know How Greatly it Increased

Production

You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

Hawkridge Brothers' steel for every commercial requirement is just such production-increasing steel as proved this "Hawk" D. Chrome Vanadium. We make

Steel of Every Description

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'Barnes-Made'
Springs

are unusual in service and wear.

They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-Made" Springs are the best buy.

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Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.
Allentown Experimental Works
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WIRE SPRINGS OF ALL KINDS
Machine Springs, Valve Springs, Automobile Cushion Springs, etc., of a quality that defies competition. Tell us your requirements. Send sample or specification for price.
JAMES STEELE, LIMITED
GUELPH, ONTARIO

$4 thermometer? I did not, and now I don't care what the temperature of the feed water is. I wouldn't turn my hand if the boilers were taking ice water."—JOSEPH W. HAYES in "System."

BUSINESS CHANGES

Renfrew Mercury.—A few days ago there was a rumor about town that Mr. Thos. A. Low had bought out the interests of Senator O'Brien in the Renfrew Machinery Co., Limited. Rumor was only partially right. There had been a transfer of interests; but it was the other way about. On making enquiry at the head office of M. J. O'Brien, Limited, The Mercury was informed that that company had purchased outright Mr. Low's share in the Machinery Co., the transfer of his stock having been made on Wednesday. Mr. Low being out of town when The Mercury learned the facts, we are not in a position to say how far this sale may indicate a further development of some of Mr. Low's other industrial interests here.

CASTING IN BURNT-OUT MOLDS

There is a class of molding and casting which, while having no particular value in an economic sense, has yet an occasional value, and is for this reason worth remembering. In the cire perdu process the wax pattern or model is surrounded with the plaster mold, eventually being melted out and replaced by metal, the mold then being broken off and a metal replica of the wax pattern secured. In the burnt-out process the original—say a flower, small animal, or the like—is put in place of the wax model, the mold material is poured in, dried, and then brought to a heat, which will reduce the mold to ashes, then the ashes are cleaned out and replaced by molten metal, the mold being preferably red hot, and when cold the mold is broken away and the casting cleaned up, when it should be a perfect replica of the article selected for reproduction. Obviously, plaster as used in the cire perdu process would not stand the heat, and probably the best molding medium is finely ground gannister, as used in steel furnace work, this being reduced with water to a creamy state and deposited on the model by gradual settlement from the water, fresh supplies of the reduced gannister being added until the required bulk has been secured. Pipe clay, as used for making tobacco pipes, could also be used, and one or two other refractory materials are available, but gannister would probably work best with most people. After the material selected has subsided the water should be poured off, and the mass should dry naturally until the bulk of the moisture is gone and then gradual heating should drive off the rest, and as the mass becomes dry it should be gradually brought to a bright red heat and kept heated until the mold is reduced to ashes, which should be removed and their place filled with molten metal in as fluid a state as possible. As the mold is broken up in removal from the casting some little care is necessary in its preparation, while probably at first a little practice will be found necessary to get the right knack in working.—M. M.

MAKING CASTINGS FROM MIXED COPPER ALLOYS SWARF

In dealing with finely divided metal, the first thing is to pass it through a magnetic machine to remove iron, and preferably the next thing should be to mix in about 5 per cent. in bulk—net weight—of hardwood charcoal, granulated to the size of large peas, dust not being wanted. Large crucibles should be used for melting, a few pounds of brass or gun-metal being melted before the swarf is put in, it being desirable to have a small bath of molten metal to start with. The swarf should be added to the bath of metal in moderate quantities until the crucible is full of metal to within 2 in. of the top, when, if possible, the crucible should be lifted and skimmed into an iron scoop, and then replaced in the fire, the dirt taken off being placed in a brick or metal bin and saved for further treatment. When in the fire again the metal should have salammoniac well stirred in at the rate of from 2 oz. to 4 oz. per 100 lb. of metal—a small excess does no harm—and when the fumes cease to come from the metal the crucible should be lifted, well skimmed, and be poured into the moulds, but on no account may it be stirred at this stage. Clean castings should be secured that will turn up without blemish in this way, the castings having a clear brownish skin when cold. If too hard, the castings should be taken from the moulds while red hot and plunged into cold water, this annealing and softening them so that they machine readily. So far as possible, copper-tin and copper-zinc alloys should be kept separate, and phosphor bronze should be kept out of brass mixtures while aluminum should be kept out of both, this metal causing pin holes under the skin except in a few of the copper zinc mixtures and phosphorus often has the same effect where zinc is present. Where ferro-bronze is used the scrap should always be separately collected, as the iron does not fit in well with miscellaneous scrap as a general thing, and manganese bronze should be kept separate where possible for the same reason.—M.E.

It is believed that nearly 30 per cent. of Canada is still unexplored.

Many Mexicans came over the border recently to learn from a Government agent how to make cottage cheese.

The sugar-cane area of 1918 in the United States was 533,880 acres, or 12 per cent. above the acreage of 1908.

The fly lays four times each summer, and 80 eggs each time. The descendants of one female fly in a single season may number 2,080,320.

Taking the average depth of the ocean to be three miles, there would be a layer of salt 440 feet thick covering the bottom in case all the water should evaporate.

Flying Men Are Certainly Farsighted

(*Continued from page 2*)

each. If commercial flying is developed quickly, the experience of these men will not be scrapped.

Among the commercial types of aircraft which are to be advertised are the land airplane, hydro-airplane and flying boat. Express planes will be developed to carry 2,000 pounds or more and specially constructed passenger cars with limousine bodies which will travel at high speed without the slightest sense of jolt or vibration. A "honeymoon" special has been constructed which is warranted to give service long after the honeymoon. A number of autoplanes have been already sold to wealthy ex-poliots who, having tasted the thrills of flying, dislike to forego their pleasure after being mustered out of the service.

Different Requirements of Commercial Planes

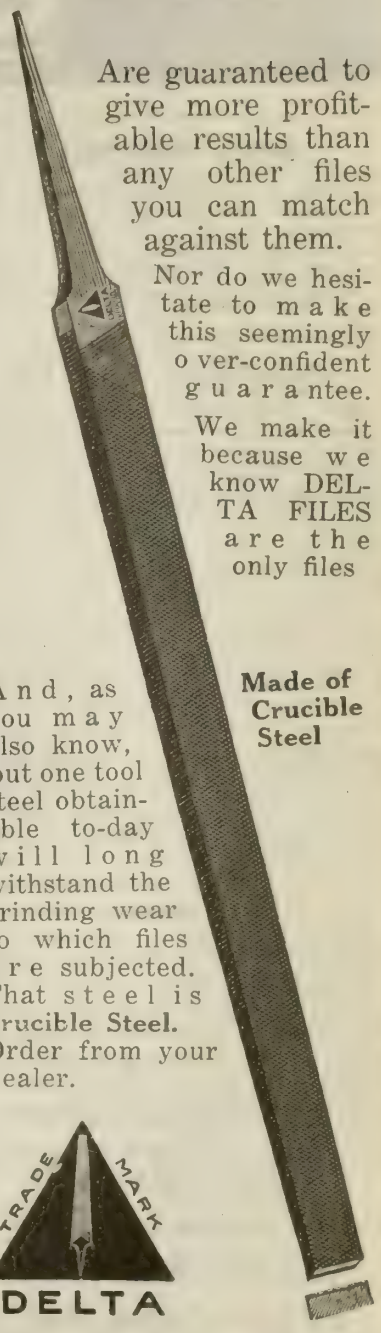
War planes are not adapted for commercial purposes, and machines to be sold to the public will have greater endurance and lasting qualities. Speed will not be so essential, and tail dives and somersaults will not be a part of the programme on a pleasure jaunt. At present there are about 5,000 planes in this country in flyable condition, but it is questionable whether these will be suitable for any purpose other than carrying mail.

During the surrender of the German navy in the North Sea, one Teutonic admiral cynically remarked: "You are welcome to them. You may throw them into the scrap heap. The future lies with the submarine and the airplane."

Great Britain is going ahead with an aircraft programme of $100,000,000 a year for seven years; France and Italy have ambitious plans, while it is stated that Germany, chaotic as conditions may seem at present, has secret preparations for the mastery of the air. Even if Congress appears somewhat lukewarm in drafting a national defensive aircraft programme, it is evident that the commercial development of aircraft has great possibilities, and the campaign of the Curtis Corporation is indicative of the enterprise of airplane manufacturers in building for the future.

Have you read page 68? It will interest you.

Delta Files



Are guaranteed to give more profitable results than any other files you can match against them.

Nor do we hesitate to make this seemingly over-confident guarantee.

We make it because we know DELTA FILES are the only files

And, as you may also know, but one tool steel obtainable to-day will long withstand the grinding wear to which files are subjected. That steel is Crucible Steel. Order from your dealer.

Made of Crucible Steel

TRADE MARK DELTA

Delta File Works

Philadelphia, Pa., U.S.A.

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WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

WANTED—DRAUGHTSMAN FAMILIAR WITH mining and crushing machinery. State salary expected. Box 565, Canadian Machinery. (c14m)

POSITIONS WANTED

IF YOU ARE LOOKING FOR A SUPERINTENDENT or general foreman, a Canadian citizen with twenty years varied shop experience in Canada and United States, a thoroughly live man with executive ability, one that can lower the cost and raise the quality of your product, just get in touch with the advertiser. Box 566, Canadian Machinery. (c14m)

OFFICE POSITION, PREFERABLY PRIVATE secretary, with firm manufacturing or handling motor vehicles or machinery, by young married man, Canadian. An experienced accountant, shorthand writer and typist. Have just completed the Complete Gas Engines Course of the International Correspondence Schools. Best references. Reply P.O. Box 566, Lethbridge, Alberta. (c13m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

AGENTS WANTED

AGENT WANTED

By a well known Sheffield firm for tool steels and alloy steels.

Must have technical knowledge and good connection. State qualifications fully to

Box Number 567, Canadian Machinery, 128 Bleury St., Montreal.

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FOR SALE

PLANER FOR SALE, 46 INCHES WIDE, 36 inches high, 17 feet bed, has single head and screw feed, in first-class condition. Will be sold cheap. Apply The John Whitfield Co., 33 Sherbourne St., Toronto. (c13m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

CANADIAN WESTINGHOUSE MOTOR. 100 h.p. Serial No. 113842, full load speed, 580 r.p.m., 225 amps. per terminal, 220 volts. Constant speed, 7200 alts. Armour & Co., Hamilton, Ont. (c14m)

ONE SPINDLE, GRIDLEY, AUTOMATIC, ⅞-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

ONE NO. 3H LeBLOND UNIVERSAL MILLER. One LeBlond heavy duty 21" lathe. One LeBlond heavy duty 17" lathe. All of above slightly used and as good as new. Reliance Motor & Tool Co., Ltd., Toronto. (c13m)

FOR SALE OR RENT

1 STEAM HOIST, 7 x 12, BEATTY DOUBLE drum, complete with boiler 100 lbs. pressure. 1—Vertical boiler with all fittings, 25 H.P., 100 lbs. 1—Air compressor, belt driven, Chicago pneumatic, 12 x 10, 300 cu. ft., at 100 lbs. 2—Cement guns, complete with all accessories. 1—McLaughlin auto truck, new stake body. 2—Air compressors, belt driven, Bury, 650 cu. ft., at 30 lbs. Burns & Roberts, Toronto. (c12m)

MANUFACTURER'S OPPORTUNITY

100 ½ and 1 ¼ h.p., air cooled gas engines, in semi-finished condition, with patterns, jigs, gauges, etc. Attractive bargain to serious party. Apply to
THE A. BERNARD INDUSTRIAL CO., Fortierville, Que.
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WANTED—ONE TWO H.P. MOTOR, 3 PHASE, 60, 220. One 10-inch lathe chuck, 4 jaw. One 16, 18 or 20 inch, 4 jaw. Northwestern Iron Works, 1419 Scarth St., Regina, Sask., Canada. (c13m)

FOR SALE

Shepard Electric Hoists, 3 Tons Capacity with Motor Driven Trolleys, Floor or Pulpit Control $\frac{220}{440}$ Volts, 3 phase, 25 cycles. Used one year, A1 condition.

N. B. PAYNE & CO.,
Electric Traveling Cranes and Hoists
Telephone, Cortland 1800. 25 Church St., New York

PATENT FOR SALE

Canadian Patent No. 180024. Rail Bonds. Manufactured and used extensively in mines in U.S.A.

G. H. BURGE,
Huntsville, Mo., U.S.A.
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Good Used Equipment

Shaw 7½ Ton 3 Motor Crane, D.C. 220.
36" x 16' C.M.C. Triple-geared Q.C. Lathe.
27" x 16' LeBlond D. B. G., Q. C. Lathe.
Pels Type Beam Shear.
Bertsch Plate Shear.
23 x 26 W. & W. Bulldozers.
2,000 cu. ft. Can. Ing. Rand Air Compressor.
96" Fifield Hor. Boring Mill.
88" x 20' Bertram D. B. G. Lathe.

The A. R. Williams Machinery Company, Limited
HALIFAX N.S.

USED MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

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IMMEDIATE SHIPMENT

LATHES.

14" x 6' McKENZIE, standard.
14" x 8' LEBLOND Toolroom Equipment.
14" x 7' HENDEY Toolroom Equipment.
6—16" x 6' C.M.C. double back gear, quick change gear.
18" x 6' CISCO, double back gear.
19" x 10' LEBLOND heavy duty.
22" x 10' REED PRENTICE, geared head.
12—26" x 12' C.M.C. double back gear, quick change.
28" x 10' CONRADSON geared head.
36" x 14' NEW HAVEN triple geared.
24"—40" x 20' McCABE, double spindle.
28"—44" x 14' BERTRAM gap lathe.
20" x 36" x 14' CMC gap lathe, double back gear, quick change gear.

SHAPERS.

15" McKENZIE B.G. crank.
16" RAE B.G. crank.
16" STEPTOE crank.
20" GOULD & EBERHARDT high duty.
24" and 28" GOULD & EBERHARDT high duty.

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No. 1½ and 2½ LEBLOND Universal.
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No. 1 LEBLOND Universal Tool, power feed and wet attachment.
GISHOLT Tool Grinder.
BAY STATE vertical surface.

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10" MYERS bench sensitive.
10" McKENZIE sensitive.
14" MYERS column sensitive.
14" PERFECT column sensitive.
15" BARNES lever feed.
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26", 28" and 34" BARNES sliding head.
26" and 28" BARNES with tapper.

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2' FOSDICK National pattern.
3' NILES box table.
4' CINCINNATI-BICKFORD, speed box drive.
5' LONDON box table.
5' FOSDICK heavy duty speed box and tapping attachment (new).

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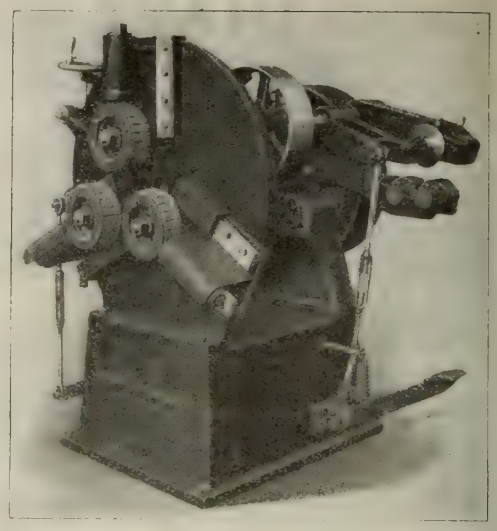

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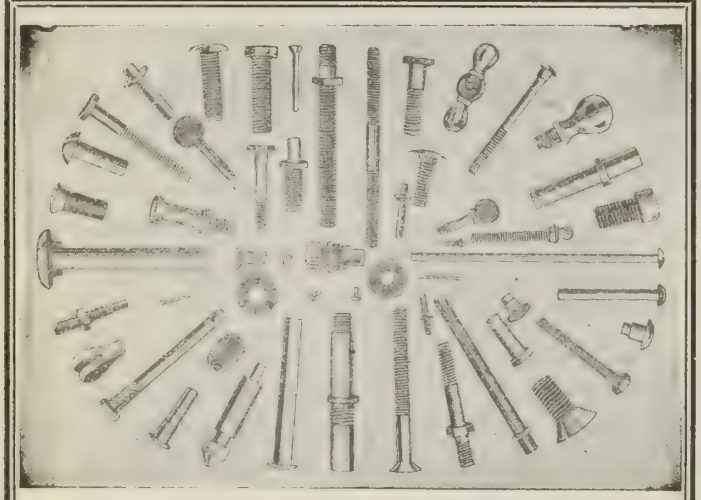

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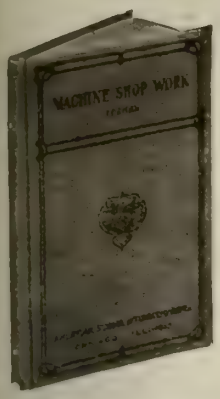

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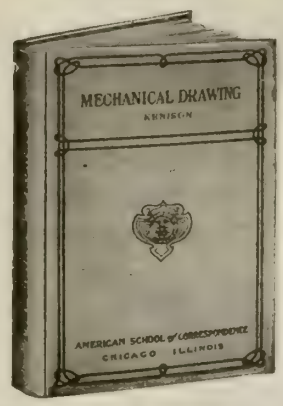

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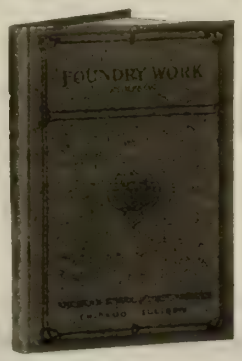

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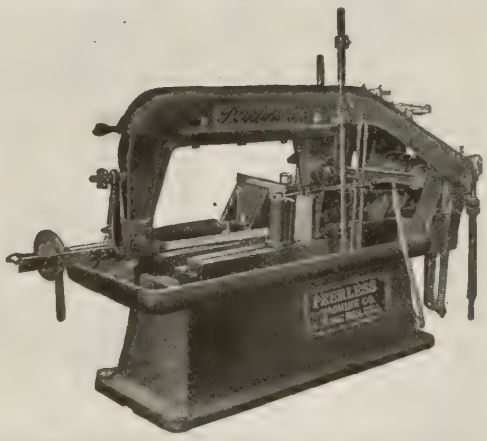

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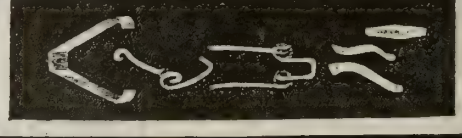

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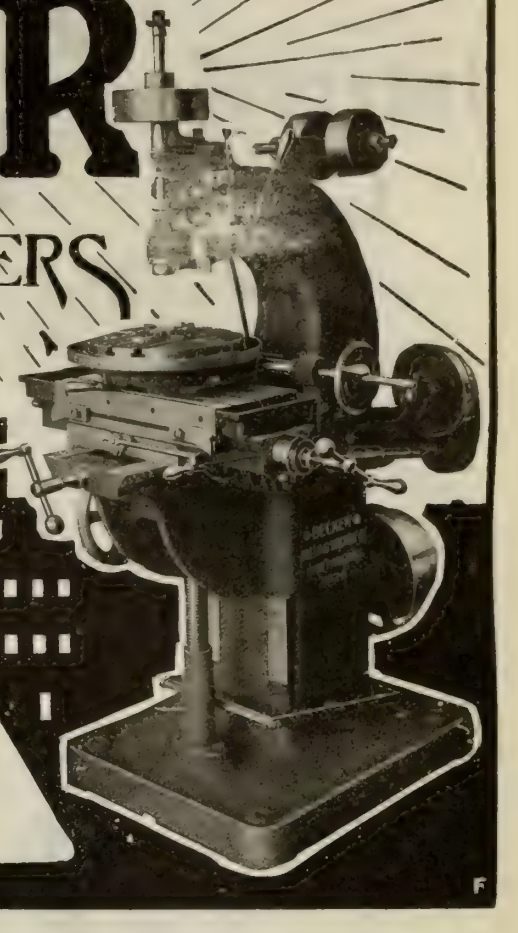

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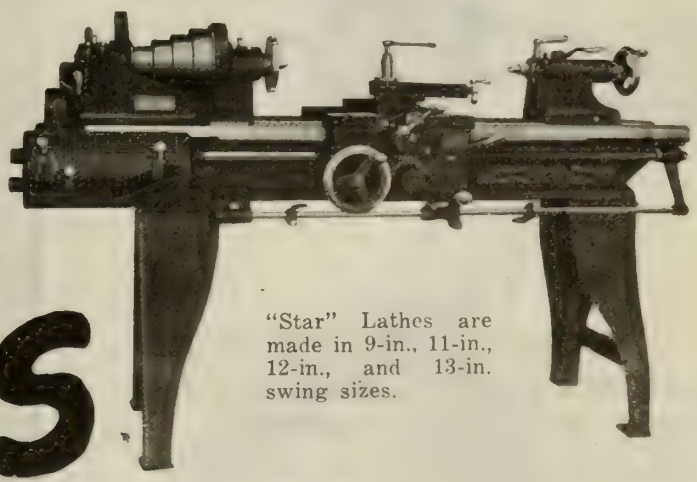

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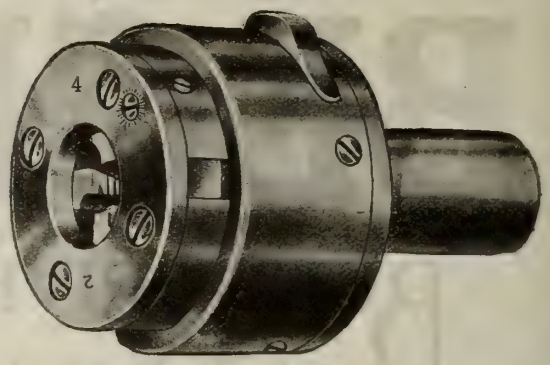

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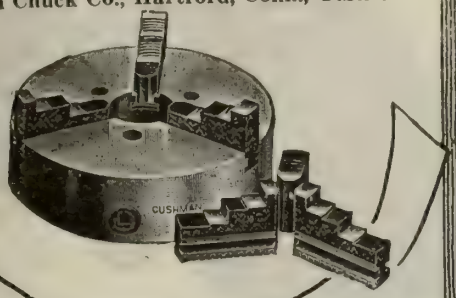

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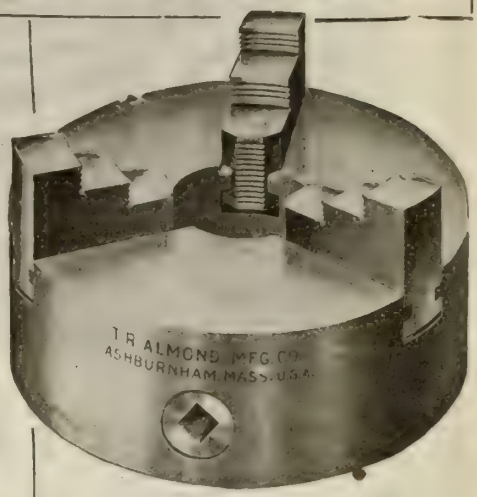

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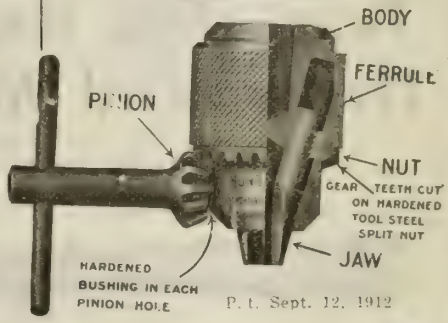

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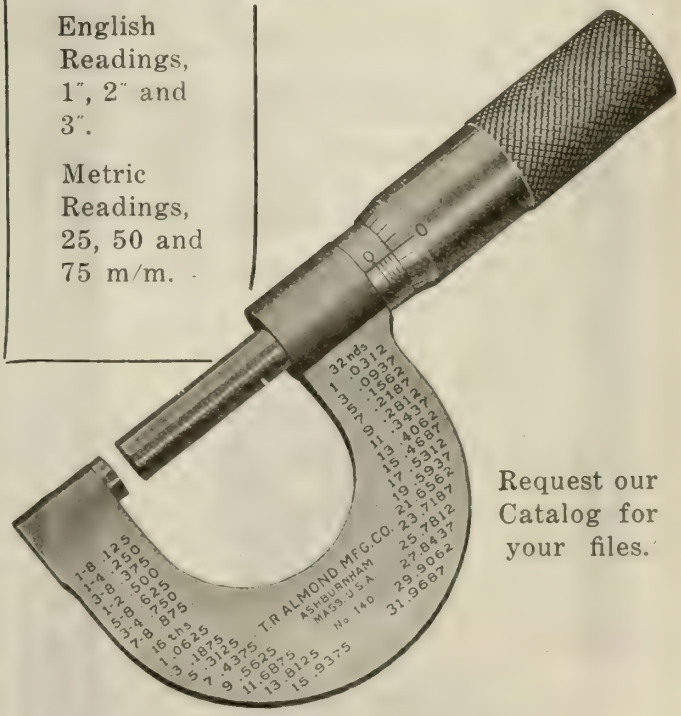

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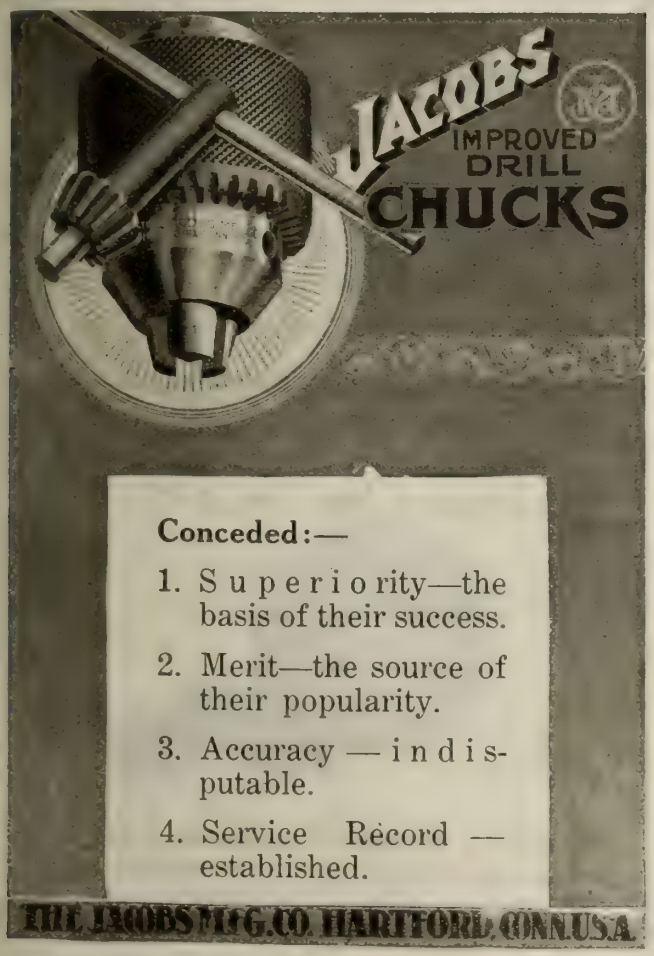

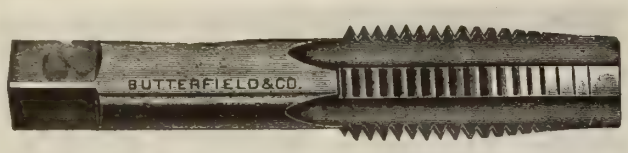

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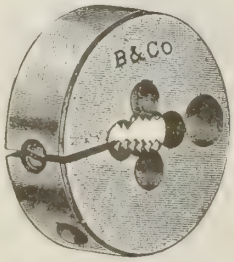

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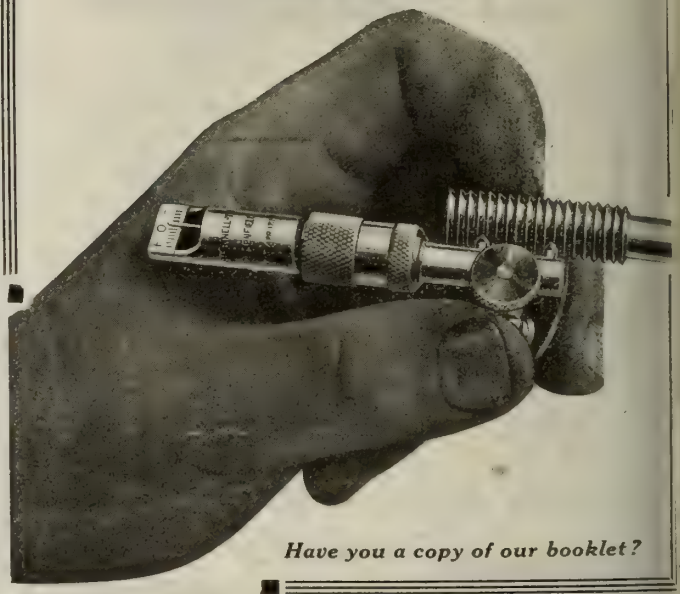

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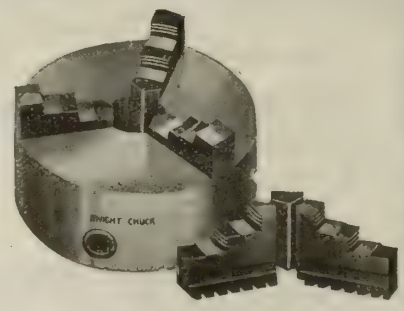

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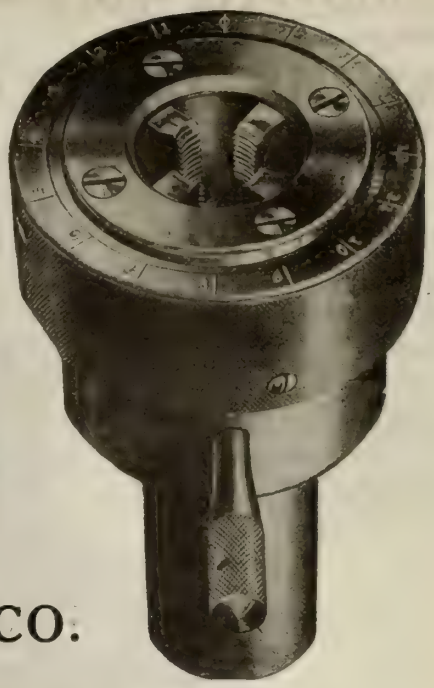

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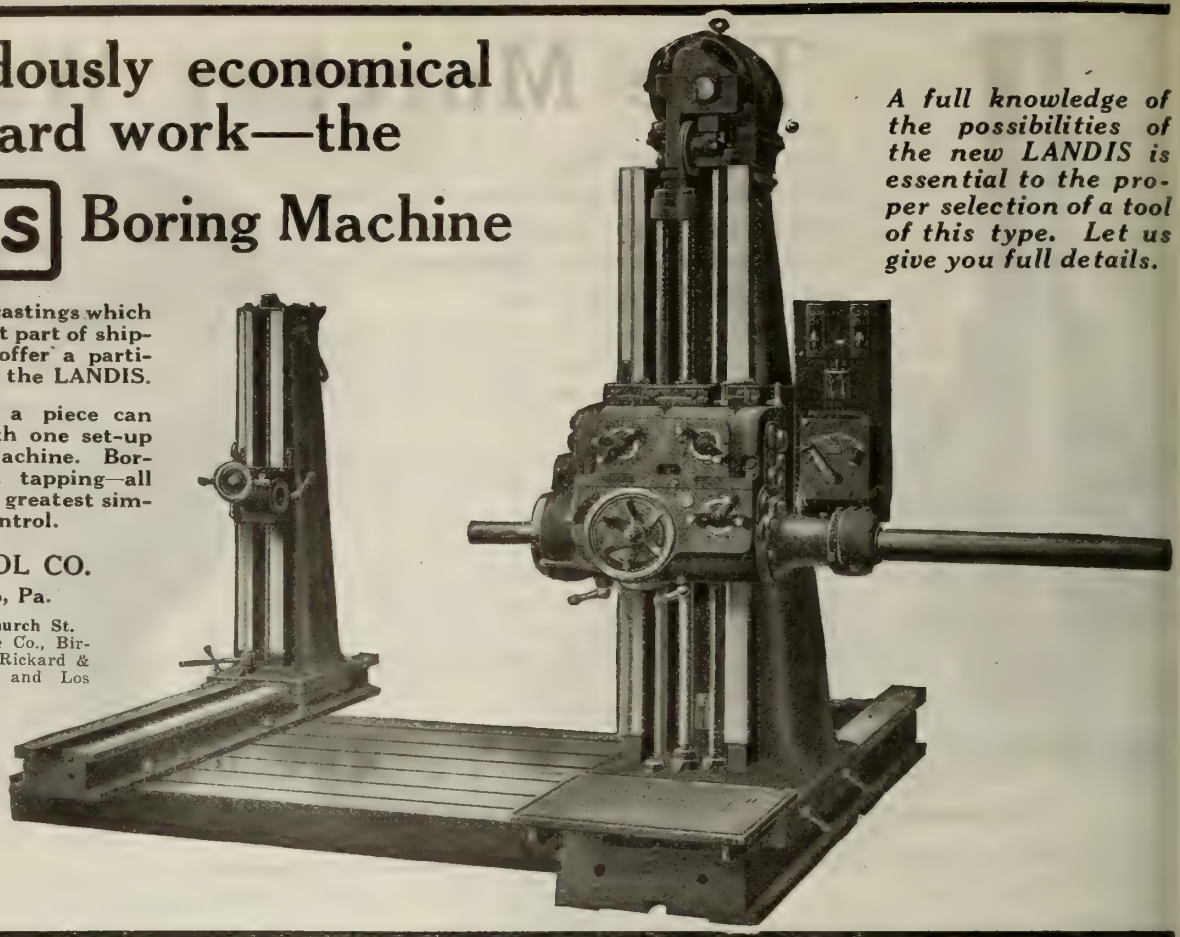

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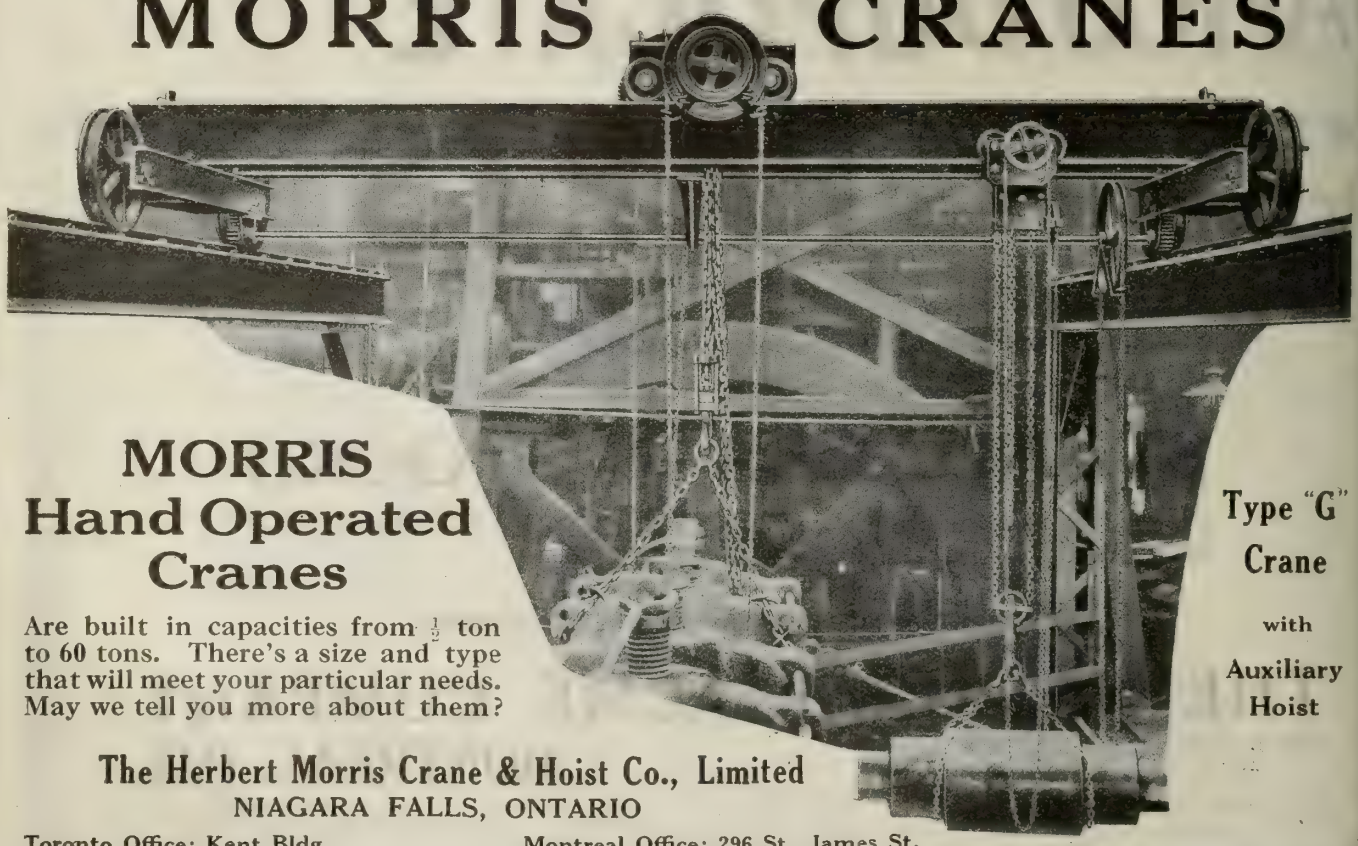

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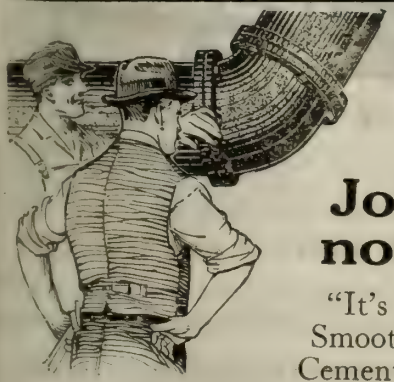

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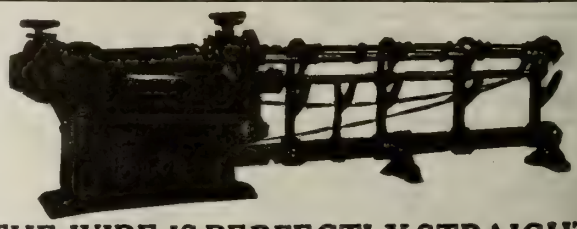

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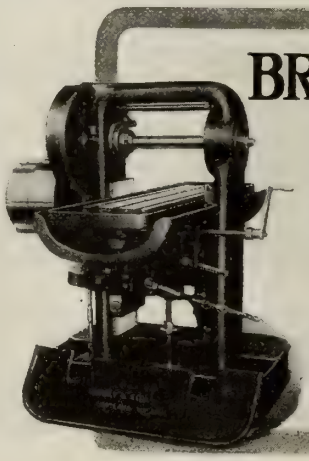

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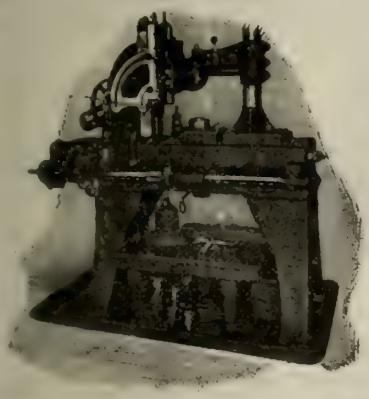

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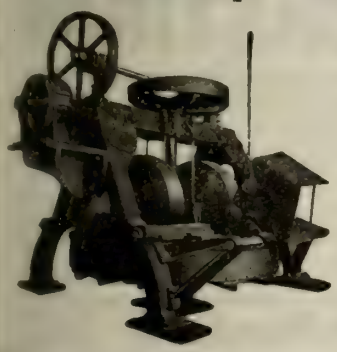

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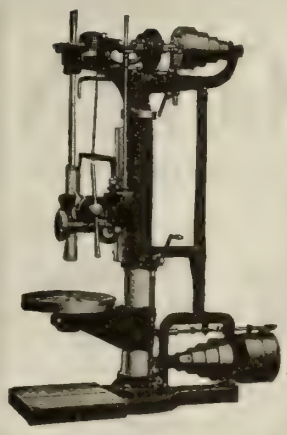

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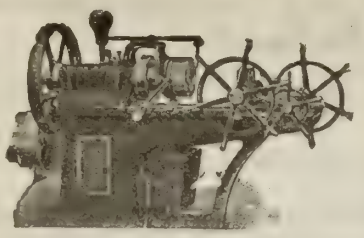

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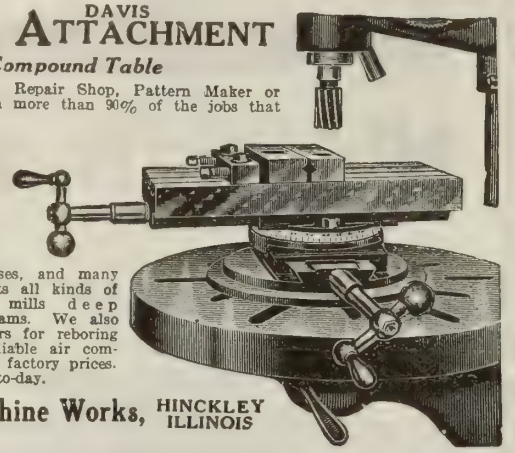

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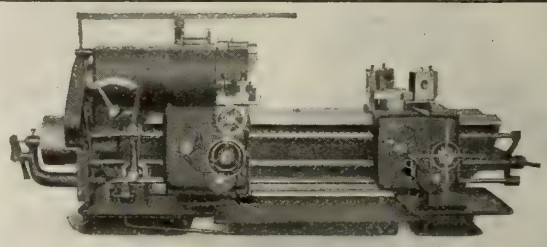

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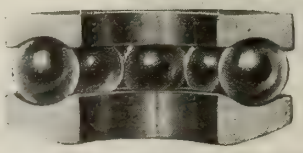

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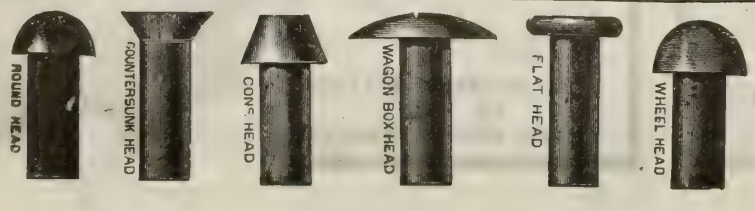

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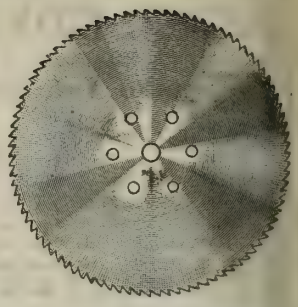

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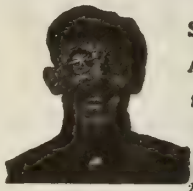

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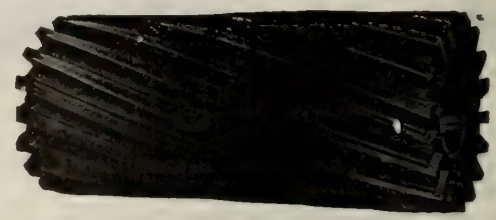

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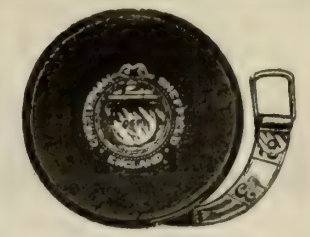

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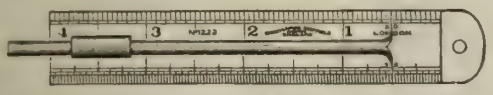

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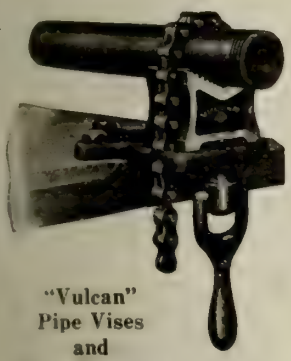

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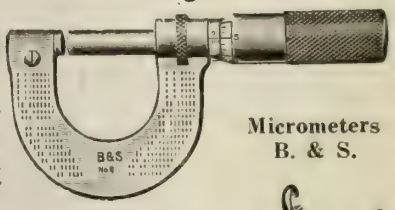

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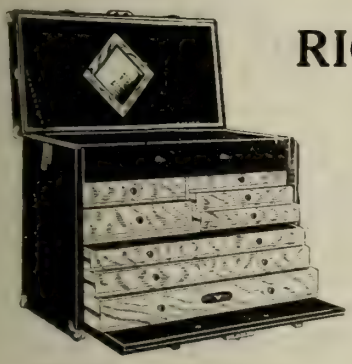

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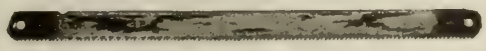

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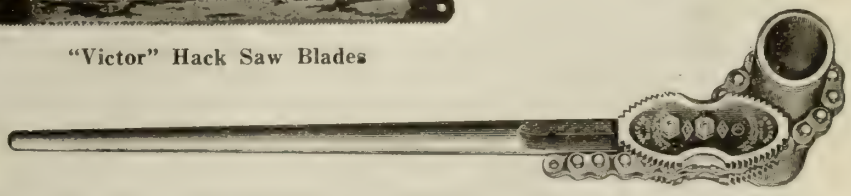

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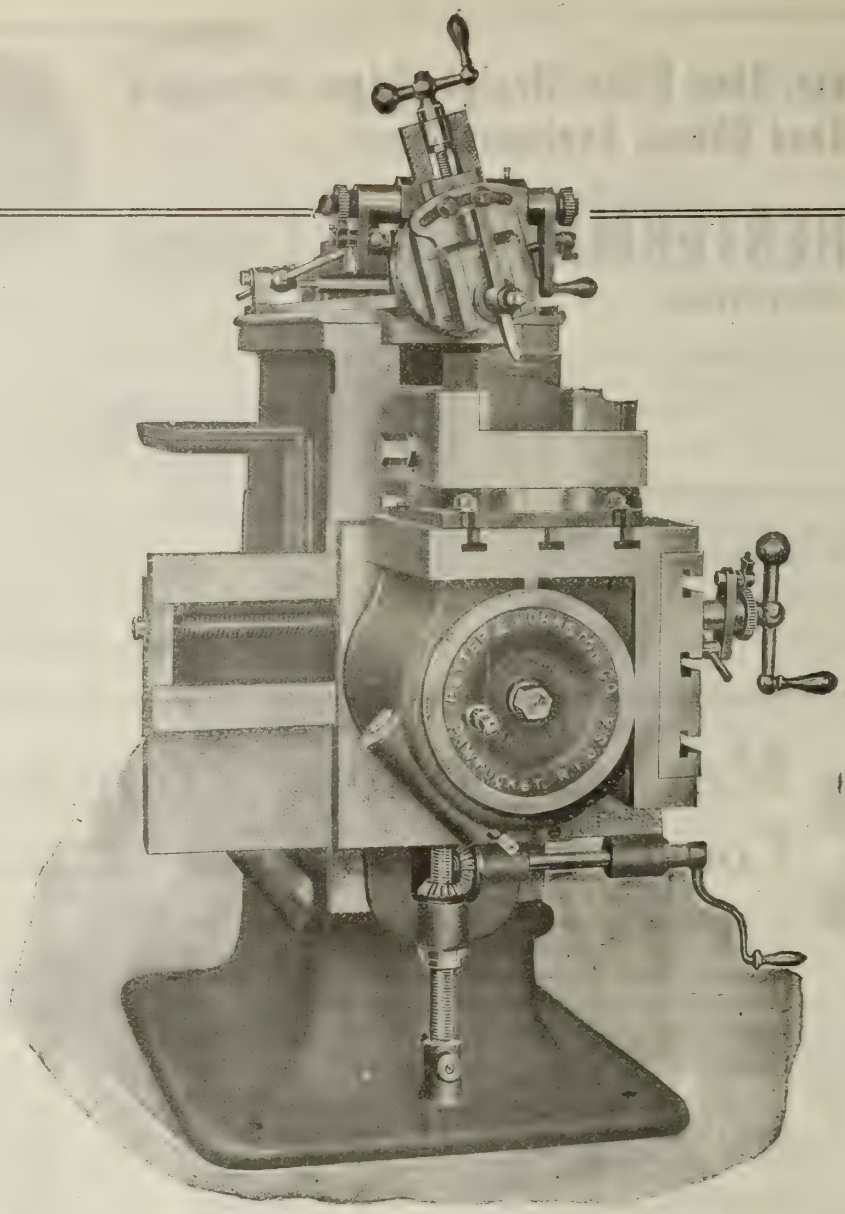

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Franklin Mfg. Co., Syracuse, N.Y.
Wentworth Mfg. Co., Hamilton, Ont.

CARRIERS
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Fittings, Ltd., Oshawa, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Walkerville, Can.

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
Fittings, Ltd., Oshawa, Ont.
International Malleable Iron Co. Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, On
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montrea
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, On
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagar Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Il
Williams & Wilson, Limited, Montreal, Que.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S

COKE AND COAL HANDLING EQUIPMEN
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toront
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

Cleveland AIR TOOLS

Announcement

Our Montreal Friends and Customers will doubtless be pleased to learn that we have opened an Office, Warehouse and Service Station at 337 Craig Street, Montreal, Quebec, where a large stock of Cleveland Air Tools, Appliances, Sundries and Repair parts will be carried in stock for immediate delivery. Prompt and efficient service is the "Keynote" of our organization and guaranteed to all alike.

C. D. GARNER
MANAGER

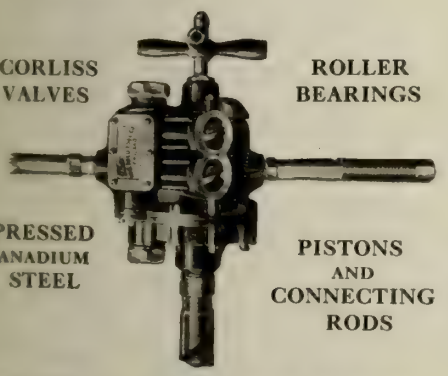
Cleveland Pneumatic Tool Co., *of* Canada, Ltd.
84 Chestnut St., Toronto, Ont. 337 Craig St. West, Montreal, Que.

PNEUMATIC TOOLS

Thor

ELECTRIC DRILLS

AIR DRILLS



CORLISS VALVES

ROLLER BEARINGS

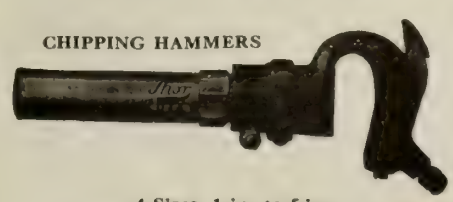
PRESSED VANADIUM STEEL

PISTONS AND CONNECTING RODS

Four cylinders—two on each side—with Semi-Corliss Valve close to each pair, giving greater power and efficiency.

ALL RECORDS BROKEN FOR SPEED, POWER and ENDURANCE

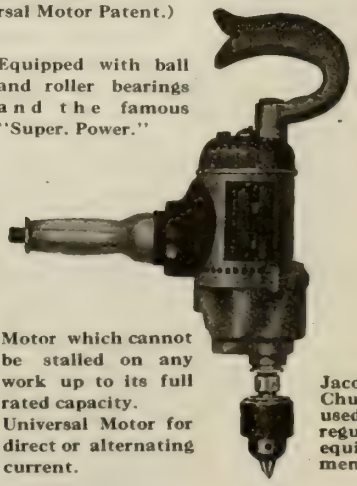
CHIPPING HAMMERS



4 Sizes, 1 in. to 5 in.
All parts hardened and ground.

(Licensed under Burke Universal Motor Patent.)

Equipped with ball and roller bearings and the famous "Super. Power."



Motor which cannot be stalled on any work up to its full rated capacity. Universal Motor for direct or alternating current.

Jacobs' Chucks used as regular equipment.

Independent Pneumatic Tool Company

General Offices:
600 West Jackson Blvd.
CHICAGO, U.S.A.

CANADIAN OFFICES: 334 St. James St., MONTREAL; 32 Front St., TORONTO; 123 Bannatyne Ave. E., WINNIPEG; 1142 Homer St., VANCOUVER.

CONNECTING RODS
Canada Found's & Forgings, Ltd., Welland, Ont

CONSULTING, CONTRACTING AND GENERAL ENGINEERING & MACHINE WORK
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Welland Motor & Machine Co., Welland, Ont
Windsor Mach. Tool Co., Windsor, Ont

CONTROLLERS, MAGNETIC BRAKES, ELEC. WINCHES, MONO RAIL HOISTS
Volta Mfg. Co., Welland, Ont.

CONTROLLERS AND STARTERS
Williams Machy. Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

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Jones & Glassco, Montreal.

COPING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Can. Blower & Forge Co., Kitchener, Ont.

COPPER, BUS BAR, SHEET, PLATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.

COUNTERSHAFTS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Baird Machine Co., Bridgeport, Conn.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind
Williams & Wilson, Limited, Montreal, Que.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CUPS, OIL
Can. Winkley Co., Ltd., Windsor, Ont.

COVERS, OIL HOLE
Can. Winkley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Quebec.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Found's & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURB PUMPS FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, BOLT
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.
Elm Cutting Oil Co., Toronto.
Ontario Lubricating Co., Hamilton, Ont.

CUTTING OIL, RECLAIMING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CUTTING AND WELDING PLANTS
Prest-O-Lite Co., Inc., Toronto, Ont.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co. Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co. Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Anderson & Co. of Can., Geo., Montreal, Que.
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal, Que.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Banfield, W. H., & Son, Toronto
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

DIES, THREADING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston, Mass.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES, BOLT, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Ltd., Montreal.

DIRECT CONNECTED UNITS
MacGovern & Co., Montreal, Que.

DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

DRESSERS, GRINDING AND EMERY WHEEL
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Ford-Smith Mach Co., Hamilton, Ont.
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp, Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILL RODS
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

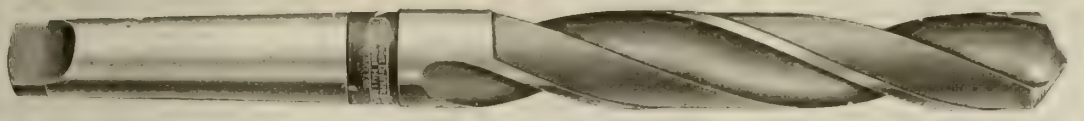
DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.

DRILLING MACHINES

RADIAL AND TURRETT
John Bertram & Sons Co., Dundas.

BUILD TO-DAY FOR TOMORROW



IF YOU NEED BIG PRODUCTION IN YOUR PLANT TO-MORROW, SEE THAT THE TOOLS YOU BUY TO-DAY WILL GIVE IT TO YOU. TEST EVERY DRILL ON THE MARKET THOROUGHLY AND YOU WILL FIND FOR LONG, HIGH AVERAGES OF WORK PRODUCED THAT

"MORSE" DRILLS

ARE UNSURPASSED

MORSE TWIST DRILL & MACHINE COMPANY

NEW BEDFORD **MASS., U.S.A.**

A "Strikingly Different"

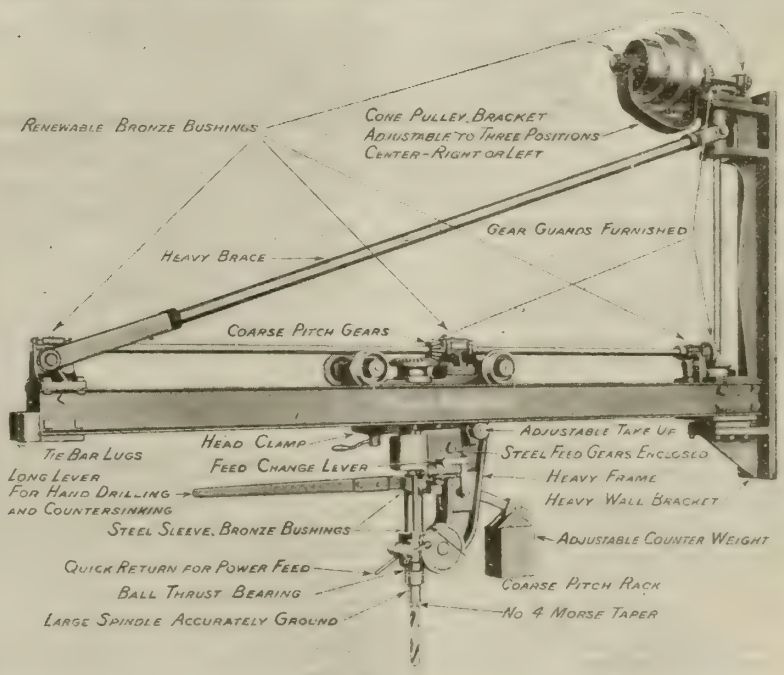
WALL RADIAL DRILL

This is a real machine tool. Careful design and high-grade materials contribute to its great success and economy. Much wider range is possible on this drill than the ordinary radial. The head is exceptionally rigid, yet moves with extreme ease from end to end of arm. For the crowded shop this drill is ideal, as when not in use it can be pushed back out of the way.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**

Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

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Canada Machinery Corp., Galt, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio
Williams & Wilson, Limited, Montreal, Que.

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Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

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Lynd-Farquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

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Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont
Williams & Wilson, Ltd., Montreal, Que.

EARTH HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

EFFICIENCY ENGINEERING SERVICE
Anderson's Efficiency Service, Toronto, Ont.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRY CLEANING SYSTEM
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DRYERS, SAND
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DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELEVATOR MACHINERY
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Baxter & Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Trueing Tool Co., Windsor, Ont.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES
Brewster Co. ,Wm., New York, N.Y.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL
J. F. A. Comstedt, New York City, N.Y.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont.
United Brass & Lead, Ltd., Toronto.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

FENCE, IRON AND FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

FILLING STATION EQUIPMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

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Harbison-Walker Refactories Co. of Canada, Montreal, Que.

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FIXTURES
Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FORGES, HAND PORTABLE
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Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

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Can. Foundries & Forgings, Ltd., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N.S

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE

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Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Armstrong, Whitworth of Canada, Montreal, Que.
Canada Foundries & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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FRICTION SURFACE BELTING
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FUEL OIL SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Gilbert & Barker Mfg. Co., Springfield, Mass.

Great Possibilities Under The Trade Agreement Between Canada and Britain.

"THE wiping out of the handicap which Canadian products met in the British market, and the granting of what is equivalent to a preference for Canada temporarily, at least," says THE FINANCIAL POST, "should result in a great impetus to our immediate trade with the mother country. If permanent, as it is almost certain to be, if we keep men of the Borden, Lloyd Harris capacity on the job, it means tremendous immigration and the settling of millions of acres of farm lands. It means the extensive development of present and the establishment of numerous new industries in Canada, to take advantage of the preference; bringing in hundreds of thousands of mechanics and mine and forest workers. For example, the Canadian subsidiary of the U. S. Steel Corporation, which has been marking time, will, in all probability, now go ahead energetically with their twenty or thirty million dollar plant development here. In fact, it is quite probable that within a week plans will be completed and action taken for the immediate erection of about 1,500 workmen's houses at Ojibway, Ont. As we go to press we read in cables to U.S. papers that scores of American manufacturers and other business developers who have been in Great Britain are returning home feeling that there is now little hope of overcoming the handicaps of prohibition of imports and preferences unless they establish branch plants in Canada or the United Kingdom."

The above is a portion of an important leading article in THE POST *of March 15th—an issue of exceptional interest. A full reprint of the article accompanies this. In addition to this*

THE FINANCIAL POST

OF MARCH 15th CONTAINS:

F. P. JONES SPEAKS OF EMBARGO REMOVAL

Believes it Will Result in a Number of Large Orders for Canada

Note These Contents of THE POST Dated March 22nd

Tariff Revision Must Be Made On Scientific Basis

Manufacturing Situation Misunderstood

No Six Hour Day for Brains

Unemployment and Bolshevism

Housing Bills Make Progress in Two Provinces

One Year's Result of Government Railroad Control

Royal Bank Now Owns Merchants National N. Y.

Hamilton Bank Aided Business and Government

Uncertainties of Tariff Hold Market Back

South Alberta for Big Irrigation Scheme

C. P. R. Earnings Fell to 10.79 Per Cent on Common

C. P. R. Earnings and Government Tax

Slow Decline in Prices Boom to Retailers

Big Decline in Munitions End of Canada Cement

Scotia Earned 11 Per Cent. in Common in 1918

United Farmers of Ontario in Retail Field

Steel Prices Sliced $7.00 a Ton

Budget Speech of B. C. Minister Comprehensive

Business Building News Items Appear Each Week in *The Financial Post*

The above are only a few of the many subjects of real profit making interest to Canadian men of affairs which have been dealt with by experts writers and editors in THE POST of March 15th and March 22nd. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

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Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical Engineering Co., Three Rivers, Que.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

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Belleview Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

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GAUGES, MANUFACTURERS, LIMIT, THREAD
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Wells Bros. of Can., Galt, Ont.

GALVANIZING PLANT
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Armstrong Bros. Tool Co., Chicago.

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Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE TANKS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GAUGES
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GAUGES, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Normac Machine Co., St. Catharines, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Swedish Gage Co., Inc., Montreal.
Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont.
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

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Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

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Can. Steel Foundries, Ltd., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

GEARS, CUT, MORTISE, ANGLE, WORM
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

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Gardner, Robt., & Son, Montreal
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

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Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GENERATORS, MOTOR
MacGovern & Co., Montreal, Que.

GERMAN SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLASSES, SAFETY
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Willson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
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Rice Lewis & Son, Toronto, Ont.

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Standard Optical Co., Geneva, N.Y.
Strong, Kenard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

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Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS
Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (SEE LUBRICANTS)

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W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH
Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
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Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
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Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

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Garvin Machine Co., New York.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
United States Electrical Tool Co., Cincinnati, O.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Blount, J. G., & Co., Everett, Mass.
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Ford-Smith Machine Co., Hamilton, Ont.
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Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
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Tabor Mfg. Co., Philadelphia, Pa.
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Norton Grinding Co., Worcester, Mass.
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Pratt & Whitney Co., Dundas, Ont.
Reed-Prentice Co., Worcester, Mass.
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Gisholt Machine Co., Madison, Wis.
Norton Grinding Co., Worcester, Mass.
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Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
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Norton Grinding Co., Worcester, Mass.
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Brantford Emery Wheel Co., Brantford, Can.
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Ford-Smith Mahcine Co., Hamilton, Ont.
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Norton Co., Worcester, Mass.

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Canada Wire & Iron Goods Co., Hamilton, On
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.

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Wells Bros. of Can., Galt, Ont.

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Ford-Smith Machine Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
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Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
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Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton, Ont.
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McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
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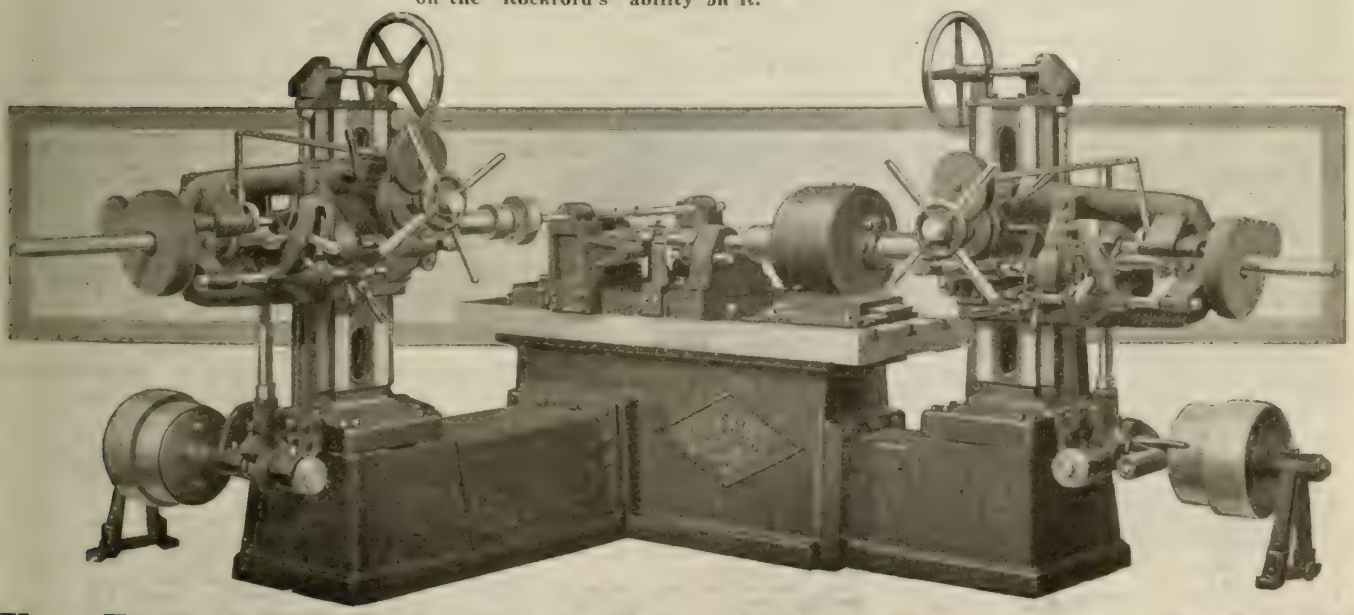

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Wright Mfg. Co., Lisbon, Ohio.
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Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Garvin Machine Co., New York.
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JACKS, PIT AND TRACK
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Toronto Tool Co., Toronto, Ont.
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Wood Turret Machine Co., Brazil, Ind.
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Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass
Hardinge Bros., Inc., Chicago, Ill.
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Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
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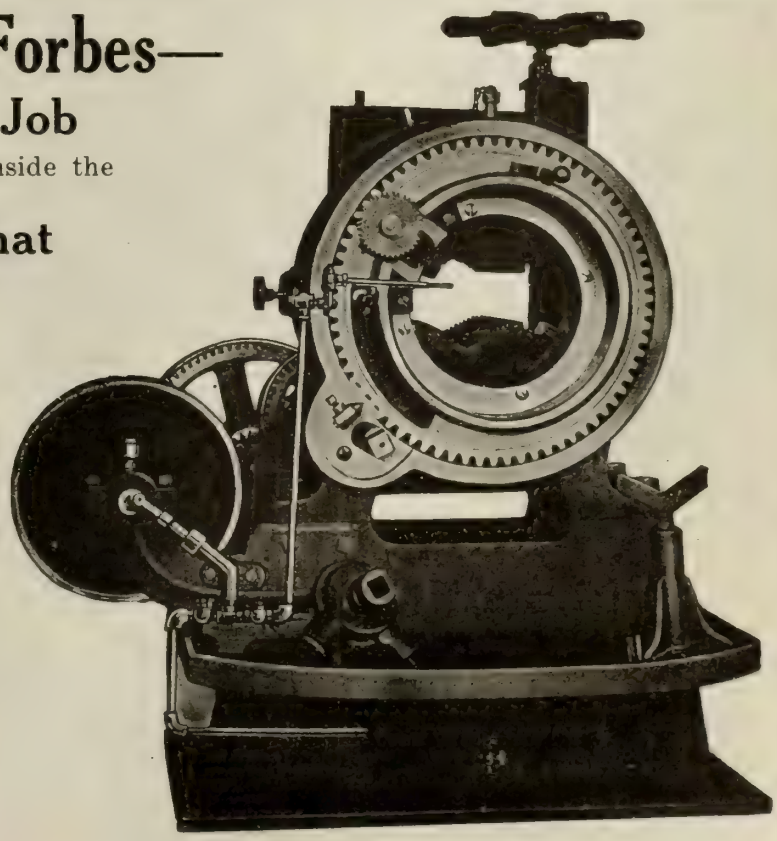
Curtis & Curtis Company
115 Garden St. Bridgeport, Conn.



LIFTS, PNEUMATIC
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LIQUID AIR
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.

LOADERS, WAGON AND TRUCK
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.

LUBRICANTS
Cataract Refining & Mfg. Co., Toronto.
Elm Cutting Oil Co., Toronto, Ont.
Ontario Lubricating Co., Hamilton, Ont.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal, Que.
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Marten Mach. Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MACHINE TOOLS
Cincinnati Lathe & Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

MACHINE & REPETITION WORK
Katie Foundry, Ltd., Galt, Ont.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co. of Canada, Ottawa, Ont.
Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Toronto Testing Laboratory, Ltd., Toronto.

METAL SAWS
Simonds Mfg. Co., Fitchburg, Mass.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

METAL STAMPINGS, SMALL
Can. Winkley Co., Ltd., Windsor, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

MILLING ATTACHMENTS
Becker Milling Machine Co., Boston, Mass.
Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Steptoe Co., The, John, Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co. Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Taber Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

MOULDS, RUBBER
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

MUNTZ METAL
Brown Copper & Brass Roller Mills, New Toronto, Ont.

NAILS
Page Steel & Wire Co., Adrian, Mich.

NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.

NICKEL
Boker & Co., Inc., H., Montreal, Que.

NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL
J. F. A Comstedt, New York City, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

NITROGEN
Carter Welding Co., Toronto, Ont.

NUTS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Williams & Co., J. H., Brooklyn, N.Y.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, Ohio.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

NUT TAPPERS
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

OILS, MOTOR
Elm Cutting Oil Co., Toronto, Ont.

OILS, DRAWING
Elm Cutting Oil Co., Toronto, Ont.

OIL SEPARATORS
Can. Fairbanks-Morse, Co., Montreal.
Sheldon's, Ltd., Galt, Ont.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

OPENING DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford, Ont.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
Brantford Oven & Rack Co., Brantford, Ont.

OXY-ACETYLENE WELDING AND CUTTING
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

OXY-ACETYLENE WELDING AND CUTTING PLANT
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Oxyweld Co., Ltd., Toronto, Ont.

PACKINGS, ASBESTOS
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PACKINGS, LEATHER, HYDRAULICS, ETC.
Baxter & Co., Ltd., J. R., Montreal, Que.
Graton & Knight Mfg. Co., Worcester, Mass.
Gutta Percha & Rubber, Ltd., Toronto, Can.
William R. Perrin, Ltd., Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

PAPER MILL CONVEYORS AND DRIVES
Can. Link-Belt Co., Toronto, Ont.
Bertrams, Ltd., Edinburgh, Scotland.
MacKinnon Steel Co., Sherbrooke, Que.

PAPER MILL MACHINERY

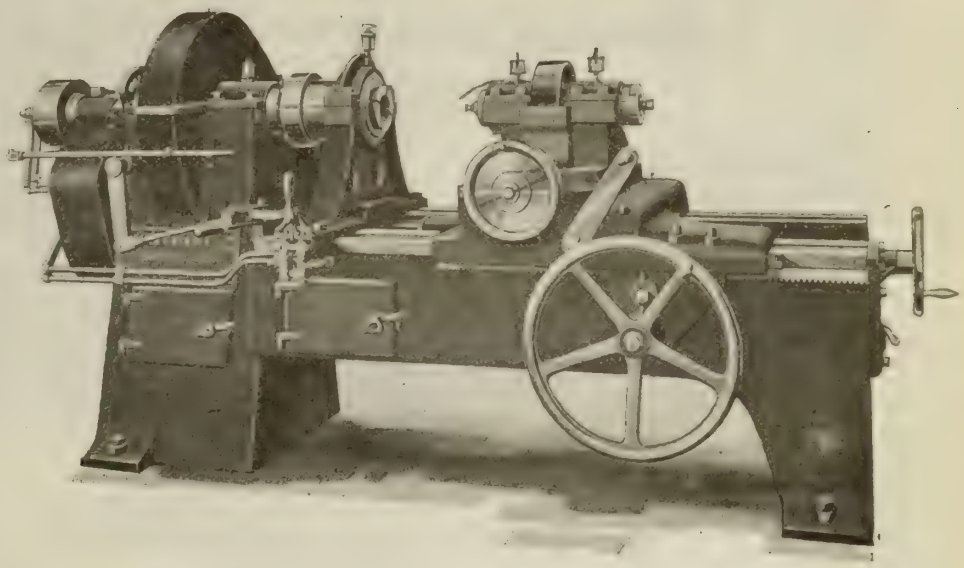
Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.



Write for Bulletin.

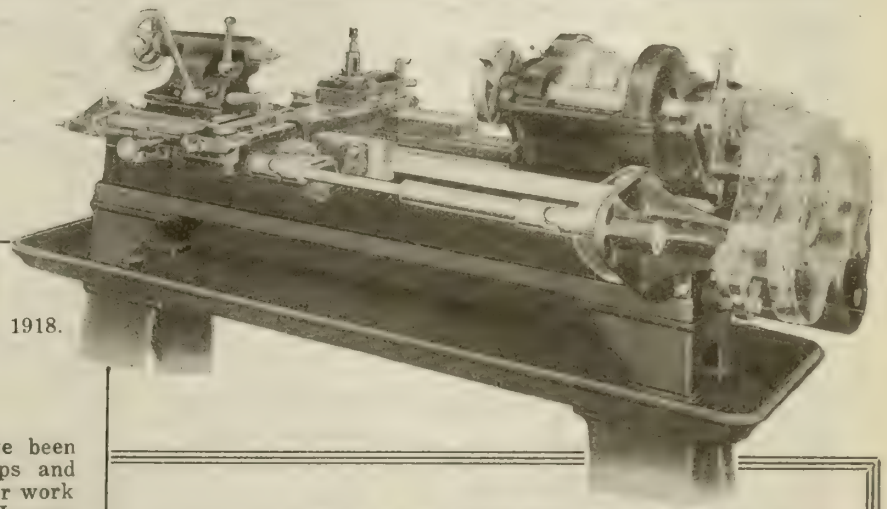
Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

PECK CARRIERS FOR POWER PLANTS
Can. Link-Belt Co., Toronto, Ont.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph, Ont.

PIPE CUTTING AND THREADING MACHINES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

PHOTOSTATS
Commercial Camera Co., Providence, R.I.

PIPE RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.

PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE REAMERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE STOCKS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE THREADERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PISTON RODS, ROUGH TURNED
General Steel Co., Milwaukee, Wis.

PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

PLANER-SHAPER, COMBINED OPEN SIDE
Lund-Farquhar Co., Boston.
Williams & Wilson, Limited, Montreal, Que.

POWER HAMMERS
Quickwork Co., St. Marys, Ohio.

POWER TRANSMISSION MACHINERY
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Williams & Wilson, Limited, Montreal, Que.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

POLE SAW FRAMES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

PLIERS
Aikenhead Hardware Co., Toronto.
Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.

POLE LINE HARDWARE
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Quebec.

PLATE AND TANK CONSTRUCTION
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

POLISHING MACHINES
Ford-Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

POLISHING PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

POWER HOUSE CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

PRESSERS, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
William R. Perrin, Ltd., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, HYDRAULIC
John Bertram & Sons Co., Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
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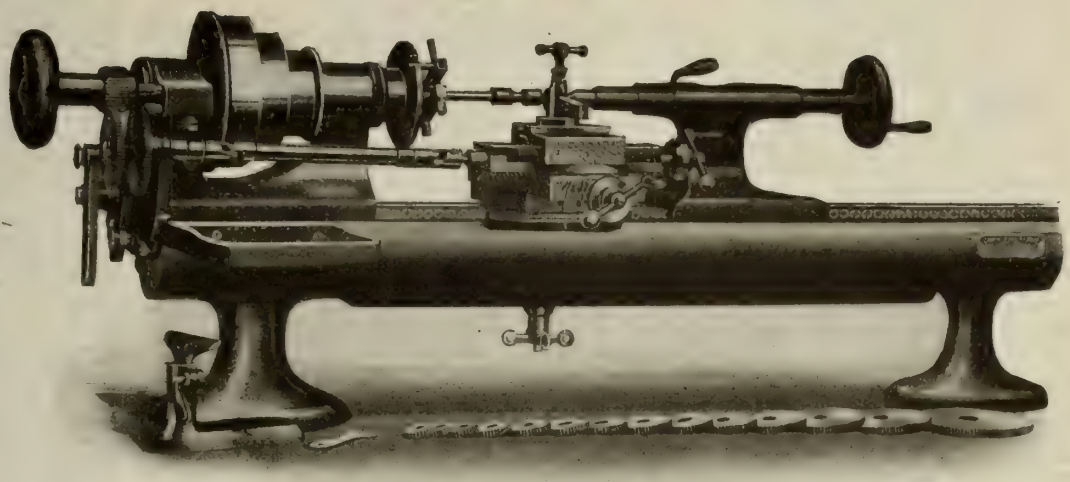

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The Secret Plans of the Allied Command.
Too Much Wilson.
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Peck, Stow & Wilcox Co., Southington, Conn.
SHEET METAL MACHINERY
Peck, Stow & Wilcox Co., Southington, Conn.
SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.
SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn
Peck, Stow & Wilcox Co., Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.
SHEETS, CRUCIBLE, CAST
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
STAMPING
Canadian Cartridge Co., Ltd., Hamilton, Ont.
SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont
SHELL BANDING MACHINES, HYDRAULIC
Garlock-Walker Machy. Co., Ltd., Toronto, Ont
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y
SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.
SHELVING, STEEL
Dennis Wire & Iron Works, London, Ontario.
SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn
High Speed Hammer Co., Rochester, N.Y.
SHIPBUILDING
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
SHOP FURNITURE
Dennis Wire & Iron Works, London, Ontario
New Britain Mach. Co., New Britain, Conn.
SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal
Williams & Co., J. H., Brooklyn, N.Y.
SILENT CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilkinson & Kompass, Hamilton, Ont.
SLEDGES, CAST IRON
Katie Foundry, Galt, Ont.
SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.
SMOKESTACKS
Canadian Welding Works, Montreal, Que
MacKinnon Steel Co., Sherbrooke, Quebec.
Marsh Engineering Works, Belleville, Ont.
SNIPS, TINNERS AND SHEET METAL WORKERS'
Kearney & Trecker Co., Milwaukee, Wis.
SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice, Lewis & Son, Toronto, Ont.
SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn
SOIL PIPE FITTINGS, CAST IRON
Katie Foundry, Galt, Ont.
SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto
SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead, Ltd., Toronto
SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
SPIKES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
SPLICING CLAMPS
Peck, Stow & Wilcox Co., Southington, Conn.
SPRINGS, MACHINERY
Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.
SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.
Banfield, W. H., & Sons, Toronto.
Beaver Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont.
Parsons Mach. Co., Bridgeton, N.J.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
Katie Foundry Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Mullinar & Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co, Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.
SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.
SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
SPROCKETS, CHAIN
Can Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.
SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.
SPROCKET WHEELS, CHILLED THREAD
Katie Foundry, Galt, Ont.
SQUARES
Peck, Stow & Wilcox Co., Southington, Conn.
STAYBOLT TOPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
STAIRS, IRON
Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.
STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont
Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.
STAMPINGS, METAL
American Pulley Co., Philadelphia, Pa.
STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J
STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.
STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.
STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec
STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
STEEL BALLS
Rochester Ball Bearing Co., Rochester, N.Y.
STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y.
Illingworth Steel Co., John, New York, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL, CARBON, FERRO-TUNGSTEN
Armstrong Whitworth of Canada, Montreal, Que
Baker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Latrobe Electric Steel Co., Latrobe, Pa
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S
Swedish Crucible Steel Co., Windsor, Ont.
STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.
STEEL, PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Atkins & Co., Wm., Sheffield, Eng.
Baker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
W. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.
STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.
STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.
STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.
STELLITE, HIGH-SPEED TOOL METAL
Delore Smelting & Refining Co., Toronto, Ont.
STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que.
Drury, H. A., Co., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
New Britain Machine Co., New Britain, Conn.
STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain, Conn.
STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.
STRAND
Page Steel & Wire Co., Adrian, Mich.
SUPPLIES, CONTRACTORS'
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
STRUCTURES, STEEL BUILDINGS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
SYSTEMS, REMOTE CONTROL FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
STORAGE AND HANDLING SYSTEMS FOR DRY CLEANERS, AND NAPHTHA
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, RECLAIMING, FOR OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, RAILWAY OIL, STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, PAINT, OIL STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, OIL STORAGE AND DISTRIBUTING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.
TABLES, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.
TACK (DOUBLE POINT) MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.
TAPPING MACHINES (PENUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto
TANKS, GASOLINE, KEROSENE AND OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
TANKS, LUBRICATING OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANKS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANKS, STEEL, WATER PRESSURE
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.
TANKS, UNDERGROUND STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.
TANKS, WHEEL, FOR LUBRICATING OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.
TAPPING MACHINES AND ATTACHMENTS
Bertram, John, & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Niles-Bement-Pond Co., New York
Rickert-Shafer Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

TAPES—MEASURING, STEEL AND WOVEN
Lufkin Rule Co. of Can., Windsor, Ont.
TAPES, POCKET
Lufkin Rule Co. of Can., Windsor, Ont.
TAPS, ADJUSTABLE
Barter Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.
TAPS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, GUN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, STAYBOLT, "MAX" TAP
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, TAPPER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, DIES AND WRENCHES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.
TAP EXTENSIONS
Allen Mfg. Co., Hartford, Conn.
TAP EXTRACTORS
Walton Co., The, Hartford, Conn.
THERMOMETERS, INDUSTRIAL
Taylor Instrument Co., Rochester, N.Y.
THERMOMETERS, ENGRAVED
Taylor Instrument Co., Rochester, N.Y.
THERMOMETERS, TEMPERATURE AND PRESSURE
Taylor Instrument Co., Rochester, N.Y.
THERMOMETERS, RECORDING AND INDEX
Bristol Co., Waterbury, Conn., U.S.A.
Taylor Instrument Co., Rochester, N.Y.
TESTING INSTRUMENTS METALLURGICAL
Shore Instrument & Mfg. Co., New York City.
TESTING LABORATORIES
Toronto Testing Laboratory, Toronto.
THREAD-CUTTING MACHINES
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Gariock-Walker Machy. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.
THREADING TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
THREADING MACHINES FOR BOLTS, NUTS AND PIPES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.
THREAD MILLING MACHINES
Taft-Pierce Mfg. Co., New York, N.Y.
Smalley-General Co., Inc., Bay City, Mich.
THUMB SCREWS AND NUTS
Canada Found'ls & Forgings, Ltd., Welland, Ont.
United Brass & Lead Ltd., Toronto
Williams & Co., J. H., Brooklyn, N.Y.
TINSMITHS' TOOLS
Brown, Boggs & Co., Hamilton, Can.
Williams & Wilson, Limited, Montreal, Que.
TIRE BENDERS
A. B. Jardine & Co., Limited, Hespeler, Ont.
TIRE SETTING MACHINES, HYDRAULIC
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
TOOL CASES
Rice, Lewis & Son, Toronto, Ont.
TOOL HOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Armstrong Bros. Tool Co., Chicago.
Deloro Smelting & Refining Co., Toronto, Ont
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
TOOL POSTS, LATHE
Armstrong Bros. Tool Co., Chicago.
Williams & Co., J. H., Brooklyn, N.Y.
TOOL ROOM PARTITIONS
Canada Wire & Iron Goods Co., Hamilton.
TOOL STEEL
Armstrong, Whitworth, Ltd. of Canada, Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Deloro Smelting & Refining Co., Toronto, Ont.
General Steel Co., Milwaukee, Wis.
H. A. Drury Co., Montreal.
Firth & Sons, Thos., Montreal, Que.
Hammond Steel Co., Inc., Syracuse, N.Y.
Harvey & Co., Arthur C., Boston, Mass.
Hawkridge Bros. Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
TOOLS, BENDING
Peck, Stow & Wilcox Co., Southington, Conn.
TOOLS, BLACKSMITHS'
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
TOOLS, ADJUSTABLE BORING
The Kelly Reamer Co., Cleveland, O.
Williams & Wilson, Limited, Montreal, Que.
TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago, Ill.
A. R. Williams Machinery Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
United States Elec. Tool Co., Cincinnati, O.
TOOLS, FORMING
Davidson Tool Mfg. Co., New York, N.Y.
TOOLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Gariock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
TOOLS, LATHE, PLANER, SLOTTER
Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y.
TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind.
TORCHES, STEEL
Armstrong, Whitworth of Canada, Ltd., Montreal
Prest-O-Lite Co., Inc., Toronto, Ont.
TRACK, PORTABLE STEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
TRANSFORMERS
MacGovern & Co., Montreal, Que.
TRANSMISSION MACHINERY
American Pulley Co., Philadelphia, Pa.
A. R. Williams Machinery Co., Toronto.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.
TRANSMISSION POLES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
TRANSMISSION ROPE
Jones & Glassco, Montreal, Que.
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Wilson & Co., J. C., Belleville, Ont.
TRANSMISSION TOWERS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Dominion Bridge Co., Montreal, Quebec.
MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton.
TRANSVEYORS
Cowan Truck Co., Holyoke, Mass.
TROLLEYS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.
TRUCKS, FACTORY, FREIGHT, ETC.
Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing Co., Toronto.
Cowan Truck Co., Holyoke, Mass.
MacKinnon Steel Co., Sherbrooke, Quebec.
Rice, Lewis & Son, Toronto, Ont.
TRUCKS, LUMBER AND KILN
Sheldons, Ltd., Galt, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Northern Crane Works, Walkerville.
TUBING, SEAMLESS, BRASS & COPPER
Standard Tube & Fence Co., Woodstock, Ont.
Tallman Brass and Metal Co., Hamilton, Ont.
TUBING COILERS, FLEXIBLE METAL
Almond Mfg. Co., T. R., Ashburnham, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
TURRET MACHINES, LATHES
Brown & Sharpe Mfg. Co., Providence
Gariock-Walker Machinery Co., Toronto, Ont.
Greenfield Tap & Die Corp., Greenfield, Mass.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.
TUNGSTEN FILAMENT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.
TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.
TURBO GENERATOR UNITS
MacGovern & Co., Montreal, Que.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.
TURNBUCKLES
Canada Foundries & Forgings, Ltd., Welland, Ont.
Rice, Lewis & Son, Toronto, Ont.
TURNTABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
UPSETTING AND BENDING MACHINERY
John Bertram & Sons Co., Dundas
Brown, Boggs Co., Ltd., Hamilton, Canada.
Ford-Smith Machine Co., Hamilton, Ont.
Gariock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.
VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.
VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.
VANADIUM STEEL
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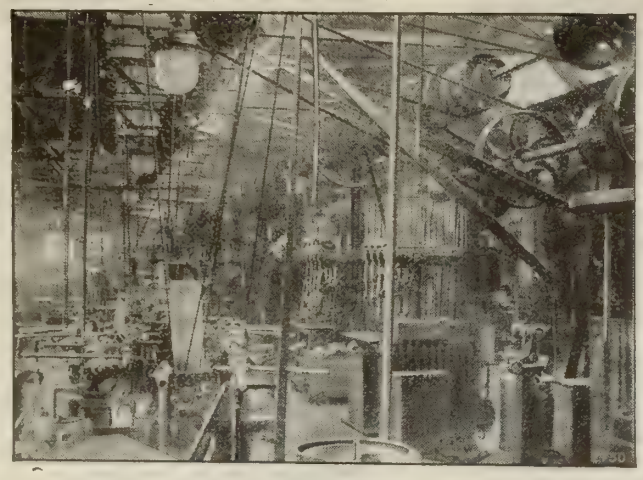

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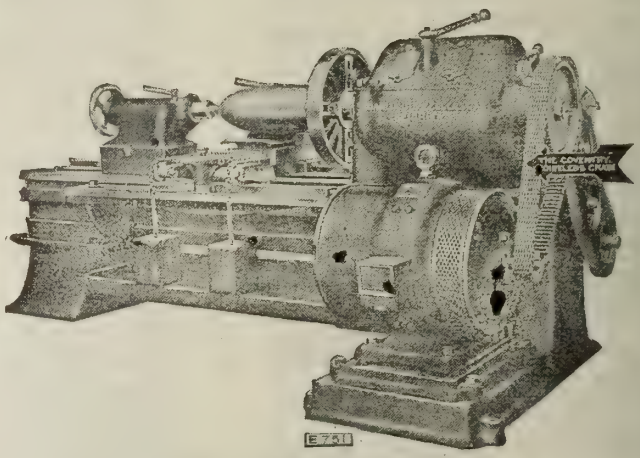

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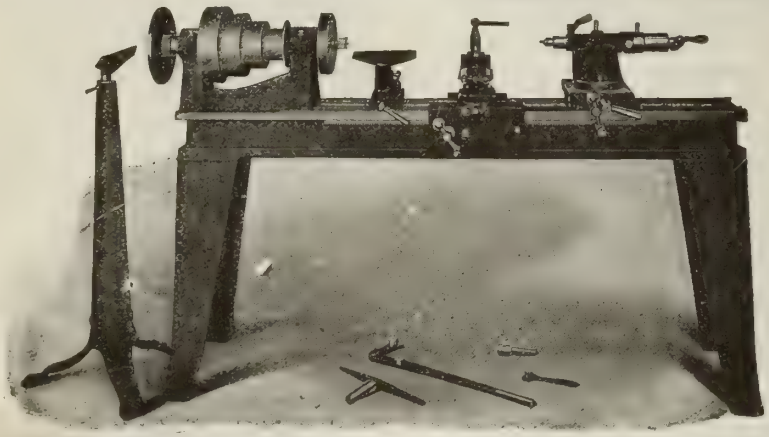

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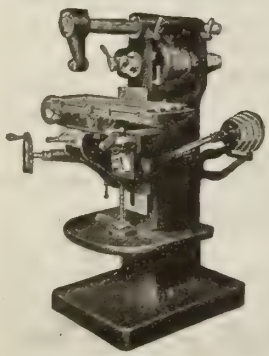

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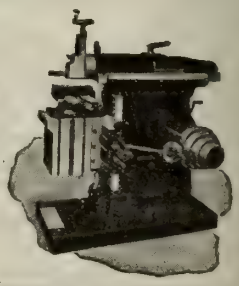

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A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI. TORONTO, MARCH 27, 1919 No. 13

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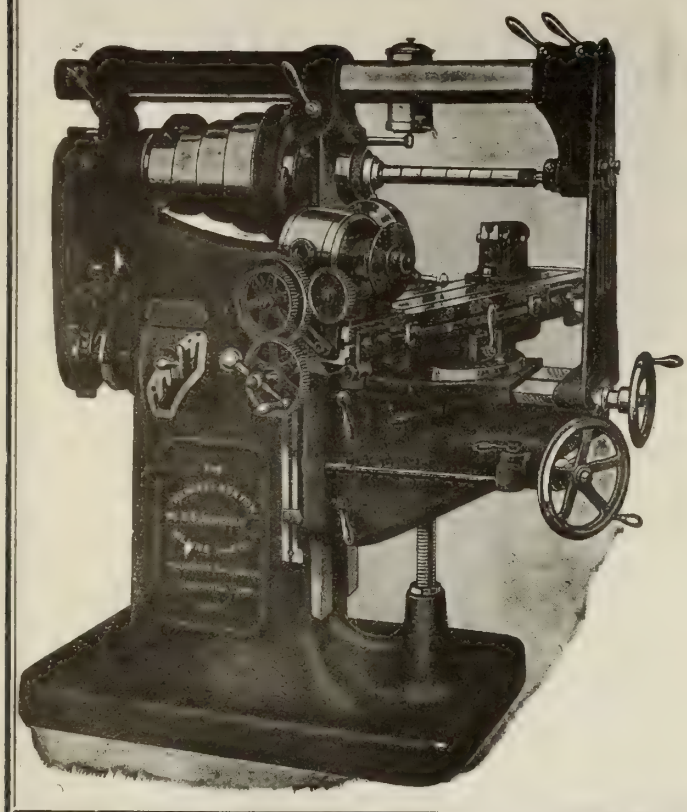

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

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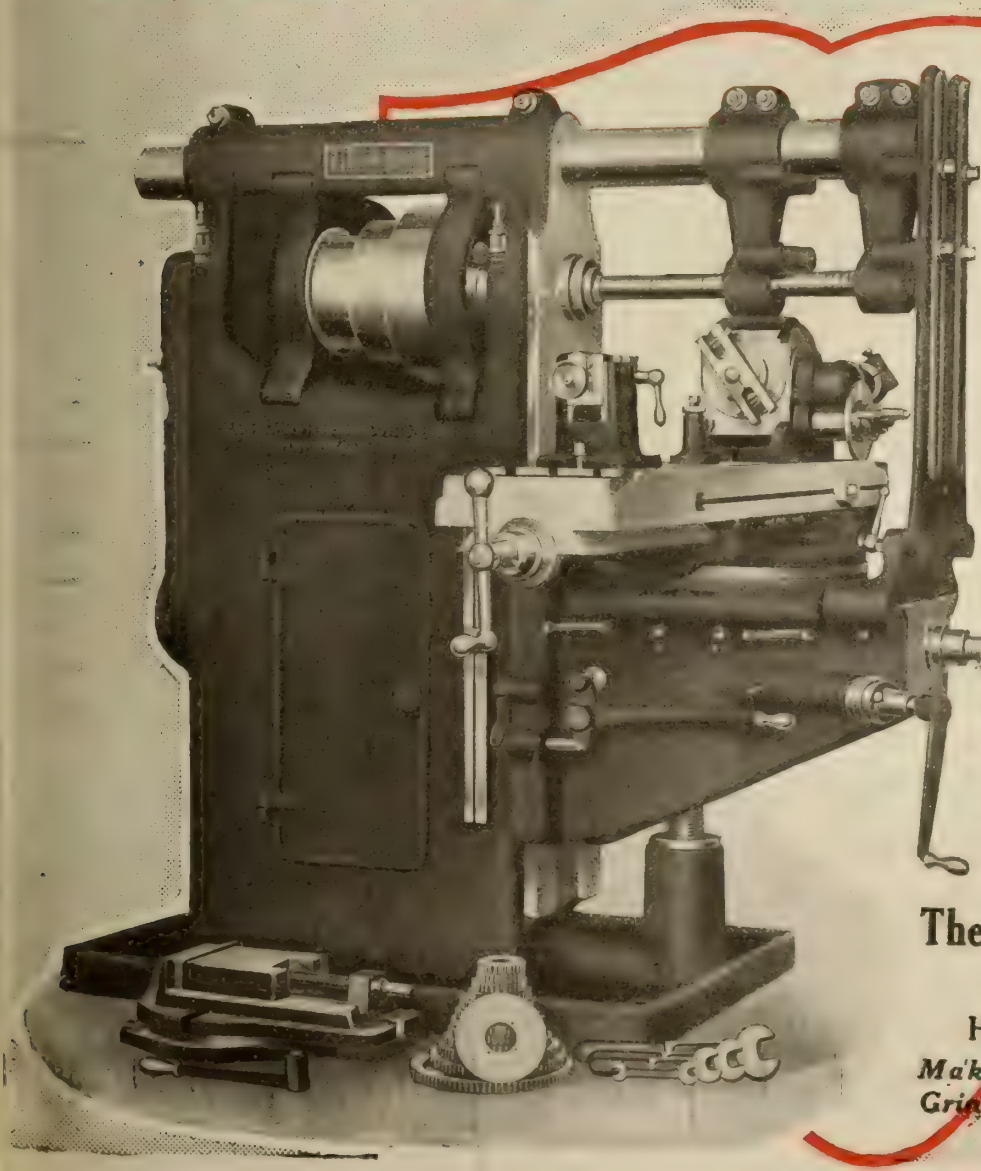
MILLING MACHINES



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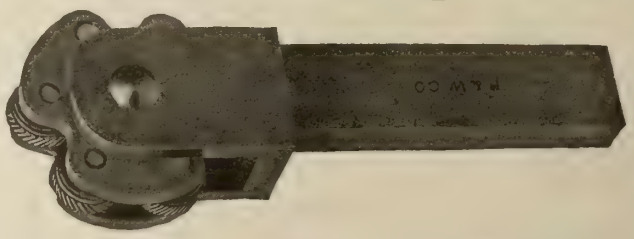

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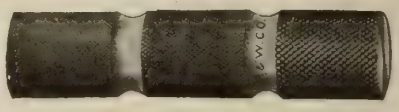

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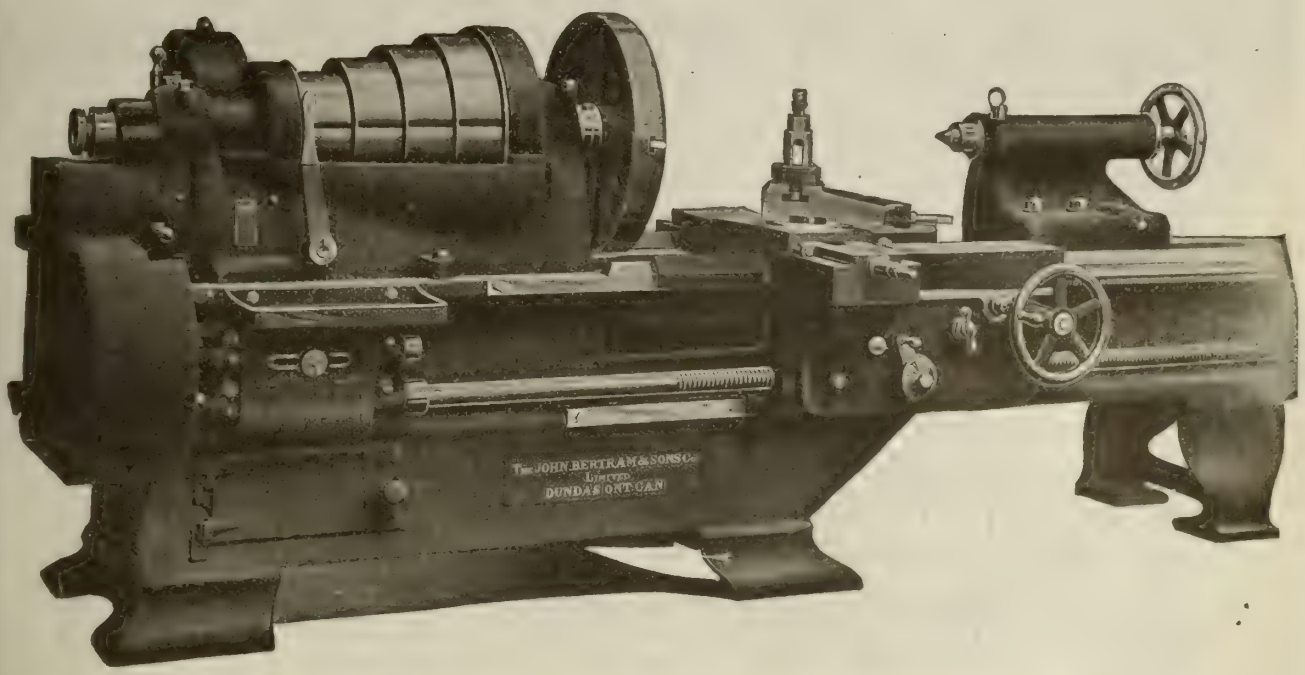

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The Publisher's Page

TORONTO APRIL 3, 1919

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If you go to the theatre or movies it is to see an advertised show.

You smoke advertised tobacco and cigars. You listen to the music of an advertised piano in your home or to the advertised records played by an advertised phonograph.

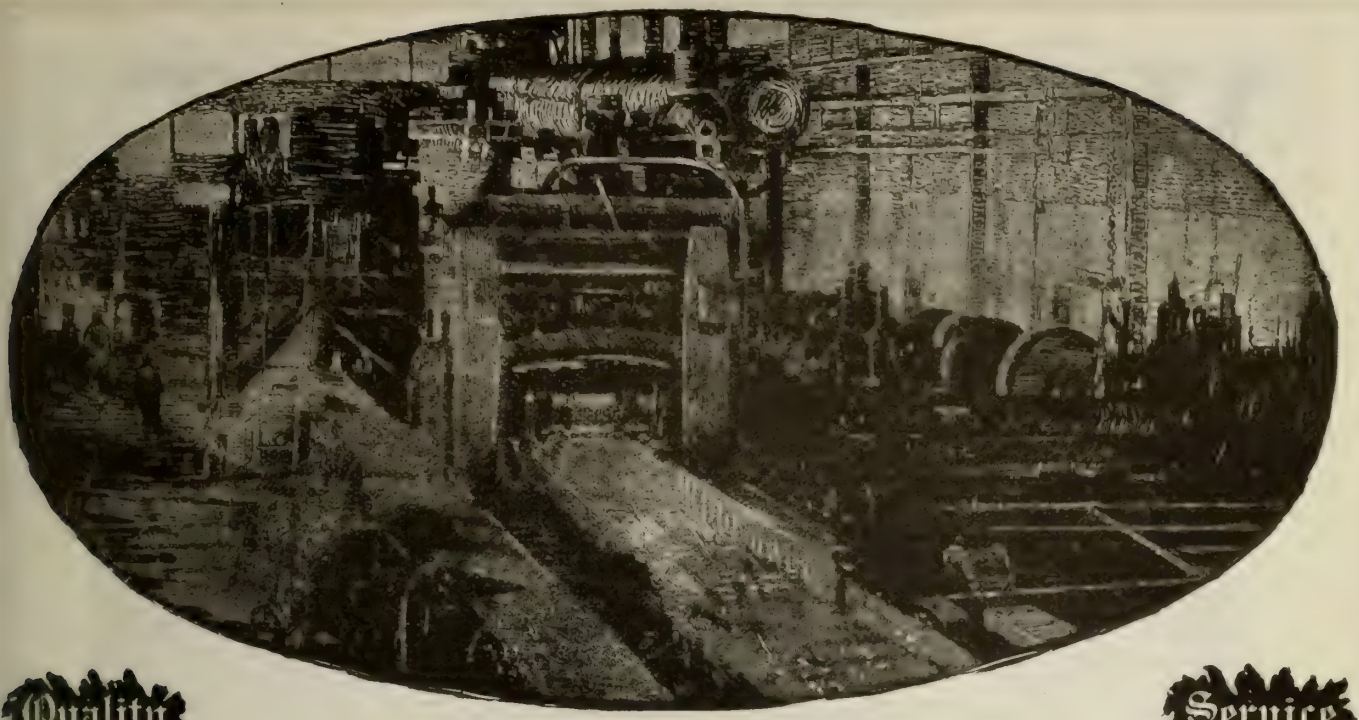
Finally you lay your tired head on an advertised pillow and your body on an advertised mattress, your wife meantime reading the bargain day advertisements in the evening paper when she should be turning out the (advertised) light.

About the only thing that enters into your life that is not advertised is sleep and it will never need advertising because the supply will never equal the demand.

There is, as we said before, a reason why you eat and use and wear and buy advertised products. It is because they are good. And it shows you have good judgment when you buy advertised lines.

A poor product cannot be continuously advertised. A good product can.

Canadian Machinery and Manufacturing News, April 3rd, 1919, Vol. 21, No. 14. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



Quality Service

REASON IT OUT

Demand full value for every dollar by spending it where you earn it

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar is Worth One Hundred Cents in Canada

THE
STEEL COMPANY OF CANADA
LIMITED
HAMILTON MONTREAL

WALCOTT

The Lathe for Continuous Duty

Hundreds of Canadian shops were working night and day to keep up with the demands of war. This continuous service put a heavy strain upon the machines used. These machines were of quality construction and modern design that stood the strain and gave economical and efficient service. Such is the WALCOTT LATHE. Here is a tool not just built for war purposes; it is a tool that will give you the best of service in peace time as well as war time. And in the WALCOTT you see a lathe with a price as low as possible, compatible with the cost of production.

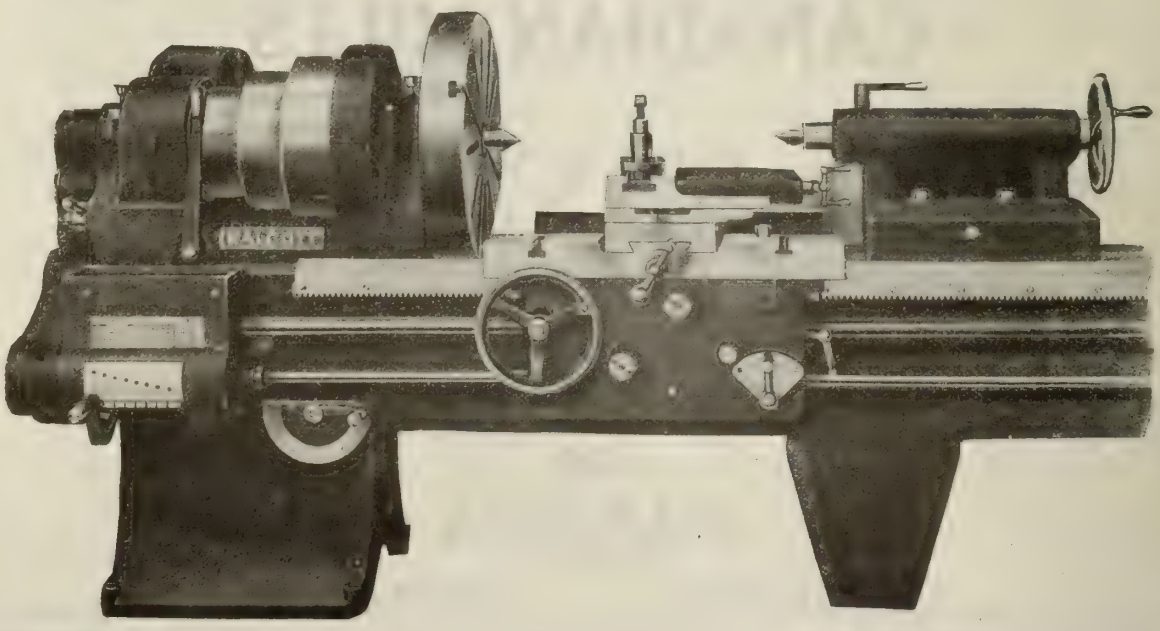
WALCOTT LATHES are in demand, but our increased facilities put us in a position to supply all Canadian requirements.

WALCOTT LATHE COMPANY

Engine Lathes

140 Calhoun Street - JACKSON, MICHIGAN

AGENTS:—Hill, Clarke & Co., Chicago, Ill. Frevert Machinery Co., New York City, N.Y. W. E. Shipley Machy. Co., Philadelphia, Pa. National Supply Co., Toledo, Ohio. Motch & Merryweather Machinery Co., Pittsburgh. H. A. Smith Machinery Co., Syracuse, N.Y. Wm. E. Duff, York, Pa. Wm. E. Duff, Jacksonville, Fla. Brown-McDonald Machy. Co., St. Louis, Mo. Smith-Booth-Usher Co., Los Angeles, Calif. Hendrie-Bolthoff Mfg. & Sup. Co., Denver, Col. Gordon & Finkbeiner, Portland, Ore. Northern Machinery Co., Minneapolis, Minn. Brownell Machinery Co., Providence, R.I. Chas. A. Strelinger Co., Detroit, Mich. Marshall & Huschart Machinery Co., Indianapolis, Ind. Fenwick, Freres & Co., Paris, France. Buck & Hickman, Ltd., London, England. Parke & Lacey Co., Sydney, N.S.W. Standard Machy. & Supplies, Ltd., Montreal, Que. Canadian Fairbanks-Morse Co., Ltd., Toronto, Ont.



BRIDGEFORD

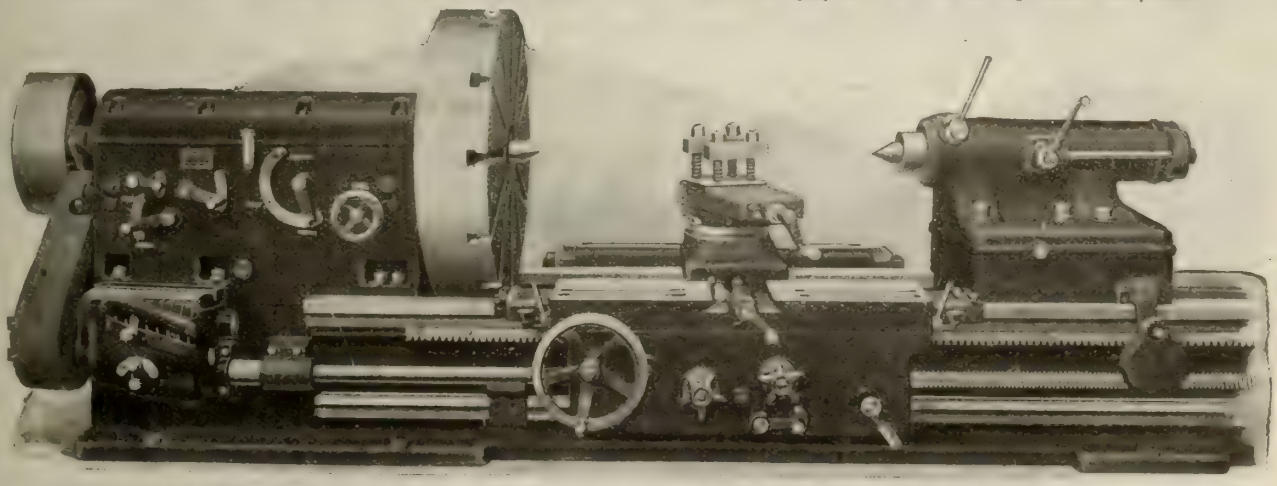
Heavy Duty Lathes

Rough turning pins on crankshafts of nickel steel was the duty assigned to this 42-in. Bridgeford Heavy Lathe in the shop of the Erie Forge Company, Erie, Pa. The rough size is approximately 6 in. in diameter and the finished size 5 in. in diameter. Eight pins is an average day's output on this efficient lathe.

Bridgeford Heavy Duty Lathes are in operation in all parts of the world on all kinds of duty. That their work is uniformly satisfactory is evidenced by the number of repeat orders from shops that started with one Brigdeford as a "tryout." One well-known plant has 200 Bridgefords and there are many others entirely "Bridgefordized."

Bridgeford Heavy Duty Lathes range in size from 24-in. to 72-in. swing.

Facts speak louder than mere words. Let us prove by facts and figures why Bridgeford Lathes are standard equipment in the leading industrial plants.

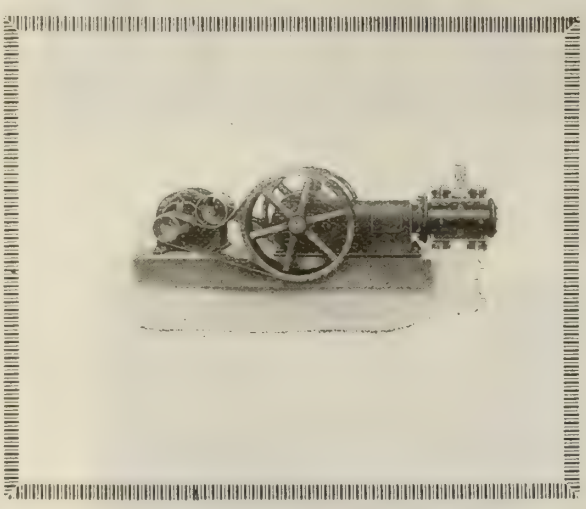


BRIDGEFORD MACHINE TOOL WORKS

151 Winton Road, Rochester, N.Y.

Manufacturers of Heavy Duty Lathes for more than 20 years

The Short Belt Drive For Compressors Saves Space



Have you been wondering how you can fit that compressor into your power house? Here is the solution—the short-belt drive.

We build both single-stage and two-stage machines—straight-line and duplex with this type of drive.

Less floor space
Less belt expense
No belt stretching
Capacities up to 2,000 ft. per min. with short-belt drive.

Send for our booklet on how to apply the short-belt drive to the best advantage.

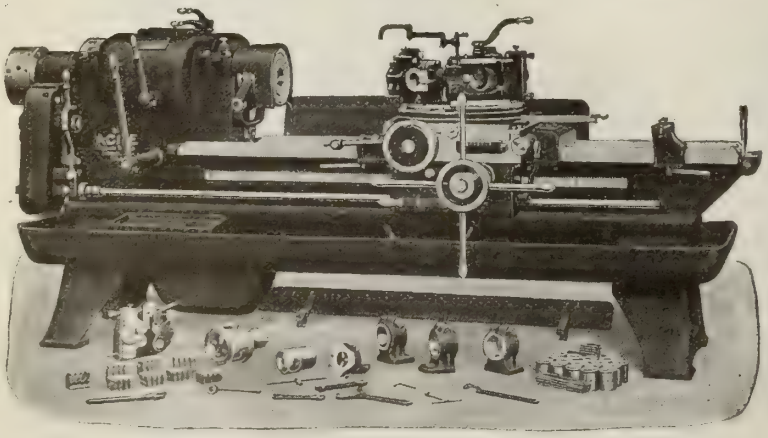
Canadian Ingersoll-Rand Company Limited

SYDNEY, SHERBROOKE, MONTREAL, TORONTO
COBALT, WINNIPEG, NELSON, VANCOUVER

Doubly Efficient—Does Both Bar and Chuck Work

This Cincinnati Acme Flat Turret Lathe is a double-production, geared head machine of the sliding gear type. It operates on minimum power because the only gears running are those doing the actual work.

This machine saves remarkable time and labor machining either bar work or chuck work up to 16 in. diameter.



3¼ in. x 36 in. Flat Turret Lathe Equipped for Bar Work.

Head is cast solid with the bed. You know what that means: accuracy, rigidity, constant and perfect alignment of spindle with vees, upon which the turret carriage travels.

We also make a full line of Screw Machines and Turret Lathes.

Write for Valuable Bulletin

The Acme Machine Tool Co.
Cincinnati, Ohio

Canadian Agents: Rudel-Belnap Machinery Co., of Montreal and Toronto

SPEED • ACCURACY

Chemistry the Keynote of Tool Efficiency

It reveals the constituent parts of substance. It transforms weakness into strength.

Every Wilt High Speed and Carbon Twist Drill, Reamer and Milling Cutter is representative of careful chemical analysis. Exact proportions of various ingredients, which are known by practical tests to give the desired results, are carefully specified. From the chemical analysis and throughout the various stages of their manufacture, WILT PRODUCTS are carefully tested for QUALITY.

That's why tools of WILT manufacture can be driven with extreme speed and stand up where ordinary tools would fall down. That's why they are absolutely accurate in their work.

For satisfactory results use WILT DRILLS, REAMERS AND MILLING CUTTERS.

Where There's a WILT--- There's the Way

WILT

HIGH SPEED AND CARBON TWIST DRILLS, REAMERS AND MILLING CUTTERS

Manufactured by the

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Walkerville OF CANADA LIMITED **Ontario**

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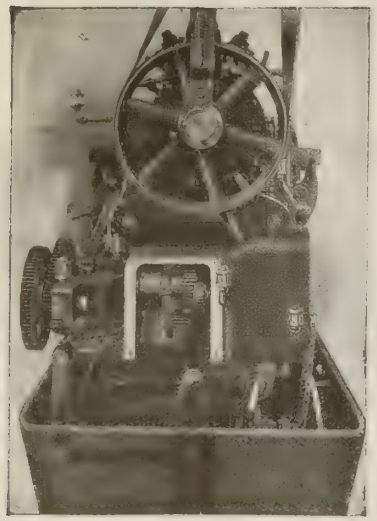
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



Courtesy National Acme Co., Cleveland, Ohio.

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is subject to exceptional hard usage, but it gives unfailing service.

YOUR MACHINE

should be equipped with clutches that will give just such satisfaction.

What are your requirements? Let us know. We maintain an engineering force to work out all clutch installations. They will co-operate with you.

Write for our Yellow Data Sheets and Booklet, "Clutches as Applied in Machine Building"

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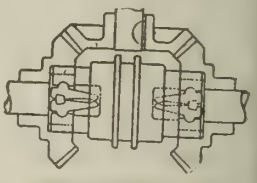

Double Clutch in Nest of Gears.

THE JOHNSON FRICTION CLUTCH

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Victoria

FOUNDRY & MALLEABLE

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Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

BRIGGS

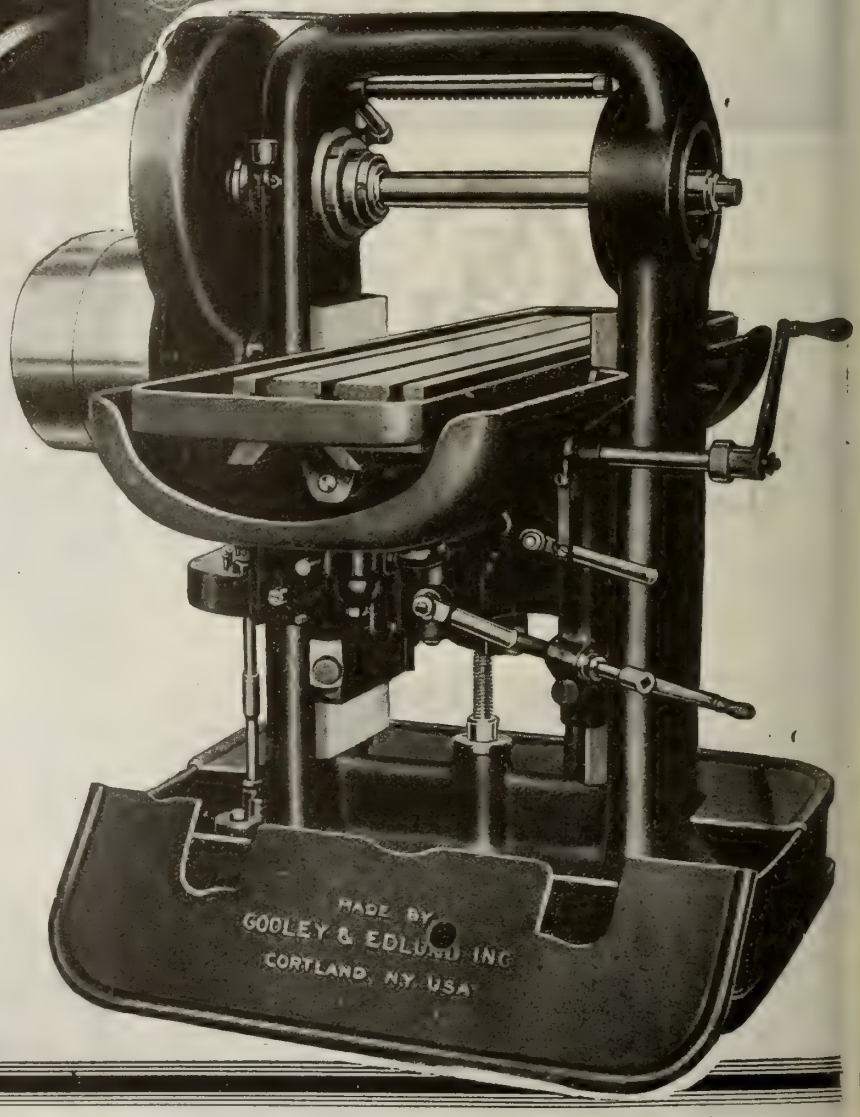
MILLER

Breaking Production Records

Forcing the feed on the "BRIGGS" to an extent impossible on any other machine.

THE photograph shows twelve belt lacer jaws clamped together on the table of a Briggs Milling Machine, where two straddle-mounted cutters mill the channels at one setting, though the stock is cold rolled steel, one inch thick. 15 minutes completes the operation, this speed being attained by forcing the feed to an extent impossible with any other milling machine. There is no chatter—the surface is "finished" when it comes from the machine.

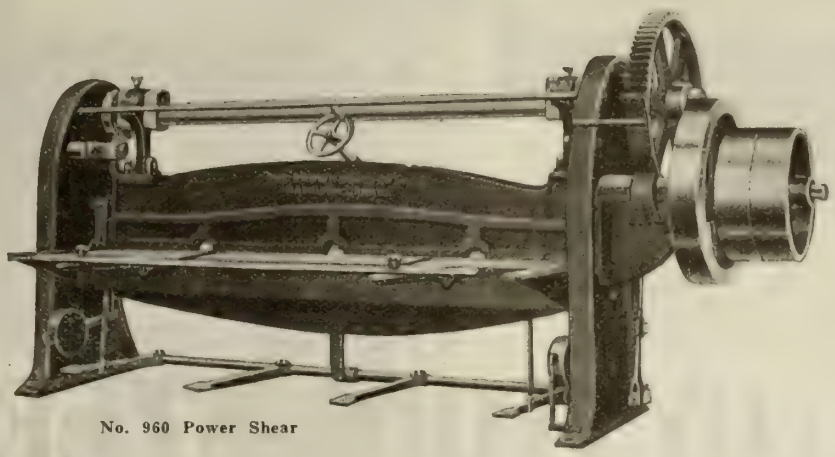
Rigid, powerful and easy to operate. Takes wide, deep cuts without showing least signs of distress, and will produce accurate work when running at a high rate of speed.



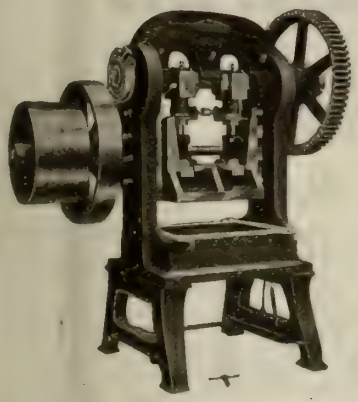
Gooley & Edlund, Inc.
Cortland, N.Y., U.S.A.
Williams & Wilson, Ltd., Montreal

FOREIGN AGENTS:—Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia and Barcelona; C. W. Burton Griffiths & Co., London, Manchester and Glasgow; Andrews & George Co., Tokyo, Japan.

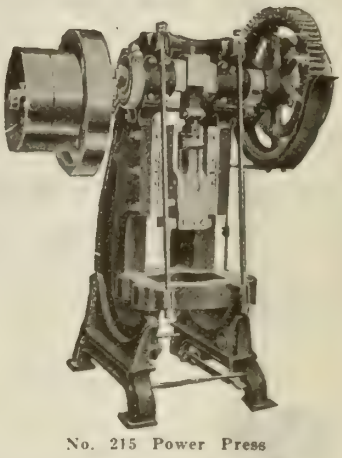
Stood The Test



No. 960 Power Shear



No. 20½ Power Press



No. 215 Power Press

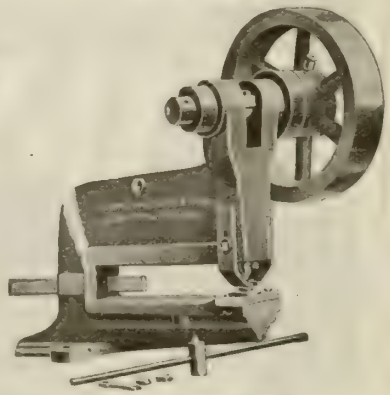
"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.

No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

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BRANDS OF ALLOY & TOOL STEELS

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HIGH GRADE STEEL FOR ALL PURPOSES

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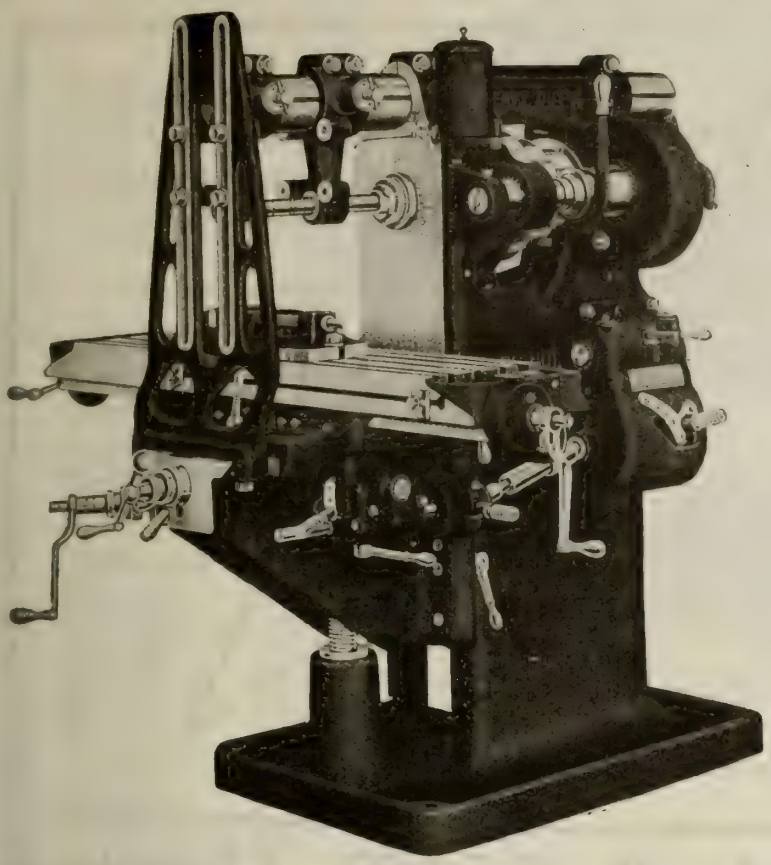

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Heavy Duty Milling Machines

Plain or Universal Types—Cone or Gear Drive. All commercial sizes No. 0 to No. 5.

Adapted for the Heaviest Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

Patent Self-Aligning Arbor Supports—

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Double-Friction Back Gears—and the simplest type of right-hand control, contribute to an increased production and longer life as a precision machine.

The R. K. LeBlond Machine Tool Company

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Canadian Agents:

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ELECTRIC
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High Grade STEEL Castings

Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

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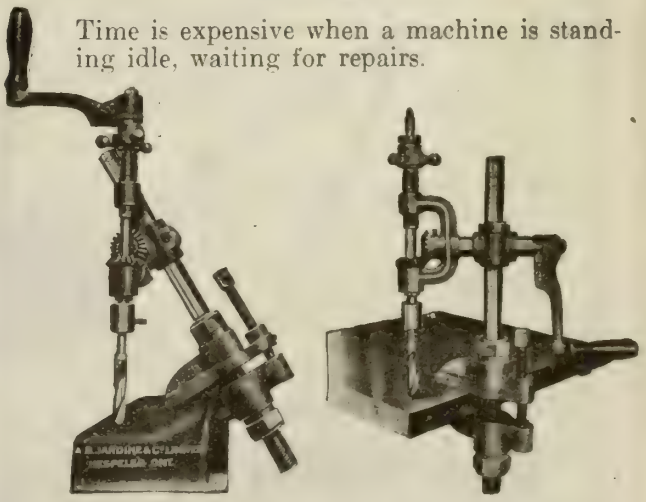
WELLAND ONTARIO

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



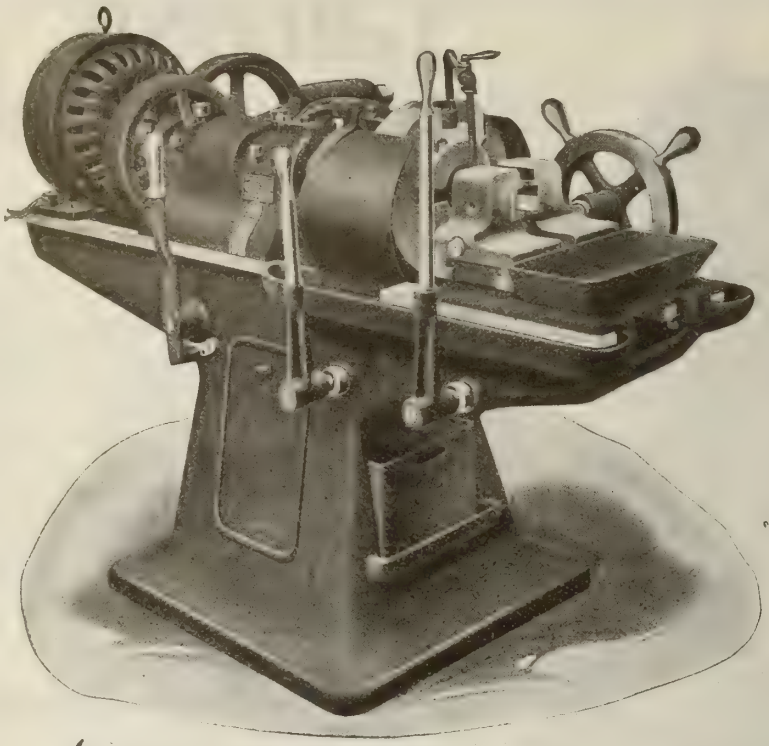
On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited

HESPELER, ONTARIO



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Our New 2" Single Head Rapid Nipple and Pipe Threading Machine—Motor Drive

Constant Speed Motor
All Gear Drive - Change Lever
6 Changes of Speed
Large Reservoir
Special Oil Trough
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Many Other Features

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Manufacturers of

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We Manufacture All Sizes

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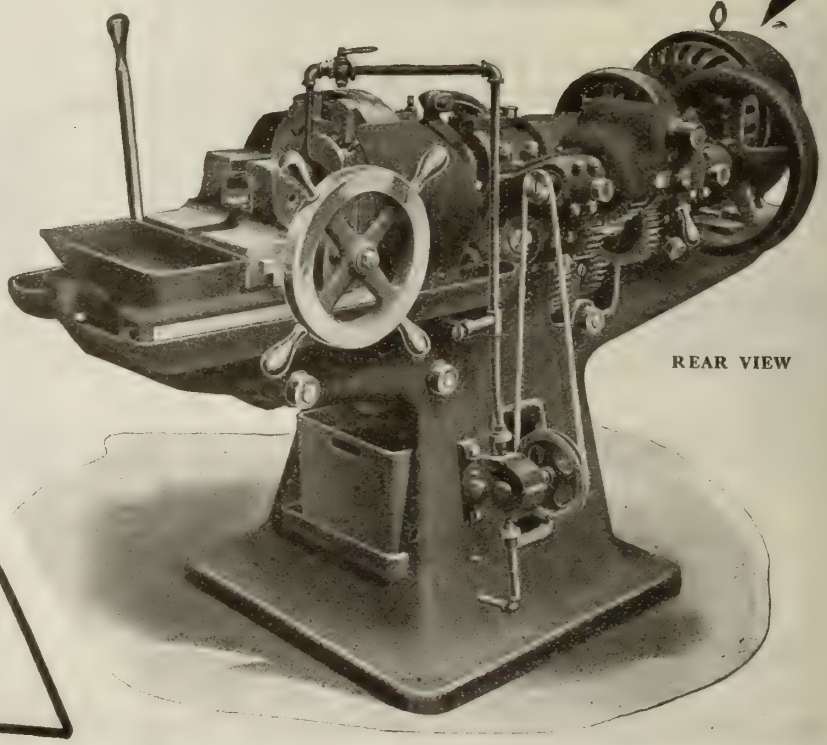
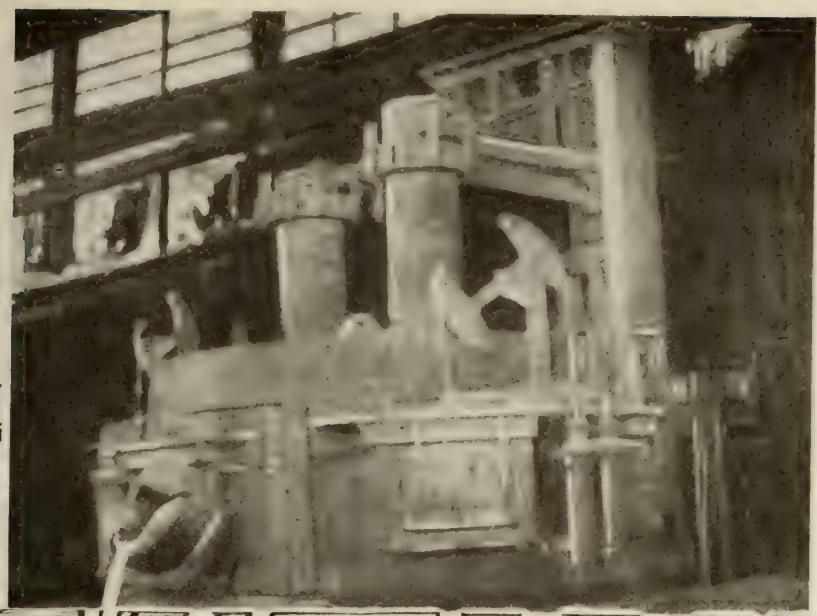
Special Machinery

WRITE FOR NEW DESCRIPTIVE BULLETINS JUST ISSUED



REAR VIEW



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High Speed Steel

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Uranium--This rare element, cousin to Radium, effects a profound change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.
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URANIUM

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"RedCut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is the Avowed Enemy of Waste and Inefficiency, and is Allied with Life

Save Time, Save Life. Are your Tools made of RedCut?

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WOLFRAM
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TOOL STEELS

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Vulcan Special Vanadium—For Punches and Dies. Has wonderful wearing qualities.

Vulcan Non-Shrinkable—For Intricate Dies. Does not warp. Does not shrink.

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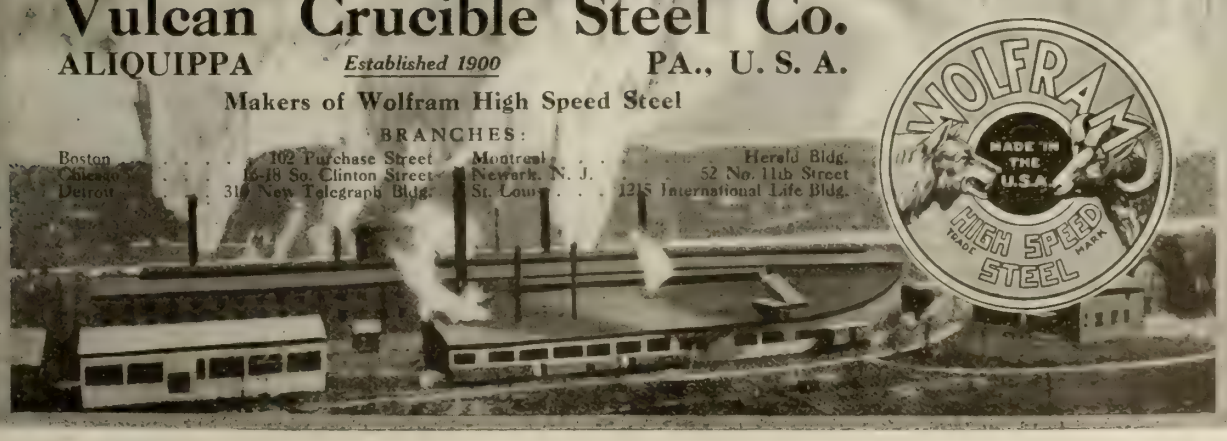

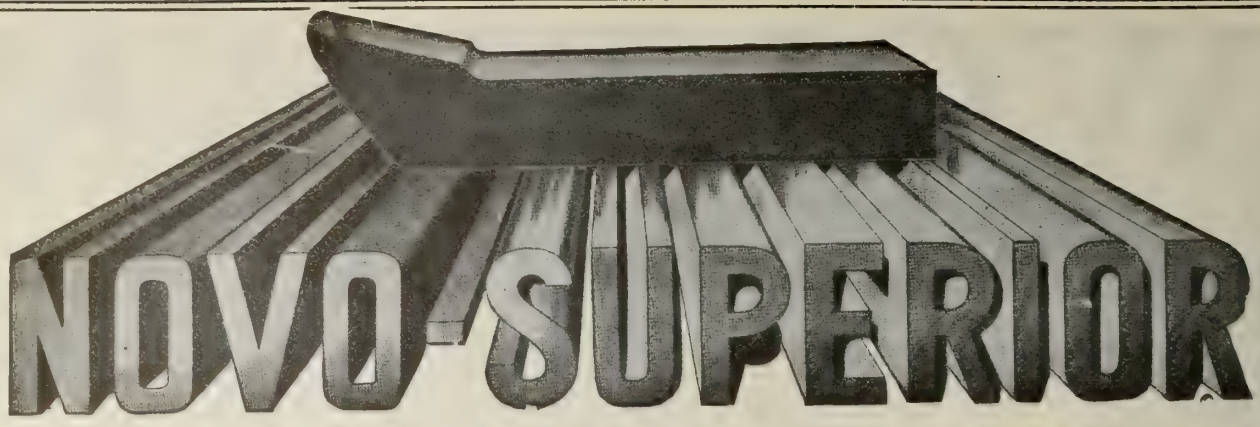

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Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
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Circular Saws – for wood and for hot or cold metal cutting
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Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
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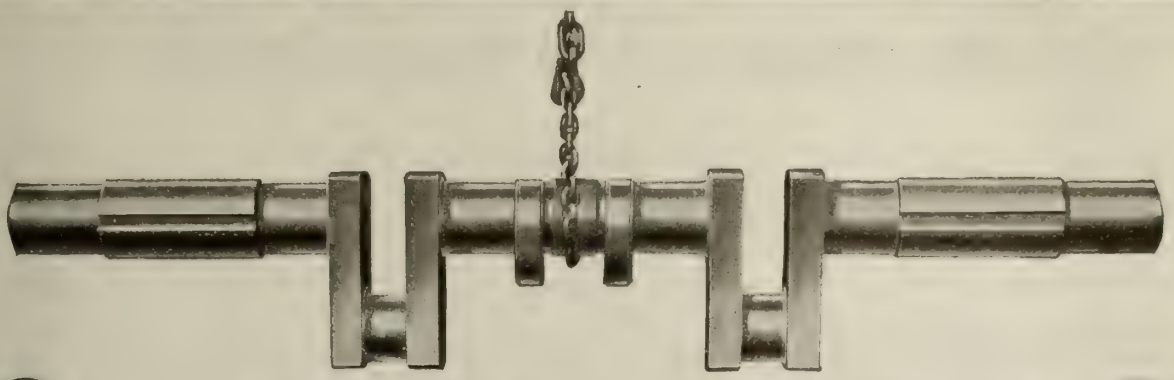

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New York Office :---312 HUDSON TERMINAL

Nova Scotia Steel & Coal Company
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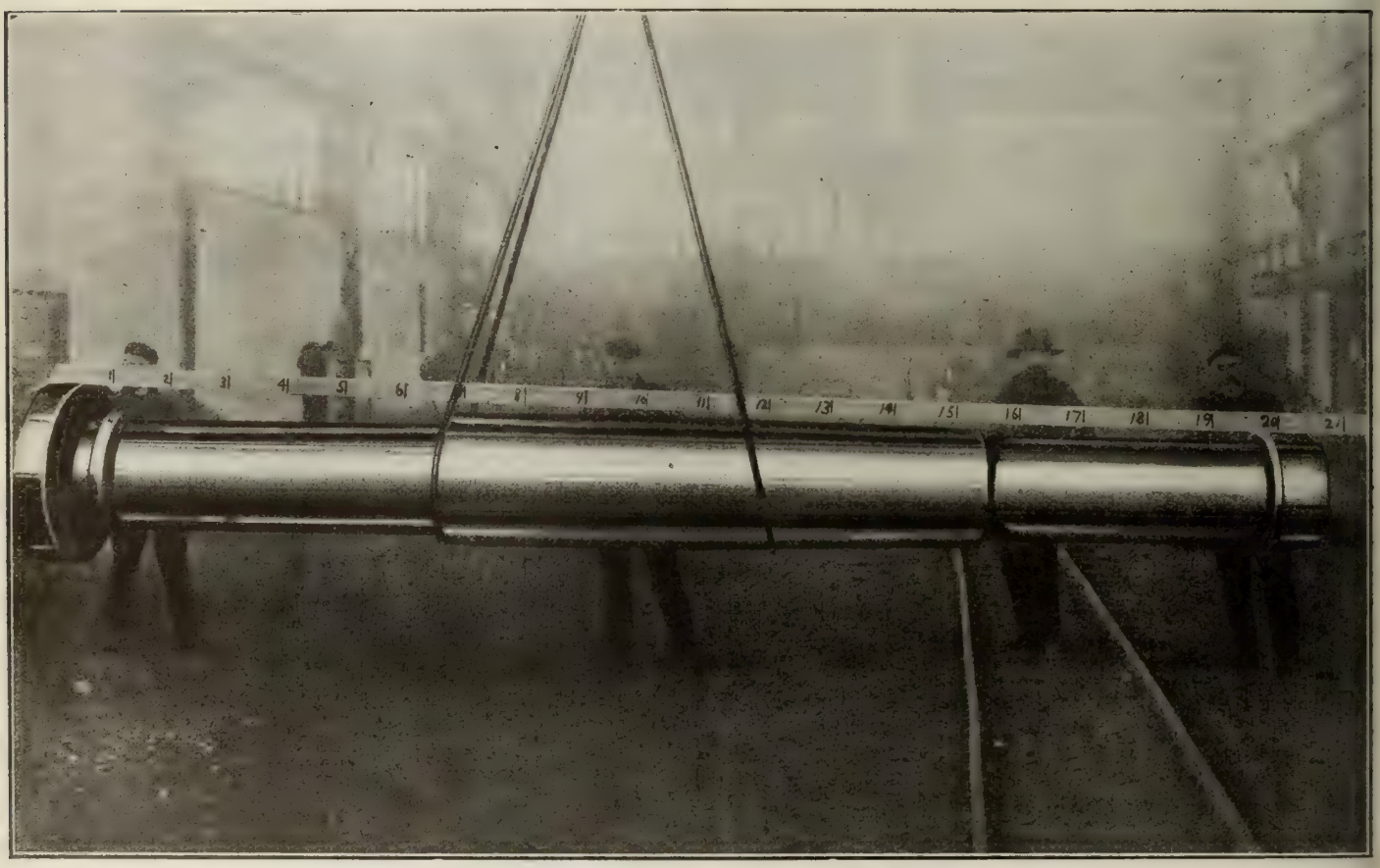

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Heavy Marine Engine Forgings in the Rough or Finish Machined

Our Steel Plant at Sydney Mines, N.S., together with our Steam Hydraulic Forge Shop and modernly equipped Machine Shop at New Glasgow, N.S., place us in position to supply promptly Marine Engine Crank and Propeller Shafting, Piston and Connecting Rods; also Marine and Stationary Steam Turbine Shafting of all diameters and lengths, either as forgings or complete ready for installation, and equal to the best on the American Continent.

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HIGH SPEED STEEL

The Highest Achievement
of British Tool Steel
Metallurgy

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Open Hearth Steel
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GEARS and PINIONS

Made in all kinds of metals, rawhide and fibre

SOCKET WHEELS
MADE TO ORDER

DISTRIBUTORS OF
DIAMOND CHAINS

For Power Transmission, Machinery and Motor Trucks, Motor-Cycles and Bicycles.

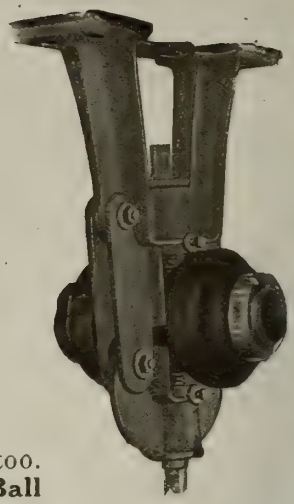
We ship gears to all parts of Canada. Write us when you want good gears, good service, good prices.

Get our Catalogue: "All About Gears."

BEVEL
BEVELS!

Chapman

Double Ball Bearings



CONSERVE POWER! There is too much power going to waste the world over. This fact has been noted by the British Government and sweeping reforms are contemplated in Great Britain.

Canada also wastes much power. A reform is necessary here, too. Babbitt bearings are being used too often where **Chapman Double Ball Bearings** should prevail. The adoption of Chapman Double Ball Bearings, wherever an axle or shafting needs support in the transmission of power, results in a saving of 75% of friction loss.

Now in use in over 2,000 Canadian factories. Fit any adjustable hanger. Adopted by Canadian and United States Governments.

Write for full story of their efficiency.

Chapman Double Ball Bearing Company of Canada, Ltd.

Room 408 Shaughnessy Bldg., Montreal. 339-351 Sorauren Ave., TORONTO, Canada.
Transmission Ball Bearing Co., Inc., 1050 Military Road, Buffalo, N.Y.

A "Strikingly Different"

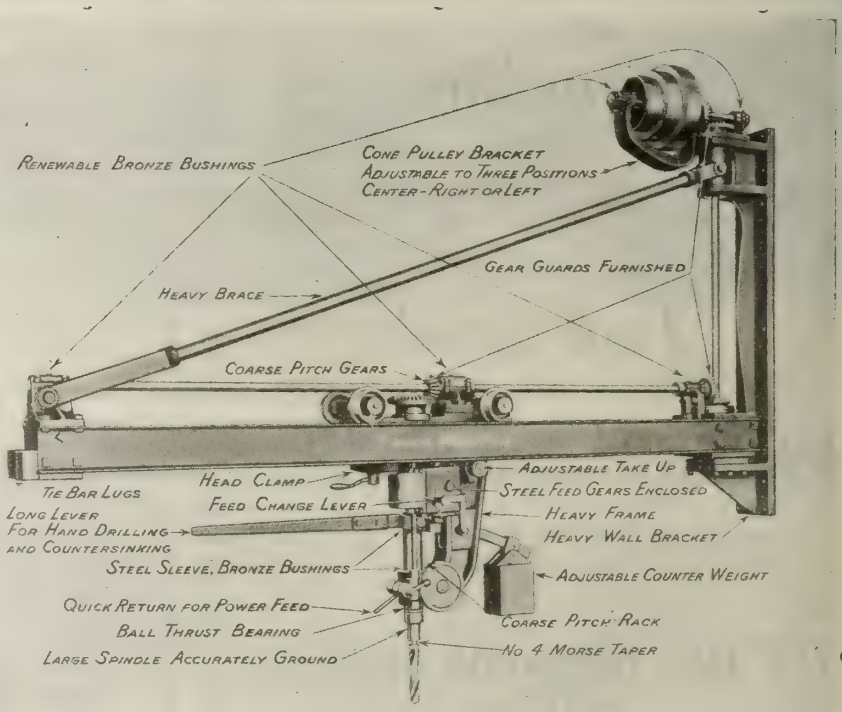
WALL RADIAL DRILL

This is a real machine tool. Careful design and high-grade materials contribute to its great success and economy. Much wider range is possible on this drill than the ordinary radial. The head is exceptionally rigid, yet moves with extreme ease from end to end of arm. For the crowded shop this drill is ideal, as when not in use it can be pushed back out of the way.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS**

STELLITE

"Not Steel but its Master"

PROPER PROCEDURE + STELLITE = PRODUCTION AND ECONOMY

One of Toronto's new industries was presented by us with a Tool-Holder Bit of No. 3 STELLITE to try out on Cast Iron.

They made tests with the best brands of High Speed Steel as against STELLITE, and found that they were able to run at double the speed and feed by using STELLITE.

"AS A MATTER OF FACT A TOOL BIT OF ⅜-inch square STELLITE HAS TURNED OFF 35,000 TIMES ITS OWN WEIGHT OF CAST IRON IN TEN DAYS."

As a consequence of their own tests they laid out their transmission to accommodate STELLITE and are now getting a much larger production than they had estimated.

We visited them recently and warned the Superintendent to save his shop-ends of STELLITE, as they were worth $2.00 per pound to his firm.

This was like getting money from home, as he had already decided to use STELLITE without this added incentive.

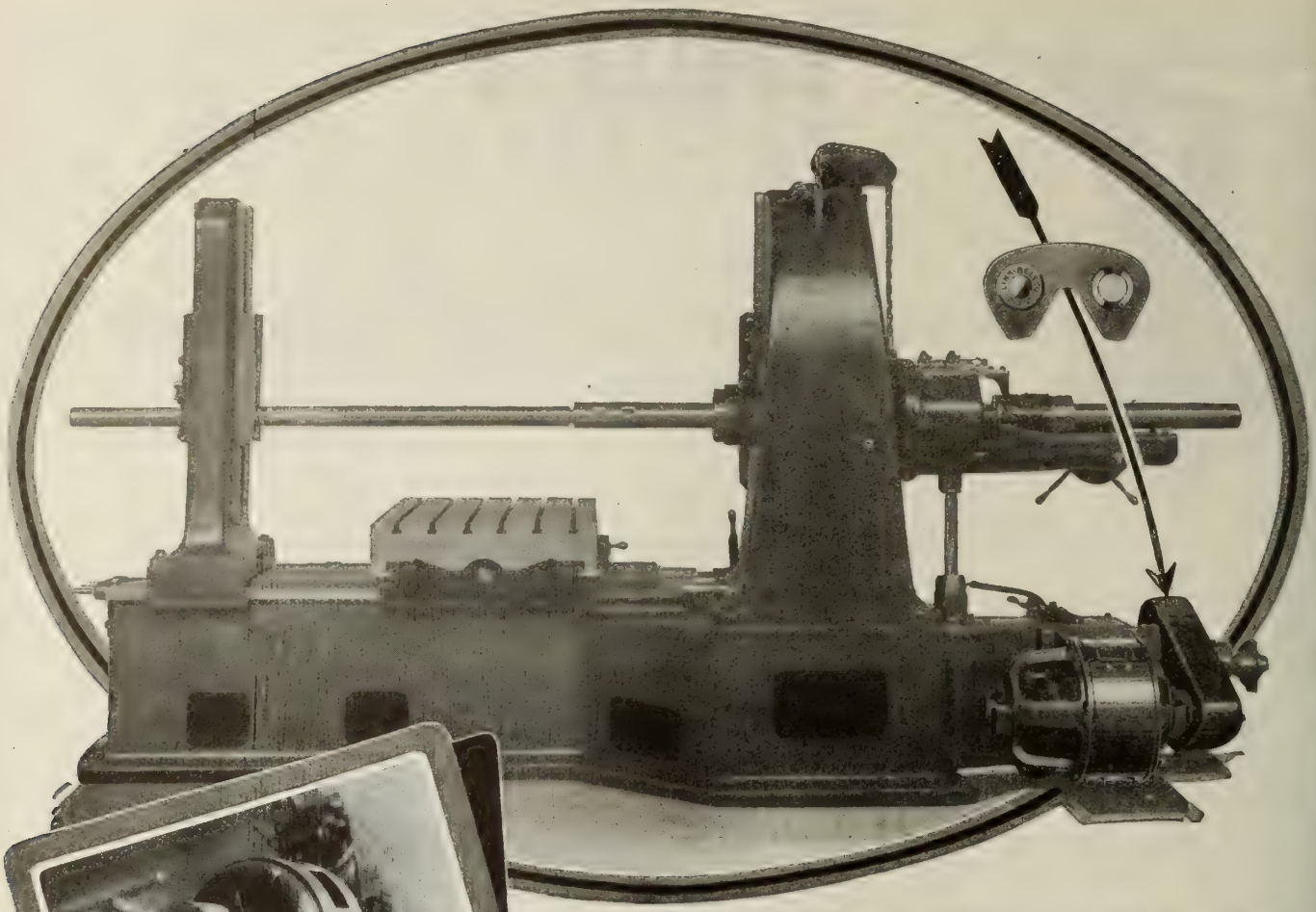
ASK FOR DEMONSTRATION.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West



Silent Chain Drives Help Prevent Tools From "Chattering"

ON horizontal boring mills, where the columns must often be located far apart, the tools are likely to "chatter" if the power application is not uniform and steady.

Link-Belt Silent Chain Drives transmit the power from motor to machine in a steady, uniform, positive "stream". There is no slippage. And yet, the chain cushions the machine against shock when heavy loads are suddenly applied.

Link-Belt Silent Chain Drives lengthen the life of the driven machine, improve the product, save power, save floor space, and increase production.

They are "flexible as a belt, positive as a gear, more efficient than either." Our Machine Tool Drive Book No. 312 gives details. Send for a copy.

CANADIAN LINK-BELT CO., LTD.

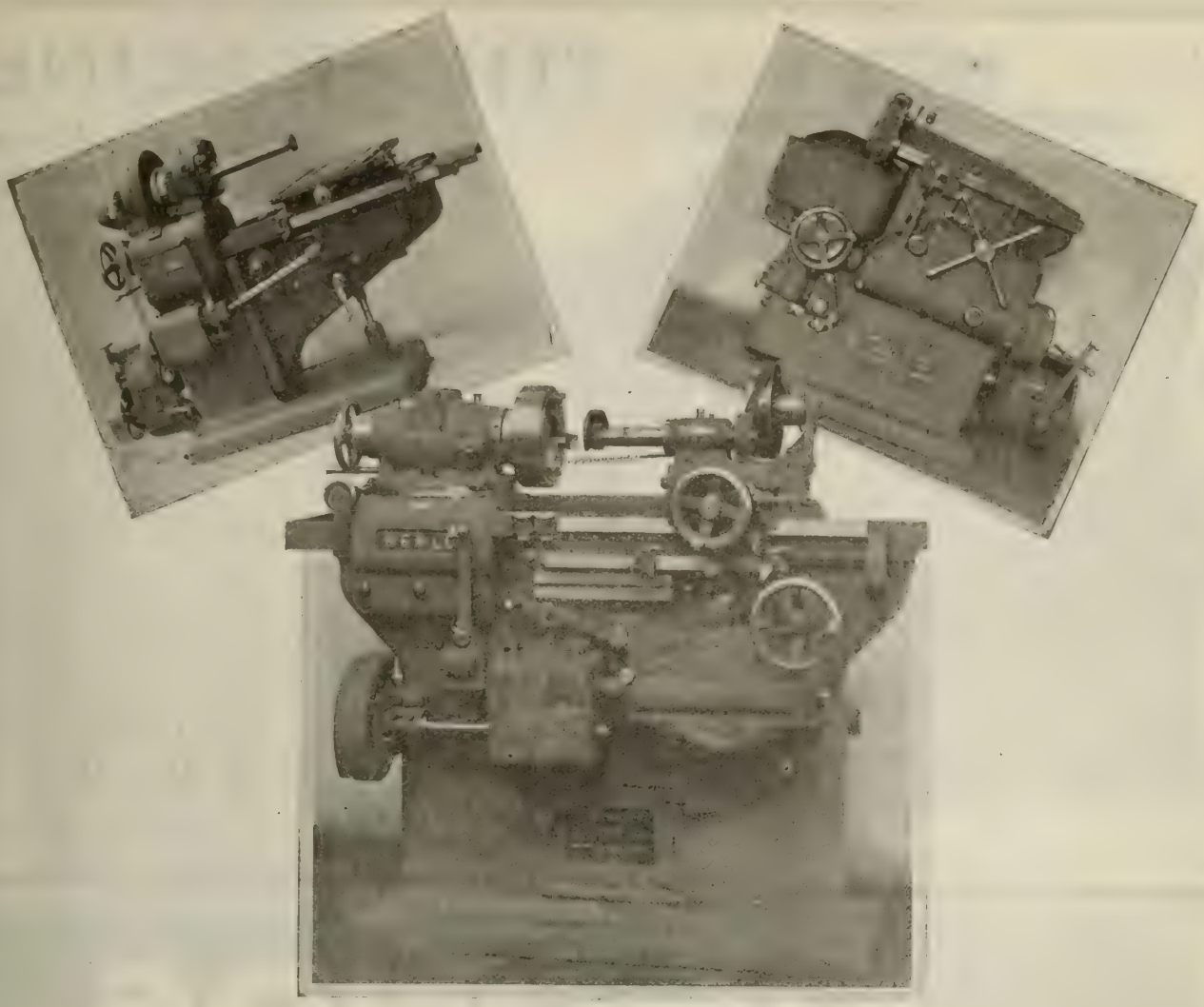
WELLINGTON and PETER STS., TORONTO

LINK-BELT
SILENT CHAIN DRIVES

We Also Make

- ☐ Elevators and Conveyors
- ☐ Link-Belt and Sprockets
- ☐ Silent Chain Drives
- ☐ Truck and Tractor Chains
- ☐ Electric Hoists
- ☐ Locomotive Cranes
- ☐ Wagon Loaders
- ☐ Coal and Ashes Systems

Write for Catalogs
Place X in Square



INTERNAL AND SURFACE GRINDING

If you do surface or internal grinding one of these three will handle your work to best advantage.

The CYLINDER GRINDER will take care of all work that cannot be rotated to advantage, such as two, four or six cylinders en bloc, and awkward large size castings of any material.

The INTERNAL GRINDER produces absolutely accurate holes, either straight or taper, in hardened steel, iron or bronze. It is ideal on bushings, gears, collars, ball bearing races and a thousand other parts, where accuracy and production are essential.

The SURFACE GRINDER delivers at a commercial rate a mirror finish on keys, rings, cutters, dies, discs, collars; in fact any shaped part whose size is within the capacity of the chuck.

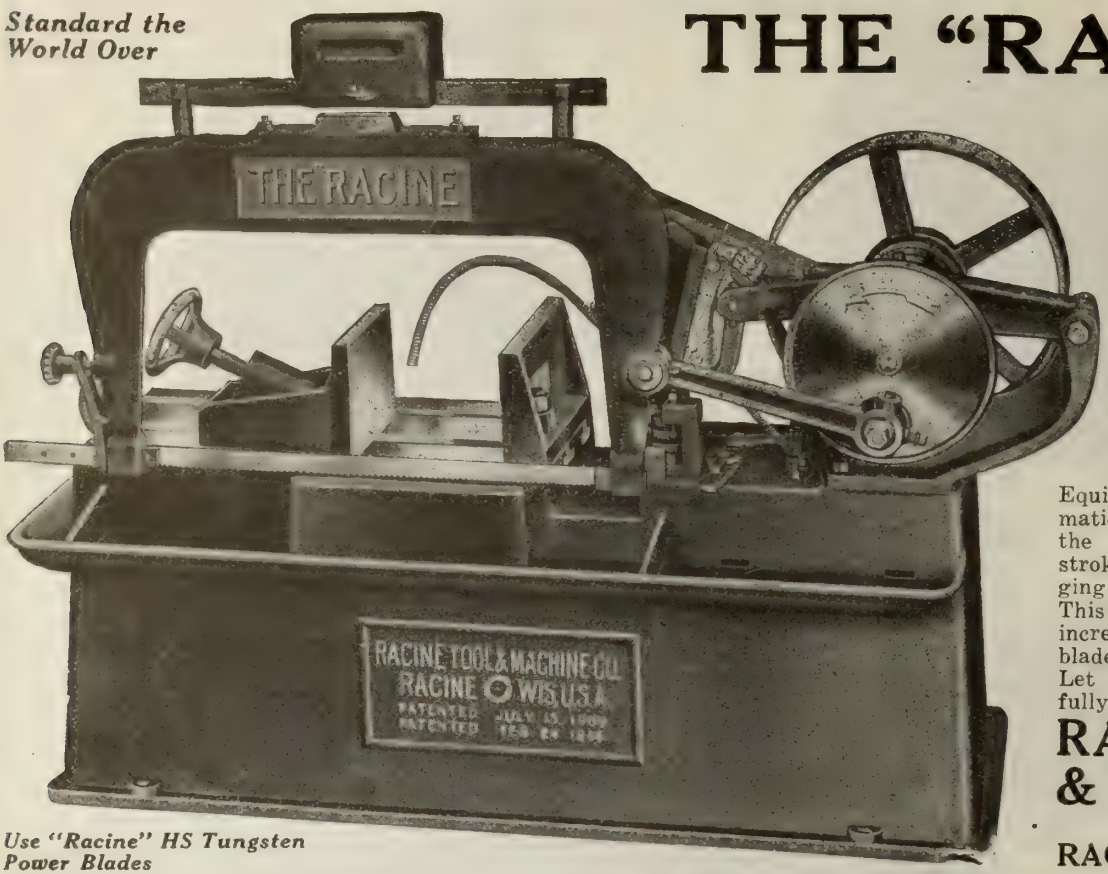
Send for a Complete Folder Catalog

The Heald Machine Company

WORCESTER, MASS., U.S.A.

Standard the World Over

THE "RACINE"



Use "Racine" HS Tungsten Power Blades

The Machine for High Speed Metal Cutting

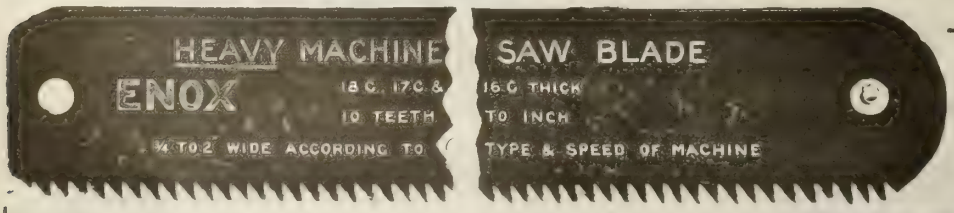
To successfully meet competition in the future you must adopt modern machines; machines that mean **quality** as well as **quantity** production. The RACINE is the tool you need. It increases speed, minimizes waste, reduces cost and is absolutely accurate.

Equipped with patented automatic lifting device which raises the blade of the non-cutting stroke and eliminates all dragging and strain on the blades. This means a saving in material, increased speed, long life for blades and greater production. Let us explain the machine fully. Write.

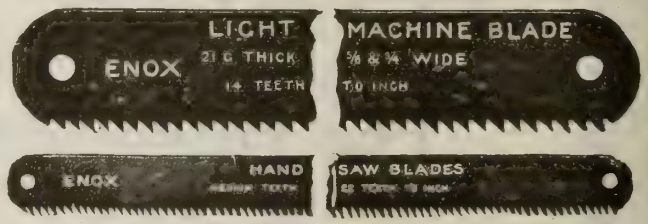
RACINE TOOL & MACHINE CO.
Melbourne Avenue
RACINE, WIS., U.S.A.

SIMONDS
HACK SAW BLADES
UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER



ENOX
Hacksaw Blades
ARE THE BEST



AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William:

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.

Accuracy—an element of speed and economy

With accurate and dependable tools mechanics can feel confident that work accomplished will be **right.** So greater speed and higher quality work are attained; time is also saved, which ultimately means economy.

Write for Catalog No. 213. It shows many styles and sizes of these accurate tools that save time and money in the long run.

The L. S. Starrett Company

ATHOL, MASS.

STARRETT TOOLS TRADE MARK REG. U.S. PAT. OFF.

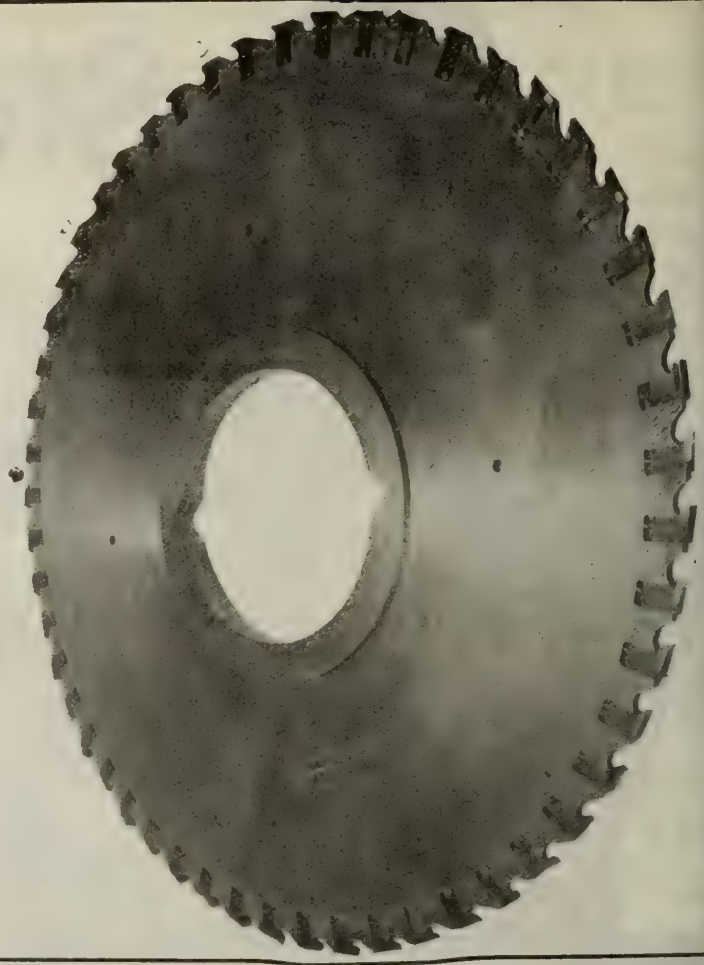
The World's Greatest Toolmakers. Manufacturers of Hack Saws Unexcelled.

New York **London** **Chicago**

42-909

90-inches in diameter

Cut on right shows a Hunter Duplex Inserted Tooth Saw used by the Erie Forge Co. for cutting gun forgings. It is the largest inserted tooth saw blade we know of ever having been made in the United States or any other country —1" plate, 1 5/16" kerf, and contains 56 high-speed steel teeth, and weighs approximately 3,000 lbs.



Hunter Duplex Saws

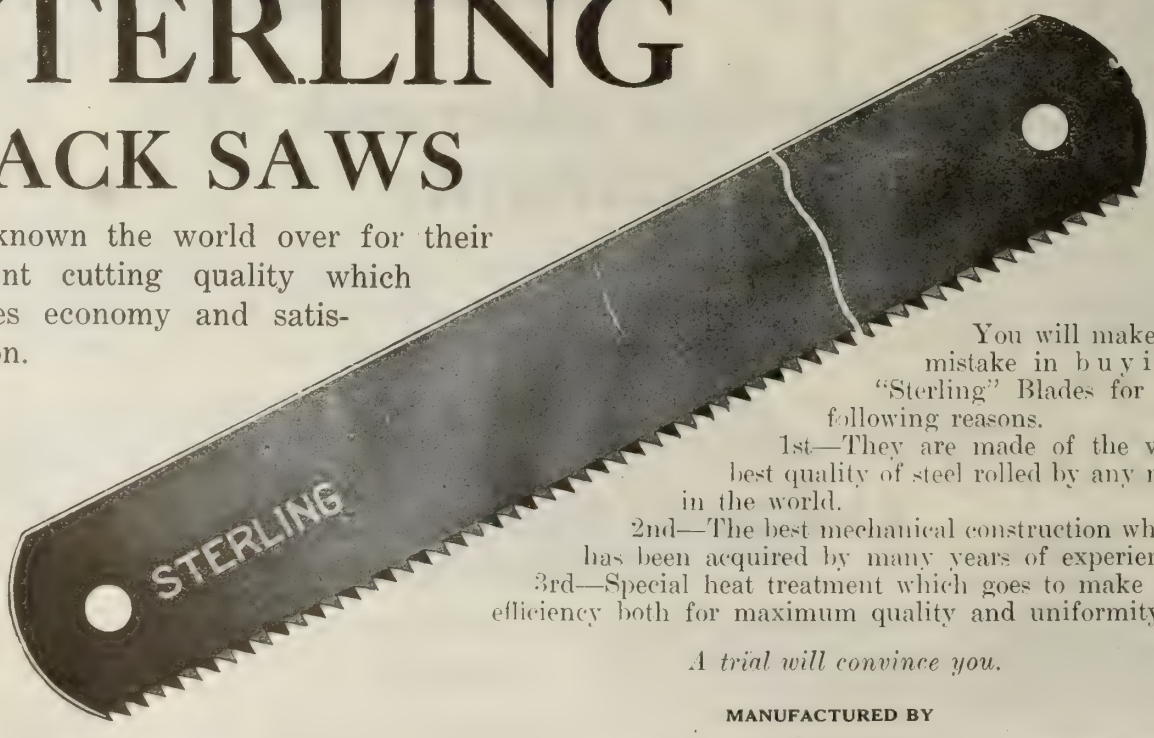
No matter what your sawing requirements may be, there is a Hunter "Duplex" Saw that is just right for the work. The discs are made of Chrome-Vanadium Steel, oil treated.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Grinders. Hardened Steel Specialties. Write for prices.

Hunter Saw & Machine Co.
Pittsburgh, Pa., U.S.A.

STERLING
HACK SAWS

Are known the world over for their efficient cutting quality which insures economy and satisfaction.



You will make no mistake in buying "Sterling" Blades for the following reasons.

1st—They are made of the very best quality of steel rolled by any mill in the world.

2nd—The best mechanical construction which has been acquired by many years of experience.

3rd—Special heat treatment which goes to make the efficiency both for maximum quality and uniformity.

A trial will convince you.

MANUFACTURED BY

Diamond Saw & Stamping Works
BUFFALO, N.Y., U.S.A.

CUT YOUR CUTTING COST WITH VICTOR Flexibles

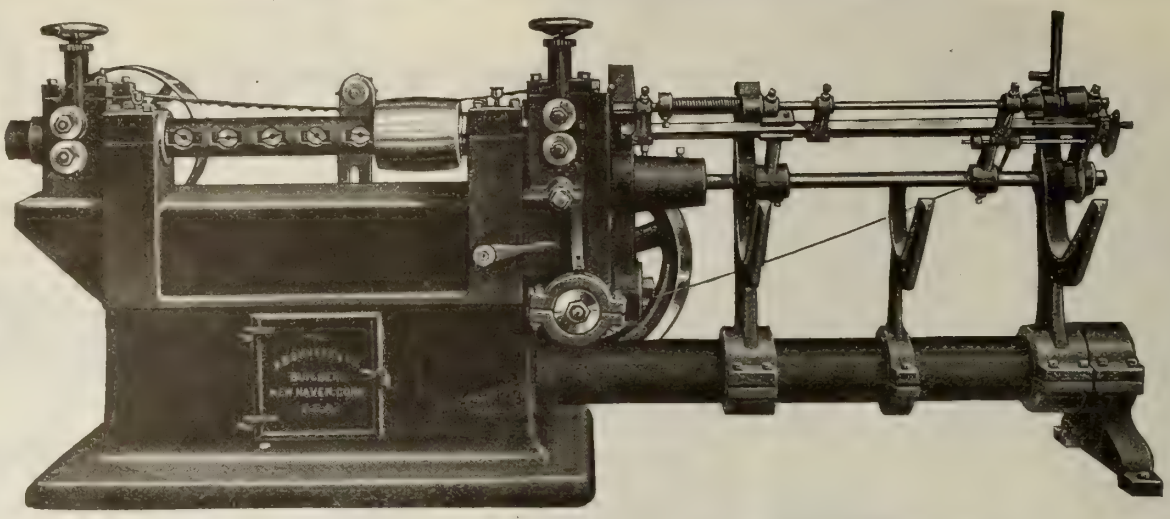
The high cost of tools should emphasize more than ever the importance of quality.

The high cost of hack saw blades ought to drive every hand blade user over to the saw that does not break in ordinary hand work.

VICTOR FLEXIBLE HACK SAW BLADES have exactly the same cutting power as the finest All-Hard on the market, and that they cannot be broken in use except by intentional abuse is an undisputable fact—which will represent a saving from twenty-five percent to thirty-three and one-third percent in breakage alone.

Seventy-five percent of the All-Hard blades used in hand frames break before they are worn out. Watch the All-Hard blades in your own shop and see the enormous amount of breakage—then use VICTOR FLEXIBLES and note the economy.

VICTOR SAW WORKS LTD - HAMILTON, CANADA



Perfect Wire Straightening Quickly and Profitably Done on Our

Automatic Wire Straightening and Cutting Machine

Just put your coil of wire on the reel, adjust the rolls and dies, and set the gauge for the length you want. The machine does the rest—thousands of feet per day, perfectly straight and cut to accurate lengths.

Catalogue tells more about them, and we'll be glad to send you a copy.

THE F. B. SHUSTER CO., New Haven, Conn.

FORMERLY JOHN ADT & SON ESTABLISHED 1866

ALSO MAKERS OF STRAIGHTENERS FOR SQUARES, HEXAGONS, FLATS, ETC.

The Greenfield Universal Grinder

For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

Greenfield Machine Company,

GREENFIELD, MASS., U.S.A.

RICKERT-SHAFER TAPPERS

Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

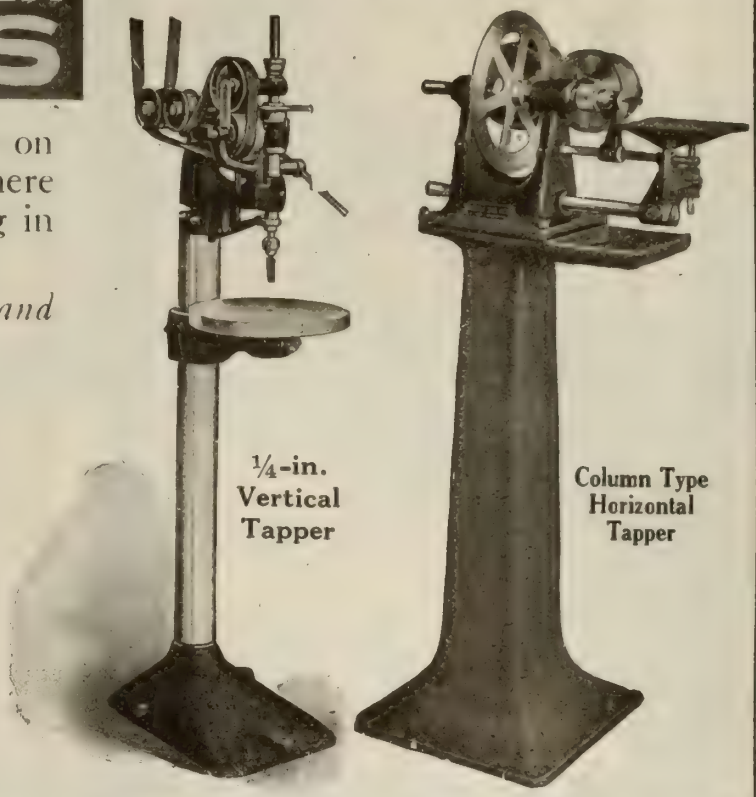
Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on ⅝-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.

Write for specifications

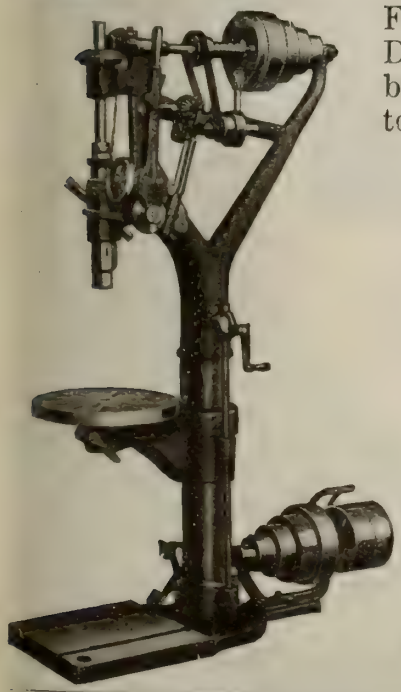
The Rickert-Shafer Co.

ERIE, PA., U.S.A.

FRED HERBERT, Foreign Agent, Coventry, England



Silver's Drills



Fast, Strong, Accurate and Dependable Drills with an experience of 65 years behind them—they can be depended on to finish the work and do it right.

The 20″ is made in four distinct styles with round or square base, and can be furnished singly or in gangs of 2, 3, or 4 spindles.

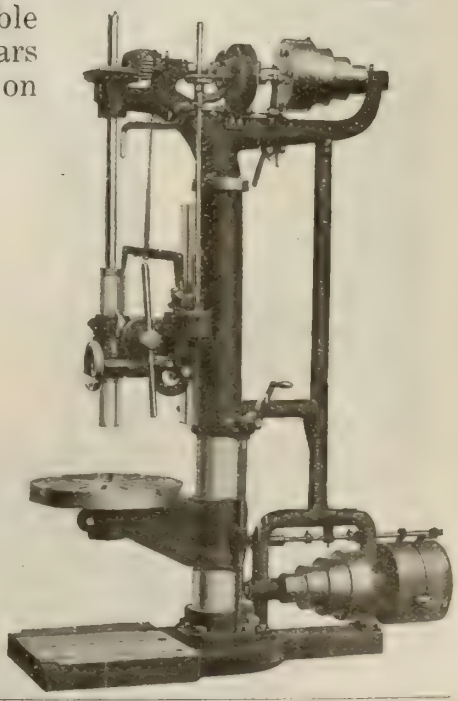
The 25″ has eight spindle speeds and six positive geared feeds.

Send for full description and quotations.

The Silver Mfg. Co.

290 Broadway

SALEM - - OHIO



"CANADIAN"

ACCURATE work demands accurate and efficient tools.

The Canadian No. 5 has some features worth considering.

Eight speeds, three power feeds—also hand and lever feeds.

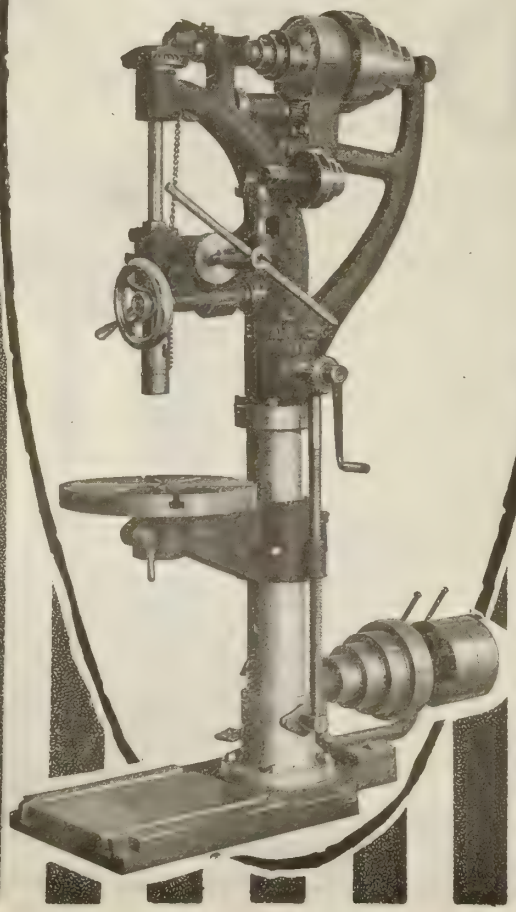
The twist of a knurled knob changes instantly plain drive to back geared drive—no tools to get lost or bother with.

An adjustable automatic trip throws out power feed when piece has been drilled to required depth.

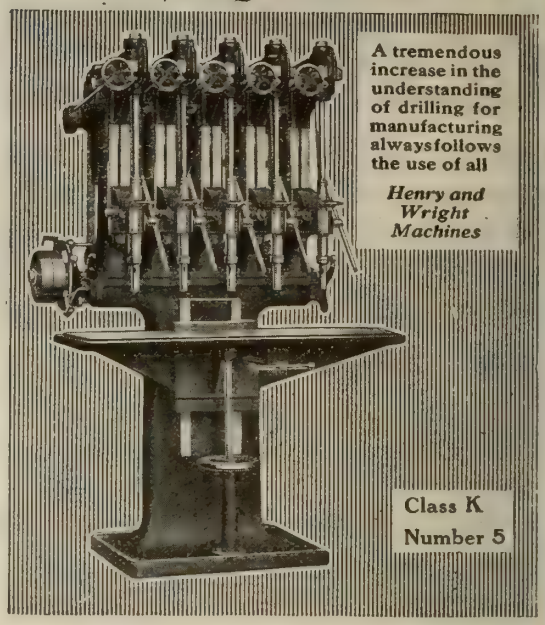
Split adjustable bearings, ball bearing graduated spindle—but then there are so many features—for complete description write for literature.

Circular 1199-16 describes the whole Canadian Upright Series

Canadian Blower & Forge Co., Limited
Kitchener, Ontario

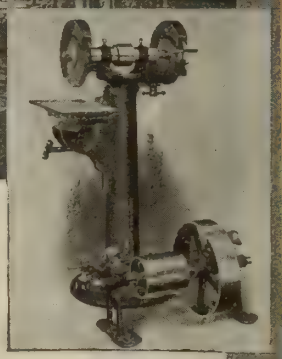


HENRY & WRIGHT
Drilling Machines



The Henry & Wright Mfg. Co.
Hartford, Conn.

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.



WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable, practical grinding outfit.

The Blake & Johnson Co., Waterbury, Conn.

BROWN'S

Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting. Extruded shapes.

Seamless Brass and Copper Tubes.
Guaranteed Ingot Metals—Yellow, Red and Composition Ingots.
We are Purchasers of Copper Bearing Material.

Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

MADE IN CANADA

Malleable and Cast Iron PIPE FITTINGS

Both Screwed or Flanged,
Black or Galvanized—All Sizes

MALLEABLE AND GREY IRON CASTINGS

For General Machine Shop Work, for Manufacturers of Automobiles and Specialty Manufacturers.

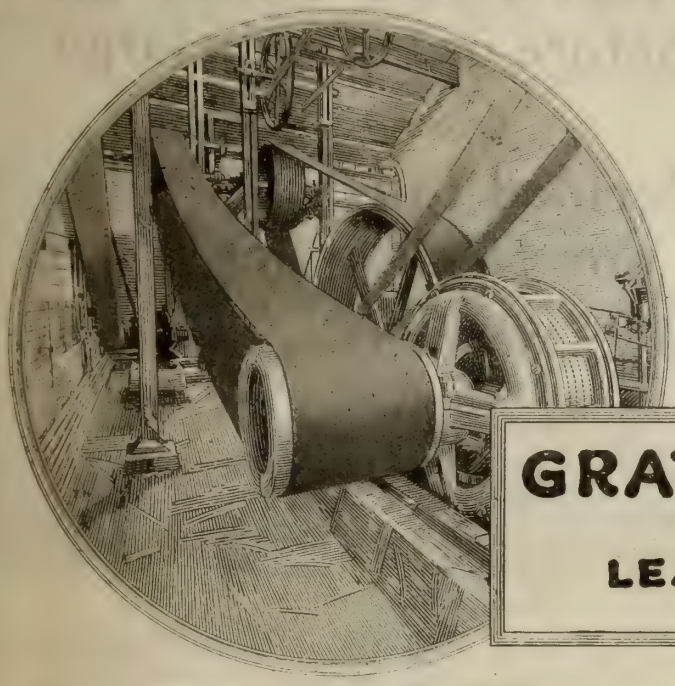
Quality Products

We have the facilities for filling your orders with exceptional promptness. Annual capacity 6,000 tons.

Prompt Service

International Malleable Iron Co., Limited

Guelph, Ontario



GRATON & KNIGHT

Standardized Series

LEATHER BELTING

Tanned by us for belting use

HERE is pictured a 75 foot Graton & Knight Heart Brand Belt in the plant of the Model Mill Company, Johnston City, Tenn. It is 24 inches wide, double-thick. It transmits 241 Horse Power. It has been in continuous hard service for five years. Its cost per week has been $1.35, or five mills per horse power, per week.

Power and the Right Material

Leather is the right material for belting. It is firm. It is strong. It has permanent power of expansion and contraction. It is tough, but it yields in the *right* degree, at the right time. It is easily and repeatedly spliced or repaired. It stands mauling by shifters. Side-slapping won't fray it. Even after long use it can be cut into narrow belts and goes on with its good work.

Leather stands alone as to these characteristics. It is Nature's contribution to power transmission needs. No other known substance is like it in wearing qualities. And no other belting material successfully replaces it.

There is no mystery about the quality of the leather in Graton & Knight Standardized Series Belts. It's in the *tanning*—an operation based on the *work to be done.* The yearly output of our tannery is nearly 300,000 hides. That makes *you* sure of uniform quality for any given specification. For there is a wide scope of selection from such a mountain of leather.

Graton & Knight Standardized Series Belts are made to give the longest possible service at the smallest possible cost. Those who use them say that they do.

Many of the best-belted plants ask us to specify the belting for every drive. Try the plan yourself. Then, when buying, call for "Graton & Knight Brand — or equal." This won't commit you to buying our belts. It will put your buying on the one basic consideration — the work to be done.

Write for new book about Standardized Leather Belting

GRATON AND KNIGHT

THE GRATON & KNIGHT MFG. COMPANY, Worcester Mass., U.S.A.

Oak Leather Tanners. Makers of Leather Belting, Lace Leather, Packings, and Specialties

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Canadian Graton & Knight, Ltd., Montreal. Canadian Representatives: The Canadian Fairbanks-Morse Co., Ltd., St. John, Montreal, Ottawa, Toronto, Hamilton, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria

"We tried Goodyear Extra Power on our hardest pull before ordering in large lots"

"Now we have decided to replace with Goodyear Extra Power all other types of belt as they wear out"

The experience of the Pease Foundry Co., of Brampton, is the experience of hundreds of other users of belting in Canada. Read what Mr. J. G. McKinnon, Manager of the Brampton plant, says in his recent letter to us:

"Your Extra Power Belting is giving us splendid satisfaction. We were averse to trying Extra Power, but now we are sorry we did not use it when we installed our latest equipment.

"We now have about $1,500 worth in use in our plant.

"We tried Extra Power on our hardest pull before ordering in large lots.

"Now we have decided to replace with Extra Power all other types of belt as they wear out."

Such tests as this are the basis of the astonishing success of Goodyear Extra Power Belting. Where *unusual* service was needed—Goodyear Extra Power made good. The result has been a vast sale of Extra Power for ordinary drives—the "day-in-and-day-out" drives that factory men want to equip with good belts and forget.

Improved service and lower belting costs have come wherever Goodyear Extra Power Belting has been installed.

Often it has overcome conditions under which other belts failed completely.

In many plants it has speeded production amazingly.

Always it has cut belting costs *and* power cost.

The particular construction of Goodyear Extra Power makes it tremendously strong, yet flexible and pulley-hugging. A friction surface assures efficient delivery of power to the pulleys.

We train men to solve belting problems. The Goodyear Belting man has a big story to tell you. Perhaps he may help you. His service involves no obligation.

The Goodyear Tire & Rubber Co. of Canada
Limited

Branches: Halifax, St. John, Montreal, Ottawa, Toronto, Hamilton, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver. Service stocks in smaller cities.

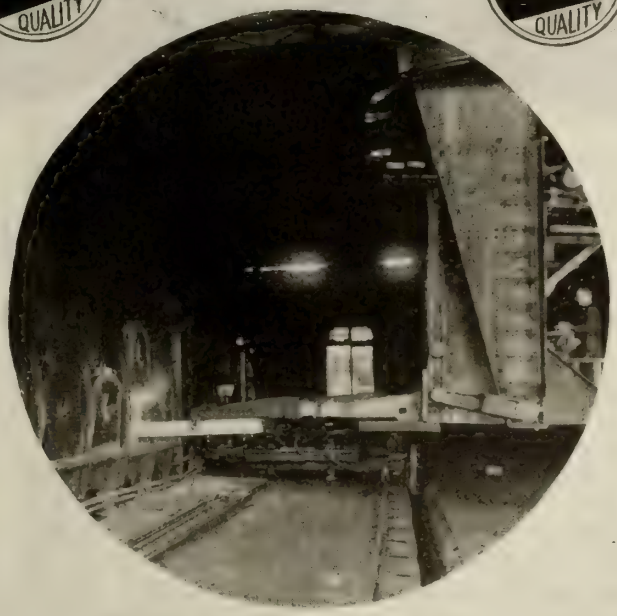
GOODYEAR
MADE IN CANADA
EXTRA POWER BELTING

ALGOMA STEEL CORPORATION, LTD.

SAULT STE. MARIE, ONTARIO

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

MARK OF ALGOMA O.H. QUALITY



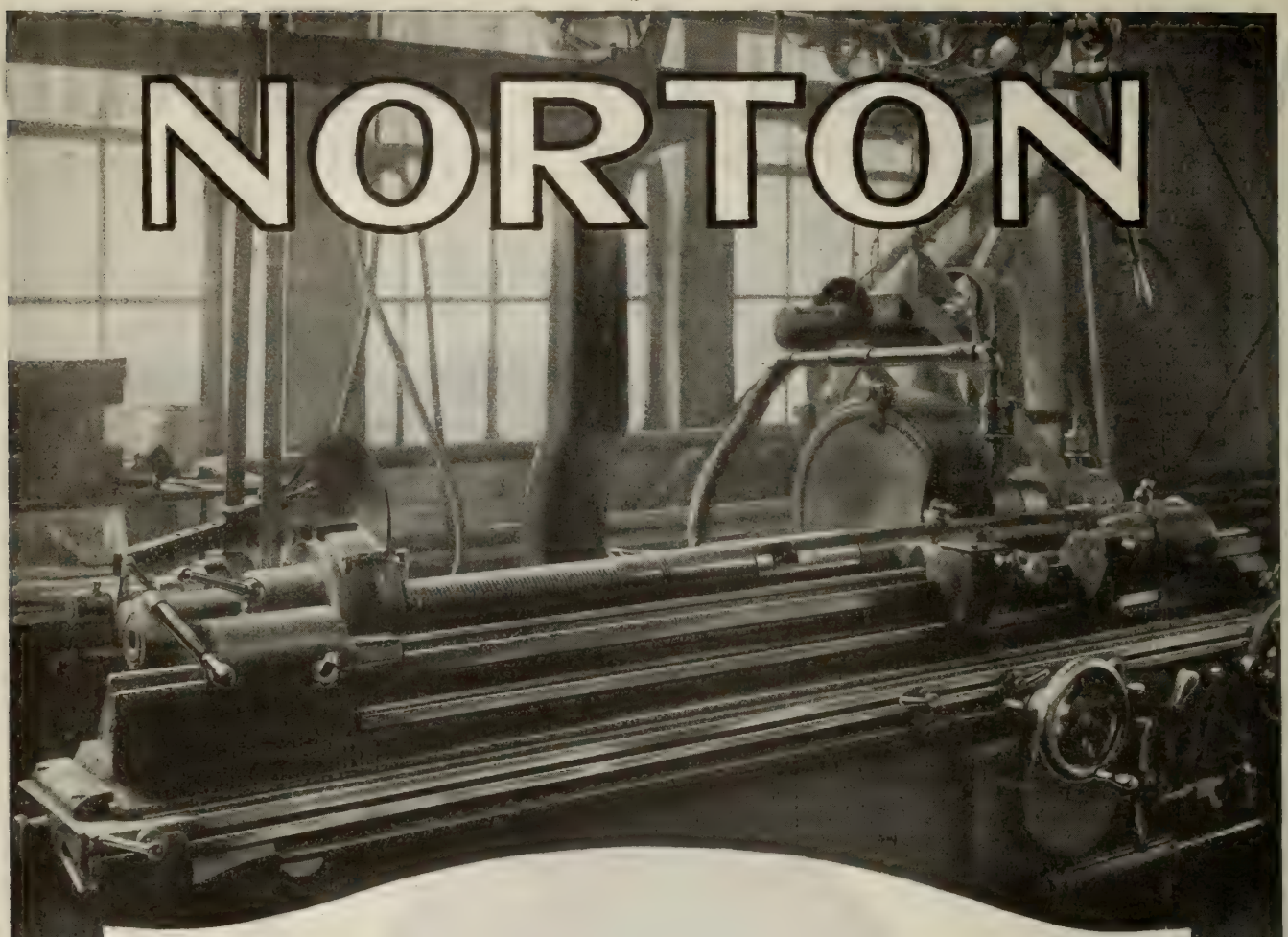
Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

MARK OF ALGOMA O.H. QUALITY

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT



In these days of gigantic demand Nortons everywhere keep production up

Here's a grinding job up in Vermont at the Jones & Lamson plant. It's a Drum Drive Shaft for a J & L Turret Machine. The material is machine steel and its rough size is 1 9/32 in. x 1 17/32 in. x 1 25/32 in. x 1 13/32 in. The finished size is 1¼ in. x 1½ in. x 1¾ in. x 1⅜ in.

A limit is set of .0005 in.—and maintained at the rate of 28 complete shafts per day.

Isn't an installation—in a plant so thoroughly well known in the quality field as Jones & Lamson—an endorsement for Nortons that you can't afford to overlook when you are ready for grinding machines?

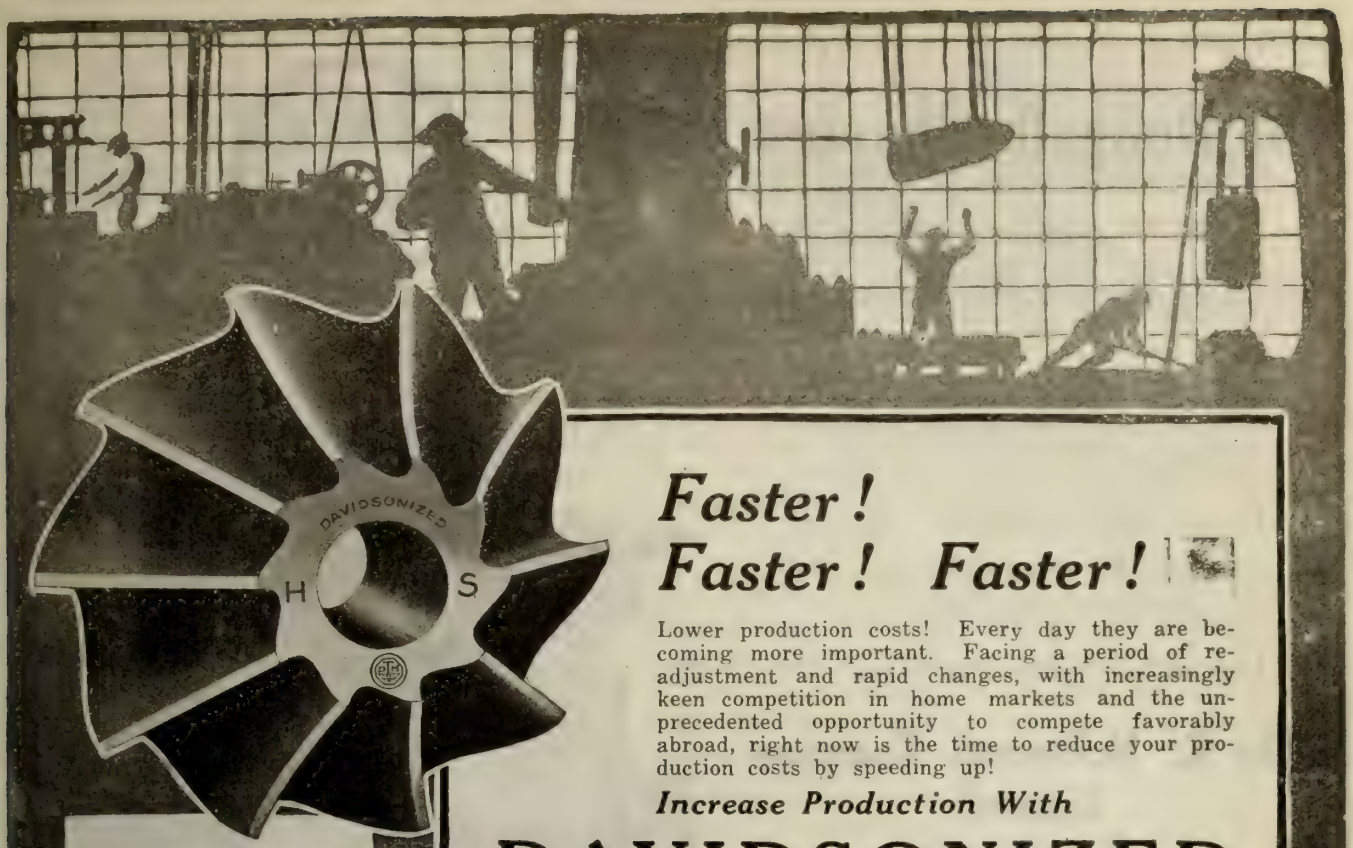
Norton Grinding Company, Worcester, Mass.

Chicago Store: 11 North Jefferson Street

Canadian Agents:

The Canadian Fairbanks-Morse Company, Limited

St. John Quebec Montreal Ottawa Toronto Hamilton
Windsor Winnipeg Saskatoon Calgary Vancouver Victoria



Faster! Faster! Faster!

Lower production costs! Every day they are becoming more important. Facing a period of readjustment and rapid changes, with increasingly keen competition in home markets and the unprecedented opportunity to compete favorably abroad, right now is the time to reduce your production costs by speeding up!

Increase Production With

DAVIDSONIZED HIGH-SPEED STEEL TOOLS

As evidence that these tools *will* enable you to increase your production radically, we quote from one of our great American gun plants:—

30% Increase in Cutting Speed

"Please be advised that we placed into production the Formed Milling Cutters received from you for milling the sectors on breech blocks made of 3½% nickel steel, and obtained an increase of 30% in cutting speed to secure the same number of pieces in production before it became necessary to re-grind, using same feed and depth of cut."

Think What This Would Mean in Your Plant

Any equipment that will increase production is worth considering, even if it involves added investment. But using Davidsonized tools does *not* require that; you need tools anyway. And your increased output through the use of Davidsonized tools will cut down the percentage cost of all the important items that make up your overhead—space, depreciation of costly machines, labor, etc. The cost of every milling operation in your plant will be reduced in two ways through the use of Davidsonized High Speed Steel Cutters—first, by the *increased output per machine per hour*; second, if Davidsonized cutters are run under only same conditions as others, by the *greater number of pieces per grinding obtainable*. The latter feature will lower tool costs to an extent which makes these tools far more economical than any others.

DAVIDSONIZED HIGH-SPEED STEEL TOOLS are revolutionizing production standards. We guarantee them to out-perform any others you are using, whether of your own or outside make, and to outlast them. If they do not make good this guarantee, it is your privilege to return them and we will cancel all charges.

Besides its convenience, saving of time and elimination of your loss by cracking in hardening, Davidson "Special Service" gives you better tools which increase production and last longer. Send us a trial order; our guarantee prevents risk. Correspondence invited.

THE DAVIDSON TOOL MFG. CORPORATION

Main Office: 118-122 Maiden Lane, New York
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To Concerns Who Make Their Own Tools

We supply Davidsonized High-speed Steel Blanks in the semi-finished state, hardened and finished within grinding size (about .015 to .020 stock to be removed from working surfaces). This enables the user to obtain these tools of unequalled quality at a cost which compares most favorably with that of tools made from the solid bar.

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These are up-to-date Shapers, designed for modern shop production.

They are plain in design, yet embody all essential features necessary for efficient work.

Every adjustment is convenient for the operator and fine for the most accurate work.

Let us have your enquiry.

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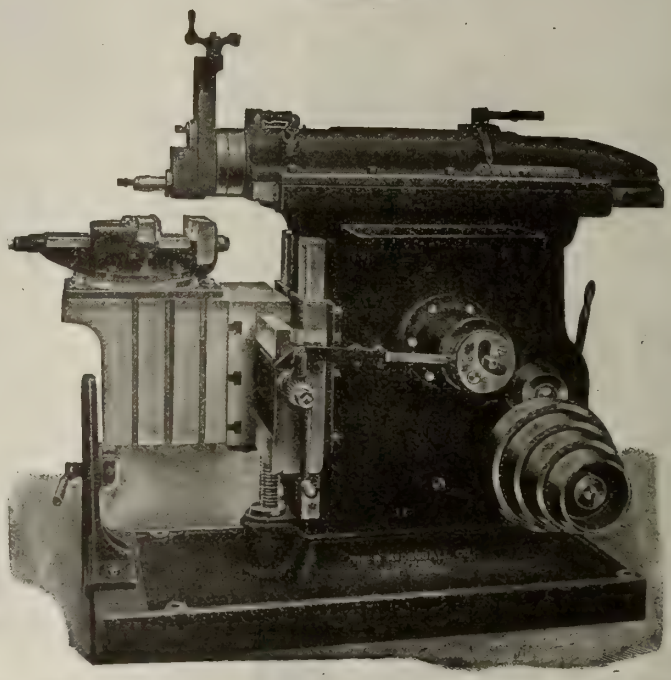
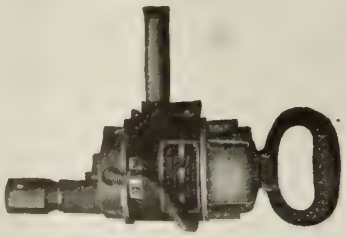


U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

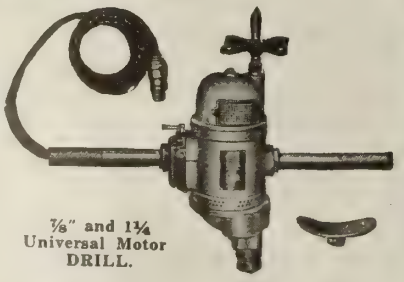
3 SIZES

3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅞" and 1¼ Universal Motor DRILL.

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THE UNITED STATES ELECTRICAL TOOL CO.

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SERVICE

Our new factory is now completed. Ninety Thousand Square Feet of floor space are equipped with the most efficient appliances and machinery, devoted exclusively to the production of

QUALITY FILES

The same meticulous care will be observed as in the past in every stage of manufacture, and we shall continue to use Best Clay Crucible Cast Steel for all shapes and sizes of Files.

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Ingersoll File Company, Limited

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WORCESTER MASS. U.S.A.

THE FIRST CHANCE YOU HAVE

TO WATCH ONE OF THESE MACHINES AT WORK, STOP FOR JUST A FEW MINUTES AND STUDY IT.

THE CONVENIENT LOCATION OF ALL OPERATING LEVERS, THE MANY SPEEDS AND FEEDS, AND THE IMPOSING SOLIDNESS OF DESIGN WILL SUGGEST TO YOU THE WORTHINESS OF A "REED-PRENTICE" FOR YOUR WORK.

WE WILL GLADLY SEND YOU A CATALOGUE OF OUR LIGHT AND HEAVY DUTY RADIALS.

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MANNING, MAXWELL & MOORE, INC., NEW YORK
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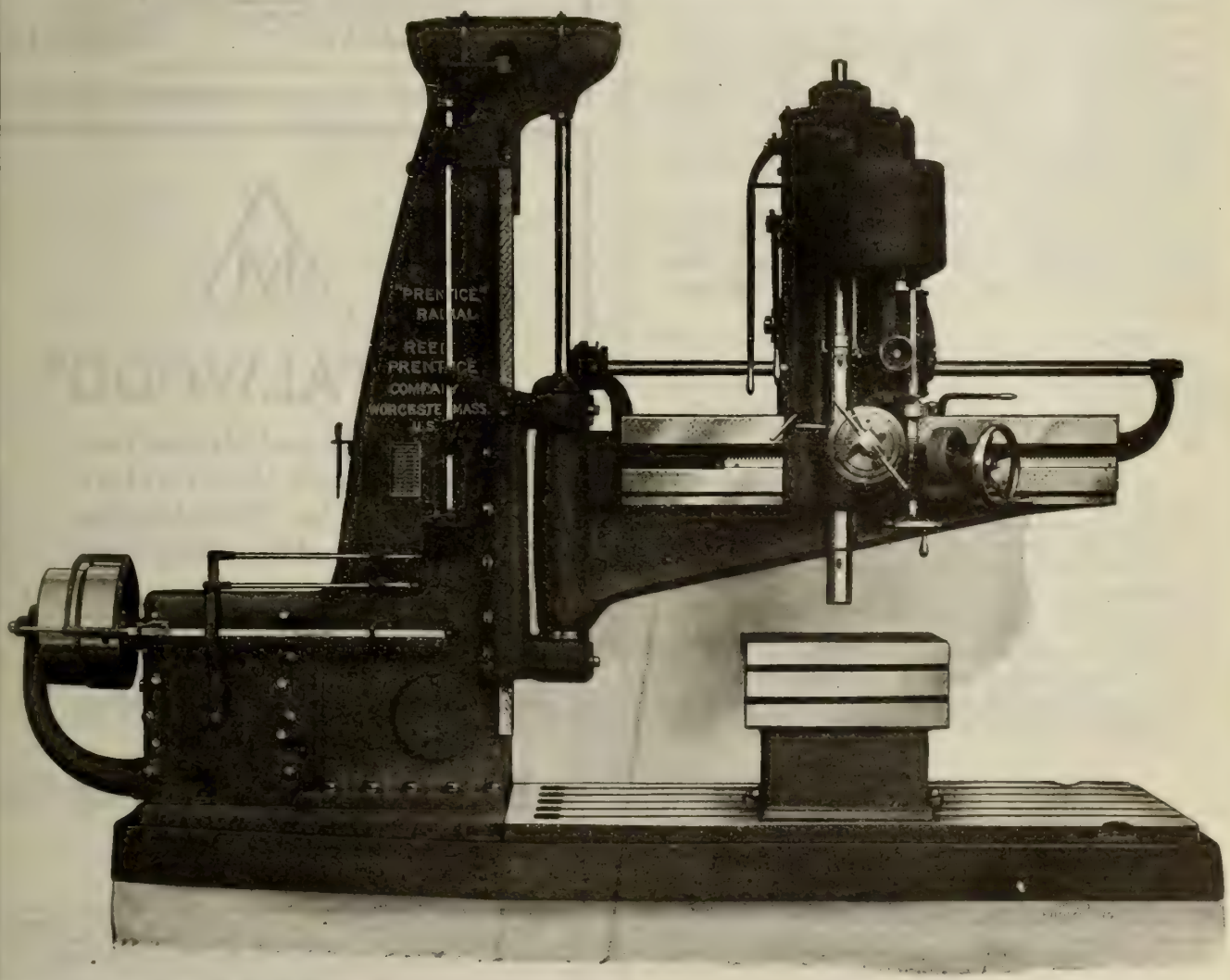


Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 39A

The Right Abrasive *for Grinding Glass*

It is well known that Alundum, an aluminous abrasive, grinds better on materials of high tensile strength, and Crystolon, a carbide of silicon abrasive, is more satisfactory on materials of low tensile strength. In the case of glass we have a material that is, so to speak, on the border line. There are several instances where Crystolon is being used in one shop and Alundum in another on very similar work. Obscure differences in the grinding conditions or in the operations may make one of the two abrasives slightly superior to the other. The following examples, therefore, are only a guide as to the wheels and grain more commonly used on different kinds of glass cutting or grinding.

For deep, medium and fine mitres in rich cut glass "Alundum stones" have long proved to be without a rival. This same wheel is also remarkably successful in work on light ware or when used as an engraving tool.

Both Alundum and Crystolon grain are used for general glass roughing and for roughing mitres in cut glass with an iron wheel or "mill." Here, owing to their purity, the artificial abrasives proved their great superiority. There are no impurities in any quantity or large sized grains which are so apt to cause chipping and other troubles. Grain size 90 is commonly recommended for this work.

Crystolon is used extensively for beveling mirrors and plate glass and for many surfacing and edging operations. It is also used on many little known operations such as surfacing glass laps and grinding the seats of glass valve sockets.

In the case of surfacing lenses or in squaring their edges Alundum is largely employed and some very remarkable tests have only recently been reported on this work. One lense manufacturer emphatically says "There will never be any more emery in our shop if we can get Alundum."

The use of Alundum and Crystolon on glass was chosen for the subject of this week's "Notes on Grinding," because this class of work is out of the ordinary and because we wished to emphasize that no matter how unusual your grinding or polishing operations are there is a correct kind and size of Norton abrasive to fit your requirements. Our Sales Engineering Department is able, by years of experience, to recommend what should be sent you on trial. Why should you not take advantage of this service? It has been responsible for cutting down the production costs in hundreds of shops. Why not yours?

NORTON COMPANY

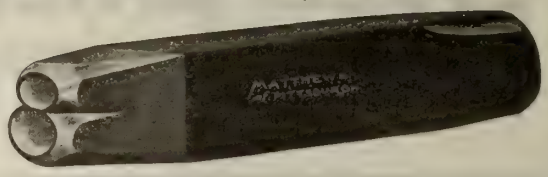
Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT. NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 11 NO JEFFERSON ST.

TRADE NORTON MARK

MARK YOUR PRODUCTS THE "MATTHEWS" WAY



"Matthews-made" steel stamps and lettering dies make easily read and durable marks on all classes of products. Matthews Champion Type Holders—for flat and convex surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years' experience.

Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

Canadian Fairbanks-Morse Co., Limited

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.

Detroit, Michigan

Sales Representatives

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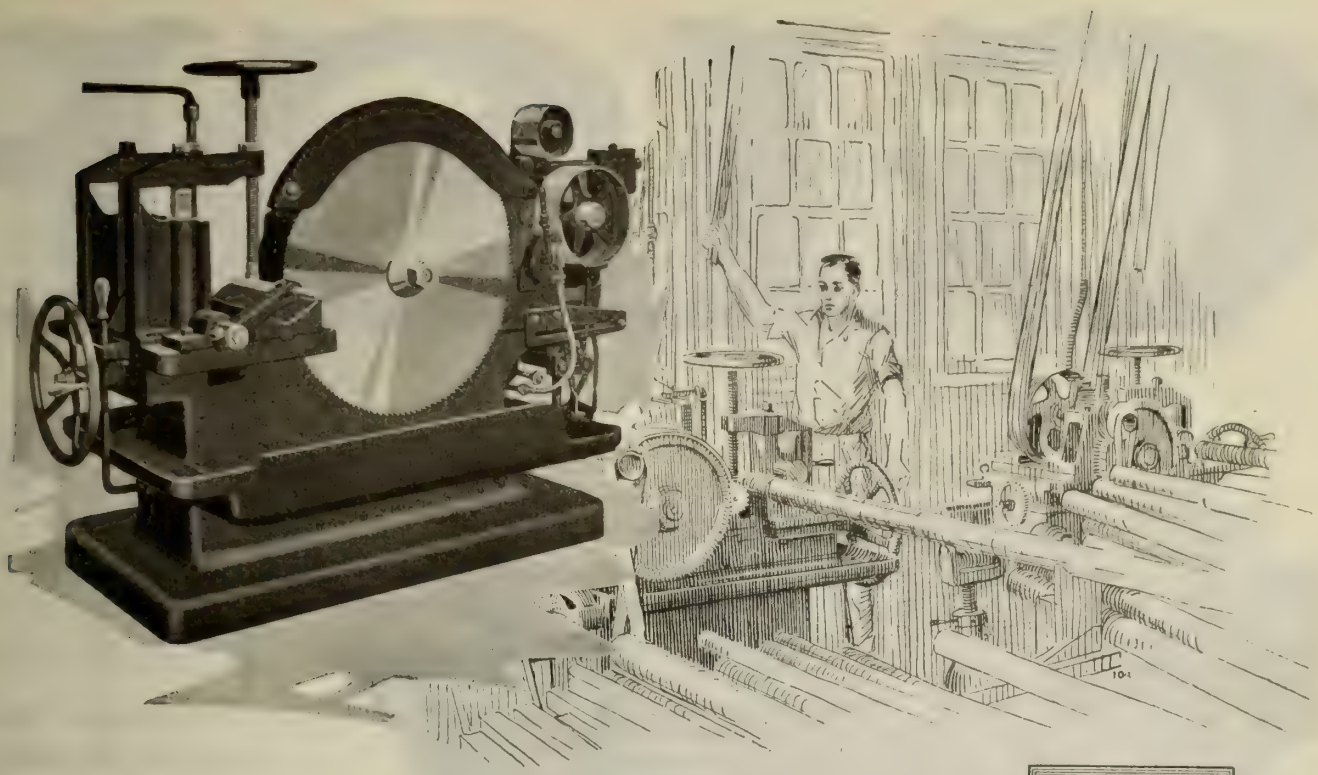

Steel Economy

The use of Nutter & Barnes Automatic Metal Cutting-Off Saw Machines in the steel shed effect a real economy in steel.

These machines fully described in Machine Tool Catalog No. 39

Got yours?

These high-powered machines drive an exceptionally small, narrow saw, considering their capacity. Consequently the wastage of steel is reduced to a minimum.

On the other hand, they are big producers. Nutter & Barnes Cold Saws are used by some of the largest shops in the world. *They can help you!*

GTD PRODUCTS
Taps and Dies
Screw Plates
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Pipe Tools
Opening Die Heads
Machine Tools
Threading Machines
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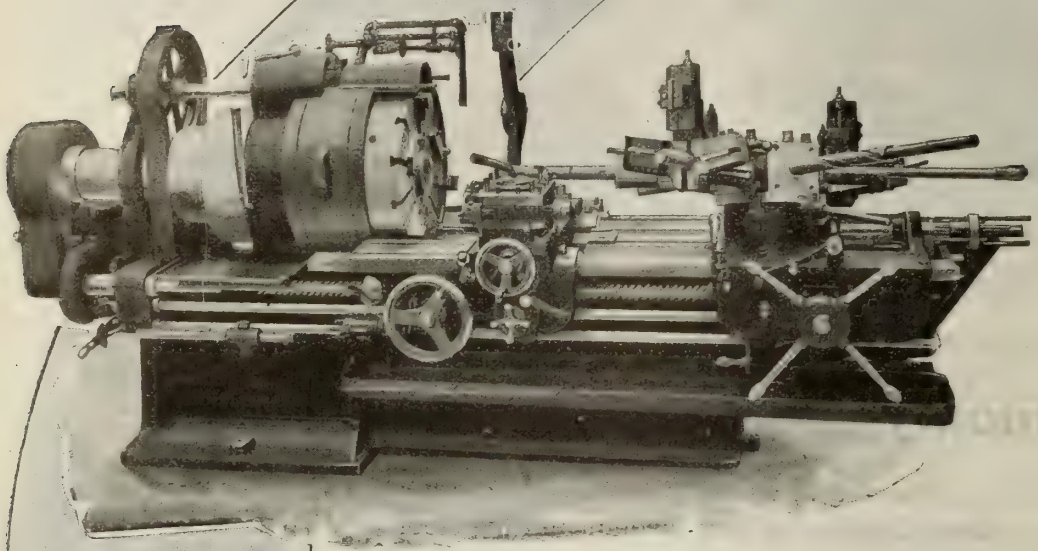

Servic

Regarding th point there ca be no question.

Gisholt Servic in the matter company orga zation, satisfi by offering users and pro pective users f Gisholt Tools the attention of Sp cialists trained to give every al toward the solution of shop pro lems.

Gisholt Turret Lathes

Let this point sink in. Gisholt Turret Lathes are dependabl the "highest" degree. The good impression they make is las rather than fleeting. They are machines one never tires machines one likes to give work to because of the assured duction.

Will you let us tell you more about them?

GISHOLT MA

Builders of Standard and Automatic Turret
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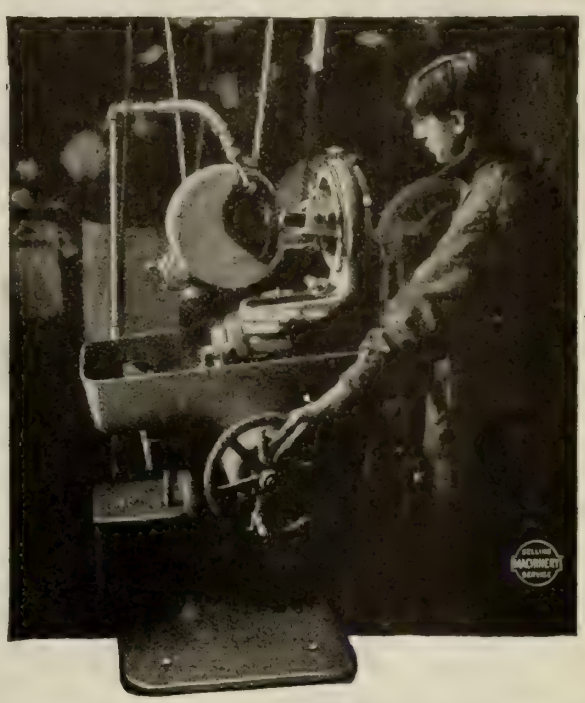
atisfies

Gisholt Service, in the matter of machines, satisfies by offering to users tools and machines designed to accomplish certain definite production objects.

Gisholt machines are only a means to an end, that end being maximum production at lowest cost.



Gisholt Tool Grinders

Designed to encourage production and discourage idleness among workmen who are now forced to waste their time, and yours, waiting for a turn at the emery stand.

A boy and a Gisholt Tool Grinder will turn wasted time into productive time and keep your lathe operators busy at their machines. The money you put into a Gisholt Tool Grinder will prove a most profitable investment.

Write for Catalog.

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Jacklift

—your way to lower labor costs and bigger profits

It can be done—that's why so many in the United States are using the Jacklift and the platform system for handling heavy loads. And now the Jacklift is being made in Canada for Canadian manufacturers who wish to reduce their inside trucking costs.

The Jacklift and platform system in your plant means the easier handling of loads, the quicker movement of materials, less labor, greater economy and less possibility of accidents or damaged materials.

Four Vital Points of the JACKLIFT

High Lift

A clear lift of 2½ inches by four easy strokes of the handle operating an ordinary jack.

Easy Lift

Four times the handle movement means a lifting ratio of 1 to 35. A girl or boy can easily handle one of these machines with heavy loads.

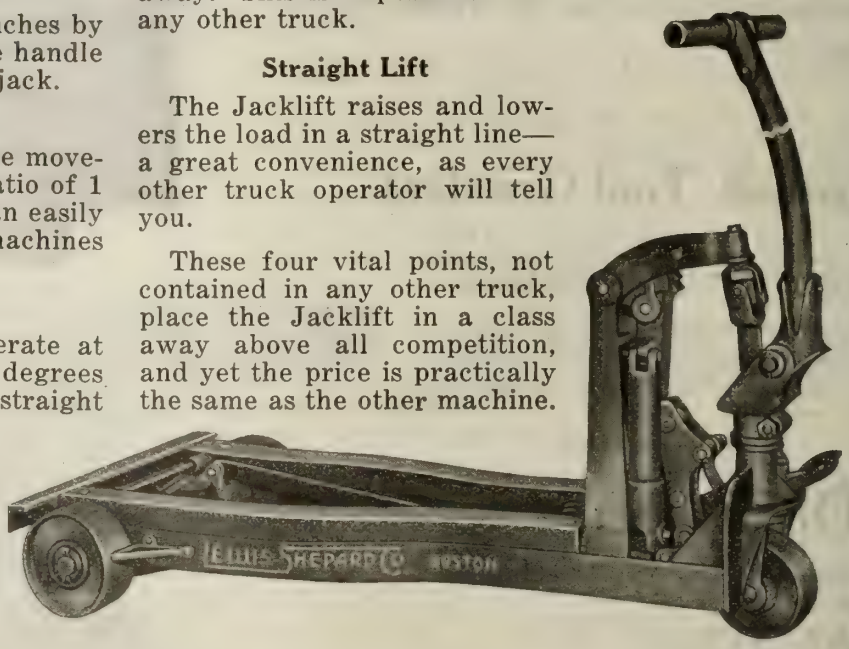
Angle Lift

The handle will operate at any angle up to 90 degrees either side as easily as straight away. This is impossible with any other truck.

Straight Lift

The Jacklift raises and lowers the load in a straight line—a great convenience, as every other truck operator will tell you.

These four vital points, not contained in any other truck, place the Jacklift in a class away above all competition, and yet the price is practically the same as the other machine.



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The Canadian Fairbanks-Morse Company

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 14 April 3, 1919

The New Home of Pratt & Whitney Co., Ltd.

A Description of the New, Modern Plant at Dundas, Ont., Which is Specially Designed, and Arranged to Manufacture on a Greater Scale Than Ever Before, This Already Well-known Line of Small Tools, Etc.

By J. H. MOORE, Associate Editor CANADIAN MACHINERY

THE following article will be strictly a plant article, devoted to a general description of the construction of the building, its various features of more than ordinary interest, which show the care and amount of thought that has been spent on the layout of this new modern plant. Of course as can be surmised, the need of a new plant arose from greatly increased business, in fact the demand for the tools, gauges, etc., as turned out by this firm has become so pronounced that the present building now in operation has proved inadequate for the needs of the small tool industry, so this new modern building was the only solution.

The building itself is of flat slab reinforced concrete, together with brick construction throughout, and as the proper place to start a description of this nature is at the ground level, let us look at Fig. 1 and see the commencement of operations. From this view we glean a general idea of the style of base used for the pillars in the basement, the molds and their construction being clearly seen in the photograph. Fig. 2 takes us still a little further, and illustrates the basement in course of construction. The massive pillars are particularly noticeable, these being of hexagon design, and measuring 36 inches across the flats. The construction of the molds for the bays are also clearly shown, the distance between these bays being 25 feet. The plant complete measures 175 feet by 75 feet, with two added towers for elevators, each 15 feet wide, making the building at these points 90 ft. wide over all. In addition to the basement there are three stories, each having a height of 15 feet from floor to ceiling. These floors will be described in due course.

At Fig. 3 we seen a decided change from photo No. 2, for things have now assumed a definite shape. It is hardly necessary to comment on this photo, for it is self-explanatory, and illustrates more clearly than written description could ever accomplish, the general appearance of the building at this stage.

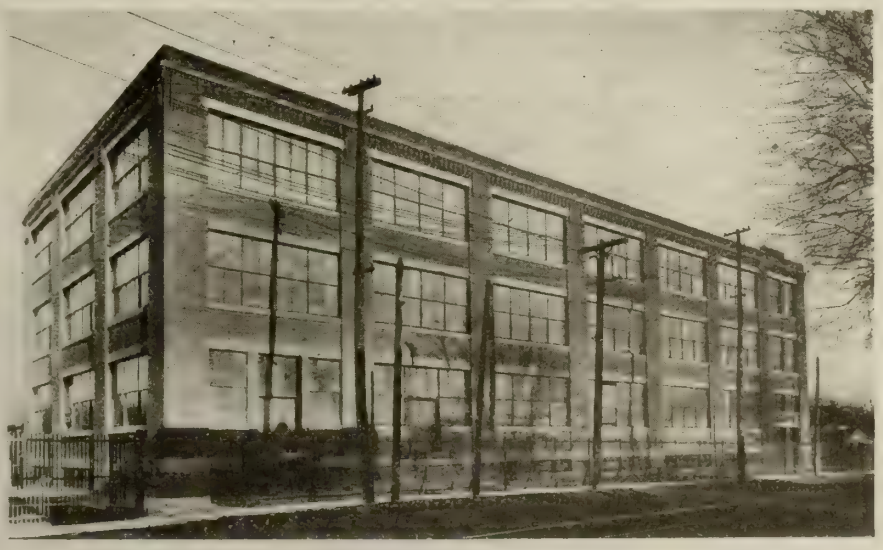


FIG. 5—THE BUILDING AS IT APPEARS FROM THE STREET.

At Fig. 4 is shown an interesting view of the reinforcement bars, and the style of placing in position. This view was taken after the second storey was completed. The old building at present in use can be seen in the background of the picture.

At Fig. 5 we see how the building looks after completion, as viewed from street. Attention is called in this view to two entrances shown in the foreground, one with steps leading up to the door, the other simply a large door with concrete sill. The first door spoken of is used to serve a double purpose, namely, as an entrance to the plant office, also as an entrance to the wicket of the parcel receiving and parcel shipping portion of the stock room. The door with concrete sill is utilized for purposes where express waggons or light shipping is done. Completely around the shipping portion of the building is laid a brick roadway, and for shipping heavier material there is a door at the ground level of freight elevator shaft, which can be opened when desired and truck backed in, when elevator can be stopped at same height as the truck and work is then easily passed from the elevator to truck, or vice versa as the case may be.

The Basement

Perhaps the best method of giving readers a detailed description of the interior of this plant would be to start at the basement, gradually working up to the roof, so, commencing at the basement, let us see what we find.

The first thing particularly noticeable is the painting scheme adopted. The roof is painted a cream color, the walls to within about 3 ft. from the floor a light buff; the remaining portion to the floor is painted dark green, and the general

effect is very pleasing. The cream-colored roof and buff walls present a good light appearance, while the green below harmonizes splendidly, yet will not get dirty as easily as the lighter color would.

Another painting scheme which is used to splendid advantage is that of painting the various type of pipes different colors. Wherever a pipe is painted red it denotes that such a pipe is a part of the sprinkler system which is installed throughout the entire building. White painted pipe illustrates that all such pipe contains electric wiring, and so on, each color having a particular meaning, which is illustrated clearly on blueprint made for this purpose. This scheme safeguards the possibility of tapping into a pipe expecting to find electric wiring, but suddenly finding that you have unfortunately tapped the sprinkler system, or perhaps the steam system.

FIG. 1—THE START OF BUILDING OPERATIONS

Another point of interest in this portion of the building is the floor construction. This floor has a cement foundation with wood blocks bedded in tar for a walking surface. Such a floor as this is much easier on the feet than the usual cement floor generally found in a basement.

At one end of the basement is a room set apart for the millwright's use, where all supplies as required by him can be kept. There is also a large wash room with individual basins, each containing hot and cold water taps. In this room are also installed steel lockers for the workmen. This wash room feature is duplicated on every floor. The fittings in these wash rooms are away above the average usually found in such a plant as this.

There is also a slop sink on every floor where same can be used for the many purposes a fixture like this comes in handy for.

Another interesting duplication on each floor is the toilet installation. On each floor are two separate toilets, one for ladies, the other for gentlemen. The fixtures in these toilets are simply splendid, and each toilet is divided by a slate partition.

Elevators

Two elevators are installed, one a 3-ton freight elevator, the other a 2-ton passenger type. At all openings on each floor are installed safety gates.

Stock Rack Systems

The method of handling the stock in the basement is well worthy of attention. First the stock is brought in from the back of the building so that it will not interfere with any other shipping, when it is placed in racks of special construction, in fact racks made specially for the purpose. These racks are made from channels and angle irons, held together by tie bolts. The construction is arranged so as to form passages about 9 inches square clear through the rack. Attached to each space is a raised stamp stating what size stock goes in that particular place. These stamps are placed on both sides of the rack so that stock can be withdrawn from either side. Another feature of these racks is that all material is classified and separated in a rather easy but effective manner. Wherever material is separated in sections the particular post or channel of the rack is painted white. This white post shows up very clearly, and flat machine steel, round machine steel, and so on are easily kept apart. This applies of course to the tool steel, etc., as well.

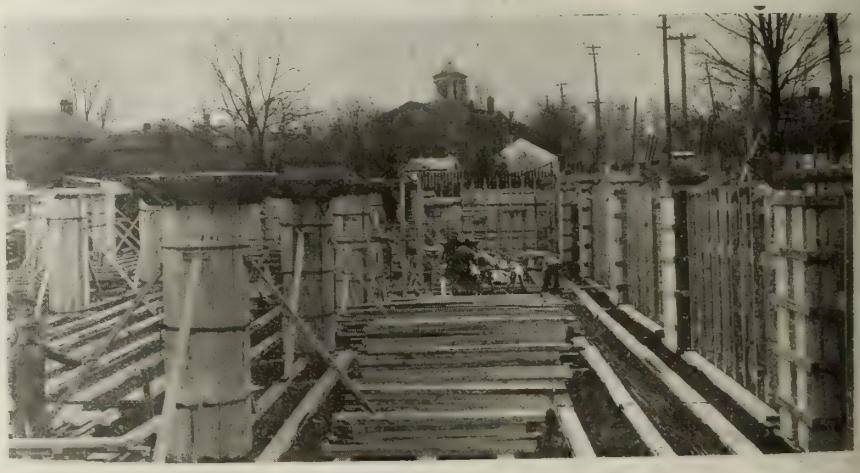


FIG. 2—AT WORK ON THE BASEMENT.

Directly alongside of the racks will be the cut-off machines. Such an advantage is easily understood and needs no comment, for it will be but the matter of a moment to transfer the stock from the racks to the machines. On the other side of these cut-off machines will be placed steel bins, in which will be stored the various lengths of short ends. These bins will also have raised stamps on each bin designating the type of stock, and all particulars pertaining to the same. In this basement will be performed the cutting off, boring, and tapping operations. Butt welding will also be carried on in this department.

First Floor

Fig. 6 allows reader to form some opinion of the interior appearance of this floor, in fact the first and second floors are very similar in design, the only difference being that the factory offices are on the first floor, while the second floor is devoted entirely to manufacturing purposes.

Starting at the factory office. Here the offices are divided in the usual way by glass partitions into a private office for C. A. Fisher, factory superintendent, then into a general office, with enquiry wicket of unusual design. At this wicket visitors state their business, when, without rising, the girl in charge can control electrically the door leading into the aisle of the office. Such a feature is well worth while, for it prevents any Tom, Dick, or Harry getting into the office without proper permission. In conjunction with these offices is built a laboratory, where scleroscope, gauges, etc., will be kept to illustrate the actual tests made on the work as it goes through the plant without the necessity of going into the shop.

The Store Room

The store room on this floor is a department in itself. Here are placed in long rows steel drawers on one side and steel bins on the other. These drawers and bins are all numbered, and each section is given a letter of the alphabet, then again each line of drawers or bins has a number. The whole system will be controlled by a card system with which you will be able at a moment's notice to ascertain the location of the piece, or pieces you desire. For example, suppose

we want a tap hob of some particular size and we find the card says section C, line 15, drawer No. 591. It is then an easy matter to locate section C, when line 15 will be seen plainly marked. Of course to find drawer 591 then becomes a mere detail. The same idea applies of course to the bins. All various tools or parts are classified under the proper head, and the system, when completely in operation, will be something to be rather proud of.

It will be noticed by readers that steel bins, etc., are mentioned, in fact the sheet steel idea is followed out exclusively, for all the index cabinets, desks, etc., in the office, are made from the same material. On this floor will also be placed the smaller automatic machinery.

In the photo No. 6 it will be noticed that there is an ice-cooled drinking fountain in the foreground. The fountains are duplicated on each floor. Another feature which applies to every floor is the manner of controlling the lights. On each post is inserted a switch receptacle which controls the lights for each bay. Four 250 candle power lights, hung 2 ft. from the ceiling, provide the artificial light for each bay, so as can be surmised, at night the place presents a very well-lighted appearance. On each floor is also built a foreman's office as shown at the right of Fig. 6, and in this office is also contained a wash basin. There is also a dumb-waiter system installed connecting to the tool room, but this will be explained further along in the article. Reader's attention, however, is called to the shaft for this dumb waiter, which has the door open for illustrative purpose. This shaft is clearly seen at the extreme right of Fig. 6. It will be also noticed from this photograph that these floors are all hardwood, carefully laid.

FIG. 4—A GENERAL VVEW OF REINFORCEMENT BARS TO FLOOR.

Second Floor

On the second floor the general building features are exactly similar, but the system of arranging operations is worthy of note. The stock will be brought up direct from the basement by elevator to this floor, when it will then commence its first operation, going through its various operations in sequence until finally it lands at the other end of the floor. From there it will be sent upstairs without any lost motion whatever. The operations conducted on this, the central and main floor will be as follows: Turning, milling, threading and filing; 90 ft. of filing bench will be installed at the finishing portion of this floor.

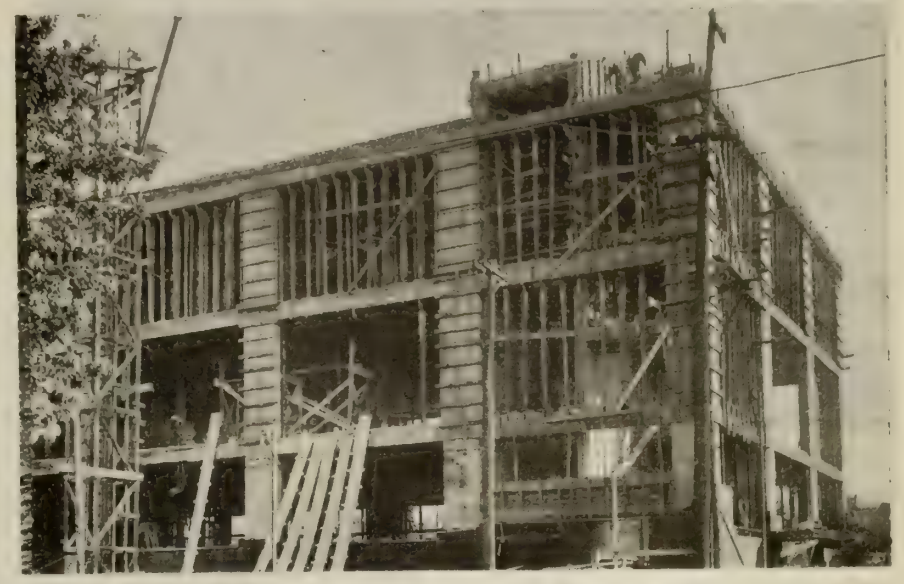


FIG. 3—THE BUILDING PARTIALLY COMPLETED

It might be well to mention that all hangers used in the power installation are of ball-bearing design and are painted a battleship grey on every floor. The novel method of motor installation on this floor is well worth a detailed description. The shafting on this floor is divided into two sections, each driven by a 20 h.p. motor. Hydro power is used. Should either of the motors give out the line shafts are so arranged that couplings, which are on the extreme ends of these shafts, can be connected in a few minutes, when the one motor can then drive the entire floor shafting until such time as the other motor is repaired. By this method all danger of power trouble is eliminated, always of course excepting the cutting off of the power itself, for which there is hardly any remedy.

The Third Floor

The third floor is divided into various departments in the following manner: Grinding, hardening, polishing, sand blasting, inspection and tool departments.

The grinding department will be equipped with dust exhaust pipe system, as also will the polishing department. The hardening department will be equipped with gas fume removing hoods. This hardening room measures 60 by 40 feet, and the floor is of wood block construction where the workmen will walk and brick construction where the furnaces will be installed. All the walls and ceiling of this department are painted dark green, and dark colored blinds will be installed, so that these can be regulated to suit the workmen in order that they can readily tell the true color of the steel heing heated, thereby ensuring correct temper. Hardening furnaces will be all oil operated while the tempering furnaces will be the electric oil bath type.

Polishing Room

The polishing room is totally enclosed in glass and stands to the right of the inspection department, in fact the sand blast department, inspection and polishing follow in sequence. The idea of having the inspection department in the middle is easily surmised, for in such position it can pass the work to either the sand blast or polishing department as required. Sliding wickets are provided for this purpose. These wickets are also dust-proof, for each of these three departments are totally enclosed in glass, and dust-proof as far as it is possible to be.

Before going on to the tool room, let us follow up the routine of the work which, after being completed on the second floor, started to come up to this, the last floor. Immediately on arrival it is taken to the

FIG. 5—GENERAL INTERIOR VIEW.

inspection department before hardening. It then goes across the floor a distance of about 20 feet and is hardened, coming back again directly to the inspection. From here it goes to the grinding department and back to the inspection. From the inspection it goes to the sand blast or polishing department as necessary through the sliding wickets already spoken of, coming back once more for the final inspection. In other words, there is not a lost movement throughout the entire proceeding.

The Tool Room

In this department is placed a complete Bowser system of oil tanks, carrying the various oils used throughout the plant. Here also is the controlling board of the dumb waiter, and we had better go into this in detail to explain its safety features. At each floor is provided a steel door, which cannot be opened until the dumb waiter is at that particular floor, nor can the apparatus be started from any floor before the door is closed. These safety features can be easily appreciated. The whole system is first of all controlled from the tool room, but the carriage can be brought to each particular floor by a button designating the floor number, but the carriage cannot be sent up to the tool room. In order to have this done, the operator in the tool room must be called up on the speaking-tube, when he can then press the correct button to bring the carriage to his floor. Such a system entirely eliminates the possibility of accidents.

The Roof

Going up on the roof we see the usual type of flat design roof, but here also are the exhaust ventilators for the gas fumes from the hardening room, together with the dust extractor which was made by Pratt & Whitney's staff themselves. A description of this extractor would not be amiss. It measures 18 feet x 6 feet and is made entirely of sheet steel. It is divided into four sections, each section containing two long stop plates and two short top plates. Each section is also provided with dust-proof doors. Of course the action of the dust-laden air is self-apparent. Coming through this extractor it continually meets these various stop plates where the dust is discouraged to go further, hits these plates, and drops to the bottom of the extractor. By the time the air reaches the end of its journey all the dust has left it, so practically free air leaves the ventilator on top. This extractor will only need cleaning about twice a year.

FIG. 7—VIEW SHOWING METHOD OF PLACING INSERTS.

Up on the roof is also the elevator house where a platform is arranged, with railing, to facilitate oiling, yet making such operation perfectly safe. The blower for exhaust system is also installed in this elevator house. In regard to the heating system as installed in this plant, it is known as the Webster vacuum system and the blower used for the oil furnaces is that of the Spencer turbine type.

Other Special Features

We have purposely kept to the last two important features. First let us look at Fig. 7; this photo illustrates

Continued on page 327

FIG. 8—LAYING THE FLOOR OF THE FIRST AID ROOM.

A New Method for the Smelting of Iron Ores

Many Ores Are Not Suitable For the Blast Furnace, and the Following Article Describes a Duplex Process For the Making of Steel From Any Ore

By J. W. MOFFAT

CANADIAN iron ores in many cases do not admit of economical reduction in the blast furnace, and the physical state in which many of them are found is such that they would have to be briquetted before being introduced into the blast furnace at all.

A new method has recently been devised for the reduction of metals from their oxide or sulphide ores, which does not necessitate the use of the blast furnace, and which at the same time enables ores of any degree of fineness to be used. In principle it employs two present known furnace processes in combination. The first step is the reducing of the ore and its conversion into the metallic state, but in the form of sponge, as it is called. The next step is the transferrence of this sponge, either hot or cold, into the electric furnace, where it is melted down and finished. This process is particularly adapted to the manufacture of iron and steel and ferro-alloys.

The iron sponge is iron in a porous form, and a definition by Raymond states that is obtained by reduction without fusion. Its weight is about one-third that of cast iron.

The reduction of iron ores into this form has been attempted by the use of gas, but the success obtained has never been very great, as complete reduction was very seldom accomplished unless by the lengthening out of the operation. Not only was this the case, but accurate control of the heat was difficult and the sponge was liable to re-oxidize it when cooled or remelted if an oxidizing atmosphere is present.

These difficulties have been overcome by the aid of pyrometers for temperature control, CO_2 recorders for gas analysis and by the use of the electric furnace in which a reducing atmosphere is readily maintained.

The reduction of hematite iron ore (Fe_2O_3) is accomplished in stages, the first to magnetite (Fe_3O_4) which takes place from 300 to 450° C., and then to porous oxide (FeO) and finally to metallic iron, which takes place from 700 to 800° C., the iron then being in a spongy metallic state. The spongy iron thus formed is finally melted at a still higher temperature of from 1100° to 1300° C.

Previous Efforts

A number of attempts have been made to use sponge iron in various ways, a few of which may be noted. In Clay's process the reduction was effected in retorts made from fire clay, the ore having been mixed with carbonaceous material, the heat being applied externally and the sponge iron product was then further heated and balled.

Newton also used a closed container in a somewhat similar way, heating it externally to a white heat for about 48 hours and taking the product while hot to a puddling furnace, or, when cold, to a crucible furnace.

Harvey devised a process in which coarsely ground ore mixed with charcoal was placed on inclined shelves within a puddling furnace in such a position that it was heated by gas entering the furnace. When reduced, the iron was worked up into puddled balls with the aid of further heat.

Roger mixed ore with coal and effected reduction in a rotating cylinder, heated externally; this he located above his puddling furnace into which the sponge was dropped, further heated and then balled.

A number of attempts have been made to use iron sponge in the crucible furnace. For instance, Beeford put a mixture of iron ore and carbonaceous material into a suitable container, heated it externally, and then transferred the sponge while hot into crucibles, thus melting it down. Later on he transferred it through a closed runner to a decarburizing chamber, where it was acted upon by decarburizing gases or steam. This was probably done to eliminate some of the carbon in the sponge. The utilization of the sponge has also been tried out in the open hearth furnace.

A number of other processes have been tried out for the using of iron sponge in the puddling crucible and open hearth furnaces, but all of them could only be considered as furnishing part of the metal used and all would certainly introduce more or less oxide into the bath of molten metal, thus increasing the finishing costs, for carbon dioxide in the furnace gases will oxidize iron sponges at as low a temperature as 300°C.

While the blast furnace at first glance might offer a means of working up the sponge, it has the serious disadvantage of oxidizing the already reduced sponge in the top part of the shaft. This action is due to the carbon dioxide, which is present in the blast furnace gases along with the carbon monoxide. This action would waste all the work previously done on the ore and the material would have to be again reduced in the reducing zone of the furnace.

In the author's process for which patents have been granted (Canadian patent No. 186,994. Oct. 15th, 1918, and U. S. patent issued Feb. 18th, 1919) for the duplexing of a reducing furnace with an electric melting furnace it is immaterial how the sponge is made. The reducing furnace must suit the materials used for supplying the heat and the means of reduction for the most convenient and economical means in one locality may not be so in another.

With modern scientific apparatus reduction and the making of iron sponge is an easy operation to carry out successfully. Such furnaces should be mechanically charged, rabbed and discharged, and means should be provided for making small additions of carbon to the charge when necessary. Preferably the gases of combustion supplying the heat should not be passed over or through the ore being reduced. Stationary pyrometers should be provided which will indicate by colored flash lamps any variation up or down from the proper temperature.

With a properly designed furnace an intelligent laborer should be able to operate a number with resulting low labor costs.

Any electric furnace can be successfully used in the final melting down of the scrap.

Canadian Ores

Ores of high metallic iron content, say 65 per cent. and over in the crude state, are becoming increasingly difficult to get in Canada and the United States within a reasonable transportation distance of any market. One of the largest concerns in the United States catalogues the product of thirty odd mines, without showing one such ore, seven, however, range between 60 and 62 per cent. Outside of the Helen and Magnie mines of the Algoma Steel Corporation, the Atikokan Iron Co. and the Moose Mountain mine of the Moose Mountain, Ltd., the ore bodies in the older and more populous parts of Canada are not large, and are of low grade as a rule.

In Ontario, except the ones mentioned, no really large property has been thoroughly proved to contain one million tons of marketable ore, though there are a few of undoubted promise, such as the Canada Iron Mines' properties in Hastings County and the Belmont mine in Peterborough. There are, however, in Ontario many small bodies of ore situated conveniently to the market.

In the 48 years between 1869 and 1916 the Dominion Government reports show a total production of about 4,350,000 tons of ore in Ontario, an average of 90,625 tons annually, or a little less than 250 tons daily, an amount insufficient

to alone supply one very small blast furnace.

In the Province of Quebec from 1886 to 1916, a period of 30 years, there was a total production of 379,953 tons, making the yearly average 12,665 tons, or a daily average of 35 tons.

New Brunswick, in 68 years, 1848 to 1916, produced 272,850 tons, a yearly average of 4,013 tons, or a daily average of 11 tons.

Nova Scotia, in 30 years, 1886 to 1916, produced 1,279,637 tons, or a yearly average of 42,655 tons, or a daily average of 117 tons.

British Columbia, in 30 years, 1886 to 1916, produced 65,078 tons and exported practically all of it to the neighboring State of Washington. This tonnage is a yearly average of 2,170 tons, or a daily average of 6 tons.

The other provinces have done little or nothing in the mining of iron ore.

Dominion Government reports also supply other statistics of the total output of all Canada. For a period of 30 years the total production was 5,759,540 tons (2,000 lbs.), a yearly product of 191,985 tons, or a daily average of about 526 short tons, or 470 long tons, the latter being the ton used in the pig iron market. This 470 long tons of ore would have to carry about 55 per cent. of metallic iron to meet the supply required for only one small blast furnace, making 250 tons of pig iron daily, which is one-half the size of what is considered a good furnace to-day, when they are being built to produce up to 600 and 700 tons of pig per day.

In 1916 the United States produced about 75,500,000 tons of ore, the population being about 100,000,000; this is equivalent to 75.5 tons per 100 of population. The same year Canada produced from her mines 340,000 tons, or 4.25 tons per 100 of population, or about one-seventeenth of what the United States did.

This is a poor showing, particularly when it is remembered that the great producing iron ranges found in the States of Minnesota, Michigan, and New York are also found in Canada, and that the last twenty years include what is called "Canada's growing time." There are undoubtedly many reasons why such a state of affairs exists, some can be removed by legislation, but the great cause of this poor showing is that few of our mines with convenient shipping facilities can produce even 100 tons per day, and the great majority of all Canadian ores unfortunately require crushing, grinding and concentration with subsequent briquetting to render them acceptable to blast furnace operators, and it is this cost of briquetting which finally proves to be the last straw.

The Canadian blast furnace operator is able to deal with one American selling agent for his entire requirements for a year's run, feeling absolutely sure of its delivery to him and of its being, according to the analysis, guaranteed at the time of its selection. Another factor which enters into the ease with which American ores can be used is the almost negligible duty of eight cents per ton and no war tax. English ores can be imported still more cheaply as regards duty as the amount in this case is only six cents.

The best solution tending towards the utilization of Canada's resources would seem to be the operation in some profitable manner of the many small iron mines, such as are to be found between the Lake of the Woods on the west, all the way down the north shore of the Great Lakes water system to the Straits of Belle Isle on the east. As there are very many large water powers available for the generation of electricity at points sufficiently convenient for the transmission of power to suitable smelting locations, the past difficulties can be largely overcome by a reversion to the use of the iron sponge of the ancients, melting it in the very modern electric furnace with its ideal conditions for that work, and without removal, finishing the metal into any desired iron or steel.

Marketing the Product

It is hardly to be expected that the electric furnace can market ordinary pig iron in opposition to that made in the blast furnace, except under most unusual conditions, such as a very long haul from the blast furnace to that market which may be adjacent to the electric furnace. Low phosphorous high silicon pig iron, however, could be made for sale to the open hearth steel furnaces and some washed metal (metal with the phosphorous sulphur and silicon practically eliminated) and other special irons would have some market.

The natural product of the electric furnace is steel, however, and to that metal is its work advantageously confined from a financial point of view. It is particularly well suited to the furnishing of the molten metal in a steel foundry, but this class of work is only prosperous in the centres of large population, and most of our smaller iron mines are situated at some distance from the cities.

During the war there was a ready market found in casting ingots for the forging of shells. The war taught us new possibilities, and if existing forging and rolling mills are not disposed to continue that practice, the electric furnace plants could cast ingots, crop them (remelting the cropped ends with the iron sponge of the next heat) and ship the ingots to a distant forging works or rolling mill which they themselves had combined to build and operate. A plate rolling mill would find a ready market for its entire output in Ontario, for instance. Rolling billets, too, would probably be satisfactory. Electric furnace steel, owing to its superior quality, will always find a sale in competition with other steels and at a higher price even when steel of high quality is desired.

Under the new process the ore should be crushed fine enough to effect the best magnetic separation of the iron oxide from its associated gangue, usually silica. It is rather expensive to get rid of rock material by means of slags made in the electric furnace, and an ore should be concentrated up until it carries as high a metallic iron content as possible, over 63 per cent. say, though no hard and fast rule can be laid down, as it all depends on the analysis of each ore.

For reduction purposes, the carbonaceous material should be ground to the same size of grain as the ore and should be very thoroughly mixed with it. Its analysis should show the weight of fixed carbon and volatile matter, moisture and ash. Theoretically the metallic iron should have one-quarter of its weight of fixed carbon present for its complete reduction, but in practice a further small percentage is added. For example, 1,000 lbs. of 65 per cent. iron ore (Fe_2O_3) has 650 lbs. of metallic iron and theoretically requires 162½ lbs. of fixed carbon for complete reduction which would be found in 275 lbs. of charcoal showing 60 per cent. of fixed carbon in analysis.

Limestone, also finely ground like the concentrates, may be mixed in the charge and will be calcined in the process, or it may be added as lime in the electric furnace. There should be enough lime present to make a very basic slag in the electric furnace.

The iron sponge may be handled hot or cold. When transferred hot, the reducing furnace should be provided with means for discharging its contents into containers having air-tight valves, taking every care that air is not allowed access to it during the discharge. The containers must be discharged into the electric furnace with like care and preferably through the roof, the furnace having been previously rendered air-tight. The current can then be put on and it will be noticed that the charge will carry the current steadily at once without the very objectionable surging found in melting cold scrap. Indeed, if the sponge is only reasonably warm this will occur and the running will be smooth.

The reducing furnace may be provided with a large air-tight cooling chamber underneath, into the top of which the iron sponge may be dropped when reduction is complete. When this chamber is constructed to hold the product of several runs, it becomes a storage bin as well, with the lowest charge cooled below the oxidizing temperature, but still being warm it can be transferred without care and be charged into the electric furnace through its regular doors.

In the case of a low grade hematite or a mixed hematite and magnetite ore, which ores do not answer well to magnetic concentration, a partial reduction to Fe_3O_4 will render it well suited as a rule.

The heat required for the chemical reactions can be either secured by burning coal or coke on a grate or by using these in powdered form, blown in with air to

a combustion chamber or by using liquid fuel, such as fuel oil. The burning gases from any of these fuels should heat externally the container in which the work of reduction is being carried on, but preferably should not be allowed to enter it. If electric heat is used it can be applied in the same chamber as that in which reduction is being carried on.

The operation of the electric furnace in the melting down of the sponge is practically the same as in the melting and refining of scrap.

In the Swedish electric furnace (Electro-Metals Co.) it requires about 1.1 k.w. hours of power to produce 1 lb. of metal and the metal is a white iron only. This is equivalent to 2,200 k.w. hours for a net ton. It is transferred while liquid to an electric furnace, where about 300 k.w. hours of additional energy are required to finish the metal into steel, making the total energy used about 2,500 k.w. hours from ore to steel.

Properly reduced iron sponge melts as readily as scrap, which can be melted and finished in good practice with 700 or 750 k.w. hours per ton, but as the rock material remaining in the iron concentrates will frequently necessitate a larger amount of lime to secure a very basic slag, the amount of slag used in the iron sponge process will be somewhat greater than in the scrap melting process. A fair average will be 800 k.w. hour with the sponge process, or about one-third the amount required by the electric process used in Sweden.

In this new process no high temperature heat is lost in waste gases leaving the electric furnace, as there will be practically no gases generated there, and compared with other processes using 1,700 k.w. hr. of energy more than the iron sponge process, which employs heat obtained for reduction from fuel, the economy in the process is readily seen. A six-ton electric furnace will require the iron sponge made from about 10 tons of 63 per cent. Fe concentrate per heat. Four heats can be easily made in 24 hours and a skilled operator could get five if the plant were suitable. Taking the number of heats at four a six-ton furnace would then readily produce 24 tons of liquid steel in 24 hours, and would require 60 tons of 63 per cent. Fe concentrates. If the ore mined would need concentration of 1½ into 1 to produce 63 per cent. Fe concentrate, one six-ton furnace would use 90 tons per day of such crude ore.

Owing to the existing instability of prices of materials and to the labor unrest, it appears to be quite inadvisable to make any attempt to quote an average cost for either plant or product—a cost quoted to-day will probably be useless a few months hence. Iron sponge, however, will cost less than scrap as soon as the war scrap is all used up.

The following are the main claims granted in the patents issued to the author:

1. A discontinuous process of treating metallic oxide ores which consists in reducing a charge of ore without fusion in a suitable furnace, and, after reducing, excluding oxidizing gases from contact with the charge, while its temperature is above the lower limit at which re-oxidation can take place, placing the reduced charge in a separate electric furnace and fusing it there in an inert or reducing atmosphere.

2. A discontinuous process of treating metallic oxide ores, which consists in reducing the charge of granular ore without fusion in a suitable furnace, and at as low a temperature as possible to maintain the granular form of the reduced ore, and after reducing excluding oxidizing gases from contact with the charge while its temperature is above the lower limit at which reoxidation can take place, placing the reduced charge in a separate electric furnace and fusing it therein in an inert or reducing atmosphere.

3. A discontinuous process of treating metallic oxide ores which consists in reducing a charge of ore without a flux, without fusion in a suitable furnace and after reducing, excluding oxidizing gases from contact with the charge while its temperature is above the lower limit at which reoxidation can take place, placing the reduced charge in a separate electric furnace and fusing it therein with a flux in an inert or reducing atmosphere 4, 5 and 6, cover the cooling of the charge after reduction and before fusion to a temperature below that at which reoxidation can take place as already set out in 1, 2 and 3.

NEW HOUSE OF PRATT & WHITNEY

Continued from page 324

clearly the system of inserts as provided in the ceiling of each floor every 3 feet apart. By means of these inserts, which take the form of fastening bolts, together with 3 in. channels placed lengthwise and crosswise, hangers for the various countershafts can be placed to within a square inch of the desired position without any trouble or hole-boring in the ceiling. This idea is a decided improvement over the old-time method.

First-Aid Room

Last, but not least, let us refer to Fig. 8, which illustrates the laying of the tiled floor in this very necessary department. This room is part of the second or main floor and is placed in this central position for convenience. The complete room is painted white, and of course, as can be seen, the floor is tiled. Foot bath, wash basin, in fact all necessary equipment will be installed in this room, where good medical attention will be secured.

Taken in all, this plant is modern in every respect, for cement stairway with railing, fire doors on every floor, sprinkler system throughout, and all other up-to-the-minute fixtures are installed. In a later article we hope to show readers of CANADIAN MACHINERY the placing of the new machine equipment, together with some of the most interesting operations throughout this plant.

FLUE TEMPERATURES

The temperature of the gases in the uptake or smoke flue affords a useful indication of the economical performance of the boiler, although it sometimes requires skill and experience to interpret the temperature readings correctly. An unnecessarily high temperature in the flue usually indicates poor economy, because it shows that a considerable quantity of heat that should be absorbed by the boiler and utilized in the production of steam is being poured into the stack wastefully; but a low temperature does not always indicate good economy, because it may be due to leakage of air through the setting or through some of its connections, or to imperfect combustion in the furnace, accompanied by extensive distillation of combustible gases in the unconsumed form.

At the moment of their emergence from the boiler, the flue gases must necessarily be somewhat hotter than the boiler or its contents, and in the best boiler-room practice the flue temperature is usually from 500° to 600° Fahr. When a materially higher value than 600° is observed, the conditions that lead to it should be investigated and remedied, because neglect to do so is likely to result in a large and probably continuous waste of heat. When the combustion is effected by means of an ordinary chimney or stack, a certain temperature in the escaping gases is essential to the realization of a proper draft. If the chimney and the other parts of the installation are correctly designed, the draft should be good with a flue temperature of 500° Fahr., as indicated above, unless the boilers are heavily overloaded; but good natural draft can rarely be had with a flue temperature materially lower than this. A high flue temperature may be due to any one of a number of causes. The boilers are perhaps being forced beyond their normal capacity, so that the flow of gas is too rapid to permit a proper absorption of the heat; or they may have become thickly coated with sediment and scale internally, so that their heating surfaces are not in good contact with the water; or they may have become covered, externally, with a coating of non-conducting soot and dirt.

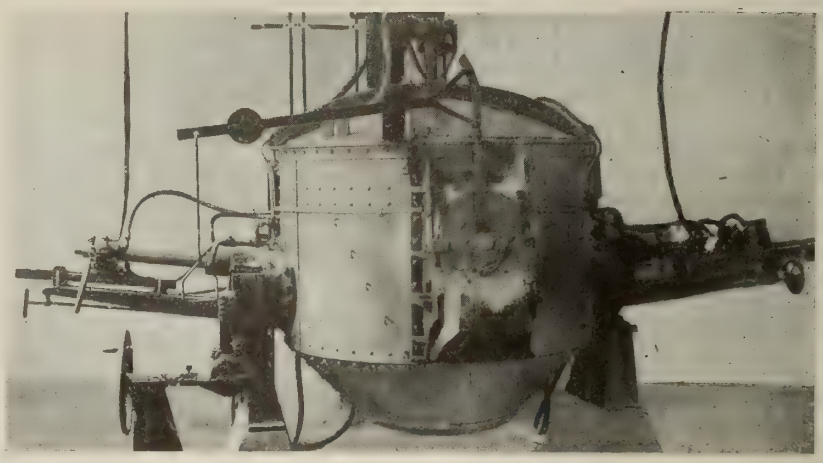
Closing the Plant.— The Canadian Steel Foundries, Welland's largest industry, has closed and when it will open again no man can prophesy. "Every order we have on hand will be completed by Saturday," said R. S. Hart, manager, "and we have no other course open to us. We have done everything within our power to keep the plant in operation, but we have not succeeded. What foundry work is available will be done at our plant at Longue Pointe." The Welland plant normally employs between six and seven hundred men, though that number has been much reduced in the past three months.

Types of Electric Furnaces—1: the Rennerfelt

The First of a Number of Articles Dealing With Various Types of Electrical Furnaces in Successful Use in Metallurgical Industry—The Electrical Characteristics of This Furnace Are of Interest

By W. F. SUTHERLAND.

THE Rennerfelt electric arc furnace was developed by Rennerfelt in 1912 and is now in successful use for melting steel, cast iron ferro-manganese, nickel, copper, bronze, brass and aluminum, etc. It is of Swedish origin, the inventor, Ivan Rennerfelt, having conducted the experiments which led to its successful development in Sweden. The earlier Rennerfelt furnaces were built of the square or rectangular type, while others were of the later round type with domed roof. Standard practice with the manufacturers now is to use the round shell with a removable dome-shaped roof. This improved design results in a better heat distribution and a more accessible hearth. Relining is also greatly simplified.

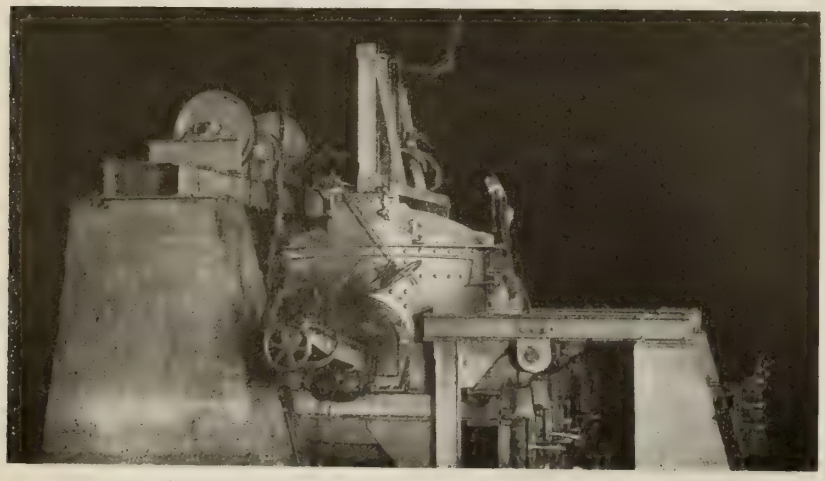


1,000-LB. FURNACE, FRONT VIEW

Originally, all furnaces, even the largest types, were tiltable about central trunnions, and the tilting was accomplished by rack and pinion and worm gearing. This construction is now only adopted in the smaller sizes, the three ton and larger sizes now being tilted by means of a cradle and rack. This construction permits of a much smaller movement of the pouring lip and where even this amount of movement is inadvisable it is possible to support the furnace by means of trunnions immediately under the pouring lip. In the latter construction as well as in the other arrangement the actual tilting of the furnace is accomplished by means of motors suitably controlled.

Operating Characteristics

The Rennerfelt furnace, while drawing a three-phase current from the mains, differs from other makes of furnaces used in the metallurgical industries through the arrangement of and method of supplying current to the electrodes. The now well known connection devised by F. C. Scott for transforming three phase current to two-phase is used for this purpose and reference to the accompanying diagram will make the connections employed understood.

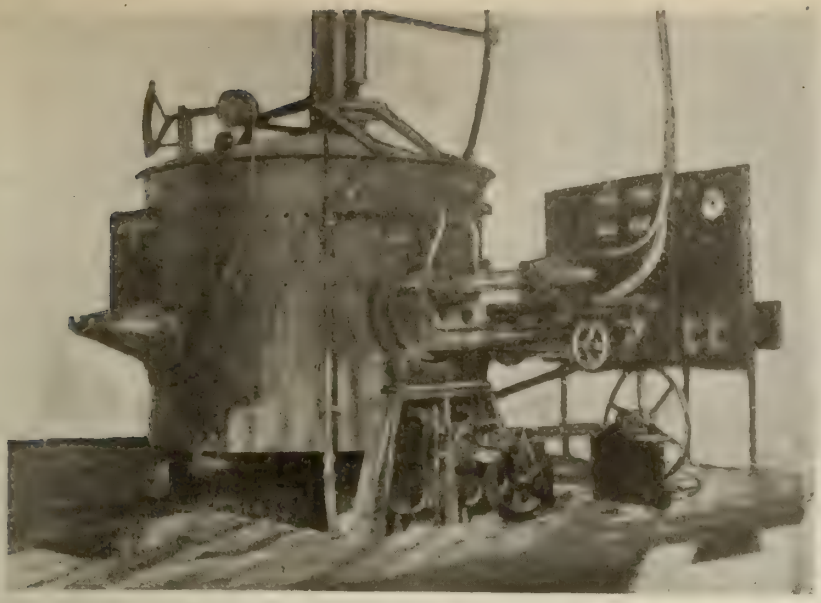


1,000-LB. FURNACE IN UNITED STATES MINT

The vertical electrode is the common return for both phases and carries 1.41 times the current carried by either of the side electrodes. The voltage employed between the centre and the side electrodes is about 100, and for steel the makers have arranged, on the transformer, for a reduced capacity voltage tap to give approximately 65 volts on the low tension side. This arrangement is of the utmost importance during refining, as the furnace will work more efficiently as an arc resistance type furnace at the lower voltage. At the same time it is evident that the same power input will not be required during the refining period as in the melting down period and excessive power would only burn out the lining. It is therefore of importance to reduce the power input from the transformer bank to the furnace, and, as mentioned, this is now done by means of taps on the transformers and not by introducing extra reactance. The reactors, which are now usually inserted on the high tension side of the transformers, are used to facilitate starting, but, due to the fact that an increase in reactance is liable to lower the power factor, it is not good operating practice to run the reactance in the circuit for any length of time. Reactance is occasionally employed in the low tension side in the larger installations, where the incoming line voltage is comparatively low.

The arc is formed between the tips of the three electrodes and on account of the two-phase current employed and the arrangement of the electrodes is thrown in a downward direction, thus creating a very intense heat where most needed, on the top of the bath itself. Thus while the arc is free burning the heat is directed where needed and a powerful heating effect secured. The character of the arc, by means of which it needs no conducting path through the metal, enables the bottom to be sintered in with little or no trouble.

It has been found that the highest efficiency and best working conditions in the Rennerfelt furnace are obtained at a certain and constant distance between the electrode tips and the top of the charge. For this reason the electrodes have been made tiltable in a vertical plane. Problems of design in connection with the maintaining of an air-tight furnace have been satisfactorily overcome and specially designed stuffing boxes, external to the shell, allow the electrodes to be tilted at their maximum angle without leakage.



TILTING MECHANISM AND CONTROL

The tilting of the electrodes has introduced an important advantage. When in their lowest position arcing to the slag can take place. By this means the furnace can work as an arc resistance furnace with the slag and metal as part of the circuit.

The free burning arc for melting cold scrap will assure an even and steady operation with a current in the high tension leads perfectly balanced and of high power factor. Automatic electrode control can be used at the beginning of the melt.

If any amount of refining is to be carried out in the furnace the electrodes are tilted at the necessary angle and the furnace worked as an arc resistance furnace. The makers state that this feature is of importance in the desulphurizing period in basic operation, especially where a heavy white slag is used as in tool steel. The use of a carbide slag is made possible instead of a ferro-silicon slag at a considerable saving.

Linings

For use in the steel industry, either acid or basic linings can be used to suit conditions encountered. For basic operation the bottom consists of magnesite brick, on the top of which is the usual fused or sintered lining of dead-burned magnesite. The side walls are made of magnesite brick up to or a little above the slag line. From there up silica brick is used. It is economy to use cheaper brick of neutral characteristics for the outer layers on the bottom and sides where the heat is not so intense and the basic characteristics of the magnesite are not needed.

For acid operation the bottom is made of silica brick with a rammed-in lining of gannister on top. The walls are made of silica brick. The roof is always made of 9 in. special silica brick. Since there is only one small hole in the roof and since it is of comparatively short radius, the maintenance costs are low and the inevitable expansion of silica brick is taken care of. A spare roof frame is furnished and a new roof may always be kept in reserve, making the replacement time less than one hour.

The life of the refractories is usually in the neighborhood of 250 heats for the roof and slightly more for the walls. No trouble is experienced with the bottom, which only requires an occasional patching and will last indefinitely if properly cared for.

The linings used for non-ferrous metals are in some cases different from those usually met with in steel practice. For copper, red brass, cupro nickel, bronze and silver, a gannister bottom is used, with silica brick sides and roof, while for bearing metal composed of 82 per cent. Cu., 5 per cent. lead, 6 per cent. tin, and 7 per cent. zinc, a bottom constructed of carborundum sand, mixed with fire clay and molasses for a binder was used with Chicago fire brick for the side walls and roof. This lining has lasted for 300 heats and it is claimed will be good for many heats more.

For the melting of aluminum a basic bottom has to be employed, made up of magnesite bricks with a fused-in magnesite lining. From the slag line up the furnace should be lined with fire-brick. It is essential in melting this metal to avoid any contamination with silica and for this reason no silica brick is used in the furnace.

Power Consumption

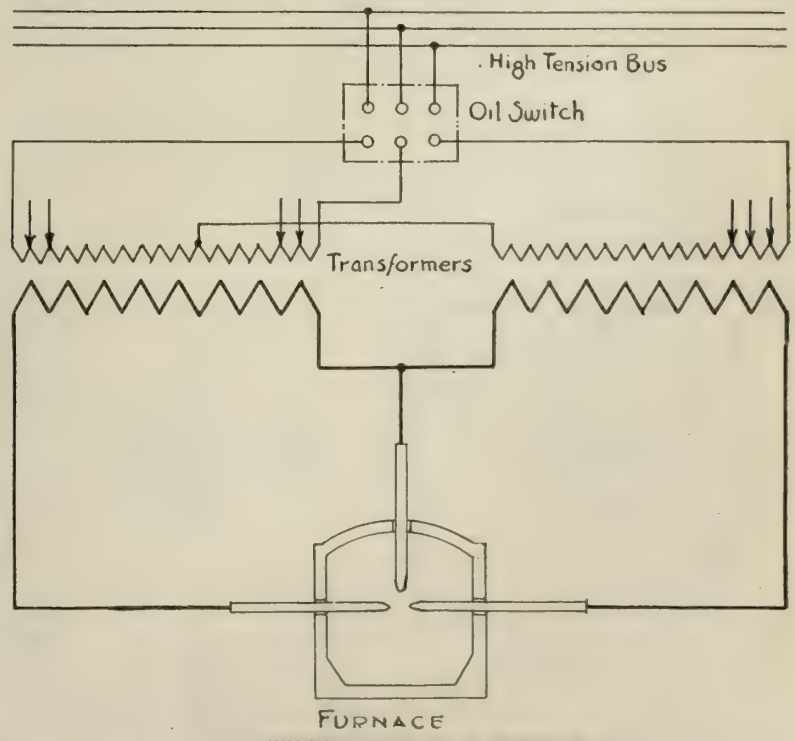
The makers of this furnace, Hamilton and Hansell, Inc., New York, have kindly furnished the following figures relative to the power consumption on various classes of work, which must, however, be read with the knowledge that variation is to be expected in this respect according to the class of work being done.

Power consumption and length of heat for four heats on steel castings, acid lining used and furnace operating only in the daytime:

Heat No.	Charge	Time	Kw. hrs.
1	1900 lbs.	4.00 hrs.	800
2	1800 lbs.	3.40 hrs.	520
3	1825 lbs.	3.26 hrs.	520
4	1800 lbs.	3.05 hrs.	490
Total	7325 lbs.	14.11 hrs.	2330
			Per ton
Aver.	1831 lbs.	3½ hrs.	637

The electrode consumption using Acheson graphite electrodes varied from 9 to 11 pounds per ton.

Another installation averaged 700 k.w. hr. per ton where no refining was required and about an additional 100 k.w. hr. for each slag taken off. These last results were obtained by continuous operation.



WIRING DIAGRAM OF FURNACE

FURNACE AND CONTROL PANELS

For the non-ferrous metals the following data are of interest:

Cupro-nickel (75% Cu, 25% Ni) in 1000-lb. Furnace

No. of pounds per heat	1,000
Kw. hr. used per ton	500
Time per heat	90 min.
Approximate loss	.32%

Bronze (95% Cu, 4% Zn, 1% Sn.) in 1000-lb. Furnace

No. of pounds per heat	1,000
Kw. hr. used per ton	300
Time per heat	65 min.
Approximate loss	.32%

Melting Silver Dollars in 1000-lb. Furnace

No. of pounds per heat	1,000
Kw. hr. used per ton	200
Time per heat	65 min.
Approximate loss	.05%

Bearing Metal (2000-lb. Furnace)

Total metal charged	8,048 lbs.
Total metal recovered	7,980 lbs.
Loss	68 lbs. (.845%)
Kw. hr. used per ton (average of 116 heats)	360 kw. hr.

This includes pre-heating, testing and melting. Average time for making one complete 2,000 lb. heat from charge to pour, 90 minutes; in other words, 12 minutes for charging, 70 minutes for melting and 8 minutes for pouring. Electrode consumption, based on 104 tons of charge, using Acheson graphite electrodes, 5½ lbs. per ton.

Rating and Transformer Capacity

The Rennerfelt furnace is manufactured in the following sizes and the transformer capacities given are advised for the various sizes.

Capacity.	Transformer rating, 40° C. rise normal rating
100-200 lbs.	40-60 Kva.
300-500 lbs.	80-100 Kva.
1,000 lbs.	150-200 Kva.
1 gross ton	300-400 Kva.
3-4 gross ton	800-1000 Kva.
5-6 gross ton	1200 Kva.

The makers give a comprehensive statement of the characteristics and salient features of the Rennerfelt arc furnace as follows:

The heat is generated with an arc with the absence of excessive strain on the power supply.

The high tension current may be of any cycle and voltage, either two or three phase, and is perfectly balanced on all three phases, if three phase current is used.

The arc is independent of any metal in the furnace and therefore can be regulated more easily with better control of the temperature.

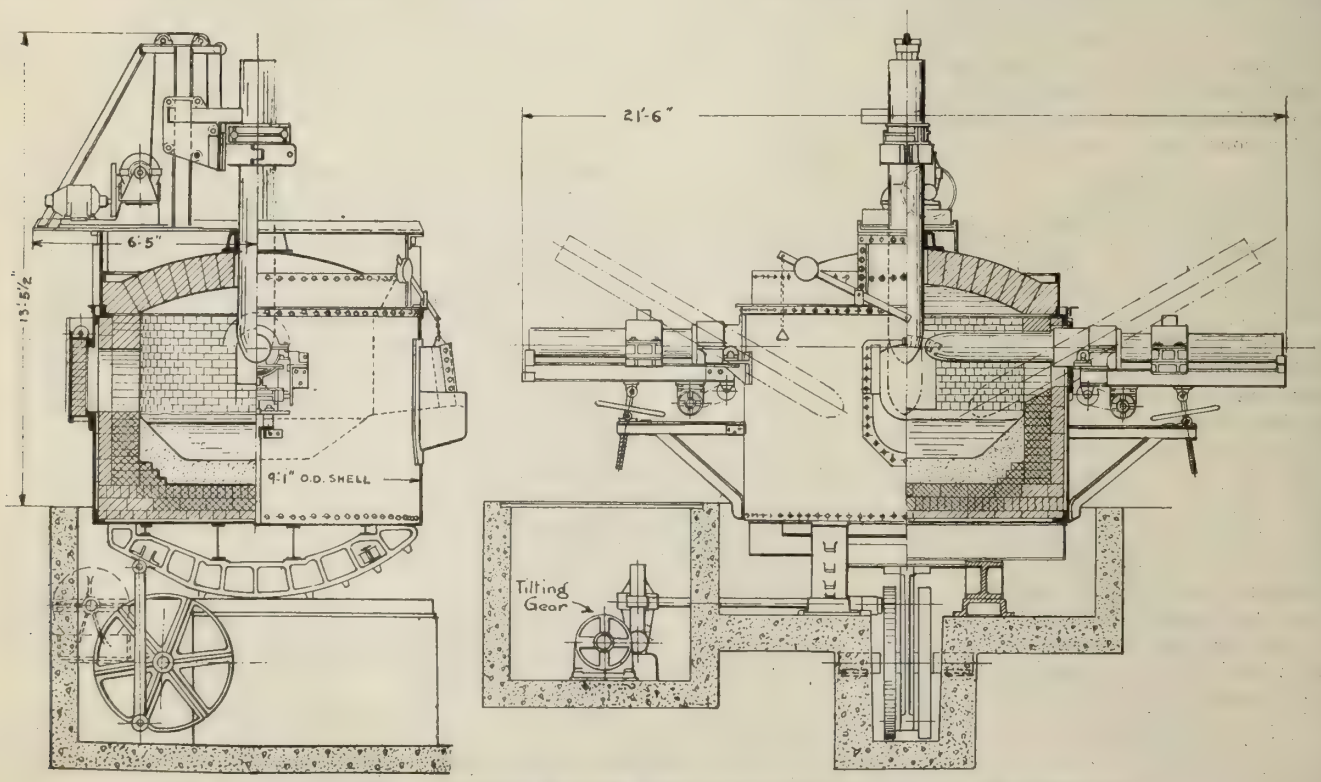
The arc is thrown violently downwards, and being a radiating arc of large volume, favors a high efficiency and the roof has a long and satisfactory life.

Due to the arc being free burning, the automatic side electrode control can be used during the melting down period without violent fluctuations in the power output.

The power factor is high—about 90 per cent. with 60 cycle current.

There is only one small hole in the short radius roof, the short radius roof and the single hole both making for strength and low maintenance cost.

A very important feature of this furnace has to do with the possibility of preheating the furnace with the free-burning arc and the bottom can be sintered in by this means without the use of coke, oil or other material. No trouble is experienced in getting contact as the arc is drawn between the tips of the three electrodes and cold scrap is never used as part of the circuit.



CROSS AND LONGITUDINAL SECTIONS OF 3-TON FURNACE, SHOWINGELECTRODE ARRANGEMENT

Canadian Machinery Drafting Course—Part I

This Series Will be Issued Every Two Weeks—In Each Section Will be Shown Some Problem, or Plate, For the Reader to Work Out—A Prize Will be Given to the Three Best Plates Sent in Each Issue, so Here's an Opportunity—Get Busy and Send Your Plate Along to Our Editor

By J. H. MOORE, Associate Editor CANADIAN MACHINERY

BEFORE entering upon this series of talks or lessons, on the art of mechanical drafting, the reader must not imagine that here commences a slow, painstaking, thorough course on the subject already mentioned. While such a course would be a boon to many, yet the average reader would not follow such a detailed course, which, to cover the subject properly, would span over a space of from three to four years. Not only would the average reader drop out of line before this time, but to the machinist apprentice especially, such a detailed course would not appeal, for included in a complete study of the drafting business would be many things not of especial appeal to him.

We will try, therefore, to only touch on the most essential points as we go along, keeping in mind that this is a course specially arranged to meet the requirements of the machinist apprentice, in order to illustrate to him the basic principles of mechanical drawing, and its application to the working drawing.

We will work up gradually from the straight line problem into the actual assembly drawing, but will go to such a stage by easy steps. We want the apprentice to feel that here is a course specially arranged for him, and should he get puzzled at any time that we will be only too willing to answer him, and lift him over the difficulty. Close study to this course should increase the earning power of the student, and besides, the objective of each student should be to land at least one prize. So now that we have introduced the object and aim of this series, let us proceed at the very beginning, and see what mechanical drawing really is.

Mechanical Drawing

To put it as briefly as possible, mechanical drawing is the method of showing graphically the intricate details of machinery. It is, so to speak, the language by which the draftsman speaks to the workman. A brief study of a well-executed drawing gives a much better idea of the machine portrayed, than a long-winded verbal, or even a detailed written, description would ever do. In fact the better and clearer the drawing is made, the easier the workman can comprehend the ideas of the draftsman.

A neat drawing for instance was never made by a careless worker, nor even by a good draftsman, with poor instruments, but as you seldom see a good designer with poor instruments one can usually tell the character of the draftsman, by his style of drawing.

To the beginner, however, a cheap grade of instruments would suffice, but as he becomes more expert, he would do well to secure a better grade of tools. In fact if one can afford it, the best plan is to purchase the better grade right at the start, but this is simply a matter which rests with the student himself.

Instruments and Materials

First comes the question of paper. In selecting drawing paper, the first thing to be considered is the kind of paper most suitable for the proposed work. As we are principally interested in the needs of this course, we will consider only the paper most suitable for our purpose, for practically every drawing office throughout the country have their own particular pet paper, which they claim is the best ever.

To keep the expense item down to the lowest possible figure, we will call for sheets 9½ x 13½ in. in size. This allows students to purchase their paper in what is called the Demy size of sheet, this being a sheet 15 in. x 20 in. By careful cutting you have two sheets from each large one, 10 in. x 15 in., sufficient size to cover the work. Whatman's paper is considered by many the best grade of paper, and either the cold pressed, or hot pressed, will answer the purpose. The hot pressed paper has a smoother surface, but does not stand erasures as well as the cold pressed sheets, so it might be well for readers to get the tougher material, for no doubt there will be considerable erasure made at the beginning.

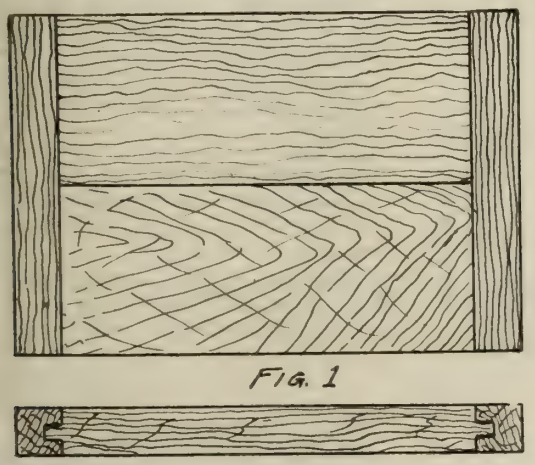
Drawing Board

The drawing board, Fig. 1, is usually made of well seasoned, and straight grained soft pine. Each end is protected by a side strip, usually about 2 in. wide. This strip is trued accurately to suit the T-square, but as students will more than likely purchase their drawing boards, we will leave this matter for the reader to study at his leisure.

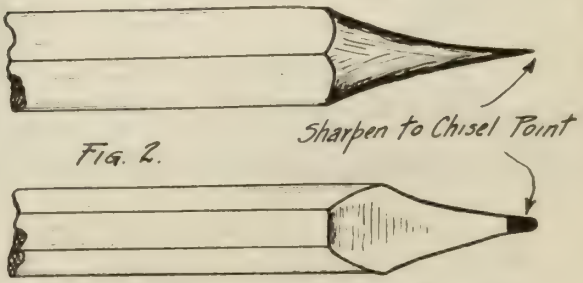
Thumb tacks are used to fasten the paper to the board. There are all kinds on the market, but a grade about 10c to 20c a dozen, will suit the student's purpose admirably.

In regard to the pencils required. Lead pencils are graded according to their hardness, the degree of which is indicated by the letter H. For example H. means simply one degree of hardness, 6H, six degrees, and so on. A pencil of 4H grade is ideal for general working conditions. Some authorities claim 2H or 3 H are better suited for lettering purposes, while for intricate detail work a 6H pencil will be found best suited to this class of work.

The hard pencils should be sharpened as shown at Fig. 2, so that in pencilling a drawing the lines may be made very fine and light. The wood is cut



SKETCH OF DRAWING BOARD



SHARPENING THE PENCIL

away so that about ¼ in. to ⅜ in of lead projects. Lead can now be sharpened to a chisel edge as shown on the sketch. In the drawing of the lines the student should place the chisel edge against his T-square, or triangle, enabling him to draw a clean cut fine line, through points as desired. Should no inking be necessary, a softer grade of pencil is used, than if it is intended to ink in over the pencil work.

T-Square

The T-square gets its name from its general appearance, and consists of a thin straight edge called the blade, with a short piece called the head, and fastened at right angles to it, see Fig. 3. T-squares are usually made entirely of wood, pear and maple, in the cheaper grades; mahogany, with protection edges of ebony, in the middle class, while celluloid edges are placed on the more expensive ones. Readers need not go to much expense on this end, except they really wish to, for a T-square of good quality can be secured for very little cost. Some T-squares are also provided with swivel heads, but for the purpose of this series, we will not discuss this point, as it is not a necessity.

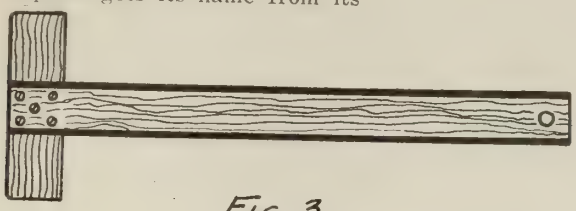


FIG. 3.

SKETCH OF T-SQUARE

To show clearly the use of the T-square refer to Fig. 4. Always keep the head A up against the left hand edge of board, otherwise the various lines drawn will not be parallel. Lines A, B, C, D, and E, are drawn ¼ in. apart, and 6 in. in length.

Take a piece of paper, and practise this exercise. You will be surprised how the pencil will want to go still further, until you learn to control your hand properly. Mark your ¼ in. distances with your rule, and draw your vertical lines 6 in. apart with a triangle, which we will now describe, both as to its uses and material.

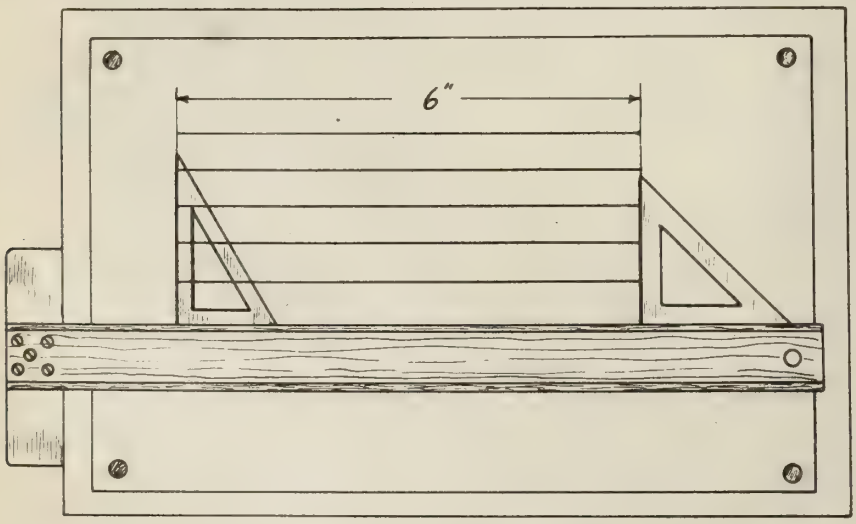
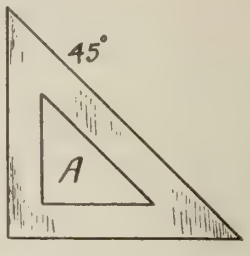


FIG. 4.

PRACTISE LESSON ON HAND CONTROL

Usually triangles are made in two styles, 45 degrees and 60—30 degrees as shown at Fig. 5. A represents the 45 deg. triangle, while B illustrates the 60 deg. —30 deg. These instruments are made of wood, steel, celluloid, or rubber, depending on the price. The student's pocket book capacity can be his guide, as to the kind he purchases.



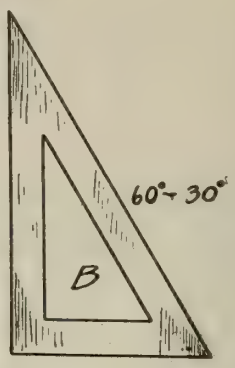


FIG. 5.

SKETCH OF TRIANGLE

A 6 in. or 8 in., a side size, will be found convenient for most work, and will be ideal for this course. By purchasing a triangle of each style as already described, the student is well equipped for such work as the course will present, at the start.

Taking it for granted that the student has now a drawing board, T-square, pencils, rubber, and triangles, we can go ahead with the exercise at Fig. 4.

First practise making the lines A and B 6 in. apart. Draw these vertically by means of the T-square and triangle, either one, as shown. Next use the T-square only, and draw your horizontal lines, meeting the vertical lines, yet not going over them. This is most important, for the exercise is simply one to teach control of the hand. All lines must touch, but not go over, yet be sure of the point, that they must touch. Draw these horizontal lines ¼ in. apart, mark-off the spaces with your ruler, or scale as it is usually called.

After you believe yourself proficient enough, study Plate No. 1. To the best of your ability follow the instructions closely, draw up the plate, and send us in your work.

To the three neatest plates received, we will award a prize, in the shape of a special 6 in. steel scale, with drill sizes, decimal equivalents, etc., stamped on its face, and in all future issues on this series, will carry out the same plan, forwarding a scale to the three best and neatest plates received on each part or plate.

Instructions

First tack a piece of paper 10 in. x 15 in. on the drawing board, using T-square to see that it is placed on fairly square. Now draw the trimming lines 9½ x 13½ in. Next draw border lines as shown at Plate No. 1, 9 in. x 13 in., and join. Divide the sheet up into 5 sections A, B, C, D, and E. In portion E print in the lettering as shown, and while we do not expect this lettering will be of splendid standard, still it will help you to get ready for the separate lesson to come later in the course. In section A, complete the horizontal lines, each ¼ in. apart as illustrated, stopping ¼ inch away from the border, and dividing lines. In section B, draw up the vertical lines, following out the dimensions given. At section C, draw 45 degree lines as shown, using your T-square and sloping edge of 45 deg. triangle. At section D draw up the 60 deg. and 30 deg. lines as illustrated, using your 60 deg.—30 deg. triangle, together with your T-square. In all cases study the plate carefully, and work to the dimensions shown.

Remember that neatness counts. For the drawing of this plate use a 3 or 4H pencil, and make your lines decided, and plain. Send us in your work as soon as you can. We will judge each plate two weeks after its issue, giving you lots of time to send your work along steadily, so get busy with a capital B, and watch for Part 2, which will further explain the various instruments, and their uses. When sending in your plate use the coupon, and fill the same in carefully. At the same time if you feel so inclined, write us your ideas on this course, and if it appeals to you. We are mighty anxious to make this course

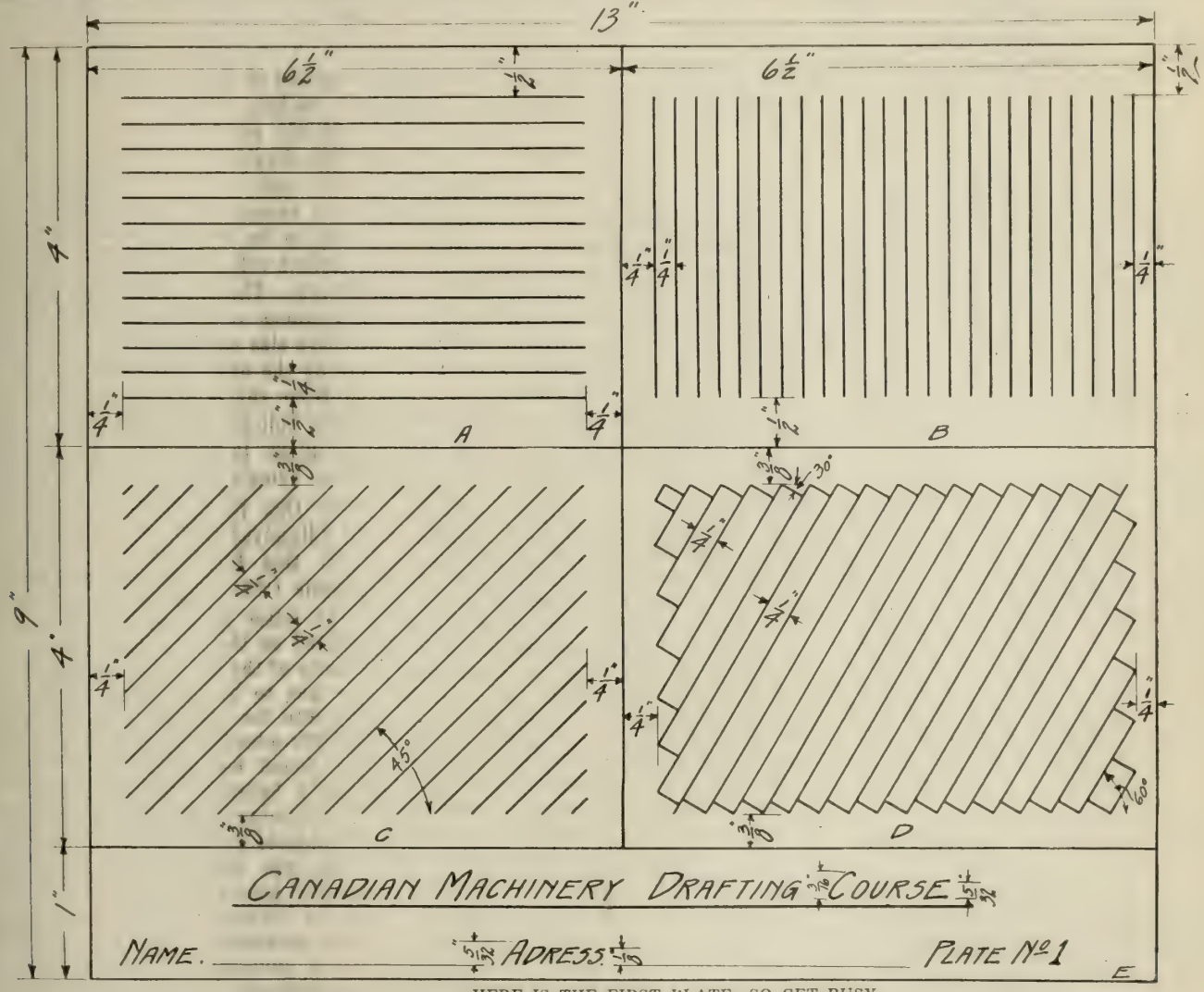
of great benefit, so let us hear from you when your work comes in.

In studying the plate, do not pay any attention to the scale, shown on the sketch. Work to the dimensions given, and the result will be what we want. We purposely do not give you an exact copy to work from, but rather let you prove that you have followed instructions closely. It is not necessary to ink in this first plate, so as stated before use a 3 or 4H pencil, and make your lines plain and decided.

Mail your plate flat, do not fold, or if desired you can roll it up, and place it in a regular mailing tube. Be sure you have sufficient postage placed on the same. We will not return plates unless specially requested to. In such cases return postage must always accompany the request. Address all correspondence on this course to CANADIAN MACHINERY Drafting Course, McLean Publishing Co., 143 University Ave., Toronto, Canada.

KEEP THINGS FREE FROM SOOT

All tubes, passages, and surfaces about the boiler should be kept free from soot, because this is an exceedingly poor conductor of heat, and if it is allowed to accumulate in quantity it will cut down the efficiency of the boiler to a serious extent by diminishing the absorption of heat. The various tubes, passages, and surfaces should be cleaned as often as may be necessary in order to avoid such accumulation, and the man in charge of the plant can best tell, from experience, at what intervals this must be done. It is not at all uncommon for water-tube boilers, in particular, to be neglected until the soot in some of the passageways accumulates to an almost incredible extent. The existence of large quantities of soot indicates that the combustion in the boiler is not what it should be, and when there are heavy deposits of soot, attention should be given to the furnace, the draft, the method of handling the fires, and such other points as may suggest themselves, in order to see if the combustion cannot be improved.



HERE IS THE FIRST PLATE SO GET BUSY

Tear off and send with drawing

Name .....

Address .....

Position .....

Firm's name.....

COAL AT END OF RUN

In ending any run of service of the boiler preparatory to laying it up for cleaning or repairs, the fire should be allowed to die out toward the end of the run,—just enough coal being fired, during the last hour, to keep up steam as long as it is needed. In this way it will be possible to avoid the waste involved in having a large mass of comparatively fresh coal on the grates at the time the boiler is put out of commission. While this point is a minor one, it is worthy of attention.

WELDING AND CUTTING

Oxy-Acetylene Welding in the Railroad Shops

Interesting Facts Regarding the Use of the Oxy-Acetylene Welding and Cutting Torch in the Railroad Shop—Paper Read Before the Institution of Mechanical Engineers

By F. HAZLEDINE

IT is only about fourteen or fifteen years ago that the oxy-acetylene process of cutting and welding metal was in its infancy, or experimental stage. Its widespread and ever increasing popularity is no doubt due to the fact that the process offers general advantages over all other systems of blow-pipe welding, by reason of its extreme portability, wide scope, and the high efficiency of the autogenous weld produced.

Oxygen. — Oxygen is obtained for commercial use by the commonly adopted methods of, first, splitting water into its elements—oxygen and hydrogen, by passing an electric current through it, and secondly, liquefying air, and splitting it into its elements—oxygen and nitrogen. The oxygen so obtained is stored in large gasometers, and then compressed into steel cylinders at a pressure of 120 atmospheres. It is then in a fairly pure state; the British Oxygen Co. guaranteeing their product to be from 98.5 per cent. to 99.5 per cent. pure.

As a result of storing the oxygen in contact with water in the gasometers, a certain quantity of moisture is carried by the gas into the steel cylinders; the moisture condenses, and to expel it from the cylinder, which it is advisable to do in order to prevent the valve freezing in cold weather, it is only necessary to invert the cylinder, and allow the pressure of the gas to blow the water out as the valve is opened and closed two or three times.

Acetylene.—Acetylene is a gas composed of 92.3 per cent. carbon and 7.7 per cent. hydrogen. It contains the highest percentage of carbon of all the hydrocarbon series, and is produced by dissolving an equal volume of carbide of calcium and water. Carbide of calcium is made by fusing a mixture of lime and coke in the proportion of fifty-six parts by weight of lime to thirty-six parts by weight of coke in an electric furnace, the temperature of which is about 7,000 deg. F.

Several types of acetylene gas generators are in general use, and they may be classified as follows:

(1) Apparatus in which a quantity of gas sufficient for several days' use is manufactured and drawn off as required.

(2) Automatic generators in which the quantity of gas produced depends upon the quantity of gas consumed.

These are mostly of the moving-bell type, but they vary to the extent that in some the water is added to the carbide, and in others the carbide is added to the water.

The following is an analysis of "generator gas: Acetylene, 98.05 per cent.; oxygen, 0.08 per cent.; sulphuretted hydrogen, 1.7 per cent.; ammonia, 0.1 per cent.; phosphoretted hydrogen, 0.04 per cent.; silicon hydrate, 0.03 per cent.

Since the presence of sulphur and phosphorus in more than very small quantities is injurious to iron and steel, it is necessary to remove these impurities from the acetylene if reliable welds are to be made. This is done by a combination of mechanical filters and chemical actions, with a material which consists of iron-oxy-chlorides, the effect being the oxidation of the impurities. In cases where portability is of first importance, use is made of dissolved acetylene, which is supplied compressed to ten atmospheres in steel cylinders that are first filled with a porous material saturated with acetone—a liquid which readily dissolves acetylene. This gas, the use of which is known as the high-pressure system, is safe, clean, and pure; a point which has direct bearing on the quality of the weld produced.

The oxy-acetylene flame (the hottest flame known to science) consists of equal volumes of oxygen gas and acetylene gas, previously mixed in a chamber of the blow-pipe before issuing from the nozzle, where it combines with one and a half volumes of oxygen obtained from the atmosphere to complete combustion. The flame takes the formation of two cones—an inner cone of intense heat (about 6,300 deg. F. at the tip), composed of about equal parts of hydrogen, carbon, and oxygen, enveloped in a relatively cool flame of hydrogen and carbon-dioxide. However, much depends upon the regulation of the flame, as an excess of oxygen will cause the metal to be oxidized, and an excess of acetylene will cause the metal to be carbonized. The welder is guided by the appearance of the flame; that is, the relative size and shape of the two cones, and by the nature of the sparks thrown off from the metal, white star-shaped sparks indicating excess of oxygen. The blow-pipes in use are of two general types, namely:

(1) One for use with high-pressure gas (dissolved acetylene).

(2) One for use with low-pressure systems (that is, generator gas).

The latter type of blow-pipe is constructed on the "injector" principle, the velocity of the oxygen causing the acetylene gas to be drawn from the generator into the blow-pipe, where it is intimately mixed with the oxygen. It has been found necessary to insert, in all cases, a hydraulic safety-valve between the generator and the blow-pipe in order to eliminate any chance of the gas backfiring into the generator. The high-pressure blow-pipe is simpler in design. As the oxygen and acetylene are both under pressure, the "injector" construction is unnecessary, therefore the only arrangements required are: a suitable valve for the control of the oxygen gas, and a roll of wire-gauze to prevent backfiring of an explosive mixture. The best blow-pipes for general use are those which are supplied with different size tips ranging in capacity from 50 to 2,000 litres per hour. This obviates the necessity of having to purchase a number of complete blow-pipes, and is also the means of saving time when changing from one class of work to another, as it is easier to change a nipple than to disconnect and recouple the gas supply to a blow-pipe.

It is impossible to overestimate the importance of adequately preparing the

work before the weld is actually attempted, as any time spent in this way is amply repaid afterwards, in the easier execution made possible by it, and also by the homogeneous nature of the weld. It is a matter, however, in which it is impossible to lay down any hard and fast rules; the varying nature of the work accomplished making it impossible to do so. The general principles obtained in the best practice point out that the line of the weld must be opened out, that is, the two sides bevelled to form an angle of 90 deg. The reasons for this are:

1. To make certain that the weld will be penetrated, not merely sealed over; and
2. To strengthen the weld by increasing the surface in contact.

It is essential that the line of the weld should be thoroughly cleaned either by hand tools or some chemical agent. The most important part of the preparation is that of arranging the pieces to be welded in such a position that there will be no deformation, breaks, cracks, or integral strains, and that they will be linable at the conclusion of the operation. This is the point in which the experience and skill of the operator is revealed as there are no rules to guide him; and upon any work but that of the very simplest character, failure to grasp and apply the laws of expansion and contraction means the partial or total ruin of the work. It is impossible to control expansion and contraction by physical force, so that the only way to prevent disastrous results is to foresee the probable direction and extent of the phenomena, and nullify the effect by preheating certain parts of the work, either by the blow-pipe, or by the welder's furnace. It is good practice when the article is not too cumbersome, to raise the temperature of the whole piece of work nearly to red heat in the furnace, make the weld whilst the temperature is still rising, and then allow it to cool slowly and uniformly in sand or asbestos, or by allowing the furnace to cool off, but in this case care should be taken to shield it from all currents of air. In large pieces of work, pans of charcoal and coke are placed in the immediate neighborhood of the place which it is desired to heat. In the case of castings it is advisable to preheat them bodily, not locally, as there is always the chance of discovering the presence of an internal strain due to the irregular cooling of the metal when it was cast. It is advantageous to preheat work in all cases in order to save oxygen and acetylene for although the heat of the oxy-acetylene flame is intense, the total amount of heat contained is not very great, and much would be lost by conduction to colder parts of the work.

The actual execution of the weld, after it has been properly prepared, is a fairly simple matter to an experienced operator, providing the welding-rod and flux of the correct composition are at hand. For wrought-iron and mild steel, the welding-rod used to replace the metal removed in forming the V should be of soft pure iron, known as Swedish iron.

For cast-iron, the welding-rod should be made of the best grey cast-iron, containing about 5 per cent. of silicon, and be free from manganese, as the silicon destroys the oxide of iron formed, and results in a weld of grey iron which is not too hard to work with ordinary cutting tools; but manganese would tend to combine the carbon and iron, and make a white iron weld which would be unworkable. It is also necessary to use a flux to slag the oxide. A well-known and excellent flux in powder form is made of equal quantities of carbonate and bi-carbonate of soda, to which is added from 10 to 15 per cent. of borax and 5 per cent. of precipitated silica. The flux is applied by heating the end of the welding-rod and dipping into the flux.

For copper, the welding-rod used should be of phosphor-copper with just a trace of aluminum. It is found that the introduction of a small amount of phosphorus prevents the absorption of hydrogen and carbon-monoxide, which would escape as the weld was cooling and form blow-holes and also prevent oxidation. The flux used is in the form of a powder consisting of sodium borate, chloride of sodium, and boracic acid, although it is not absolutely necessary if the edges of the weld and the metal to be added are clean.

SAVING LIFE BY OXY-ACETYLENE

An extraordinary story of the salvage of a British submarine which went down near the Clyde was recently cabled by the Associated Press. The submarine had seventy-three persons on board including naval contractors and men from the yard where she had been built. The order was given to submerge, and she was just beneath the suface when water began to pour into her aft and she descended stern down to a depth of fifteen fathoms.

A few hours passed before divers were sent down on what they thought was a forlorn hope so far as bringing anyone up alive was concerned. Reaching the bottom they discovered that the stern of the vessel was embedded in many feet of mud. Knocking at the hull they were amazed to hear a responsive tapping.

Strong wires were put round the vessel and the air cylinders were utilized to blow out the oil fuel stored forward, which enabled the vessel to drive upward until her bow was well above water in a perpendicular position. Immediately a big hole was cut in her with oxy-acetylene cutting blow-pipes and forty-two men were brought out. They had been below fifty-seven hours before being saved.—From the "Acetylene and Welding Journal."

WELDING FOREMEN

One of the real troubles in the welding industry is to find foremen who appreciate the problems involved; that is, men who can be made to feel that welding is more than a mechanical job. All kinds of men have been selected for this position, and for all kinds of reasons. One superintendent may prefer a blacksmith because a blacksmith is familiar with steel and iron, but he ignores the fact that the blacksmith knows nothing about cast iron, brass, aluminum, etc. Each trade finds its special knowledge useful in welding, and a first-class welder should know something about all metal trades. A welder who does only one thing can be trained quite easily in a short time, and he need not know much more than how to do his special work correctly, but the man in charge must know more than this. A person ignorant of the elementary practices of metallurgy and mechanics cannot be safely entrusted with welding work that involves possible damage to person and property. When those in authority fully realize their responsibility in this matter, proper methods of instruction such as welding schools and trade journals will come into their own.—From the "Acetylene and Welding Journal."

SAFETY VALVES AND BOILER HEATING SURFACE

The now accepted rule that the size of the safety valves of the ordinary type required on each boiler shall be determined as follows:

Area of safety valve in square inches equals total heating surface of boilers in sq. ft.) multiplied by $\frac{1.25}{p + 15}$

where p is the working pressure in pounds per square inch. A set of experiments made by Isherwood showed that increase of efficiency was associated with a reduction in the tube surface, so it is pertinent to ask how the safety valves referred to would answer in this case. In the first series, the boiler heating surface was 792 square feet, and the pressure 80 lbs. gauge, so that the area of safety valves

$$= 792 \times \frac{1.25}{80 + 15} = 10.42 \text{ sq. in. or } 3.64$$

in. diameter.

In the second case with half the tube surface then this formula would give the safety valve area

$$= 424 \times \frac{(1.25)}{80 + 15} = 5.580; \text{ or } 2.66 \text{ in.}$$

diameter.

A rule which gives results of this charcter is one that can hardly be deemed entirely satisfactory, and points to the desirability of returning to the notion that the maximum rate of evaporation depends upon the maximum capacity of the furnace to liberate heat energy. The area of the fire grate is surely the measure of the safety valve area.—M.M.

Can Export Now.—The Canadia Trade Commission announces a new ruling under which it will be possible to resume exportation of wood pulp to Mexico. Owing to conditions arising out of the war both Canada and the United States were obliged to exercise extreme caution as to permitting the exportation of any paper-making material.

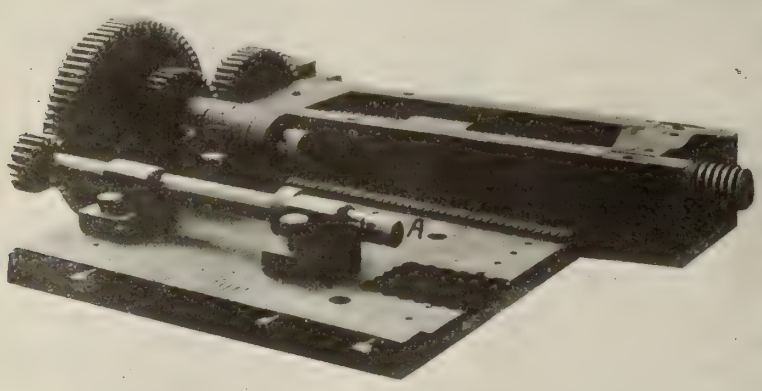
WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

INTERESTING MILLING FIXTURE.

By J. H. MOORE.

There are many methods employed of hobbing screws, but one of perhaps the most interesting fixtures for milling screws, used for jacks, came to the writer' attention the other day. The photo illustrates its construction clearly, and the simplicity of the idea is its chief asset.



GENERAL VIEW OF THE FIXTURE

The mechanism is mounted on a flat plate, and consists of gears so arranged that, from the time they are driven from shaft A, until they reach the master screw B, the proportion is correct. This screw has a similar pitch to the one desired to hob or cut, and has a hole in its end into which the work is placed.

The complete fixture is mounted on the miller table, and end of shaft is connected by a special length bar to universal joint shaft on feed gear box. By this method a direct gear drive from the gear box is obtained. The operation time on this work has been cut down more than half, and a much better class of work has been obtained, than by the former method. A hobbing cutter is, of course, placed on the miller arbor when the work, by means of the gearing, feeds crosswise at the proper speed, cutting a good thread of correct pitch. No doubt this scheme will bring to many readers' minds its possibility of adoption to other classes of work.

RELIEVING TURNING TOOL.

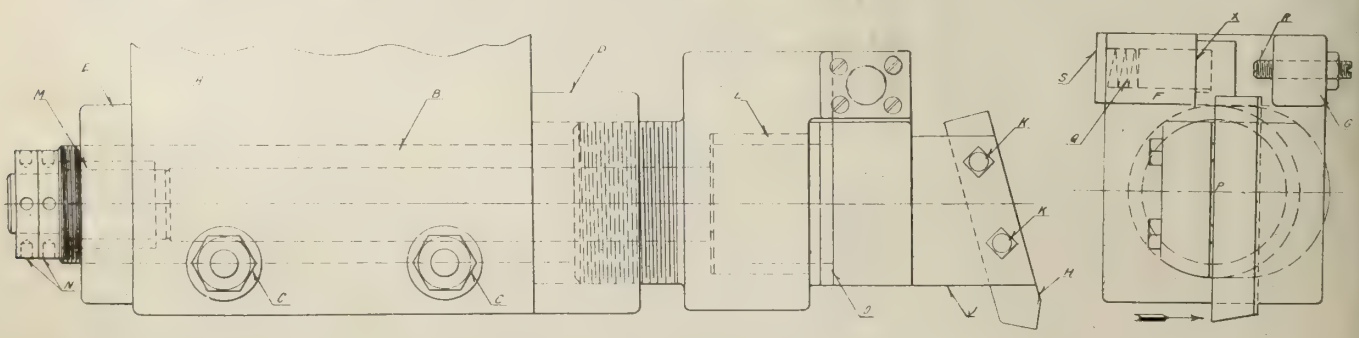
By F. SCRIBER.

When turning some classes of work it is very desirable that there be no marks on the parts being turned. A turret lathe usually comes forward, makes a cut and returns to its original starting point and then indexes. This makes it necesary to drag the tool back over the work, and as there is always some spring to the tool when cutting, as a general thing, when the tool is going back without cutting it will scratch the work, sometimes very deeply.

To eliminate this scratch on the finishing operation on particular work, a tool similar to that shown in Fig. 1 was designed. This is held in a holder A to the turret. In this holder is mounted a sleeve B. This sleeve is revolvable in the holder so as to give the proper clearance and cutting rake for the tool, and when located in the proper position is rigidly clamped by the two bolts C, with nuts and washers on same.

A lengthwise adjustment is also provided on this sleeve by means of adjustable nuts D and E. At the end of this sleeve B two lugs F and G are arranged. The purpose of these lugs will be described later. The cutting tool itself, H, is held in a shank J by means of screws K. This shank is free to revolve in the sleeve B, two hardened steel bushings, L and M, providing bearings for the same, while the adjustable nuts N keep it back in place against the shoulder O.

When turning work the thrust of the cut is taken in the direction of the arrow, which pivoting about the centre P causes the face K on the shank to come against the lug F on the sleeve, thus making a rigid and fixed place for taking the thrust of the cut. When through cutting the work the spring Q contained in this lug forces the tool holder around until the other side of the lug on the shank of the tool comes against the screw R, thus the cutting edge of the tool is held clear of the work while the tool returns to its

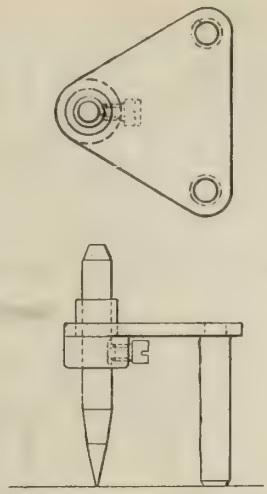


DETAIL OF RELIEVING TURNING TOOL

original starting point. This simple operation of throwing the tool forward prevents scratches or tool marks appearing lengthwise of the work.

The spring is kept in place by the plate S, which is in turn held onto the sleeve of the tool by four small screws. When starting in on a new piece the action of cutting the material forces the cutter around the centre P, compressing the spring and bringing the shank of the tool up against the lug K, thereby returning the cutter to the correct position for turning.

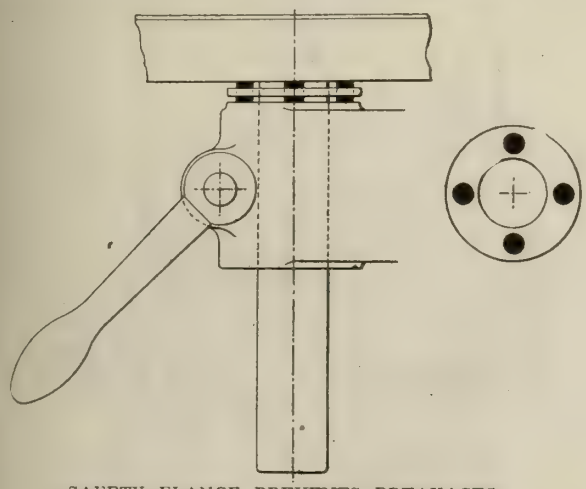
Atherley, Ont.—Tenders are asked for a 20 h.p. engine to run the stone crusher for Rama Township. The township will supply wood and water. Work will commence in May. Tenders must be in the hands of the clerk or reeve by noon on Saturday, April 12, 1919. Henry Heavener, reeve, R.R. No. 2, Atherley. W. M. Shields, cleerk, OConnell P.O.



CENTRE PUNCH FIXTURE

CENTRE-PUNCH FOR ACCURATE LOCATING

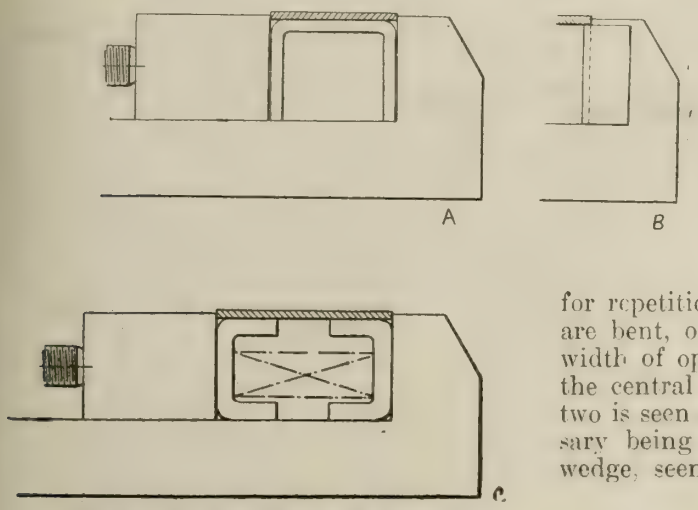
THE view offers a suggestion for a centre-punch, the idea being to provide means for holding it perfectly upright and steady, while the point is brought accurately to a line, or an intersection where it is desired to place a pop as near as possible true. A little stand is built of two pegs and a triangular plate, the latter having a bush forced into it, to hold the punch, which is secured by a set-screw. This tool also enables the tool-maker to get a better view of the surface, since it is only necessary to place a finger or two upon the plate or hold the pegs to keep the tool steady.—FRED HORNER.



SAFETY FLANGE PREVENTS BREAKAGES

SAFETY FLANGE FOR SENSITIVE DRILL TABLE

THE drawing shows a safety buffer flange that was fitted to the stem of a sensitive drilling machine table, the object being to prevent breakage through youngsters allowing the table to bang down violently through neglecting to hold it firmly when loosening the grip handle. The machine was in a small shop, for general service. The buffer consisted of a thin ring like a pipe flange templet, with four holes into which were pushed rubber plug. The hole in the ring was a loose fit on the table stem.—FRED HORNER.



PACKING FOR THIN WORK IN TOOL MAKERS' CLAMPS

PACKINGS FOR THIN WORK IN TOOL-MAKERS' CLAMPS

VERY thin plates or pieces that have to be held in toolmakers' clamps for operating on by hand or machine must usually be packed up firmly to prevent them from slipping down under the pressure of the tools. Three kinds of packing are shown in the view, A being one for repetition pieces, simply plate bent round. At B strips are bent, one round each jaw, this being suitable for any width of opening of the jaws, but giving no support under the central areas of the work. A compromise between the two is seen at C; here pieces are bent into U shape, if necessary being wedged apart firmly with a wooden block or wedge, seen dotted.—FRED HORNER.

DEVELOPMENTS IN SHOP EQUIPMENT

UNIVERSAL AND CHUCKING HOLLOW SPINDLE THREAD MILLER

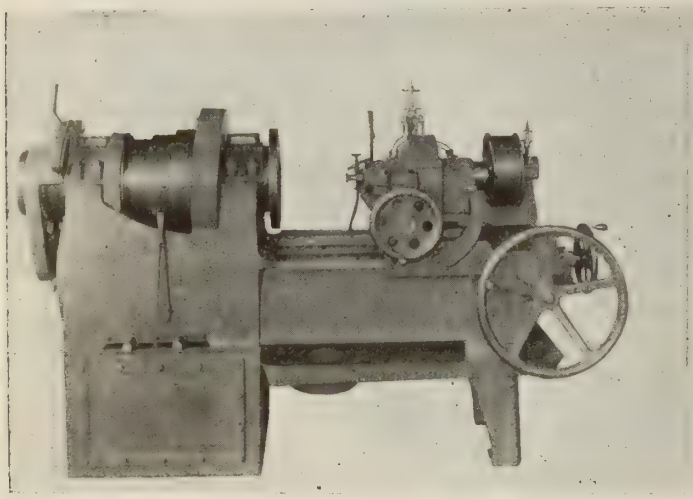
THE Smalley-General Co., Bay City, Mich., have developed a new universal and chucking hollow spindle thread miller similar to the No. 1 size, but of larger range and for work of smaller diameter than the former size.

General Description

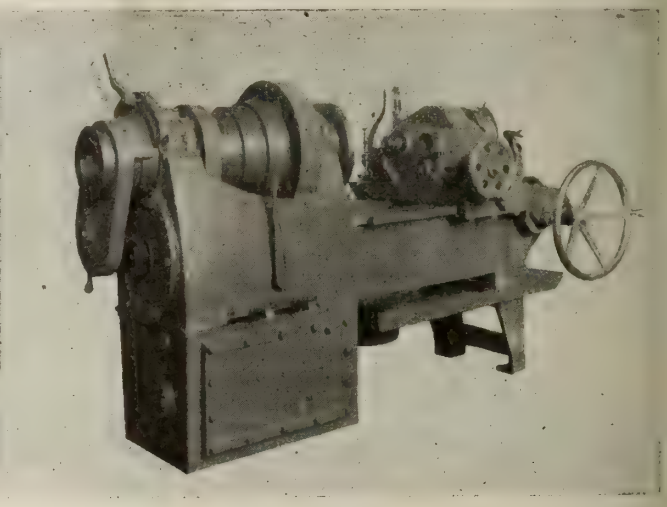
The salient features of the thread miller are sturdy construction, turning attachment, small floor space occupied, quick change of speeds and pitches for various threads, absence of loose gears, simplicity of operation and cleanliness. When the multiple tooth hob is used, the thread is completed at one revolution of the work, but when a single cutter is used as many revolutions are necessary as there are threads. If the threads are near the end of the work, the chucking type of machine as shown herein is recommended. For lead screws, jack screws, worms and work where the milled surface is 4 in. or more from the end, a centering type of milling head is supplied and the work is held between centres. The bed, which is of lathe type, has the main head cast solid with it, thus insuring rigidity and perfect alignment. Under the main head are the gears driving the main spindle. They are mounted on shafts in the cabinet leg, and so arranged that with the three step cone eighteen speeds can be obtained. The changes of speed and also the shift from neutral to milling speed or turning speed are obtained by shifting the levers on the front. The turning speed bears a constant relation to the milling feed so that it is fast for small work, and slow for large. This feature enables faces to be turned true with the thread giving perfect alignment when screwed together. The only loose gears are those required for the lead screw to change the pitch of thread milled. Thus it is seen that quick shifts from one job to another are possible. The chuck carrying the work is mounted on a flange on the outside of the main head spindle and is driven by means of a train of gears giving the required speed and connected to the main spindle by means of a change gear train is the lead screw. On the shears of the bed is located the milling head, and the milling hob is held on the spindle by a tapered arbor and draw-in bolt.

This machine will swing 20 inches diameter. The maximum distance from the face of main spindle to the face of milling spindle with popular sized bed is 20 inches. Any length of bed can be provided. It will mill either internal or external, right or left hand, straight or tapered threads. It is not adapted to the milling of absolutely square threads.

The spindle in the main head is 38 inches in length with an opening through the centre 6 inches in diameter. It carries a flange 15 inches in diameter to which face plate or chuck of any type can be attached. The bearings are 8x6 inches and split. The main spindle is driven by means of a three step cone pulley and a gear train. Just beneath the main spindle is a combination of gears actuated through clutches which controls either the high or low speeds. The low speed is for milling, and the high is for lathe or turning speed. In order to govern the peripheral speed of the surface to be milled, there is located in the bottom section a system of sliding gears which in combination with the three step cone gives a total of 18 speeds. The lead screw is driven and changes of pitch are obtained as in a lathe.



DIRECT FRONT VIEW



GENERAL VIEW

Located on the ways of the machine is the bottom slide which in turn carries the top or cross slide. This cross slide is controlled in its relation to the bottom slide by means of a micrometer screw, by which the diameter of the thread is controlled. The top slide carries the milling spindle which is either direct driven for light threads, or back geared for the usual run of work. The spindle bearings are 2¾ inches in diameter by 6 inches in length. The milling hob is held on this spindle by means of a tapered arbor and a draw-in bolt. Just back of the spindle is placed a tool holder. In front of the spindle is a socket for boring bar. Either may be used in connection with high speed for finishing or facing, and it is usually unnecessary to remove the turning

tools when milling. When milling, the bottom carriage is clamped to a feed tube located between the ways of the machine. All the slides are provided with tapered gibs. The bearings of the bottom slide on the ways are 24 in. x 24 in., while the guiding or gibbing ways are 24 in. x 8 in.

The cutting lubricant falls into the steel pan below the shears, and then drains into a settling basin on the bottom of pan. From there it is taken by reversible oil pump with flexible metallic connections back to the work. The machine is fully equipped with grease cups and self closing oil cups. The milling spindle and back gears are lubricated by plural oiler located within easy access and sight of operator.

Slides are provided with wipers to keep them clear of chips.

Most of the gears in gear box revolve on hollow shafts which are packed with an absorbent. These shafts are filled with oil, which slowly drains out through holes in the tube, thus oiling the bearing. The lower shaft turns, but is immersed in oil.

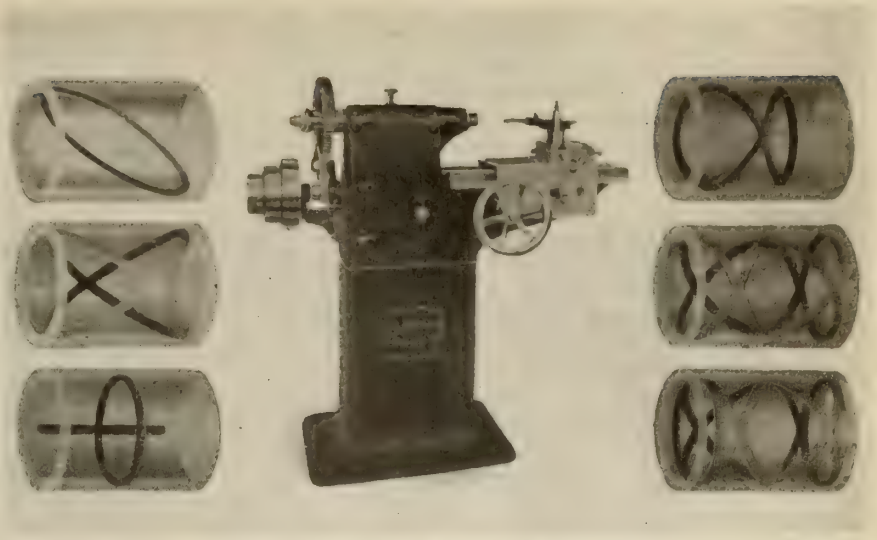
The unique feature of the Smalley General Thread Miller is the feed-tube and lead-screw device which controls the lead on the thread to be milled. Some of its important advantages in brief are:

(a) The dragging backward action against the thread of the lead-screw prevents any backlash.

(b) The 12 inches of thread on the lead screw, as against the 4 to 5 inches on ordinary machines, gives longer life, greater accuracy and larger production.

(c) The thread can be picked up at any time or place. It is not necessary to wait for the split nut to come around as on a lathe.

(d) It does not use up the lead-screw when in high or turning speeds.



GENERAL VIEW OF MACHINE AND WORK

FISCHER OIL GROOVING MACHINE

The Fischer Machine Company of Philadelphia, Pa., have recently placed on the market what is known as their oil grooving machine. This machine, with some of the classes of work as accomplished by it, is shown in the accompanying photograph.

The machine has been designed to automatically cut oil grooves in bearings, and by means of certain gear changes, will cut straight groves as well as spirals, as shown in illustration. It will do both internal and external work.

Machine is convenient and easy to operate, has few parts, there being no complicated mechanism to cause trouble, all operating parts being thoroughly enclosed and dirt proof. The machine may be locked by means of a binder screw, and the clutch disengaged, in this way adapting machine for cutting keyways.

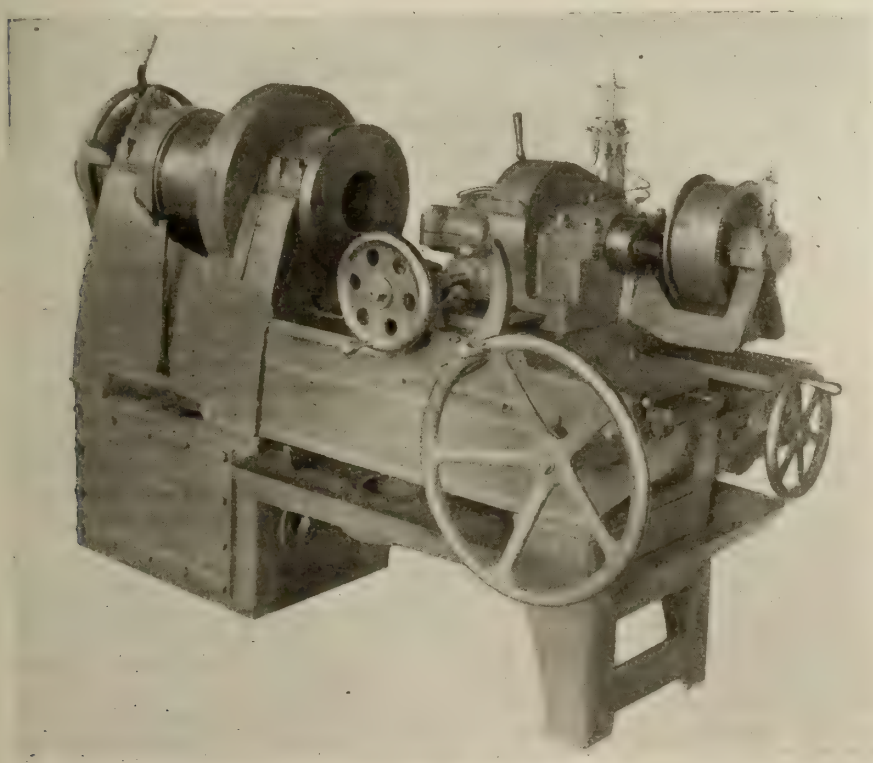
The tool slide has a reciprocating motion, and is linked to an adjustable connecting rod, and will cut any length groove within the capacity of the machine, which is 10 inches over the carriage, and a stroke from zero to 8 inches. This machine effects a great saving of labor, does better and more uniform work than can be done by hand. General specifications follow:

Net weight of machine, 815 lbs.

Net weight of countershaft, 130 lbs.
Gross weight, 1,000 lbs.

Size, boxed for export, 60″ x 54″ x x 30″.

Gross weight, 1,000 lbs.
lbs.



CLOSE UP VIEW OF MACHINE

NEW PUBLICATIONS

The Landis Machine Company, Waynesboro, Penn., have published a 50-page booklet on the Landis Pipe Threading Machinery. This publication, catalog No. 25, illustrates and describes in detail the Landis stationary pipe drive heads, pipe threading, cutting machines, rotary pipe and nipple threading heads, etc. The excellent illustrations combined with the text make the publication of considerable value to those interested in the pipe threading and cutting machinery.

The Independent Pneumatic Tool Company, Chicago, has recently sent out a new folder descriptive of the Thor Line of pneumatic tools. The various tools are displayed and described in such a manner that a ready comparison may be made of the various classes.

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A Changed Russia?

SELLING goods to Russia has been regarded as a risky proposition for a long time. There are many Canadian firms that were hard hit by having merchandise in Russia on the outbreak of the war and to them the idea of once more putting merchandise in that market was of secondary rating to the paramount question, "Who is going to pay for them?" Even Canadian firms which have had a very large connection in Russian and Siberia make certain now that any shipment they might be contemplating is well covered in advance.

Now comes word from New York that L. C. A. K. Martens, who has been a resident there for some time, is prepared to act on behalf of the Soviet Government with the idea of spending about $200,000,000 in gold.

The purchases he requires to make include railroad supplies, agriculture implements, machinery, tools, mining machinery and supplies, electrical supplies, printing machinery, textile manufactures, shoes and clothing, fats and canned meats, rubber goods, typewriters and office supplies, automobiles and trucks, etc. Russia, on the other hand, is prepared to sell flax, hemp, hides, bristles, furs, lumber, grain, platinum, metals and minerals.

Mr. Martens further makes the assertion that German domination of trade and political conditions has been broken and that "Russia is starting all over again." The Russian agent also goes on to state that many of the reports that have appeared in print regarding the murder carried on by the Government has been grossly untrue. Martens hopes to get recognized at Washington, and open up trade between the two countries.

Stop Talking Prices

CANADIAN MACHINERY has received a letter, written to a well-known manufacturer, and some of the views on price and wage matters are well worth reading:—

An interesting fact has been brought to our attention. It relates to the manufacturing costs of steel products. The statement is to the effect that the Steel Corporation have paid in salaries and wages during 1918 considerably more than four hundred million dollars.

With their estimated production of finished steel the cost of wages and salaries alone, will, therefore, approximate $25.00 per ton, from which it will be seen that before there can be a material reduction in the cost of steel products, it must be brought about through a reduction in wages and in transportation costs, for, as you know, transportation costs have advanced from 50 to 75 per cent. during the past several years, and you know that wages and transportation enter very largely into the base cost of steel products.

This advance in wages and transportation will apply to ore, coal, coke, limestone and all other supplies.

As to the possibilities of wage reduction, one well-known New York man, in speaking on this subject the other day, expressed the belief that wages will not be materially reduced until 1920. He went on to say that undoubtedly Europe will be unable to harvest anything like a full crop in 1919, and that it will be 1920 before the food supply of the world is sufficient to reduce the cost of living.

He then urged that the business men stop talking about price reductions and saying that prices will shortly be reduced, for in doing so they destroy their own market and kill the business enthusiasm by keeping consumers out of the market.

In addition to the above, there is a constructive side, for in Europe there is an almost inconceivable shortage of iron and steel, representing an accumulated demand of more than four years' standing. This applies with equal force to South America, Australia, New Zealand, Japan, China, India, for the lack of transportation facilities have made it impossible to transport supplies to these countries.

We know that in the United States, a period of six months' depression in the steel business has inevitably been followed by a prolonged period of unusual demand, and we know that there has been a check on the peace consumption of steel in this country for approximately two years.

We have a strong conviction that this is a time when every business man should make a correct analysis of present world conditions and lend his assistance in a constructive solving of the present problems.

What That Drop Amounts To

HAVE you ever seen oil dripping? Didn't seem to be wasting much, did it?

But these drops amount to a lot if there are enough of them. Here is something worth remembering:—

Oil just dropping wastes: 15 gallons per day, 105 gallons per week, 5,460 gallons per year.

Oil wasting through an opening the size of the eye of an needle, one thirty-second inch in diameter, under 3 pounds pressure waste: 264 gallons per day, 1,848 gallons per week, 96,096 gallons per year.

Oil leaking through one-eighth of an inch aperture wastes: 2,788 gallons per day, 19,516 gallons per week, 1,014,832 gallons per year.

Steel Then and Now

SHIP plate has been reduced in Canada to 4.50 cents per pound. Market quotations from United States makers make this figure possible.

During the war the prevailing price was from 10 to 12 cents per pound. The firms selling in Canada were not making any more than they are now.

It is a significant fact that there have been no wage reductions to make possible the cuts that have been made in the selling price of steel. For all intents and purposes wages are just as high now as they were when plate was bringing the long price.

The situation, looked at in an ordinary way, would mean one of two things: (1) The steel mills were making big money during the period of the war, or (2) they must be losing a lot of money selling at present quotations. Steel mills are not in business for their health, so that inference No. 2 can be dismissed.

During the war the great cry was for plate. Shipbuilding could not proceed without the supply. The fact that there was such a call is no good reason why the price should have been allowed to go crazy. It is plain evidence that there was war time profiteering.

Making a Serious Mistake Here

By AN INSPECTOR

IN July, 1913, the Ontario Government put into force an act concerning the design, construction and inspection of steam boilers, which was a long step in advance of any previous regulation.

Being framed on the line of the British Columbia laws, it was also a step towards the much needed uniformity of laws in the different Provinces, the absence of which makes a boiler safe in one Province and dangerous in another.

A Good Act

As we have said this act was a good one, and met with the unqualified approval of boiler builders, insurance companies and boiler purchasers, all of whom stood to benefit by it. The boiler builder had only to show that his boiler was built under the Ontario Act, to establish the quality of the article he was selling, the purchaser had the same guarantee as to the article he was buying, and the insurance companies had a certain amount of guarantee as to the risk they were taking. It gave the operating engineers or firemen a sense of security against accident, by reason of the boiler and fittings being of standard designs, and subject to the approval of the Government inspectors.

Hopes of a Better Era

This action of the Government led those interested in steam engineering to hope that other much needed reforms would ensue, particularly the granting of graded certificates. However, the Government was content to rest on its laurels, probably feeling that having done one good work, they were entitled to a period of recuperation. This, in itself, might not have been so bad, but that recently they awoke from their long hibernation with a feeling that something should be done. What malign force prompted this feeling deponent knoweth not, but in their anxiety to take some action the Government has passed an order-in-council which goes a long way to wipe out all the benefits of the Act of 1913.

The Order-in-Council

This order-in-council follows an amendment to the Ontario Factories Act, making it compulsory that all boilers (except those in private dwellings, or used for farm or agricultural purposes) be either insured with a Boiler Insurance Company, registered in the Department of Insurance, or inspected once annually by an inspector, duly authorized in writing by the superintendent of the Trades and Labor Branch.

The order-in-council provides that **any engineer holding a 1919 license shall be considered duly authorized to make such inspection.** An inspection of a boiler by the engineer in charge of that boiler will not be accepted, but an inspection by any other engineer will be. That is, an engineer can inspect his next door neighbor's boiler, and vice versa.

What an idealistic condition is opened up by this order-in-council. No more bumptious and critical inspectors poking their noses into all kinds of hidden recesses, and making foolish suggestions entailing more work for the poor engineer. Instead of that, Bill Smith gets his good friend and fellow lodge member, Jack Jones, to come around and just give his boiler a look over.

"Now Jack," murmurs Bill, "I guess there's no need of knocking that back hand hole out. It's always an awkward job to get it tight again with a new gasket."

"Sure Bill, that'll be alright," says the obliging Jack.

"I didn't knock the manhole door in, Jack. You can see everything from the front hand hole with this torch of mine. Anyhow, you know you don't need to be afraid of any boiler I have charge of."

"That's true, me boy," agrees Jack. "We will just open the smoke box door and look at the end of the tubes."

This being done, and Jack assuring himself that the end of the tubes are still there, the inspection is completed. After a little desultory conversation Jack goes off with a feeling of a job well done. Before leaving he has arranged for Bill to reciprocate his kind offices the following week.

In the course of a few days Bill's employer gets a report from Jack Jones informing him everything is in excellent shape, which cannot fail to give the boiler owner the utmost satisfaction.

How About This Case?

Take another instance of what might happen. Supposing a plant of, say, 300 H.P., containing 3 boilers of 100 H.P. each. The company does not carry insurance. There is a certain weakness about one of the boilers, which the engineer knows of and has informed his employer. He knows it may run indefinitely, or may give out at any moment. An insurance inspector would insist on a repair. The plant is busy and a shut-down is undesirable. There is a little plant close to with one boiler, and an engineer holding a 1919 license, who can probably write his own name. He is called over and asked to make the inspection. Everybody is satisfied. It may be said that employers or owners would not permit such things. I will give instances of my personal experience on these lines which will dispose of that argument, a little later on in this article.

What An Inspector Should Know

Before going any further it would be well to discuss the duties and qualifications of a competent boiler inspector.

In England, where boiler inspecting has been brought to a perfection not known on this continent, the insurance companies demand a high grade class of men for their boiler inspectors. These men have to be qualified as engine inspectors also, and are almost invariably recruited from the ranks of the sea-going engineers. They hold either an extra first class or first class Board of Trade certificate, which guarantees them to be men of special training and experience. Having obtained a man of this calibre, these companies subject their recruits to a rigid course of instruction extending over some months, before they are allowed to go out and inspect on their own responsibility.

Evidently from the care expended in selecting and training inspectors, the heads of these companies do not believe that any Tom, Dick or Harry is qualified to inspect boilers. The chief men on the staffs of these organizations are men of world-wide reputation, such as Michael Longridge, Stromeyer, Brian Donkin, etc.

What then should the qualifications be to make a successful inspector?

First of all he should be a mechanic. Not necessarily a boiler maker, in fact, very few boiler makers are qualified as inspectors. He should have a thorough knowledge of the principles of design and construction of all types of boilers, fire tube and water tube. He should know the principles of combustion and of heat. He should have had considerable experience in operating, and combine with these abilities the faculty of being able to make a good working sketch. He should be able to make a clear and intelligent report on what he finds.

In his actual inspecting work his knowledge of boilers should enable him to detect incipient flaws and weaknesses, and suggest remedies to prevent their spread. The ability to state his opinions in clear-cut language, and a large amount of tact, are also qualifications to be desired.

Some of the insurance companies in Canada attempted to obtain these kind of inspectors, and in some cases succeeded. However, what militates against them is the fact that these men can command much higher salaries than the insurance companies can afford to pay, from the incomes they receive. They do get the best men possible, and under the direction of their chief engineers they do good work.

One thing is certain. A company that stands to lose real money by an accident will, in the nature of things, be more particular in their inspection than any other agency.

Not a Sinecure

The work of a boiler inspector carried out conscientiously is arduous, dirty and uncomfortable. It is more so in Canada than need be, owing to the disinclination of the average engineer to properly prepare his boiler for inspection. The inspector is hampered in his work by having to dig his way through hot ashes and soot, which should be cleared out long before he comes. He frequently has to argue and persuade in order to have the handholes and manholes opened up. It is not to be understood that this is always the case, for there are many engineers who take a pride in having things ready for the inspector. There are too many who do not, either from ignorance or unwillingness to make the effort.

Too much of this attitude has been engendered in the past by inspectors themselves. In too many cases the inspector did not carry out his duties in a thoroughly conscientious manner, but when conditions were against him simply let it slide. This made the engineers imagine that there was no need to bother. The result was that when the careless and incompetent inspector was relegated to the limbo of forgotten things and a new man more aware of his duties came along, trouble ensued.

To make a proper inspection of a boiler it should be cooled off thoroughly. The interior of the boiler should be perfectly clean. The exterior surfaces should be the same, and every part of the boiler that is possible of access in any way should be properly prepared. The inspector should then make a thorough inspection of every part, and be able to make a report of conditions that will be almost an exact index of that boiler's fitness for its work.

The characteristics of a steam boiler, its liability to sudden accident, or gradual failure through corrosion, are the same whether the boiler is located in Chowbent, Lancashire or Kalamazoo, Mich. Therefore, one would be led to imagine that the same or nearly the same ability would be necessary to inspect them. Evidently this is not so.

The Province of Ontario takes the view that any man who can throw coal into a boiler is qualified to inspect it. It takes this view in issuing its certificates by granting the same certificate to a man in charge of 5,000 H.P., as to the man in charge of 50 H.P. It further gives the man who has charge of one boiler and engine, and knows but little about either, the power to inspect a 500 or 1,000 H.P. water tube boiler and pronounce on its condition. Ye gods, was ever such a nonsensical and dangerous principle propagated by any responsible body?

There are good men in charge of stationary plants in Ontario as elsewhere, but the majority are no more fit to carry out an inspection of a steam boiler than they are to diagnose a case of sickness and prescribe for it. This is not meant as disparaging their abilities for the position they hold, but rather to point out that their training and education has not been along lines such as would fit them for the task. Many engineers (?) holding Ontario licenses are practically illiterate, and a special clause is inserted in the examination regulations to allow these men to have a person to write down their verbal answer to the examination question or allow the examiner to perform this duty. Yet these men are qualified by an order-in-council to assume the responsibility of declaring on the safety of a steam boiler. The extent of their experience consists in a large number of cases in having fired a boiler for some years, coupled with starting and stopping a steam engine and making minor repairs, such as packing glands, etc.

As to the argument that boiler owners would see for their own sake the necessity of having as thorough an inspection as possible. Some boiler owners will, but many more will, from a false sense of economy, avoid it as far as possible.

The writer was asked to make an inspection of a boiler which had been giving trouble by leaking round the seams. The owner said he had a good engineer, but would like an outside opinion. On being asked if the boiler had been inspected regularly, he said not for some years; he didn't think it needed it. A visit was made to the boiler room while the boiler was under steam to get a general idea of conditions. There was some leakage over the fire seam and round the front head. The gauge glass showed signs of being plugged up, and looking in the fire door to observe the girth seam, the back end of the combustion chamber was observed to be pretty near filled up. Arrangements were made to let the boiler down and to make an internal inspection the next day. It took an hour's hard work the following day to get the back handhole door knocked in, the scale was piled up so thick and hard against it. The dirt and ashes had so much accumulated in the combustion chamber and up to the bridge wall that it was almost impossible to get any kind of a fire in the furnace, and that fact alone had saved the back plate from bulging. The small amount of heat that could be obtained kept the water circulating over the fire, and the solid matter was deposited on the back plate. After the inspection had been completed, the owner was asked how the boiler had got into that state and how often was any cleaning done. He stated that he had stopped the cleaning, as his man used to spend four or five hours every Sunday on the job, and it cost too much.

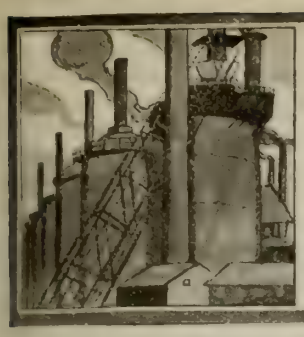
Another case was where a locomotive boiler had been installed by the owner and his engineer. This boiler had been set up in such a manner that the fire was under the fire box altogether, and the solid mud ring was exposed to the full heat of the flame. The result was, as might be expected, innumerable cracks and a fractured ring. This owner prided himself on knowing all about boilers.

The writer remembers well a case of a hospital in a large city in Ontario where dangerous conditions prevailed, and it was only after several strong reports had been made, and pressure put upon the authorities that these conditions were remedied. And the boilers were in the basement of the hospital.

In large plants or medium-sized plants owned by responsible manufacturing concerns, every care is taken to safeguard the boiler and maintain its efficiency, and every recommendation of an inspector is carried out. These clients will not be affected by the new order.

It is the hundreds of small, one-boiler concerns which stand most in need of efficient inspection that will be the ones to take advantage of this new order of things. The owner who hates to spend a cent on his boiler upkeep will be the one to pick out a man he knows will be easy to make the inspection. Was it for this class of owner the order was made? What is the object of it; through whose influence was it promulgated? What are the arguments in its favor? And what do the engineers themselves think of it?

Probably some of them will be of the opinion of a certain Government inspector now deceased, but well known in his day. To all arguments of a technical nature he had one reply, "A kettle is a kettle, and a b'iler is a b'iler." In all the years this man inspected he was never known to go inside a boiler, and there are others.



MARKET DEVELOPMENTS

Consumers Get Benefit of All Reductions

Dealers Have Passed Along the Latest Cuts—Planes Are Showing a Tendency to Come to Lower Levels—Big Deal Put Through For Disposal of Shell Steel

NOT much time has been lost in passing the reductions made in the price of steel and iron on to the Canadian consumers. The price lists issued this week pass on the average cut of seven dollars per ton. Plate is now quoted at 4.50c per pound. In this connection it is worth noticing that there has been no wage reduction yet in the steel trade, and yet during the war plate sold locally at from 10 to 12 cents per pound, against the lowly 4.50 now. The inference is that either much money was made by the mills during the war or they must be losing quite a tidy sum now, and it is hardly likely that the latter will be generally accepted. It is perhaps a little too early yet to state whether the new prices are going to result in much vigorous buying, although the trade generally is very hopeful that such will be the case. There is already talk of further reductions, but it will be some months before anything in this line can be done.

Some machine tools are showing a tendency to drop in price, but not to any very great degree. Planers are a little down, and they can afford to be. At the outbreak of the war and the beginning of munition making there was no demand for planers, and firms stopped making them. When war shops came into the market and when the shipbuilding programme was started there was a big call for planers, one U.S. Government order calling for as many as 400 at a time. The result was that prices simply ran wild, and they are still over twice the old price.

Some 40,000 tons of shell steel, the property of the I.M.B., was sold to Toronto scrap dealers during the week, and it is likely that the remainder of this material in the country will be shipped to England. No disposition has yet been made of the steel here that belongs to the United States Ordnance Department, although negotiations pending ought to bring something definite.

LOWER PRICES FAIL TO BRING MONTREAL BUYERS OUT STRONG

Special to CANADIAN MACHINERY

MONTREAL, April 3.—Reconstruction is still in the making, apparently, and business operations, on a sound basis, are delayed or postponed to a large extent by the unsettled conditions contingent on the readjustment that has been taking place since the first of the year. The extended delay that has taken place in the settlement of American shell contracts has prevented a speedy clearing of these plants, and the taking up of new enterprise. Considerable capital is tied up in this way, thus delaying expansion in other directions.

Price adjustments in steel are lowering the mill and warehouse quotations, but buying is still of a light character. Metals are devoid of interest. Machinery trade is quiet and old material has shown slight improvement.

Lower Prices, But Light Demand

Whether the decision of the American mills to meet the reduction in steel prices, announced by the Commission, and the apparent willingness of the Canadian mills to meet the changed conditions will stimulate buying is yet to be seen. As yet, the movement has not been pronounced, but from past inquiries it would not be surprising to see a revival of heavy buying, not of an abnormal character, but of sufficient volume to create renewed confidence to the trade. One of the difficulties at the present time is in the operation of the mills, it being necessary in some instances to run for intervals, periodically, in order to meet trade requirements. Steel production on an economic basis requires continuous operation, so that light, but steady, demand necessitates the shut down of the furnaces during operating periods. Should lower prices create a better domestic demand it may enable the mills to operate closer to capacity and avoid expensive shut downs. Considerable war material is still stocked and producers are expecting to dispose of this at a loss. Local dealers have revised prices on some commodities to meet the lower quotations at the mills, but inquiry as yet has not been sufficient to indicate that heavy buying will immediately follow the cutting of the price. The base price on both iron and steel is now fixed at $3.75 per hundred, and price revisions are expected on other lines. Dealers here have made a further adjustment in respect to plates, the new scale being $4.50 on ¼ inch, and $4.90 on the smaller sizes. Black sheets have also been revised, No. 28 gauge being quoted at $6.55 and No. 10 at $5.15 per hundred.

Copper Undertone Better

The week's developments in the metal situation has added little interest to the market and the trade is still hovering on the brink of expectancy. In commenting on the better tone of the American copper situation, dealers here say that the optimistic tone is naturally reflected in local circles, but do not anticipate any immediate activity in this connection. It is reasonable to expect a revival of interest now and then, but a general return to normal activity will only take place when readjustment has reached the point where reconstruction can be carried on on a stable and reliable basis. Demand at present is of a character, but the volume is relatively light. Price quotations are unchanged and firm at 19 and 20 cents per lb. The tin situation is still devoid of mentionable interest, the demand continuing to be largely for small lots. Operations are more or less obscured, and dealers report little future buying. All the

metals are inactive with price quotations unchanged.

Used Tools Still Prominent

Machine tool activity throughout the district continues to be of a transient character, the supply equal, at all times, to the present demand. Dealers are making occasional sales of new tools, but the bulk of the trading is in the transfer of used equipment from a previous buyer to new purchaser. In many instances these sales are made on a direct basis, but in others the dealers are acting the part of rebuilders, in overhauling and refitting the machines for more general purposes than for which they were originally designed or previously used. The question of price continues to be an influencing factor in the sale of new equipment, and it is this phase of the situation that places second-hand trading in the primary position. However, used machinery of a serviceable character is becoming scarcer, and eventually the demand will revert to new tools. With Government action in respect to lower prices on primary commodities the way may be opened for better quotations on finished products and machinery.

Scrap Improvement Anticipated

The outlook in old material and scrap circles has taken on a more encouraging tone during the past week, and while sales have increased but little, there is a feeling throughout the trade that a gradual revival will shortly develop. This is generally surmised from the belief that the lowering of steel prices will stimulate heavier buying, with the consequent increased demand for scrap. Dealers are less reluctant to take on additional material at prevailing prices, as many think that the trade is on the turn and that the market will become more active before the month is out. It would appear that shell earnings are pretty well absorbed, but heavy melting steel is still plentiful. Dealers buying prices here are well maintained, with the exception of two items, boiler plate and machine shop turnings, these having fallen off $2 and $1 per ton, the respective quotations being $10 and $5 per ton.

POINTS IN WEEK'S MARKETING NOTES

Production at U. S. steel mills is about 75 per cent. of capacity, which is equal to 105 per cent. of the 1914 capacity.

—

Further declines are looked for in steel, but for the present it is regarded as certain that prices will stand, and buying is proceeding on that assumption.

—

U. S. Railroad Administration ordered 100,000 cars, but the railroad officials refuse to take deliveries, and only 20,000 of the lot have been accepted.

—

Experts who have gone through the U. S. Steel Corporation report for the year claim that figures there show that consumers are paying too much for steel.

—

Some machine tools are showing a tendency to move toward a lower market price. In other cases deliveries are very indefinite and prices strong.

—

Some 40,000 tons of shell steel have been sold to Toronto scrap dealers, and great quantities of what remains will be sent back to England.

—

Plate is sold in Toronto and Montreal now at $4.50 base.

—

New lists are out on lapwelded boiler tube, the discounts being raised from 37 to 40½.

—

The slowness of making adjustments with war contractors is causing some inconvenience in shops where the amount involved is needed as working capital.

NO GENERAL REDUCTION LIKELY FOR PRICES OF MACHINE TOOLS YET

TORONTO. — Warehouses announce that all stock on hand has now been brought to the level of the recent cuts. It is anticipated that this will stimulate buying to a very considerable extent.

Machine-tool dealers notice a tendency to bring down prices from war levels. In fact this is quite marked in some cases, and equally absent in others, especially where makers have orders on the books and no stock on hand.

Some Movement in Scrap

Anything that looks like a deal helps to relieve the stagnation that has enveloped the scrap market during the past three or four months. There are signs now of business coming to life, and also of a stronger feeling in some of the metal lines. There has been some little speculation regarding the disposal of much of the shell billets that are stored in this country, the property of the Imperial Munitions Board and of the U. S. Ordnance department. We understand that a great deal of the Imperial Munitions Board steel will be shipped out of the country, probably to England, although CANADIAN MACHINERY learned today that a deal had been put through whereby some 40,000 tons had been sold to a Canadian firm of metal merchants. A large melter has been in touch with the lot, but it has not been disposed of yet. No prices have been let out on the sale of this material, but it is understood that something in the neighborhood of $11 was secured.

Although the tendency has not found expression in higher figures yet the market for red and yellow metals—copper, machine composition, red and yellow brass—is stronger. The copper market is showing more strength than at any time since the decline took place. The best evidence of this is the refusal of dealers to promise fourth-quarter deliveries. Otherwise the market is not improved. Dealers are not anxious to have offerings coming into the market, as it means stocking the stuff, and they are not at all anxious to do this.

More Cuts are Made

The cuts that were made in American steel prices were effective on March 21, the day of their announcement, and they have been passed on to Canadian dealers. It is correct to state now that Canadian purchasers can secure the advantage of all these reductions, as there has been a cut of an average of $7 per ton on all warehouse lines. Some of the Canadian firms will be pinched a little by reason of having higher priced material on hand, but for the most part the Canadian warehouse interests will get out very well. They were not heavily stocked for the very good reason that they could not secure the material. The chances are that many of them would have taken on much larger tonnage had they been able to secure deliveries. Although they used to make wry faces at such things as licenses, preferences, etc., the chances are that in some cases at least the dealers will now be inclined to rise up and call these trade impediments blessings in disguise.

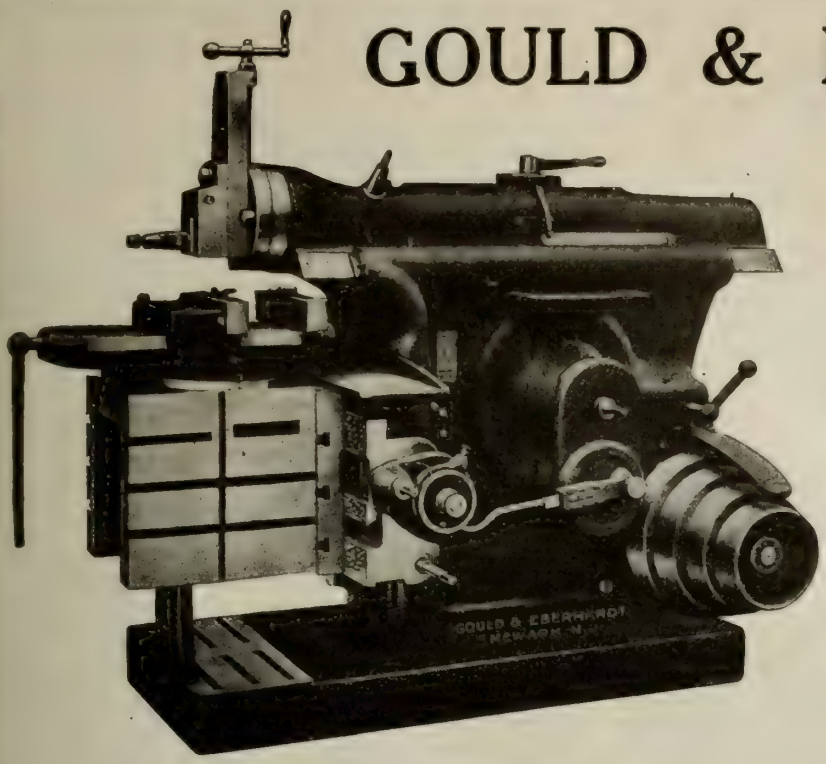
Plates and sheets have been brought down, the mark aimed at being a $7 per ton reduction. The new price on plate is $4.50 per pound (¼-inch up) and $4.90 for 3/16.

Business is improving, and there seems to be no good reason why it should not continue to do so. There has been a tendency to hold back, or else to make purchases in very small amounts.

Boiler tubes did not stay very long with their pronounced intention of remaining at old figures. The cut on these amounts to the same as $7 per ton on other lines, although it is worked out differently. The discount has been increased 3½ points from 37 to 40½. This concession is made only on lapweld steel tubes, but this covers the great part of the trade, as fully 90 per cent. of the tubes used in this district are of this sort. Seamless tubes are not yet cut. The mills making them have orders on hand that will run for some time, but the prospects are that sooner or later they will have to meet the reductions on the other varieties of tubes.

The Price of Machinery

If one imagines that all, or nearly all,



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the war-shop machinery has been absorbed, all that is necessary is to take a look through some of the shell shops that have been partially dismantled. Of course much of the stuff will bring only scrap bids, but there is enough outside of this to be a factor in the market.

It is hard to see where there is going to be much reduction in the price of machinery. Planers are showing symptoms of coming down, probably because the trip down is a long one, and they can afford to take it in large steps. Some of these machines are still a good 200 per cent. above old levels. At the first of the war no planers were called for, and as a result they were built in small numbers. When the rush of shipbuilding came there was a big call for planers. In fact the U. S. Government at one time called for 400 at once. A tremendous demand and an empty market meant only one thing, viz.: greatly increased prices. Now that work calling for these machines is competitive and normal the prices begin to shrink. Some firms announce cuts of 15 and 20 per cent., but the best deliveries they can quote are two or three months ahead. Another well-known maker of gear hobbers promised between two and three months' delivery, whereas two or three weeks used to be the usual thing. One firm having three 60-inch boring mills in stock sold the lot in two weeks. There is a belief in Canadian trade that admits that the sale of new material is better.

PRICES MAY BE CUT AGAIN, BUT FOR PRESENT THEY HELP BUSINESS

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Apr. 3.—The passing of another week has not brought iron and steel buyers to a more favorable appraisal of the price reductions that became effective March 21, nor do producers express more confidence that the reductions will bring about a general trade revival. There are a few who do, but the majority frankly admit that they expect some time to elapse, perhaps many months, to elapse before there is a really active market. This admission virtually carries with it an admission that prices will decline further before there is really heavy buying.

Fairly Active Market

All the business that was held back during the three or four weeks prior to the price reduction, and after Secretary Redfield had announced his intention of seeking deflation of war time prices, is likely now to come out, and in the past ten days it has been coming out in very good volume, making the market at least as active as it has been at any time since the signing of the armistice. It is observed, however, that the buying is from just the same sources as formerly, no new demand having been created, so that the volume on a long range average is not likely to be altered. Business is merely being placed now that would otherwise have been placed some time ago.

While the market can hardly be described as better than quiet, or moderately active, and while production is only at about 75 per cent. of capacity, sight must not be lost of the very important fact that such activity really represents an enormous tonnage of iron and steel. The viewpoint must be that of the large increase that has occurred in capacity. During ten years before the war the steel industry operated at its full capacity for only about three years out of every five, on an average, and the capacity was much smaller than that now existing. As there has been an increase of capacity during the war of 40 per cent., from 35,000,000 tons of annual ingot capacity in 1914 to fully 49,000,000 tons, a 75 per cent. operation now means a greater tonnage than could have been produced before the war, as it would be 105 per cent. of the 1914 capacity. The capacity in that year, in turn, was much greater than the capacity in 1906, which will long be remembered as one of the very best years, if not the very best, the steel industry ever had before the war. It is surprising that the steel industry is not operating at capacity now. The wonderful thing is that such a large tonnage of steel is being taken by buyers and is consumed, for nothing is more certain than that no one is buying steel, or accepting delivery of steel, that is not urgently needed. Practically everyone believes that prices will decline rather than advance, and as they are not at all likely to decline in the very near future it is better to order at once if the material is needed soon.

Room for Declines

While iron and steel producers have much of their "costs" in their public utterances and in the arguments with the Industrial Board at Washington, the consumers are convinced that there is a large and unusual margin of profit from which price reductions could be made, and it is pointed out by some buyers and by a few particularly broad-minded producers that after all it does not do much good to convince people in Washington that costs are high and reductions cannot be made, because it is from their customers that the producers must secure their orders. It is the customer, not Washington, that must be convinced. It is true that the Railroad Administration is located in Washington, and railroad orders usually account for a considerable part of the steel business, but appearances now are that the Industrial Board does not control the Railroad Administration. It certainly is true that the railroad officials have a great deal to say in the matter of railroad purchases. The Railroad Administration cannot force purchases upon the railroads, as was proved by the case of the 100,000 freight cars ordered a year ago. Even before the war ended some of the railroads began refusing to accept deliveries of cars under that transaction, and with war's end the position of these railroad officials is made stronger. Only about 20,000 of the 100,000 cars have been made and delivered.

With this question of costs and profits so prominent, the current report of the United States Steel Corporation is being studied with particular interest. The report states that deliveries during 1918 were at substantially "Government prices," from which there have since been reductions averaging about $11 per net ton. Now while the corporation reported earnings in the year of $208,000,000, or only say 25 per cent. more than in the best year before the war, the total profits were very much larger, there having been large deductions on account of special conditions that would not obtain in future. It is understood that bonuses to employees, on account of exceptionally large profits, amounted to something like $10,000,000 more than would usually be expected. Then there was an adjustment of $20,000,000 to inventory that will not have to be made again, while $40,000,000 was charged off by reason of various facilities installed for filling war orders having become worthless. Finally there was about $275,000,000 allowed for Federal taxes. The total profits therefore were in excess of $550,000,000. While some producers assert that prices cannot be reduced unless wages are reduced, it is noted, by comparison with the total profits just mentioned, that the total wages and salaries paid by the Steel Corporation in 1918, exclusive of payments made by its four railroads now under control of the Railroad Administration, amounted to $426,299,290. As the Federal tax is levied upon profits in excess of certain fairly liberal allowances, money that is earned to pay that tax can hardly be considered a necessary part of the expense of production.

It is not surprising, therefore, that many buyers expect additional price reductions. The common view is that such reductions are more likely to occur in June than at any other time. A quarterly readjustment of prices seems to be the natural thing, particularly as the War Industries Board set such a period.

Pig Iron

The foregoing applies particularly to steel. Pig iron may experience declines at almost any time, as the pig iron market, on account of the multiplicity of districts, each with its own individual market level before the period of Government control, is a much more complicated affair than the steel market, with its single Pittsburgh basis. The present effort is to hold all pig iron price cuts at $7.25 per ton ($3 reduction last December and $4.25 in March) under the Government prices that ruled at the close of the war. That price schedule, however, presented some unusual features, the Eastern Pennsylvania furnaces being on a Pittsburgh basis, charging freight from Pittsburgh to destination rather than from furnace, while the Birmingham furnaces got as high prices at furnace as the Northern furnaces, when under competitive conditions they must sell at less, on

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account of the heavy freights North.. As there is not enough demand to go round consumers will buy at the lowest delivered prices available, and that would shut some furnaces out of much of their trade. For instance, the basis price of No.2 foundry iron, silicon 1.75 to 2.25 per cent., is $26.75. The valley furnaces will sell at that price, and so will the Buffalo furnaces, f.o.b. furnace in each case, but the Eastern Pennsylvania furnaces would quote that price, f.o.b. Pittsburgh. New England buyers would not take such iron, as Buffalo iron would be cheaper, yet in the past Eastern Pennsylvania furnaces depended on New England for considerable business.

At a meeting of the Associated Manufacturers of Merchant Pig Iron held in Pittsburgh late last week an assurance was secured from the Industrial Board, that the board does not consider itself in any sense a Government price fixing body, hence the furnaces decided they had no occasion to adjust pig iron contracts to the reduced basis. Pickands, Brown & Company, Chicago, however, have issued formal notice that they will voluntarily make the concession to all customers on shipments beginning March 21.

IMPROVEMENT IN NEW YORK MARKET

Special to CANADIAN MACHINERY

NEW YORK, April 3.—The past week has produced a somewhat better volume of inquiry for machine tools than the preceding week. In fact, March business, on the whole, has been fairly good, comparing favorably with normal prewar months. Some machine-tool builders are complaining, while others have a fairly good budget of orders. Certain types of tools are naturally in greater demand than others.

As has been noted in previous letters, the farm tractor industry has been making great strides since the end of the war, and manufacturers of tractors have come into the markets for quite a large number of machine tools. In this connection, the report of the Department of Agriculture that the 1919 output of tractors will be 315,000 is of interest, as this is more than double the number that were turned out last year.

A Big Field

J. N. Willys, president of the Willys-Overland Co., Toledo, Ohio, in making his annual report, says that the outlook for the farm tractor and automobile industries was never brighter. Mr. Willys says that the output of cars from his own plants will be 175,000, or more than twice the depleted 1918 production and exceeding by 25 per cent. the company's best year. Mr. Willys reports a steadily increasing demand for cars. As other automobile manufacturers are also expanding to a similar extent it is obvious that the automobile manufacturing industry will continue throughout the year as one of the best customers of the machine-tool builders.

Slow Move Here

One thing that is holding back buying of machine tools to some extent is the slowness of the United States Government in making settlements with war contractors. The British Government is also somewhat slow in this respect. However, the work is proceeding gradually, and with much of the preliminary details out of the way the actual cash remunerations should soon come.

New inquiries before the New York trade include one from the Submarine Boat Corporation, which has a large shipyard at Port Newark, N. J., for 100 16-in. engine lathes, 100 20-in. upright drills and 100 emery grinders, all motor driven. These tools are to be installed on merchant ships being built at the Submarine plant. Another good-sized inquiry comes from the Standard Oil Co. of New Jersey, which requires about 50 machines for a ship repair plant at Bayway, N. J. The list includes about a dozen punches and shears, a plate planer and miscellaneous machine tools.

One of the largest machinery orders placed in this country for export since the war ended has been closed by F. E. Robert & Co., Philadelphia, engineers, for the steel plant of Sota & Aznar in Spain. The machinery purchased includes rolling mills, large cranes, machine tools, etc. The French High Commission, New York, has practically completed purchases of about 150 machine tools for reconstruction work in France.

Still Buying Heavily

The Navy Department has been a consistent and steady buyer of machine tools for several months, the ending of the war having made no appreciable change in its program. One of the largest of the navy projects is the armor plate and naval ordance plant at Charleston, W. Va., for which $3,500,000 to $4,000,000 worth of very large machine tools were purchased a few months ago. Recent purchases have covered equipment for a new torpedo station at Alexandria, Va., and tools for various shipyards. Extensions are being made at practically all of the navy yards, but particularly at Norfolk, Va.; Boston, Brooklyn and Mare Island, Cal.

The machine-tool trade is expecting that the railroads will soon come into the market. The first railroad list of importance in months has been issued at Chicago by the Chicago, Burlington & Quincy for about 50 tools. Several of the roads in the East are known to have buying programs in contemplation but these have been held up awaiting funds. Now that railroad financing plans are under way it is expected that money may soon be provided for necessary betterments.

Many Used Tools

A great many second-hand tools from war plants are now being offered. The International Arms & Fuse Co., Bloomfield, N. J., which recently issued a list of about 1,000 used tools, which it offered for sale, has had fair success in disposing of them. It is expected that the entire equipment of the plant of the Wright-Martin Aircraft Corporation, Long Island City, N.Y., will soon be placed on the market. At a recent sale of the equipment of the Stenotype Co., Indianapolis, Ind., users of tools made bids for a great deal of the equipment which were higher than dealers were willing to pay. Milling machines in particular were in demand.

FAIRBANKS-MORSE HAD RECORD YEAR

Earnings on Common After All Deductions Total $710,097

Montreal.—A record year, both from the standpoint of the volume of business handled and that of profit, is disclosed in the annual report of the Canadian Fairbanks-Morse Company, Limited, for 1918, now being sent to the shareholders. After providing for depreciation, war taxes and allowing a full year's dividends on the preference shares of the company, the balance earned for the common shareholders was $710,097, as compared with $691,973 in 1917, $546,629 in 1916, and $619,048 in 1915. The earnings shown in 1918 represented 44.38 per cent. on the $1,600,000 common stock, against 43.2 per cent. in 1917 and 34.2 per cent. in 1916. Dividends of 18 per cent. were paid on the junior issue of the company in 1918, as compared with 26 1-8 per cent. in 1917, and 10 per cent. in 1916.

Present Surplus $1,762,537

After all dividend requirements were liquidated there remained a balance of $422,097 to add to the amount brought forward from 1917, bringing the total surplus up to the substantial figure of $1,762,537. The surplus of $1,762,537 represents the equivalent of nearly 57 per cent. on the combined issues of $1,500,000 preference shares and $1,600,000 common. A survey of the balance sheet to be submitted to the shareholders indicates a comfortable financial position and shows several interesting changes from last year. The company ended the year 1918 with $519,861 cash on hand, with no bank loans and with an excess of current assets over liabilities of more than $4,300,000.

The balance sheet shows an increase of over $630,000 in inventories and nearly $1,000,000 in accounts receivable. Another feature of the balance sheet is the disappearance in the 1918 exhibit of any allowance for deferred charges, as against an item of $472,982 carried in the 1917 statement.

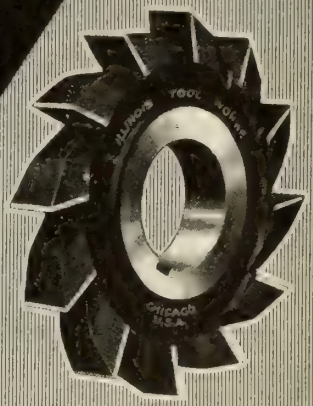
The president's report further states: "With the signing of the armistice, work at the Toronto factory on munitions ceased. During the war period the effort of this department was concentrated entirely on the production of shells, thus contirbuting in a measure to the success of our armies in the field. We have put aside the sum of $150,000 for the purpose of plant rehabilitation and are already producing some of our established lines at Toronto. The outlook for the future is promising and we expect that the results for the coming year will be satisfactory."

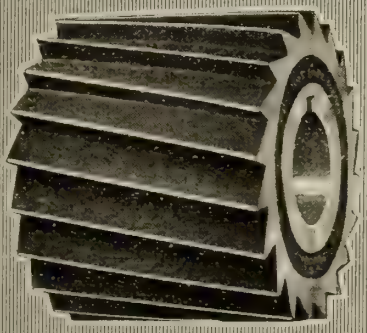
None Better *can be Made*

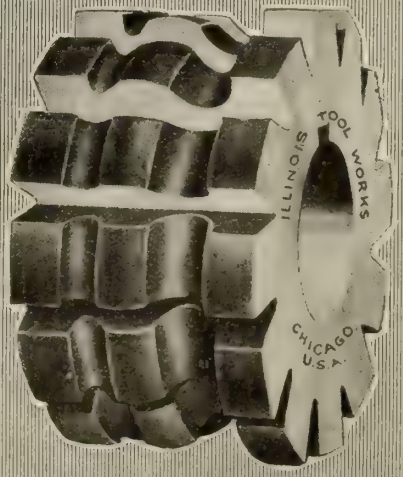
ILLINOIS

CUTTERS

No matter how difficult your cutter requirments may be, it is probable that we have solved similar milling problems for others.







ILLINOIS TOOL WORKS, CHICAGO.

Detroit Store 997 Woodward Avenue. Represented by A. C. Towne & Co., Buffalo. Louis G. Henes, 75 Tremont St., San Francisco and Title Insurance Building, Los Angeles.

How to Locate Export Trade for Canada

Things That the Canadian Manufacturer Would Do Well to Bear in Mind—Ask Specific Questions and Make Use of the Trade Commissioner's Service

HERE are certain things that the Canadian manufacturer should bear in mind when completing his preparations for foreign trade. Attention to these will have much to do with the success or failure of any selling plans that may be contemplated. CANADIAN MACHINERY, in conversation with an authority on this matter, secured considerable information that should be helpful.

In the first place the Canadian firm that is desirous of securing export business should make use of existing service provided for that purpose. Following is the correct list of representatives of the Canadian Trade Commission:

Argentine Republic—B. S. Webb, Reconquista No. 46, Buenos Aires. Cable address: Canadian.

Australia—D. H. Ross, Box 140, G.P.O. Melbourne office, Stock Exchange Bldg., Melbourne. Cable address: Canadian.

British West India Islands and British Guiana—E. H. S. Flood, Bridgetown, Barbadoes. Cable address: Canadian.

China—J. W. Ross, 13 Nanking Road, Shanghai. Cable address: Cancoma.

Cuba—J. C. Manzer, 501 and 502 Antigua Casa de Correos, Teriente Rey 11, Havana. Cable address: Cantracom.

France—Phillippe Roy, Commissioner-General, 17 and 19 Boulevard des Capucines, Paris. Cable address Stadacona.

Holland—Ph. Geleerd, Acting Trade Commissioner, Zuidblaak 26, Rotterdam. Cable address: Watermill.

Italy—W. McL. Clarke, via Carlo Catanco 2, Milan. Cable address: Canadian.

Japan—A. E. Bryan, 53 Main Street, Yokohama. Cable address: Canadian.

Newfoundland—W. B. Nicholson, Bank of Montreal, Water Street. St. John's, Newfoundland. Cable address: Canadian.

New Zealand—W. A. Beddoe, Union Bldgs., Customs Street, Auckland. Cable address: Canadian.

Siberia—L. D. Wilgress, Suifunskava Street, 10, Vladivostok. Cable address: Canadian.

South Africa—W. J. Egan, Norwich Union Bldgs., Cape Town. Cable address: Cantracom.

United Kingdom—Harrison Watson, 73 Basinghall Street, London, E.C.2, England. Cables: Sleighing, London; J. Forsyth Smith, Acting Canadian Trade Commissioner, 87 Union Street, Glasgow. Cable address: Cantracom; J. E. Ray, 4 St. Ann's Square, Manchester. Cable address: Cantracom: J. Forsyth Smith, Century Bldgs., 31 North John Street, Liverpool. Cable address: Cantracom; N. D. Johnston, Sun Bldg., Clare St., Bristol. Cable address: Canadian

Canadian Commercial Agents:

Australia—B. Millin, Royal Exchange Bldg., Sydney, N.S.W., Australia.

British West Indies—Edgar Tripp, Port of Spain, Trinidad Cable address: Canadian; R. H. Curry, Nassau, Bahamas.

Norway and Denmark—C. E. Sontum, Grubbegd, No. 4, Christiania, Norway. Cable address: Sontums.

Have Other Help

Recently the British Trade Commission has made arrangements so that the services of its representatives can be made to serve any part of the British Empire where a trade commission is not already located. The list of British Trade Commissioners follows:

At Headquarters

C. Hamilton Wickes, 73 Basinghall Street, London, E.C.2.

Canada

Montreal—G. T. Milne, 367 Beaver Hall Square, Montreal. Telegraphic address: Britcom.

Toronto—F. W. Field, 257-260 Confederation Life Bldg., Toronto. Telegraphic address: Toroncom.

Newfoundland—G. T. Milne.

Australia

Melbourne—S. W. B. McGregor, Commerce House, Flinders Street, Melbourne.

Sydney—The Officer in Charge, H.M. Trade Commissioner's Office, Royal Exchange, Sydney.

New Zealand

Wellington—R. W. Dalton, P.O. Box 369, Wellington.

South Africa

Johannesburg—W. G. Wickham (at present c o Trade Commissioner's Office, Cape Town).

Cape Town—J. L. Wilson-Goode, P.O. Box 1346 Norwich Union Bldgs., Cape Town.

India and Ceylon

Calcutta—T. M. Ainscough, O.B.E., McLeod Buildings, 28 Dalhousie Square, Calcutta.

Straits Settlements

Singapore—P. J. McKellen (at present stationed at headquarters).

British West Indies and British Honduras

Trinidad—A. J. Pavitt, Port of Spain, Trinidad.

Must Be Specific

Above all else inquiries sent to any of these men should be specific and very much to the point. There are letters and catalogues sent out that might just as well be dropped in the waste paper basket here as elsewhere. British firms make a practice of working their trade commissioners for all they are worth. As an instance of this, one firm communicated to the Canadian office and presented a direct list of forty-two questions, each of which required a great deal of research work. The digging up of this material took up almost two weeks, and proved to be a valuable document for the enquirer and also for the office, as it was thus enabled to be in possession of a large amount of information that had not previously been available.

Point to Remember

When writing to the Trade Commissioners remember that they may know nothing of your business; they may be strangers to your best lines. Do not trust to a catalogue and a rubber stamp letter turning the trick. Ask for these:

Prices that are paid for similar lines in the country you wish to enter.

Competitive lines that are now on the market.

Change in the markets and marketing conditions owing to the war.

Progress made by local firms making these lines. It is important to keep this information up to date as in nearly every country an effort is being made to produce at home the lines that have been extensively imported.

Value of the market. By this we mean an estimate of the possible amount of goods likely to be purchased in the district.

Merits of the competing lines. It is very necessary to know this in detail.

Differences in the selling methods employed. This includes the important matter of credit, terms, collections, etc.

What sort of representation a firm should have. Get a list of suitable firms or importers.

Changes in tariffs. In fact get all information about this matter and keep it up-to-date as frequent changes are made.

Ask for the best way to ship and pack.

Use the trade papers of the lines you want to reach if such publications are available.

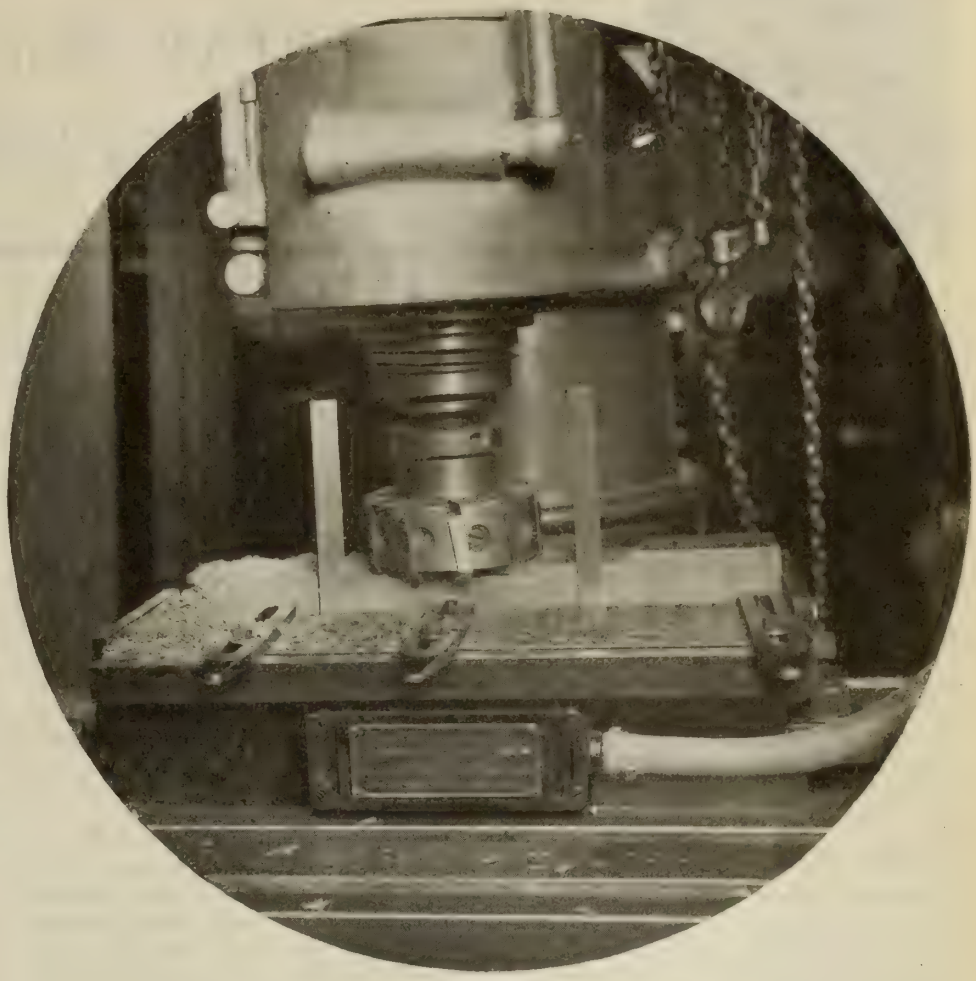
The British Commission

Although Canadian firms are more vitally interested in the Canadian Trade Commissioners, it is interesting to note the scope of the work carried on by His Majesty's Trade Commissioneers.

The primary duty of His Majesty's Trade Commissioners appointed in various parts of the British Empire, comprises the collection of information in regard to opportunities that may arise for securing and developing the trade of the United Kingdom and such other parts of the British Empire as may express a desire to avail themselves of the facilities afforded by the Trade Commissioner Service, but it is also a part of their general duty to endeavor to promote the trade or the British Empire as a whole, within the area to which they appointed.

Instruction are also given to Trade Commissioners to report from time to time to the Board of Trade and to the Governments of such parts of the British Empire as may invite them to do so, all

Holding a $\frac{5}{16}''$ x 2'' cut in Cast Iron on Simmons' Magnetic Chuck



Here is an example of the "grip" of a Simmons Chuck used on a No. 5 Brown & Sharpe Vertical Milling Machine.

On a piece of cast iron 16" by 2" by 1½" held by an 8" x 18" chuck, a cut 5-16" deep was made across the entire piece. The feed was 12½" per minute; the cutter was a 5" diameter inserted tooth face mill, running at a speed of 100 R.P.M. Current used by the chuck, .4 amp. at 110 volt. The strongest "grip," with the least current—and no leakage of magnetism into frame of chuck or machine. It is powerful and yet it conserves electricity.

Bulletin 103E describes Simmons' Magnetic Chucks.

TAFT-PEIRCE

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INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

CONTRACTS

Brantford.—Schultz Bros. Co., Ltd., has secured contracts for the supply of interior hardwood finish for the Union station, Toronto, and for the erection of a new three-storey mill building for the Riverside Silk Mills, Galt.

ENGINEERING

Welland.—Crowland township council at a meeting let the contract for installing 16,470 feet of water mains in the Crowland industrial section. Six tenders in all were received, ranging from 60 cents to 95 cents a foot. The contract was let to the lowest tenderer, Mitchell & Mohan, of London, at 60 cents. Work will begin at once. The council some time ago made the purchase of the necessary pipe.

Ottawa.—As the result of a conference it was decided to at once call for tenders for 250,000 ties to be used in connection with the further construction of the Hudson Bay railway. It is practically certain that, as the result of representations made by Western members, that in addition to the securing of ties, some construction work on the line on the bay will be done this season, and the line completed in all probability before the end of the summer of 1920.

MARINE

Toronto.—Announcements are posted that the S. S. Dalhousie City opens the season's trips on March 31, taking passengers and freight. She leaves Toronto at 5 p.m., and Port Dalhousie at 8.30 a.m.

Dunnville.—The T., H. & B. car ferry Maitland has been laid up for a few weeks for repairs. The boat has made a record in lake navigation, having been on the run between Ashtabula, Ohio, and Fort Maitland on the Grand River, continuously since April 1 of last year, excepting when delayed by freight shortage. A return trip has been made across the lake every fifteen hours in every sort of weather for practically one year.

Midland.—The second steel vessel being constructed by the Midland Shipyard Co. to the order of the Imperial Munition Board is now rapidly nearing completion. The steel structural work has been finished and the machinery is being placed in the vessel so that she will be ready for launching as soon as the ice begins to move. Carpenters are now at work placing the deck houses and fitting out the officers' quarters. The vessel is a duplicate of the "War Fiend" which sailed last fall and recently sailed from St. John for Gibraltar.

Port Dover.—This community is dissatisfied with the amount which has been put in the estimates for the improvement of Port Dover Harbor. Reeve R. M. Taylor has been invited to attend the meeting which is to be held in Brantford, at which representatives of all the municipalities along the Lake Erie & Northern and Grand Valley Electric Railways will be present to discuss the matter. It is understood that an indignation meeting will be held in the Telephone City to be followed by the sending of a strong deputation to Ottawa to impress forcibly on the minds of those in authority that something worth while must be done, and soon, in regard to Port Dover harbor.

Toronto.—George S. McKellar, operating manager of the Dominion Shipbuilding Company, denies a report that fifty men a day are discharged at the company's plant because of lack of work. "We are building six ships at the present time," he said. "About two weeks ago we laid off 150 men on account of the non-arrival of a big shipment of steel. We are expecting this material any day now, and as soon as it comes the men will all be taken on again. There are about 1,000 men on our payroll now." Asked as to the prospects for further contracts for ships, Mr. McKellar said: "We are waiting to see what the Government is going to do in the way of shipbuilding. However, I think the prospects are all right."

New York.—Edward N. Hurley, chairman of the United States Shipping Board, addressing the National Marine League here to-night, presented for consideration an American ship-operating program. He reviewed his plan in part as follows: The Government-owned ships should be sold to and operated by American citizens at a price which fairly reflects the current world market for similar tonnage. Twenty-five per cent. of the purchase price of each ship should be paid down, the remainder falling due and payable in graded annual instalments over a period not exceeding ten years. It is understood that no transfer of a vessel to foreign registry should be permitted without express permission of the Government.

London.—J. W. Isherwood, inventor of the Isherwood longitudinal system of ship construction, who recently paid a visit to America, and has returned to England, predicts a world shipping boom for the next three or four years, and

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matters affecting, or likely to affect, the trade, industry, and commerce of their area that may come under their notice.

The Trade Commissioners are also directed to furnish information in regard to tariffs, subsidies, bounties, contracts, open, or likely to be open, for tender, the opening of new industries, the extension of public works, financial and trade conditions, and other matters of commercial interest, whilst they are to report, as occasion required, on the nature and extent of foreign competition in local markets so far as it affects British trade.

An important part of the work of the Trade Commissioners is to compile and furnish periodically the names of principal importers and buyers of British goods in the different localities of the area in which they act, with an indication of the classes of goods in which they deal, and also to compile an agency record in respect of firms or persons holding agencies for firms domiciled in the various parts of the British Empire and in foreign countries, supplemented by lists of firms or persons desirous of acting as agents for firms domiciled in the various parts of the British Empire. They also are to acquaint the Department of Overseas Trade with information in regard to important trade exhibitions or agricultural shows, etc., open to British exhibitors which it maye be proposed to hold in their area. Special importance is attached to their obtaining and forwarding to the Board of Trade from time to time samples of:

1. Articles of foreign manufacture which may appear to be displaying British goods of a similar kind in the local markets.

2. Any new or little known natural or manufactured products of their area (such as minerals, fibre, earth, etc.) which appear likely to be of use for industrial purposes.

Canada has an extensive system of trade commissioners. It is up to the manufacturers to make use of them. The effort is well worth the making.

makes the statement that the United States will inevitably advance and will become England's greatest competitor. He said that it is not probable that America will produce such a plentiful supply of ships as to revolutionize sea carrying, nevertheless that country is bound to become England's greatest

LOOK AFTER BOTH IMPORT AND EXPORT

MONTREAL.—At the present time reconstruction" is more of a byword than a password and yet there are none of us can afford to lose the opportunity of doing our fair share toward the problem of readjusting the abnormal business and industrial conditions subsequent to the ending of the world war. The market situation to-day is not as we would wish it and, as a matter of fact, is due to circumstances over which we have no control, but the sooner we attack the problem, and also, the more "horse-sense" we use, the better we can assist in bringing prices, market conditions, supply and demand, to a level where we can all do business, and at a profit. Pre-war prices, present day prices, and the prices we would all desire to make, are of totally different proportions, and the sooner we quit "shopping" and get firm prices, firm delivery, and buy and sell, instead of using paper and ink, and "hot air," the sooner will the meaning of the word "reconstruction" be made clear to us. As a matter of fact, we have had innumerable inquiries for commodities, domestic and export, we have had our mills and correspondents give us best prices and delivery, rock bottom prices, and that is the end, or rather the beginning of the end; markets are disturbed, everyone is out to get what he can and proper trading is impossible.

To endeavor to secure a fair share of legitimate business, the International Metal and Trading Co., have opened offices at 406 McGill building, Montreal, P.Q., with an organization competent to handle both import and export business. They have completed business relations with important houses in South America, the far East, India and South Africa, and are ready to handle any commodities suitable for these countries.

Negotiations are under way for the purchase of considerable new material for South America, and the plans laid out for the expansion of trade between Canada and there are well under way. The International Metal and Trading Co. extend their services to anyone in the market for staple products, also for second-hand material. Their scrap department is efficiently organized and in close touch with market developments.

Paper Mill Machinery

To Manufacturers Seeking Locations

The Success of Your Industry Depends Upon Your Choice of Location

Complete, up-to-date information on shipping facilities, power rates, labor conditions, raw materials, factory sites, municipal inducements, etc., for every commercial centre in Ontario.

Complete details, plans and photographs of over 60 available vacant factories in Ontario, 1,000 to 100,000 square feet floor space.

Our whole organization is free to bona-fide parties seeking industrial locations.

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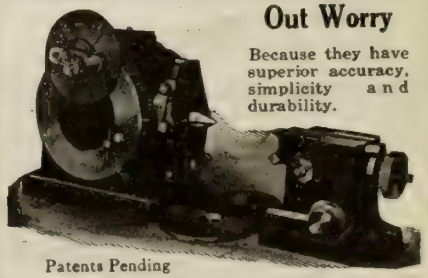

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Brantford Oven & Rack Co., Ltd.
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You Know How Greatly it Increased

Production

You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

Hawkridge Brothers' steel for every commercial requirement is just such production-increasing steel as proved this "Hawk" D. Chrome Vanadium. We make

Steel of Every Description

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PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works

Allentown, Pa., U.S.A.

competitor. It is true that workers are paid higher wages in American shipyards than in British shipyards, but they will produce ships quicker and cheaper, and if England does not wake up she will be left as a shipbuilding nation.

St Catharines.—Capt. James P. Delaney died early Friday morning. Those simple words will carry a message that will be heard with deep regret in every port of Canada's waterways. Boy and man, "Jim" Delaney had sailed the inland seas. He rose from cabin boy at ten years of age to master on his first ship, the "Lake Michigan. When the old canal was the great connecting link between Ontario and Erie, Captain Delaney was a well-known sailor; in later life he commanded some of the finest steamships afloat, and then assumed the important duties of a St. Lawrence River pilot. For years he was a master mariner in the employ of the Matthews Transportation Company, and brought up many of their finest steamers on their initial trips to the Great Lakes, the "Haddington," "Beaverton," "Eastern," "Wacondah," and others. He appeared to be a natural-born navigator. During his long period of service, through all kinds of weather, he never lost a ship; in fact, it may be said that he never had a serious mishap. About five years ago he became a pilot for the American Government, and handled many naval gunboats on their trips to the seaboard.

PERSONAL

John A. Greig, of Ross and Greig, has been elected president of the Caledonian Society of Montreal.

The death occurred, on Monday, March 24, of R. A. Hogge, purchasing agent for the past few years for the Steel Company of Canada in Montreal. Mr. Hogge was born in Dumfries, Scotland, in 1886, coming to Canada in 1910. After a period of service with Messrs. Hugh Russell and Sons, iron and steel merchants, he entered the employ of the Steel Co. of Canada in 1912 as clerk in the works office, subsequently being promoted to purchasing agent.

TRADE GOSSIP

To Stimulate Thrift.—Among their employees the Canada Car and Foundry Co. has organized a War Saving Society, through the co-operation of which it is expected to work up an enthusiastic spirit among the men. The company will present a shield to the factory obtaining the largest percentage of subscribers, and it will become the property of the plant having the greatest enrolment at the end of six months.

Wants Information. — Lieut.-Colonel W. H. Price, who roused the Ontario House by his slashing attach upon war profiteering in Canada, will follow up his opening assault by putting the members of the Legislature on record on the matter. The Parkdale member, if occasion offers, will introduce a resolution asking the Dominion Government to request from the Imperial Munitions Board a statement of the moneys spent on munitions in Canada during the war and the profits made upon munition contracts.

Contemplated Expansion. — Peacock Bros., of Montreal, who for many years have been Canadian agents for G. and J. Weir, Limited, of Glasgow, are now manufacturing the Weir feed pumps in their own factory recently established in Montreal. Considerable new equipment has been obtained from the States and England, and the new plant is amply equipped to handle efficiently this new branch of their operations. It is announced by officials of Peacock Bros. that the Clyde Engineering Works are contemplating increased expansion of their business in Canada.

Jobs For Them.—One thousand jobs are awaiting Detroit's returned crippled soldiers at Ford Motor Company's plant in Highland Park. This announcement was made by Edsel B. Ford, president of the company. The men will be paid the minimum wage of six dollars a day of eight hours now in effect in the plant. "The thousand soldiers are wanted for our new self-starter department," said Mr. Ford. "The only requirements necessary are that they are crippled soldiers, Detroit men, and have use of their hands. Men who have lost both legs and an arm will find work with us that they can do. We can use these men whether they have to stand up or lie down at their work."

At the Polson Yards.—It is rumored that difficulties are being met with in reference to the continued operation of the Polson Iron Works, Toronto, and that if for any cause the works are closed down the completion of four boats in process of construction for the Imperial Munitions Board will be suspended. If the works are closed down 1,200 men will be thrown out of work, which, at this time, is highly undesirable. G. T. Clarkson refused to make any statement whatsoever. It is understood that the trouble became acute when the creditors failed to get together to decide upon a policy to be followed so that all concerned could cooperate in the continued operation of the plant.

Briquetting of Coal.—At a recent meeting of the Montreal branch of the Engineering Institute of Canada, a paper was read by Paul A. Seurot, M.E.I.C. on "Coal Briquetting," in which he emphasized the importance of developing this industry for the purpose of materially assisting in the solution of the ever-present fuel problem, and at the same time aid in making Canada more independent in this regard. He stated that of the total coal brought out of the mines, from 10 to 35 per cent. was practically wasted, and if proper facilities were provided the bulk of this could be economically utilized. Some little attention was given to this matter out West where some 1,100 tons of coal was briquetted per day, but when compared to other countries, Canada was far behind in the development of this industry.

TRADE IN SIBERIA

The Canadian Manufacturers' Association is sending to its members an announcement of some importance dealing with steps that have been taken to develop trade with Siberia. The circular states in part:

"Careful investigation shows clearly that wonderful opportunities await Canadian manufacturers in the markets of Siberia, provided they are taken advantage of without delay.

"The lack of financial stability in Siberia is the chief difficulty. To overcome this, the British Government has organized the Siberian Supply Co., with headquarters at Vladivostok. Honorable R. E. Hubbard, representing the British Government, spent some time in Ottawa and at the head office of the association, for the purpose of giving information regarding the possibilities of Siberian trade, and how to go about securing it.

"Through negotiations shared in by the Canadian Manufacturers' Association, the Department of Trade and Commerce, the Canadian Trade Commission and the Siberian Supply Co., the services of the latter have been placed at the disposal of Canadian manufacturers who desire to enter the Siberian export field. This organization endeavors to keep itself constantly informed as to what goods are required and in what quantities. When it finds a possible market for Canadian goods, the Canadian Trade Commission at Ottawa will act as Purchasing Agent, the Canadian manufacturers to be paid before the goods leave Canada, out of a credit to be established by the Canadian Government. We have been provided with a list compiled by responsible mercantile and Government representatives at present in Siberia, showing the classes of goods in demand and a schedule of these appended hereto.

"Members of this association who are organized into groups should consider the advisability of sending group representatives immediately to Vladivostok.

"Individual manufacturers who are in a position to make prompt deliveries are urged to send catalogues (illustrated where possible), and price lists (in Canadian currency and f.o.b. shipping point), giving weight and cubic space of goods when packed for ocean shipment, as well as samples where practicable, to Honorable R. E. Hubbard, the Siberian Supply Co., Vladivostok.

"Please advise us when you forward catalogues and samples, in order that we may check their delivery, and furnish you with information in regard to transportation of goods.

"If you are interested, communicate with the Commercial Intelligence Department of this association, 1404 Bank of Hamilton building, Toronto, reporting any action taken hereon. The association will arrange for conferences with the Canadian Trade Commission at Ottawa, for any group of manufacturers in kindred lines when advice is received that such conferences are desired.

LUFKIN

SCALES

All standard patterns, also Combination Steel Scales and Reference Tables, carrying DECIMAL EQUIVALENTS OF FRACTIONS AND WIRE GAUGES, TAP AND DRILL SIZES OF ALL STANDARDS.

Handy and Durable

THE LUFKIN RULE CO. OF CANADA, LTD.
WINDSOR, ONT.

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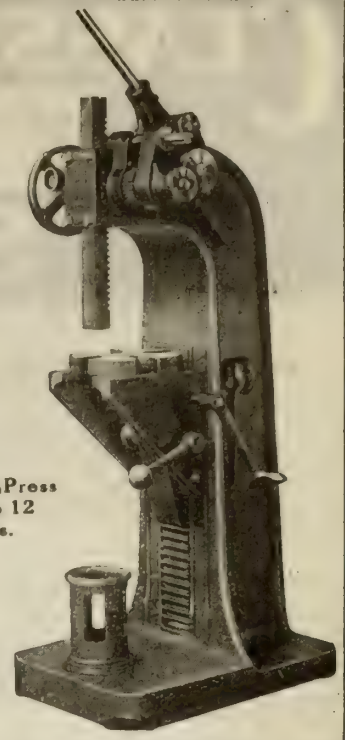

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WOODLAND
Fire Bricks

And Other Grades
CUPOLA BLOCKS
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From our Stock at
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OF CANADA, LIMITED
Office and Warehouse:
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'Barnes-Made'
Springs

are unusual in service and wear.

They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-Made" Springs are the best buy.

Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U. S. A.
Man'frs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

Clear
Wired and Frosted
Portlights

ROBERTS GLASS BEVELING CO. INC.
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PROMPT DELIVERIES

Canadian Representative:

John Lindsay

34 Victoria Street, Toronto

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IF YOU ARE LOOKING FOR A SUPERINtendent or general foreman, a Canadian citizen with twenty years varied shop experience in Canada and United States, a thoroughly live man with executive ability, one that can lower the cost and raise the quality of your product, just get in touch with the advertiser. Box 566, Canadian Machinery. (c14m)

SUPERINTENDENT OR WORKS MANAGER now open for position. Sound, practical man, with good initiative and executive ability. Thirty years' experience on marine and Corliss valve engines, machine tools, mining and sawmill machinery; also general repairs. Well versed in the design of tooling required to get the maximum efficiency and production. Best references. Box 568, Canadian Machinery. (c14m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

Used Machinery

For Sale

1—No. 40 Bliss Press.
1—No. 74½ Bliss Press.
1—No. 75½ Bliss Press.
1—42" Boring Mill, two heads.
1—30 x 30 x 10 Planer.
1—16" Smith Mills Shaper.
1—18 x 6' C.M.C. Lathe.
1—26 x 10' Whitcomb-Blaisdell Lathe.
5—Racine Power Hack Saws.

Charles P. Archibald & Co.

Machinery and Supplies

164 St. James St. - Montreal

HELP WANTED

WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

WANTED—DRAUGHTSMAN FAMILIAR WITH mining and crushing machinery. State salary expected. Box 565, Canadian Machinery. (c14m)

SALESMAN—MACHINERY AND SUPPLIES—City of Montreal. Man familiar with machine tools and with experience and connection in City of Montreal preferred. Good opportunity for an ambitious and capable young man. Write in detail in first instance, stating salary wanted to start. Box 569, Canadian Machinery, Montreal. (c15m)

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EXPERIENCED ON MACHINE TOOL DESIGN. Apply in confidence to Box 570, Canadian Machinery. (c18m)

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PLANER FOR SALE, 46 INCHES WIDE, 36 inches high, 17 feet bed, has single head and screw feed, in first-class condition. Will be sold cheap. Apply The John Whitfield Co., 33 Sherbourne St., Toronto. (c13m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

CANADIAN WESTINGHOUSE MOTOR. 100 h.p. Serial No. 113842, full load speed, 580 r.p.m., 225 amps. per terminal, 220 volts. Constant speed, 7200 alts. Armour & Co., Hamilton, Ont. (c14m)

ONE SPINDLE, GRIDLEY, AUTOMATIC, ⅞-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

MANUFACTURER'S OPPORTUNITY

100 ½ and 1 ¼ h.p., air cooled gas engines, in semi-finished condition, with patterns, jigs, gauges, etc. Attractive bargain to serious party. Apply to
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FOR SALE

Shepard Electric Hoists, 3 Tons Capacity with Motor Driven Trolleys, Floor or Pulpit Control $\frac{220}{440}$ Volts, 3 phase, 25 cycles. Used one year, A1 condition.

N. B. PAYNE & CO.,
Electric Traveling Cranes and Hoists
Telephone, Cortland 1800. 25 Church St., New York
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PATENT FOR SALE

Canadian Patent No. 180024. Rail Bonds. Manufactured and used extensively in mines in U.S.A.

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WANTED—ONE TWO H.P. MOTOR, 3 PHASE, 60, 220. One 10-inch lathe chuck, 4 jaw. One 16, 18 or 20 inch, 4 jaw. Northwestern Iron Works, 1419 Scarth St., Regina, Sask., Canada. (c13m)

AGENTS WANTED

AGENT WANTED

By a well known Sheffield firm for tool steels and alloy steels.

Must have technical knowledge and good connection. State qualifications fully to

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Good Used Equipment

Shaw 7½ Ton 3 Motor Crane, D.C. 220.
36" x 16' C.M.C. Triple-geared Q.C. Lathe.
27" x 16' LeBlond D. B. G., Q. C. Lathe.
Pels Type Beam Shear.
Bertsch Plate Shear.
23 x 26 W. & W. Bulldozers.
2,000 cu. ft. Can. Ing. Rand Air Compressor.
96" Fifield Hor. Boring Mill.
88" x 20' Bertram D. B. G. Lathe.

The A. R. Williams Machinery Company, Limited

HALIFAX N.S.

IMMEDIATE SHIPMENT

LATHES.

14" x 6' McKENZIE, standard.
14" x 8' LEBLOND Toolroom Equipment.
14" x 7' HENDEY Toolroom Equipment.
6—16" x 6' C.M.C. double back gear, quick change gear.
18" x 6' CISCO, double back gear.
19" x 10' LEBLOND heavy duty.
22" x 10' REED PRENTICE, geared head.
12—26" x 12' C.M.C. double back gear, quick change.
28" x 10' CONRADSON geared head.
36" x 14' NEW HAVEN triple geared.
24"—40" x 20' McCABE, double spindle.
28"—44" x 14' BERTRAM gap lathe.
20" x 36" x 14' CMC gap lathe, double back gear, quick change gear.

SHAPERS.

15" McKENZIE B.G. crank.
16" RAE B.G. crank.
16" STEPTOE crank.
20" GOULD & EBERHARDT high duty.
24" and 28" GOULD & EBERHARDT high duty.

MILLERS.

No. 1½ and 2½ LEBLOND Universal.
No. 3H and 4 LEBLOND Universal.
No. 3 FORD-SMITH Universal.
BECKER vertical single pulley drive.
BECKER No. 7H SLincoln type.

GRINDERS.

No. 3 LANDIS Universal.
No. 1 LEBLOND Universal Tool, power feed and wet attachment.
GISHOLT Tool Grinder.
BAY STATE vertical surface.

DRILLS.

10" MYERS bench sensitive.
10" McKENZIE sensitive.
14" MYERS column sensitive.
14" PERFECT column sensitive.
15" BARNES lever feed.
20" BARNES back geared.
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26", 28" and 34" BARNES sliding head.
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2' FOSDICK National pattern.
3' NILES box table.
4' CINCINNATI-BICKFORD, speed box drive.
5' LONDON box table.
5' FOSDICK heavy duty speed box and tapping attachment (new).

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24" x 24" x 7' LONDON heavy pattern.
30" x 30" x 8' BERTRAM, one head.
36" x 36" x 12' BERTRAM, one head.
42" x 42" x 10' McGREGOR GOURLAY, heavy pattern, 2 heads.
26" x 26" x 8" new WHITCOMB-BLAISDELL.

MISCELLANEOUS.

8" JARECKI pipe threading machine.
4" MERRILL pipe threading machine.
1½" McGREGOR GOURLAY.

The above list merely gives part of our stock, which is ready for immediate shipment from Toronto.

Write our Service Department and put your proposition up to them.

THE A. R. WILLIAMS MACHINERY CO., LIMITED

64 FRONT ST. W. - - TORONTO

Used Machinery and Motors For Sale

2—24" Colburn Drill Presses. $500.00 each.
1—24" Baker Heavy Duty Drill Press, $450.00.
3—Newton Cold Saws. Cheap.
2—Davis Cut Off Machines. $100.00 each.
2—Hamilton Gear Cut Off Machines. $100.00 each.
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Peerless Heavy Duty Power Hack Saws. $100.00 each.
1—200 Gallon Dean Pump. 1,800-lb. Pressure. Cheap.
1—Le Blond 24" x 10' 0" Lathe with Taper attachment. $500.00.
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1—18" x 8' 0" Putnam Engine Lathe. $150.00.

MOTORS

1—Canadian General Electric Co., type 1, class 6, 25 cycle, 200 H.P., 550 volts, 185 amp., 500 R.P.M., wound rotor at $2,300.00.
1—Canadian Westinghouse Co., type C.C.L. induction motor, squirrel cage rotor, 300 H.P., 2,200 volts, 70 amp., 3 phase, 25 cycle, 480 R.P.M. at $3,200.00.
1—Canadian General Electric Co., 200 H.P., type 1, class C, 25 cycle, 2,200 volts, 46 amp., 500 R.P.M., squirrel cage rotor at $2,800.00.
1—Canadian Westinghouse Co., type C.C.L., 200 H.P., 550 volts, 189 amp., 3 phase, 480 R.P.M., 25 cycle, squirrel cage rotor at $2,450.00.
1—Canadian General Electric Co., type 1, class 4, 25 cycle, 150 H.P., 550 volts, 146 amp., 750 R.P.M., squirrel cage rotor at $1,850.00.
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All the above in good condition. Call or write

The Canada Metal Co., Ltd.
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USED
MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, Nova Scotia
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FOR SALE

Large Quantity of
USED MACHINERY
In excellent condition.

Automatic and Hand Screw Machines
Drill Presses, Grinders
Milling Machines
Punch Presses
Electric Motors
Air Compressor
Automatic Slotting Machine
Twist Drills
Miscellaneous Equipment

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We Want a Mechanical Engineer With Sales Experience

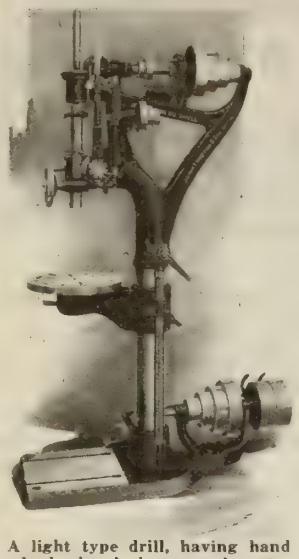
—a man who can give his entire time to selling a widely advertised power house device. An intelligent, convincing talker, a man not afraid of work, a man who expects good pay for good work, is the man we want. We will respect your confidence. In the first instance, write fully to Box 160, Power House.

P.H.

YOU'LL FIND WHAT YOU WANT

In the Classified Advertising Section of Canadian Machinery. Watch it each week for all kinds of new and used machinery.

YOU MAY WANT WHAT YOU FIND.



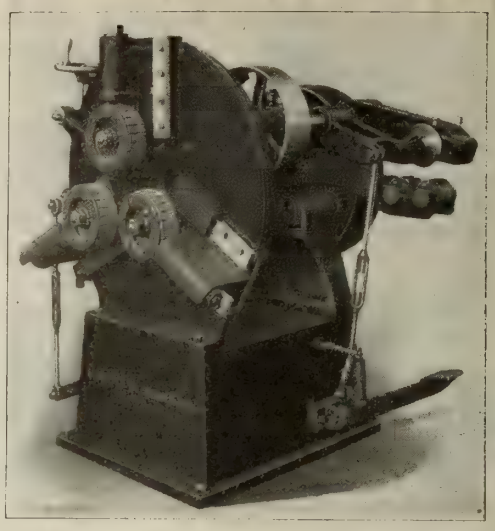
A light type drill, having hand wheel, hand lever and automatic feed.

IF YOU WANT

Machine Tools

NEW OR USED

Complete equipment for Boiler Shops, Structural Steel Works, Railroad Spring Shops, Flue Shops, or Machinery for any other purpose, or Woodworking Machinery of any kind



A Universal Machine for cutting and cleaning from 1½" to 6½" flues.

GET OUR QUOTATIONS

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TORONTO MONTREAL WINNIPEG

GAUGE MAKERS TO THE TRADE

You need special tools—we need your work. Send us your blue prints for estimates on following:

Gauges, Tools, Dies

Special and Rolling Mill Machinery

High-grade workmanship and accuracy on all work guaranteed.

RELIANCE MOTOR & TOOL CO.

LIMITED

427 Queen St. W. - Toronto, Canada

IMMEDIATE DELIVERY

MONTREAL STOCK

Motors 3-Phase 60-Cycle

75 H.P., 550 VOLTS, 450 R.P.M. 2
60 H.P., 550 VOLTS, 450 R.P.M. 1

TRANSFORMERS....3
200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

TRANSFORMERS, POLE TYPE—550 $\frac{220}{110}$ VOLTS
5 K.W.....2 10 K.W.....1

D.C. LIGHTING GENERATOR
10 K.W., 110 VOLTS, 450 R.P.M.....1

RAND AIR COMPRESSOR, 800 F T.....1

Prompt Delivery and Subject to Inspection.

Low Phosphorus Pig Iron, Electric Furnace Products, Steel Products of all descriptions

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FOR SALE

Machinery and Entire Plants *Equipment of* O'Brien Munitions, Limited, and Energite Explosives

All In First Class Condition

PIPE AND FITTINGS—
Standard pipe ¼" to 8", Boiler tubes, Standard fittings and valves, whistle, steam traps, Hydraulic Fittings (50% brass), cast iron pipe, radiation wall and floor, etc., etc.

ELECTRICAL EQUIPMENT—
Motors, Transformers, Switchboard and endless instruments, Northern Electric magneto telephone system, Fire Alarm system, Line material, poles and pole fittings, copper wire, lead cable, Wheeler street lights, etc., etc.

AUXILIARY STEAM PLANT—
Cross-compound, GouldieMcCullough Corlis Engine, 275 K.W. Generator with complete equipment, including instruments.

BOILERS AND TANKS—
100 H.P. Gouldie-McCullough, 150 H.P. Jencks Machine Co. 200 H.P. Heiner Safety Water Tube, steaks, guys, valves and fittings; water heaters, steam superheaters.

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Pumps — C.F.M. duplex, Gould and W'house centrifugal and fittings. Compressors—Steam w'house, Ingersoll-Rand, Underwriters crowell pressure and vac.

FANS AND COILS—
Canadian Buffalo Forge ventilating and pressure fans, heating coils, exhausters, blowers, etc.

HYDRAULIC EQUIPMENT—
Accumulators, Pumps, Presses, all complete with fittings, etc.

CONVEYORS (horizontal and return)
Complete with belting, rollers, pulleys, driving gears, motors, Am. Steel & Wire Co.'s aerial cableway, cars, shields, driving mechanism and cables.

ETHER-ALCOHOL APPARATUS—
Badger's latest improved Ether and Alcohol units complete.

MIXERS—
Werner Pfliderer, self-dumping.

REFRIGERATING EQUIPMENT—
By Kroeshell Bros., steam or electricity complete, condensers, coils, headers, valves and fittings.

INDUSTRIAL RAILWAY—
Rails, frogs, switches, fish plates, turn tables, gasoline and oil locomotives, steel box cars, flat cars, work, coal, cinder, wooden powder and rat cars, and all-steel snow plough.

FIRE APPARATUS—
100-lb. pressure 1,000 gal. Underwriter-Centrifugal Fire Pump, with direct connected 100 H.P. G.E. motors; capa., six streams.

PLUMBING—
Hot water tanks, bib taps, wash basins, toilets, showers, latrains, syphon traps, wash basins, etc.

SCALES—
Howe and C.F.M platform, Renfrew Truck, C.F.M. Tank and Truck, automatic weighing machine.

PIPE COVERING—
85% 2-ply Magnesia, Cork Covering 4" 125'.

TRANSMISSION EQUIPMENT—
Belts, shafting, pulleys, hangers, gears, conveyors, elevators, etc.

SHOP EQIUPMENT—
Consisting of fully-equipped machine, carpenter, tinsmith and blacksmith shops. Also a quantity of miscellaneous machinery, tools, etc., etc.

M. J. O'BRIEN, LIMITED - - Renfrew, Ontario

PARTIAL LIST OF TOOLS

2—60" Bullard Vertical Boring Mills
1—60" Niles Vertical Boring Mill
No. 4—B. & S. Plain Miller
1—36" x 36" x 8' Gray Planer, two heads
No. 3—Cincinnati Universal Miller
5—No. 0 Steptoe Hand Millers
13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
14" x 6' New Carroll-Jamieson Quick-Change Lathe
15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
15" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 17"
17" x 8' New National Quick-Change Lathe
3—17" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 19"
17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 19"
18" x 24" New Rahn Larmon Lathe, D.B.G. Quick-Change
19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 21"
9—19" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 21"
25" x 14' New Sidney D.B.G. Quick-Change Lathe, swing 27"
33" x 14' Putnam, arranged for Motor Drive
6' Western Radial Drill
5' Bickford Single Pulley Drive Radial
100-lb. New Little Giant Hammer
50-lb. New Little Giant Belt Hammer
25-lb. New Little Giant Belt Hammer
30-ton Watson & Stillman Hydraulic Press

FRANK TOOMEY INC.
127 North Third Street PHILADELPHIA,

We are looking for a Canadian concern to manufacture our line.

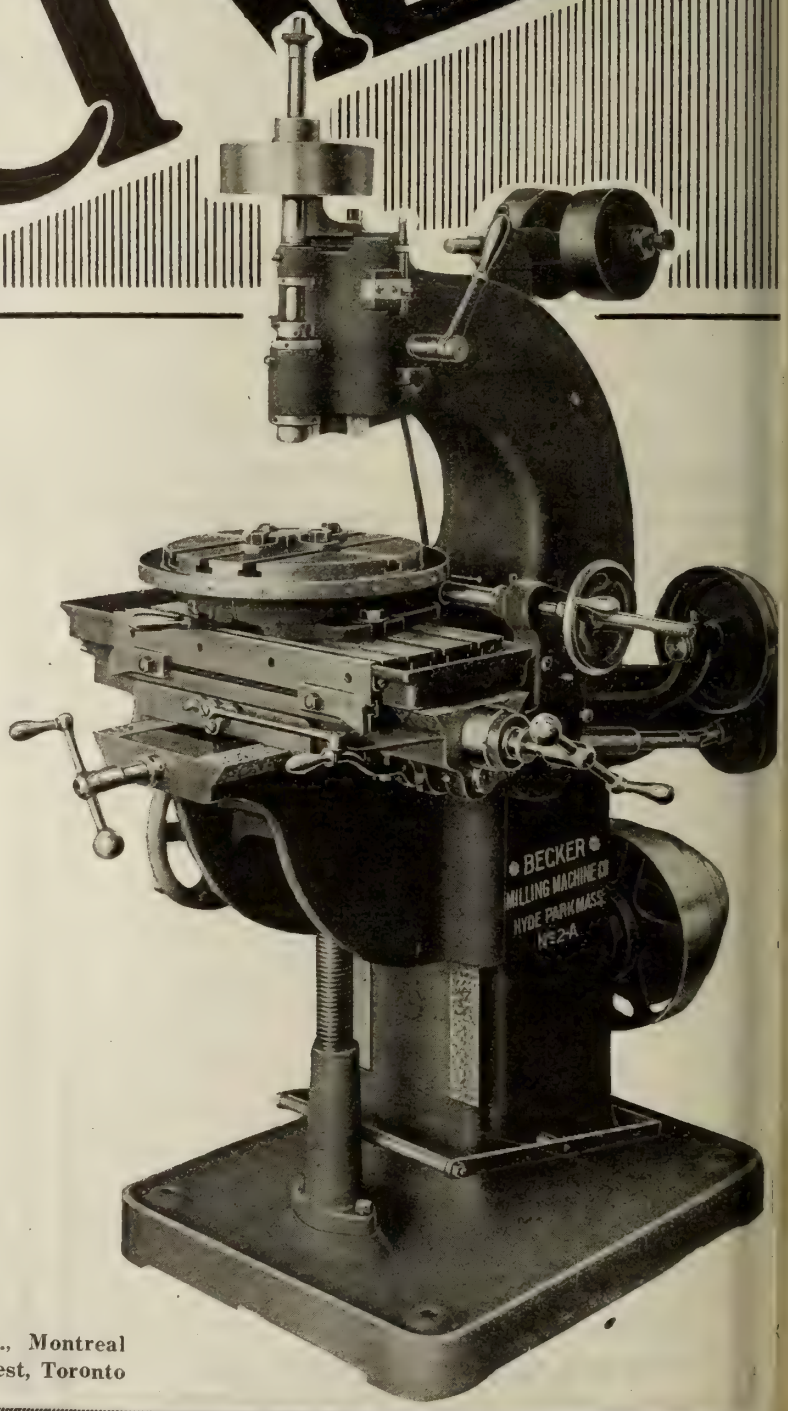
We would like to correspond with a prominent concern in Canada with a view to having our line of machinery manufactured and sold in Canada for the Canadian market. Our line consists of excavating machinery, trenching machines, concrete mixers and concrete road-making machinery, multipedal farm tractors, etc.

Please write us as to your facilities.

F. C. AUSTIN COMPANY, INC.
Office 609 Railway Exchange
CHICAGO, ILL.

BECKER BELT-DRIVEN MILLERS –
The Machines that Give the Smooth Finish

BECKER



Where there's a Becker there's Speed

Convenience, rigidity and accuracy are outstanding features of this small size Becker Milling Machine. Use it for high speed demanding the utmost accuracy.

QUICK DELIVERIES

Becker small size Millers are carried in stock ready to ship. They include Nos. 2, 2A, 3, 4B, 2H, 3H. These machines are finely adapted for light engraving, die sinking, profiling and milling small and medium size parts.

Remember, the full Becker line includes machines for practically every milling purpose.

Send for Monthly Stock List.

Becker Milling Machine Company

Hyde Park, Boston, Mass.

Canadian Agents:

Rudel-Belnap Machinery Company, Ltd., 137 McGill St., Montreal
A. R. Williams Machinery Company, Ltd., 64 Front St. West, Toronto

SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

ELLIOTT & WHITEHALL MACHINE & TOOL CO.

GALT, ONT.

SPECIAL MACHINERY
JIGS AND FIXTURES PUMPS
GAUGES GASOLINE ENGINES
GEAR CUTTING

ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

IN STOCK HERE

National High Speed Side Milling Cutters

6	Only	3½	x	5/8	x	1"	4	Only	5	x 1	x 1¼"
6	"	4	x	½	x	1"	2	"	6	x 1	x 1"
2	"	4	x	5/8	x	1"	4	"	6	x 1	x 1¼"
2	"	4	x	¾	x	1¼"					

National High Speed Slitting Saws

9	Only	2½	x	3/64	x	7/8	4	Only	5	x 3/32	x 1
10	"	3	x	1/8	x	1	1	"	6	x 1/8	x 1
20	"	4	x	1/8	x	1	4	"	6	x 3/32	x 1
12	"	4	x	1/16	x	1	12	"	6	x 3/16	x 1
6	"	4	x	3/16	x	1	6	"	6	x 3/16	x 1¼
6	"	4	x	5/32	x	1	2	"	7	x 1/8	x 1
20	"	4	x	3/32	x	1					

J. A. M. Taylor MACHINE SHOP SUPPLIES

M. 786 318 Stair Bldg., Toronto

FITCHBURG

Plain Cylindrical Grinders

Built by

Fitchburg Grinding Machine Co.

FITCHBURG, MASS., U.S.A.

TOOLS, DIES and GAUGES

Manufacturers of UNIVERSAL CYLINDER RE-BORING TOOLS.

Windsor Machine & Tool Works

Windsor, Ont.

WELDING APPARATUS AND SUPPLIES

The REGO 100% Efficient Welding Torch

Saves Oxygen Eliminates Flash-Back Better Welding

Write to us for anything and everything you need.

WELDING & SUPPLIES COMPANY

C. ROYER, Manager 1227 Ontario Street East, MONTREAL

BATH Universal Manufacturing Grinders

built by

Universal Grinding Machine Company

Fitchburg, Mass. U. S. A.

SPECIAL MACHINERY

Built to Order

Also gauges, punches, jigs, dies, small tools, etc.
Prompt Service.
Moderate cost.
Send Blueprints for estimate.

MADE IN BR·EN·Co CANADA

Brown Engineering Corporation
LIMITED, TORONTO
415-419 King St., W. Tel. Adel.425

MARTEN MACHINE CO. HAMILTON, ONT.

ACCURACY-RELIABILITY

MACHINES, EQUIPMENT APPLIANCES and TOOLS
for
SPECIAL PURPOSES
DESIGNED AND BUILT

We will make what YOU want as you want it.

Write us about it.

WOOD PATTERNS METAL PATTERNS
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OUR REGULAR PRODUCTS:
THREAD GAUGES
SNAP GAUGES
CYLINDRICAL GAUGES

WE ARE GENERAL AND SPECIAL TOOL MAKERS

Let us quote you on your requirements, and have your tools made as you want them made.

WOOD PATTERNS METAL PATTERNS
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TOOLS

Special Equipment
Built to Specification
Steel Plate and Structural Steel Work

Grey Iron Castings

High Quality and Prompt Service Double-Sure

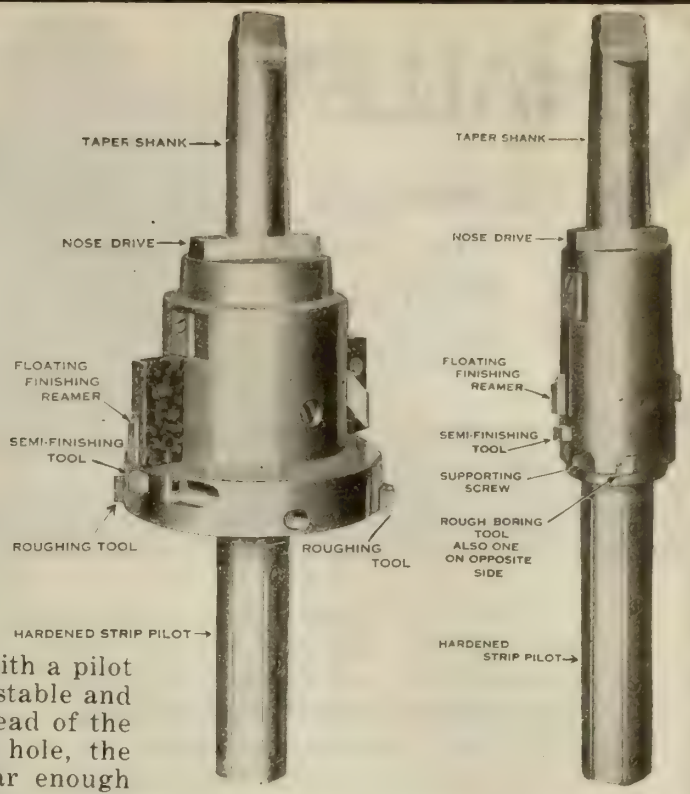
Write for Full Particulars

WILLIAM HAMILTON CO., Limited
TORONTO - ONTARIO

KELLY

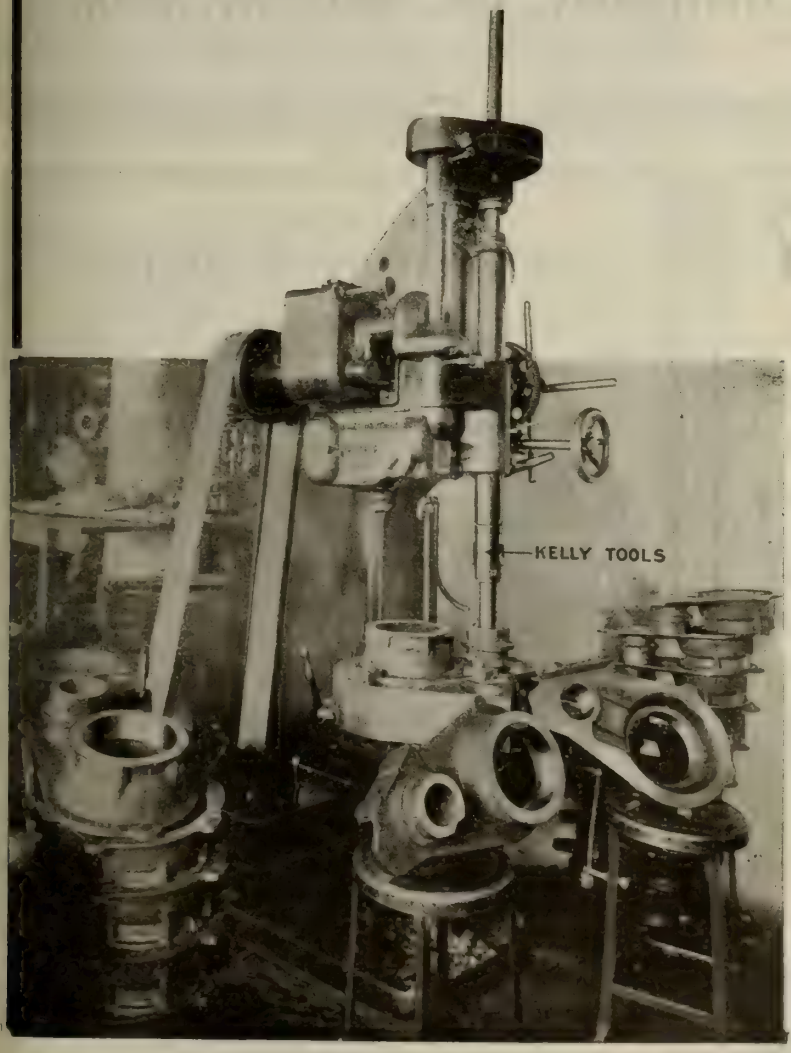
Tools for Bigger PRODUCTION

Use These Cost Cutting Combinations



This photograph was taken in the plant of the Youmans Machine Company, Cleveland. The drill press is a standard type; work is performed at two settings.

For the larger hole, the Kelly Tool is fitted with a pilot that enters the fixture guide hole. Two adjustable and replaceable high-speed steel tools are set ahead of the floating reamer; the first rough bores the hole, the second semi-finishes and the reamer (set far enough back to allow the boring tools to clear) finishes it, all in one pass of the spindle.



At the second setting, the fixture is provided with a locating plug that fits the larger hole. The tool is similar to the larger one and performs practically the same work, except that the hole is longer and the boring tools do not clear before the reamer enters. Both holes are held to a limit of .001"; center distance to .002". Holes must be parallel to each other and square to the face. This work is performed on steel castings and is of such uniformly high standard that it passes the most careful inspection. Kelly Tools for drill press work are provided with pilots and bodies of any specified diameter and length, with shanks to fit taper hole in spindle or adapted to use special chucks.

Catalog J-4 shows Kelly Tools in action. Get it?

THE KELLY REAMER CO.

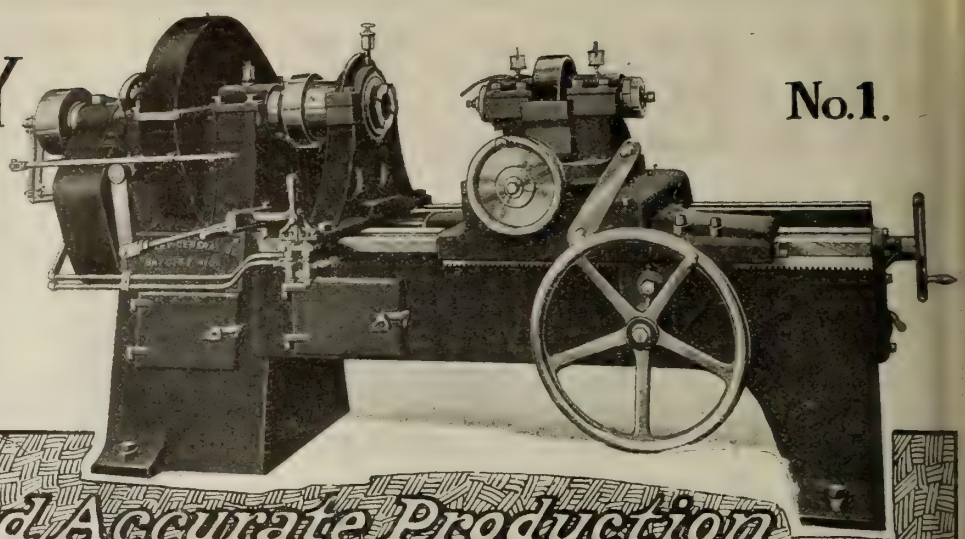
CLEVELAND, OHIO

AGENTS:
London: Burton, Griffiths & Co., Ltd.
Paris: Burton Fils.
Latin America: Fox Bros. & Co., New York City.
40 Domestic Agencies.

SMALLEY

General Thread Milling Machine

No.1.



For Fast and Accurate Production

Investment in labor-saving devices is not an expense. The real expense is the constant daily leak through the pay roll. The **Smalley General Thread Miller** is the great economizer of human effort. Its accuracy, its convenience and speed justify the investment of capital necessary to its installation wherever quantity thread milling is done. This modern machine tool has two speeds and will mill in one minute 2 to 12 inches, or turn 15 to 30 feet. Pay you to write for full description of this cost-cutter.

Smalley-General Company, Inc., Bay City, Mich.

Canadian Agents: Rudel-Belnap Co., Limited, Montreal and Toronto

ACCURACY

When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

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GALT MACHINE SCREW CO., LIMITED
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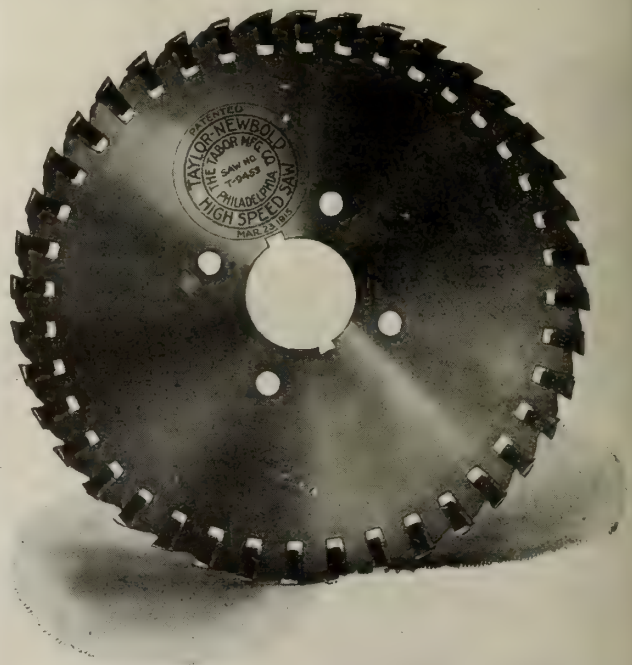
TAYLOR-NEWBOLD



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Automatic Machinery
for all purposes
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Screw Machine Products
Consult us on your machine problems
Toronto Tool Company
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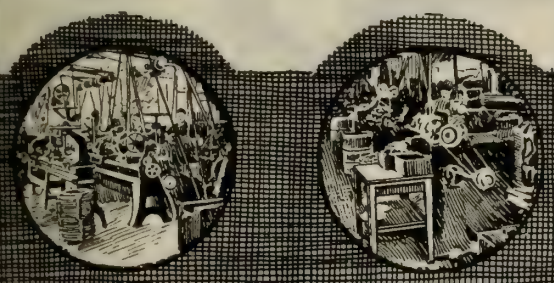

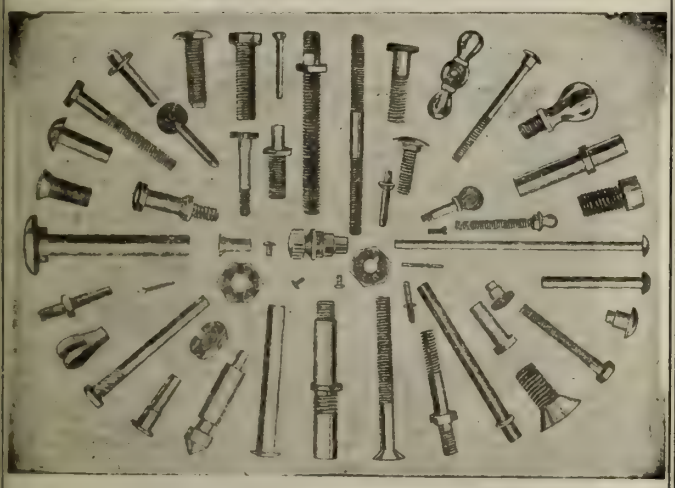

Automatic Screw Machine Products
ACCURACY QUALITY

Our Mechanical Engineers are at the service of our Clients.

United Brass & Lead, Limited
St. Helen's Avenue, - Toronto
W. L. TOBIAS, *Superintendent*
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Don't Wear Out Men Wear Out Tools

It's cheaper to scrap dull files than to pay men to work with them.

That's why you should instruct all men to turn in files the moment they reach their "inefficient point".

"Famous Five" Files, however, stay sharp for a long time because the steel is high grade, accurately cut and properly hardened.

Specify them when ordering.

They are:

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GREAT WESTERN
AMERICAN
ARCADE
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Made in Canada by

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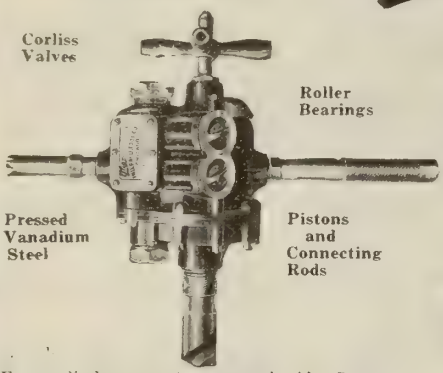
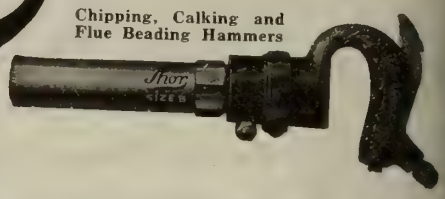
PNEUMATIC TOOLS

Piston Air Drills and Reamers



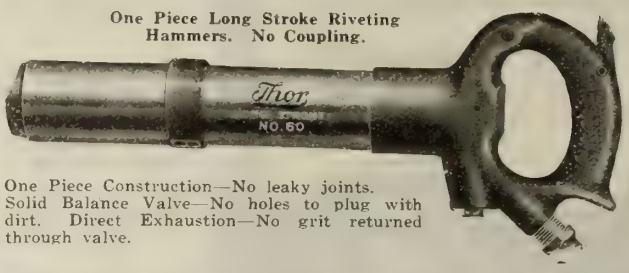
Four cylinder type, two on each side. Semi-Corliss valve close to each pair of cylinders gives greater efficiency and power, saves clearance losses and allows air to enter cylinders at full pressure of the pipe line.

Chipping, Calking and Flue Beading Hammers



SPEED UP YOUR PRODUCTION AND BE PREPARED FOR THE COMING BOOM

One Piece Long Stroke Riveting Hammers. No Coupling.



One Piece Construction—No leaky joints. Solid Balance Valve—No holes to plug with dirt. Direct Exhaustion—No grit returned through valve.

Four sizes, 1" to 4" stroke. The barrel and all wearing parts are hardened and ground, making the Thor Chipper practically free from vibration.

INDEPENDENT PNEUMATIC TOOL COMPANY

General Office: 600 West Jackson Blvd., CHICAGO

CANADIAN OFFICES: 334 St. James St., MONTREAL; 32 Front St., TORONTO: 123 Bannatyne Ave. E., WINNIPEG; 1142 Homer St., VANCOUVER

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Manufacturers often spend thousands of dollars on additional buildings and equipment in order to get greater output and profits long before their product reaches 80 per cent., or their profits 50 per cent. of what may be easily secured from the facilities they already have.

Are you satisfied with your output? We can and will increase your production.

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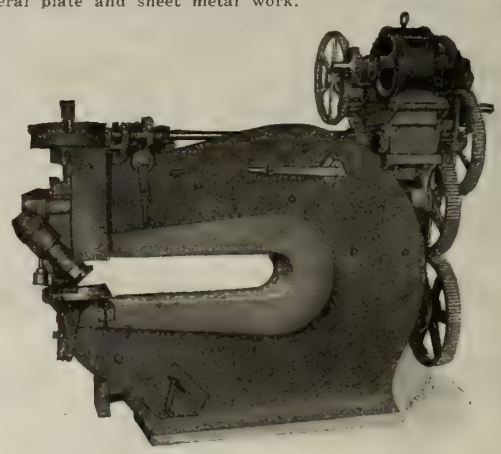
Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building shipes, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

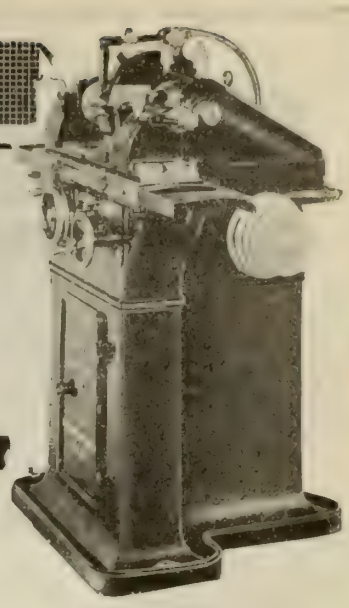
SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

Write for Catalogue

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

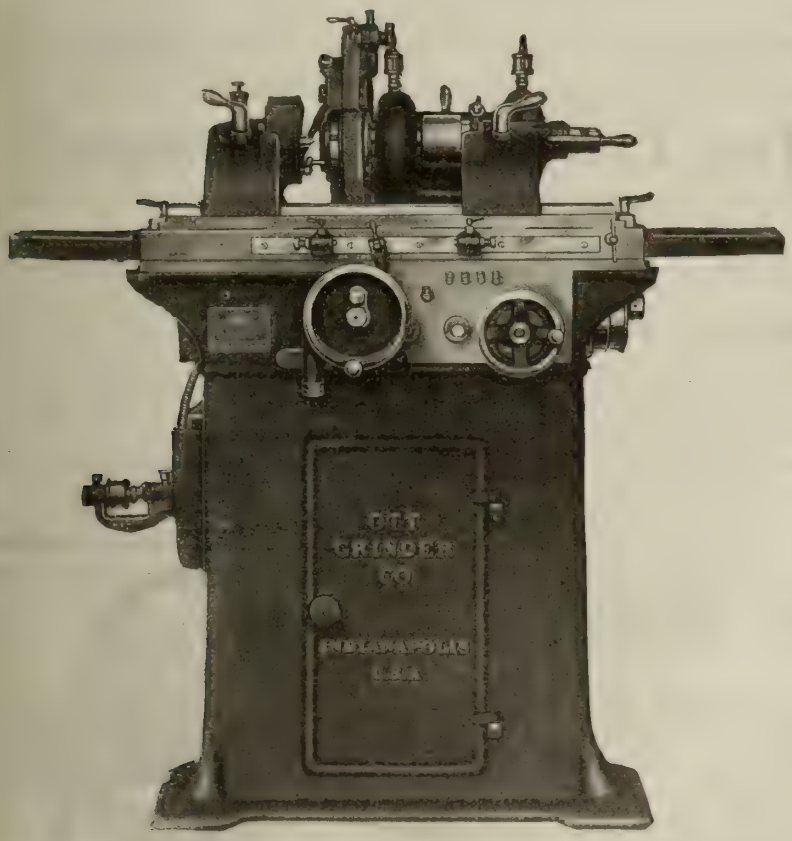
The New OTT



5" x 18" Plain Grinder

A TOOL of large production capacity for the grinding of duplicate parts at low unit costs.

It is of simple balanced design, permitting rapid and easy operation. It is absolutely rigid and wonderfully accurate.

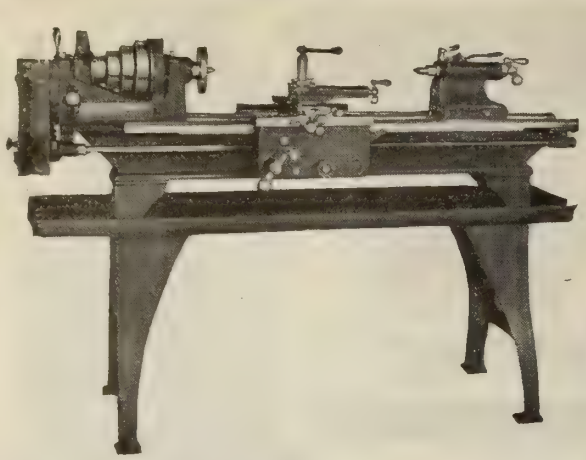


THE new 5" x 18" Plain Ott Grinder is equipped with either automatic or hand feeds. Bearings throughout are Non-Gran metal, insuring long life and the maximum of bearing service. The wheel spindle is of special steel, carefully hardened and accurately ground. It runs in bearings that can be easily and quickly adjusted for the slight wear that takes place. Spindle and bearings are constantly lubricated from two large sight-feeding oilers which enables the operator to tell at all times that the spindle is being properly lubricated. The head and footstocks clamp to the table with T bolts and align themselves from a true surface on the front edge of the swivel table. The countershaft bearings are all Hyatt Rollers.

Investigate. Send blueprints and samples of work and we will submit production and cost estimates for your consideration.

OTT GRINDER COMPANY

Main Office and Works: 217 West Tenth St., INDIANAPOLIS, INDIANA



Economical in first cost, operation, maintenance and floor space.

35 YEARS OF PERFECTION IN SMALL LATHES

"STAR" LATHES

THE SENECA FALLS MFG. CO., INC., 366 W. Fall St., Seneca Falls, N.Y.

9'-11'-13" swing with a full line of attachments.

STAR TRADE MARK REGISTERED

The ideal equipment for Accurate Production, Manufacturing, Repair Shops, Garages, Training Schools, and all classes of accurate high-class work.

THE

TRADE K-T MARK

FOUNDRY

GALT - ONT.

Fifteen Tons per Day

Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. We can advise you and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

—ASK US

MAKE NAILS! NOT NOISE!

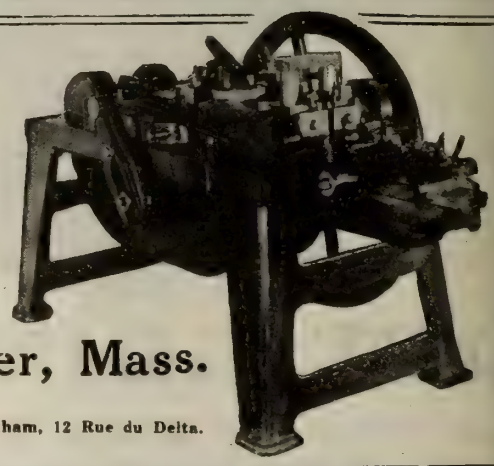
We offer the trade new types of

WIRE NAIL MACHINES

QUIET IN OPERATION; WITH VERY HIGH OUTPUT; ALL PARTS ACCESSIBLE; DECREASED MAINTENANCE COSTS; GREAT CAPACITY; OCCUPYING SMALL FLOOR SPACE.

Smoothly running machines, with balanced mechanical motions and no rotating cams. Built in 5 sizes, handling wire from No. 17 to ⅜" diam.

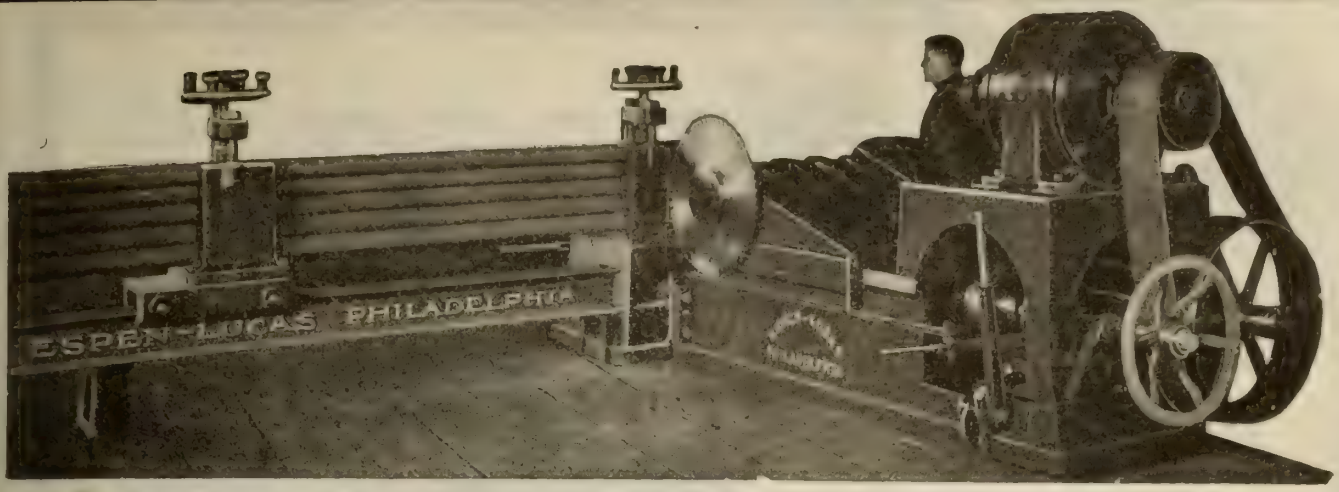
PRACTICALLY NOISELESS IN OPERATION

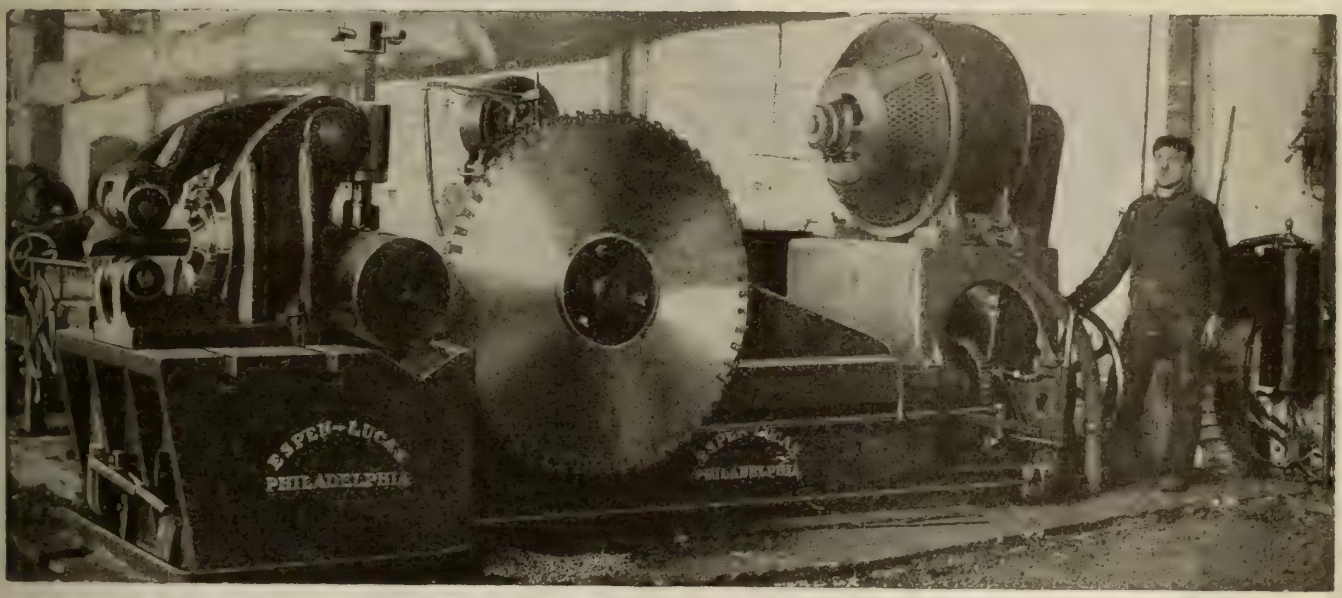


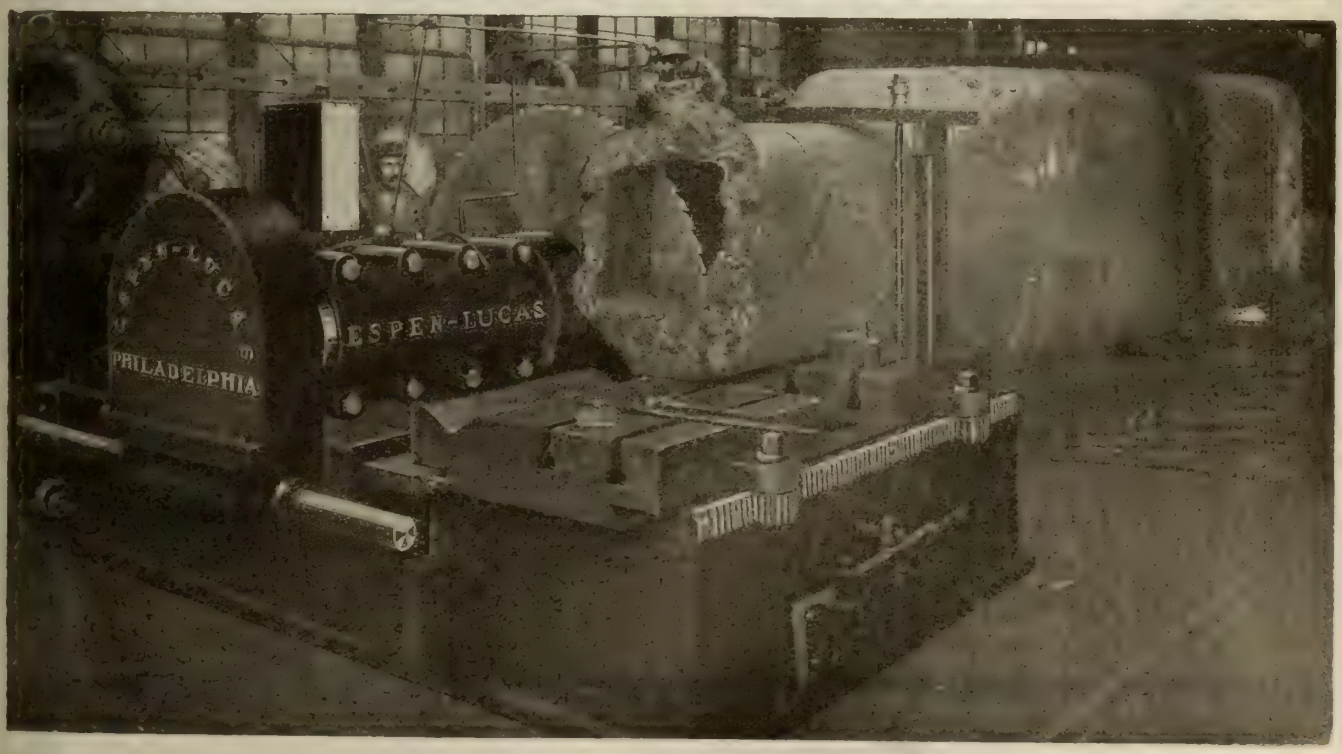
Sleeper & Hartley, Inc., Worcester, Mass.

CANADIAN BRANCH, COATICOOK, P.Q.

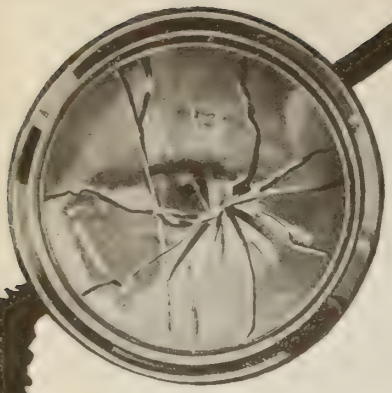
London, England, F. A. Perry, 63 Queen Victoria Street, E.C. 4. Paris, France, Edgar Bloxham, 12 Rue du Delta. ustralia: Edwin Wood Pty. Ltd., Melbourne.







THE ESPEN-LUCAS MACHINE WORKS, FRONT & GIRARD AVENUE PHILADELPHA, PENNA., U.S.A.



STOCO

EYE SAFE

"CELOGLAS"

SHATTER-PROOF LENS

SAFETY GOGGLES

ANY glass goggle lens will break under a sufficiently hard blow. The wearer and his employer are primarily interested in what happens when the lens breaks—whether the splinters are driven into the eyes of the wearer or stay in the frame.

That's where the Stoco **Celoglas** shatter-proof lens saves the day. Even though it may be fractured by a flying missile, the lens will remain intact in the frame and no particles of glass can fly in the eyes.

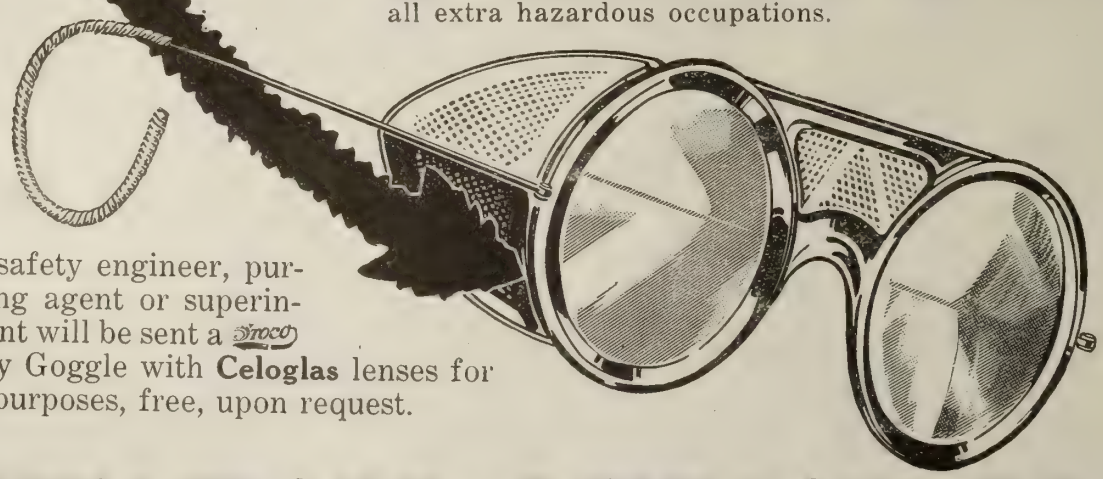
Stoco Safety goggle frames with **Celoglas** lenses are the ideal eye protection. The Stoco frame is the strongest ever made for eye protection purposes. It protects around and **between** the eyes, and is so sturdily constructed that it will ward off any ordinary missile without inconvenience to the wearer. Light in weight and extremely comfortable in use. Lenses may be changed without the aid of special tools.

Made with easy cable ear-bows, as illustrated, or elastic head-bands, at the same price.

Price with CELOGLAS shatter-proof lenses, **$115.00 per hundred pairs**

Price with regular heavyweight glass lenses, **$90.00 per hundred pairs**

Stoco **Celoglas** lenses are earnestly recommended for all extra hazardous occupations.



Any safety engineer, purchasing agent or superintendent will be sent a Stoco Safety Goggle with **Celoglas** lenses for trial purposes, free, upon request.

STANDARD OPTICAL CO.
GENEVA, N. Y.

Castings-Forgings

A FEW days lost in striving to ascertain where certain steel products can can be obtained means money and prestige sacrificed—and a set-back to your policy of prompt delivery.

CUT delays to the minimum, and assure yourself of systematic co-operation by placing your orders for FORGINGS AND CASTINGS with us.

OUR equipment is as complete as a Foundries Equipment could be, our service organization Dominion-wide in scope, ever on the alert to give you practical, efficient service.

NO matter what your requirements be, we can supply you promptly. If service and quality count with you—we will eventually receive your enquiries.

DOMINION FOUNDRIES & STEEL, LIMITED

HAMILTON, CANADA

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THE CARTER WELDING COMPANY OF TORONTO, LIMITED, announce that in addition to their OXY-ACETYLENE WELDING and CUTTING DEPARTMENT they have added ELECTRICAL WELDING MACHINES, and THERMIT WELDING EQUIPMENT.

They are now equipped to handle everything in Oxy-Acetylene, Electrical and Thermit work. No job too small, and none too large.

OXY-ACETYLENE WELDING
DAVIS
APPARATUS
DAVIS-BOURNONVILLE CO. N.Y.

THE CARTER WELDING COMPANY OF TORONTO, LIMITED, are the sole Canadian agents for the DAVIS-BOURNONVILLE Welding and Cutting Apparatus, and handle—

Portable Generators	Carbide	Carbon Removers
Stationary Generators	Welding Rods	Portable Trucks
Welding Torches	Flux	Compressed Acetylene
Cutting Torches	Carbonite Rods	Electrolytic Oxygen
Regulators	Goggles	99.80% pure
Hose		

There is no connection with any other firm in Canada under a similar name.
All correspondence to be sent to Toronto office.

The CARTER WELDING CO. of TORONTO

LIMITED

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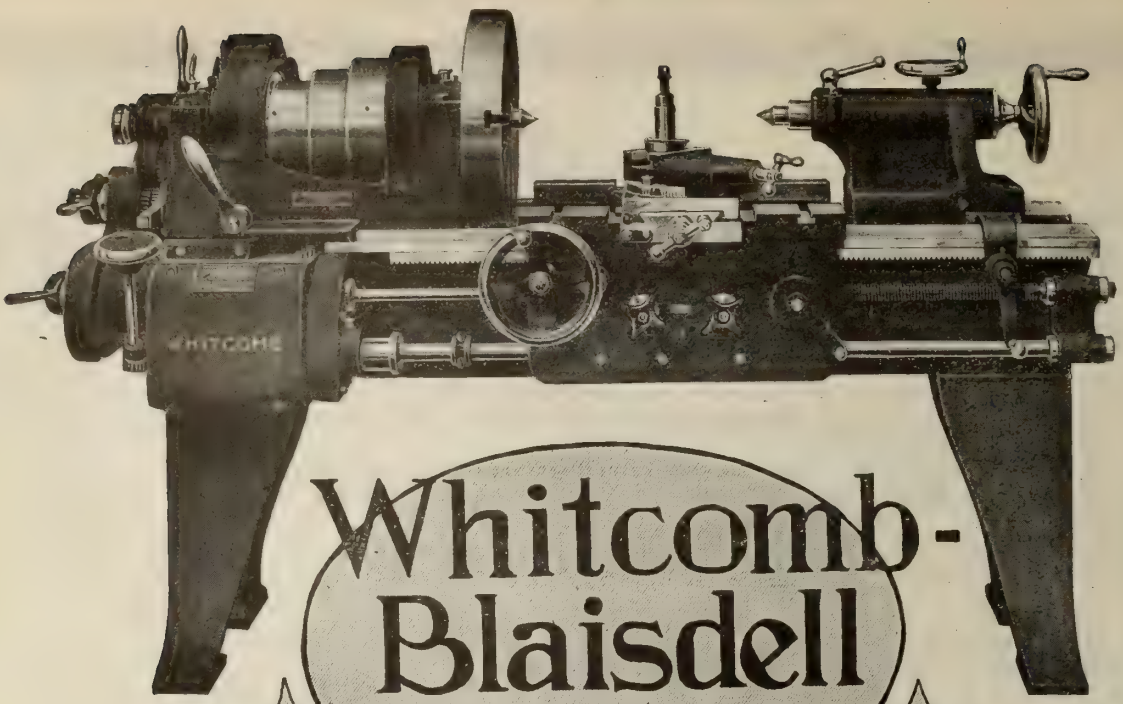


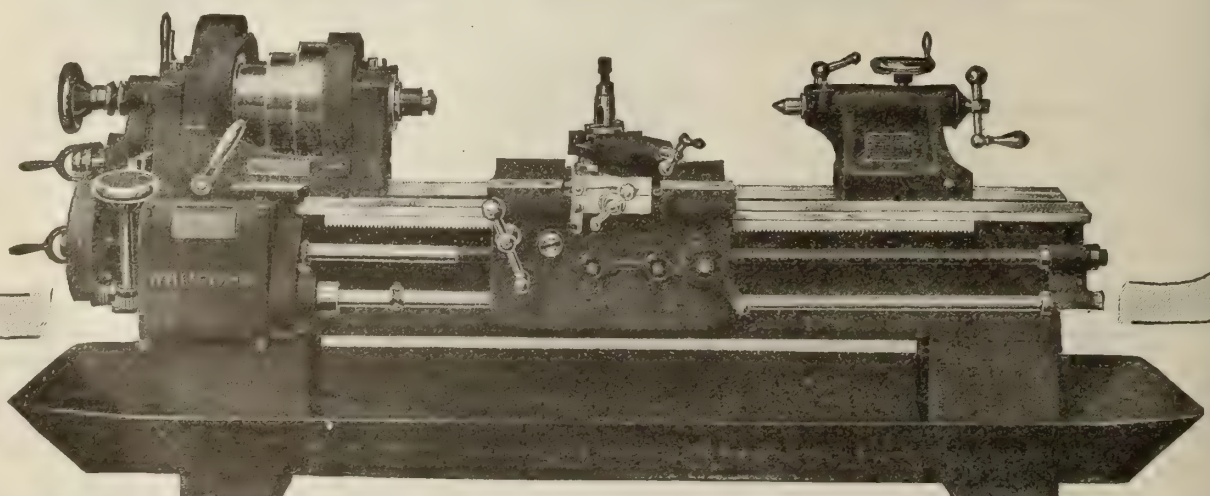
Whitcomb-Blaisdell Lathes

POWERFUL, WELL-BALANCED MACHINES THAT ARE LIGHT-RUNNING AND ADAPTED TO ALL CLASSES OF **RAPID MANUFACTURING.**

Every feature of the W-B Lathe of to-day has been considered from the viewpoint of greatest utility. Materials used embody toughness and durability. Our tests must prove great wearing quality and strength before any material is selected.

The product of an organization that has for sixty years been distinguished for the superior design, workmanship and material of its product.

WRITE FOR OUR LATEST CATALOG DESCRIBING ALL OF THE GOOD FEATURES OF WHITCOMB-BLAISDELL LATHES.



Lathes

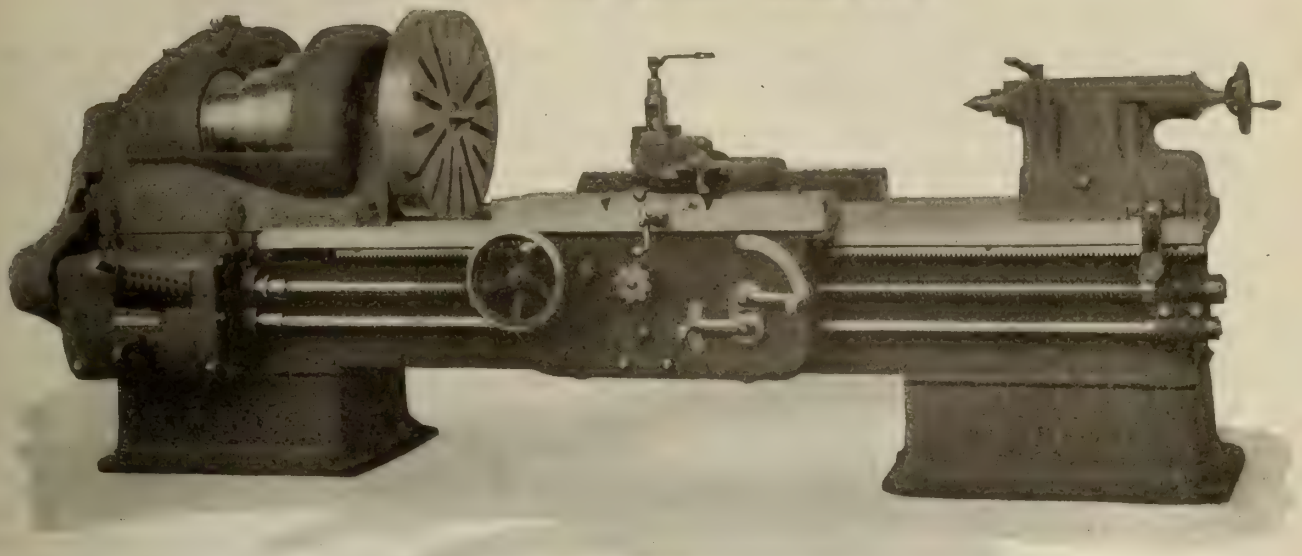
WHITCOMB-BLAISDELL MACHINE TOOL CO.

WORCESTER, MASS.

Planers

WICKES Heavy Duty Engine Lathes

BUILT FOR REAL SERVICE



We also manufacture High grade Horizontal and Vertical Rolls, Angle Rolls, Punches, Shears, Sprue Cutters, Radial Wall Drills, or Countersinking Machines and Flanking Clamps.

Ask for Our Catalogue

WICKES BROS., SAGINAW, MICH., U.S.A.

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The Time to Make Normal Money is Now.

HOW

By Installing Modern, Time-Saving Machinery

WHERE

Buy a Cisco, The Best Lathe Made.

The Lathe with the Pull.
24" x 12" (equal to most 30")
24" x 16"

The Lathe of Simplified Accuracy.
18" x 8" (equal to most 22")
18" x 18"

Immediate Delivery

THE CISCO MACHINE TOOL COMPANY

Makers of
14"-16"-18"-24"
Engine and Tool Room Lathes

CINCINNATI, U.S.A.

Made in
Cone Driven Motor Driven
Geared Head
Motor Driven Geared Head

Becoming a Bigger Man

WHAT is the difference between some men you know and others known to you? Why are some men earning $3,000 a year and some $30,000? You can't put it down to heredity or better early opportunities, or even better education. What, then, is the explanation of the stagnation of some men and the elevation and progress of others?

We are reminded of a story. A railroad man, born in Canada, was revisiting his home town on the St. Lawrence River. He wandered up to a group of old-timers who sat in the sun basking in blissful idleness. "Charlie," said one of the old men, "they tell me you are getting $20,000 a year," "Something like that," said Charlie. "Well, all I've got to say, Charlie, is that you're not worth it."

A salary of $20,000 a year to these do-nothing men was incredible. Not one of the group had ever made as much as $2,000 a year, and each man in the company felt that he was a mighty good man.

Charlie had left the old home town when he was a lad. He had got into the mill of bigger things. He developed to be a good man, a better man, the best man for certain work. His specialized education, joined to his own energy and labor sent him up, up, up. To put it in another way: Charlie had always more to sell, and the world wanted his merchandise—brain, skill and ability. Having more to sell all the time, he got more pay all the time.

Charlie could have stayed in the old home town; could have stagnated like others; could have been content with common wages. In short, Charlie could have stayed with the common crowd at the foot of the ladder. But Charlie improved himself and pushed himself, and this type of man the Goddess of Fortune likes to take by the hand and lead onward and upward. Almost any man can climb higher if he really wants to try. None but himself will hold him back. As a matter of fact, the world applauds and helps those who try to climb the ladder that reaches towards the stars.

The bank manager in an obscure branch in a village can get out of that bank surely and swiftly, if he makes it clear to his superiors that he is ready for larger service and a larger sphere. The humble retailer can burst the walls of his small store, just as Timothy Eaton did, if he gets the right idea and follows it. It is not a matter of brain or education so much as of purpose joined to energy and labor. The salesman or manager or bookkeeper or secretary can lift himself to a higher plane of service and rewards if he prepares himself diligently for larger work and pay. The small manufacturer, the company director, the broker—all can become enlarged in the nature of their enterprise and in the amount of their income—by resolutely setting themselves about the task of growing to be bigger-minded men.

Specialized information is the great idea. This is what the world pays handsomely for. And to acquire specialized information is really a simple matter, calling for the purposeful and faithful use of time. This chiefly.

One does not have to stop his ordinary work, or go to a university, or to any school. One can acquire the specialized information in the margin of time which is his own—in the after-hours of business. Which means: If a man will read the right kind of books or publications, and make himself a serious student at home, in his hours—the evening hours or the early morning hours—he can climb to heights of position and pay that will dazzle the inert comrades of his youth or day's work.

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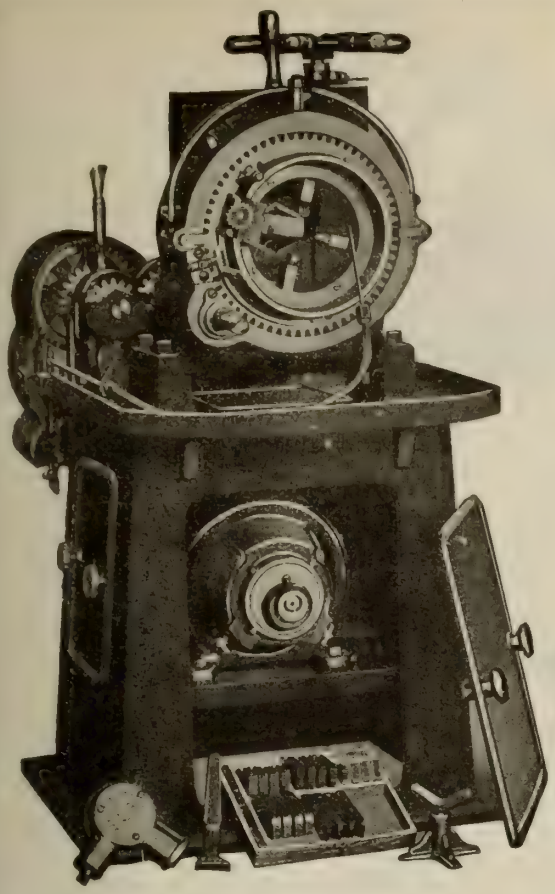

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1. One man can do the work of six against the old stock and die method of cutting.
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These are convincing arguments for the construction and utility of this machine. Thread cutting can be performed fast, clean and true. Equipped with self-centering vise.

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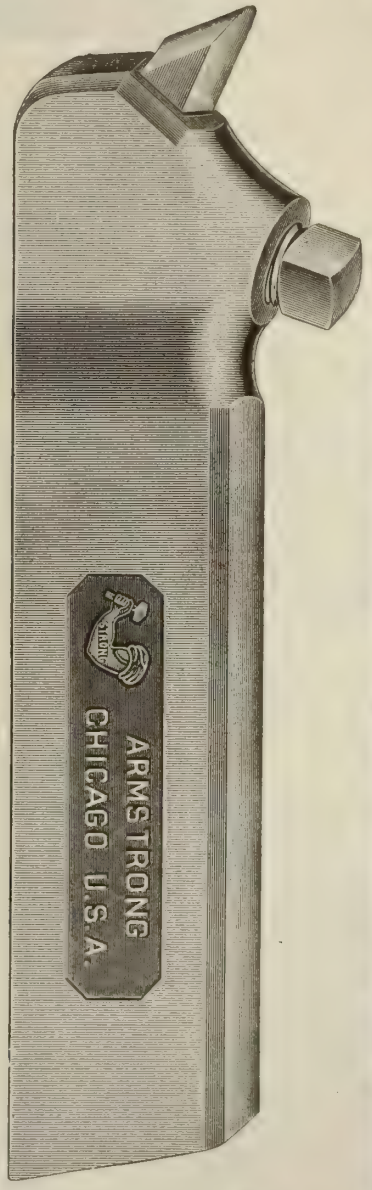

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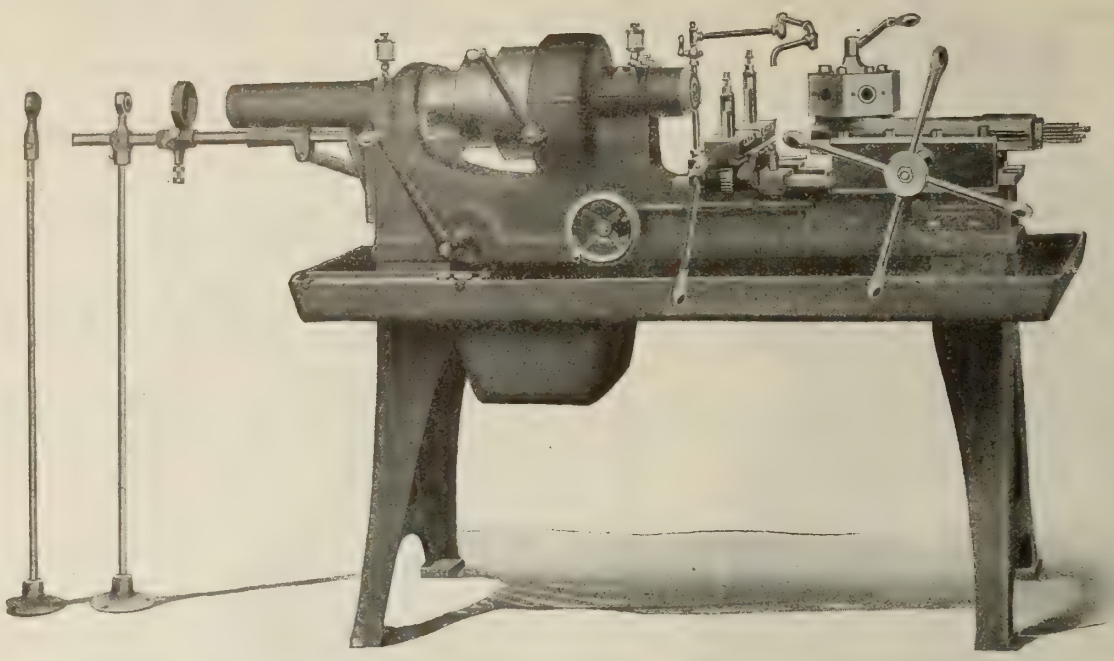

No. 2 Turret Screw Machine

The No. 2 Turret Screw Machine is particularly fitted to small parts manufacturing. Many fuse parts and adapter contractors have used large batteries with marked success. Now you will find them just as profitable and reliable for your peace work.

The machine is built with both plain head and geared friction head construction. The geared friction head adapts it particularly to threaded work up to the capacity of 1 in. x 6-in. for alloy steels and other tough metals requiring the power obtainable through this construction.

With our increased output we can quickly equip you, and, as with all W. & S. machines your production can be speeded by equipping from our immense stock of standard tools.

Turret Lathes and Screw Machines from 5/8 in. x 4 in. to 4½ in. x 44 in. bar capacity. Maximum swing 21½ in.

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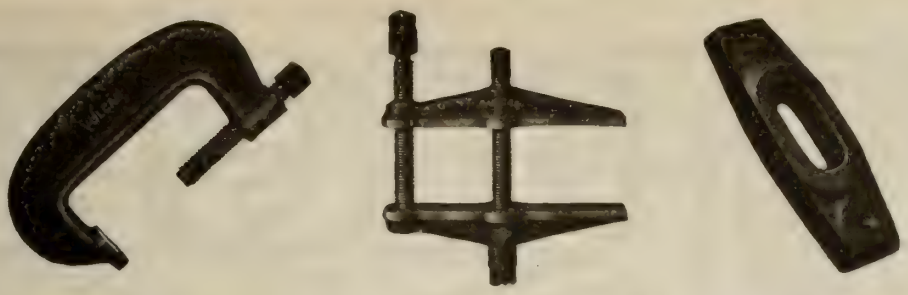

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"THEY STAND THE STRAIN"

JUST "because they're cheap" is no reason why you should buy *cast* Clamps. They're dear at any price if not dependable and a moment's thought will show that a cast product *cannot* be depenable for such service.

Williams' Lines of "C," Machinists' and Strap Clamps provide a wide range of sizes for all clamping service—"There's a Williams' Clamp for every purpose." And they're all fully guaranteed.

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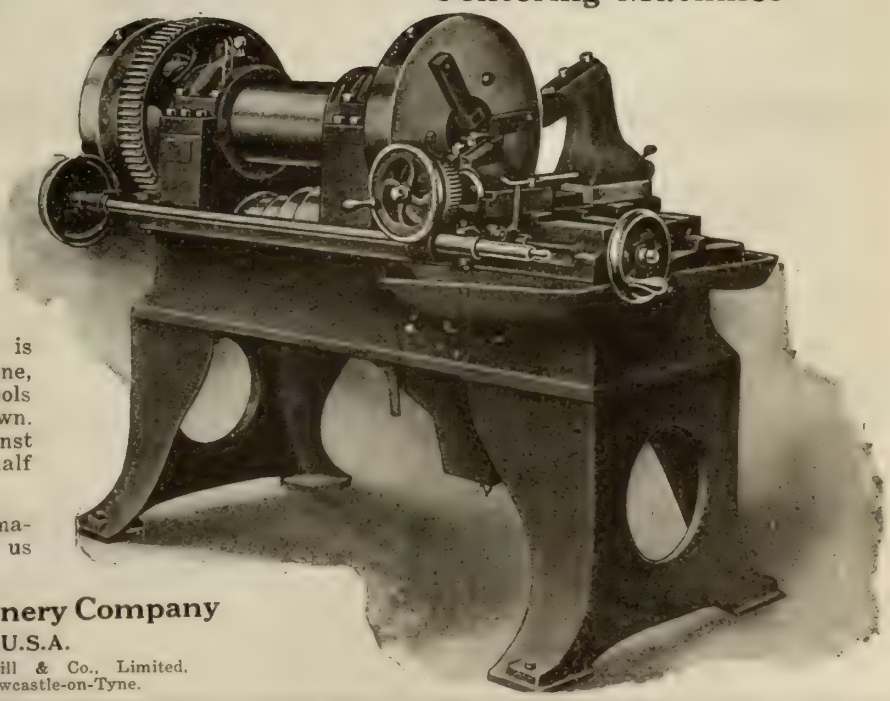
Cut Your Cutting-off Costs in HALF

HURLBUT'S

Patent Cutting-off and Centering Machines



TO say that the Hurlbut, Rogers Cutting-Off and Centering Machine will **double your production** and **cut your costs in half** may seem like a broad claim. But this is just what this machine will do compared with any ordinary machine of its kind.

Hurlbut, Rogers speed and efficiency is easily explained. Instead of only one, it is equipped with two cutting-off tools —one cutting up and the other down. In this way they hold the work against each other and finish a job in just half the time and do twice the work.

You can't afford to be without this machine. It saves real money. Let us tell you more about it. Write!

The Hurlbut, Rogers Machinery Company

South Sudbury, Mass., U.S.A.

Foreign Agents—England: Chas. Churchill & Co., Limited. London, Manchester, Glasgow and Newcastle-on-Tyne.

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In mines, mills, foundries and industrial plants, on sugar plantations, in office and commercial buildings, on board ships, in fact, wherever there is lifting of any kind (up to 30 tons) to be done, Wright Hoists serve with that inimitable service which has made the name a synonym for satisfaction.

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WRIGHT MANUFACTURING COMPANY

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OWN STORY *of his*

FIVE YEARS *in the* ARCTIC

Over five years ago Vilhjalmur Stefansson, the famous Arctic explorer, was commissioned by the Canadian Government to lead a party into the uncharted space that extended from the north-westerly boundaries of Canada on to the North Pole. Shortly after the party got away the news came back to civilization that Stefansson and some of his party had drifted out into the Arctic seas on an island of ice and they were given up as lost. But Stefansson came back, safe and sound after four years of amazing adventures, during the course of which he made many discoveries of scientific and geographical value. Mr. Stefansson has written his story of this wonderful journey and exclusive Canadian rights have been purchased by MACLEAN'S MAGAZINE. It starts in the April issue and will continue for six months. It is a thrilling narrative—unquestionably the most important Canadian story of the year.

★ **Stefansson's story will be published exclusively in Canada in MACLEAN'S. The series of articles by him, now appearing in American and Canadian newspapers, refer entirely to his experiences on previous explorations and do not deal with the journey that he undertook for the Dominion of Canada and completed last year.**

Other Outstanding Features of April MacLean's

"Imperial Relations Must be Worked Out," by Viscount Bryce. An important announcement on the future construction of the British Empire.

"Reconstruction in Turkey," by Stephen Leacock. A humorous article on the present condition of things in Turkey as seen by Canada's great humorist, and applied to Canadian conditions.

"Bulldog Carney," by W. A. Fraser. A splendid novelette of the Canadian West, complete in this issue. Illustrated by Charles L. Wrenn.

"Opening the New Book," by J. K. Munro. An article on the situation at Ottawa created by the new Liberal leadership—smashing, impartial, fearless.

"The Sun Gazer," by Charles G. D. Roberts. A remarkable animal story. Illustrated by Artheur Heming.

"Canada's Fishmonger General," by Thomas M. Fraser. An article on a young Canadian who put Canadian fish on the diet of the British armies by a series of Barnum and Bailey advertising stunts.

"Bombing the Boche," by Lieut. J. Vernon Mackenzie. The second of the two articles that Mr. Mackenzie has written on the whirlwind campaign of raid reprisals which so frightened all Germany.

"The Transformation," by Frederic S. Isham. Illustrated by Hanson Booth. The second instalment of this sparkling new serial.

"Man and Wife," by C. W. Stephens. Illustrated by R. M. Brinkerhoff. The first instalment of a three part story of Canadian life by a new Canadian writer—a delightful love story with a background of business intrigue.

The Review of Reviews

The best articles from all publications the world over are selected and condensed for this department. Some of the articles in the April number are:

The Man Behind Bolshevism.
Could German Fleet have been Destroyed.
The Secret Plans of the Allied Command.
Too Much Wilson.
Is the ex-Kaiser Haunted?
Next Government Will be Labor.
New Life of Deposed Princess.
A New Kind of Socialism.
Are We Communicating With Mars?
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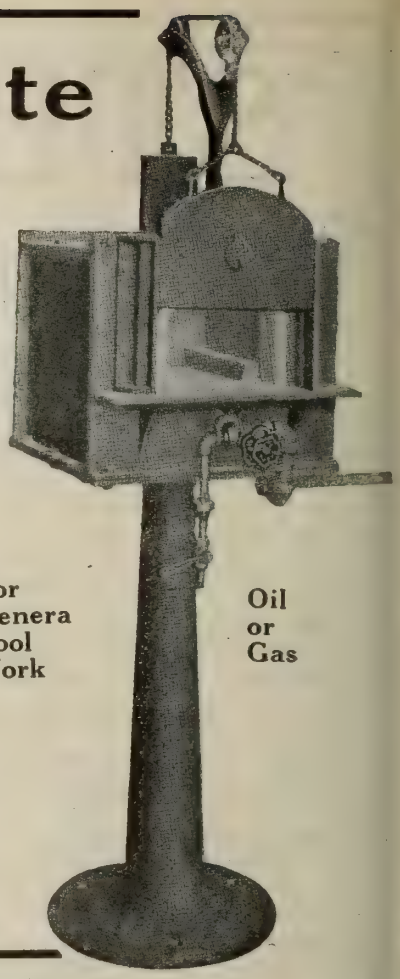
These tool forges are particularly adapted for the requirements of the small machine shop for annealing and tempering dies, cutters, reamers, etc.

Combustion is perfect and no flames come in contact with material. Built to stand the highest temperature. Doors are properly counterbalanced. In every way BELLEVUE FURNACES meet with the demand for durability, efficiency and convenience.



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Oil or Gas

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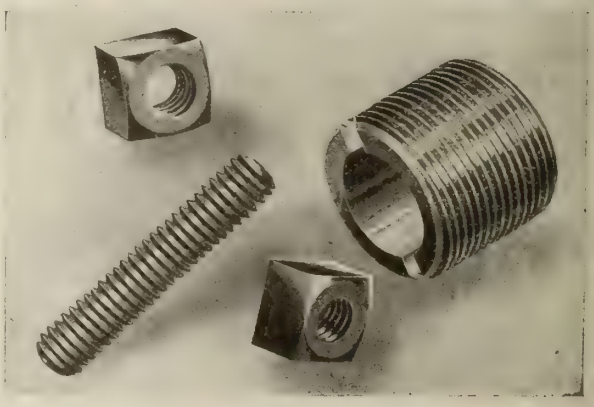

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Manufacture Brass Automatic Screw Machine products. Capacity of machines 1/8 in. to 2 in.

Send us your samples or blue prints, and we will quote prices. Satisfaction guaranteed.

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KEMPSMITH

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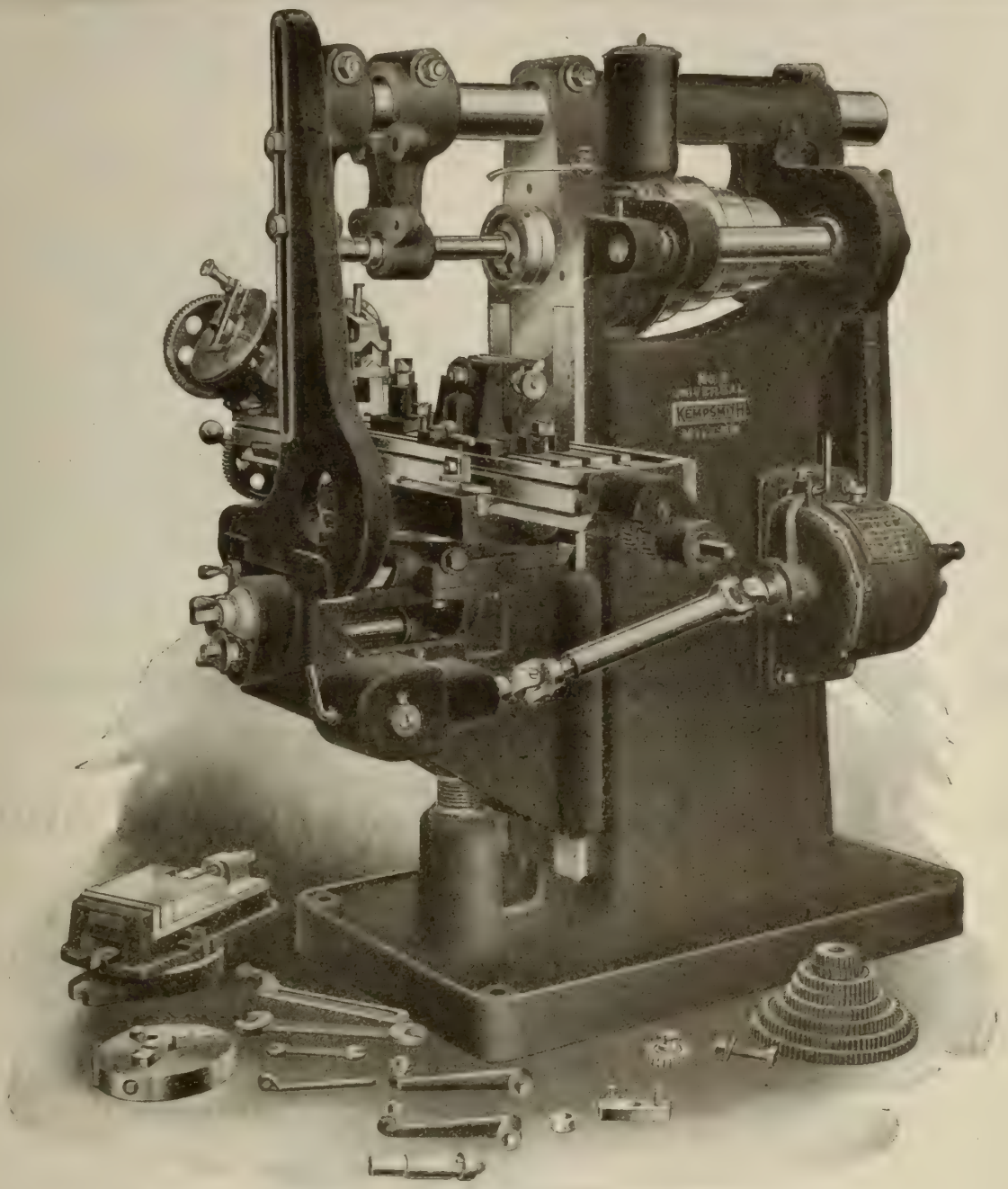

KEMPSMITH No. 2 Universal Milling Machine

Equipment—Double friction countershaft, 10½ inch Universal Dividing Head complete with tailstock, centering rest, Hill patent dog and driver, two index dials, set of change gears for spiral milling and index charts for operating; 6 inch Universal Chuck, 1 inch arbor, two arbor supports, brace, No. 3 Swivel Vise, outside tool shelf and all necessary crank handles, wrenches and accessories as shown.

THE KEMPSMITH MANUFACTURING COMPANY

MILWAUKEE, WIS., U. S. A.

FOREIGN AGENTS: Barandiaran & Co., 3 Alameda, San Sebastian, Spain. Edgar Bloxham, 12 Rue du Delta, Paris, France. D. Drury & Co., 1-2 Central House, Main St., Johannesburg, S. Africa. Nielsen & Winther, Copenhagen, Denmark. Parke & Lacy Co., Ltd., 60 Clarence St., Sydney, N.S.W., Australia. Selson Engineering Co., 85 Queen Victoria St., London, E.C., England, and 19 Via Botero, Turin, Italy. Spliethoff Beeuwkes & Co., Leuvehaven, W.Z. 159, Rotterdam, Holland. American Trading Co., Tokio, Japan.

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Economical—Safe—Dependable

The Curtis Air Hoist has been so perfected in its speed regulation, design and mechanical construction that it is the simplest, safest, most economical hoist for light and medium capacities. It effects a decided saving in man power.

A Hoist to Meet Your Needs

CURTIS AIR HOISTS have been successfully adapted to meet a wide variety of needs in hundreds of the leading industrial plants throughout America.

Our Engineering Department is at your service, ready to study any special conditions you have to meet and recommend suitable equipment. Illustrated descriptive literature and full information on request.

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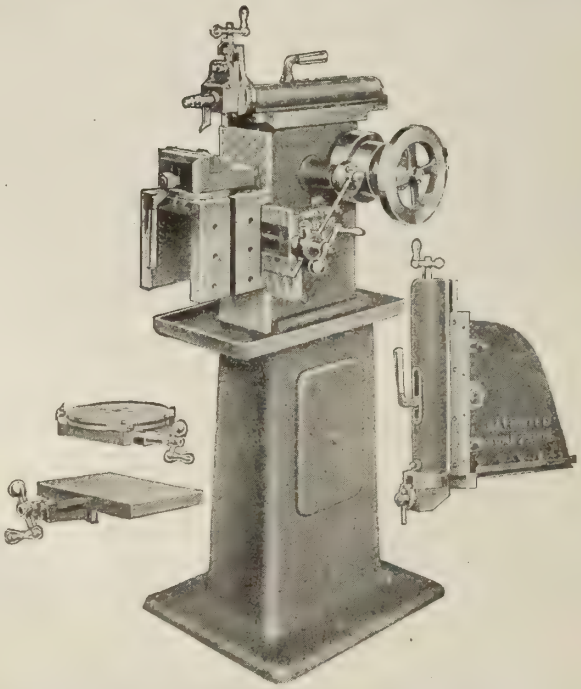
The Rhodes Combined Shaper & Slotter

Designed especially for making tools, dies, models — and shaping and slotting all classes of light work.

Rigid, well made, accurate in production and durable in service.



Can be quickly and conveniently changed from horizontal to vertical operation.

This feature exists in NO other machine on the market.

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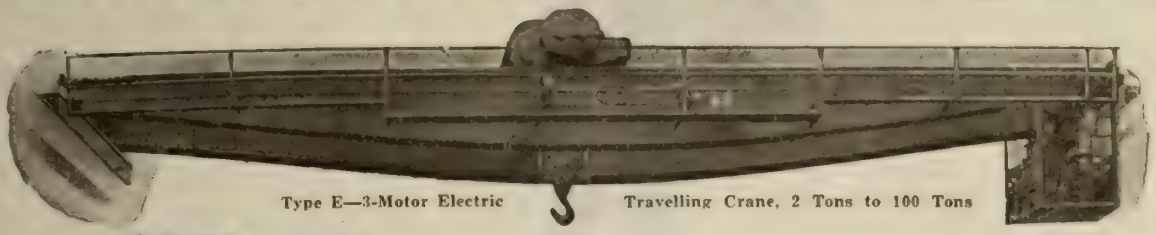
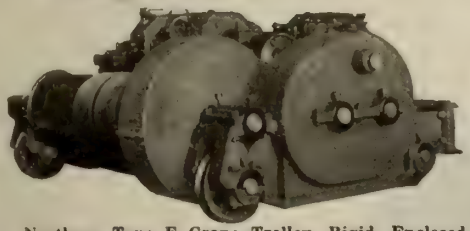
CANADIAN MADE CANADIAN MADE

Electric and Hand Traveling Cranes



Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons



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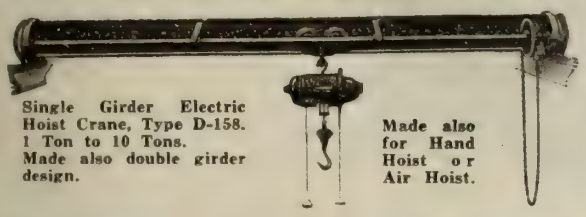
We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.



Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

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Catalogs free.

Type D Electric Hoists —½ to 10 Tons.

Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

Northern Crane Works, Limited

Walkerville, Ontario, Canada

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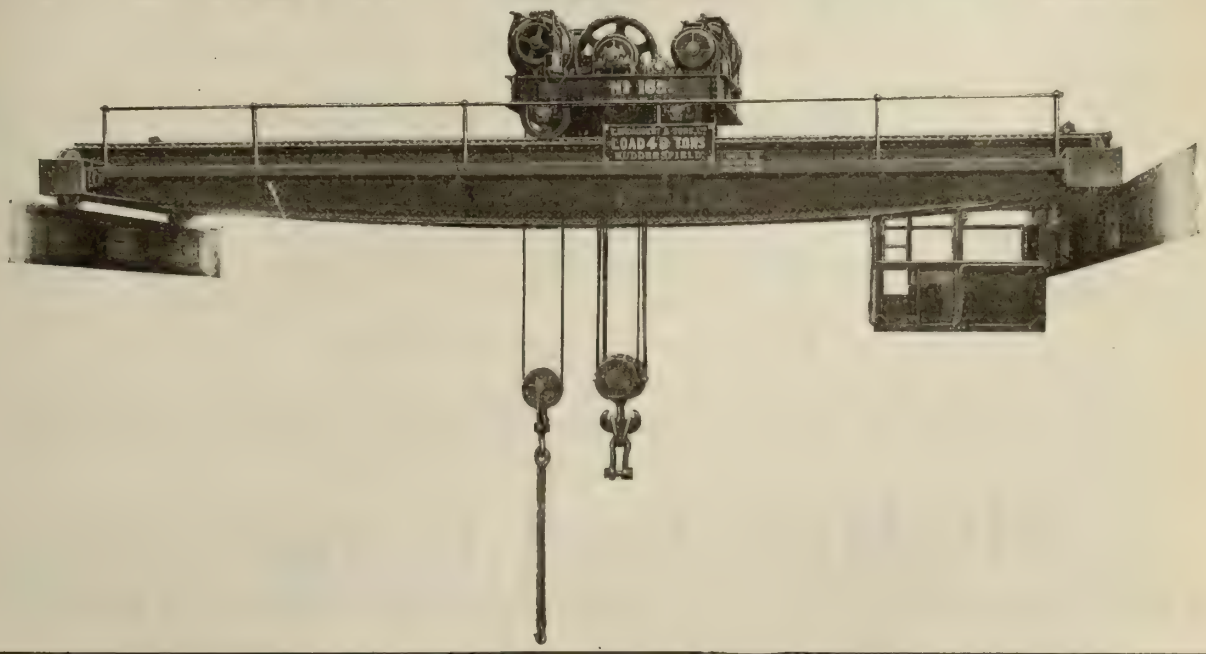

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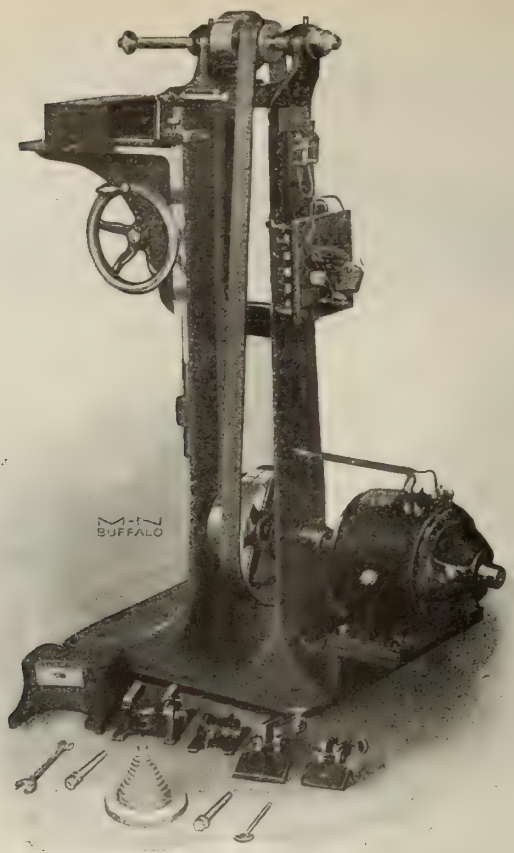

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Let Your Die Troubles End Right Here

Why let Die Trouble stand between you and maximum production?
In the

Modern Die Chaser Grinder

you will have a machine that does away with die trouble—because its output is **marvellously eccentric.**

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For Fast Accurate Work

Bulletin C. G. will give you full details. We would also be pleased to send you full particulars re **"Modern" Self-Contained Grinding Machines.** Tools splendidly adapted to meet the present demand for large production.

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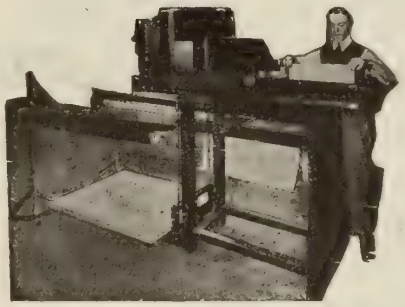

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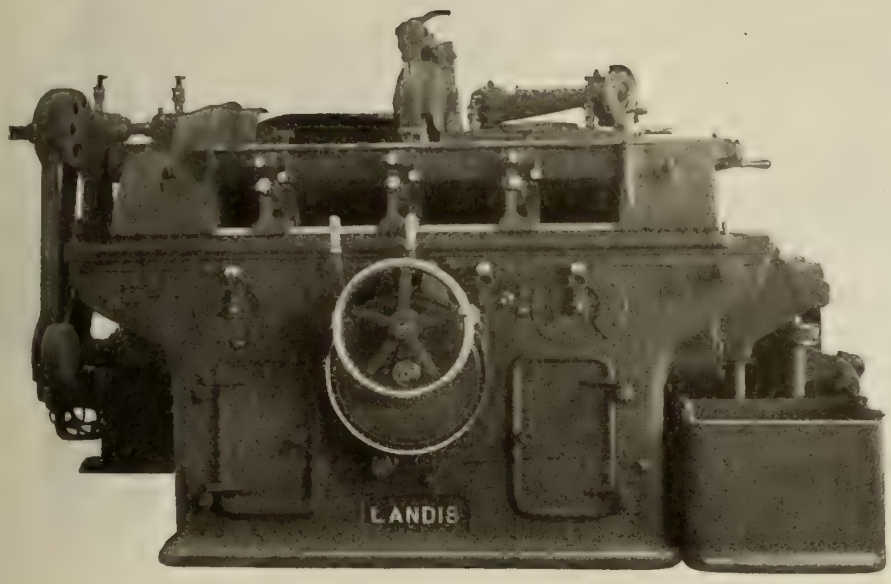
LANDIS

Self-contained Plain Grinding Machine



No matter how excessive the tool-load may be, there can be no variation of the degree of accuracy because the work is held stationary —and "the wheel travels."

In addition the Landis is compactly and rigidly built to avoid any chatter.

A study of the machine will convince you of its many advantages and its fool-proofness. The built-in, labor-saving features insure big production.

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guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

Marshalltown, Iowa
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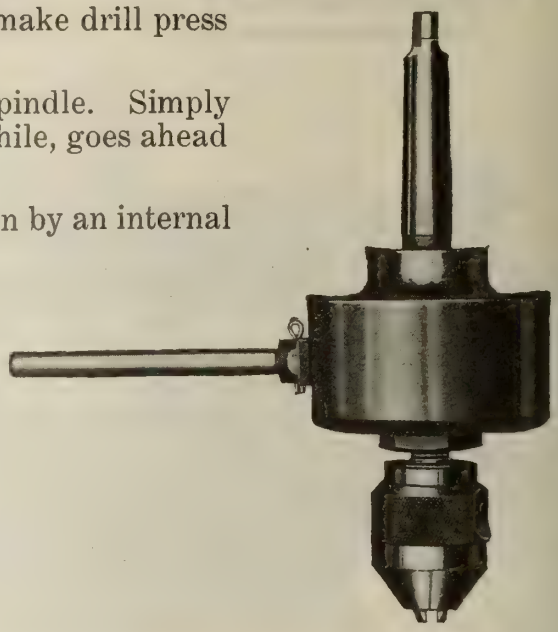
Save Taps, Trouble and Money

The "B-T" Reverse Tapping Attachment fits any make drill press and is equally efficient on **all** of them.

Eliminates necessity of reversing the machine spindle. Simply raising spindle reverses tap—the machine, meanwhile, goes ahead at full forward speed.

A reverse speed twice that of tapping speed is given by an internal gear drive. It is friction driven—automatically adjusted by the amount of pressure the operator puts on the drill spindle.

Can also be had with positive drive. Both plain and friction chucks are fitted with jaws to grip round and square end of tap.



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FOR TRUEING GRINDING WHEELS

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It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

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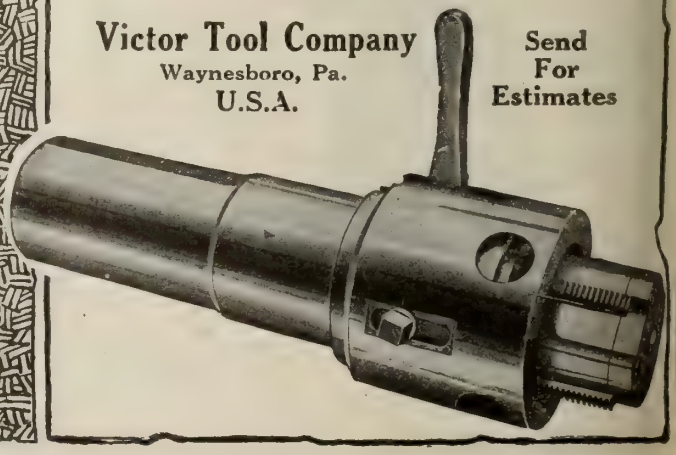
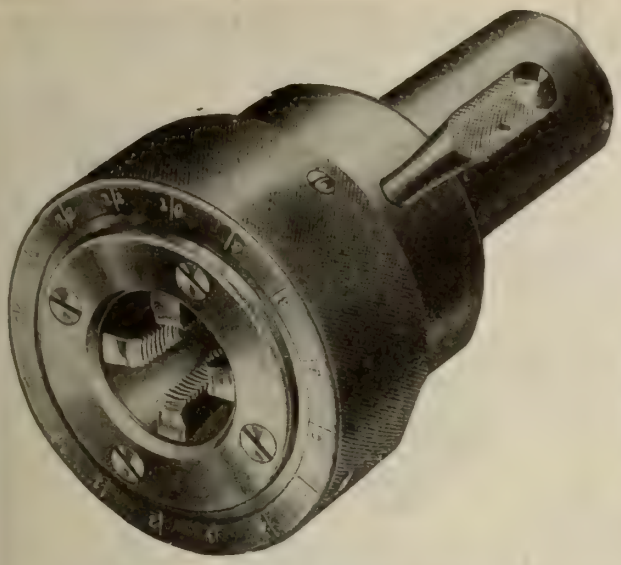
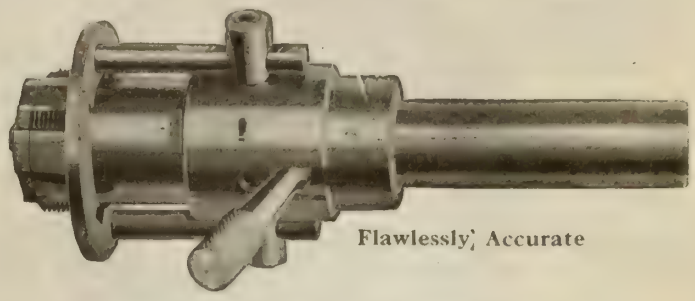




MURCHEY

COLLAPSING TAPS and SELF-OPENING DIES



Flawlessly Accurate

Wonderfully Fast and Durable

Two Murchey Taps on your lathe completely finish these so that when they come off the machine there is no more handling or re-sizing to do. No need of taking out of one lathe and putting it in another. No reversing, no stripping. No chance of work getting off centre. Do work more accurately and 50% faster than solid tools. Murchey Chasers are quickly adjusted to compensate for wear, and Murchey Adjustable Taps serve as long as ten solid taps. Write at once for full particulars.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris France.

H & G

Die Head Cuts

Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

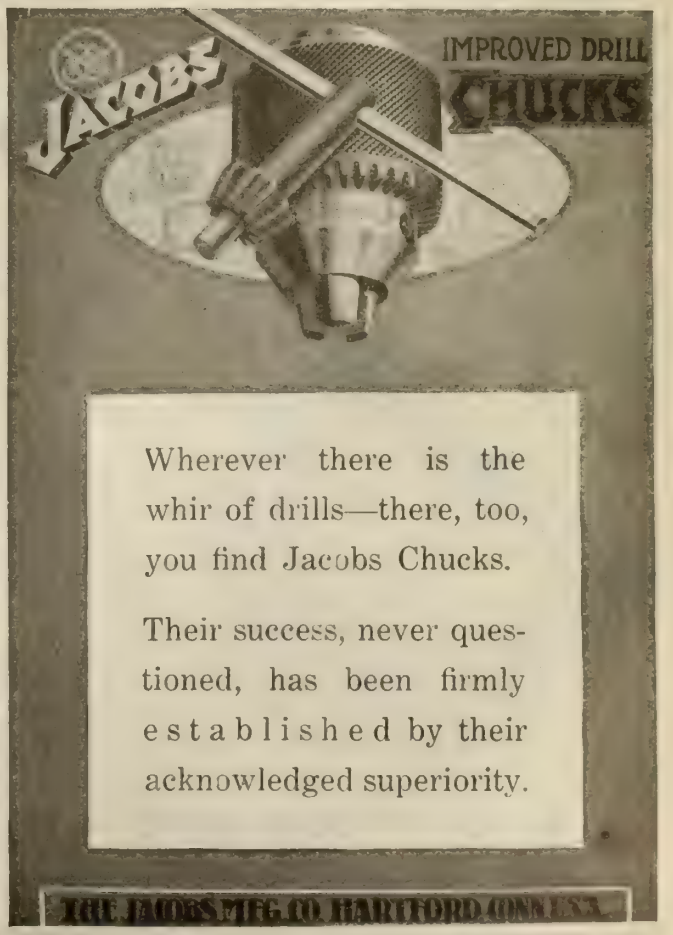
No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

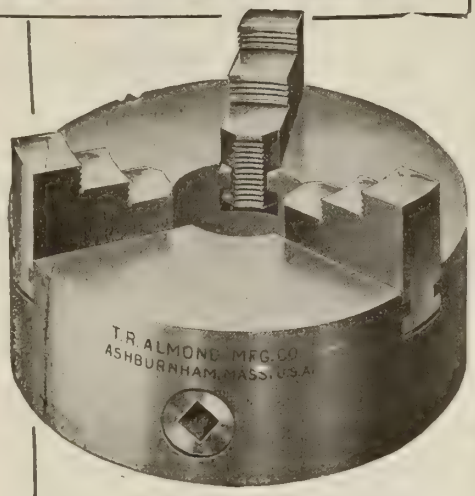
Eastern Machine Screw Corp.

New Haven - Conn.

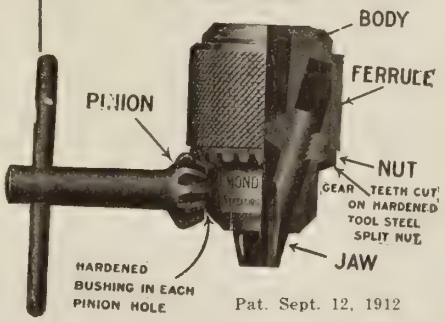


ALMOND CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".

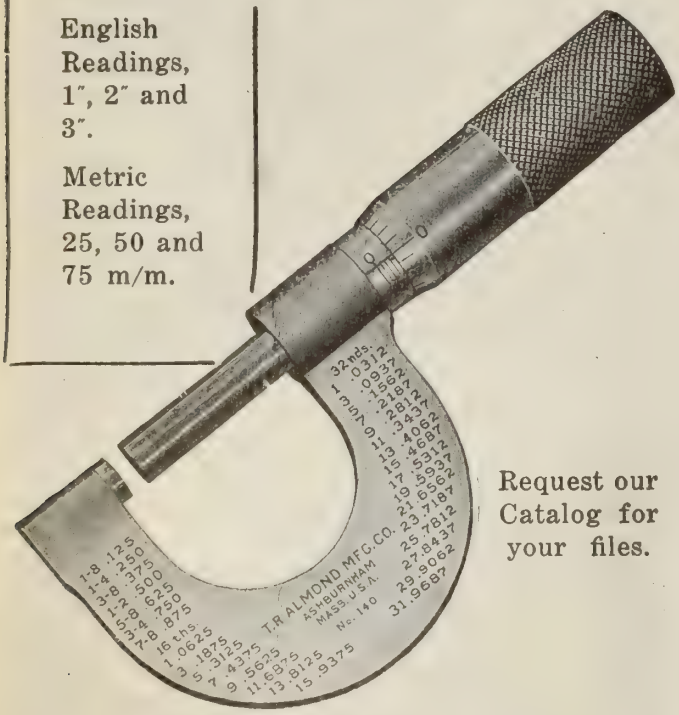


Pat. Sept. 12, 1912

Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



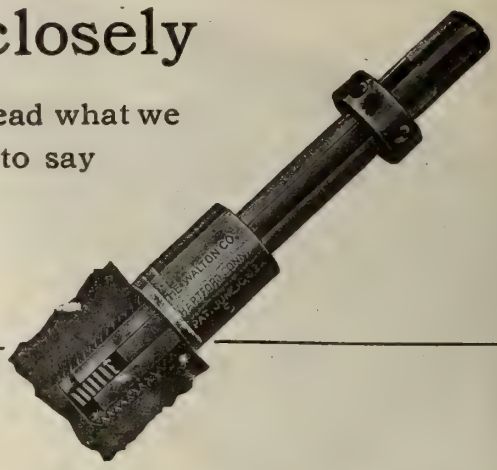
Request our Catalog for your files.

T. R. ALMOND MFG. CO.

6 Maple Avenue, Ashburnham, Mass.

Look at this again —closely

and read what we have to say below



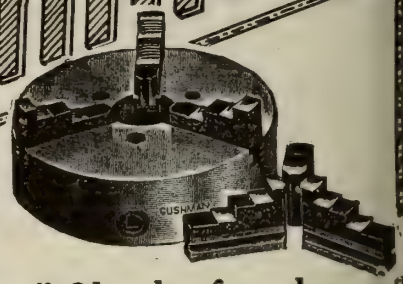
WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will **save a great deal** of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.

Don't you think it would pay to have a few lying around on your benches?

The Walton Company

Hartford, Conn.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

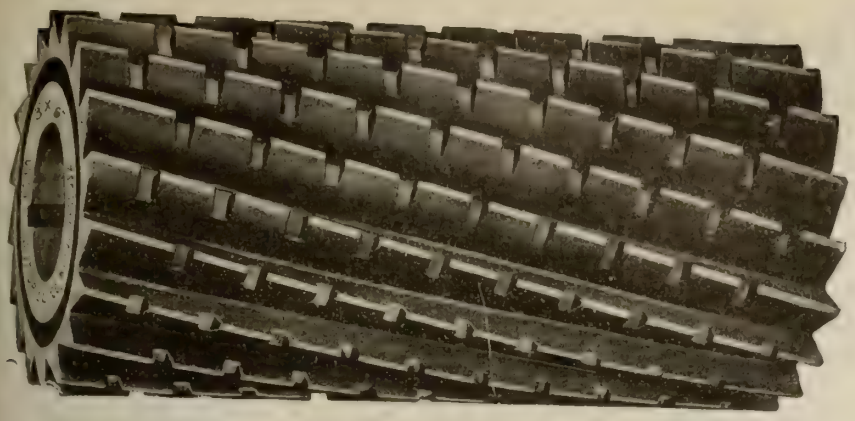
And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

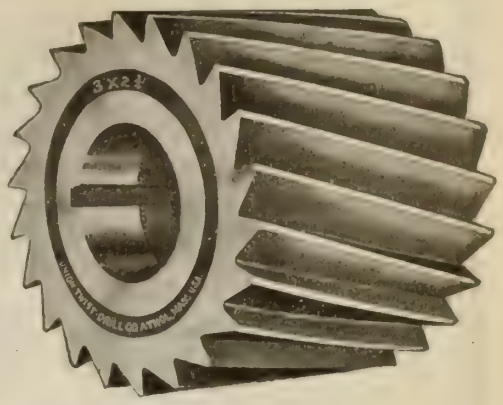
The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

CHUCKS





BUTTERFIELD

TWIST DRILLS GEAR AND MILLING CUTTERS

(Carbon and High Speed Steel)

It will pay every manufacturer, who is not acquainted with Butterfield Tools, to measure their quality by the test of long, hard SERVICE.

You'll find the Butterfield durability the key to tool economy.

Drop us a line for catalogue.

Butterfield & Company, Inc.

Rock Island, Quebec

Toronto Office:
220 King Street West

LANDIS—The Reconstruction Threading Tool

Threads will play a mighty big part in reconstruction here and abroad. Economy in producing these threads will be more important now than ever, and it is vitally necessary that the most efficient and most economical machines be employed.

Landis Die Heads and Machines will meet all demands, whether for quality, production or low threading cost. The chaser is fundamentally different in design from any other thread-cutting tool, and this design insures clean-cut, well-formed threads on iron, steel, brass, monel metal or any material.

Production is doubled due to the chaser having a strictly tangential disposition to the cutting edge, thereby eliminating all unnecessary friction.

Threading costs are reduced from 50 to 75% since the chaser is merely given a slight grinding at the cutting edge, when dull. The chaser has three inches of available cutting material, which permits of 90 to 120 grindings, and no annealing, hobbing or retempering is necessary.

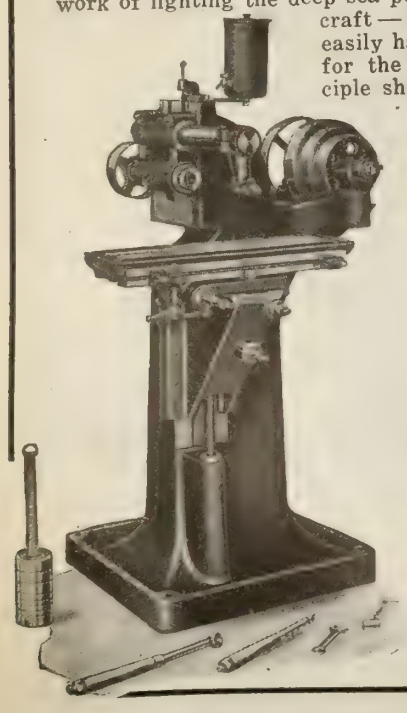
Familiarize yourself with the other big features; they are worth knowing.

Ask for Catalogue No. 24

LANDIS MACHINE COMPANY

Waynesboro, Pa.

Battleships steamed for the harbor when enemy submarines were about. That's where they belonged. The work of fighting the deep sea pests was left to smaller craft — they were quicker, more easily handled and more capable for the work. The same principle should apply in your shop practice.



U.S. MILLER

should be used for milling small parts. They too are quicker, more easily handled and more capable for this work than big tools. You can actually reduce your milling costs one-third to one-half on each part by the use of the U. S. Hand and Weight Miller. Finely built to combine speed, accuracy and durability.

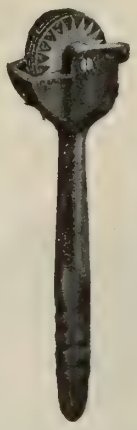
United States Machine Tool Co.

CINCINNATI

Ohio U.S.A.

Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.



For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company

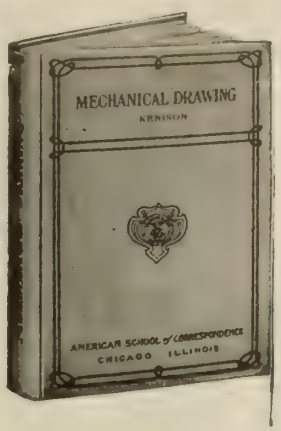
HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

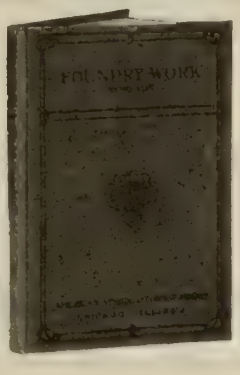
Mechanical Engineering Books

If you are desirous of improving yourself in your trade and so putting yourself in the position of making more money, these Mechanical Engineering Books will be found helpful.

MACHINE-SHOP WORK. By **Frederick W. Turner,** Instructor in Machine-Shop Work, Mechanics Arts High School, Boston. 208 pp., 241 illus. Cloth binding. The use of various hand tools is explained, followed by a comprehensive discussion of the lathe and lathe tools, with the methods of screw cutting, taper and eccentric turning, etc. The way to figure compound gears for screw cutting; drilling; boring; planers; shapers; slotters; milling machines and cutters; how to cut spirals, gears, cams, etc.; grinding; the operation of automatic machines. Price $1.50



MECHANICAL DRAWING. By **Ervin Kenison, S.B.,** Assistant Professor of Mechanical Drawing, Massachusetts Institute of Technology. 176 pp., 120 illus. Cloth binding. Gives a course of practical instruction in the art of Mechanical Drawing, based on methods that have stood the test of years of experience. Includes orthographic, isometric and oblique projections, shade lines, intersections and developments, lettering, etc., with abundant exercises and plates. Price $1.00



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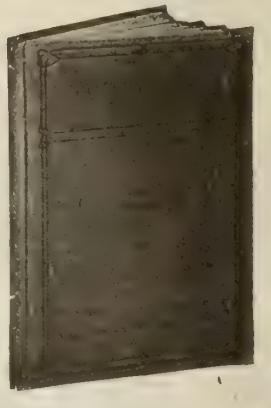

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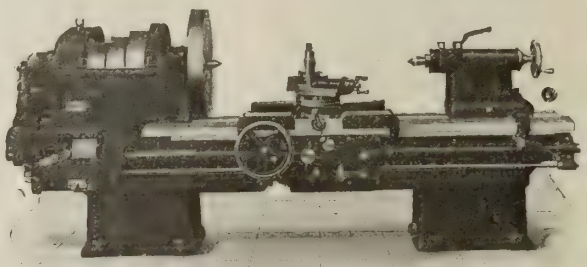
Sidney for Service

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohio

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

MacKINNON STEEL CO., LTD.

Engineers, Manufacturers and Erectors of Steel Structures

Industrial Bridges, Buildings, Towers, Penstocks, Columns, Smoke Flues and Stacks, Chutes, Coal Bins, Ore Bins, Tanks, Towers, Cranes.

Structural Steel and Steel Plate Work, and a combination of the two lines.

Prompt Deliveries Assured. Write for Catalog.

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Sherbrooke, Quebec

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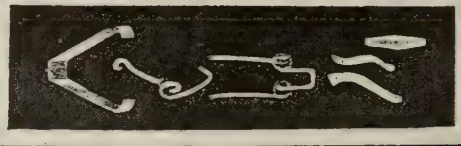
DUNBAR SPRINGS

are dependable springs

We've been making springs since 1845. We've evidently made good. The demand for Dunbar Springs has forced us to put up a big new plant. With better equipment than ever before, we are ready to handle your orders. You might be interested in spiral or flat Vanadium Steel Springs—we've done some good work in this line. If there's anything in small springs or oil tempered Steel Springs of any sizes that you need, it might be well to get in touch with us.



The Dunbar Brothers Co. BRISTOL CONN.

No. 121
Die Adapter

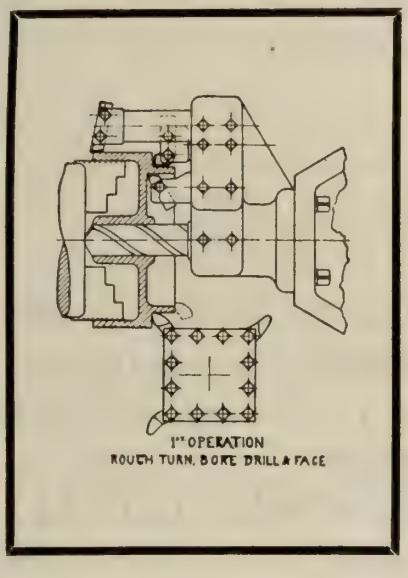
No. 148
Facing Head

Increased Capacity Draw Back Collet with Bushings

No. 147
Multiple Turning Head

No. 138
Single Cutter Turner

No. 144—
Slide Tool



What Would it Mean To You in Dollars and Cents

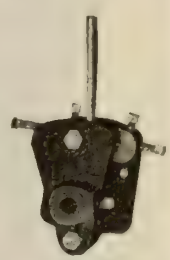
to have five cutters working simultaneously on your work?

That is what is taking place in the first operation on this pulley.

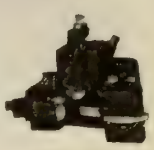
But other things are required also to obtain maximum production and lowest cost. The combination of cutters, speeds and feeds must be correct for the material worked upon; the lip and clearance angles of the cutters must be ground right and the tools must work in the proper sequence.

These are problems for the trained production engineer to solve.

The Foster Engineering staff is at your service. Avail yourself of their skill and knowledge.


No. 155
Recessing and Boring Tool

Scroll Chuck


No. 140
Pointing Tool

No. 142
Center Drilling Tool

THE FOSTER LINE

No. 1-B UNIVERSAL TURRET LATHE
Bar Cap. 2" — Swing over Carriage, 14" over Cross Slide, 8"

No. 2-B UNIVERSAL TURRET LATHE
Bar Cap. 3¼" — Swing over Carriage, 20" over Cross Slide, 13½"

No. 0 PLAIN HEAD SCREW MACHINE
Bar Cap. 7/16" — 10" Swing

No. 1 PLAIN HEAD SCREW MACHINE
Bar Cap. 11/16" — 11" Swing

No. 2 PLAIN AND FRICTION HEAD SCREW MACHINES
Bar Cap. 1 1/16" — 13" Swing

No. 3 PLAIN, FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1 1/16" — 14½" Swing

No. 4 FRICTION HEAD SCREW MACHINE
Bar Cap. 1 3/16" — 17¼" Swing

No. 5 FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1 11/16" — 17¼" Swing

Nos. 6, 7, 8, 9, 10 FRICTION HEAD SCREW MACHINES
Bar Cap. 2 1/16"; 2 5/16"; 2 7/16"; 2 13/16"; 3 1/16" resp. — 20" Swing

No. 2 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1 1/16" — 14" Swing

No. 2 FRICTION SET-OVER TURRET LATHE
Bar Cap. 1 1/16" — 14" Swing

No. 3 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1 3/16" — 16" Swing

No. 3 FRICTION HEAD SET-OVER TURRET LATHE
Bar Cap. 1 3/16" — 16" Swing

THREAD MILLERS
Manufactured under the Holden & Morgan Patents

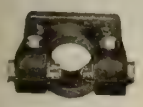
No. 149
Rear Forming Tool Holder

No. 141
Flanged Tool Holder

No. 103 B
Split Bushing

No. 145
Rear Tool Holder

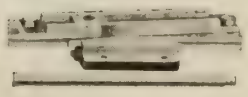
No. 139
Multiple Cutter Turner


No. 143
Knurling Tool

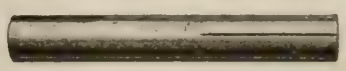
Push-Out Collet with Bushings

Draw-Back Collet with Bushings

No. 103A
Flat Cutter Bushing

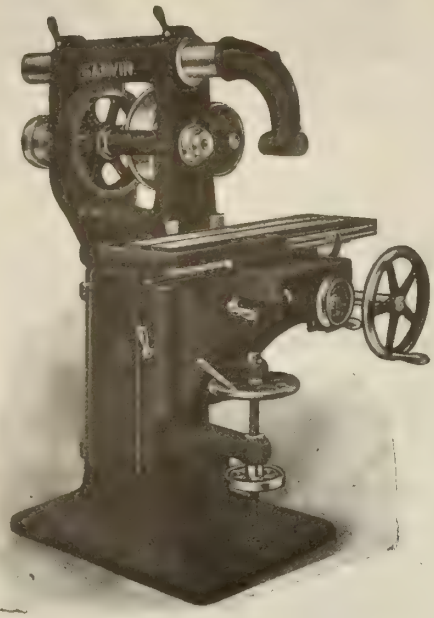

Taper Attachment

No. 102 A
Adapter for Forged Cutters

No. 107C

Pilot Bar

Foster Machine Co., Elkhart, Ind., U.S.A.

GARVIN No. 11 Plain Milling Machine



No. 11 Plain Milling Machine
Use Code . . . . Abode

Adapted to the lightest kinds of small milling and light manufacturing and suitable for jewelers, makers of electrical goods, brass workers, sewing-machine manufacturers and others.

The Features of the Machine Are:

Telescope Arm.
Hardened and ground Tool-steel Bearing for arbor in arm.
Spindle Bearing Taper, with adjustment.
Power Feed driven by vertical worm shaft inside of column, which drives a worm gear clutched to the pinion shaft in the knee.
Feed Works located and protected inside of column.
Quick and sensitive movement of Table by Adjustable Lever and Rack Pinion.
Micrometer adjustments of Knee and Saddle.
Oil Pan around table.
Elevating Screw does not pass through the floor.

Power Feed of Table	12½ in.
In and Out Adjustment	4½ in.
Vertical Adjustment	10 in.
Net Weight, Skidded	600 lbs.

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IMMEDIATE DELIVERIES

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THE GARVIN MACHINE COMPANY

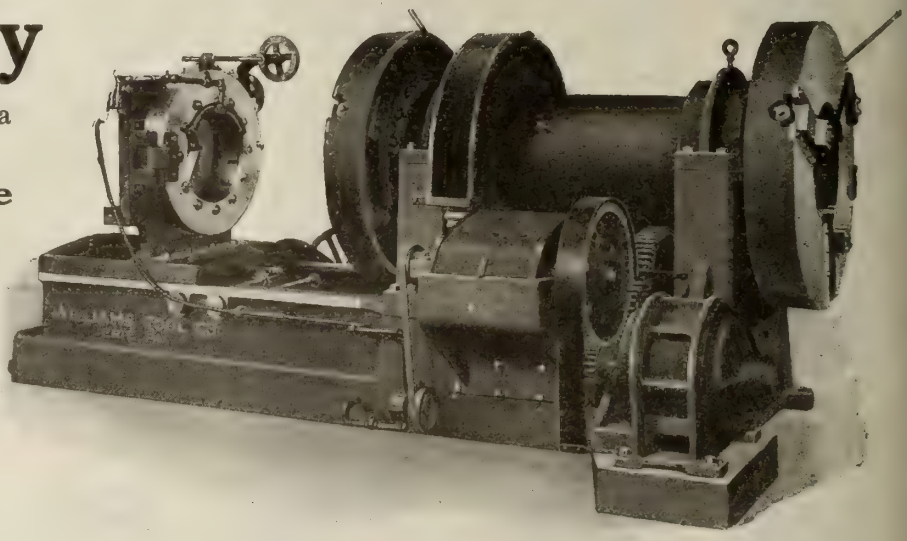
Spring and Varick Streets (*Visitors Welcome*) **50 Years New York City**

Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

Williams Pipe Machine

that's on the job.
For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.
It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.
The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



Write

Williams Tool Company

Erie - Penn. - U.S.A.

Canadian Agents:
The A. R. Williams Machinery Co., Ltd. Toronto Canada

European Agents:
Universal Machinery Corp. London - England

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Classified Index of Oil Handling Equipment

Circulating Systems for Lubricating Oil;
Curb Pump for Oil and Gasoline;
Cutting Oil Reclaiming Systems;
Dry Cleaning Naphtha Storage and Distributing Systems;
Filling Station Equipment;
Filtering and Circulating Systems for Lubricating Oil;
Fuel Oil Systems;
Gasoline Meters;
Gasoline Pumps, Self-Measuring;
Gasoline Tanks;
Hand Pumps for Oil and Gasoline;
Kerosene Pumps, Self-Measuring;
Kerosene Tanks;
Lubricating Oil Filtering and Circulating Systems;
Lubricating Oil Storage Systems;
Lubricating Oil Storage Tanks and Pumps;
Meters for Oil, Kerosene, Gasoline, etc.;
Naphtha Storage and Handling Systems for Dry Cleaners;
Oil Meters;
Oil Pumps;
Oil Storage and Distributing Systems;
Oil Tanks;
Paint Oil Storage and Handling Systems;
Pipe Line Registering Measures (Meters);
Power Pumps for Oil, Gasoline, etc.;
Railway Oil Storage and Handling Systems;
Reclaiming Systems for Oil;
Registering Measures;
Remote Control Systems for Oil and Gasoline;
Rubber Cement Tanks and Pumps;
Self-Measuring Pumps for Oil and Gasoline;
Tanks for Oil, Gasoline, Kerosene, etc.;
Tanks for Underground Storage;
Underground Tanks;
Wheel Tanks for Lubricating Oil and Gasoline.

THERE IS A BOWSER SYSTEM FOR EVERY REQUIREMENT.

Write BOWSER To-day.

Tell us what kinds of oils and how much you use.

Detailed information will be mailed on any particular outfit in which you would be interested. We also offer to you the services of our special engineers in making a survey of your plant and planning a complete gasoline and oil storage system suited to your needs.

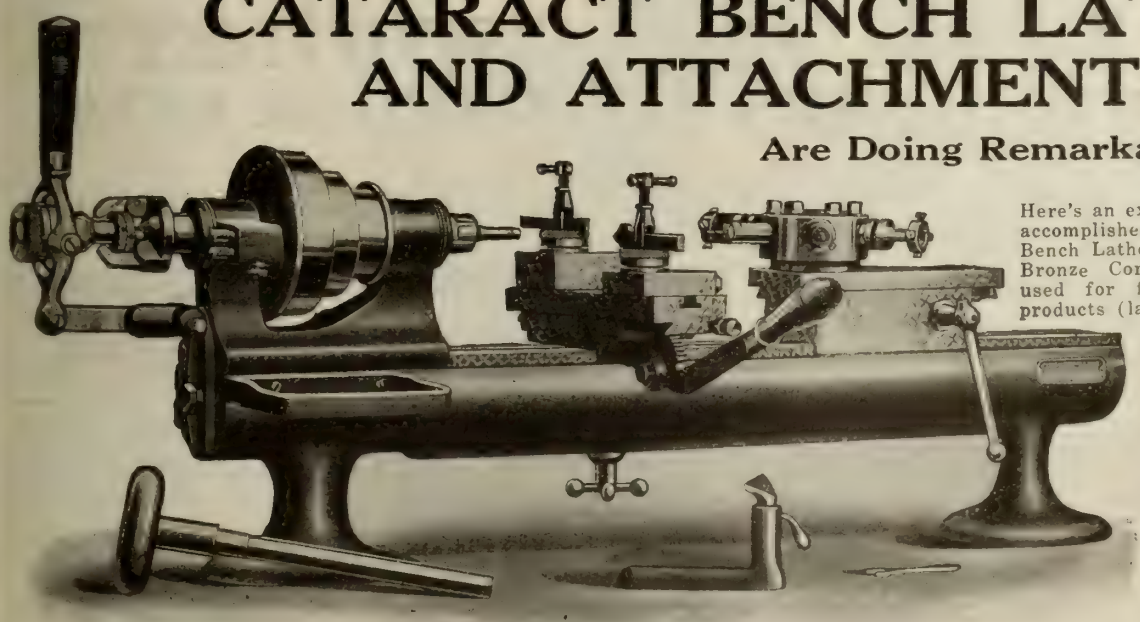
S. F. BOWSER AND COMPANY, Inc., Ft. Wayne, Ind., U.S.A.

Canadian Office and Factory, Toronto, Ont.

LONDON	PARIS	HAVANA	SYDNEY
32 Victoria Street S.W. 1	5 Rue Denis-Poissons	Lonja del Comercio 427	6 Castlereagh Street

CATARACT BENCH LATHES AND ATTACHMENTS

Are Doing Remarkable Work



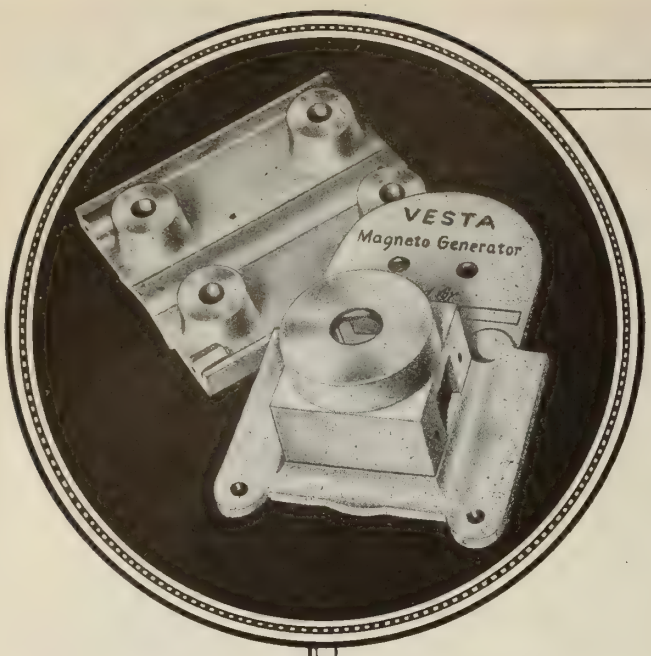
Here's an example of what was accomplished with a Cataract Bench Lathe: In the American Bronze Corporation they are used for finishing Non-Gran products (largely bushings). It is conceded that Non-Gran Bronze with its distinctive, dense, tough quality, is more difficult to machine than many grades of steel. Limits are .005" on length, .002" for flanges and .0005" for diameters and concentricity — .00025" not infrequently required; but no matter how exacting requirements, four "Cataracts" handle the work to complete satisfaction of all concerned.

Cataract Bench Lathes Have Made Good Everywhere

Write for our Catalog

Hardinge Bros., 1770 Bertau Avenue, Chicago, Ill.

ALFRED HERBERT CO., Limited, Coventry, England, are our representatives for United Kingdom, France, Belgium, Russia, Japan, Manchuria, Korea, Formosa, China, Italy.



FRANKLIN DIE-CASTINGS

"Die-Cast It"

Die-castings have solved many a manufacturing problem.

Good die-castings are durable, accurate parts. Where applicable they differ from machined parts only in lower cost and more consistent uniformity. They represent years of intensive study by metallurgists, engineers and designers.

The Franklin Manufacturing Company

originated the die-casting process in America 27 years ago. It has always led the way in perfecting it. Difficult problems have always come to Franklin.

To Canadian manufacturers wishing to speed up production and cut costs with absolutely no loss in the efficiency of their product, the Franklin Manufacturing Company offers the services of its expert metallurgists, designers and engineers.

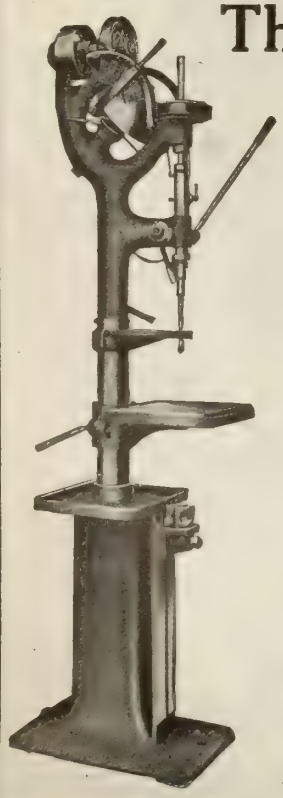
Send samples of blue prints to-day for a report on the practicality of using die-cast parts. Write, too, for Booklet "C" containing interesting facts about die-casting.

Franklin Mfg. Company

746 Gifford St., SYRACUSE, N.Y., U.S.A.

A HIGH SPEED

Tool Room Drill The ALBANY



This light service drill has unique features which put it in a class by itself.

The machine starts rapidly, has quick speed change and unusual facility for changing drills. Accuracy of drilling depth is assured without measuring and all other features of the "Albany" are similarly designed to increase its capacity for quick, accurate drilling up to ½ inch.

Details in Circular

FOREIGN AGENTS: F. W. Horne & Co., Tokyo, Japan, China, Korea. R. L. Scrutton Co., Ltd., Sydney, Australia and New Zealand. Litton's Machine Tool Co., London, England. A. Berthoin, Grenoble, France. V. Lowner, Copenhagen Denmark. Aktiebolaget, Rylander, Asplund, Stockholm, Sweden. Gillespie Bros. & Co., South Africa (New York City). Monti & Oscuro, Milan, Italy.

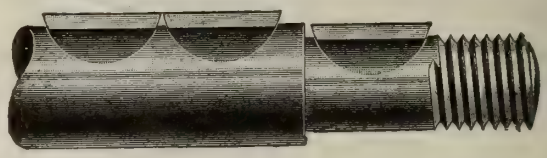
Albany Hardware Specialty Mfg. Co.

ALBANY - WISCONSIN

"WHITNEY" MACHINE KEYS

For the

Woodruff System of Keying



If you are not already using the "Woodruff System" write us at once. Remember that the operations of cutting the Keyseats and inserting the Keys require no skilled labor. Used by all manufacturers to whom economy, rapidity, and interchangeability are essential.

Furnished in our Special Carbon Steel

Furnished in Nickel Steel Heat Treated

The Whitney Mfg. Co.

HARTFORD, CONN.

Chains Keys and Cutters Hand Milling Machines

POTTER & JOHNSTON

AUTOMATIC MILLING MACHINES

HORIZONTAL VERTICAL

EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

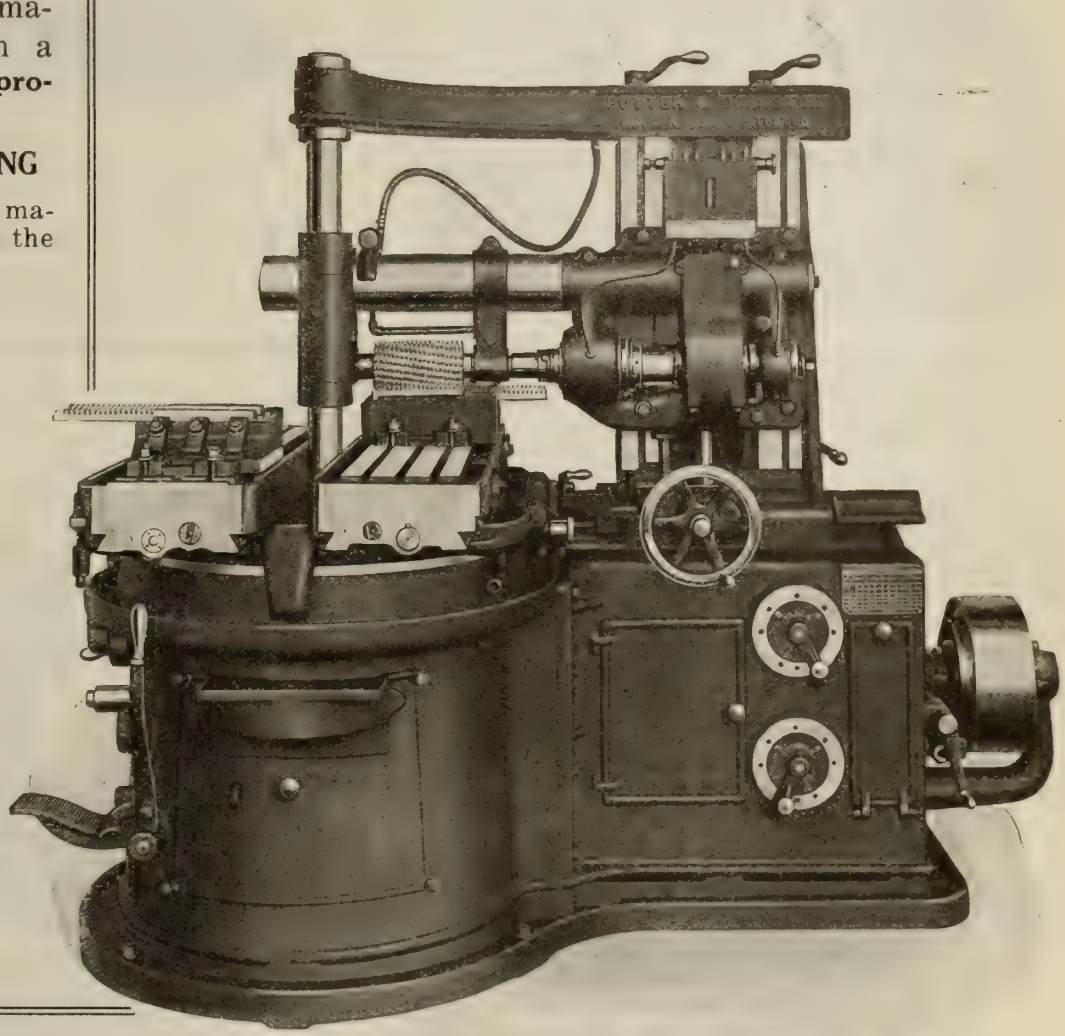
16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches.

12 Spindle Speeds, 20 to 180 R.P.M.

Send us your Blueprints and we'll gladly give you production figures.

Bulletin 36 on application.



Canadian Offices: POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse: Galt, Ont., Canada

FORD TRIBLOC

The Tribloc is the kind of "helper" that will handle any sort of a load quickly, surely and safely. It doesn't lag or slip, doesn't get in the operator's way, doesn't break down on the job. It can do more than a gang could, without the confusion, and in far less time. For shifting massive pieces or placing heavy moulds, it saves time, effort and men.

The planetary gearing, **all steel** working parts and the patented loop hand-chain guide insure strength, durability and safety in operation at any angle or speed. A Tribloc is so efficient and so well made, we guarantee it for five years. You're as safe in buying it as the workmen are in using it.

A Tribloc is the extra "help" you've been needing. Ask for our catalog, which gives details and prices.

FORD CHAIN BLOCK & MFG. CO.

Second & Diamond Sts. PHILADELPHIA, Pa.

OVER-SEAS REPRESENTATIVE
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
120 BROADWAY, NEW YORK, U.S.A.

2150-D

Production of Rare Quality at Lowest Labor Costs

There is unusual strength, accuracy, speed, convenience and range in

AURORA
Drilling Machines

You can use them to great advantage on any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.
Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works

AURORA, INDIANA, U.S.A.

The BARNES DRILLS

TRADE MARK

Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.

Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

Here's Information You Need!

Send for your copy

In view of the modern trend toward welding as a means of labor, time and money saving, and the positive superiority of *ARMCO IRON* filling material, every well posted welding engineer should have this book of valuable information at hand for quick reference.

" Armco Iron Welding Rods and Wire " is not merely a catalog, but treats in a helpful way of the following subjects:

Requisites of a desirable filling material.

Welding of mild steel and wrought iron.

How and why the new American product ARMCO IRON surpasses the now unobtainable genuine Norway and Swedish irons as a welding material.

How a single composition of ARMCO IRON supplants a large number of compositions of other welding materials.

Analysis and physical tests of ARMCO IRON.

Typical examples and illustrations of welding done with ARMCO IRON.

Emergency Fleet Corporation specifications for welding wire.

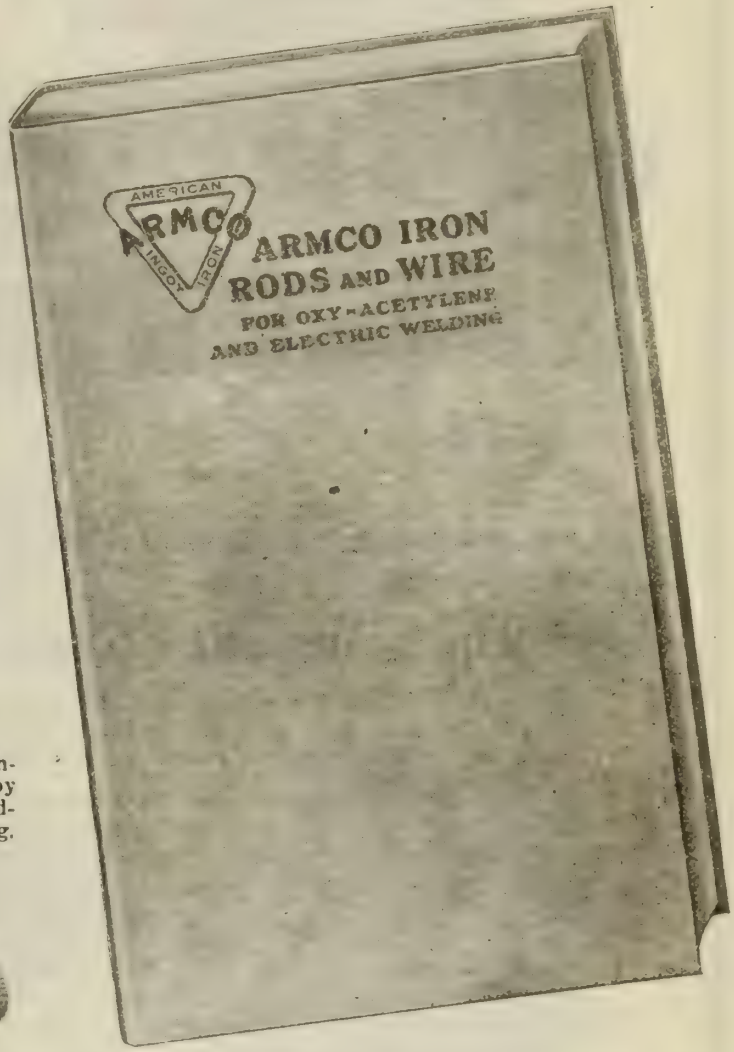
Microscopic study of steel and iron with reference to welding.

Cost cards for keeping tab on welding jobs.

Metallurgy of iron and steel, including color chart for heat treatment.

Miscellaneous useful data including tables of wire gauges, conversion of temperatures from Fahrenheit to Centigrade, properties of elements and metal compositions, decimal equivalents, metric conversion tables, definitions of electrical units, mensuration factors.

If you are a consulting, designing or managing engineer, shop superintendent or foreman, your free copy is ready for mailing on request, and the engineering advice of our welding specialists is also free for the asking.



PAGE STEEL & WIRE CO.

Established 1883 as Page Woven Wire Fence Co.

Makers of "Copperweld" Copper Clad Steel Wire; ARMCO Iron Welding Rods and Electrical Wire; Wire Mill Products, Plain and Galvanized; Wire of Special Analysis; Wire Fencing for all Purposes; Factory Gates; Ornamental Iron Fence; Machine Guards; Tool and Stockroom Partitions; Architectural Iron.

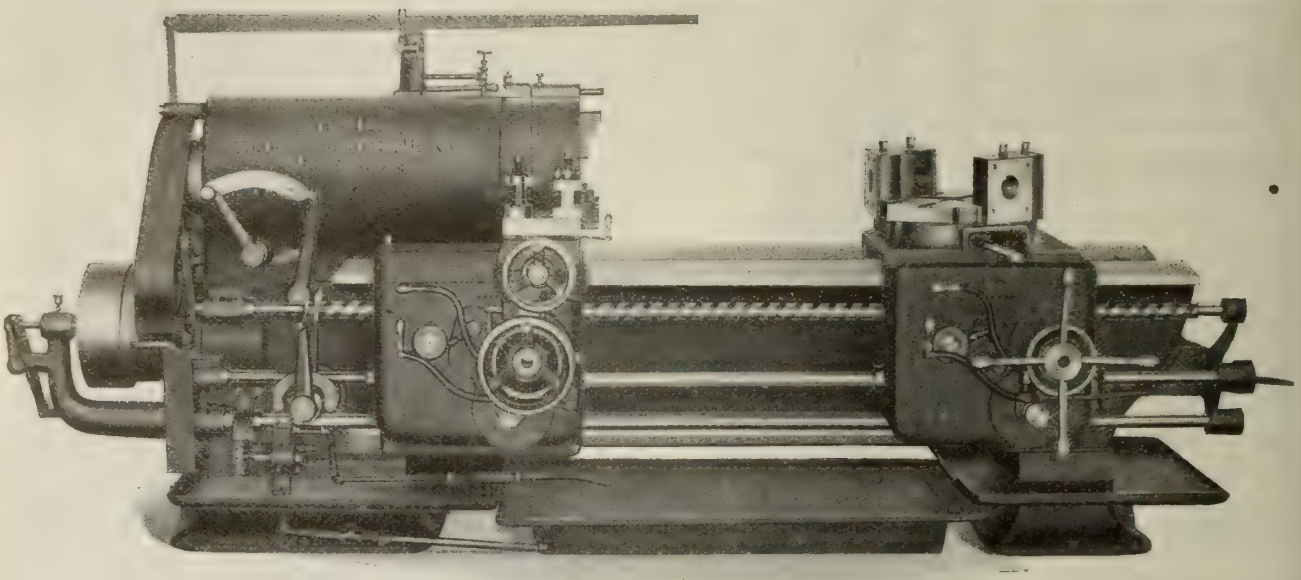
Plants: Monessen, Pa. and Adrian, Mich.

Sales Offices: 30 Church Street, New York

Western Representatives: Steel Sales Corporation, Chicago

STEEL AND WIRE PAGE QUALITY PRODUCTS

STEINLE



One of the reasons why the Steinle 24″ Full Swing Side Carriage Turret Lathe is ahead of all others in the economical and accurate production of many classes of work.

The Constant Power Single Pulley Drive

This feature insures the same amount of power being delivered to the machine at all times. It does away with power losses due to variation in the amount of belt contact always in evidence when cone pulleys are used.

One belt furnishes power for all functions of the machine. As long as this one belt is kept in proper condition the operator never has trouble with the power traverse of the carriages or pump, as the power for operating these features is derived from the main drive through geared connections and not through belts.

No countershaft to oil or get out of kelter.

Consider the advantages: ONE BELT direct from line shaft or motor, Thirty Reversible Spindle Speeds, Power Traverse for Both Carriages, Independent Feed for Both Carriages, Cutter Lubricant Pump, ONE BELT.

The operator can give all his attention to the cutting tools, feeds and speeds, resulting in more and better work.

There are more good reasons why the Steinle 24″ Full Swing Side Carriage Turret Lathe is ahead of all others in the economical and accurate production of many classes of work. We will give these reasons in future advertisements in this Journal. Watch for them. They will be interesting to you.

STEINLE TURRET MACHINE CO.

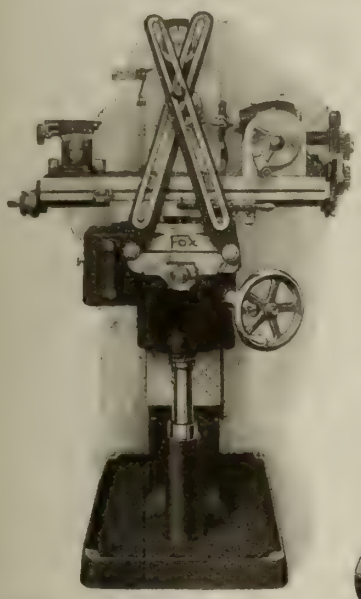
MADISON - - WISCONSIN, U.S.A.

TRADE **FOX** MARK
REGISTERED

MILLING MACHINES

FOR

Rapid Production of Motor Parts

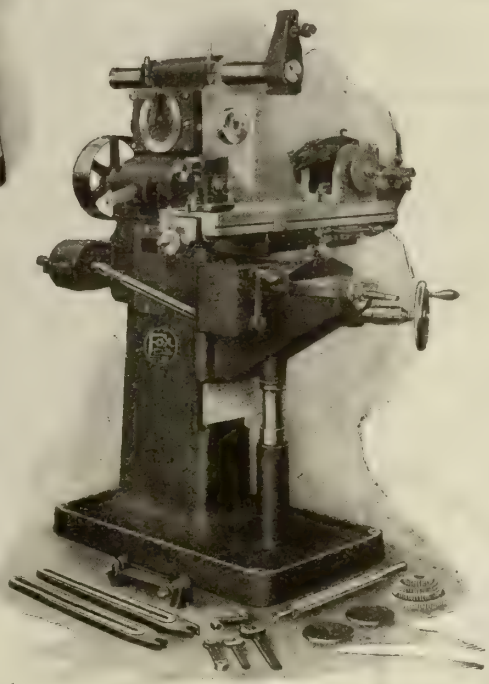


The **demand** for increased production **requires tools** of **great strength** and **durability;** the Fox 2-A Universal Milling Machine illustrated has met this demand, and is being used wherever extreme accuracy and quantity production are required.

The machine has a universal table, spiral cutting attachment, 10″ Dividing Head with 6″ Universal Chuck, making it a machine **especially adapted for Tool Room Work.**

The **United States Government** used this machine in its various **repair shops** for **Aeroplane Motors.**

You should be using this tool to help the production of parts necessary for reconstruction.



Specifications—No. 2-A Miller.

Spindle speeds 12
From 21 to 423 r.p.m.

Table feeds 6
From .317″ to 2.79″ per min.

Table .....8½ x 27″
Long. feed (power) 26″.
Vertical feed (hand) 13″.
Trans. feed (hand) 8½″.

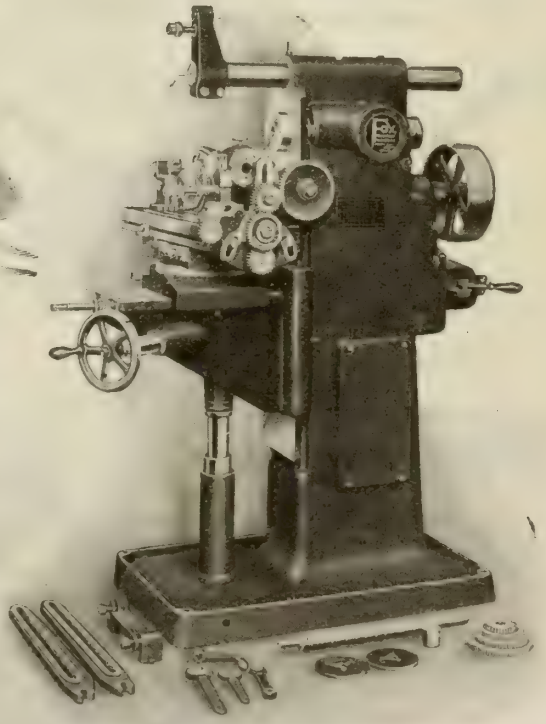
Drive...Single pulley 10 x 3″ running 250 r.p.m..

Gears — Hardened steel.
Weight .....1,500 lbs.

We build this same machine with a plain table, omitting the spiral cutting attachment and Dividing Head.

Our No. 1 type machine has a four-step cone drive, and while being a lighter machine is a "bear" for work. This was proven by **the hundreds** of **them in** the **largest munitions plants.**

We also build the Fox Multiple Spindle Drilling Machines.



FOX MACHINE COMPANY
1047 W. Ganson St., Jackson, Michigan, U.S.A.

Keep the Wheels of Production Turning

Today every production minute is vital. If production is to reach its maximum, the waste minutes must be saved. Lacing a belt only twice a year at an average of ten minutes time —some methods take half an hour—multiplies into a huge production loss, throughout industrial America. Old-fashioned, obsolete belt lacing methods must go.

The Clipper Belt Lacer
Laces a Belt in Three Minutes

Any machine workman can lace a belt instantly with the Clipper. The low cost of the Clipper lacing tool makes possible immediate lacing—no running around the plant or calling for an expert.

The Clipper makes a durable and perfect joint — one that pulls better and is safer—is flush with the belt on both sides and is more flexible than the belt itself.

The Clipper goes to you for free trial.

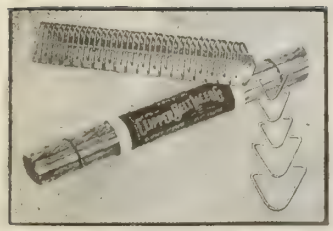
It is perpetually guaranteed where Clipper hooks are used.

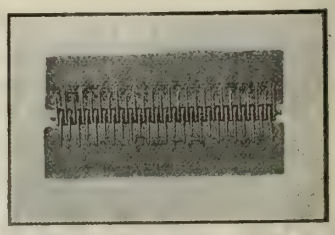
The American Museum of Safety gave the Clipper the only gold medal ever awarded for metal lacing.

The use of the Clipper in your plant will solve effectively your belt lacing problems.

Clipper belt lacing predominates in every manufacturing center in the world

Some mill supply dealer in every city sells the Clipper





Clipper Belt Lacer Company

·GRAND RAPIDS·
·MICHIGAN·U·S·A·

A Time Saver— Can You Beat It?

HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, when properly tightened, will not break away, or slip.

If you break it we will furnish a new one free of charge.

Consolidated Press Company

HASTINGS *LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.* MICHIGAN

Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver

Cool Shop This Summer

If You Use

EONOMIZER FORGE

IT is economical in power; protects workmen from flames and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into forge shop.

Write to-day for catalog 34-T

W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors

50 Church Street New York

(Hudson Terminal Bldg.)

Canadian Representative: R. J. McLean
128 Bleury St., Montreal, Canada.

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.

Rivet Heater

For

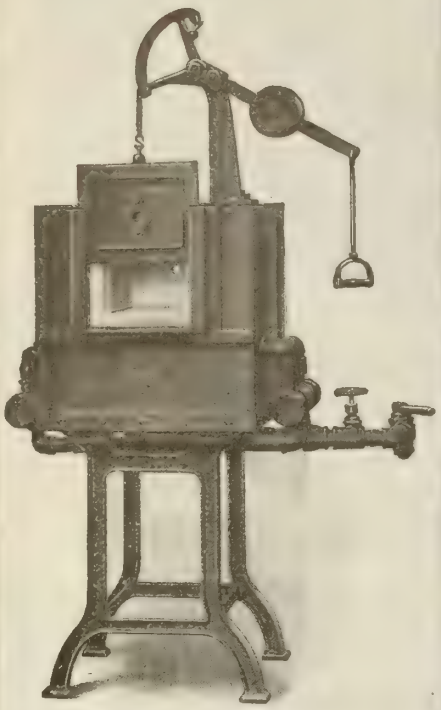
Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting

Toronto Office:

STANDARD FUEL ENGINEERING CO.

W. H. KIRK, Manager
909 Excelsior Life Building
Phone: Main 385

STANDARD FUEL ENGINEERING CO. DETROIT, MICH.



TYPE K HIGH SPEED STEEL FURNACE

The Right Furnace for High Speed Steel

Too much—too little or an uneven heat treatment of High Speed Steel renders it practically worthless for the purpose intended.

This Gilbert & Barker furnace has been designed especially for the correct heat treatment of High Speed Steel. A temperature of 2400°F. is quickly obtained and **easily maintained.** The heat is uniform on all sides of the work and loss by radiation is reduced to the minimum by special insulation.

More than 50 years' experience in designing and building furnaces, especially for the accurate and economical heat treatment of metals is your guarantee of satisfaction.

PROMPT DELIVERY ON G. & B. FURNACES

Recent additions to our plant, already one of the largest in this field, makes it possible to offer immediate shipment of your order.

Tell us your problem and we will tell you the type of furnace you require, but first send for Bulletin 24. To-day is a better day than to-morrow--write.

Gilbert & Barker Mfg. Co.

West Springfield, Mass., U.S.A.

Canadian Agents: Williams & Wilson, Montreal, Que. New York Office, 26 Broadway.

GILBERT & BARKER MFG. CO. G&B SPRINGFIELD, MASS. U.S.A. EST. 1865

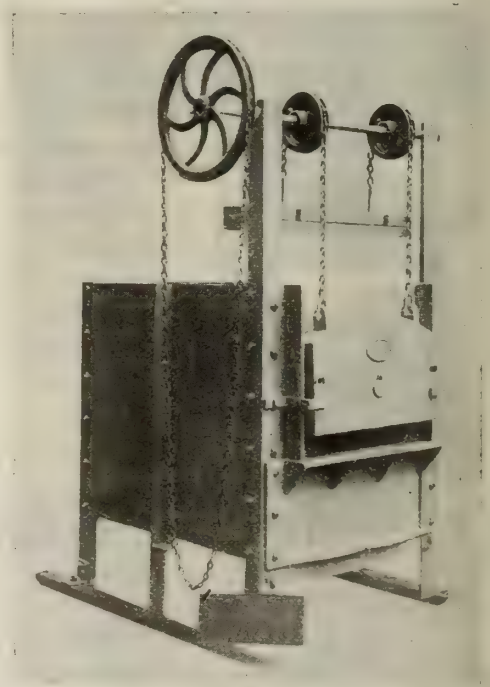
Do These Advantages Appeal

To Your Sense of Economy and Efficiency?

OIL FURNACE
VERSUS
COAL FURNACE

It's economy — requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. *Can you afford to lose the Advantages of this oil Furnace?*

Write To-day for Full Particulars.



Mechanical Engineering Company,
Limited
Three Rivers, Que., Can.
Cable Address: *"Mecol"*

"After the Fire"

"OAKITE saved these brass parts from the scrap pile.

"When the shop burned down, these parts were in the hottest part of the fire. The oil was baked on to them so hard that we could not remove it by scrubbing or soaking in all kinds of acids.

"And just when we were ready to scrap them, one of those Oakite men came in here, and said he could clean them with Oakite.

"And he did.

"Just look at those parts now—good as new!"

This Advertisement is one of a series based on actual occurrences.

OAKITE MANUFACTURED BY OAKLEY CHEMICAL CO. 44 THAMES STREET · NEW YORK

ANGULAR GRIT

Saves Labor
Saves Time
Saves Costs

One ton of Angular Grit equal carloads of sand

Quicker and Better

ANGULAR GRIT offers you the most advanced and economical method of cleaning castings, etc. Its angular and irregular cutting points clean raw castings and forgings more thoroughly and with greater speed than either sand or shot.

ANGULAR GRIT dispenses with sand bins and sand dryers, and there is no dust nuisance where it is used.

If you are using sand, think of the labor you can save by adopting ANGULAR GRIT in its place.

Used for all kinds of cleaning operations—best materials for cleaning shells. Prove its superiority by giving it a trial.

Pittsburgh Crushed Steel Co.
Established 1888
Pittsburgh, Pa., U.S.A.

Canadian Representatives:
Williams and Wilson Ltd., Montreal, P.Q.

We make **Machinery Guards** of all kinds.

Metal Lockers for Clothes.

Steel Shelving for all purposes.

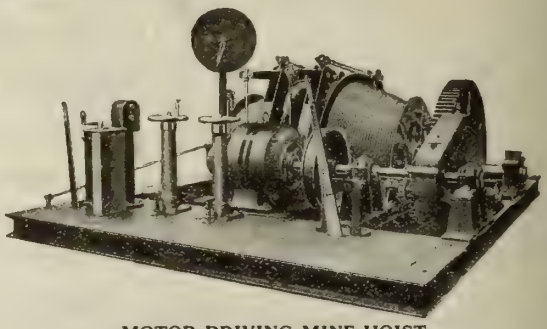
Drop a line for full details

Canada Wire & Iron Goods Company
Hamilton Ontario
Eastern Representative:
H. E. O. Bull, 184 Mance St., Montreal, Que

LANCASHIRE MOTORS

HAVE WORLD WIDE REPUTATION FOR

"RELIABILITY"



MOTOR DRIVING MINE HOIST

Specialists in Motor Manufacture and Application

SEND YOUR ENQUIRIES TO

The Lancashire Dynamo & Motor Co., of Canada, Limited

Head Office and Works
45 NIAGARA ST.
TORONTO

Branch Office
602 NEW BIRKS BLDG.
MONTREAL

At Your Service

Let Us Quote on Your Contract Work

Our Staff is always available for Consultation.

PATTERNS
CASTINGS
FORGINGS

And Machine Work of all Kinds

VICTORIA FOUNDRY CO., LIMITED
OTTAWA CANADA

PUNCH PRESS WORK

What Can You Save?

By Using Parts Made in the Punch Press

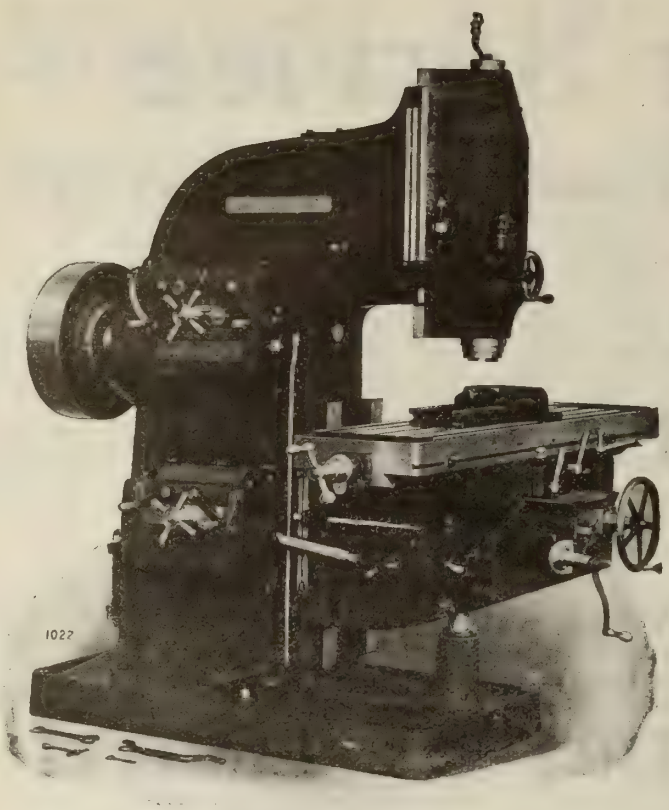
Look over your standard parts, Mr. Manufacturer, and see what parts can be made (or could be made by slight change in design) by this process.

You will be surprised at the saving you can effect.

We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

A Battery of presses is also available at our plant to manufacture parts for you with the understanding that you pay only for good parts made. Our facilities ensure prompt deliveries at right prices.

W. H. BANFIELD & SONS LTD
370-386 PAPE AVE., TORONTO.



CINCINNATI VERTICALS

UNUSUAL SPINDLE POWER. HEAT TREATED ALLOY STEEL HARDENED GEARING.

MASSIVE SPINDLE HEAD CONSTRUCTION.

HANDY-CAN MILL AROUND A RECTANGLE WITHOUT STOPPING FEED OR SPEED.

These are some reasons why you should use CINCINNATI VERTICALS.

The Cincinnati Milling Machine Co.
CINCINNATI, OHIO.

Canadian Agents:

H. W. Petrie, Ltd	Toronto, Ont.
H. W. Petrie, of Montreal Ltd.	Montreal, Que.
General Supply Co., of Canada	Winnipeg, Man.

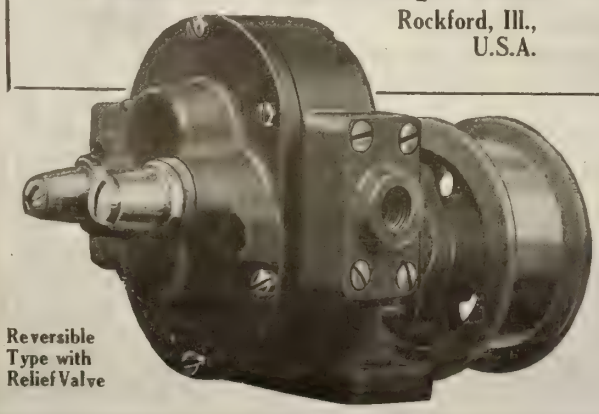
NO PULSATION

TRAHERN lubricating pumps are Rotary Geared. This type of construction insures a steady even pumping movement, in either direction, which forces a copious stream of lubricating coolant into the deepest cuts. The stream is forced from the pump in an even flow, absolutely free from pulsation.

This steady flood of coolant increases the efficiency and prolongs the life of your equipment and insures a higher grade of work turned out at lower cost.

Trahern Pump Co.

Rockford, Ill., U.S.A.

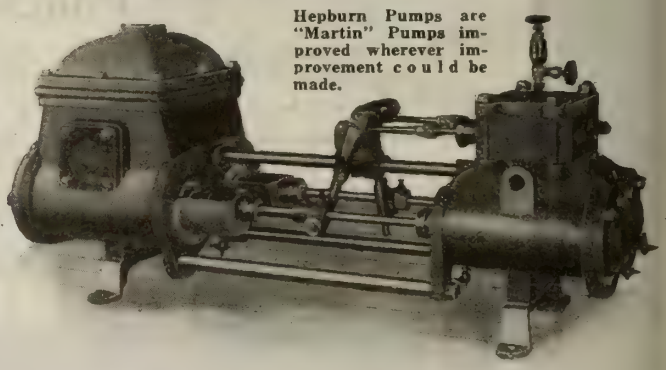


Reversible Type with Relief Valve

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



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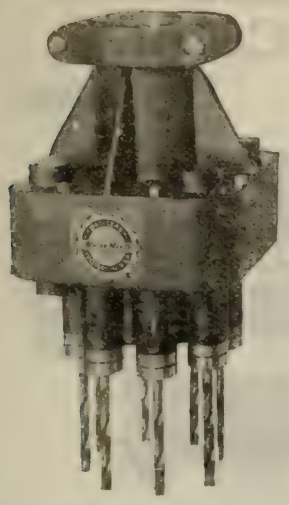

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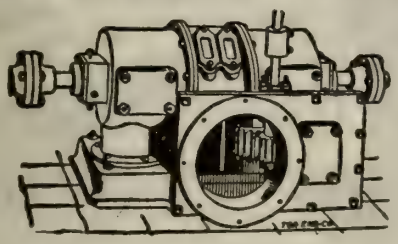

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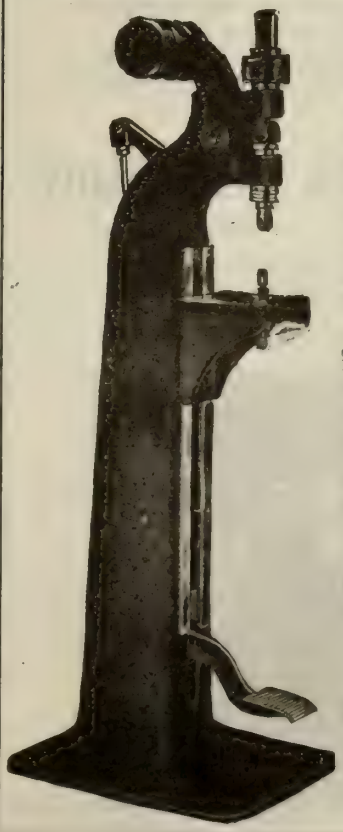

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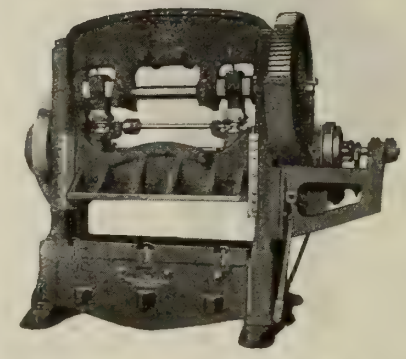

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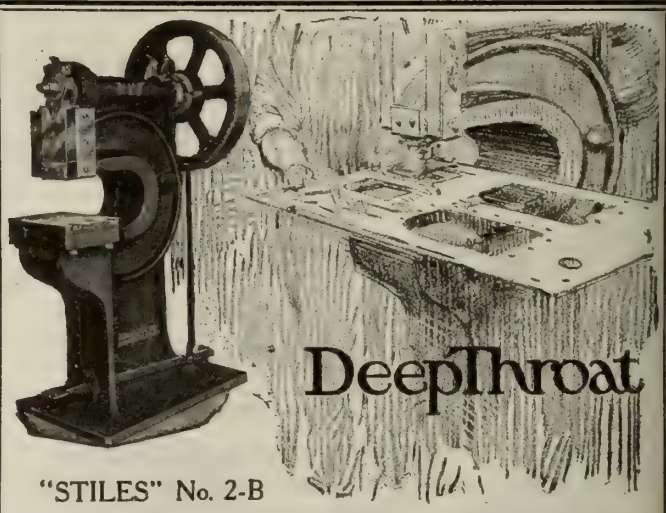

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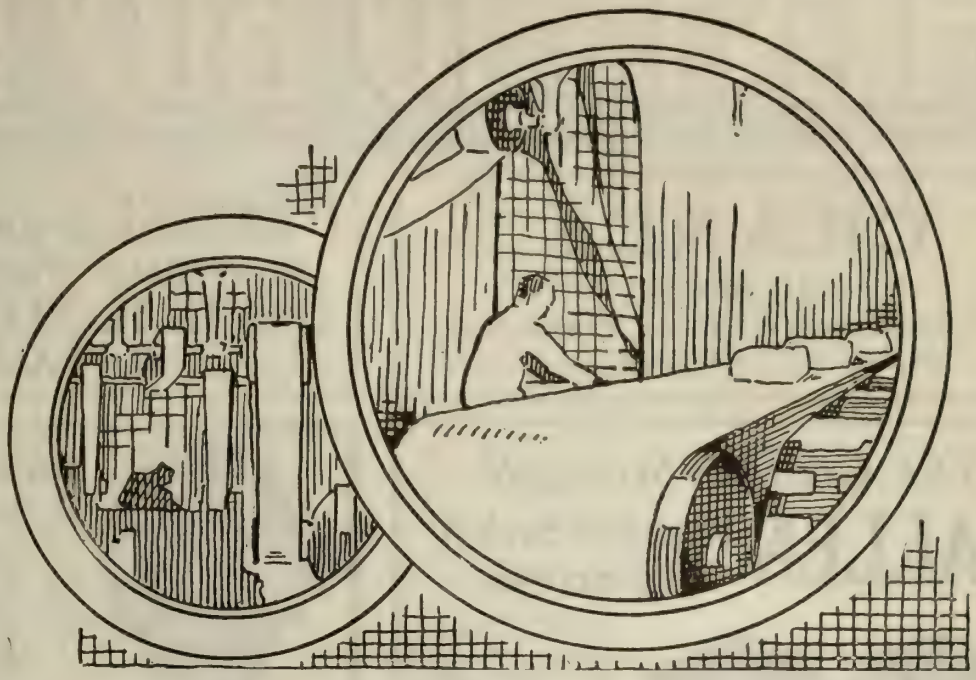

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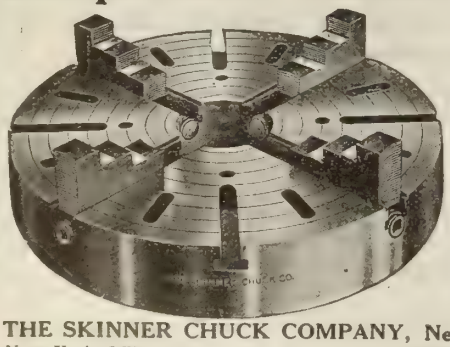

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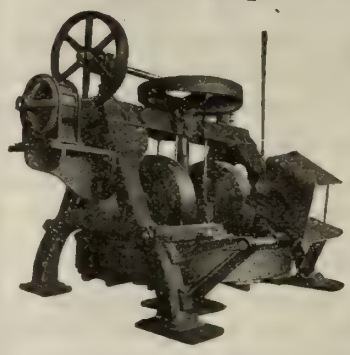

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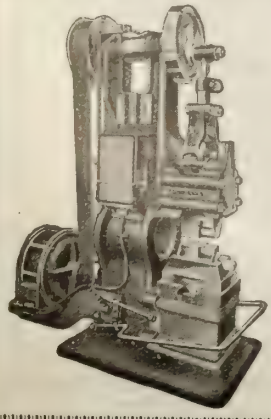

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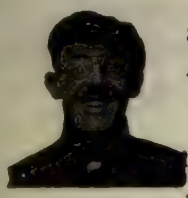

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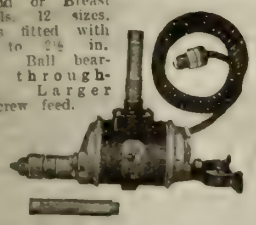

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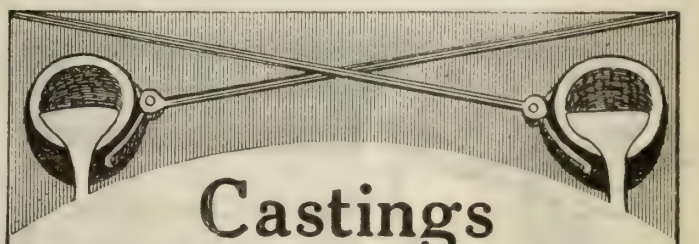

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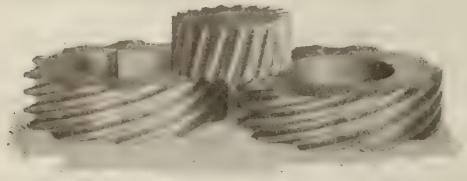

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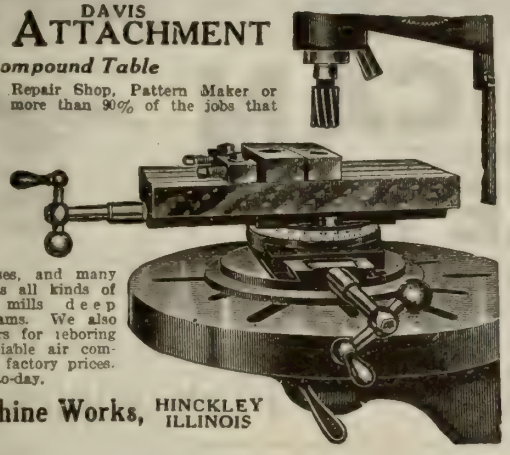

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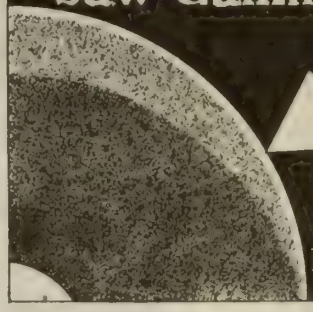

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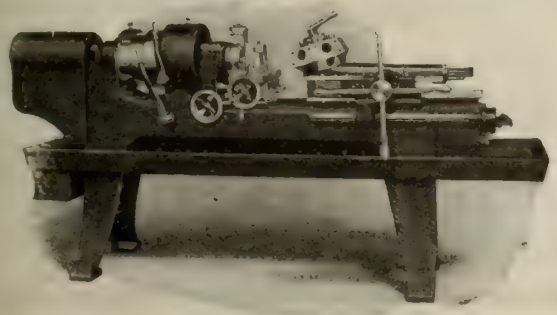

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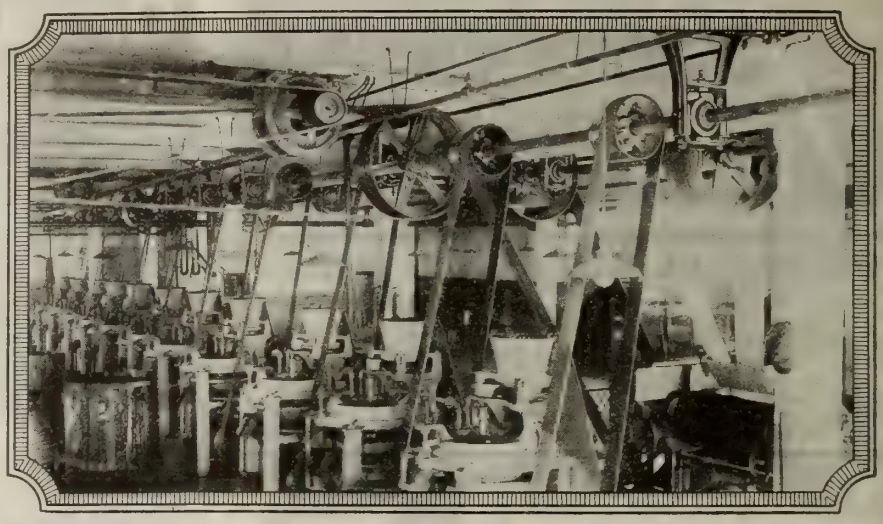

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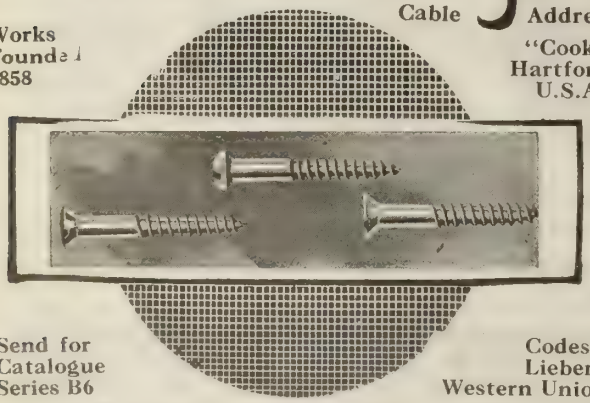

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ALLOY, STEEL
Armstrong, Whitworth, of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal Que.
Firth & Sons, Thos., Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hewkridge Bros. Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Standard Alloys Company Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa

ALTERNATING CURRENT, ELECTRIC WELDING EQUIPMENT
Arcwell Corporation of Can., Toronto, Ont.

ARBORS
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
J. C. Wilson & Co., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Co., Walkerville, Ont.
Sheldons Ltd., Galt, Ont.
Pangborn Corporation, Hagerstown, Md.

AUTOGENOUS WELDING AND CUTTING PLANTS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

AUTOMATIC MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
National Acme Co., Cleveland, O., and Windsor.
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto, Can.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

AUTOMATIC METAL CUTTING-OFF MACHINES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.

AUTO SHEET METAL MACHINERY
Quickwork Co., St. Marys, Ohio.

BABBITT METAL
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto
Rochester Ball Bearing Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BALLS, STEEL
Boker & Co., Inc., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Katie Foundry, Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Williams & Wilson, Limited, Montreal, Que.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie, Ont.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BEADING MACHINES
Quickwork Co., St. Marys, Ohio.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BEARINGS, HIGH SPEED, OR HEAVY DUTY BRONZE
Wentworth Mfg. Co., Hamilton, Ont.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Can. Consolidated Rubber Co., Ltd., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

BELTING, CONVEYOR
Can. Consolidated Rubber Co., Ltd., Montreal.
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BELTING, FRICTION AND SURFACE
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal, Que.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, WOVEN
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENCH LEGS, STEEL
New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

BENDING ROLLS (PLUTE & AUGH)
Wickes Bros., Saginaw, Mich.

BENDING MACHINERY
Bertram & Sons Co., John, Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BLASTING MACHINES, SAND
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio
Williams & Wilson, Limited, Montreal, Que.

BILLET MARKERS
Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste Marie, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BLOW PIPES AND REGULATORS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.

BLUE PRINTING MACHINERY
Commercial Camera Co., Province, R.I.
Mulliner-Edlund Tool Co., Syracuse, N.Y.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que.
Joyce, Koebel & Co., Inc., New York.

BOLT CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Riverside Machinery Depot, Detroit, Mich.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BOLTS, SPRING SHAKE
Can. Winkley Co., Ltd., Windsor, Ont.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto.

BOLT THREADING MACHINERY
Jardine & Co., Ltd., A. R., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Canadian Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Gisholt Machine Co., Madison, Wis.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland, Ohio.
New Britain Mach. Co., New Britain, Conn.

BRAKEBAND LINING CUTTERS
Peck, Stow & Wilcox Co., Southington, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland, Ont.

BRASS AND COPPER BARS, RODS

BRAKES, CORNICE
Peck, Stow & Wilcox Co., Southington, Conn.

AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.
Tallman Brass & Metal Co., Hamilton, Ont.

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co. Inc., Toronto, Ont.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BRICKS, FIRE
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

BRIDGES, RAILWAY AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.

BRONZE, COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville, Ont.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananoque, Ont.

BUSHINGS, BRONZE
Oberdorfer Brass Co., M. L., Syracuse, N.Y.

CALIPERS
Peck, Stow & Wilcox Co., Southington, Conn.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CALKS, BOOT
Lufkin Rule Co. of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Ferrante Mach. Co., Bridgeton, N.J
Brown, Boggs & Co. Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBONIZING BOXES
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal.

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CASTINGS, MACHINERY
Winnipeg Iron Foundry Co., Winnipeg.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.
Wentworth Mfg. Co., Hamilton, Ont.

CARRIERS
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Fittings, Ltd., Oshawa, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Walkerville, Can.

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
Fittings, Ltd., Oshawa, Ont.
International Malleable Iron Co. Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice, Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto
Williams & Wilson, Limited, Montreal, Que.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont
Whiting Foundry Equipment Co., Harvey, Ill
Williams & Wilson, Limited, Montreal, Que.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

COKE AND COAL HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

Only a Drawing-in Bolt Required to Hold Arbors and Collets

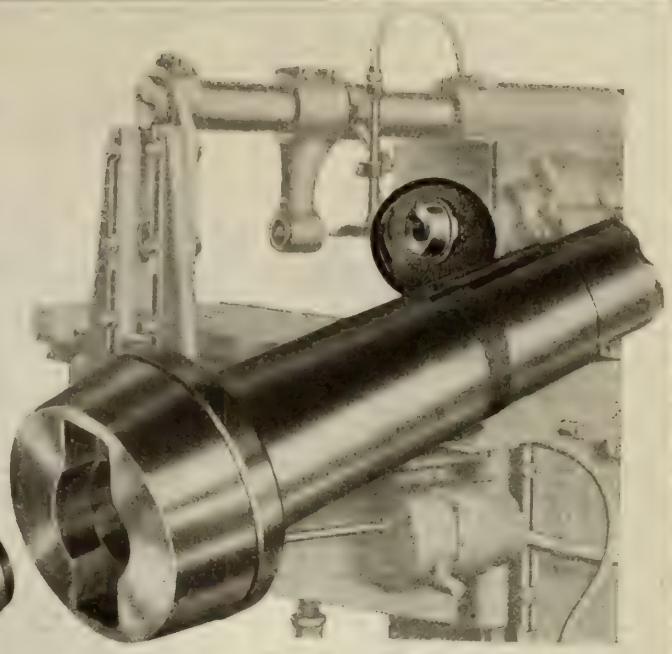
Clutch on arbor or collet fits recess in spindle and drawing-in bolt securely holds arbor or collet in place. This construction does away with plates, screws and loose parts; and as illustration shows

No Drive Could be More Positive

The spindles of Brown & Sharpe Milling Machines are but one of the many features of these easy-to-operate, productive machines. Let us tell you about them in detail. See for yourself why they are so well equipped to stand the steady drive of your busy shop.

All Brown & Sharpe arbors have a shank as large in diameter as the largest standard arbor of the same taper.

Nose of Spindle Free From Projecting Parts



Brown & Sharpe Mfg. Co.
PROVIDENCE, R.I., U.S.A.

Canadian Representatives:
The Canadian Fairbanks-Morse Co., Ltd., Toronto, Montreal, Winnipeg, Calgary, Vancouver, St. John, Saskatoon.

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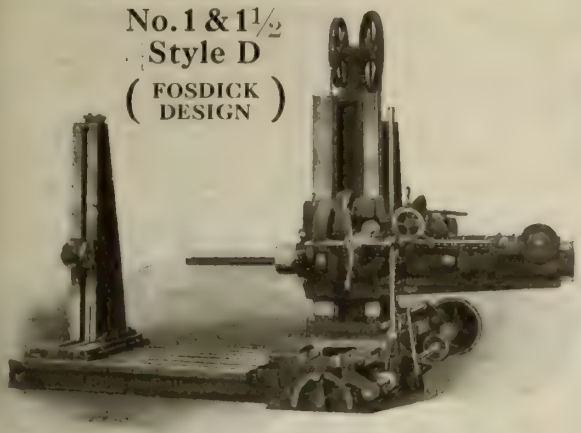
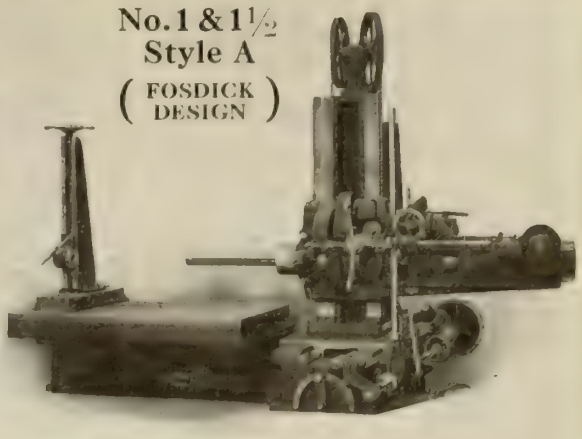
No. 1 & 1½
Style D
(FOSDICK DESIGN)



G&L MACHINE TOOLS

No. 1 & 1½
Style A
(FOSDICK DESIGN)



Size of Machine	No. 1	No. 1½
Diameter of spindle	3½"	4"
Morse taper No.	5	6
Traverse of spindle	28"	30'
Vertical adjustment of head	36"	64'
Horizontal adjustm't of column	36"	62"
Maximum, work bed to center of spindle (Style D)	44"	62"
Size of work bed	42" x 72"	42" x 120"
Size of Machine	No. 1	No. 1½

Speeds (4 to 255 R.P.M. geometrical progression)	12	12
Feeds, in all directions (.007 in. to ¼ in. per revolution)	8	8
Motor horse power	7½	10
Floor space	9' x 15'	11' x 19'
Total height of machine	8' 9"	10' 3"
Net weight (Style A machine)	16,000 lbs	21,000 lbs
Net weight (Style D machine)	15,000 lbs	19,500 lbs

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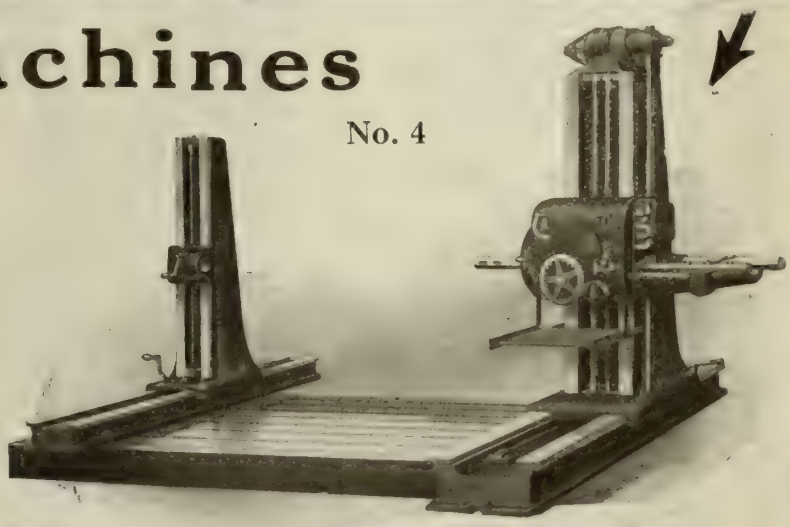
No. 4



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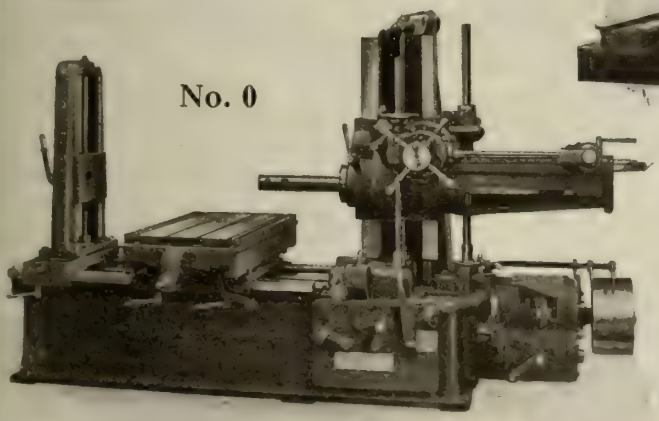

NO. "4" FOR BIG WORK

Diameter of spindle	5
Size of hole in spindle	No. 6 Morse
Size of floor plate	8' x 12"
Floor space required	16' x 24' 6"
Weight	50,000 lbs.

NO. "0" FOR PRECISION WORK

Diameter of spindle bar	3⅛ in.
Spindle bored to fit Morse Taper No.	5
Longitudinal travel of spindle	26 in.
Vertical adjustment of head on column	25½ in.
Size of table	24 in. x 50 in.
Traverse travel of table	30 in.
Longitudinal travel of table	32 in.
Approximate net weight	9,500 lbs.

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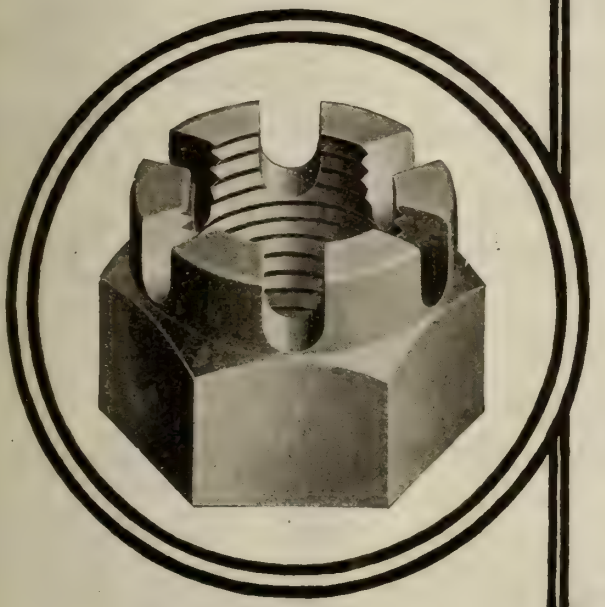

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Can. Matthews Gravity Carrier Co., Toronto, Ont.
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Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
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Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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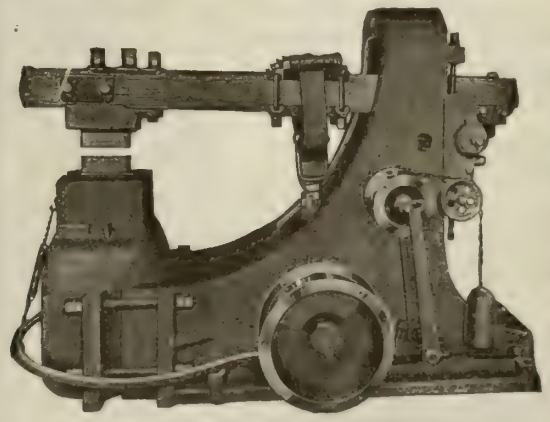

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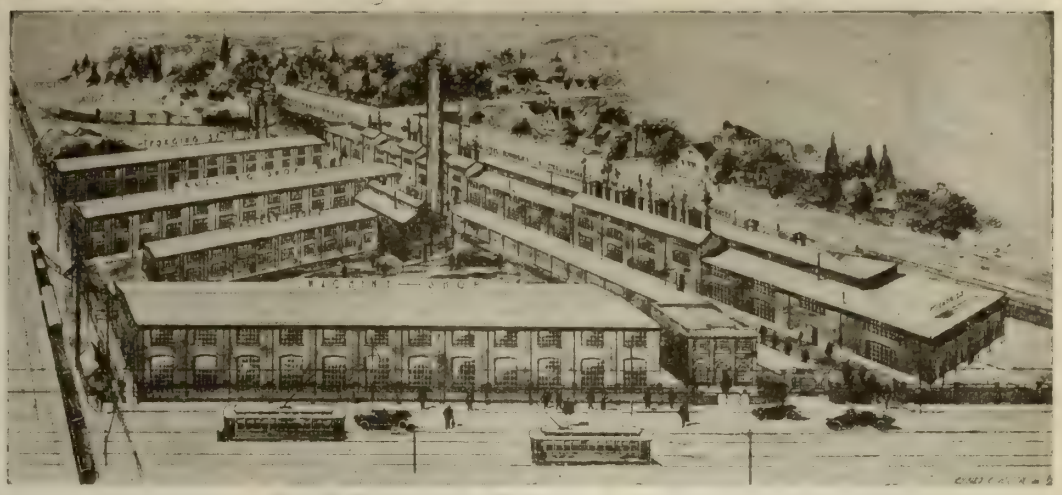

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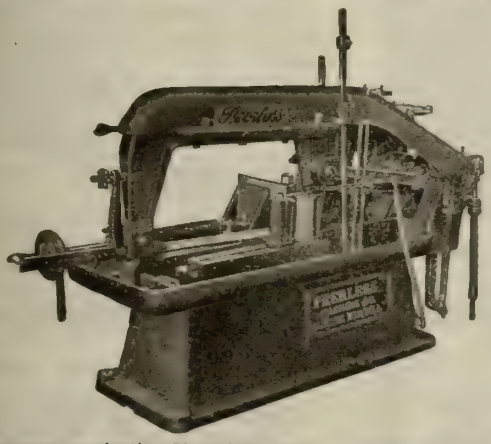

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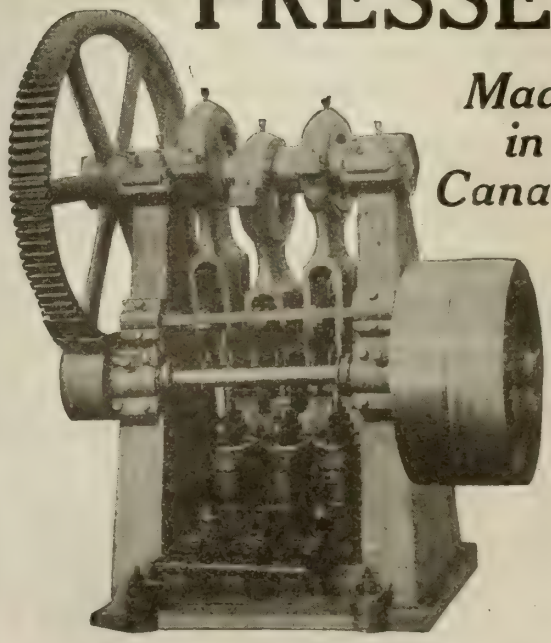

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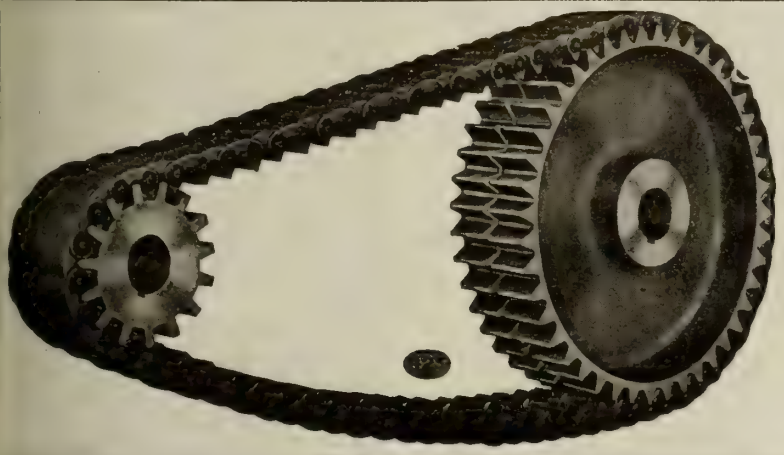

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Pratt & Whitney Co., Dundas, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER AND SELF-FEEDING
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, CHUCKING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, TAPER, BRIDGE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIPE, SHELL
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REELS, WIRE AND TEXTILE MFG.
American Pulley Co., Philadelphia, Pa.

REGULATORS, AUTOMATIC
Electric Steels & Metals, Ltd., Welland, Ont.

REGULATORS, PRESSURE TEMPERATURE
Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.
F. B. Shuster Co., New Haven, Conn.

ROAD BUILDING EQUIPMENT
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

RODS
General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich.

ROLLER CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Limited, Montreal, Que.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont.

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

RULES, STEEL, STRAIGHT AND FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOXWOOD, FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOARD AND LONG
Lufkin Rule Co. of Can., Windsor, Ont.

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

SAND BLAST MACHINES
Pangborn Corporation, Hagerstown, Md.

SAND BLAST SUPPLIES AND ACCESSORIES
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
Pangborn Corporation, Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SASH WEIGHTS AND WRENCHES
Fittings, Ltd., Oshawa, Ont.

SAWS, CIRCULAR METAL
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAW SHARPENERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

SAWS, SLITTING
Taylor, J. A. M., Stair Bldg., Toronto, Ont.

SCALES, MECHANICS'
Lufkin Rule Co. of Can., Windsor, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City

SCREENING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

SCREW MACHINE PRODUCTS
Galt Machine Screw Co., Galt, Ont.
Knight Metal Products, Ltd., Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

SCREW MACHINES, HAND, AUTOMATIC
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
H. C. Dodge, Inc., Boston, Mass.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que.

SCREW MACHINES, AUTOMATIC MULTIPLE SPINDLE
H. C. Dodge, Inc., Boston, Mass.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.

SCREWS
Can. B. K. Morton, Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SCREW SLOTTERS
Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Williams & Wilson, Limited, Montreal, Que.

SEPARATORS, MOISTENERS AND OIL FOR COMPRESSED AIR
Pangborn Corporation, Hagerstown, Md.

SELF-OPENING DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

SEPARATORS, SAND
Pangborn Corporation, Hagerstown, Md.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn., U.S.A.
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Rhodes Mfg. Co., Hartford, Conn.
Stentoe Co., John, Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

SHAFTING
Algoma Steel Corp., Sault Ste. Marie, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Jones & Glassco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

SHARPENING STONES
Norton Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas
Bertrams, Ltd., Edinburgh, Scotland
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

SHEARS, POWER
John Bertram & Sons Co., Dundas
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
A. B. Jardine & Co., Limited, Hespeler, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

SHEARS, ROTARY
Quickwork Co., St. Marys, Ohio.

WILLIAMS & WILSON, LIMITED

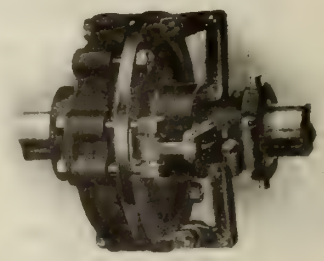
Cable Address "Willwills" Montreal, P.Q. Established 1891

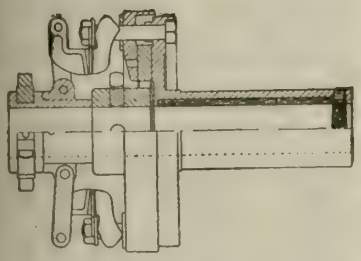
"COMPETITOR" FRICTION CLUTCHES

No! Don't Misunderstand Us

This is not a Competitor of other Makes of Friction Clutches. "It has no rivals." It is a competitor of the Troublesome loose Pulley.

Friction Clutches give far better results than tight and loose pulleys and are more readily operated, also more economical, as the saving in time and belting, the protection of machinery and the prevention of accidents will pay many times over during a year their original cost.



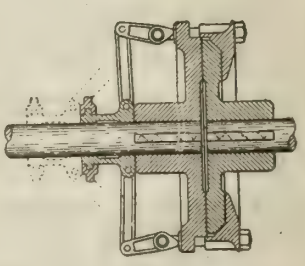


Competitor Pulley Clutch

Be Up-To-Date. Don't Install a Tight and Loose Pulley. Install a "Competitor." This will do away with tight and loose Pulley troubles and the First Cost is very little more.

By the use of friction Clutch Cut-off Couplings, sections of the line shaft or various departments can be shut down without interfering with any other portion of the plant. This is especially advantageous when it is necessary to make repairs during working hours, or to run one department when the remainder of the plant is closed.

When friction Clutches are used for driving direct to machines, the load is picked up gradually while the line shaft is running full speed. Each machine is operated independently.



Cut-off Coupling

Worrall Type

For your large, heavy Drives. The "WORRALL" Clutch has No Equal.

We carry a full line of these Clutches in Stock. In all sizes and Bores.

WILLIAMS & WILSON, Limited, Montreal, P.Q.

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.
SHEET METAL ROLLING MACHINES
Peck, Stow & Wilcox Co., Southington, Conn.
SHEARS, SPLITTING
Peck, Stow & Wilcox Co., Southington, Conn.
SHEET METAL MACHINERY
Peck, Stow & Wilcox Co., Southington, Conn.
SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.
SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Peck, Stow & Wilcox Co., Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.
SHEETS, CRUCIBLE, CAST
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
STAMPING
Canadian Cartridge Co., Ltd., Hamilton, Ont.
SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont.
SHELL BANDING MACHINES, HYDRAULIC
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.
SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.
SHELVING, STEEL
Dennis Wire & Iron Works, London, Ontario.
SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.
SHIPBUILDING
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
SHOP FURNITURE
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal.
Williams & Co., J. H., Brooklyn, N.Y.
SILENT CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilkinson & Kompass, Hamilton, Ont.
SLEDGES, CAST IRON
Katie Foundry, Galt, Ont.
SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.
SMOKESTACKS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Quebec.
Marsh Engineering Works, Belleville, Ont.
SNIPS, TINNERS AND SHEET METAL WORKERS'
Kearney & Trecker Co., Milwaukee, Wis.
SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice, Lewis & Son, Toronto, Ont.
SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn.
SOIL PIPE FITTINGS, CAST IRON
Katie Foundry, Galt, Ont.
SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto
SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead, Ltd., Toronto.
SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
SPIKES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
SPLICING CLAMPS
Peck, Stow & Wilcox Co., Southington, Conn.
SPRINGS, MACHINERY
Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Dunbar Bros. Co., Bristol, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.
SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.
Banfield, W. H., & Sons, Toronto.
Beaver Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
Katie Foundry Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Mulliner & Eulund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co, Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont.
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.
SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.
SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
SPROCKETS, CHAIN
Can Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.
SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.
SPROCKET WHEELS, CHILLED THREAD
Katie Foundry, Galt, Ont.
SQUARES
Peck, Stow & Wilcox Co., Southington, Conn.
STAYBOLT TOPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
STAIRS, IRON
Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.
STAMPINGS, SHEET BRASS, COPPER, ALUMINIUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.
Homer & Wilson, Hamilton, Ont.
Westworth Mfg. Co., Hamilton, Ont.
STAMPINGS, METAL
STAMPINGS, METAL AND STEEL
Can. Cartridge Co., Hamilton, Ont.
STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.
STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.
STAPLE MACHINES
Sleeper & Hartley Inc., Worcester, Mass.
STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec.
STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
STEEL BALLS
Rochester Ball Bearing Co., Rochester, N.Y.
STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y.
Illingworth Steel Co., John, New York, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm. Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.
Swedish Crucible Steel Co., Windsor, Ont.
STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.
STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co. Montreal, Que.
STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.
STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.
STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.
STELLITE, HIGH-SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.
STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que
Drury, H. A., Co., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
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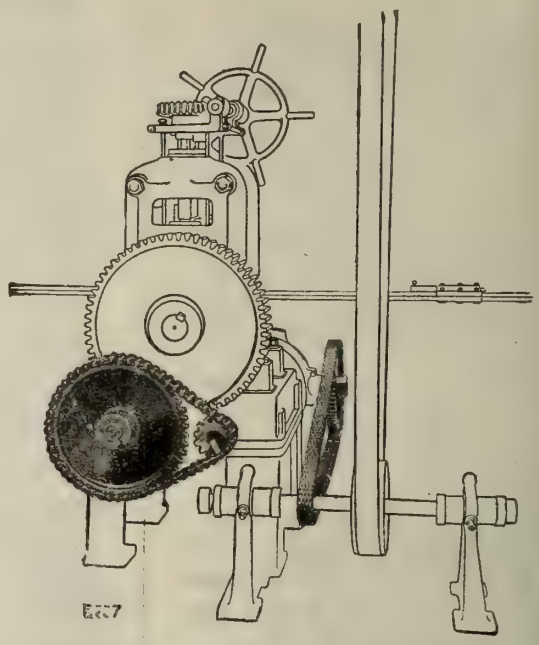

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AND MANUFACTURING NEWS

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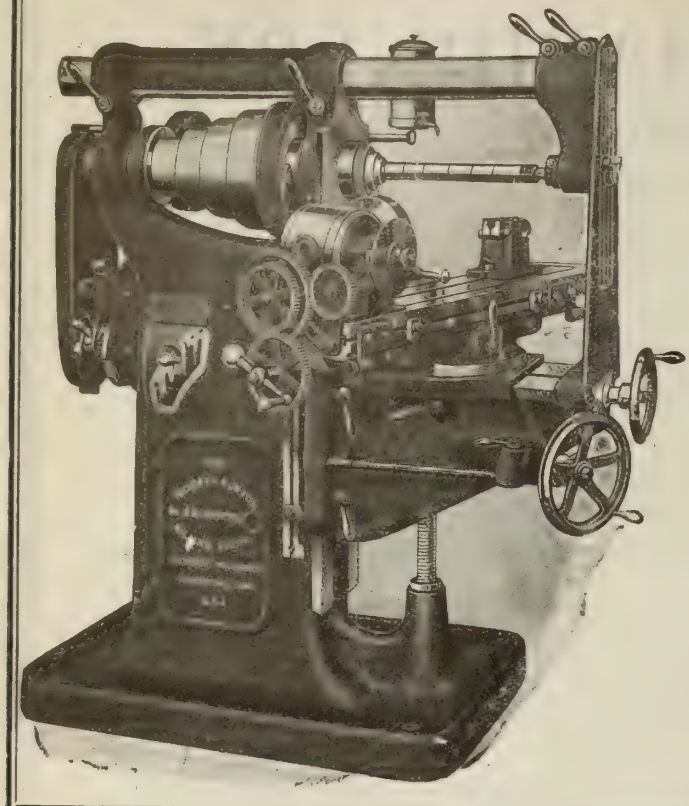

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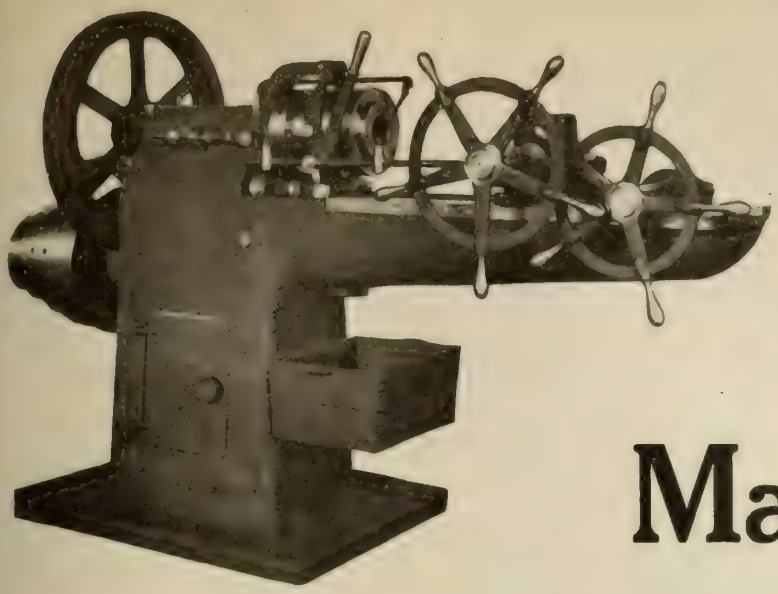


Splendid Values

In New and Second-hand

Machinery

LATHES SECOND-HAND AND NEW

2—19″ x 10′ Sidney Quick Change Gear Engine Lathes.
1—17″ x 10′ Sidney Quick Change Gear Engine Lathe.
5—18″ x 10′ Mueller Standard Heavy Duty Engine Lathes.
1—16″ x 8′ Monarch Quick Change Gear Engine Lathe.
1—28″ x 14′ Boye & Emmes Instantaneous Quick Change Gear Engine Lathe. In first class condition.
1—18″ x 8′ McDougall Quick Change Gear Engine Lathe. In good condition.

MILLERS NEW AND SECOND-HAND

2—No. 1 Kempsmith Universal Milling Machines.
2—No. 2 Kempsmith Universal Milling Machines.
1—No. 1 Kempsmith Universal Milling Machine. In first class condition.
1—No. 3 Kempsmith Universal Milling Machine. In first class condition.
2—No. 21 Garvin Plain Milling Machines. In first class condition.

SHAPERS NEW AND SECOND-HAND

1—28″ Smith & Mills Actual Stroke 32″ Single Pulley Gear Box Drive Shaper.
1—26″ x 30″ C.M.C. Back Geared Crank Shaper.
1—20″ Smith & Mills Back Geared Crank Shaper.
2—16″ Smith & Mills Back Geared Crank Shapers.
1—20″ Ohio Back Geared Crank Shaper. In first class condition.
1—16″ Ohio Back Geared Crank Shaper. In first class condition.

DRILLS NEW AND SECOND-HAND

2—Class "B" 8″ Henry & Wright Sensitive Drills.
2—Class "B" 12″ Henry & Wright Sensitive Drills.
1—20″ Silver Plain Drill.
1—76″ C.M.C. Portable Radial Drill. Complete with motor attached. In first class condition.

The above is a partial list of new and second-hand machines we have in stock for immediate shipment. For further particulars write, wire or phone us. Get our monthly stock book.

Inspection Invited

The Geo. F. Foss Machinery & Supply Co., Limited

Machine Tools and Supplies

PHONE MAIN 8500 305 St. James Street **MONTREAL**

C.M.C.

SLOTTERS

Sizes 11", 15", 18" and 24"

The C.M.C. Slotter is designed to combine strength and rigidity with convenience of operation, and has all modern improvements.

It is built with that thoroughness and embodies all the mechanical excellence that so distinguishes the entire line of C.M.C. machine tools.

A special descriptive bulletin is cheerfully furnished to parties interested.

Send us your enquiries.

CANADA MACHINERY CORPORATION
LIMITED

GALT - ONTARIO

Toronto Office and Warerooms:

BROCK AVENUE SUBWAY

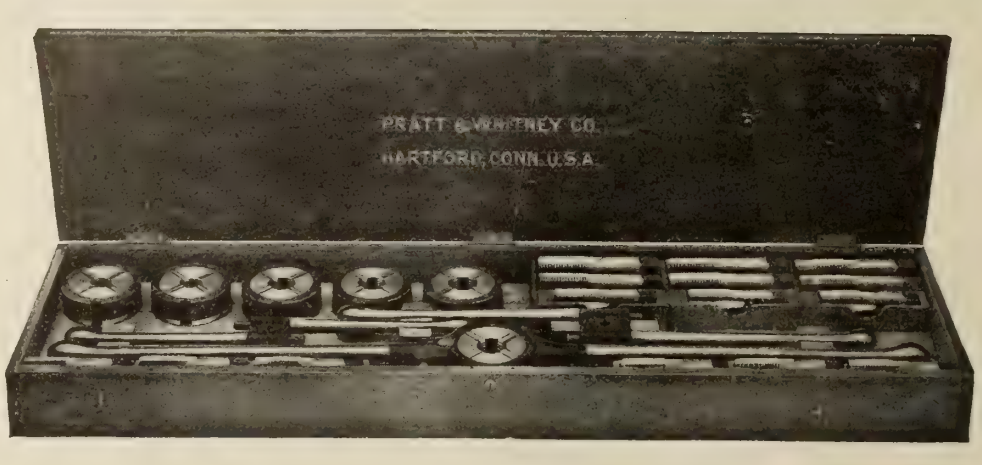
EDITORIAL INDEX—PAGE 10 BUYERS' DIRECTORY—PAGE 8 ADVERTISING INDEX—PAGE 10

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 15. Publication Office: Toronto, April 10th, 1919 Subscription Price $3.00 per Year

SMALL TOOLS



P. & W. Die-Stock Set No. 4

These sets are furnished in various capacities for either U.S. Standard, S.A.E. Standard, Whitworth Standard or "V" Form. The Pratt & Whitney Policy of highest quality materials, together with the necessary refinement and accuracy, is maintained in all tools composing these sets.

PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS

42-inch Vertical Boring and Turning Mill

Motor driven through speed box. Built in sizes from 42-inch to 100-inch.

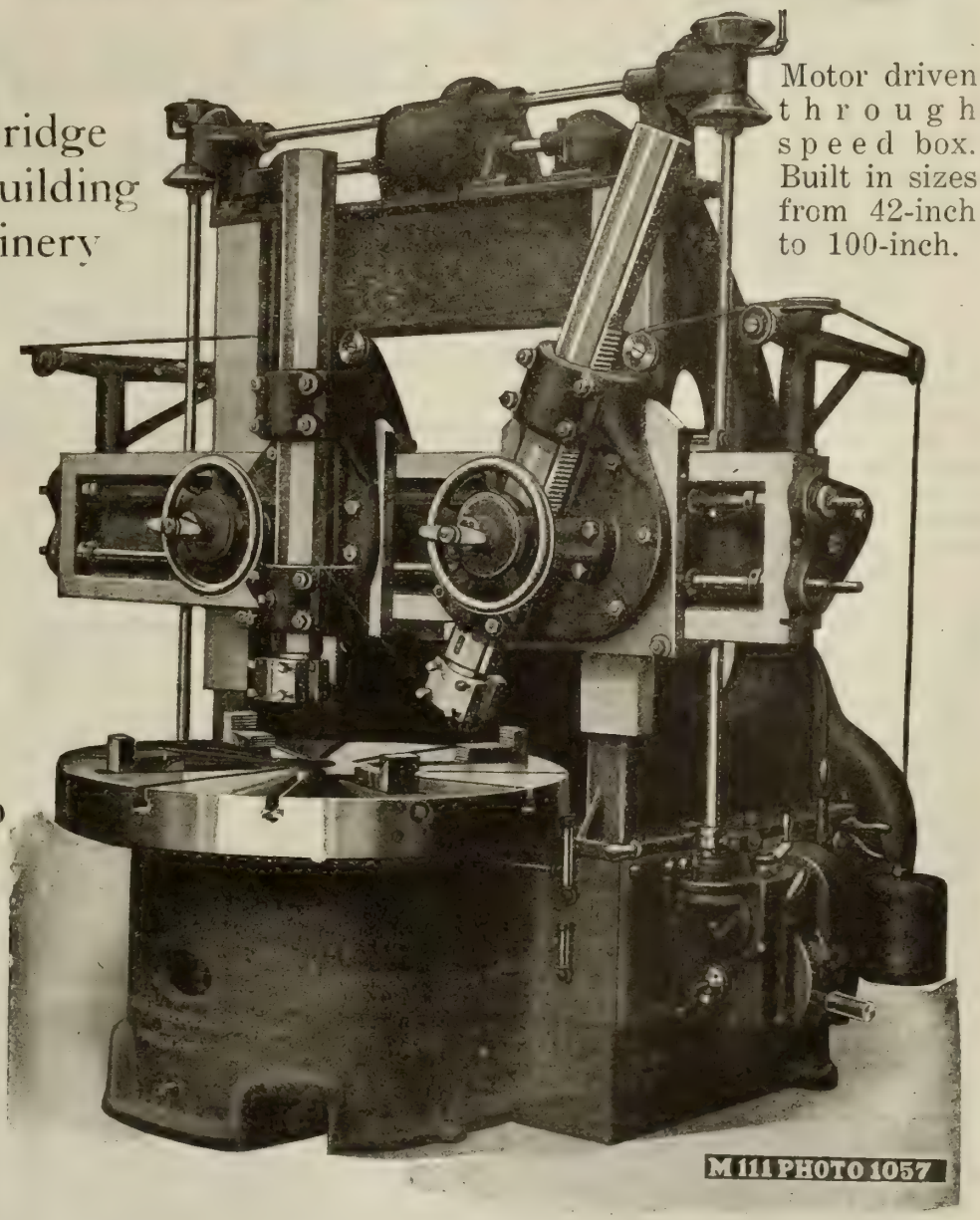
Structural Bridge Shop Shipbuilding Plant Machinery

Locomotive and Car Shop Equipment

Repair Shop Machinery

General Machine Shop Equipment

Drop us a line for Photographs and full particulars.



The John Bertram & Sons Company Limited

DUNDAS, ONTARIO, CANADA

MONTREAL 723 Drummond Bldg. | TORONTO 1002 C.P.R. Bldg. | VANCOUVER 609 Bank of Ottawa Bldg. | WINNIPEG 1205 McArthur Bldg.

The Publisher's Page

TORONTO APRIL 10, 1919

A List of Things Advertising Will Do*

Not Only Will It Open the Market and Speed Sales, But Its Effects on the Advertiser's Organization Is Marked

By W. S. Lockwood

Advertising Manager, H. W. Johns-Manville Co., New York

I NOTICE, on page 102 of your March 6 issue, a letter inquiring for a list of things that advertising will do. I think I have a fairly comprehensive list and I should like to come to the rescue of your inquirer.

Here is a list of the things that I believe the right kind of advertising will accomplish. It will—

Increase sales.

Lower selling costs.

Attract a better grade of salesmen to an organization.

Reduce the cost of training and obtaining salesmen.

Attract a better grade of general employees to an organization.

Assist the purchasing department in getting material.

Assist the traffic manager in moving the product.

Assist the employment manager in getting the particular people the organization needs.

Assist those responsible for the financing of a business not only rendering it easier for them to get money when needed, not only giving them the whole country as a field in which to seek accommodations instead of merely the city or district in which the concern is known, but also render it possible to finance a business at a lower cost.

Keep down competition. If a field is dominated by a highly successful national advertiser, there is far less danger of competition springing up.

Render salesmen more efficient.

Facilitate collections.

Protect a concern against the consequences of a revolutionary movement being made by a competitor. The right sort of advertising is business insurance against revolutionary improvements.

Enable a concern to reach all classes, to reach prospective customers that might never be reached by salesmen or direct by mail advertising.

Give a stronger control over the entire organization particularly over the selling force.

Cause more dealers who are handling the concern's product to spend their own money advertising that fact.

Advertising will cause individuals to accept more readily a concern's product when recommended by salesmen.

This is the well-known principle of consumer acceptance, but my list would not be complete without referring to it because it is most important.

Facilitate the legitimate influencing of legislation where such influencing is desirable.

In the case of specialties, such as typewriters, adding machines, etc., advertising reduces the probability of a concern's machine being traded out for a competitive piece of apparatus.

Broad, general advertising usually renders a concern's salesmen better informed on its product than they would be were there no advertising. Somehow a salesman will read his own concern's advertising when it appears in publications of a national standing when he won't read literature prepared for his special instruction.

This is a long list, you will say. Perhaps you will smile and shake your head as did a friend of mine, after reading this list over and say sadly, "What a wonderful patent medicine copy man that fellow would make!"

Well, it does sound kind of all-inclusive, doesn't it? It does sound like the claims for Dr. Ketchem's Renowned Exhilarator, "good for man or beast, guaranteed to cure rheumatism, gout, hay fever, tuberculosis, falling hair and an indisposition to get up in the morning. Splendid for removing peach stains from clothing and unsurpassed for polishing the piano. A few drops on the shaving brush will improve your lather wonderfully. Makes a wonderful sauce for roast goose."

Will Stimulate All Functions of a Business

Yes, it does look a little bit like the same sort of extravagant claiming of everything, that we used to find in the patent medicine ads, but here is the difference—modern advertising is not merely a temporary stimulant for a certain portion of a business, it is much more. Advertising as carried on in days gone by and as still carried on by many concerns, is, of course, merely that and nothing more. Its sole purpose is to promote sales. Sometimes, if well conducted, it actually does that, as in the case of certain types of retail advertising, as in the case of certain types of mail-order advertising. But the broad, modern advertising of which I am speaking is a stimulating force for an entire organization, for every member of that organization. It is a business tonic and the difference between the claims I have made for it and the claims of the quack medicine fakirs is that they used to claim that their medicine would actually do everything and I merely affirm that advertising will stimulate all the various functions of a business.

My list may not be complete. If I have overlooked anything I shall be grateful to any reader of *Printers' Ink* who will furnish me with one or more additional items. It seems to me that the suggestion of your correspondent is an excellent one and that it is high time that somebody took upon himself the responsibility of compiling a complete list of the things that modern advertising will do for a progressive organization.

Yes, there is one thing more. Advertising stimulates the central organization in a peculiar and remarkable way. All the members of it somehow realize that they have got to get back of their advertising and "make it succeed." Even the boss works harder where a concern is advertising extensively, but he gets a lot more fun out of it.

(*Extract from an article in Printer's Ink)

Canadian Machinery and Manufacturing News, April 10th, 1919. Vol. 21, No. 15. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.

Quality Service

THERE IS NO ARGUMENT

When you are assured

QUALITY SERVICE PRICE

and One Hundred Cents Worth of Value
for Every Dollar You Spend

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar is Worth One Hundred Cents in Canada

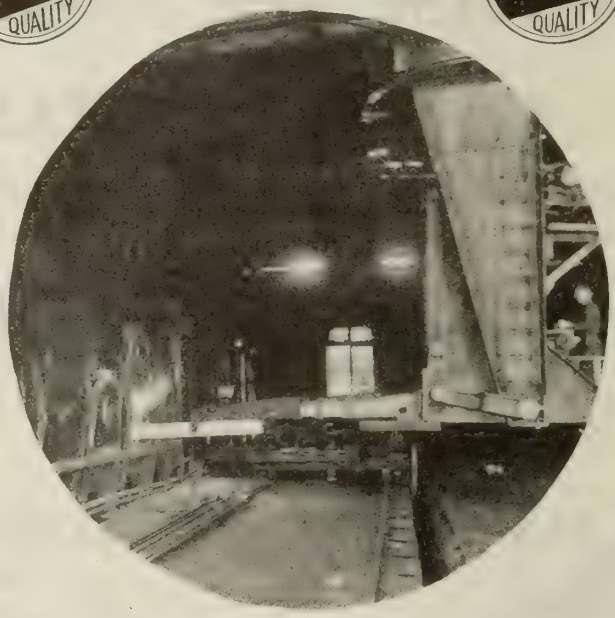
THE
STEEL COMPANY OF CANADA
LIMITED
HAMILTON MONTREAL

ALGOMA STEEL CORPORATION, LTD.

SAULT STE. MARIE, ONTARIO

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

MARK OF ALGOMA O.H. QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

MARK OF ALGOMA O.H. QUALITY

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

BETTS

Heavy Duty Machine Tools

enjoy an enviable reputation for simplicity of design, durability, rigidity and accuracy. This is the result of fifty-eight years of concentrated effort to produce the best tools that mechanical genius can devise.

Betts heavy duty machine tools have kept pace with the demand for increased production and are to be found in practically all of the leading locomotive works, railroad shops, steel mills, shipyards, forge shops, navy yards, electrical shops, rubber factories, etc.

The machine illustrated below is a 20-foot boring mill. A general idea of its massiveness may be gleaned from the fact that there are 75 men standing or seated on its structure, and it weighs 374,000 lbs. This machine is as uniformly accurate as the 5-foot and increasingly larger sizes.

Our entire organization is at your service. Send for detailed specifications, quotation, and delivery on any Betts tool.

HEAVY BETTS DUTY

Planers

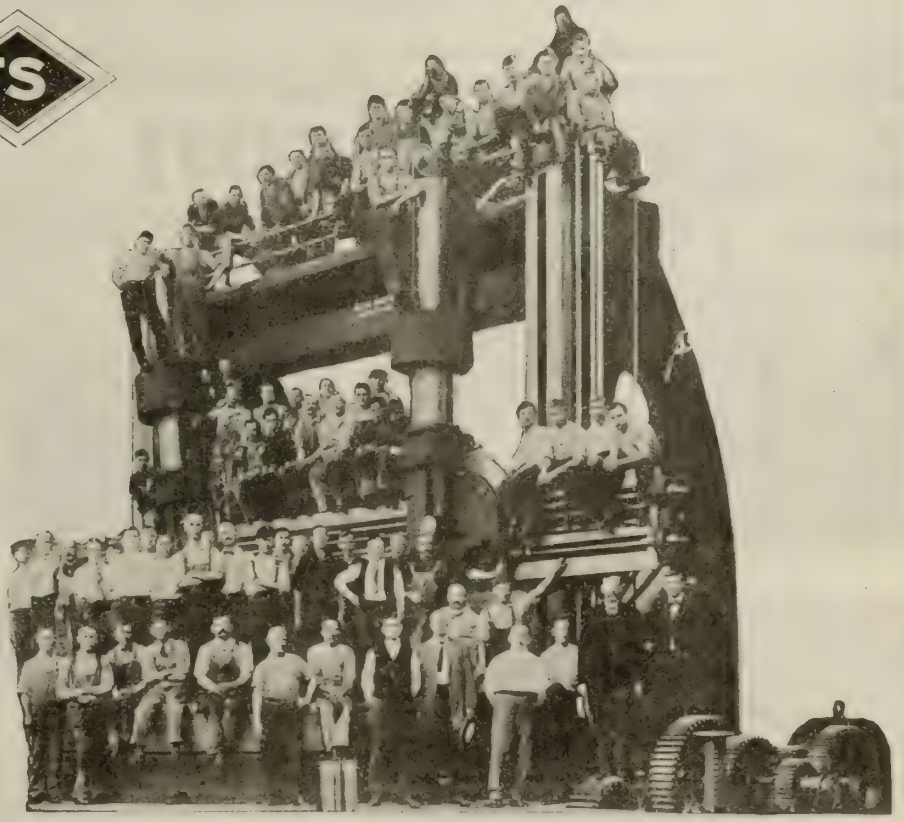
Boring and Turning Mills

Horizontal Boring, Drilling and Milling Machines

Tire Turning Mills

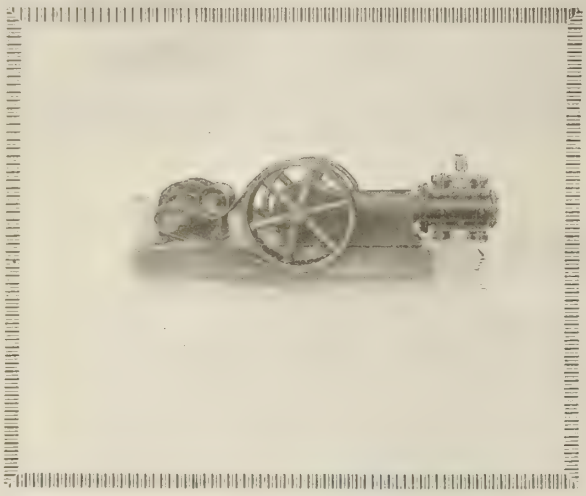
Car Wheel Borers

Crank Slotters



BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.

The Short Belt Drive For Compressors Saves Space



Have you been wondering how you can fit that compressor into your power house? Here is the solution—the short-belt drive.

We build both single-stage and two-stage machines—straight-line and duplex with this type of drive.

Less floor space
Less belt expense
No belt stretching
Capacities up to 2,000 ft. per min. with short-belt drive.

Send for our booklet on how to apply the short-belt drive to the best advantage.

Canadian Ingersoll-Rand Company Limited

SYDNEY, SHERBROOKE, MONTREAL, TORONTO
COBALT, WINNIPEG, NELSON, VANCOUVER

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

WILT

HIGH SPEED AND CARBON TWIST DRILLS, REAMERS AND MILLING CUTTERS

Quality Tools a Vital Necessity

Where there's a WILT--There's the Way

Equip your plant with modern tools of the best quality. It is the vital necessity of the day to manufacturers. Competition of the present and in the future demands it.

For your drilling, reaming and milling cutter operations, choose *WILT High Speed and Carbon Drills, Reamers and Milling Cutters.* As compared with any ordinary tool they cut faster, more accurately, require less power, require less re-grinding and give longer service—and they cost no more than ordinary tools.

Put them to the test—you'll find them best.

Wilt Twist Drill Company

OF CANADA, LIMITED

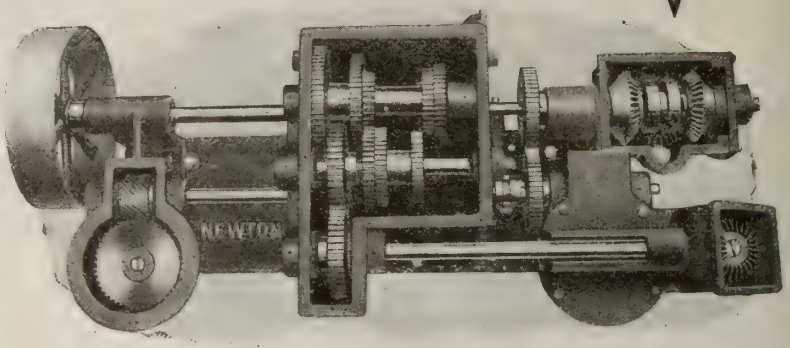
Walkerville Ontario

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England.

THE JOHNSON FRICTION CLUTCH

OVER THERE

is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.



Courtesy of Newton Machine Tool Works, Philadelphia, Pa.

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads., note the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are you requirements?

Our Booklet "Clutches as Applied in Machine Building" and Yellow Data Sheets are Free

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main St., Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Faubourg du Temple, Paris.

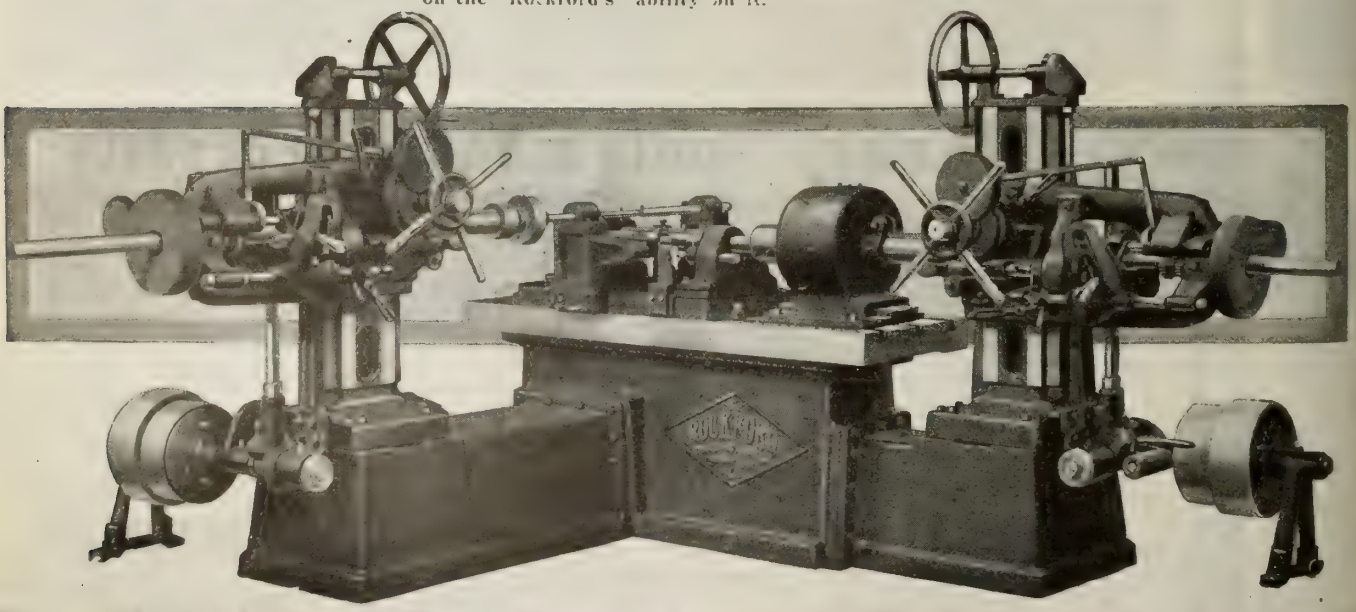
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Rockford Horizontal Boring Machine

For Automobile Manufacture

This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



The Rockford Drilling Machine Co., Rockford, Ill.

Frogs, Switches
Mates, Crosses
Diamonds, Etc.

For Steam & Electric Railways.

Built-up, Hard-Centre or Solid Manganese-Steel

TRACKWORK

COMPLETE INTERSECTIONS

CANADIAN STEEL FOUNDRIES, LIMITED

Transportation Building, Montreal

Electrite Uranium

Electric furnaces, automatically regulated, the most modern methods, and the introduction of **Uranium** — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

GSC

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

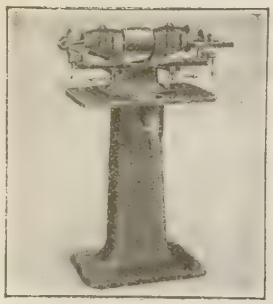
Milwaukee, Wisconsin

DETROIT—823 Dime Bank Building

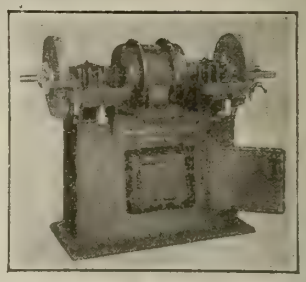
FORD-SMITH Grinders

A fine example of high grade material and workmanship

Water Tool Grinder



General Purpose Grinder



Motor Driven Floor Grinder

Motor-Driven Grinders
Floor Grinders
Bench Grinders
Water Tool Grinders
Swing Grinders
Disc Grinders
Special Grinding Machinery
Hack Saws
Swivel Tables

Write for Catalogue and price list.

The Ford-Smith Machine Co., Ltd.
HAMILTON - ONTARIO

FOREIGN AGENTS:
W. E. Storey, 3 Arundel St., London, Eng. Alf. Herbert, Limited, 54 Dey St., New York, U.S.A.

IMPERIAL GENUINE BABBITT METAL

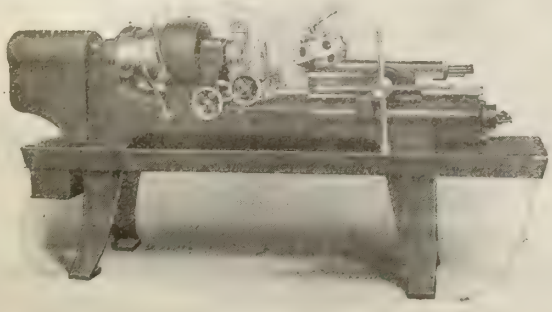
The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



INVESTIGATE!

SEND FOR
CATALOG "C"
OR
ASK THE USER

WOOD TURRET MACHINE CO.
BRAZIL INDIANA U.S.A.

STELLITE

"Not Steel but its Master"

PROPER PROCEDURE + STELLITE = PRODUCTION AND ECONOMY

One of Toronto's new industries was presented by us with a Tool-Holder Bit of No. 3 STELLITE to try out on Cast Iron.

They made tests with the best brands of High Speed Steel as against STELLITE, and found that they were able to run at double the speed and feed by using STELLITE.

"AS A MATTER OF FACT A TOOL BIT OF ⅜-inch square STELLITE HAS TURNED OFF 35,000 TIMES ITS OWN WEIGHT OF CAST IRON IN TEN DAYS."

As a consequence of their own tests they laid out their transmission to accommodate STELLITE and are now getting a much larger production than they had estimated.

We visited them recently and warned the Superintendent to save his shop-ends of STELLITE, as they were worth $2.00 per pound to his firm.

This was like getting money from home, as he had already decided to use STELLITE without this added incentive.

ASK FOR DEMONSTRATION.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times.

Are your Tools made of Red Cut?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
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BOSTON
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WOLFRAM
MADE IN THE U.S.A.
HIGH SPEED STEEL
TRADE MARK

A Keen Cutter

WOLFRAM
Is Both
VULCAN CRUCIBLE STEEL CO.
ESTABLISHED 1900
Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company
MONTREAL QUE.

Strong in the Neck

Swedish Steel & Importing Co., Limited

Montreal
New York
Toronto
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Direct representatives of foremost Swedish mills; makers of

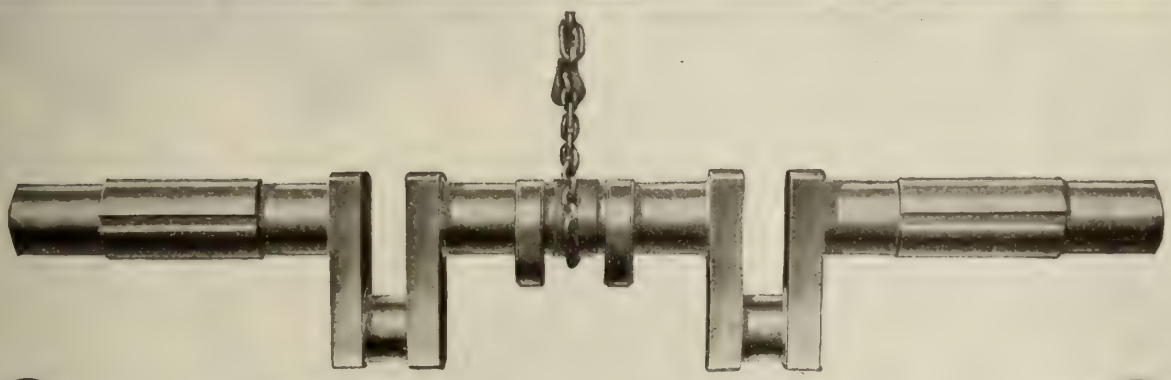
Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK
SS
DOUBLE ESS

PROMPT SHIPMENTS
from large stock

CANADA FOUNDRIES & FORGINGS LIMITED



Why Worry? Bring It To Us If It Is a Forging.

Canadian Billing & Spencer Plant

Welland

LOCOMOTIVE AND CAR WHEEL TYRES

HIGH-SPEED AND CARBON TOOL STEEL

MISCELLANEOUS SHOP TOOLS

MADE IN CANADA

ARMSTRONG WHITWORTH OF CANADA, LIMITED

Head Office:
298-300 St. James Street,
Montreal.

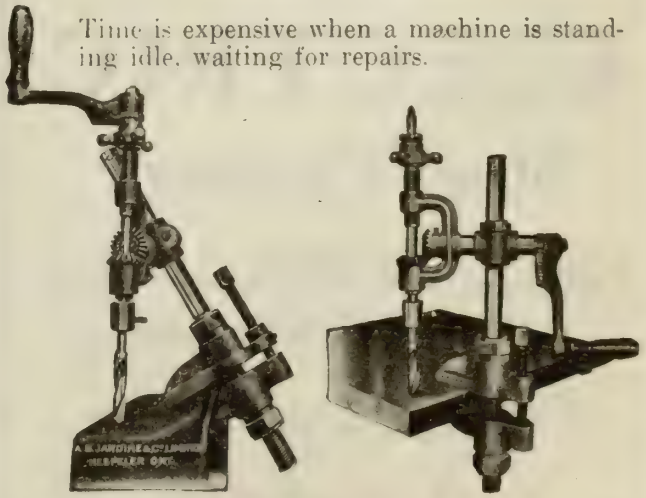
Works:
Longueuil, Que.

Branches:

126 Wellington St. E. TORONTO
27 King William St. HAMILTON
McArthur Building WINNIPEG

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

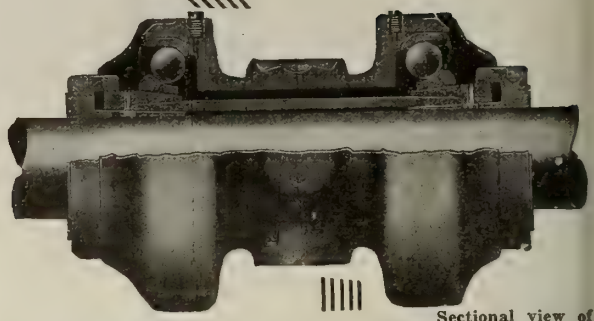
Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited

HESPELER, ONTARIO

Chapman Double Ball Bearings



Sectional view of Chapman Double row ball bearings.

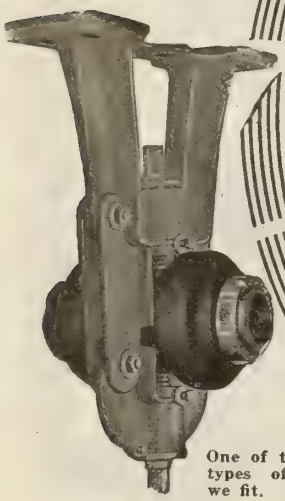
Pay You to Adopt Them

Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball Bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.

Chapman Double Ball Bearings practically eliminate friction, and they require lubrication only once or twice a year—therein lies the secret of their ecenomy.

Chapman Double Ball Bearing Company of Canada, Limited

339-351 SORAUREN AVE., TORONTO
Room 408 Shaughnessy Bldg., Montreal; Transmission Ball Bearing Co., Inc., 1050 Military Rd., Buffalo, N.Y.



One of the many types of frames we fit.

Have you received a copy of Catalog 3-G? Pay to send for one if you haven't.

E&M

ELECTRIC

Steel Castings

High Grade STEEL Castings

Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

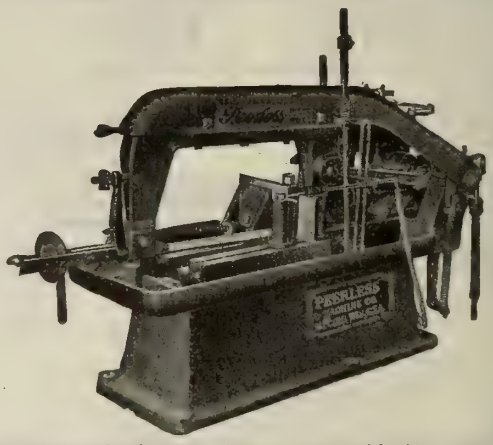
THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

Peerless HIGH SPEED

THE NEW STANDARD

Increases Production—50 to 100%



It increases production 50 to 100 per cent. with the same number of machines, at a greatly reduced cost.

Or it gives the same production with two-thirds to one-half as many machines, saving in investment, in attendance and in floor space. And in all cases it saves in expensive material and saw blades.

Proof can be furnished in the record the Peerless High Speed has made with many large concerns of international reputation. Further proof and the best proof will be to try it in your own shop; and if you think you can afford to do without it after 30 days' use, we will pay freight both ways.

Write for description, names of users and trial plan.

PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN

Whitcomb-Blaisdell Planers

WHITCOMB-BLAISDELL LATHES AND PLANERS PLAY SOME PART IN THE MOST OF THE HIGH-GRADE MACHINE TOOLS MADE ON THE CONTINENT.

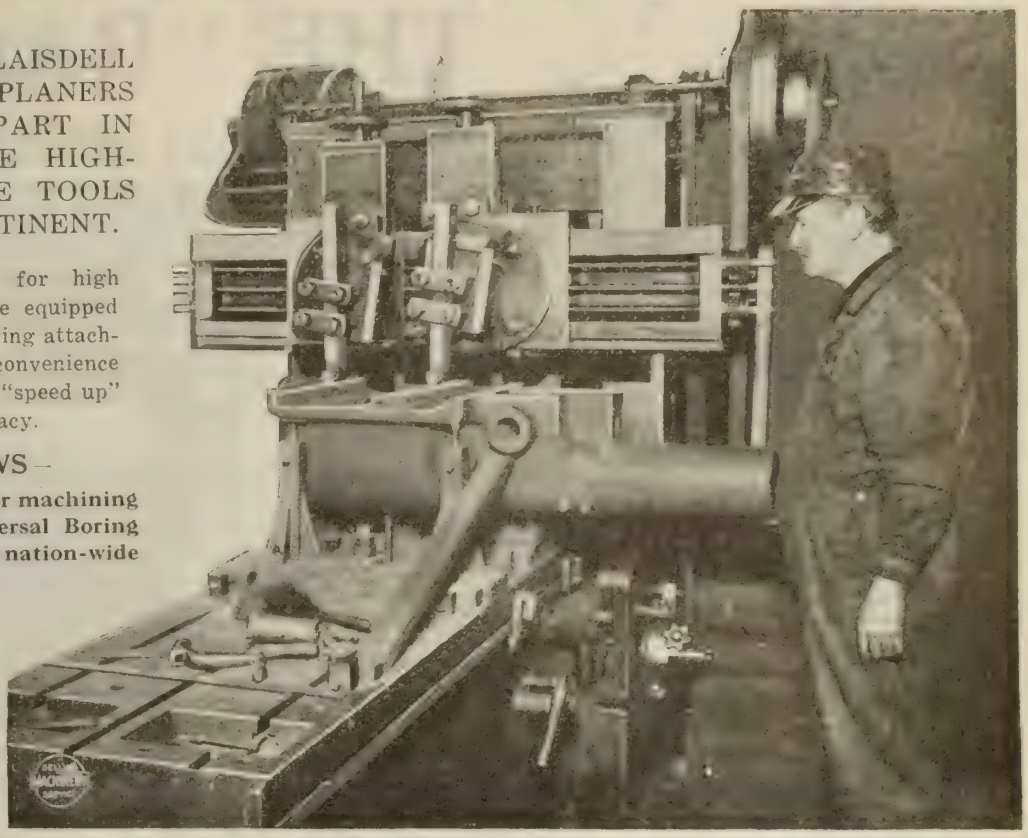
ALL-round machines for high grade work, they are equipped with special labor-saving attachments that add to their convenience and enable the operator to "speed up" without endangering accuracy.

ILLUSTRATION SHOWS—

a Whitcomb-Blaisdell Planer machining the head post of a Universal Boring Machine—a machine with a nation-wide reputation for accuracy.

May we send you our catalogue giving full particulars?

Whitcomb-Blaisdell Machine Tool Co.,
WORCESTER, MASS.
U. S. A.

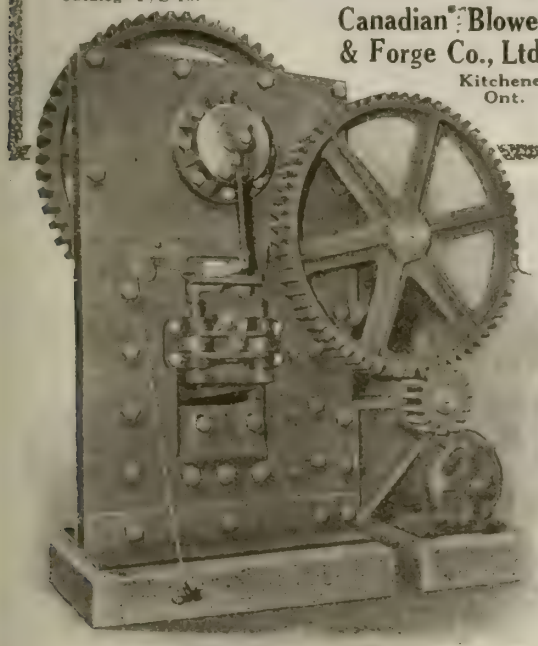


CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

Canadian Blower & Forge Co., Ltd.
Kitchener
Ont.



GENUINE EMERY

Sizes 180, 160, 140, 120, 110, 100, 90, 80, 70, 60, 54, 46 40, 36, 30, 24, 20, 18, 16, 14, 12, 10, 9, 8. hole.

EMERY FLOUR AND WASHED FLOUR

EMERY GLASS FLINT GARNET CORUNDUM CARBORUNDUM	PAPER AND CLOTH	IN SHEETS, ROLLS, DISCS, BANDS, STRIPS and TAPES, &c.

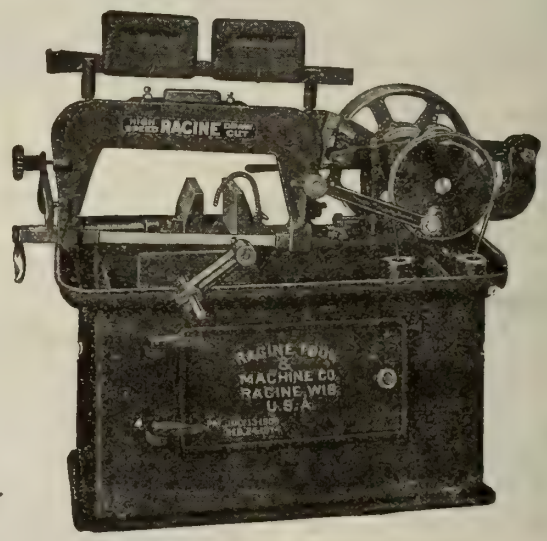
John Oakey & Sons

LIMITED
WELLINGTON MILLS
LONDON, S. E. 1., ENGLAND

USE

THE "RACINE"

FOR HIGH SPEED METAL CUTTING



The "RACINE" is capable of making straight, clean cuts at high speed through angle irons, die-blocks, heavy bars, etc. It combines the advantages of fast work with **least blade wear.**
Our patented automatic lifting device raises the blade on the non-cutting stroke, thus prolonging the cutting life of the blade by eliminating all undue pressure and drag.
Have us prove our claims. Write for details to-day.

Use "RACINE" H.S. Tungsten Blades

Racine Tool & Machine Company

Melbourne Ave., Racine, Wis., U.S.A.

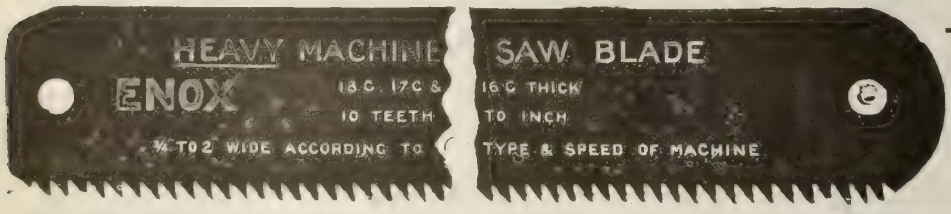
STANDARD THE WORLD OVER

SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

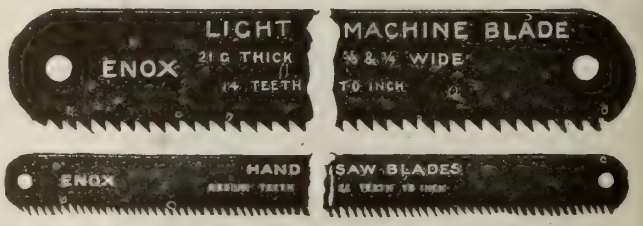
Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST



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Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Makers:

Y'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

per Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William:

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Lim ited, 495 Railway St., Vancouver, B.C.

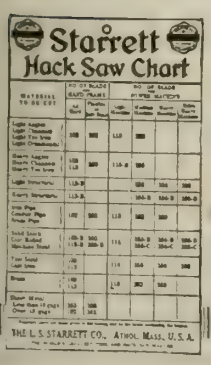
Different Metals Require Different Hack Saw Blades

If you want to cut structural steel or brass pipe efficiently, you need a different hack saw than for cast iron or machine steel, and you certainly can't work as coarse a blade in a light machine as in a heavy one. To try to do everything with the same blade is simply to do most of it inefficiently.

Starrett Hack Saws

do the most work with the least effort and in the shortest time because each one is made to meet the exact requirements of different metals in different powered machines.

Our Hack Saw Chart will help you select the proper blade for any kind of work, and you can depend upon it. Our Service Department will help you solve your cutting problems and increase the efficiency of your cutting-off department.


Starrett
Hack Saw Chart

Materials to be Cut	No. of Blade Cuts Per Inch		No. of Blade Teeth Per Inch			
	Soft Cuts	Medium Cuts	Hard Cuts	Medium Cuts	Fine Cuts	Extra Fine Cuts
Light Angles / Light Channels / Light Tee Irons / Light Channels	10B	14B	14B	18B		
Heavy Angles / Heavy Channels / Heavy Tee Irons	10B / 14B	14B	14B-B	18B		
Light Structurals	14B-B			18B	24B	24B
Heavy Structurals	14B-B			18B-B	24B-B	24B-B
Iron Pipe / Galvanized Pipe / Brass Pipe	14B	18B	14B	18B	24B	
Solid Iron in Cold Rolled / Non-Ferrous Metals	14B-B / 14B-B	18B / 24B-B	14B	18B-B / 24B-C	24B-B / 24B-C	24B-B / 24B-C
Tool Steel / Cast Iron	14B / 14B		14B	18B	24B	24B
Brass	14B / 14B		14B	24B	24B	
Sheet Metal: Less than 12 gage / Over 12 gage	18B / 18B	24B / 24B				

THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.

Write us today. Ask for Catalog No. 213

THE L. S. STARRETT CO.

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

ATHOL, MASS.

NEW YORK LONDON CHICAGO

42-908

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

A "Strikingly Different"

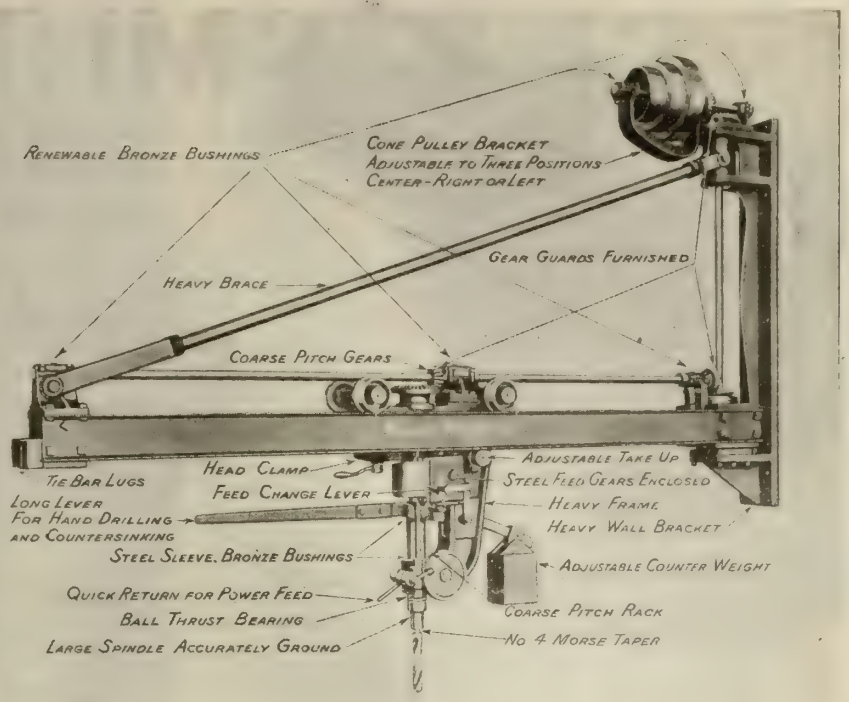
WALL RADIAL DRILL

This is a real machine tool. Careful design and high-grade materials contribute to its great success and economy. Much wider range is possible on this drill than the ordinary radial. The head is exceptionally rigid, yet moves with extreme ease from end to end of arm. For the crowded shop this drill is ideal, as when not in use it can be pushed back out of the way.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS**

This Machine—the Forbes—

Feeds the Cutters to the Job

Moreover, readily carried to the pipe inside the shop or anywhere out in the yard.

It Cuts Clean Threads that Make Tight Joints

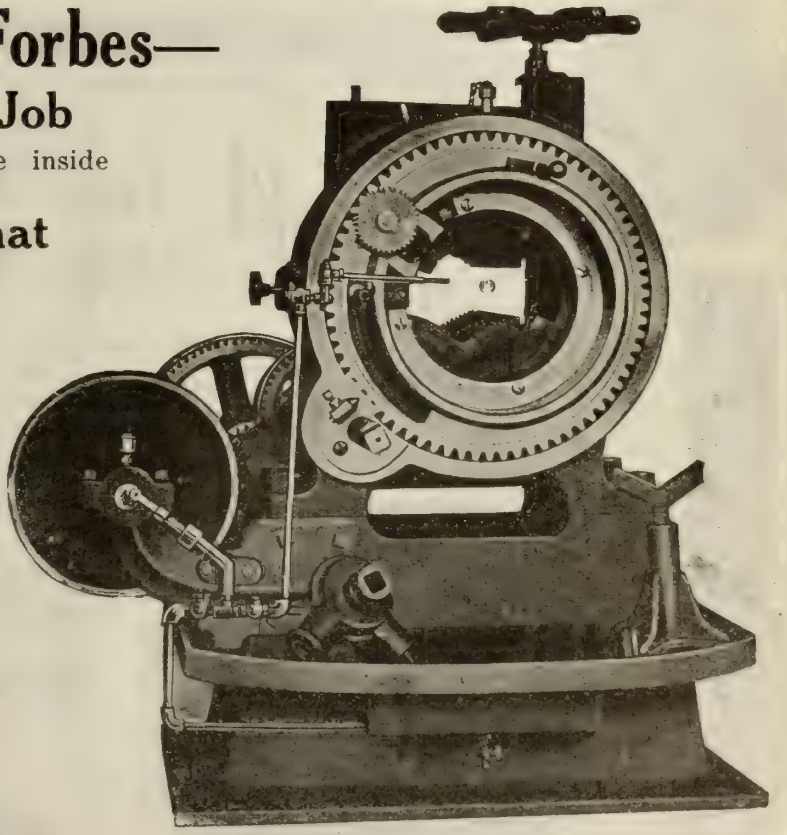
ON THE SPOT

The pipe remains firmly fixed in the self-centering vice. The dies, revolving, cut-off or thread, as the case may be.

More than 25,000 Forbes Machines now in use support our claim that the Forbes is the greatest labor-saving device on pipe work.

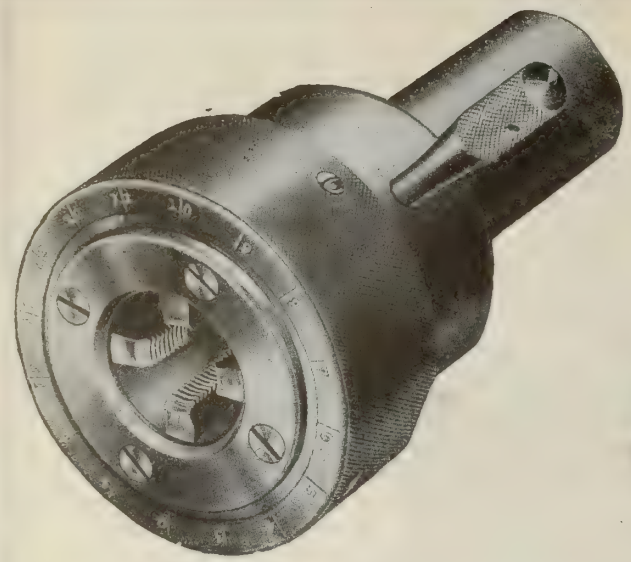
All sizes up to 15-inch, Hand, Belt or Electric power, can be shipped promptly.

Wire your order at our expense



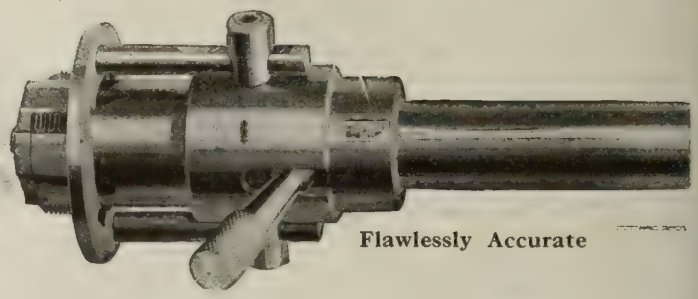
Curtis & Curtis Company

115 Garden St. Bridgeport, Conn.



MURCHEY

COLLAPSING TAPS and SELF-OPENING DIES



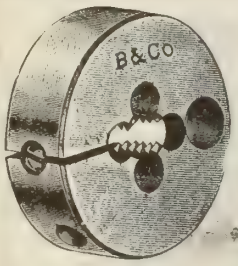
Flawlessly Accurate

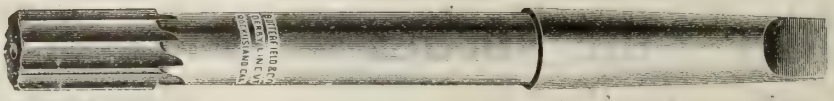
Wonderfully Fast and Durable

Two Murchey Taps on your lathe completely finish these so that when they come off the machine there is no more handling or re-sizing to do. No need of taking out of one lathe and putting it in another. No reversing, no stripping. No chance of work getting off centre. Do work more accurately and 50% faster than solid tools. Murchey Chasers are quickly adjusted to compensate for wear, and Murchey Adjustable Taps serve as long as ten solid taps. Write at once for full particulars.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris France.





Butterfield

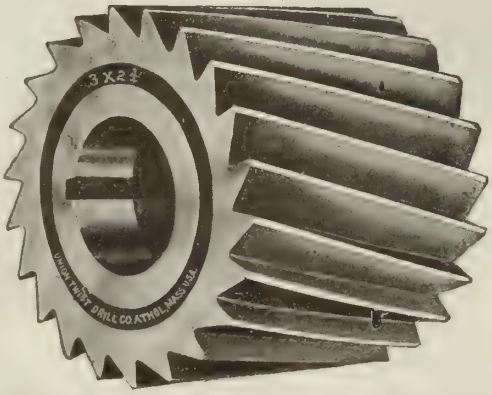
Taps, Dies, Reamers Drills, Milling Cutters

Butterfield quality gives the Maximum returns on your investment. BECAUSE

It ensures **clean and accurate cuts** and will duplicate the work over a long period of use.

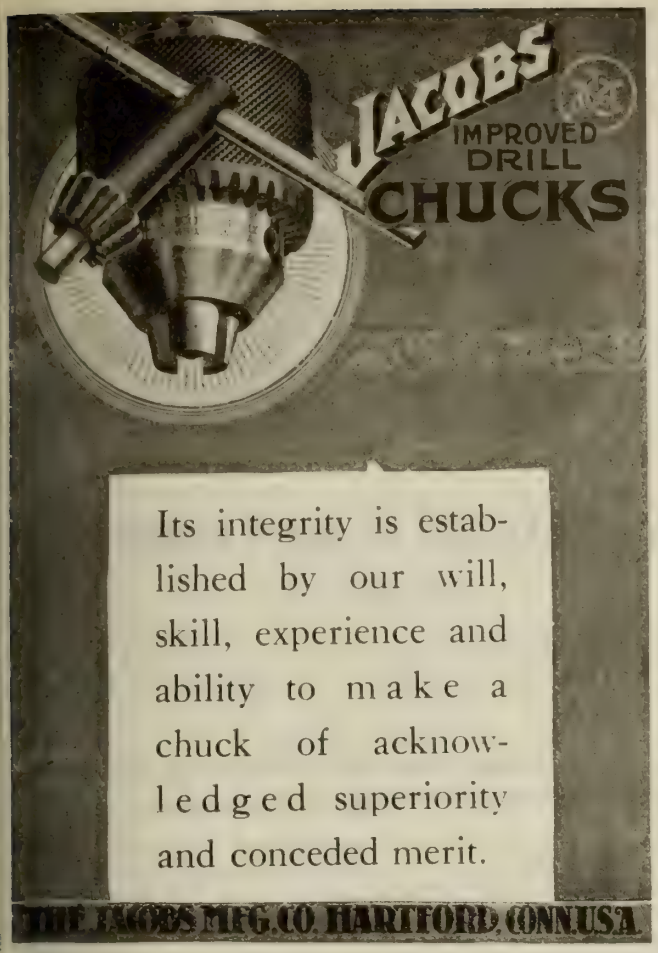
Butterfield Quality is the result of 35 years' continuous effort to keep our product distinctly in the lead from the standpoint of efficiency and economy.

SEND FOR OUR CATALOGUES. Catalogue Seventeen covers Taps, Dies and Reamers. Catalogue "A" covers our line of Twist Drills, Gear and Milling Cutters.



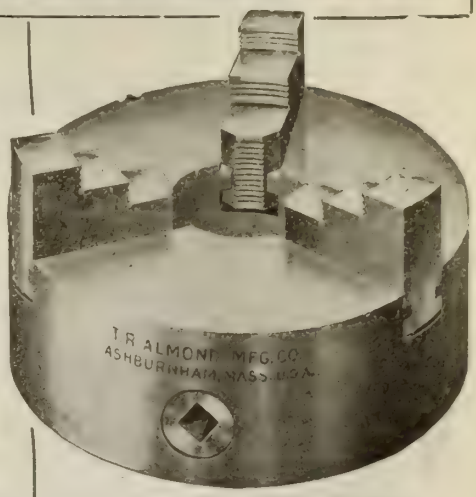
Butterfield & Co. Inc., Rock Island, P.Q.

Toronto Office: 220 King Street West

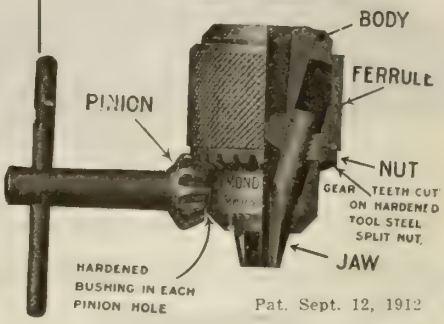


ALMOND CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



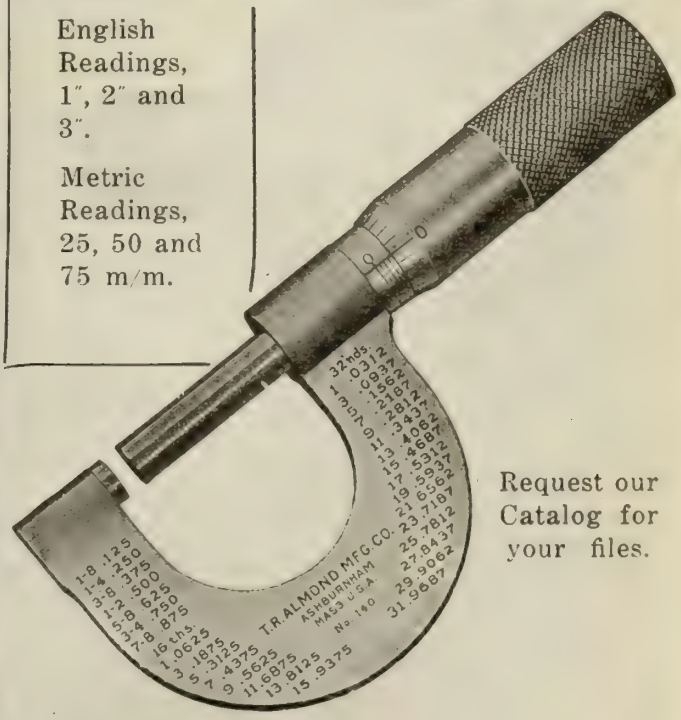
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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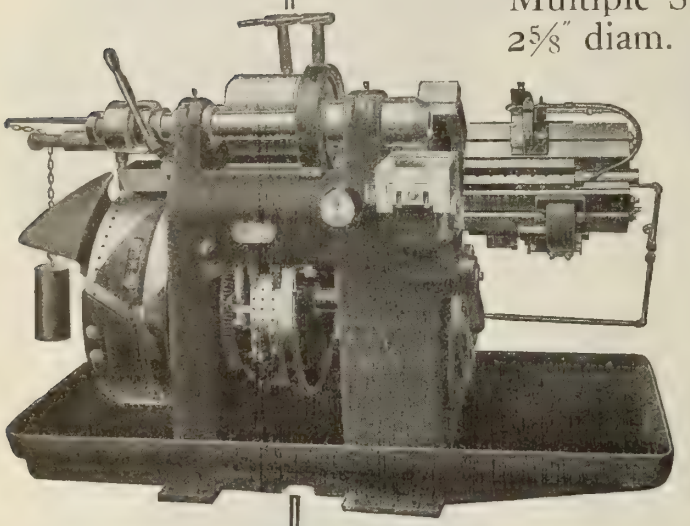
T. R. ALMOND MFG. CO.

6 Maple Avenue, Ashburnham, Mass.

GRIDLEY AUTOMATICS

For the rapid and accurate production of turret lathe work AUTOMATICALLY.
Single Spindle Type, capacities up to 5" diam.
Multiple Spindle Type, capacities up to 2⅝" diam.



The National Acme Company

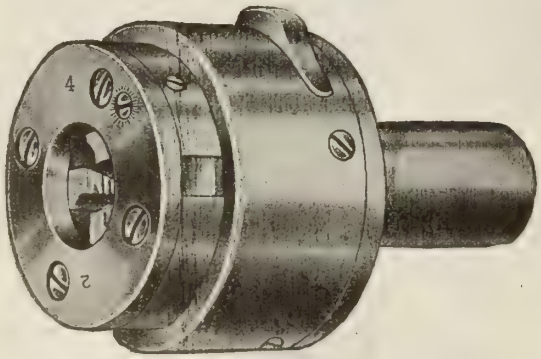
Cleveland, O.

New England Plant: - Windsor, Vt.
Canadian Screw Plant: - Montreal, P.Q.

Branch Offices:

New York Boston Chicago Detroit Atlanta San Francisco
Warehouses: New York Chicago With Foreign Representatives

Makers of Gridley Single and Multiple Spindle Automatics at Windsor, Vt., and Acme Automatics, Threading Dies and Screw Machine Products at Cleveland, O.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

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A wheel of the right grit, grade and size—Carborundum for cast irons, brass bronze and aluminum. Aloxite for malleables and steel work. But before sending you any wheel, we must know what you are grinding and how.

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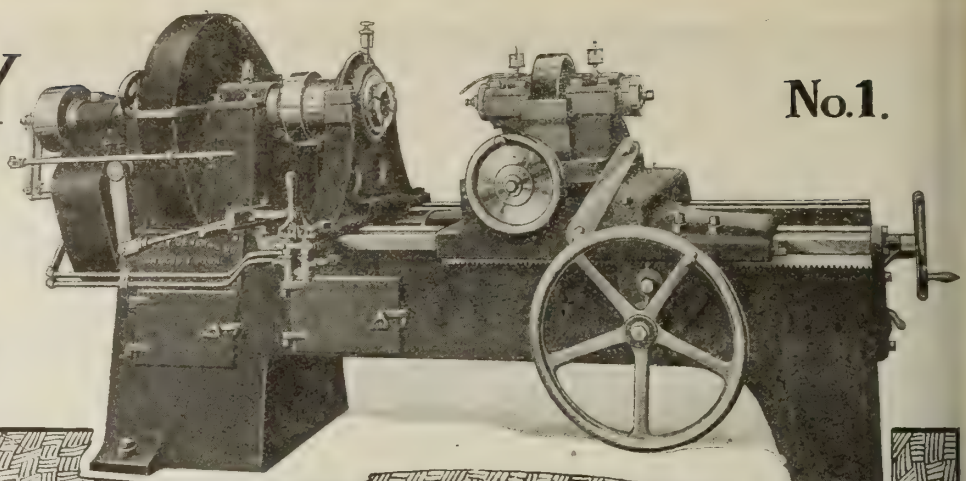
SMALLEY

General Thread Milling Machine

No.1.



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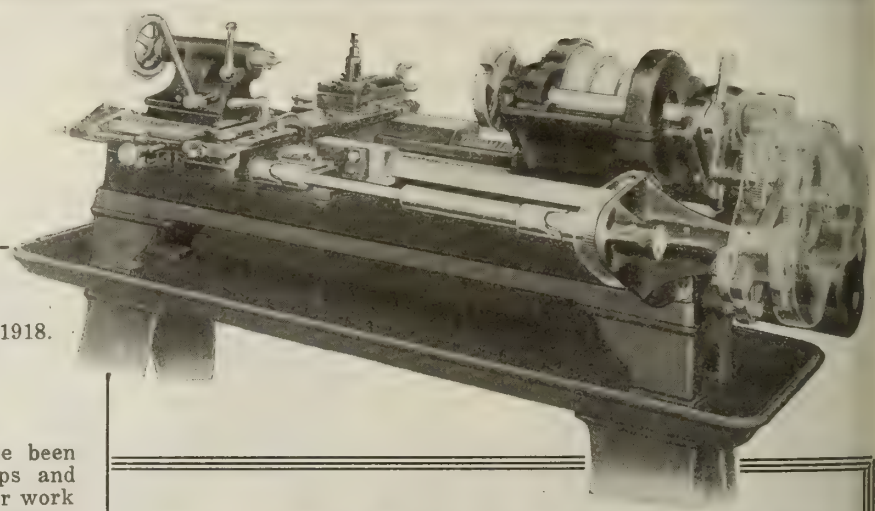

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By J. A. Walton

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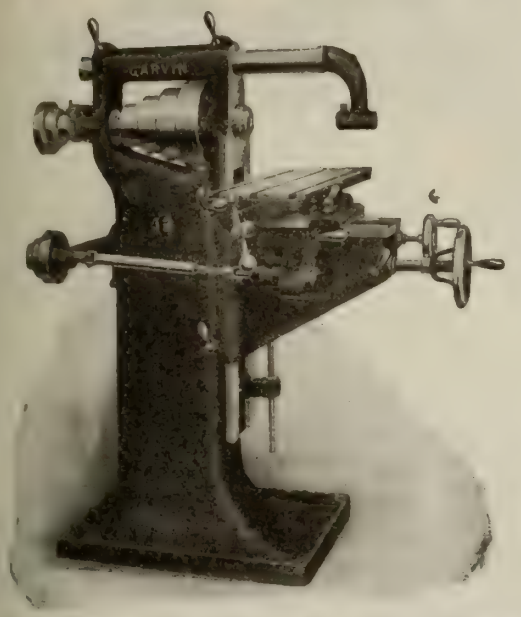

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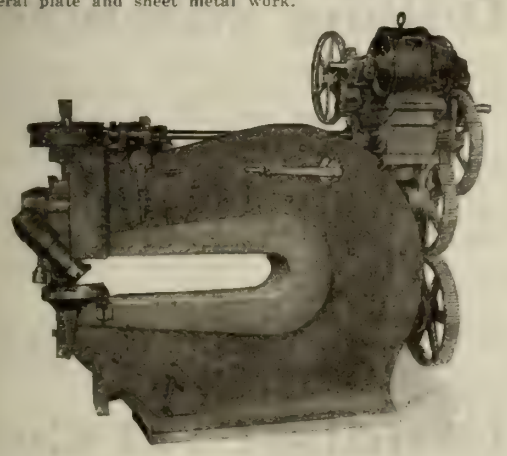

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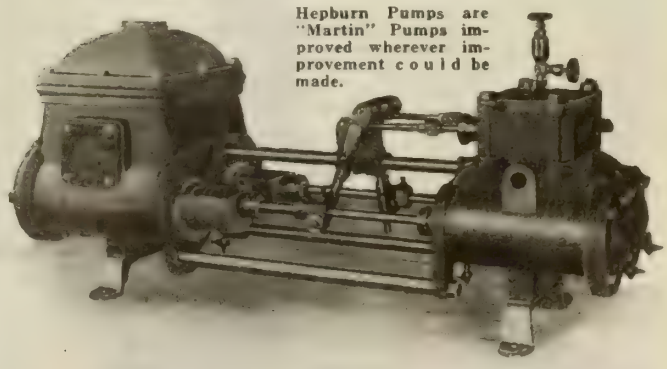
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



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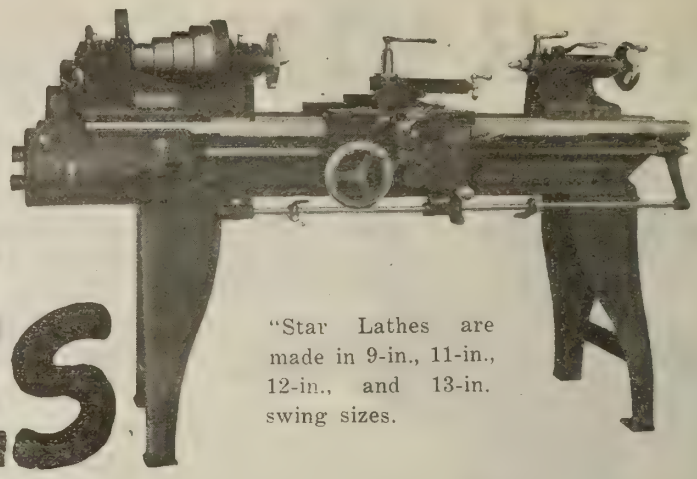
STAR LATHES



"Star Lathes are made in 9-in., 11-in., 12-in., and 13-in. swing sizes.

"Star" Lathes have a wide range for exacting service and are exceptionally desirable for use in

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In design and construction they conform to the highest type of standard engine lathe practice and for rated capacity are unsurpassed.

In addition to its space and cost-saving abilities the "Star" Lathe offers simplicity of operation and special mechanical and service advantages.

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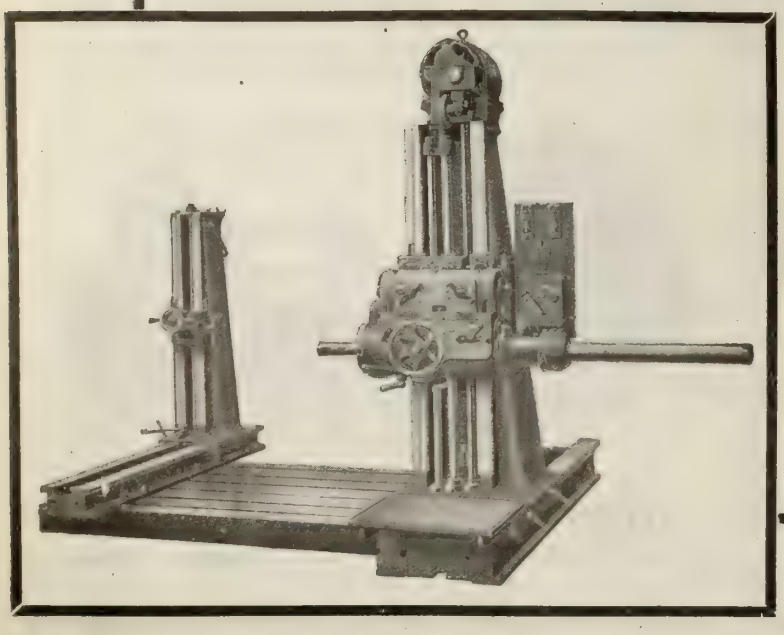
Let us mail you booklet containing complete facts on "Star" Lathes' mechanical advantages. Dictate us a line now. (4)

Save Floor Space
Save Set-up Time



The New LANDIS Boring, Milling and Drilling Machine

has solved the housing problem for many a plant. Instead of installing special machines for boring, milling and drilling, all three operations are being performed by the New LANDIS.

In addition to the floor space saved the New LANDIS being so adaptable, saves set-up time. One chucking of the work is all that is required to do all three machining operations.

The powerful spindle construction, ease of operation, concentric screw feed and other LANDIS features are fully explained in our catalog.

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Waynesboro, Pa.

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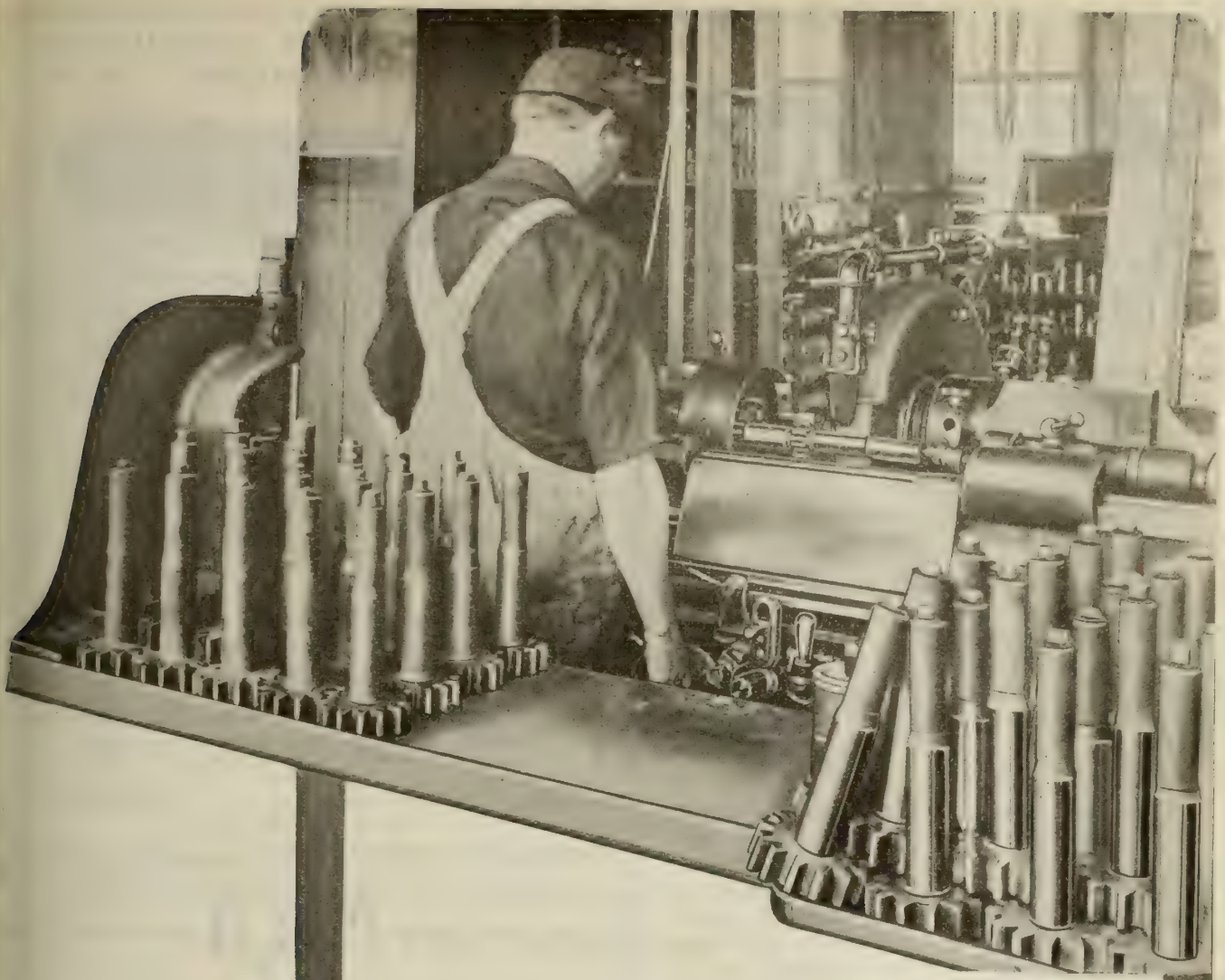

Here's Pinion Shaft Grinding On a Norton

This photograph was made in one of the well-known automobile factories, and shows just how Pinion Shafts for a well-known truck are being produced. In the rough these shafts have a diameter of about 1¼ in.; from .018 in. to .020 in. of stock is removed, the operator being allowed a tolerance of .0015 in. and the output is approximately 200 daily. The machine shown here has been in constant use over 8 years, has required hardly any repairs, and has always given splendid satisfaction.

This is fairly good grinding, but no better than you should obtain. Compare your results and if you are in need of additional information, write to us. We'll be glad to help you.

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Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 41A

The Snagging of Unannealed Malleable Iron Castings

Grinding the Hard or White Iron Castings

White iron castings that have not been annealed are usually ground on double-end floor stands. The sizes and shapes of wheels correspond to those mentioned previously.

Abrasive

In the case of the unannealed iron, we have a dense, brittle metal, the carbon being combined with the iron. It is hard from the standpoint of penetration, but of low tensile strength. These conditions call for a carbide of silicon abrasive, such as Crystolon.

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The grains employed on these hard castings range from 16 to 24, and the grades from R to U Crystolon vitrified. The wheel that is found most frequently to meet the conditions imposed by these castings is the 20-S Crystolon vitrified wheel, although for small castings up to five pounds in weight with light fins, 16-R Crystolon will give satisfaction. Also, when a slightly harder wheel is desired, 16-S Crystolon will usually answer the purpose.

However, the thin, sharp fins that are found on such articles as hard pipe fittings, for instance, call for 16, 20 or 24, grades T and U Crystolon vitrified. Also semi-automotic means of applying certain hard castings (as agricultural links) to the wheel, call for grades T and U Crystolon.

For the average run of white iron castings, the 20-S Crystolon wheel will answer the purpose in 60 per cent. of the cases, the 16-S Crystolon in 20 per cent. and the remaining 20 per cent. will be divided among 16-R, 16-T and 20 or 24-U Crystolon vitrified.

NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

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Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

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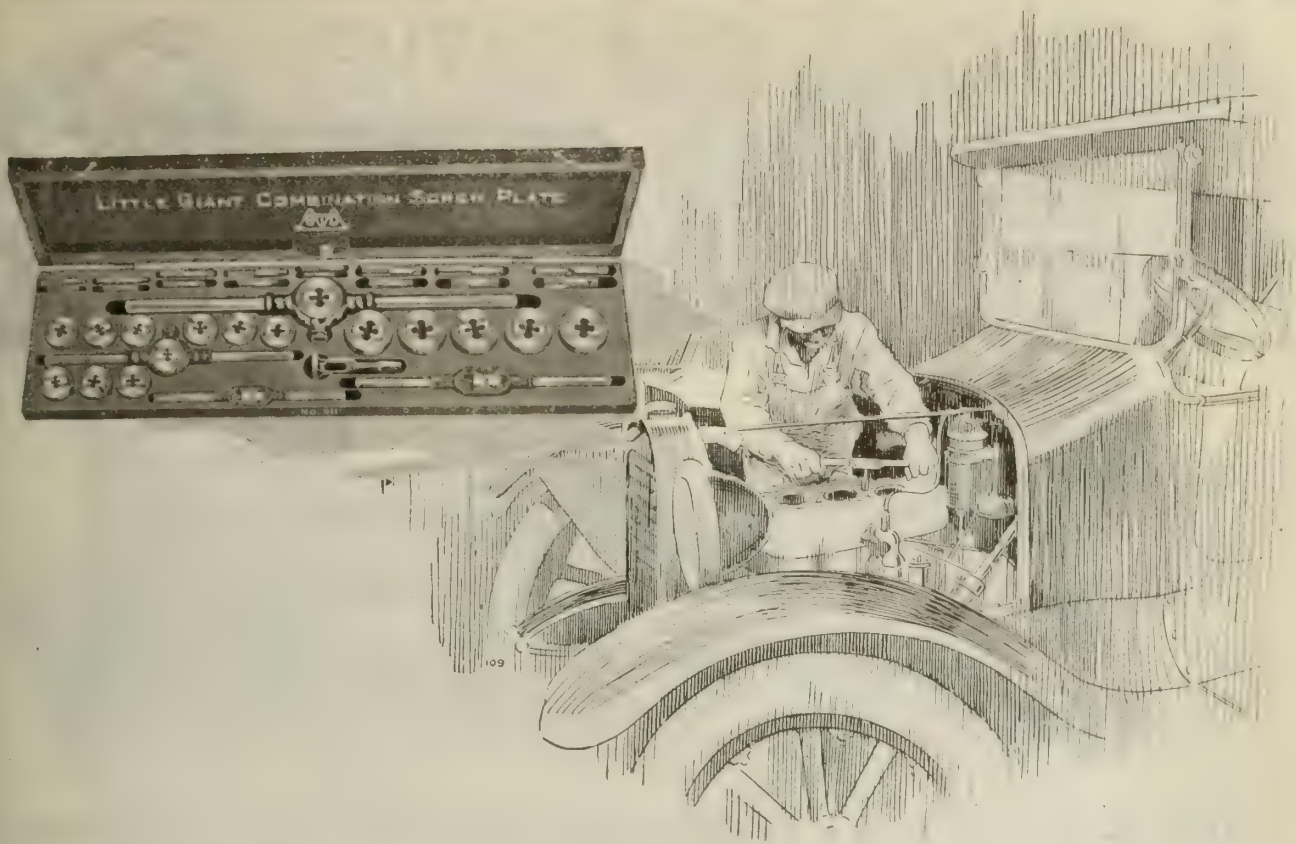

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QUANTITY and quality production simply must follow the use of McDougall Gap Lathes.

The high grade workmanship, materials and liberal proportion of parts all make for unusual strength, rigidity and accuracy.

BE SURE TO INVESTIGATE THE McDOUGALL GAP LATHE.

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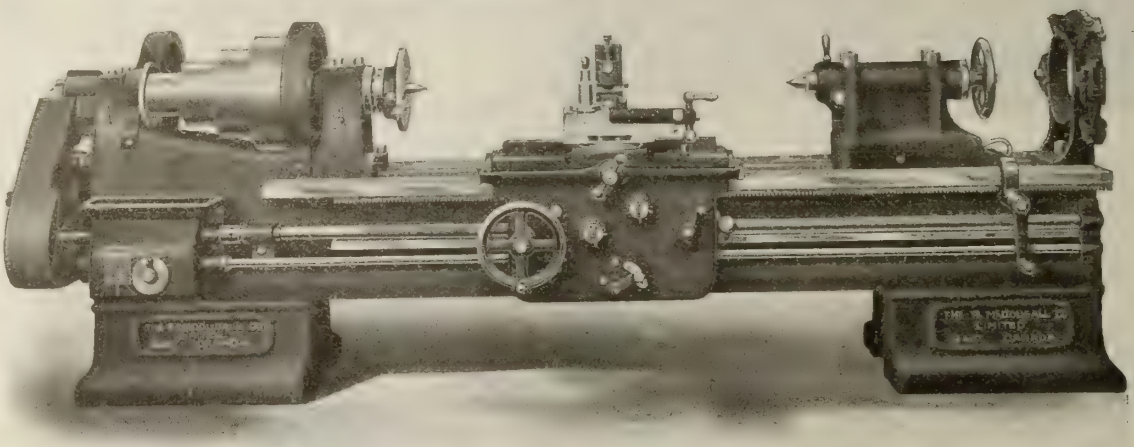

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Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

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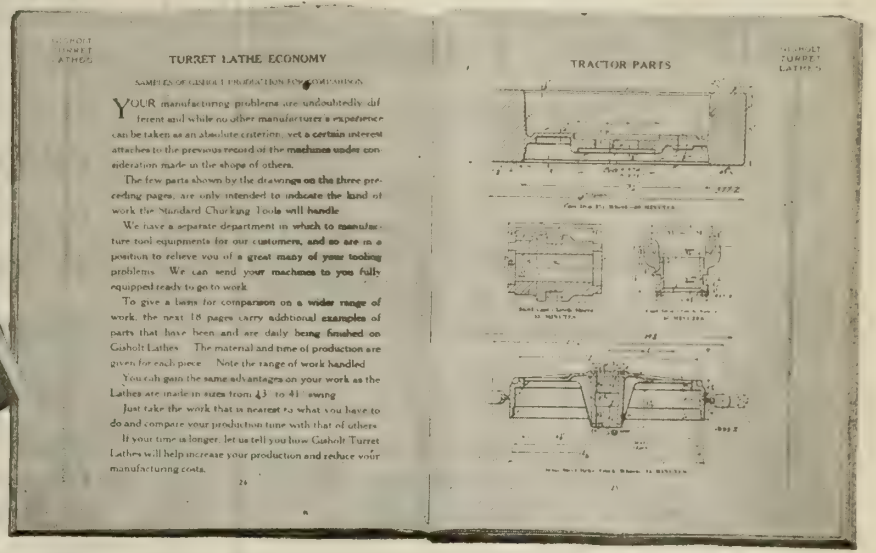

TURRET LATHE ECONOMY

SAMPLES OF GISHOLT PRODUCTION FOR COMPARISON

YOUR manufacturing problems are undoubtedly different and while no other manufacturer's experience can be taken as an absolute criterion, yet a certain interest attaches to the previous record of the machines under consideration made in the shops of others.

The few parts shown by the drawings on the three preceding pages, are only intended to indicate the kind of work the Standard Chucking Tools will handle.

We have a separate department in which to manufacture tool equipments for our customers, and so are in a position to relieve you of a great many of your tooling problems. We can send your machines to you fully equipped ready to go to work.

To give a basis for comparison on a wider range of work, the next 18 pages carry additional examples of parts that have been and are daily being finished on Gisholt Lathes. The material and time of production are given for each piece. Note the range of work handled.

You can gain the same advantages on your work as the Lathes are made in sizes from 4½ to 41" swing.

Just take the work that is nearest to what you have to do and compare your production time with that of others.

If your time is longer, let us tell you how Gisholt Turret Lathes will help increase your production and reduce your manufacturing costs.

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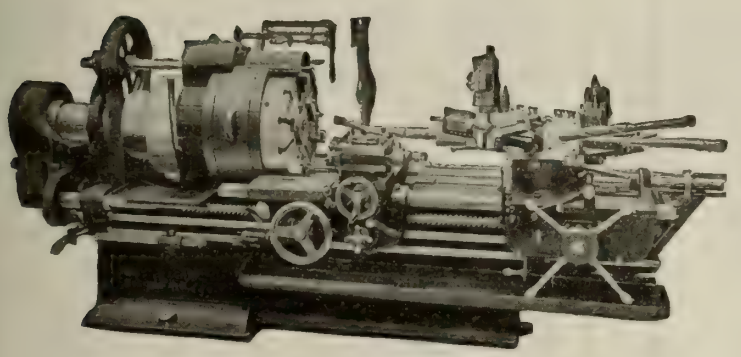

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is ready for distribution. One hundred pages of interesting information to assist you in solving your manufacturing problems.

A new book full of information data regarding the work produced. Especially valuable now that your immediate problems must concern getting back on a pre-war basis of manufacturing. *Send for your copy.*

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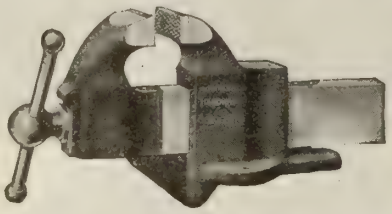
COLUMBIAN
Sledge-Tested VISES



All Good Points In One Vise

NO matter what other make of vise you favor you'll find its best features in Columbian Sledge-Tested Vises — and in addition, many good points of its own.

Some men select a vise for deep jaws. Others want a vise with removable steel jaw facings. Still others attach most importance to simple, quick-acting adjustment of jaws or swivel base.

Columbian Sledge-Tested Vises will give you all of these and in addition an unbreakable vise. Columbian is the only hollow-jawed, malleable iron vise made. You can hammer it with a 16-pound sledge and not break it. It is twice as strong as a cast iron vise and you can obtain a Columbian Vise in any style or size you want at the same price you'd pay for an old-style vise.

The makers of Columbian Sledge-Tested Vises are the largest makers of vises in the world. A thousand jobbers and mill supply houses sell Columbian Vises.

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ALUNDUM for steel and other materials of high tensile strength.

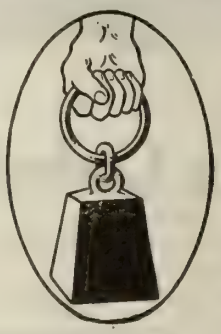
CRYSTOLON for cast iron, brass and other materials of low tensile strength.

Norton wheels are fast, accurate and cool cutting.

There is a Norton wheel to fit the job whether that job be one of tonnage, finish or both.

Put your grinding problem up to us. We study our customers' requirements and keep a large stock to meet them.

For anything mechanical write our nearest house.



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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 15 April 10, 1919

Manufacturing the Banner Hosiery Machine, Part II

Being a Continuation of the Previous Article on This Subject—Further Operations, Together With Photographs, Are Described in Detail—Part Three Will Follow at a Later Date

By ROBERT MAWSON

IN the previous instalment of this article some of the special fixtures used by the Hemphill Mfg. Co., Pawtucket, R.I., for machining elements used on hosiery machines known by the trade name of "Banner" were described. All the examples shown and described were operations performed on Jones and Lamson automatics.

In this part of the article some other equally interesting illustrations of work done with special fixtures on Jones and Lamson will be shown and described. Afterwards the machine tool departments will be treated in a similar manner.

When machining the carrier ring the first two operations are performed on Jones and Lamson machines.

The machine performing the first operation is shown in Fig. 1.

The casting is located by being held in three jaws at A, B and at the rear.

All these jaws are made with a fixed stop provided with a steel block, as may be seen; another block being tightened toward the casting forces it against the former block noted.

The casting is also pushed into the jaws until the lower surface of each lug comes against a locating pad.

At the lower part of the fixture a stop C is provided, thus accurately locating the casting in relation to the centre axis of the machine. The large hole is then bored to a gauge and the outside face machined until the flange is the correct thickness.

Note might be called here to the face

FIG. 1—FIRST MACHINING OPERATION ON CARRIER RING. FIG. 2—SECOND OPERATION OF CARRIER RING. FIG. 3—FIRST MACHINING OPERATION ON SINKER HEAD. FIG. 4—SECOND OPERATION ON DRUM CAM RING.

plate of this machine, on which may be seen a number of machined recesses.

These are for locating different fixtures, each of which is machined on the outside until it fits accurately into one of the recesses shown, thus insuring the axes of machines and fixtures coinciding.

The half tone Fig. 2 shows the fixture used when performing the second operation on the carried ring. At A may be seen one of the conventional type of plug gauges, this being used for testing the large bored hole in the first operation. The casting is located on an expansion plug which fits inside the large bored hole, the construction and method of operating the expanding medium being the same as described in the first section of this article. It will be seen that on this fixture the expanding plug is slit into four parts. There have been at different times discussions in various mechanical magazines, on which was the correct method and number of sections to split an expanding arbor, some writers quoting the and others four, or more as the proper divisions. It may be said here that at this plant some arbors are made with three, others four, and in some cases more, in each case equally good results being obtained. It seems, therefore, that satisfactory results may be obtained, not by the number of sections, but rather by the accuracy of the tool maker's work which is put into the tool.

After the ring has been placed on the arbor as shown, and the centre plug expanded, the outside edge and the face is machined, the tool being located and held on the Jones and Lamson automatic, as previously noted. One of the finish machined carrier rings is shown at the right of the fixture at B.

Machining the Sinker Head

The first operation when machining the sinker head is boring the inside large hole. For this purpose the casting is held on a three-jawed universal chuck, and the hole bored to a plug gauge, The casting is then placed on the special fixture Fig. 3, which is attached to the face plate of a Jones and Lamson automatic. The casting is held by the expanding arbor of the chuck being operated in the manner previously described. The edge of the casting is then faced, the outside turned and a groove machined on the outside periphery. The different tools used for these operations are held in the various stations of the machine turret. The sinker head shown in the half tone is one which had the various operations noted performed on it.

The illustration Fig. 4 shows a two spindle Jones and Lamson set-up for machining drum cam rings, for the second operation. One difficulty in performing this work is caused by the rings being somewhat thin in section, th dimensions being 7 in. outside diame and only ⅜ of an inch in thickness. T two sides which are faced must be a solutely parallel and to ensure this t expanding arbor is made with a turr shoulder against which the ring is pu ed. The expansion of the arbor th holds the part against the shoulder and also in a rigid manner for the machini operation. The outside diameter is th turned to the size noted and the outs face machined. The ring is tested by means of a go and no go gauge, that the correct thickness is obtained. the top of the turret may be seen a ri A before it has been machined by t second operation and one at B after t work has been performed on it. The t tools used for the machining operati are of the inserted bit type, and may easily observed by reference to the h tone.

Boring Widening Pick Cams

At this plant a number of fixtu have been designed so that several pie may be held and machined at one tin A study of some of these will be n made and should prove both interesti and valuable. The illustration Fig. shows the fixture which is used on Jones and Lamson for boring the wid ing pick cams. The fixture will hold castings at once, which are made of m leable iron. The pieces are located

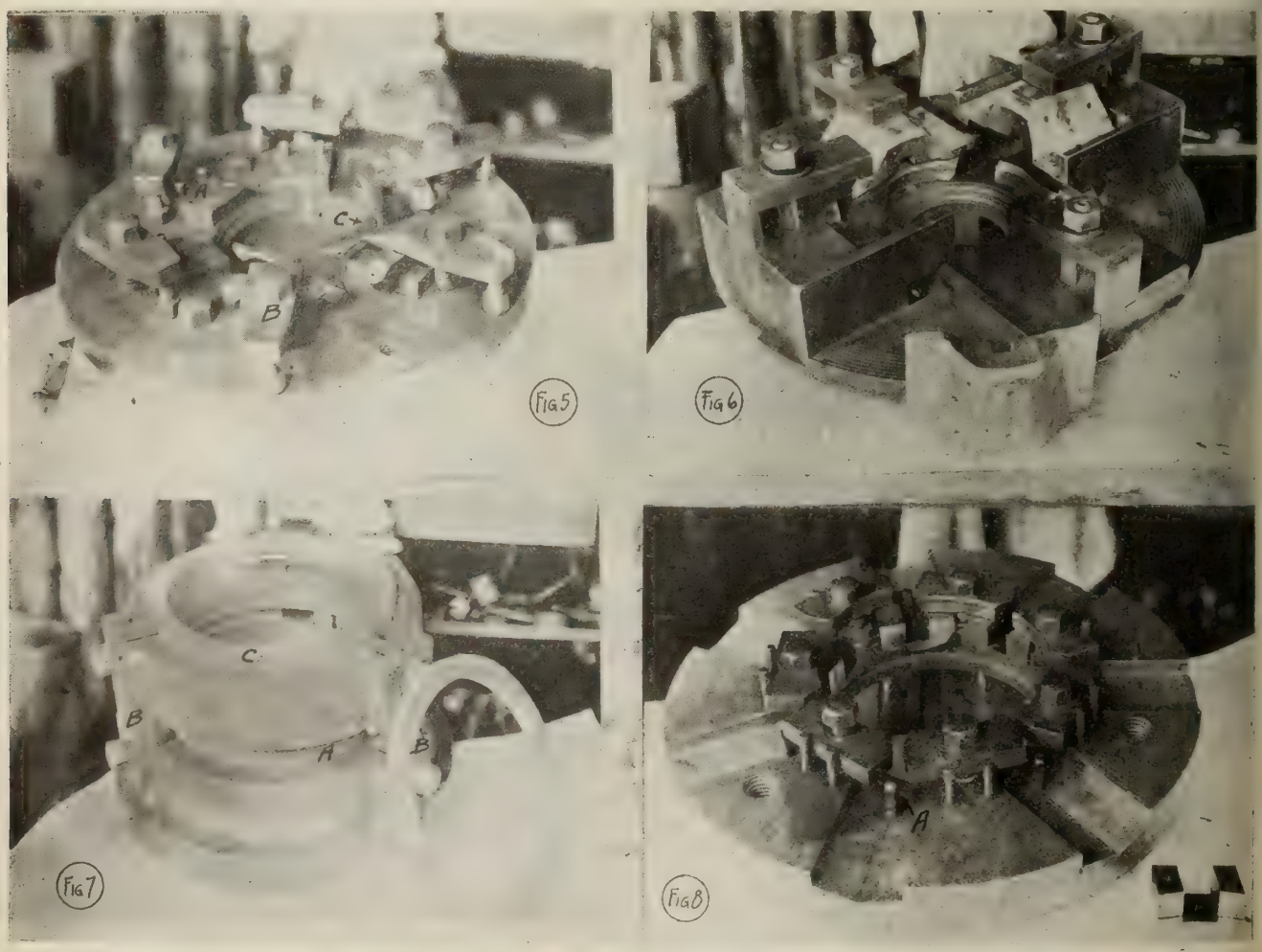
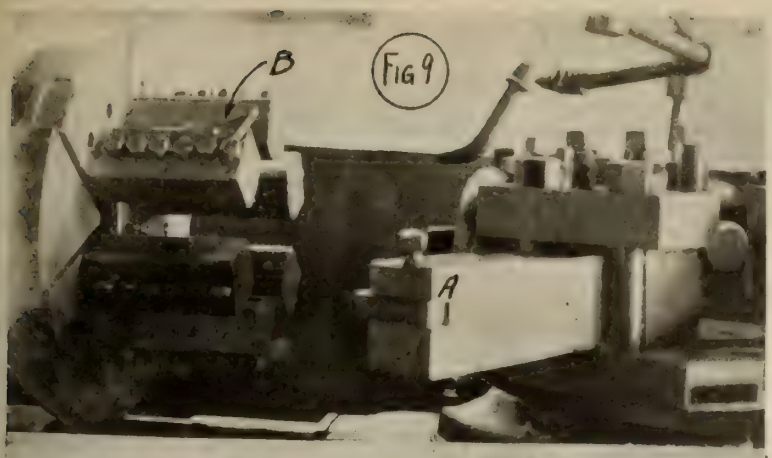
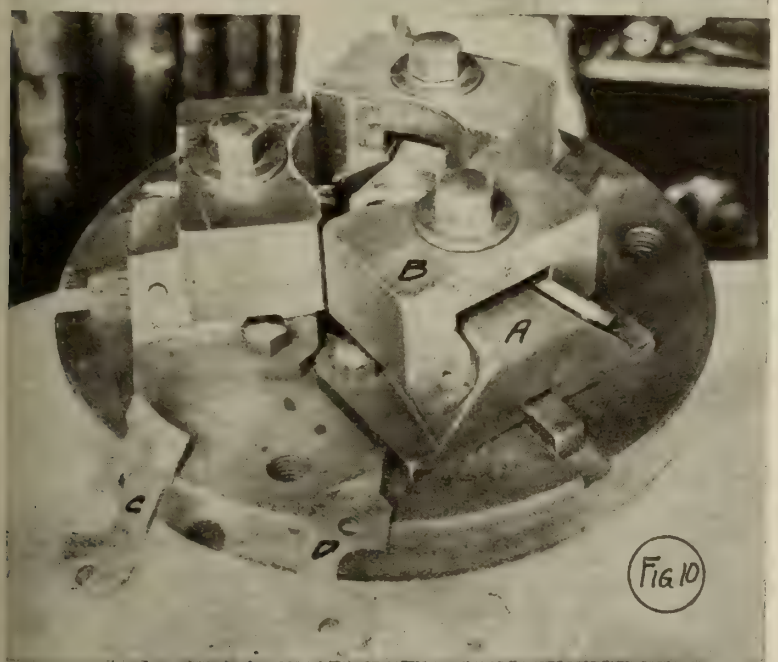
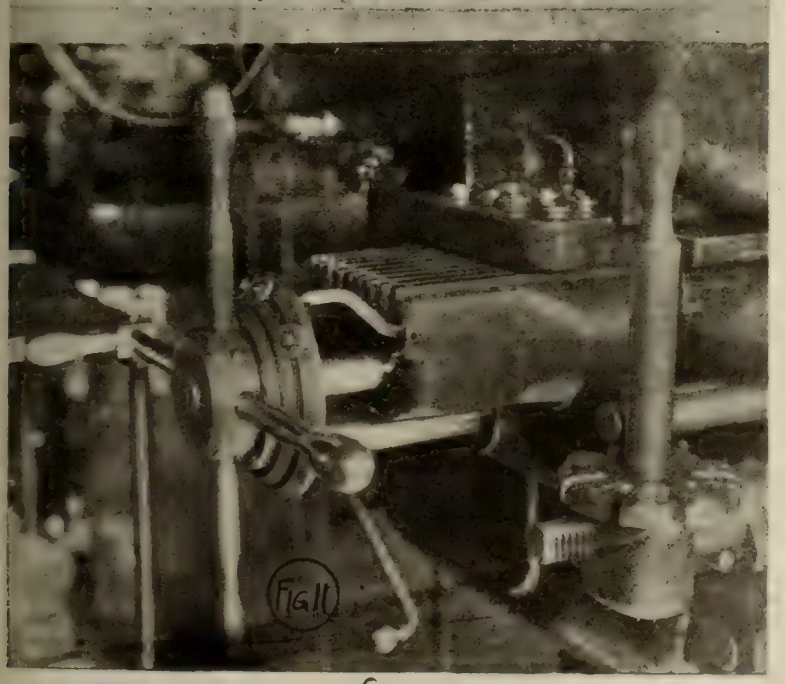


FIG. 5—BORING FIXTURE FOR WIDENING PITCH CAMS. FIG. 6—BORING FIXTURE ON CAM BLOCKS. FIG. 7—FIRST OPERATION ON DRUM CAM RINGS. FIG. 8—FIXTURE TO MACHINE RADIUS ON MOUTH PIECES.







C

FIG. 9—MACHINING INSTEP RAISE CAM

FIG. 10—MACHINING STITCH CAM

FIG. 11—DIAL USED ON AUTOMATICS

two pins at A, the casting being placed between them. The set screws at B are then tightened, which forces down the clamps onto the piece, thus holding it securely. Attention might be called to the construction of the clamps which are provided with a set screw tapped into the outer end. By adjusting this set screw the lever action of the clamps may be diminished or increased as desired. When the castings are in position, and held down, the inside jaws C are bored to a plug gauge, thus obtaining the correct form and diameter required. One of the finest bored pieces may be seen resting against the fixture at the left.

The half tone Fig. 6, shows a fixture used on a Jones and Lamson automatic for boring the cam blocks. This is the last operation on this piece, which is made from a die casting. The outside has been milled to the correct width and the various holes drilled, and a slot machined on the lower face. However, the inner face must be bored to a certain diameter and also true with the outside flanges. The fixture illustrated is used for this purpose.

The tool, it will be seen is designed to hold four castings at one setting. Each of these pieces is located by raised flanges, the inside dimensions being made to suit the width across the parts to be machined. The location outward is determined by a stop pin, against which the casting is pushed by hand. The four straps being then tightened against the upper surface of the pieces as shown hold them securely.

The inside edge is then bored to a plug gauge, and in front of the fixture may be seen one of the finished bored elements with the machined surface upward.

First Operation on Drum Cam Rings Rings

Our next example is the fixture used for the first operation on the drum cam rings, the work being again performed on a Jones and Lamson automatic. This fixture is made to hold two castings at once. The lower piece is slid through the slot A after the three clamps B have been dropped down out of the way.

The supporting ring C is also placed in the position shown by also dropping the holding clamps down. The six clamps, three for each ring, are then adjusted until the outside of the pieces run concentric in the machine. After this has been obtained the clamps are tightened against the pieces to hold them securely.

The inside holes are then bored to a gauge and the upper faces machined and one of the elements after this work has been performed is shown at the right of the fixture. It is obvious that after the operator has faced the upper casting the facing tool must be fed back and then down before a similar operation can be performed on the lower element.

The fixture shown in Fig. 8 is used for machining the correct radius on the mouth pieces. This tool is made with a receiving contour of a similar shape to that which the parts are made. The elements are then pushed into these re-

cesses and against a locating pin as A. When the operator forced them against these stops the clamps shown are tightened, thus holding the elements securely. The inside face is then bored to a plug gauge, and one of the finished machined parts may be observed at the right of the fixture.

Machining Instep Raise Cams

It will be observed that quite a number of cams are used on the hosiery machine; this medium is accurate and sure in its operation and therefore ideal for a machine of this type that is operated largely by women who have the supervision of a number.

The next example will be the machining of the instep raise cam, the duty of which is to raise the cylinder and therefore the needles when forming the instep of the stocking. These are milled on the edges, a hole is also drilled and tapped and a groove milled radially along the outer face. The operation here described is boring the inside surface to the correct radius to suit the outside diameter of the cylinders.

By referring to the half tone, Fig. 9, it will be seen that a Jones and Lamson is again employed for the machining operation. The cams are located by a tongue which is made to suit the milled groove. This tongue extends the full length of the fixture jaw, six of these being provided on the tool. The steel cams are therefore slid into the inside of the jaw and one of the screws shown on the outside screwed into the tapped hole of the element. By this method the tongue locates the piece and the screw holds it in position. The fixture is designed to hold thirty-six pieces, each screw holding a cam. As the method of holding is not very secure and a heavy cut could not be taken, several passings of the boring tool is taken until the correct diameter is obtained, determined by a standard plug gauge.

The boring tool is shown at A, and as can readily be seen, is of a rigid construction to prevent chattering, and thus ensuring a smooth finish. One of the finish bored cams is shown resting on the fixture at B, also the construction of the fixture may be plainly observed.

The illustration, Fig. 10, shows the fixture used when machining the stitch cams. These pieces, when finished, must have the inside face bored to suit the diameter of the cylinder, and further, the face must be at the same angle as the cam blocks, the machining of which has been previously described.

To obtain this dual result the cams are located on pins which are driven in blocks A, which have a similar angle and shape to the cam blocks. The cams, after being placed on the pins, are held in position with the strap B. The fixture is designed to hold six cams, three of the left hand and three of the right hand.

The inside face or edge is then bored to the required diameter. At C and D are shown two finish bored cams, left and right hand respectively. The fixture is held and located on the face-plate of the Jones and Lamson automatic in a manner similar to that previously described.

Improved Type of Dial Used on Machines

Every operator who has used automatics knows the loss of time caused by setting up work so that interchangeability of finished parts may be obtained. This is caused in a large measure by the rather poor arrangement of feed which affords no certain way that the operator may know exactly how much material is being removed. Much time is wasted by the set-up man testing the various machined surfaces with the aid of micrometers or gauges until the correct or desired results are obtained.

The illustration, Fig. 11, shows an arrangement which has been added to all the Jones and Lamson machines by the Hemphill Company to avoid this trouble. The dial on the feed screw is about six inches in diameter and is graduated on the beveled edge to read to 1,000 parts of an inch, figured from the travel of the feed screw. A large pointer has been also attached to the machine as shown, the point being in line and close to the graduated edge. Around the circumference of the beveled edge is machined a slot which may be seen by referring to the half-tone. Small discs are held in this slot by means of a setscrew, which taps into retaining nuts and can slide freely in the circular slot. There are the same number of discs attached to the dial that there are stations in the turret of the machine or tools used for the machining operation. These discs are marked on the quarters with the numbers 1, 2, 3, 5 and 6, according to whether the machine is a 4 or 6 turret.

To operate the dial arrangement, taking for an example station No. 1, the operator machines the part in question until he obtains the correct size. He then places one of the discs with the No. 1 directly in line with the pointer and fastens it there by means of the screw tapped into its retaining nut. A similar procedure is followed out for all the other stations, care being taken to place the No. 2 on a disc for No. 2 station and so on for each. The machining operation on any piece is then much simplified, the man being only called upon to turn the dial by means of the staves until the disc with the same number as the station operating is in line with the pointer, when he is sure to obtain the desired size required.

A further advantage of the arrangement is that, should the operator desire to take a thousandth of an inch more off a certain section, it is only necessary for him to turn the disc in question so that the pointer will be opposite one graduation past the line indicated by the disc. These spaces representing one thousandth of an inch of feed or material removed on the diameter are well separated owing to the large diameter of the dial plate, and thousands of an inch can be easily split into half thousands, or even quarter thousands, depending on the accuracy of the operator's eye. However, for ordinary manufacturing work, thousandths of an inch are usually considered close enough, and when exact work is desired or necessary, grinding after the turning operation is resorted to.

It will be noticed that the index for the various turret stations provided with the machine is in close proximity with the special dial arrangement here described, and therefore chances of error which might occur by the operator setting a different number of disc to a certain turret station is remote and would be caused by rank carelessneess only. Under the arrangement here illustrated much worry is removed from the man's mind, enabling him to do better and more productive work. It is found also that the operator quickly becomes accustomed to the arrangement which in a very short time may be considered automatic in its nature.

About Unemployment.—Frank Watkinson, at the Toronto Labor Temple estimates that there are between twenty and twenty-five thousand men out of employment in the city, and that this number is daily increasing by reason of the number of soldiers who are returning to Canada, and who have finished their vocational training courses and are upon the Labor market. A more conservative estimate by a public official places the figure between ten and fifteen thousand. The Ontario employment office in Toronto has positions on farms for five hundred men. Of this number one hundred and twenty-five are for married men. Officials there seem to believe the Labor situation is not serious, as they are experiencing difficulty in placing men on farms; even those with farm experience are not trying to locate themselves in the country as a medium of earning a living. The official stated that if there were 25,000 men out of work in the city, that close to 20,000 had enough money to live on for some time, as they were not applying for work.

Scotia's Annual Meeting.—The annual meeting of the Eastern Car Co. and the Nova Scotia Steel and Coal Co. was held at New Glasgow. At the meeting of the former company the directors recommended for payment a dividend of six per cent. on the preferred shares. Two years' dividends were due on this stock and the dividend now declared, and which is payable April 15, is for the year 1917. It was decided not at this time to pay a dividend for 1918. The company has orders on hand from the Government that will keep the shops going for three months. D. H. McDougal was re-elected president, and W. D. Ross of Toronto, was elected vice-president. At the Steel Company meeting only the ordinary business was transacted and reports of President McDougall and the directors were presented. The former directors were elected without change. Col. Thomas Cantley, chairman of the board of directors, presided. The work of overhauling the plant is still going on.

Shop Arithmetic; Use of Decimal Fractions

The Third of a Series in Practical Mathematics For the Mechanic and Those Learning the Machinists' Trade—The Present Article Takes Up the Subject of Decimal Fractions and Explains the Micrometer

By J. H. RODGERS

STANDARDIZATION in every branch of industrial activity, calling for greater accuracy in manufacturing machine tools of every description, to insure of interchangeability, now demands much closer measurements than are practically possible by the use of ordinary or vulgar fractions. Probably the smallest graduation that can readily be determined without the use of scientific measuring instruments is one-hundredths of an inch, and divisions that have a smaller value than this cannot be correctly marked on the ordinary steel scale, and even if they could their value would be negative, owing to the fact that the eye of the average mechanic is seldom, if ever, trained to such close observation, nor would it be considered advisable from a mechanical or physical standpoint. The principle upon which all precision measurements are calculated is derived from the decimal system. This method of finding accurate distances and angles is incorporated into every form of computation, whether it be mathematically or scientifically applied.

In respect to common or vulgar fractions it will have been noted that the denominator could have been expressed by any number, but as the name implies, decimals are numbers represented by a tenfold increase or decrease, so that decimal fractions would have for their denominator the numbers 10, 100, 1000, etc.; or in other words, 10 or some power of it. It is seldom, however, that the denominator is used when expressing decimals, the value being determined by the position of the various figures in relation to the decimal point. Referring to Chart 1 it will be seen that the decimal point is located between the whole number and the first figure of the decimal fraction. When a decimal part of a unit is to be expressed alone, the decimal point will be located at the extreme left of the number.

Before going further it may be well to show how a vulgar fraction is changed to a decimal of the same value. Suppose it is required to express ¾ as a decimal. It has previously been stated that the denominator of a decimal fraction is always 10 or a power of 10. Therefore, it is necessary to change ¾ to a fraction having a denominator of 10, 100 or other power. For an accurate conversion it will be required that 4 be a factor of the new denominator; thus, 4 is not a factor of 10, but is of 100, therefore, by the method shown in the last lesson the new fraction and the decimal equivalent will be:

$$\frac{3}{4} = \frac{75}{100} = \cdot 75$$

The above has been given to show the process of conversion, but the simple method is to divide the numerator by the denominator for the direct result; for instance:

$$\frac{3}{4} \quad 3\cdot 0 \quad 0\cdot 75$$
$$28$$
$$20$$
$$20$$

To make the above conversion more clear. It will be seen that the 4 is not contained in the 3, so that it is necessary to alter the expression in order that the division may be performed. To do this, place a decimal point after the 3, and likewise in the quotient, and annex ciphers to the dividend until the work is completed, proceeding as in the ordinary division. What is the decimal equivalent of 27-64?

$$\frac{27}{64} \quad 27\cdot 0 \quad 0\cdot 421875$$
$$256$$
$$140$$
$$128$$
$$120$$
$$64$$
$$560$$
$$512$$
$$480$$
$$448$$
$$320$$
$$320$$

This would read: four hundred and twenty-one thousand, eight hundred and seventy-five millionths.

$$\frac{421875}{1000000}$$

When expressing a decimal as a vulgar fraction care must be taken to move the decimal point. For instance:

$$\frac{1}{4} = \cdot 25 = \frac{25}{100} \left(\text{not } \frac{\cdot 25}{100}\right)$$

$$\frac{\cdot 25}{100} = \cdot 0025 \quad \frac{\cdot 25}{100} \Big) \cdot 250 \Big(\cdot 0025$$
$$200$$
$$500$$
$$500$$

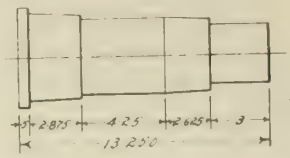
It will be well for beginners to become familiar with Chart 1, showing the relative value of the different positions to that of the decimal point. Thus:

$$\frac{13}{1000} = \cdot 013$$

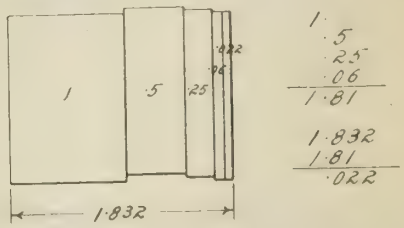
$$\frac{25}{10000} = \cdot 0025$$

$$\frac{5}{1000} = 005$$

Addition of decimals is much the same as whole numbers, the essential point being to place the various numbers in a systematic order, so that the decimal point will always come in the same vertical line. This is imperative for accurate calculation. Example: To check up the overall length with the various detail dimensions in the wrist pin here shown.



No difficulty is experienced in subtraction of decimals, as it differs very little from the integral method, the same precautions as previously described being adhered to. In making up a dimension of, say, 1,832 inches from standard measuring blocks, as here shown, it is desired to know the thickness of the fifth block A.



In addition and subtraction, position of the digits is of vital importance, but in multiplication and division, location is neglected for convenience of calculation. The essential consideration in multiplication is that the product will contain decimal places equal to the sum of those in the multiplicand and the multiplier. Thus:

$$\cdot 875 \times \cdot 046 = \cdot 040250$$

3 places 875 2
3 " 046 1
5250
3500
6 " ·040250 2

It will be seen that when the above multiplication is completed there is only five places in the product, so that it is necessary to add a cipher on the left to complete the problem. In this instance the decimal point happens to fall in the same position, but the result would be the same in any case.

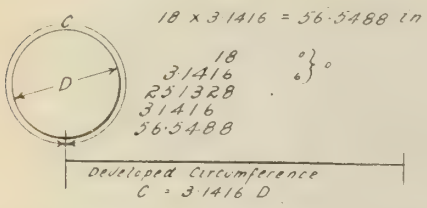
$$13\cdot 125 \times \cdot 6 = 7\cdot 875$$

3 places 13·125 3
1 place ·6 6
4 places 78750

10 - 0
0

The cipher to the right may be eliminated as it has no value.

When dealing with fractions it was stated that the constant accepted as the ratio of the circumference of a circle to its diameter was 3 1-7, but while this is reasonably accurate, the constant generally recognized and used in all engineering practice is 3,1416. Using this latter multiplier, what would be the circumference of a sphere 18 inches in diameter?



The division of decimals is virtually the same as the division of whole numbers, but owing to the presence of the decimal point, is often confusing to beginners. Some advocate the entire neglect of the decimal conditions until after the division has been performed, and then locate the point in the proper position in the quotient. The writer, however, prefers to eliminate the decimal point in the divisor before the work is commenced, by moving the point in the dividend to the right sufficient to make the divisor a whole number. That is, by multiplying the divisor and the dividend by the same number does not alter the conditions of the problem. This rule was explained in dealing with vulgar fractions. For instance, to divide

4·09375 by ·25

multipy each number by 100, by moving the decimal point two places to the right, thus:

```
4·09375 ÷ ·25 = 409·375 ÷ 25
25)409·375 (16·375
   25
   159
   150
    93
    75
    187
    175
     125
     125
```

With this method the decimal point is always treated as one of the figures in the dividend and brought down and also placed in the quotient at the same time. To divide 32.65 by .7854, place the numbers as in ordinary division, as:

```
·7854) 32·65 (
```

To convert the divisor to a whole number it is necessary to multiply it by 10,000, and to maintain the relative value of the problem it is likewise necessary to treat the dividend in the same manner. This can be done by simply moving the decimal point four places to the right, adding ciphers in the dividend if required. The question then becomes:

```
(a)   (b)      (c)
·7854 32·6500· 41·571
      31416
       12340
        7854
        4486·0
        39270
         55900
         54978
           9220
           7854
           1366
```

In work like the above, where many figures are involved, it is always well to check the work. This can be done by the method explained in the first lesson —by casting out the nines. To prove division, the process is simply reversed: that is, multiply the quotient by the divisor and add in the remainder, the result should correspond with the dividend. For the above question the proof would be:

(41·571 x 7854) + 1366 = 326500

However, to work this out in detail, entails considerable effort, and the chances of error are quite evident, and therefore, the simple method of "casting out the nines" is suggested for checking problems involving many figures. With the index letters a-b-c-d, representing the final remainders after casting out the "9's", the rule for proving may be expressed as:

$$(a \times c) + d = b.$$

which is the general rule given above.

For this specific problem the proof would be:

$$(6 \times 0) + 7 = 7 = b$$

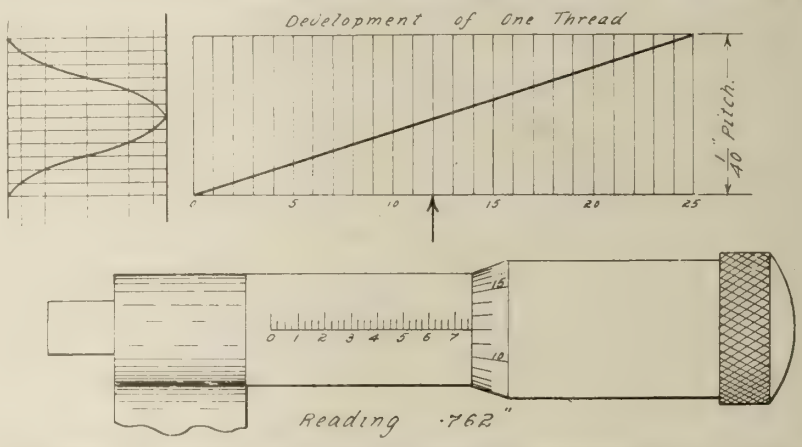
This can be done mentally, and with absolute accuracy, after a little practice, thus offering an immediate check on the correctness of the work.

The instrument that demonstrates the practical application of the decimal system, and one of direct interest and vital importance to the engineering student, is the now widely used micrometer caliper, or simply micrometer.

The use of this instrument differs from the ordinary steel scale chiefly in the fact that the measurement is scientifically controlled, and the degree of accuracy is dependent more on the sense of touch than that of observation, although accurate reading is essential. It is not proposed to go into details regarding the construction of these precision tools, but a brief examination of their operation is necessary to demonstrate their relation to the decimal system. The pitch of the thread that is cut on the spindle, and which controls the lateral movement of the spindle, is 1-40 of an inch, or in other words, the screw has 40 threads per inch, and the circumference of the thimble on the inner end is graduated into 25 equal divisions; therefore a circular movement of one division advances the spindle:

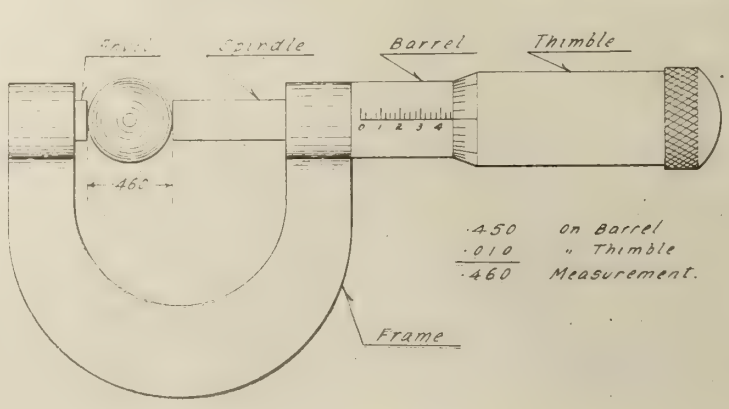
$$\frac{1}{25} \text{ of } \frac{1}{40} = \frac{1}{1000} = \cdot 001 \text{ inch}$$

To illustrate more clearly how this reading is obtained, the sketch below



shows, on an enlarged scale, the development of one thread of the screw, and the thimble graduations.

Continued on page 354



Getting Down to a Peace-Time Basis

Showing How One Firm, Utilized a Special Purpose Machine For Peace-Time Work, With Very Little Change or Expense to the Original Design—This Idea is Worthy of Note

By J. H. MOORE, Associate Editor CANADIAN MACHINERY

SCRAP those machines; they are no further use to us in our regular business. How often have you heard this same expression when speaking of machine tools used specially in the shell making business during the war-time rush? Quite often, no doubt, and perhaps in some cases with very good reason. Yet, are there not many tools still with a good peace basis life before them, scrapped because of the erroneous idea that once a shell tool, always a shell tool, or nothing?

It is not the intention of this article to convey the impression that every type of machine used for shell work can be converted into regular peace lines, but, the article does point out, one striking case in point where a cut-off machine, used to trim off the shell billets, and casings to size, was converted into a turret lathe with very little trouble or expense.

Not alone this, but owing to the large hole through the regular spindle head of this machine, its capacity for its relative floor space was much larger than could have been otherwise obtained. Another feature which helped the rigidity of this machine was its construction of cross feed carriage. The cut-off work, which it was called upon to do in war time, is an exceedingly rough and hard operation, causing considerable strain on the machine in general. For this reason, the carriage was originally designed to withstand such strain, therefore is of splendid rigid construction for such work in combination to the regular turret. The cross feed is also driven by means of a large bronze worm wheel, and even with very heavy duty no chattering is in evidence, which often happens on the ordinary turret lathe if too heavy a cut is fed.

To get directly into the exact procedure employed in the conversion of machine, let us start right at the beginning.

The headstock itself required no change, for at present it is geared about 5 to 1, giving ample driving power. There is also a three-step cone pulley on the lower driving shaft. A glance at the photograph accompanying article will show readers the belt going down to this pulley. The chuck used on the shell work was also O.K. for the new purpose, being of the universal three-jawed type. So we can safely say that absolutely no change to the headstock was required.

As regards the cross slide, its main construction also remains unchanged, the only change being the different type of tools used. Naturally this change was absolutely necessary for any case where different work had to be made.

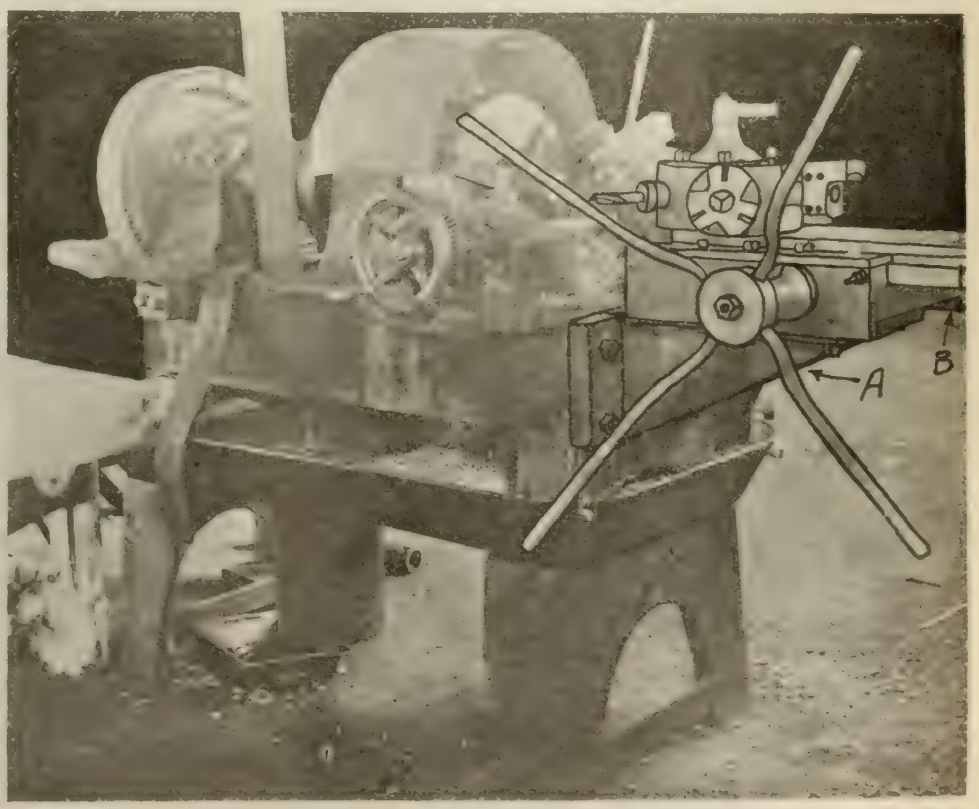
At the extreme end of the cut-off bed, a bracket, A, was fastened. Both the method of securing and its construction are plainly shown on photograph. Not only was this bracket bolted by good substantial cap screws, but after being lined up in place, ⅝ in. dowels were used as an extra precaution.

On top of this bracket was fastened the slide casting B. Its construction is exceedingly simple, as can be seen on photograph. This piece was also secured by dowels before completion. The turret slide was an old one they had on hand, and by going over the same to see as to its accuracy, they soon had a turret lathe capable of taking up to 4 in. bar stock, for the hole through the spindle is of sufficient size to accommodate 4 in. stock. The rest of machine is of similar size and rigidity, being well braced with solid ribs.

As for the tool equipment on this lathe, these points are not touched upon, because the tooling on such a machine depends entirely on the class of work being done.

The firm who so ingeniously converted this cut-off machine into a regular turret lathe, is the Globe Engineering Company of Hamilton, Canada, and their superintendent, J. Gough, who allowed the writer to photograph the machine, is directly responsible for the idea of thus licking the shell game cast-off into a regular production machine tool.

Sault Ste. Marie.—The Soo locks are ready for any vessels that may care to pass their way. Painting and repairs to the locks are completed. The lakes are now wholly free of ice, and ice which remains in St. Mary's River is not so heavy as to cause trouble to a freighter. A Canadian tug made a trip from the Soo into Little Lake George through the old ship channel and is the first steam vessel to venture out this year. If there is any request the canals will open at once. This would be the earliest opening of the Soo locks since they were established. The earliest date of opening was in 1902 when the first vessel went through on April 1. The new fourth lock will not open at once. Delay in arrival of certain machinery may postpone the fourth lock opening until early in July. The gates are hung, however.



GENERAL VIEW OF CONVERTED MACHINE

Some Interesting Brass Cock Operations

An Article Describing Two Interesting Operations, in the Manufacture of Brass Cocks, as Practised in a Well-known Canadian Plant Where Such Goods Are Manufactured

By J. H. M.

IN these days of modern production methods, speed, combined with good workmanship, is a necessity, and the two operations illustrated in the following article are examples of such a condition. The views were both taken in the plant of the Canadian Brass Co., Ltd., of Galt, Canada, where a full line of waterworks, gas companies, and plumbers' brass goods are manufactured.

Hexagon Milling Fixture

Fig. 1, the first of the views, illustrates the operation of milling the hexagon portion on brass stop cocks of the usual standard design. Referring to the view, we see that one of the operator's hands is on wheel, which feeds the work in and out, while the other hand is in a still lower position, grasping lever B, which operates the mechanism spacing the hexagon location attachment. Briefly the action is as follows:

The work is first placed between the stand "C" and screw, with suitable cap "D," operated in turn from handwheel "E." The stop cork is placed so that it points square with the milling end cutter, and the stand "C"' is raised or lowered until the portion to be milled is in line with the centre of the cutter. Of course, when once this height is set up, a large number of similar size cocks are run through at such position, but to change this height is only a matter a moment.

The work is fed in at a good rate of speed by the wheel "A," and returned as soon as milled. The lever "B," is now operated by the workman, which causes the cock to revolve until the next two edges to be milled come into position, and the same procedure is gone through once more. The telling of the operation in reality takes longer than the actual work, for the operator becomes so accustomed to the operation that he moves the various wheels and lever automatically. Such an idea as this need not be confined to the manufacture of brass goods only, but by adopting the same basic principle, other classes of work could be machined in such a manner to good advantage.

Oscillating Cock Grinder

The second and last operation shown in this article is that of grinding into place the key of cock into its seat. The work is done on machine, as shown in photograph, Fig. 2, which is so geared annd costructed at the back that an oscillating motion is obtained. A glance at the photograph clearly illustrates how this movement is obtained. The key itself is held in the chuck, while the operator, who has now started the machine, places, with a brush, some fine liquid emery paste on the stem. He then takes the body of the cock, and with a slight backward and forward movement grinds the two into place, the oscillating movement of the machine helping considerably in preventing the two pieces seizing together. After the cocks are finally completed they are tested under 150 lbs. water pressure. While no photograph of this testing apparatus was taken, still a general description might not be amiss for the reader's benefit.

The work is placed over a nozzle at the bottom end, and a screw with a covering cap is tightened by means of a handwheel down on the top. The pressure is now turned on when water comes up through the bottom nozzle and is balanced by a valve until 150 lbs. has been reached. Any leaks will, of course, be sure to show up at such a pressure, but as the manager of the concern mentioned to the representative of CANADIAN MACHINERY, the red brass as used for all this work seldom shows any flaws.

FIG. 1—HEXAGON MILLING OPERATION

FIG. 2—GRINDING THE COCK

WELDING AND CUTTING

WINFIELD ELECTRIC WELDING MACHINES

OUR illustrations show four products of the Winfield Electric Welding Machine Co. of Warren, Ohio, and a brief description is here given of each.

Fig. 1 shows the S48 sliding horn spot welder, which can be operated both by hand and foot power. It has a capacity of two ¼-inch plates, the overhang of the jaws being 4 feet. The greatest opening between electrodes is 3 inches. The distance between copper bands and the lower horn when the lower horn is at the top of its slide is six inches, and when the horn is at the bottom of its slide and the box post clamped to it, the distance is 26 inches. The dimensions of the lower horn are 2½ in. by 3 in., and the height from the floor to the centre of the welding points 42 in. The base is 26 in. x 42 in., the extreme height 66 in., while weight is about 3,000 lbs.

The equipment that accompanies the machine includes a 35 kw. transformer, enclosed auxiliary switch, which operates remote control switch, either automatically or not, as the operator desires. Three sets of 1¼ in. point caps, a swivel head, removable swivel foot lever, stop for regulating travel of upper electrode and foot treadle, wrench for adjusting the electrodes, and a ten-step self-contained regulator for controlling current.

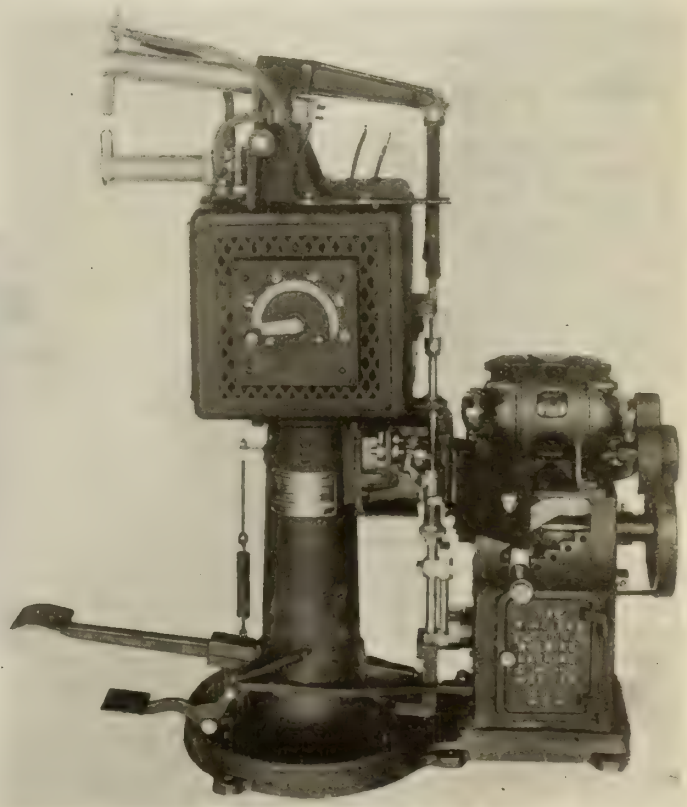
Fig. 2 is known as the B-10 No. 35 butt welder. This machine has a capacity of ½ in. to 1½ in. round stock, or stock of an equivalent cross-section. The transformer is 50 kw. capacity and the machine is equipped with LO step current regulator for adjusting the current, and water-cooled terminals. Back stops are provided to prevent the work from slipping, a hand toggle lever for upsetting work, and stops to regulate the amount of take-up in each weld.

Fig. 3 shows a B-13 butt welding machine designed especially for welding flat stock, capacity 9-16 in. x 4 in. flat stock. The floor space occupied is 60 x 36 inches, with an extreme height of 60 inches. The height from the floor to centre of the welding dies is 41 inches.

The transformer on this machine is of 75 kw. capacity. For compressing the stock a 5-ton double-action hydraulic ram is fitted. The upsetting lever carries an auxiliary switch which operates a remote control switch. There is one set of water-cooled welding dies and a ten-step self-contained regulator for controlling the current. Fig. 4 shows a regular S-6-M regulator motor-driven spot welder. In the illustration the switch door is shown open. It can be operated either automatically by small clutch treadle or non-automatically by large treadle. The capacity is two ⅛-inch plates, the overhang being 6 inches. The greatest opening between the electrodes is 1½ inches. The distance between horns closed is 4 inches, and the diameter of horns, 2 inches. The height from floor to centre of welding points is 43 inches, floor space 19 by 30 inches, with an extreme height of 48 inches. The machine weighs about 500 pounds.

The electric equipment includes a 10 kw. transformer and enclosed automatic switch with door and removable cover. One ½ h.p. Crocker-Wheeler constant speed a.c. motor with noiseless raw hide gears. The gear box carries gears which give six changes of speed. There are the necessary wrenches for adjusting the switch and electrodes, three sets of

FIG. 2—BUTT WELDER



MOTOR DRIVEN SPOT WELDER

water-cooled point caps, and a large removable treadle for operating machine non-automatically. A stop is provided for regulating travel of upper electrode and treadle, and six-step self-contained regulator for controlling current.

Another size of this machine is known as S-6-L, and has a capacity of 1-16 in. stock. It is furnished with a 7½ kw. transformer. Both the S-6-L and S-6-M machines can be furnished with sliding horn and belt-driven attachment if desired.

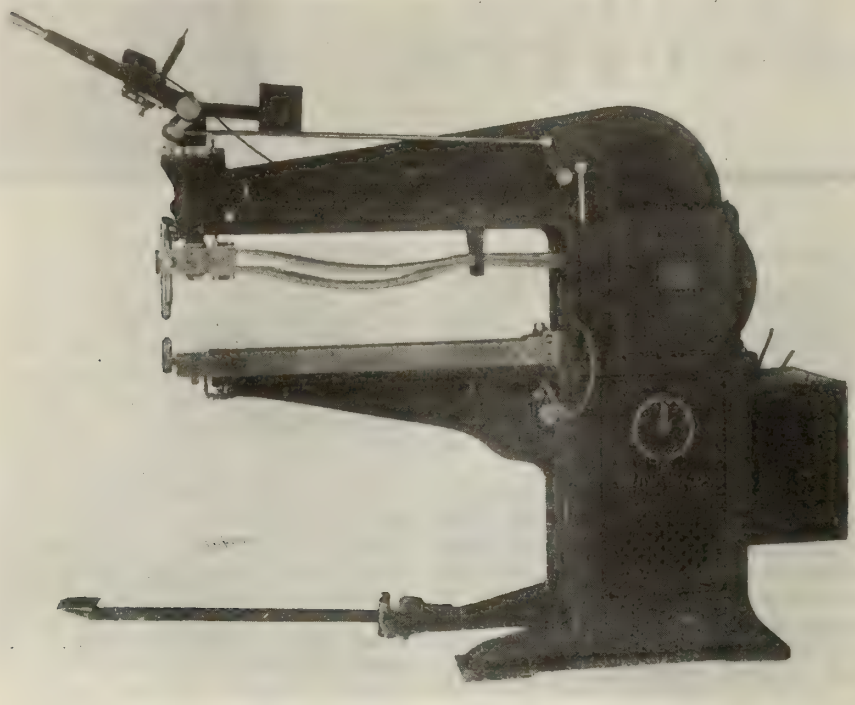


FIG. 1—SLIDING HORN SPOT WELDER

NOTES ON OXY-ACETYLENE WELDING

For brass, of which there are many variations, a welding-rod of new metal of the same composition approximately as the article to be dealt with, having a very small quantity of aluminum added after casting, should be used. This introduction of aluminum prevents the volatilization of the zinc, and to prevent oxidation and to dissolve the alumina, the flux used for copper is indispensable.

To weld, to merit the description autogenous, must be the result of fusing the metal of the two pieces to be welded, and the metal to be added to fill the V; so the operator must manipulate the flame in such a manner that the two bevelled edges receive equal heat and become molten at the same time as he drops some molten metal from the rod, and proceeds along the line of the weld, in a succession of little molten baths.

The commonest defects in welds are "adhesion," "oxidation," and blow-holes." "Adhesion" means that the added metal has been dropped into the V before the bevelled edges are properly molten, and has merely "stuck" instead of being welded in. Welds in ductile metal, such as iron and steel, are improved by hammering and afterwards annealing, providing the hammering is not done below a temperature of 800 degs. C. or thereabouts.

The scope of the oxy-acetylene welding process is wide, and its possibilities have not yet been realized and exploited to the fullest extent. Many manufacturers are, however, making use of it not only on repairs, but on new work, such as barrels, tubes, and tanks, in which the seams are welded instead of being riveted, and framework of all kinds, such as carriers and stands for motor-cycles. Repairs are effected on work of a very varying character, ranging in size from small carburettor details, to large ships' rudders and propellers.

FIG. 3—BUTT WELDER FOR FLAT STOCK.

ARITHMETIC COURSE

(Continued from page 349)

For a one inch micrometer the axial line on the barrel is divided into 10 equal divisions, each of which is subdivided into four others, so that one of the latter equals the pitch of the enclosed operating screw. As the thimble is rigidly connected to the spindle, it is evident that one complete turn of the thimble advances or retards the spindle 1-40 of an inch. Means are provided, however, to obtain finer measurements, by graduating the end of the thimble, to indicate the advance for a portion of a revolution. These divisions will represent a lateral change of .001 inch. When reading a micrometer remember that each main division represents 4-40 or 1-10 inch, the decimal equivalent being 1, and the subdivisions would be 1-4, 2-4 and 3-4 of one of the main divisions. The reading on the barrel of the above setting is:

$$\cdot 7 + \left(\tfrac{3}{4} \text{ of } \cdot 1\right) = \cdot 7 + \cdot 05 = \cdot 75$$

and the graduation of the thimble, coinciding with the axial line on the barrel, is 12, and as each division equals .001, the reading would be:

$$\cdot 75 + \cdot 012 = \cdot 762$$

Ordered Drags.—J. G. Cameron, road superintendent for the United Counties of Stormont, Dundas and Glengarry, has ordered 20 road drags from the Ontario Bridge Co., Ltd., of Toronto.

WHAT OUR READERS THINK AND DO

GRINDING A MASTER HOB

By J. H. M.

THE following article is presented in this section of CANADIAN MACHINERY with a double purpose in view, the first being to answer a query sent in by J. Davis of Oshawa relative to this subject, and secondly, that all readers can follow the description of procedure as mentioned herewith, writing their views on the subject should they have another or better method of accomplishing this required operation.

Fig. 1 illustrates an exact duplicate of the sketch as sent in by Mr. Davis, and following are the exact words as written to us in his letter: "Here is a problem that has given us considerable trouble. How would you grind correctly the master hob shown on sketch? The hob is as near perfect as it can be made, in lead or pitch, depth of thread, angle of thread 60 degrees, and taper Briggs Standard. It is to be used for making special taps, and must not show more than .001 inch error in any direction after it is ground."

To begin with, the writer of this article referred to Machinery Handbook, Page 1061, and found that the nearest size pipe hob for similar work, conformed to the sketch shown on Fig. 2. A hob of this nature should not be so difficult to make, provided the machinery and hardening operations have been carried out with care. It will be noticed that slight differences of diameter and length are shown between the engineer's hob and that mentioned in the Handbook, but the taper, which is after all the main feature, is the same in both cases, namely, ¾ in. to the foot. It will be particularly noticeable that 26 flutes are suggested instead of ten as used by Mr. Davis. This is a significant point.

In the writer's opinion the best method of doing this work would be on a regular cutter and reamer universal grinder, but should this not be possible in the particular case in point, the work could then be done on the lathe, making sure a face plate is used, with dog to hold the work, or rather the mandrel supporting the work.

The reason for this method of grinding is of course self-evident, namely in order to ensure that both centres are dead centres, similar to any grinding machine. If this is not done, naturally the work has not the same chance of accuracy.

A portable grinder of good design can then be mounted on the lathe, making sure it is set to the proper angle of ¾ in. to the foot, and that the wheel is properly dressed. It is imperative that the wheel be correctly dressed, otherwise no good accurate work can be accomplished. Taking it for granted that the work is set up as suggested, traverse the wheel over the work in the usual manner.

Other points which Machinery Handbook mentioned particularly, are as follows: that all taps must be relieved both on the top and in the angle of the thread, also that usually the flutes of these hobs are cut with a 50 degree single angle cutter.

The writer will conclude by quoting the experience on a similar hob, which a friend of his passed through. This particular party was superintendent in a well-known machine plant, where the custom was to order their hobs direct from the manufacturers of such tools. No success was experienced with these hobs, although they were of a well-known and much boosted line. No rake was given on these whatever, and on taking the matter up with the firm concerned, they mentioned that only by special request did they place rake on their hobs, as it was not considered necessary. However, to make a long story short, the hobs were changed as shown in Fig. 3, where A illustrates how the hobs were first, and B shows how they were later made. After being thus changed they worked splendidly. The material these hobs were cutting was high grade carbon steel.

And now to the readers. Have you any such experience, if so how did you overcome it? Exchange of ideas is well worth while, so let us hear from you.

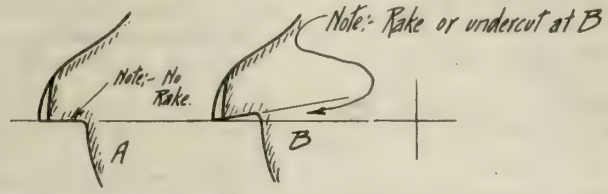


Fig. 3.

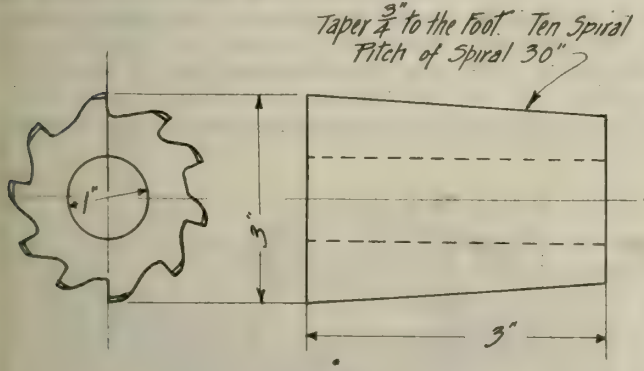


Fig. 1.

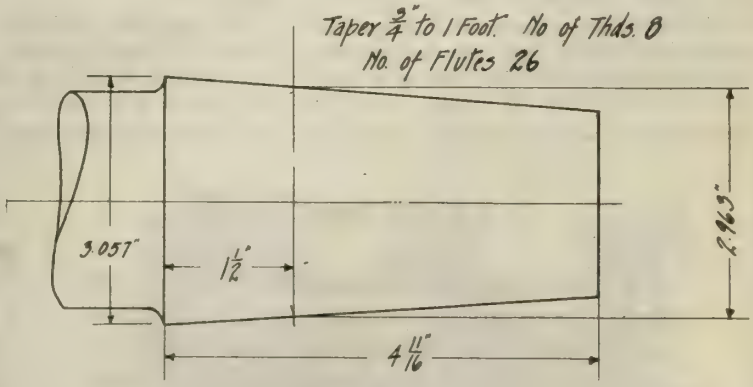


Fig 2

AN IMPROVISED SOFT FACE HAMMER.*

By Leon A. Prescott

When it is necessary to pound certain metals such as brass, nickeled or finished work it is desirable to use a hammer which will not damage or mar the surface. Such a tool is called a "soft face" hammer. Hammers with babbitt-metal hears are regularly manufactured for this purpose and are very convenient. But an impromptu tool can be assembled easily as suggested in the illustration. First a piece of leather belting is cut as shown at A. Then this strip of leather is arranged on the hammer head as suggested at B. The hole, H, must be large enough so that the hammer handle will slip through it. The leather protective strip is fastened by driving a tack through the position T into the wooden handle. When pounding on objects that should not be marred, the blow is delivered with the side of the hammer head, which is protected with the leather.

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TO STRENGTHEN AN AXLE BY REMOVING METAL

By A. J. GRAY

We are having continuous trouble with the axle of a logging car. The axle apparently gradually fatigued and broke off on the outside of the bearing close to the collar, as shown in Figure 1.

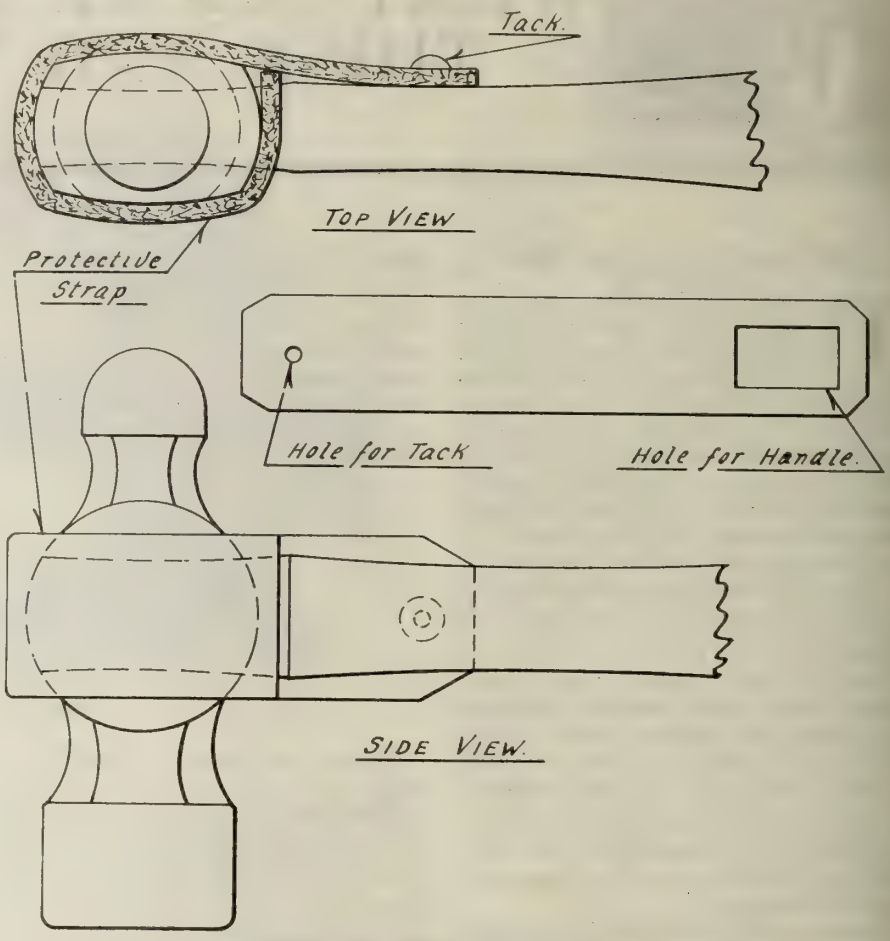
The roadway is not as smooth as might be, and the continual pound had a hammering effect that caused the break, in spite of the fact that the axle had a more than sufficient factor of safety to take care of all the dead load.

The trouble was remedied by tapering the axle to the centre, as shown in Figure 2.

The explanation of the fact of removing the metal from the centre of the axle having a strengthening effect, is found when it is understood that the reason for failure was the hammering on the axle caused by the poor road-bed. The force tending to cause fracture would be the foot-pounds of energy that has to be absorbed at the neck of the axle where the break occurred.

Energy is a combination of two factors. That is, eneregy = force × space. It will follow that the greater the space moved through, the less will be the force of resistance caused in absorbing the energy.

This explains the fact of the axle as made to Figure 2, being the strongest, as in giving slightly at the centre it allows more give at the neck, which is equivalent to a greater space moved through to absorb the same amount of energy of the pounding, thus producing less strain in the metal axle.

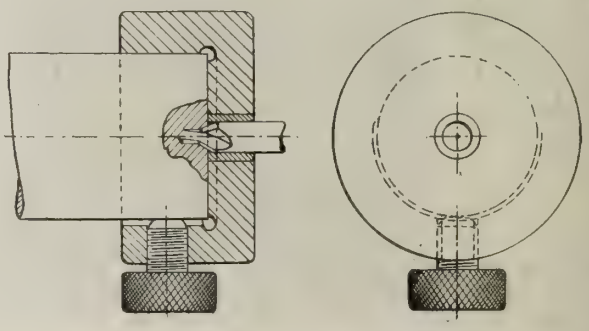


IMPROVISED SOFT FACE HAMMER

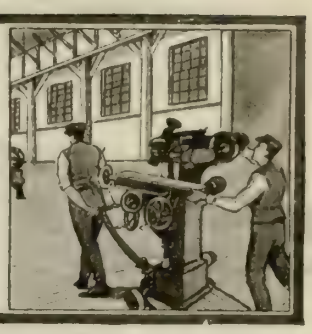
Incorporation has been granted to the H. M. Lane Co. to carry on the business of general consulting engineering, designing and construction work; and the manufacture, sale and installation of all kinds of machinery and manufacturing equipment. Capital is $10,000, and the head office and place of business of the company is to be at Windsor, Ont.

A CENTERING CAP

THE suggestion offered in the block is an improvement on the ordinary centering cap, bored out to a complete circle, to slip over the end of a shaft, spindle, boss, or other round piece. The objection to a complete circular fit is that it offers no latitude for burrs on the work, slight variations in diameter, lumps or other irregularities in castings or forgings. Therefore, the design is modified as illustrated, a little less than half the interior of the cap being left to fit the work, the remainder of the circle being milled out a little larger. —Fred Horner.



DEVELOPMENTS IN SHOP EQUIPMENT



NEW BENCH SAW

THE illustration shows a new bench saw recently developed by J. D. Wallace & Co., 1405 N. Jackson Boulevard, Chicago, This machine eliminates much of the waste of time occasioned by the running to and from stationary machines.

As the name implies the Wallace Bench Saw is a bench tool portable and designed to operate on the electric lighting current, yet it has ample power to take a full two-inch cut through the hardest of wood, making it possible to use this machine for 80 per cent. at least of the sawing usually done.

This machine overcomes the disadvantages of other designs. To cut at an angle the saw is tilted instead of cocking up a heavy table. The illustration shows the saw tilted to a 45 degree angle. This, as will be realized, makes it possible to cut long stock without fear of breaking the angle by the stock coming in contact with the floor, as is so often experienced when attempting to cut long stock on a table tilting machine. Other advantages accruing from this saw tilting design are, first: the operator is working on a table which is always in a horizontal, efficient and safe position; second: the exact angle of cut is set without much difficulty by simply spinning the hand wheel until the angle desired is registered on the dial in the front of the machine; third: no time is wasted adjusting the machine, for, as is often the experience when attempting to set a table tilting machine, the heavy table drops a few degrees before the screw is tightened, making it necessary to do the work over again, or if the drop goes unnoticed the cut is taken and the stock either spoiled or the job must be done over.

This tilting mechanism is controlled by a hand wheel mounted on a perfectly cut screw acting on a swiveled nut. This swings the cradle in which the motor-driving mechanism and saw are mounted. While it is very easy to make this adjustment, the screw holds the cradle rigidly.

The saw can be raised and lowered so as to cut or groove the stock any depth up to 2 inches. The raising and lowering mechanism is similar to the tilting mechanism and is controlled by a hand wheel in the front of the machine.

The crosscut fence is built into the machine but can be thown under the table when not in use. It is, however, never off of the machine and lost.

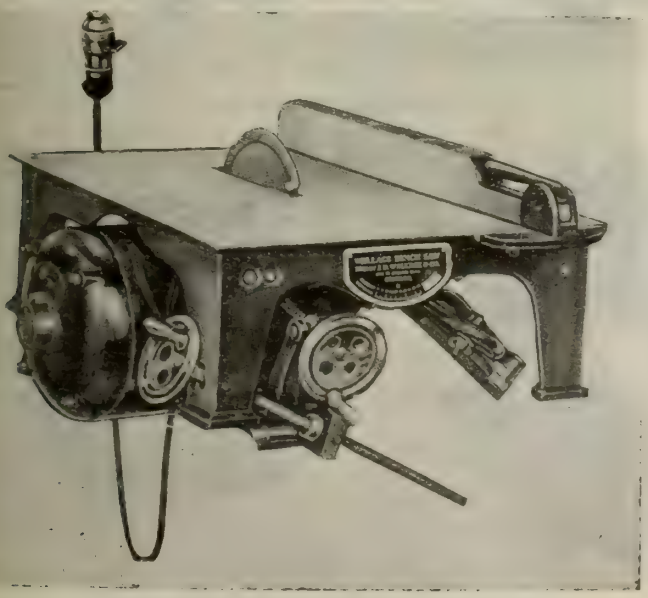
The rip fence is finished on both sides so that it can be used on either side of the saw. This fence is of box type and is clamped to both sides of the table by means of a handle conveniently located. This handle works on an eccentric and locks by going over the centre of the eccentric.

The shutter saw guard is a great factor in increasing the efficiency and cutting expenses with this saw. This saw guard is built into the machine, and for that reason is always on guard. It slips back as the stock goes through and is so designed that it never interferes with the efficient operation of the saw.

It not only protects the operator's hands, but prevents two other causes for accidents, whench cause more losses than actual cutting, that of catching the tail end of the stock in the back of the saw or catching the waste stock in the teeth of the saw and having it shoot into the abdomen of the operator. The saw guard eliminates all three causes and for that reason saves time and damages.

TAPER ATTACHMENT FOR SUNSTRAND LATHE

The Rockford Tool Co., Harrison Ave., Rockford, Ill., have developed a taper attachment for use with their Sunstrand lathe. The lathe was recently described in CANADIAN MACHINERY and the taper attachment illustrated has some novel features of interest, chief among which is the fact that it is located on the front of the lathe instead of the rear, as is more usually the custom. Another important feature has to do with the method of attaching the taper device. Only three screws are necessary, and if the owner desires to buy the taper attachment for a lathe already in his shop, no fitting or machining are necessary to secure it in place. Too often these screws



NEW BENCH SAW

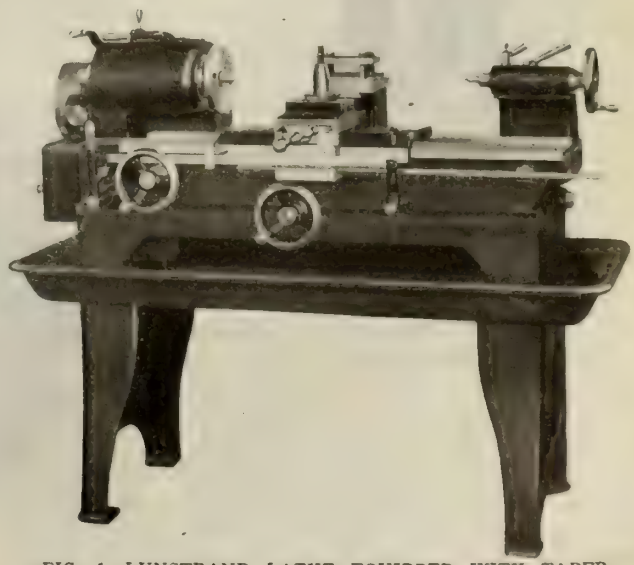


FIG. 1—LUNSTRAND LATHE EQUIPPED WITH TAPER

will be noticed on the block forming the front of the attachment, and the other is at the right hand end of the bed, where the bracket is attached. The attachment is made with graduations to indicate

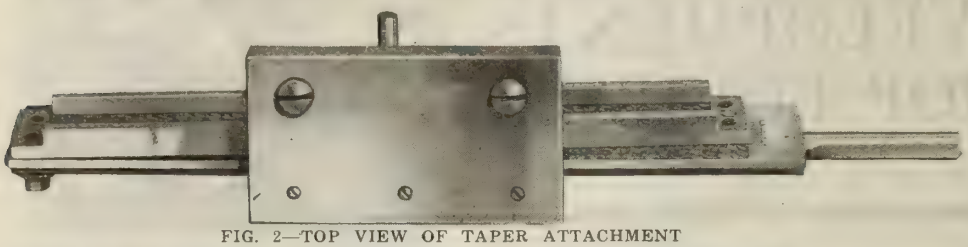


FIG. 2—TOP VIEW OF TAPER ATTACHMENT

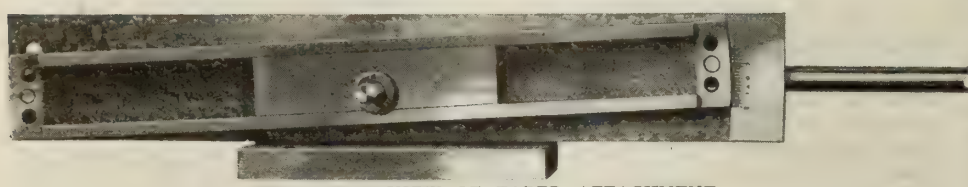


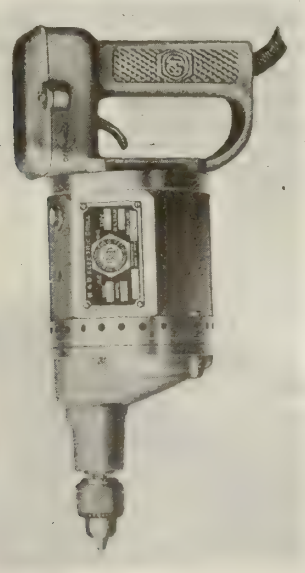
FIG. 3—SIDE VIEW OF TAPER ATTACHMENT

tapers in either degrees or in inches per foot, and is provided with a sliding block running in a bearing, which may be set at any desired angle.

NEW PORTABLE ELECTRIC DRILLS

The Black & Decker Mfg. Co., Baltimore, Md., have recently placed on the market two new models: a 3/16-in. and a ¼-in. portable electric drill "with the pistol grip and trigger switch." This patented feature has heretofore been obtainable only in the larger sizes.

These two models are one-hand drills, which is made possible by the pistol grip and trigger switch. This makes it possible to handle the tool like an automatic pistol, the current being controlled by



PORTABLE DRILL

pulling the trigger without the necessity for changing the position of the hand holding the drill. In addition to the advantage of convenience, this control saves the breakage of drill bits so often caused by the drill sagging on the bit when the operator changes the position of his hands to switch off the current.

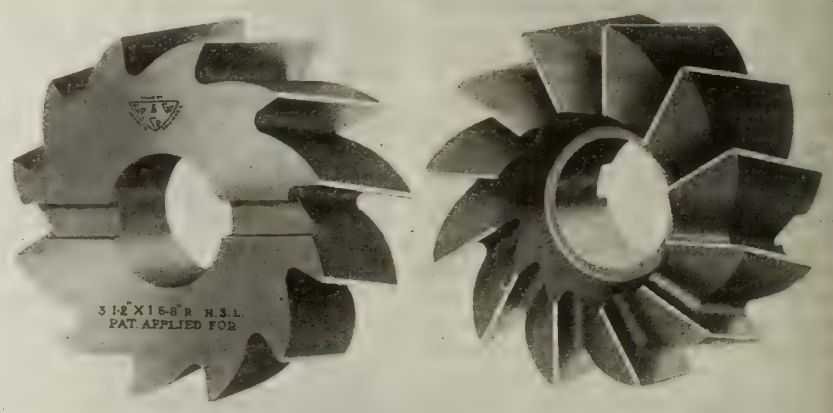
These two models have 1/6 horse-power motors with series compensated windings, and operate on any current from direct to 60 cycle alternating. Cooling is by means of a vane impeller mounted on the armature shaft, which causes a forced circulation of air all through the housing. Gears run in grease in a grease tight compartment like an automobile transmission.

No load speed of the 3/16-in. drill is 1600 R.P.M., energy consumption 175 watts.

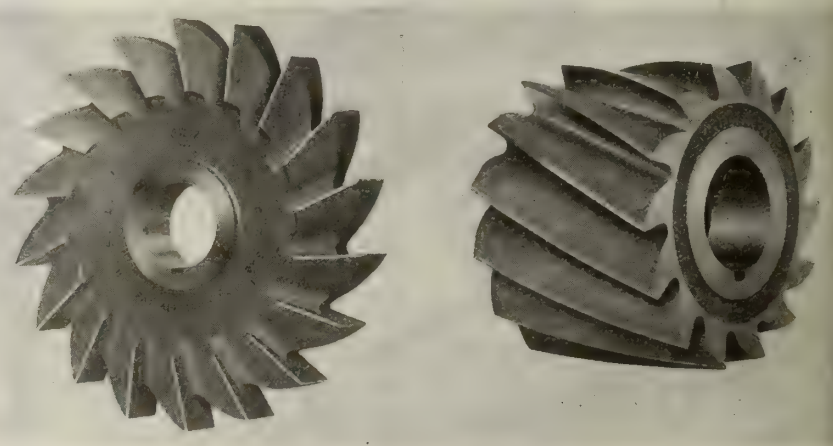
No load speed of the ¼-in. drill is 1200 R.P.M., energy consumption 175 watts.

NEW TYPE-MILLING CUTTER

The Goddard & Goddard Co., 39-45 West Congress St., Detroit, Mich., has recently brought out an improved type of profile milling cutter, the special features of which may be readily seen from the accompanying illustrations. The style of tooth adopted (for which patent is pending) is the result of careful study and experiment and embodies that most desirable combination of maximum strength of tooth with maximum clearance for chips. The well recognized value of the shearing action versus a scraping action is incorporated in the undercut tooth as in contradistinction to the radial tooth. A much increased angle of spiral has also been adopted. The combined result of the above noted features is a smooth action under heavy cuts, freedom from clatter and ability to deliver maximum production with minimum consumption of power. Attention has also been paid to the distribution of metal in these cutters so as to deliver the last ounce of service. Note the deep-seated recess in the shell end mills, this allowing several recuttings of end teeth. Note the extra thickness of web in the side mill, also the extra long side teeth, thus allowing several recuttings as the peripheral teeth wear down.



GO AND GO MILLING CUTTERS



NEW TYPE MILLING CUTTERS

This Firm Helps Circulate Information

At Ingersoll-Rand Co., Sherbrooke, Que., a Well-Run System is Used to Get the Worth-While Material Before the Men Who Desire to Read It—Demand For the Material

SOME of the industrial concerns in Canada are paying considerable attention to the filing of articles taken from technical papers and books, which might be of use to their men. Some of them have regular circulating libraries, and the articles are all listed and stored away so that they can be secured at any time. One plant in Canada that pays considerable attention to this work is the Canadian Ingersoll-Rand Co., Ltd., of Sherbrooke, Que.

For a long time they have been circulating the various journals that come in around the shop, and find that this service is appreciated. However, some of the journals take a very long time to find their way around the circle, and do not always reach the publicity department again. Then they were finding themselves too much burdened with piles of old journals which were seldom consulted.

To remedy this they went through the files of their journals, CANADIAN MACHINERY, "Canadian Engineer," "American Machinist," "Power House," etc., removing articles of greater interest.

These were placed in cardboard folders, arranged by subjects. They then threw out the old journals, except one or two which were requested to be kept on file. The lists of articles were then mimeographed and sent out, both to the shop and sales, with a request that these lists be kept on file, and that when articles were wanted they should be specified by number, say, "Compressors No. 5," or "Mining No. 15." In order to keep a check on the whereabout of the articles a card-index is kept with the names of the borrowers, what they have, and the dates of giving out and return.

In order to have a cross-check, cards with the name of the borrower are slipped in the place of the folder going out, so that if a folder comes in with no indication of who sent it, the card shows. The lists are being added to continually, and revised lists issued from time to time. When articles are taken from current journals before these are sent on circulation, a note is made in the index to the effect that the articles are to be had on application to the Publicity Department.

It may be thought that such a file is of little value, but judging from the fact that the foundry foreman has six of the "Foundry" series out at present, that the company have requests from the draughting offices, and from more than one of the sales offices, there seems to be some value in having information on hand.

The Circulated Lists

The following will give an idea of the manner in which lists are prepared. We are reproducing only the first nine items on each list, simply to show the range of subjects that are dealt with. Some of the lists are already past the 50 mark, and it looks as though the Ingersoll-Rand Publicity Department had a complete method of looking after this work.

General

1. The World's Large Bridges.
2. What it Pays to Know About Factory Lighting.
3. Increasing the Output in Great Britain.
4. The 20 Men Behind the Lines.
5. Practical Training of Apprentices.
6. Standard Specifications for Babbitt Metals.
7. Fundamentals of Beam Theory.
8. Fundamentals of Apprenticeship.
9. Duty Trials on Pumping Station in Toronto.

Draughting and Design

1. Draughting Room Versus Shop.
2. Draughting Room Etiquette.
3. A Plea for the Poor Draughtsman.
4. Representation of Screw Threads and Dimensioning.
5. Conversion Table; Inches and Millimetres.
6. The Solution of Equations Higher Than Quadratic.
7. Critical Speeds of Rotors Resting on Two Bearings.
8. Critical Speeds of Rotors Resting on Three Bearings.
9. Drawing Room System in the Engineering Department.

Forge Shop and Foundry

1. The Sand Blast in the Modern Foundry.
2. Heat Treatment of Steel.
3. Factors in the Heat Treatment of Steel.
4. Heating Treating Furnace with Oil Fuel Equipment.
5. How Marine Cylinders Are Moulded and Cast.
6. Electric Steel Furnace Development.
7. Forging Machine Die Design.
8. The Types and Uses of Industrial Pyrometers.
9. Pattern Match Plates.

Electrical

1. Practical Talks on Controllers.
2. Motors Operated Under Modified Conditions.
3. Distribution Loss Factors.
4. Transient Conditions in Induction Motors.
5. Principles of Phase Converter.
6. Balance on Three-wire System.
7. Electrical Machine Bearings.
8. Synchronous Motor Starting.
9. Specifications for Electric Motor Application.

Machine Shop Practice

1. Tip-it Welding Process.
2. Composition and Properties of Steels.
3. The Ferro-alloys.
4. Causes of Defects in Steel Ingots.
5. Sand-blast Equipment.
6. Checking Angles With Swedish Blocks.
7. Practical Points in Flat Gauge Making.
8. Elements of Gauge Making.

Engines, Pumps, Boilers, Fuel

1. Some Recent Developments in Air Pump Design.
2. Large Steam Turbines.
3. The How and Why of the Beyer Condenser.
4. Design of Turbine Pumps.
5. Two New Nordberg Engines.
6. Steam Costs in 6,600 H.P. Boiler Plant.
7. American Uniflow Engine.
8. Pyrometer Construction and Repair.
9. Review of the Steam Engine.

Compressors

1. Efficiency of Compressed Air Installations.
2. Caring for the Air Compressor.
3. Cost of Steam-driven Air Compressor Plant.
4. The Hydraulic Air Compressor at Cobalt.
5. Air Compressors as Vacuum Pumps.
6. The Efficiency of An Air Compressor in Mine Operations.
7. Increasing the Efficiency of Air Compresors.
8. Blowing Engines.
9. Graphic Air Compressor Calculations.

Compressed Air; General

1. Development of the Pneumatic Sand Blast.
2. Compressed Air in a Modern Tannery.
3. Hand Drills in Structural Work.
4. Compressed Air for Forge Shops.
5. Sand-blast Conditions for Efficiency.
6. Compressed Air in the Foundry.
7. Compressed Air in the Cotton Industry.
8. Air Lift Efficiency.
9. Uses of Compressed Air in the Modern Shop.

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Price Fixing a Failure

PRICE fixing, no doubt, served a splendid purpose during the period of the war. In a good many cases it served to nip in the bud quite a collection of traders who might otherwise have passed into history bearing on them the tag, "war profiteers."

But now that the war is over, price fixing is not popular. It has been tried out in steel and iron.

Steel kings have stuck together, and as they have viewed with alarm the prospects of too much grease getting on the price skids, they have gathered together and chanted a verse or two on "Steady Now, Boy."

And after this is over they come forth with a new list of prices. Of course, they would not care to seize the phrase the labor men make use of and announce that the new figures they are about to chalk up amount to an "irreducible minimum," but it's much the same thing, even if wheeled out from mahogany surroundings.

Purchasing agents and buyers on a large scale do not like a fixed market. They know that manufacturing costs are not the same at all places, and that while $3 may represent a very small margin of profit for one man, it means a big, juicy dividend for another. The buyer prefers to go into the open, untrammelled market, or send out his specifications for tender. It is as plain as day that he does not like the "fixed" market, and the paucity of his buying is proof positive of this fact.

Director-General Hines of the U.S. Railroad Board refuses point-blank to have anything to do with the fixed prices. He apparently has it figured out that sooner or later he will be called upon to hand back the roads to those who own them, and he is not going to take the chance of wishing on these lines a great big expenditure at prices higher than those which would prevail in an ordinary competitive market.

As far as this man Hines is concerned, he has simply taken the price-tinkering arrangement and led it to the back door of the railroad premises. The roads were looked upon as good for $1,500,000 worth of steel orders, but they have not bought a pound, and Hines says very plainly that they do not intend to, and it is hard to see where there is any properly constituted power that can force him to come down from his high level. And as long as the nation's biggest buyer stays out of the market the smaller buyers are not at all likely to rush in.

If there is not a great deal more business moving at the new prices than at the old, steel mills stand to lose. It is plain that there is nothing but loss for them in coming from 3c per pound to 2.65 if the same volume of business is handled.

It is becoming plainer every week that purchasers do not like price "fixing" in peace times. They much prefer the old competitive market, where a good-sized order was certain to bring in the very best offers that producers could get. The fact that large buyers of iron and steel are staying out of the market is about the best possible evidence of their disapproval of a prearranged schedule of prices.

This Man is Worth More

OTTAWA has a new way of making appointments, and also of securing applicants for positions that are opening up there. In the good old days the members of the House had a list of the boys who had been faithful during elections. Those who had driven rigs, posted bills, dodged up the back lanes and up the alleys were all remembered. They would not have been good party men for many years had they not received recognition.

For some unknown reason it used to be considered one of the greatest things in the world to get on the Government pay roll. The impression was abroad in the land that it was a good thing, rather easy work, and quite removed from the atmosphere of a sweatshop. And although the wages were never very high, there were always plenty of applicants for every little Government job that turned up. A man who received an appointment that was worth a couple of thousand was indeed quite favored.

But now they advertise for the men that are wanted in the civil service. Here is a sample of one of the better appointments that is opening up now:

> THE Civil Service Commission of Canada hereby give public notice that applications will be received from persons qualified to fill the following position in the Civil Service of Canada:—
>
> **A Commissioner of Immigration—Salary $2,500 per Annum**
>
> 1. A Commissioner of Immigration for the Western District, Department of Immigration and Colonization, at a salary of $2,500 per annum. The office of the Commissioner shall be in Winnipeg. The appointee must be capable of assuming responsibility for the direction, control and supervision of all immigration employees within his territory and for the transaction of all official business arising from the Immigration Act. Candidates must have a good general education, a knowledge of business, together with executive ability and personality. They should produce credentials as to their general experience and qualifications for the position.

Now, a person who can stand up and meet the requirements in the ad. given does not need to go on the pay roll of the Government at $2,500 per year. He can earn a good deal more working for other concerns.

The publisher of a good, bright weekly paper refused to consider applicants for the position of editor of his paper only a few weeks ago because none of them would ask over two thousand a year.

There are plenty of shop executives, some of them in very humble capacities, that are making more than $2,500 per year. Good draftsmen will get that much money, while there are scores of men on the road who would not be interested in the Government proposition.

The Government can advertise and offer to pay $2,500 a year, but there is nothing to guarantee they will get a man to measure up to the specifications they set forth. They are in reality calling for a $5,000 man, and probably taking a chance that he may be had for half the price.

DEMOBILIZING the army might not be much of a trick if the authorities would let the work proceed. There are a large proportion of the men who could attend to their own demobilization if given half a chance.

THE barbers in Galt are going to charge fifty cents for a hair cut. Does that mean that so many of the Galt Scotch folk have joined the Bolsheviki that the remainder have to make up the deficit in the hair-cutting revenue?

Dollars Wasted in Pipes and Fittings

By T. H. FENNER, Associate Editor Canadian Machinery

INDUSTRIAL plant managers have been brought to a sense of realization of power plant costs during the last two years. The result has been a tightening up of supervision, and a close analysis of fuel, water, maintenance, and wages costs, with an appreciable reduction in these items in many cases.

There is another item which it is more difficult to keep adequate trace of, but which is responsible for many hundreds and even thousands of dollars loss in a year, according to the size of the plant.

Hard to Keep Track Of

The modern factory contains many thousand feet of piping, wrought iron, copper, brass and galvanized, and this piping is being constantly renewed, repaired, or altered. From one to twenty steamfitters and helpers are kept busy on this work, varying with the extent of the buildings, and keeping track of all the material used becomes a matter of great difficulty, unless a very rigid system is in force. This applies to the power plant itself and to all the piping through the factory.

Generally speaking, it is in the smaller plant that the greatest waste of both time and material takes place, owing to want of a proper system, but even in many large plants, where the organization is on a much better basis, the loss, though smaller in proportion to the general expense amounts to large sums in the aggregate.

The Case of the Small Plant

Take the case of a small plant of from 100 to 200 horsepower, which are in the majority in this country. A plant of this kind may employ a steam fitter, or the man in charge of the engine and boiler room will attend to the repairs himself. In this case the element of time does not enter into the question so much as the man is usually employed on a standing wage basis.

There will be piping in a plant of this kind ranging from ⅛ inch diameter to six inch, and fittings for all these sizes. All fittings, pipe, packing and tools will be kept in the engine room, and the man in charge will have complete control of the ordering of material, and the using of it. He will be directly responsible to the manager, who cannot in the nature of things have much idea of the requirements of this department; and has to depend entirely on the engineer's judgment.

In a plant of this kind it is not usual to carry a large stock. As a rule, there will probably be from one to three lengths of each size of pipe up to 2½ in., the larger sizes not being carried, but ordered as required. Fittings for all these sizes will be on hand, and a collection of valves of various kinds. Now the number and variety of fittings would surprise a good many people who have not given the matter much thought.

There are elbows, forty-five degree elbows, tees, crosses, reducing bushings, couplings, unions, flange unions, locknuts, plugs, caps, side outlet elbows, etc. These are made in three different kinds; cast iron, malleable and galvanized, all suitable for different classes of work. Whether the right kind for the particular job is used or not depends on the knowledge of the man doing the job, and the durability of the job depends also on using the correct material.

The stock of these fittings carried on hand also depends on the good sense or otherwise of the man in charge. To be short of some particular fitting when it is badly needed, may result in the shut down of the whole plant, while on the other hand, to carry a large stock means tying up money which could be better used elsewhere. In how many of these small plants could the engineer give a reasonable idea of the stock on hand at any particular moment, without a wild scramble through his stock? Very few it will be found. What usually happens is that he takes a look in the bins when getting some fitting out, and orders a dozen of a few different kinds, to keep up the stock. This results usually in a surplus of the particular variety in most use, and a shortage of most of the others. Then the time comes when a particular fitting is needed, and needed badly. It is not there. The job can't wait, so what happens? Instead of using the cast iron fitting a galvanized fitting of the same size, and costing about 30% more, is taken. If that is not available then a larger one is used, and the difference made up by the use of reducing fittings at each end. This, again, brings up the cost of the material, and if there are several fittings on the job it may easily cost double. The time occupied in doing the job is increased, and even if the man's time does not count, the delay to a department of perhaps 25 to 50 hands is considerable. Then when the job is done, instead of examining the fittings that have been taken down, to see if their usefulness is entirely over, a hundred to one they are thrown into the scrap heap.

Can be Used Elsewhere.

Now, a fitting that may not be of much use on a high pressure steam line would be of use on an exhaust heating line, or a low pressure steam line. The same applies to the pipe. Although one part may be bad, the rest of it might well be used in some other part of the system. There being no check on the material used, or a very inadequate one, a number of fittings and several pieces of pipe are wasted on that one job alone. Now take the case of valves. Here is one of the most prolific sources of waste in most plants. To begin with, it is usual to find every make of valve known to industry represented on the system. This is bad in itself, for if a valve of one make is removed from a line, and another one substituted, there is nearly always a difference in length. This means that the length of pipe has to be pulled together or sprung apart, which entails a straining of fittings, which sooner or later results in another repair job. Again, a valve has a defective spindle. There is no spare spindle on hand, therefore, the whole valve has to be taken out of the line, and another one substituted. This usually entails the taking down of two or three lengths of pipe and fittings before a flange or union is reached. What becomes of the body of the valve, which is perfectly good. Mostly it is thrown in a corner and forgotten, and when another valve gives out on the body part the same procedure is gone through. Now if all valves when taken out of the line were carefully dismounted, and the bonnet, gland nut, and spindle put into separate bins or boxes, a good deal of money could be saved in the course of a year. In addition to this, one make of valve should be determined on as the most suitable, and whenever an old valve is replaced it should be by one of this standard pattern.

A Standardized Sytem

In this way the whole of the system will be gradually standardized. Furthermore, a straightway gate valve should never be employed on a steam line, as it is almost impossible to keep them steam tight. Another source of waste is that of cutting a length of pipe, only to find it too long or too short by a ½ inch when put up. This means it has to be either cut and screwed all over again, or else the springing method so much in favor among steamfitters is resorted to. They get the pipe together, but it is in no condition to take up the normal working stresses, having been considerably strained already. The result is another repair job very shortly.

What About the Large Plant?

If this is all true in the small plant, what about the

large ones, where the extent of the piping system is multiplied many times?

Here the stock is usually carried in a special stock room, and the engineering department makes requisitions on the stock room for the material required. An adequate stock is usually kept on hand, and a card index system is employed which keeps a record of stock drawn and stock on hand. The stock room puts in its own requisitions on the purchasing department to replenish the stock. Even with this it occasionally happens that the stock room clerks allow some particular stock to get too low, and before their order has gone through a demand arises for the particular article that is out of stock. I have seen a whole section of a factory without heat for three days in the middle of winter, for lack of a seven-inch fitting. It is always well for the chief engineer or foreman steamfitter to keep tabs on the stock himself, and remind the stock clerk when anything is getting low.

So far as the stock room goes the the system is all right, and the chances of over or understocking not very great. However, when we come to the requisitioning of stock by the steamfitting department, the same elements of waste arise as in the smaller plant. We will take a case in point. The chief engineer receives a message that a bad blow of steam is occurring in a certain department. He sends a hurry-up call to the steamfitting shop, and a man is despatched to find the trouble. He sees the break, gets the steam shut off and starts in to make repairs. He sends his helper to the pipe shop for some fittings. The ones he wants are not there. There is no time to get an order signed by the chief, so the helper is sent to the stock room for such and such material, for which an order will be returned later. On the steamfitter's time slip will appear so much time, and so much material on this particular job. No record of material saved from the job, or whether the material charged was actually used, or some of it thrown back in the pipe shop, or how much scrapped. The only record is so much material issued from stock and charged up on the job.

Now, supposing some of the fittings have not been actually used on the job, some of the old fittings having been used again. These fittings are, as far as the books are concerned, gone, and their value written off. They may be returned to the pipe shop, or if the job is in an out of the way spot, left lying around. The result of this is that there is an amount of stock lying in the pipe shop which there is no trace of. Now, it is surprising, how much of this stock will find its way out of the gate. In a large factory men are dropping in to the pipe shop every now and again for a half-inch tee, or a two-inch elbow, and as the stock has not to be accounted for they get it. In the course of a year this amounts to a considerable sum.

If a new line is to be put up the same thing occurs. The man who is to do the job figures out what fittings he wants, gets a requisition signed, and receives the material. Anything over goes into the pipe shop, not back to the stock room, and the department is charged for the full amount. The same things occur with regard to valves, etc., as in the small plant, but on a larger scale.

The Remedy

The way to remedy this, in both large and small plants, is simply to check up closer on the material used, and this can be very easily arranged. Instead of simply having a time slip, with the material used entered in, a properly marked slip could be used, which would be a complete history of the job. First of all, it would be necessary to take stock of the material on hand, accounting for everything, good or bad. What is no good can be weighed, and put on the scrap heap. The next step is to have properly marked and classified bins, or stands, with two divisions for each class of fitting, one for old and one for material already used once. You are now in a position to keep track of your stock, which is, in other words, your money.

When a new line of pipe is to be put up, instead of issuing orders to put it up, get an estimate on the job from your staff, whether in a large or small plant, just as you would from an outside firm. Let them (or him) go over the job, see the best way to run it, and measure up the quantity of pipe and the number of fittings required. The accuracy of the estimate will, of course, depend on the man, but at least there is something to go on.

When the job is done, a return should be made shewing exactly how much material has gone into the job, and how much scrapped. This material should be checked off from your inventory, if the plant is too small for a stock room and a card index system, and a copy kept in the office, and one given to the man in charge.

If a repair job, the slip should show:—
Feet of pipe taken down.....
Number and size of fittings taken down .....
Feet of new pipe installed .....
New fittings installed .....
Pipe scrapped .....
Fittings scrapped .....
Pipe returned to shop for second use .....
Fittings returned to shop for second use .....

This is checked up against your inventory, and the fitgings scrapped added on to your scrap pile. This is surely not much trouble, and a monthly, two monthly, or six monthly checking up of your new, second-hand, and scrap material should pretty near account for every pound of material brought into the plant.

A system of this kind involves no extra bookkeeping and no extra clerical labor. It is just as easy for the department clerk to handle as the other one of merely charging up material used (or supposed to be used).

Whether the plant be large or small the amount saved in a year in this department would probably be a surprise to most managers, and in these days of high-priced material, every source of waste should be carefully guarded.

SEVERAL large firms in United States are out with circular letters urging that there should be a movement on the part of the several makers of certain lines looking to the fixing of prices for certain definite periods. The contention is that were prices named and fixed for six month periods business would be improved. That is a large, open question. Steel prices have been brought down about 15 per cent. from war levels, and the announcement is made officially that the figures will stand until the end of the year. In spite of all this, the Director-General of the Railway Board of U.S. says that he will have none of the fixed prices, and, moreover, he refuses to sanction placing tonnages of rails which are needed. Price-fixing is rather a delicate matter. The average buyer prefers the open market with restrictions removed.

MANY of the thinkers in trade circles are beginning to see that both United States and Canada have a big foreign market that has never been touched. Strange to say, this foreign market is right at home and consists of the foreign buying power on this continent. The idea is that they should appeal to them through the foreign press, teach them that it will pay them to stay rather than to leave for Europe and take their savings with them. It looks like a case where business and citizenship can be mixed to advantage.

The British Columbia Government has found a good way in which to spend money. Tax sales were advertised. The total amount of arrears was $904,041.29; the amount collected was $100,869.44, while the amount spent in advertising the sale was $42,061.03. For instance, in Barkerville the amount of arrears recovered was $4,239.18, while the Prince George *Citizen* is credited with $10,400.40 for advertising.

MARKET DEVELOPMENTS

Doubting Value of the Fixed Market Price

Indications Are That the Lowered Price is Not Going to Bring a Great Volume of Business Into the Market—More Price Reductions Noted in Lines That Did Not Cut on March 21

IF an immediate improvement were looked for in the steel and iron market following the announcement of a new schedule of fixed prices, there must be some disappointment over the way in which it is working out. Director-General Hines of the U.S. Railroad Board has forced the issue by declaring that he will not come into the market as contemplated with a $1,500,000 order for steel. Others, while not making such a dramatic spectacle, are serving the same purpose in other ways. Buyers do not like the "fixed" price idea. While admitting its need during the war period, they refuse to believe now that it can produce as good results for them as the old system of calling for tenders in an open and untrammelled market.

Boiler tubes have came down during the week. Lap-welded were cut last week and now seamless tubes are put down by about 8 per cent. Several such lines are trailing along in the price reduction procession, after having positively stated that they had no intention of noticing the cuts of March 21.

Machine tool dealers claim to be taking on a very satisfactory volume of business now. They also point with satisfaction to evidences of a renewal in the demand for new machinery, rather than for the used material, of which there is still a very large amount on the market. The new machinery persists in remaining on a very high price level, and departures from these figures have been rather infrequent and unimportant.

BIGGER BUSINESS IS LOOKED FOR IN THE MONTREAL MARKET

Special to CANADIAN MACHINERY

MONTREAL, Quebec, April 10.—Business and industrial activity is rapidly assuming its spring attitude and the trade here are anticipating developments within the next month that will open the way for a partial return to the activity of last summer.

The opening of navigation has always been the signal for expansion of Montreal and district business, so that all parties are justified in looking forward to busier times. Trading is becoming more normal, and although this process is gradual it is steadily assuming a condition more stable in character. The activity of the metal market is slowly improving, but demand is considerably below the normal. Steel conditions are showing up better and the coming of spring is a promising factor for larger business.

Machine tool activity is still quiet, but a start has finally been made in the disposal of Government-owned equipment. Old material is again looking forward for a renewal of activity.

Better Steel Outlook

No marked increase in steel demand has followed the decline in price, and the trade is apparently not yet prepared to start out on a buying movement, irrespective of the lower cost of material. There is undoubtedly some hidden influence affecting the entire situation, and until this atmosphere of uncertainty is removed from present industrial conditions no extensive expansion is likely to develop. It is evident that during the past week or two trading has been heavier, but the supposition is that the bulk of this was buying that was held over pending the reduction that has recently come into force. Few of the warehouses here were heavily loaded with the class of material that was most urgently needed, not because they did not care to carry a stock, but due to their inability to obtain delivery from the mills in the United States. This, while a serious handicap six months ago, has resulted to the advantage of dealers here, as they are now in a much better position to meet the lower scale that must inevitably become effective before domestic buying will develop to the point where futures are a feature. Dealers here have made another cut on plates, the current price being 5c on ¼ inch and 5½c on 3-16 inch. Demand, however, has shown little material increase despite the lower figure, but early prospects are brighter. As stated by one dealer: "We are looking forward to increased activity within the next month. About the middle of April business invariably shows a freer tendency, and with the opening of navigation we are anticipating a renewal of trade that will, in some measure, compensate us for the slack period of the past several months."

Disposing of Government Tools

Recent developments in the machine tool situation across the line has aided in clearing away some of the mist that had hovered over the industry for some time, but final plans of disposing of equipment now owned or controlled by the Government are yet in the making. If these agreements are approved by the different parties, the sale of all machines will be in the hands of the manufacturers and the dealers, the stipulation being that sales will be made alternately —one Government tool and one of the manufacturers. The commission that will be allowed for the sale of the tools now held by the Government will be 7½ per cent. It is not expected that these tools will be obtainable for a lower price than new machines, unless sanction is given for such reduction. There is a considerable quantity of machine tools in this district that will probably come under these new regulations, but dealers are not expecting to share very heavily in the disposal of this equipment. It is estimated that approximately $5,000,000 worth of machinery is tied up in this district alone. One plant that had received an order for small arms has over one hundred machines that have never been uncrated. A fair volume of business is reported, particularly in used machinery. Prices on ordinary second-hand tools are relatively low, but tool-room equipment retains its high figure.

Improvement Looked For

Although buying of old materials has not shown any great improvement here, the encouraging remarks of dealers apparently reflects a better tone, and the fact that quotations are quite firm would appear to indicate that a reaction might not be far distant.

The character of inquiries that are coming in from different consumers shows their interest in developments, and should conditions retain their cheerful atmosphere it would not be surprising to see some early buying. Dealers here are watching the market closely but are not yet anxious to renew their heavy buying. Prices are firmer than past week but no changes have been made.

REPORT DEMAND FOR MORE NEW MACHINERY

TORONTO—Business is better in machine tool lines than it has been for some time, certainly a long way ahead of what the firms were anticipating after the signing of the armistice. It is a good sign to see customers coming into the market for new machinery, instead of demanding to have their wants supplied from the used machinery market. Warehouses are doing a large amount of business, but they are not certain that the lower prices on plate and tubes has all to do with it. There is no indication that the new prices have made it desirable for the large buyers to come into the market on a generous scale yet.

Few More Reductions

It is just the least bit amusing to notice how, one after another, the various lines are falling in line and granting concessions to the trade which they said very plainly a few weeks ago they would not do for a long time yet. Makers of boiler tubes were quick on the job after the cuts of March 21 to announce they would not follow suit. Lapwelded tubes came down first, and now seamless is going to follow. There has not been any announcement on the latter yet, but some of the warehouses are announcing a new figure in advance of the mill statement. The American plants making seamless tubes took the matter up with the Canadian sellers, and asked them to use their own judgment in the matter, and recommend what was necessary. Later this was added to by telling them to go ahead and make concessions if such were necessary in order to secure business. The Canadian firms reported favoring a cut and also that it should be announced at once. The reduction which is given in detail on the market page, amount to about eight per cent.

The warehouse interests are well pleased with the amount of business they are securing, but this does not hold good with the firms that are selling for straight mill orders. An order that looks quite interesting to a warehousing concern holds little interest for the mill unless it happens to be one of many going in.

The National Railways and the C.P.R. are placing a lot of business for plate and boiler tubes.

There seems to be a little misunderstanding in regard to the way in which some of the prices are quoted in CANADIAN MACHINERY from time to time. For instance, one Ontario firm writes to ask if our quotation on iron bars is not too high. He has a quotation of $8.05 from a Canadian rolling mill, whereas the price we are quoting this week is $4.25. The prices quoted in our columns are warehouse prices, and they are always above the mill quotations. This same rule holds good in all lines. When plate was being quoted at 3c Pittsburgh, Chicago warehouses had a price of 4.27. With the new price of 2.65 on plate the Chicago warehouse will now be 3.90.

Selling New Machinery

Dealers in machine tools and supplies are well pleased with the business they are closing at present. Several of the firms are concentrating on the sale of new machinery and they are meeting with considerable success. One large Toronto firm has its machine tool salesman going to the United States this week to spend some time in the better machine shops there where quantity production is specialized in. We have been rather out of touch with this class of work in Canada, especially during the time of the war, as nothing much else was allowed but the production of munitions. Now that firms are turning to new lines, where they will have to meet competition, it is certain they will want the best methods known to the trade.

Motor plants are doing quite a good deal of buying now, and in several cases they are making an honest attempt to give a preference to lines they can secure in this country, but the equipment they need for their business calls for a lot that has to be imported.

Market is Firmer

Although scrap metal prices have not started to climb yet, it is easy to notice that there is a great deal more strength in the market than for some time past. There is a chance that fourth quarter copper may be hard to get. Just now dealers are not quoting or selling on that delivery, and if this should keep up for any length of time it would be certain to drive up the price in the local scrap markets. As it is those who have red brass now are asking more money for it.

In the other classes of metals much the same feeling is apparent. There have been no price changes and a certain amount of trading is going on at the lists published. But there is a growing and a well defined tendency on the part of the trade to hold material instead of making sales under present circumstances. Although dealers do not care to come out and say so it is one of those situations where it is felt that a great many things may happen on very short notice, and one of the happenings is likely to be a strengthening of prices which dealers will have to pay in order to induce holders to part with their material.

POINTS IN WEEK'S MARKETING NOTES

An effort is being made to wipe out the 25c difference between iron and steel bars in Toronto warehouses. Steel has always had a lead of 25c per hundred. As a matter of fact a good many iron orders have been filled with mild steel.

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Those who have scrap material to dispose of are holding it more closely than ever. There are several indications that the market is going to be quite a bit stronger in the near future.

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Director-General Hines of the U.S. Railroad Board refuses absolutely to recognize the new schedule of prices that have been set in the United States, and has not placed any business on the strength of their arrival. It was generally understood that with the announcement of lower prices the Government roads would come into the market for at least 1,500,000 tons of steel.

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Machine tools dealers are quite well satisfied with the amount of business that is moving now. Several of the firms are concentrating all their efforts on the sale of new machinery against the demand for used stuff which has been rather insistent for some time past.

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Montreal reports that trade prospects in that district are showing considerable improvement over recent months.

OWL METAL CO., LTD., ERECTING ADDITION TO FACTORY

Upon the death of E. H. Bissett, president of Bissett & Webb, Ltd., who controlled the stock in the Owl Metal Co., Ltd., Winnipeg, the estate sold his interest to E. G. and L. R. Barrett, of the Vulcan Iron Works, Winnipeg. More capital has thereby been influenced, and the firm intends to operate on a much larger scale than heretofore, and are now erecting an addition to their present factory.

They intend to recover metals from scrap and metal by-products, converting brass and bronze filings, turnings, borings, into ingots after refining.

Their white metal department for the manufacture of solders for tinsmiths and plumbers, and machine type metals for newspapers and printers, is also being largely extended. The plant which has been bought is the very latest for the refining and casting of metals. As a result of this re-organization, the whole of the stock in the Owl Metal Co. will

be held by well-known Western men. J. J. Broadhurst continues as secretary-treasurer and manager. The Owl Metal Co. have made arrangements to put out copper, red brass, yellow brass, and bronze in ingots suitable for machine shops. They are also manufacturing soldering salt, liquid and paste.

U.S. RAILROAD DIRECTOR WILL NOT RECOGNIZE THE NEW PRICES

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Apr. 10. —The whole talk of the trade in the past few days has been on the refusal of the Railroad Administration to proceed to make purchases on the basis of the iron and steel prices announced by the Industrial Board of the Department of Commerce, and made effective by producers March 21. A wide variety of opinions has been expressed on the subject of the refusal. As is frequently the case in human affairs the loudest talk is the most unthinking. Such commentators refer to Mr. Walker D. Hines, Director General of Railroads, as "blocking business," in substance, or as "throwing a monkey wrench into the machinery." Then there are references to the "fine Italian hand of John Skelton Williams," none of whose criticized actions in the past few months appeared to have been based upon anything but a desire to safeguard the public funds, which have to be maintained by taxes paid both by those who criticize and by those who do not. Mr. Hines has been criticized, also, for refusing to accept the steel prices after they were announced, instead of before, when it has not been shown that he had any previous opportunity to pass upon them.

Even though Congress has not acted as to the disposition of the railroads, it is a perfectly safe guess that they are going to be returned to their owners. It is only the additional legal restrictions, and the additional liberties, that are to be arranged that is a matter of doubt. Mr. Hines must return the goods to their owners in as good physical condition as when taken over, and improvements can be charged for, but only at a fair price. If Mr. Hines pays too much for steel the excess price must be paid out of the public funds. Mr. Hines needs only to consult the earnings reports of steel companies for 1918 to see that the profits per ton of steel were extremely large, and that profits would be entirely fair if prices were reduced, from the Government level, much more than they have been thus far. The owners of the railroads, with whom the steel producers have uniformly, up to this date, sympathized with so strongly, would have to be satisfied even with Mr. Hines meeting the extra cost of steel out of the public funds, for this would result in the railroads being saddled with an inflated market when the roads were returned to their owners. The railroad companies would then have to make their purchases on this inflated market, or perform the task of deflating it themselves.

Other Views

There are numerous other views expressed however. One, quite pertinent, is that the Industrial Board departed entirely from its original plan, as officially announced. The Board was to act as intermediary between producers and Government buying departments, to arrive at prices at which business would be done. Instead, what the Board did was to meet with the steel producers, agree upon their terms, and then try to force the Government departments to accept the terms.

Another criticism made of the Board, and made quite emphatically by many buyers of steel, is that the Board executed a complete right about face as to the character of prices to be developed, irrespective of whether they were high or low. It was announced that the law of supply and demand had ceased functioning, and that the object of the whole operation was to restore the operation of the law of supply and demand. This, of course, means an open trading market, but what the Board did by the time it got through was to publish a schedule of prices and then refer to them as being minimum for the remainder of the year. Not only does that not represent an open market, it covers a period three times as long as the periods for which the War Industries Board used to set prices.

The Pig Iron View

The pig iron producers are pleased rather than otherwise at the hitch in the carrying out of the Industrial Board's program. The pig iron people are more or less like the copper people. The copper producers allowed their market to go where it would, the result being that two or three weeks ago it reached a low point, at about 4 per cent. below the ten-year pre-war average price. Since then it has scored an advance of 5 per cent., and is standing on its own feet. The pig iron producers would not mind if pig iron declined below the cost of production would come down. The pig market would stiffen, and the cost of production woud come down. The pig iron producers, moreover, never did like the Industrial Board's schedule of prices, claiming that steel was reduced too little in proportion to pig iron. If steel had been reduced more, there would be more buying of steel, and then more consumption of pig iron. The pig iron producers recognize that profits depend upon price and production combined. If there is a profitable price, but no iron is made, there is no profit.

The Buyers of Steel

For many years the steel trade philosophy has been that the buyer has little title to say anything about prices or the market. It is for the sellers to do the talking. Fifteen years and more ago the buyer had practically nothing to say about the character of steel he wanted to buy. He was expected to take ordinary soft steel. If it was not strong enough, use more tons for a given purpose. In this matter there has been a radical revolution, nearly all steel producers being anxious to furnish the buyer with any description of steel he desires, and many steel producers even do research work at their own expense, to develop kinds of steel better suited to buyers' requirements. In the matter of price, however, the buyer is supposed to have as little to say as formerly.

The steel buyer has, however, expressed himself, and as a matter of fact he had expressed himself as to the Redfield Board prices, effective March 21, before the Railroad Administration refused to accept the prices. The buyer expressed himself by means of the character of his buying. The record made since March 21 is a very clear one. For a few days there was much heavier booking of orders, the orders showing that they represented business held back in anticipation of price reductions, whether when announced they should prove large or small. It was business that had to be placed in any event. Now, with the longer experience since March 21, all steel producers consulted admit that the bookings are of precisely the same character, and are from the same buyers, as earlier in the year. No new variety business, in other words, has been brought out by the price reductions. There is no steel for construction work or other general investment purposes. The buying is hand to mouth in character and is for common, every-day requirements. Averaging together the decreased rate of buying just before March 21, when business was being held back, and the greater rate of buying that obtained afterwards, the average rate is less than the buying rate in January and February.

Thus the ordinary buyer, the general public, buys no more than before the price reductions, and thus the public really went on record as to its appraisal of the new prices, before the Railroad Administration did.

At this writing the situation is entirely in confusion. Steel prices may be further reduced in the near future, or further time may be consumed in discussion. There is even a possibility that the steel producers will not hold together and that there will be a really open market.

Steel mill operations are at about 75 per cent. of capacity, or a trifle less. Some of the mills have considerable business on books, some have very little and some have none, having already closed.

The four-wheel drive truck company of Clintonville, Wis., U.S.A., have decided to locate a Canadian branch of their concern in Kitchener. This will be an acquisition, as the concern will employ five hundred hands.

GENERAL MOTORS WILL BUILD $6,000,000 PLANT AT WALKERVILLE

Special to CANADIAN MACHINERY

New York, April 7, 1919.—In announcing new construction projects of the General Motors Corporation to be begun this year, President W. C. Durant stated that a $6,000,000 automobile plant for the Cadillac division will be built at Walkerville, Ont. A total of $37,398,000 has been appropriated for the concern's various plants as follows: Detroit, $12,650,000; Flint, $6,715,000; Pontiac, $2,150,000; Lansing, $2,450,000; Saginaw, $2,427,000; Toledo, $543,000; St. Louis, $4,135,000; Janesville, Wis., $4,500,000; Bristol, Conn., $1,078,000; Muncie, Ind., $800,000. A considerable part of the appropriations will doubtless be spent for machine-tool equipment for extensions to plants, the General Motors buying already this year having amounted to a very large sum.

Other automobile expansion is in prospect. Henry Ford is reported to have purchased a 30-acre site at South Boston, Mass., for an automobile plant, but this has not yet been officially confirmed. The Studebaker automobile plant at South Bend, Ind., will be considerably expanded.

Lower Prices Coming?

Buying of machine tools in the American centres continues in fair volume, though the expectation among buyers that prices will soon be lower is injecting a spirit of hesitancy that sellers do not like to see. There are a great many inquiries, but orders are difficult to close. A difference of opinion exists among machine-tool manufacturers on the question of price reductions. Some say that prices which were unduly raised during the war period should be brought down to a proper level, but it is claimed that in a majority of instances advances in prices were only sufficient to cover increased costs of labor and material. While material costs have been lowered somewhat since the end of the war, labor costs are not coming down, and probably will not for some time. It is stated that there is an exaggerated idea among buyers as to the extent to which the reduced prices of pig iron and steel affect the cost of a machine tool, which is about 80 per cent. labor.

However much explaining the machine-tool trade may do, the idea seems firmly rooted in the minds of buyers that prices will come down, and much business is unquestionably being held back on that account. Other factors which are disturbing the machine-tool trade as well as the general business situation are: (1) Uncertainty and nervousness as to the treaty of peace; (2) the snarl at Washington over the question of agreed prices for iron and steel; (3) the slowness of the Government in settling claims on war contracts; (4) the delay in new construction projects, due to high prices and difficulty in obtaining bank loans, and (5) the approaching Victory loan. In addition, foreign trade is somewhat disturbed because of the unsettled conditions in Europe, the unfavorable rates of foreign exchange and high ocean freight rates.

The French High Commission, which has placed orders on a list of about $1,000,000 worth of machine tools to be used in reconstruction work in France, has temporarily suspended all buying, and has held up some of the orders which had not been confirmed. Probably nothing will be done until the peace treaty is signed.

The machine-tool trade, while somewhat discouraged by existing conditions, believes that the present large volume of inquiries is indicative of a potential large business, which sooner or later will develop. There are numerous export prospects in the market. A representative of a Belgian automobile, motorcycle and bicycle plant, which was destroyed in the war, is in New York to purchase a complete new plant equipment. A Philadelphia engineering concern is inquiring for several hundred tools for export to Belgium.

The Standard Oil Co., of New Jersey, has sent out additional inquiries during the past week for the equipping of a ship repair plant at Bayway, N.J. It is also inquiring for tools for machine shops at new oil refineries to be built in South Carolina and Texas. It is reported that the company may soon inquire for a large list of equipment for a new shipyard in Norway.

Crane manufacturers are finding quite a bit of business to bid on, but few orders are being placed. Locomotive crane builders have approximately three months' work ahead in completing old orders placed during the war. Since the ending of the war the new orders placed for locomotive cranes have amounted to less than 10 per cent. of the capacity of all the plants in the United States.

PROTESTS AGAINST THE POLICY OF IMPERIAL MUNITIONS BOARD

GALT "Reporter":—The Imperial Munitions Board is dumping into the market a large amount of material, which it is disposing of at bargain-day rates, to the injury of manufacturers who are putting forth prodigious efforts, not only to keep their war staffs fully employed, but also to make room for returned soldiers seeking jobs.

The Board's policy does not ring true to the appeal of the Government for a continuance of energy in productive work. Individuals, corporations and communities have set their jaws to carry out their pledges to veterans. Under their eyes movements are progressing for the amelioration of the distressed; for the steadying of business affairs; for the materialization of a variety of plans conceived in the interest of the masses. How is it possible to obtain the best results—looked-for results on the part of the Government departments seized with the importance of a rapid readjustment of trade conditions based on normal distribution of our products —with a great Public Service disrupting business by unloading material on a more or less gorged market, to which legitimate interests have been looking for support in these trying reconstruction days? How can business be steadied by introducing an element of disorganization at a most critical period? Is it putting the matter too strong to say that this dumping by the Imperial Munitions Board shows that some persons in authority are displaying little concern either for the men at work or the unemployed.

And "dumping" it truly is.

Much of this machinery—engines, boilers, iron tools, lathes, etc.—came in duty free from the United States under an agreement with the Board. Now what is happening? To put it briefly, this: Instead of paying a duty of 42½ per cent. on the selling price at the United States shop, by an arrangement with the Department of Customs the duty is assessed against the selling price under the forcing process of the Imperial Munitions Board, which has been instructed to rid itself of the left-over material at the earliest possible moment. We are not told that the Board protested against a forced disposal at this time, giving good reasons for its patriotic attitude. If it saw the injustice of the arrangement that is what Sir Joseph Flavelle and his colleagues should have done. We are left in ignorance as to this. We are compelled to believe that the Board faithfully, and without consideration for home interests, submitted to the instructions from England and proceeded with all haste to carry out the same.

To-day machinery for which $100,000 —or more—was paid is being sold to large concerns for less than one-half the invoice price, plus the duty, not on import figures, but on the bargain quotation from the Imperial Munitions Board. In other words, the duty collected amounts to about 10 per cent., and thus are the manufacturers of Galt forced to meet nothing less than cut-throat competition having the connivance of men in authority at Ottawa. Recently possible sources of business were closed to several Galt industries because of the Imperial Munitions Board's activity in dumping enterprises. The Board's customers, representing millions of capital and millions of profits, are well able to buy in a normal market, and without the alluring terms coming from Sir Joseph

Continued on page 369

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	. 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	**11 00**
Tire steel	**5 50**
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	. 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$19 00	$20 00
Electro copper	18 50	19 00
Castings, copper	17 25	19 00
Tin	60 00	58 00
Spelter	9 00	8 50
Lead	6 75	7 50
Antimony	8 00	8 50
Aluminum	35 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	8 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 00	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	14 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd. brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	**$8 50**
Structural rivets, as above	**8 40**
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per Ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks...list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 25
Sheets, black, No. 10	5 15	5 25
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head.28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 85
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
[illegible] Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	29 99	.....
1½ in.	32 00	28 00
1¾ in.	32 00	28 00
2 in.	36 00	28 00
2¼ in.	40 00	30 00
2½ in.	41 00	35 00
3 in.	47 00	40 00
3¼ in.	.....	47 00
3½ in.	57 00	48 00
	65 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

White			Cts. per lb.
XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Idea!	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

'lavelle and his colleagues would cer-ainly do so, thus helping along the ıovement to sustain employment in the ıterest of the country at large. We ıay well imagine what Sir Joseph Fla-elle would have said in answer to a roposal to dump ten or twenty thousand ons of American pork products, bought y the British Government for consump-on by the troops in France, on the Canadian market at figures below market prices and freed from the normal duty. But that's another story—or perhaps the suggestion is a cruel reminder of recent events that stirred the country. As it is, the machine shops of Galt have been hit by a policy that does not dovetail into the protestations of administrative leaders concerned as to the unemployment problem.

HIGHER PRICES SEEM CERTAIN TO COME IN U.S. SCRAP MARKET

THERE are signs of a revival in the scrap iron and steel market, and hile this is not general, in some places has been very marked. In some cases ıe activity is due to the dealers laying ı stocks to hold for the rise in prices ıat they feel is bound to come. Follow-ıg are reports from United States oints:—

Philadelphia.—A price of $15.75 de-vered has been offered for a large ton-ıge of steel by a large eastern interest. he whole scrap market is showing re-ewed strength, and this is specially otable in heavy melting steel. $16.50 elivered and $17 for May delivery is be-ıg quoted, while wrought iron pipe is p to $17.50 to $18.50 on buying by the ethlehem Steel Co.

New York.—Prices are holding firm, ith little change in the local market. ost of the demand is confined to heavy elting steel, though there is a fair de-and for wrought pipe. The increased ısiness expected from the cut in iron ıd steel prices has not yet developed, ıt there is a cheerful note to the mar-et, keeping prices firm on all grades.

Pittsburgh.—While for some time past ıe seeking has been all on the side of ıe dealers, consumers are now on the okout for supplies. This condition has sulted in a stiffening of prices. En-ıiries are pretty numerous, and while ıere is not much actual business, prices all cast scrap are on the upward move. eavy melting steel is quoted at $16.

Buffalo.—What is believed by dealers be the beginning of a heavy buying ovement, is the statement that the Steel o. has entered the market for a large ıantity of heavy melting steel. This ass of material is now quoted at $14.50 $15, an increase of 50 cents. Turnings ıd borings are in good demand.

Cleveland.—There is very little doing the scrap market in this district. A ımber of consumers are either shut wn or are running slack. It is expect-that from one to two months will apse before anything considerable is ne. Turnings are quoted at $8 to .50, and No. 1 bushelling has advanced cents from $14.50 to $15.

Chicago.—The activity in the market re is furnished by dealers who are ying down considerable quantities of aterial in their yards to hold for what ey consider the inevitable rise of ices. Although there is not much buy-g by consumers, the general situation is better than formerly. The Chicago, Milwaukee and St. Paul offers 1,200 tons, the Chicago and North Western 2,500 tons, and the Wabash 400 tons cast iron car and locomotive wheels.

Cincinnati—With a very small demand evidenced, there has been almost no change in the scrap market in this district during the week. Prices are the same as those quoted last week. There are a few enquiries which seem to be more on the line of keeping in touch with price movements than a genuine desire to buy.

St. Louis.—Prices have gone up a little in this district, due to small offerings, and some competition among dealers. This is not a consumers' market, small purchases by steel mills being the only buying of this class. The railroads are offering some scrap, the St. Louis Terminal Railway having sold 300 tons of rails this week at good prices.

Birmingham.—What trading is being done here is by dealers buying in for future trading. Quotations are low. There is much more stock in yards than was the case three or four months ago.

LOWER IRON PRICES HAS NOT BROUGHT MUCH NEW BUSINESS

THE reduction in pig iron prices has not brought the revival that was expected in some quarters. While enquiries are more numerous in some districts, in others there is little change from the prevailing dullness of the past few weeks. Following are reports from different districts through the country:

Philadelphia.—There has been an improved enquiry in this district, resulting in much better feeling in the market. There have been sales amounting to more than 2,000 tons, in which was included a lot of 500 tons of low phosphorus for the Chicago district.

New York.—The large amount of business that was expected to eventualize on the reduced prices, has so far failed to make an appearance. It was thought that the reduced prices would wipe out the uncertainty in the market, but so far this has not proved to be so. There are rumors that iron can be obtained at less than the minimum rates, but there is nothing to corroborate these rumors. Export orders are scarce, but a good number of shipments on old orders are being handled, as space in vessel becomes available.

Pittsburgh.—The market here is not by any means active, the tendency of consumers being to use up the stock they have on hand and on contract before going into the market for more. Business has not been helped much by the recent cut in prices, and the belief is held that the cut was too drastic, considering that the price of the raw materials was left untouched.

Buffalo.—What selling there has been here has been in carload lots at the new prices, and enquiries have also been confined to small lots. Reduction in prices has not resulted in revival of business, and many producers feel that there will have to be a readjusting period before any stimulation is apparent.

Cleveland.—There has been some increase in both sales and enquiry this week, for second quarter and last half. One sale of 2,000 tons foundry iron is reported, as well as smaller lots. One local automobile casting concern has been taking 2,000 tons a month recently. The piling of iron in furnace yards is still going on, but shipments in general have been better.

Chicago.—Pickands, Brown & Co., the leading producers here, were the first to apply the reduced prices to all iron shipped after March 21st. Several others have followed their lead. The step was taken independently of the price stabilizing plan emanating from Washington. The idea was that contract holders were entitled to the benefits of the reduced prices as well as those who are only now buying.

Cincinnati.—Few enquiries and small sales are the features of the market here. The reduced prices have not had any stimulating effect.

St. Louis.—Enquiries in this district have shown a great increase since the announcement of the price reductions although not much actual business has been closed.

Birmingham.—Furnaces are still being blown out in this district. The Ironton furnace of the Alabama Co. has been blown out, among others. It is likely that other furnaces will be banked during the week, if further orders are not forthcoming.

Toronto.—Following a conference with the Toronto Harbor Board, Mayor Church announced that Toronto's claim for a just share of shipbuilding contracts had not yet been relinquished. Representatives of the city will approach the Dominion Government after the Easter recess to request more generous treatment in this respect, and also to present a petition for the erection of a grain elevator in Toronto.

ATLANTIC CROSSED BY STEAMER FOR FIRST TIME JUST 81 YEARS AGO NOW

London.—At this time when eager preparations are being made for crossing the Atlantic by aircraft, it is interesting to recall that eighty-one years ago "The Times" recorded the departure from the Thames of the first vessel to cross to America under steam. From the issue of March 31, 1939, is reproduced the following paragraphs:

The experiment of a steam voyage from England to America has commenced. On Wednesday afternoon, March 28, the St. George Steam Packet Company's powerful steamship Sirius, Lieutenant Roberts, R.H., Commander, sailed from the East Lane Stairs for New York, proceeding in the first instance to Cork, from where she will start to her destination on Monday next. The Sirius is a vessel of 700 tons with an engine of 320 horse-power, and has been fitted up in most splendid manner. It is expected she will complete the voyage in fifteen days, and so confident are her owners that they have already announced her setting out from New York on the return voyage on the first of May. She carries from London twenty-two passengers, but this number will be considerably augmented at Cork. She does not take out goods, being intended as a passenger ship only.

Quebec Second to Sail

Soon after the departure of the Sirius the American Line packet ship Quebec, Captain Herbert, for New York, came down the river in tow of a steam packet. She carried out 171 emigrants; cabin. 17; between decks, 32; and steerage, 122. The latter were chiefly agricultural laborers and their families. Some parties were bold enough to lay a wager that the Quebec would arrive before the Sirius at New York.

The Sirius, however, reached New York April 22, and duly left again for England May 1.

An express message from Falmouth, published in "The Times" May 21, recorded her arrival at that port after a voyage home of eighteen days.

Made Initial Voyage

A five-year-old boy passenger on the outward voyage of the Sirius is still living at Dorset. He is the Rev. V. F. Ransome, a retired country rector, and Rev. F. L. Blathwayt of Melbury, Osmund Rectory, in Dorset, who has just had a conversation with him, informs us in a letter that Mr. Ransome clearly remembers his experiences. Our correspondent says the Sirius was a two-masted, one-funneled steamer, 178 feet in length; she carried 450 tons of coal on the voyage, being loaded almost to the water's edge, but ran so short of fuel she had to burn every spare yard spar, and even rosin, of which she carried fifty-eight casks.

"A printed abstract of her log, which lies before me as I write," Mr. Blathwayt says, "shows she encountered at times heavy seas, gales, sleet and snow, and when the vessel left Cork there were only six first-class passengers left on board, the others being so alarmed by the run down the English Channel that they disembarked and forfeited their passage money."

COMPETING FOR CANADIAN TRADE

What British Firms Think About Canadian Market at Present

LONDON, March 30.—Discussing the question of the Canadian market with a representative of CANADIAN MACHINERY the secretary of the British Machine Tool and Engineering Association remarked that at the present time the prospect in front of exporters was not a very bright one. During the war the whole of the output of the English machine tool industry had gone to swell the making of munitions. Since the armistice the Government subsidy on steel has been withdrawn, and steel had gone up in price. This had made it increasingly difficult to resume competition in the Canadian market with makers in the States who were now on a much easier footing than ever before.

BRITISH SLOW TO FOLLOW OPENINGS?

Could Shops on Pacific Coast Compete For Asiatic Business?

LONDON (Special).—The secretary of a large engineering organization in London remarked that at present one of the chief obstacles to the increase of the British machinery market in Canada was the absence of imagination amongst the manufacturers themselves, and the lack of combination between the various branches whose trade interests were identical. At the moment the attention of firms was largely absorbed by the enormous demands for machinery coming from destroyed industrial areas in Northern France and Belgium, and whilst satisfying these and assisting in European reconstruction there was a danger of overlooking the possibilities offered in Canadian markets which might never occur again. It was, also, not fully realized that American competition in the far East and in Canada might be successfully met by establishing factories in Western Canada and using Victoria as a jumping off ground.

IS CANADA NOT WELL ENOUGH KNOWN?

Greece Was Not Going to Consider This Country in Matter of Contracts

On March 7 the Canadian Trade Commission issued the following statement: "The Greek Government is in the market for 500,000 steel railway ties of 24 pounds weight each. Canadian firm contemplating bidding must take immediate action, as the demand is urgen American firms are known to be alread in the field. The Canadian Trade Com mission believes that this may give Do minion manufacturers a chance to us surplus steel and the forging presse which were installed for munition mak ing."

A representative of the Trade Commis sion afterward interviewed Mr. E. Tra velos, chairman of the Hellenic Com mission in the United States, with regar to the inquiry for half a million stee ties for the Greek Government. Mr. Tra velos stated his instructions were fo 100,000 at 155 pounds weight, and wa not aware that Canadian steel manufac turers were prepared to bid on this orde but when informed, said he would be gla to give every opportunity to Canadia firms to compete. He preferred to handl inquiries through the Canadian Trad Commission in Ottawa, and agreed t send specifications, blue prints and othe details as soon as ready.

On the general question of Canadia trade with Greece, the chairman of th Hellenic Commission said very frankl that Canada as a source of supply ha not been considered by his Commissio He requested full information on the Do minion's capacity. An invitation to M Travelos to visit Canada, and especiall Ottawa, has been extended. Mr. Trave los thought that if the matter of credit could be arranged, an enormous quantit of work which had to be undertaken i Greece could be arranged. He especiall mentioned a scheme for the water suppl of Athens.

INCORPORATIONS

Incorporation has been granted to th Stamped Metal Products Co. of Canada Ltd., to carry on business of mining smelting, casting, forging, rolling, etc The capital stock is $6,000,000, issue in $100 shares, and the chief place o business is at Toronto.

Incorporation has been granted to "Th A. R. Williams Machinery & Supply Co. Ltd.," with chief place of business a Montreal, for the purpose of manufac turing, dealing in, repairing, etc., en gines, boilers, power plant, electrical hydraulic equipment, etc. The capita is placed at $500,000 and the head office is at Montreal. Incorporation is grante as a private concern.

Notice appears in the "Canadian Gazette" that letters have been issued incorporating J. A. Campbell, manufacturer, S. S. Anderson, F. C. Kerby, all of Windsor; J. B. Gunn, of Winnipeg, and others, for the purpose of manufacturing, trading in conveyances and vehicles motors, machinery, engines, boilers, etc., under the name of "Canadian Collapsible Rim Co., Ltd." The capital stock is $500,000 and the chief place of business is to be at Windsor, Ont.

)OMINION STEEL HAS WON ACTION

nglish Courts Have Given Decision Against Owners of the Vessels

Montreal.—Cable advice received from ondon stated that the case brought by ie Dominion Steel Corporation in the nglish courts to force the owners of number of ships, under charter when ar broke out in 1914 to the Canadian ncern, to carry out their contracts has en decided in the corporation's favor. The court has ruled that the owners ust return the vessels to the company ntil the expiration of the charters, hich are for long terms, just as soon they are released from Government rvice. The return of the steamers will rmit of the pre-war trade in coal from ova Scotia mines to St. Lawrence River rts being resumed at a comparatively rly date. Although the definite text the decision is not yet available, it known that the ruling of the court tablishes the validity of the claim of e corporation against the shipowners, ferring the action to another English urt.

It will be recalled that when ocean arters became so valuable the owners the steamships under contract to the ominion Steel Corporation took the and that the declaration of war canled the charters for their vessels and ithdrew them to more lucrative trade, which they have been engaged for veral years. The moneys received from e Admira tlea yrETAOINSHRDLSH e Admiralty are far in excess of ose which would have been received om the Canadian company and it would em that the latter has a good claim this margin. The Steel Corporation so claims heavy damages for failure carry out the original charters.

Definite action against the owners of e vessels was instituted during the cent visit of Mark Workman, presint of the corporation, to England.

RE INTERESTED IN THE ELECTRIC FURNACE

ganization Formed for Purpose of Spreading Information Bearing on This Point

Steps were taken to promote the use various electric furnace products at meeting called by Acheson Smith, e-president and general manager of e Acheson Graphite Company, held at agara Falls on March 21 and 22.

The meeting passed resolutions invitg all manfacturers of electric furnaces, ectrical apparatus and electric furnace pplies and accessories, public utility rporations, designers and inventors of ectric furnace equipment and the users electric furnaces to become members id to join in a campaign to disseminte to engineers and to the public data to the quality of electric furnace oducts of all kinds.

The organization formed is to be calle the Electric Furnace Association. A permanent organization was created as follows:

President — Acheson Smith, Acheson Graphite Company, Niagara Falls, N.Y.

First vice-president—C. H. Booth, Booth-Hall Company, Chicago.

Second vice-president—W. E. Moore, Pittsburgh Electric Furnace Company, Pittsburgh, Pa.

Secretary—C. G. Schluederberg, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Treasurer—F. J. Ryan, American Metallurgical Corporation, Philadelphia.

Directors—The officers and C. A. Winder, General Electric Company, Schenectady, and F. J. Tone, Carborundum Company, Niagara Falls.

The president was authorized to get in touch with all who should be interested in joining the organization and was requested to arrange an early meeting when completed publicity plans could be presented. In the meantime different committees were instructed to perfect reports as a basis for constructive work.

MARINE

Montreal.—Among shipping on the St. Lawrence this season there will be many vessels of the United States Shipping Board Emergency Fleet Corporation. Within a fortnight after the opening of navigation there will be a fleet of 98 ships coming down from the Great Lakes. Altogether there will be 300 ships completed this summer, which will come down from such ports as Duluth, South Chicago. Saginaw, Detroit, Toledo, Cleveland, Manitowoc, Lorain, and Buffalo.

Toronto.—The board of control received a letter from A. C. McMaster, secretary of the Dominion Shipbuilding Company, stating that the Government had decided against granting any contracts to the company for ships. Contracts for two ships were wanted and very large financing had been arranged in the country. "They have as much right to take up the shipbuilding as these old debt-ridden junk railways," said Con. McBride of the Government. Mayor Church was authorized to again take up the matter with the Government. Board of Trade and Harbor Commission.

Toronto. — The navigation season of 1919 is now officially open between Toronto and Hamilton and Toronto and Port Dalhousie. It will be a month, however, before the Canada Steamships Company will open the season between Toronto, Niagara and Lewiston. Ferry service between the city and island is on now. Operations in harbor improvements will start in the near future. and it is proposed to complete what is known as sections 3, 4 and 5 inside the Western gap. The entire breakwater will be built in 1,000-foot sections, with 40-foot intervals, and will serve as a sheltered waterway for small craft as well as preserve the new shore line.

Toronto.—The "War Toronto," one of the fleet of forty-six wooden war freighters being built at different points in Canada, steamed out into the lake on her trial trip. It is just seven months since the freighter was launched, and it is expected that she will be on her way to England before long to take part in coastwise trade. She was built by the Toronto Shipbuilding Company, and her successful trial closes the "war boat" programme of that company. She is a 3,000-ton boat, built to the maximum canal size of 260 feet length and 42-breadth beam. Like her sister boat, "War Ontario," she has proved in every way satisfactory to her builders. She was built on exactly the same lines as the "War Ontario," and as the letter boat has proved seaworthy in bad gales the "War Toronto" will easily make the trip to England.

BOOK REVIEWS

Iron and Steel, by H. P. Tieman, the McGraw, Hill Book Co., New York. Price $4.00.

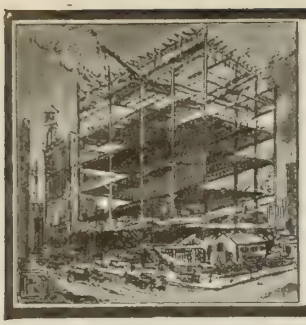
This is the second edition of this handbook on iron and steel nomenclature and processes and the subject matter has been greatly enlarged, revised and entirely reset. The number of terms and the text also has been entirely reset. The general processes of manufacture have undergone but little change, the principal development being in the greatly increased use of the electric furnace. The chief increase in the text is due to more extended discussions of subjects, such as heat treatment, physical properties, and testing, and to the numerous investigations of the more theoretical aspects of the subject, particularly those included under metallography.

For the benefit of those little versed in the metallography of iron and steel and who may desire a guide to a more sequential, and hence, logical study, than is afforded by the alphabetical arrangement of the text, which has been adopted as best for ready reference, a brief outline of the metallurgy of iron and steel has been prepared, and placed immediately preceding the text.

As has been mentioned, an alphabetical arrangement has been chosen in arranging the text, and the subjects treated of are cross-indexed throughout in such a manner that references are easily found. The subject of nomenclature has been very fully dealt with and the metallographist and mill man are enabled to meet on common ground and understand the technical terms special to each branch of the science, the laboratory and the mill.

The general treatment is a combination of dictionary, an encyclopaedia and a handbook, possessing as well as omitting some of the features of all. The definitions of isolated terms or processes are found under their respective headings, while those employed in connection with some special subject or process are found under the latter, reference being made by page numbers.

This work is of value to the millman metallographist, teacher or student interested in iron or steel.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Toronto.—The executive committee of the Toronto branch of the Engineering Institute of Canada has appointed three sub-committees. The first is to consider the ways and means of finding employment for disengaged engineers and for the advancement of others who are seeking the same. This committee had elected E. T. Wilkie as chairman and W. Cross as secretary. The second sub-committee was appointed to consider the feasibility of drafting a scale of fees for services rendered by engineers. This committee is presided over by Frank Barber and the secretary is W. S. Harvey. The third committee is considering the problem of grading the salaries of engineers according to their responsibilities and duties of office.

London.—One of the navy's secrets that has been disclosed since the cessation of hostilities is the use made of otters or Paravanes (called P.V.'s for short) in enabling ships to pass through minefields with almost complete immunity. These devices were towed in pairs, one on either side, from a point as low down as possible on the ship's bows, in such a way that they were not in the ship's wake but stood out obliquely away from the hull. When a mine-mooring cable was encountered it was forcibly deflected from the ship and along the whole length of the towing rope until it came to the Paravane itself. Here it encountered scissors or shear blades which, although it was made of steel 1½ in. diameter, cut it as easily as a pair of scissors cuts a piece of string. These blades, which were only 10½ in. long, with a section about 1½ in. wide by ½ in. thick, had to be made of exceedingly fine and strong steel, and after long and extensive tests by the Admiralty, the "Triumph Superb" high-speed steel, manufactured by Messrs. J. J. Saville and Company (Limited), of Sheffield, was exclusively adopted for them. The whole efficacy of the Paravanes, so far as mines were concerned, depended on these cutter-blades, for if through becoming blunt or breaking they failed to cut the cable, the mine would remain submerged and dangerous, whereas if it was released and rose to the surface it could be immediately detected and destroyed. When one realizes that the size of cable anchoring the German mines was 1½ inches in diameter, the efficiency of the Paravanes was most astonishing. As the secret of these steels is released commerce will be immensely benefited in their application.

PERSONAL

J. B. O. Kemp has been appointed manager of the Toronto Branch, at 208 Kent Bldg., of the Herbert Morris Crane & Hoist Company, Limited.

H. W. Appleton, formerly with Robert W. Hunt & Company, and recently works manager Toronto Plate Glass Importing Co., has joined the staff of Burns & Roberts, Ltd., railway and contractors' equipment, Toronto.

H. E. Streeter, who has represented the Swedish Gage Co. in Canada for the past seven or eight years, is resigning from the company. The Montreal office will be closed and a new office will be opened in Toronto, and will be in charge of M. J. Horsey, late of the Imperial Munitions Board.

Major Jas. McGregor, resident engineer of the Halifax ocean terminals, has arrived back after two years' service in the Third Battalion of Canadian railway troops. Major McGregor was engaged, while in France, in building and repairing standard gauge roads destroyed by the Germans.

F. D. Still, vice-president and secretary of the Canadian Sirocco Company, has left on an extended trip for the far East, where he will investigate trade conditions in connection with export work. Mr. Still's itinerary includes Japan, China, Australia and most of the European countries and he expects to cover approximately 36,000 miles before returning home about November 1st.

C. S. Ogilvie has been appointed to the position of assistant engineer for the Ottawa division of the G. T. R. System. Mr. Ogilvie held a similar position with the same company at Belleville, but resigned to go overseas. He was a prisoner in Germany for over three years, being released after the signing of the armistice.

Stratford Wins.—The first aid team of the transportation department of the Stratford shops was again successful in taking the first honors in the annual competition held last week by the G.T.R. at Montreal. The Chamberlain shield is the prize awarded for efficiency in this work. The executive of the Grand Trunk System take a keen interest in encouraging first aid work in all their large shops and terminals.

TRADE GOSSIP

New Office Opened.—Forest, Jackson and Forest are opening up an office in the old Witness building on Craig St., Montreal, for the purpose of carrying on a general brokerage business in steels, metals and machinery.

Action Decided.—The Montreal Cotton and Wool Waste Company has been awarded judgment to the amount of $17,167 against the Dominion Iron and Wrecking Co. The action arose over the refusal of the defendant to pay the purchase money required to buy the material in a bridge at Grand 'Mere.

A Coal Strike.—T. J. Freeman, manager of the St. George's coal field, Sydney, N.S., received a message from the company's expert to the effect that after tunnelling south for 200 feet at a depth of 140 feet a solid six-foot seam of coal had been struck. This is splendid news to the shareholders of the company, as the best seams in Cape Breton do not exceed six feet.

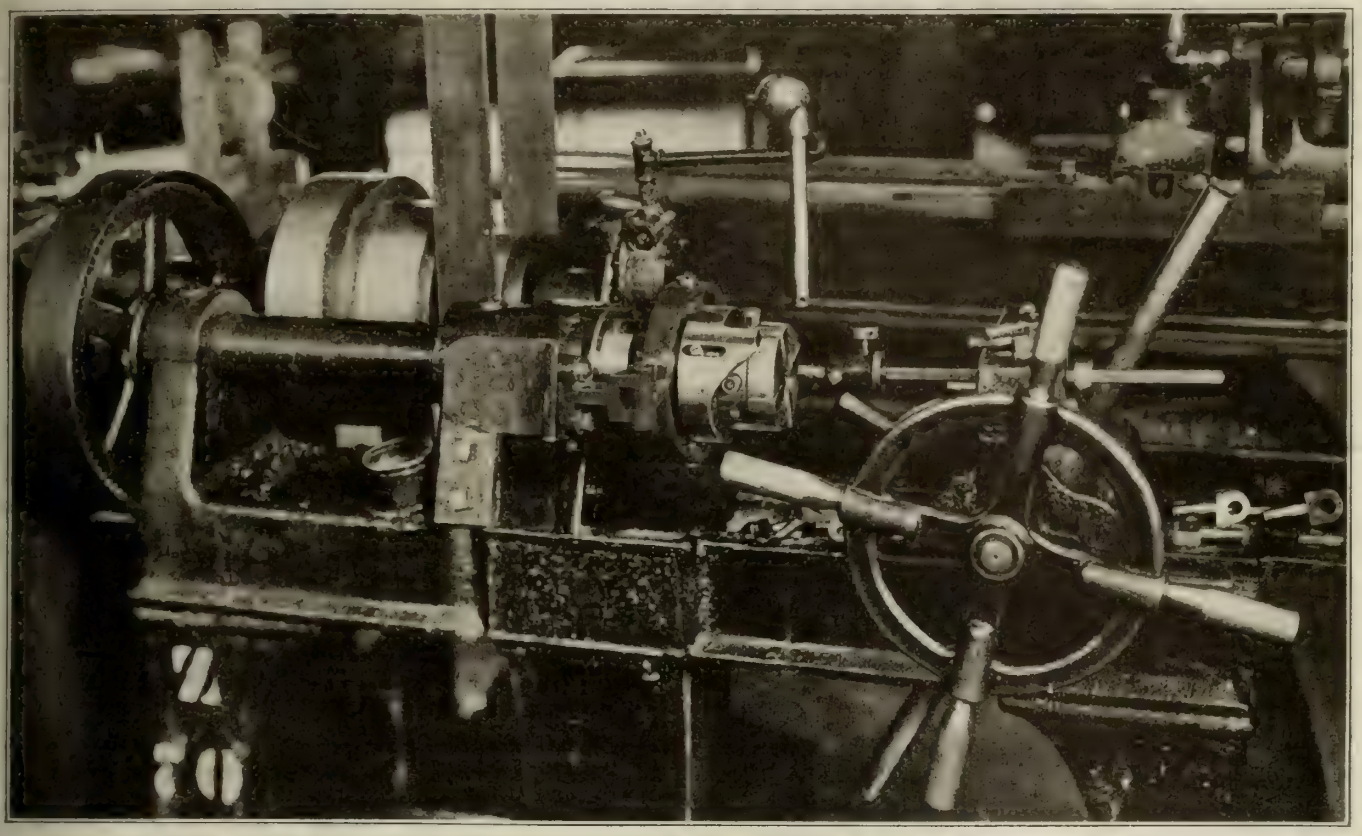
Agricultural Machinery.—A firm at Nova-Nikolaevsk, Siberia, with several years' experience in the agricultural machinery and engineering trades of that country, is desirous of securing the representation of Canadian firms in a position to supply machinery and other lines suitable for the Siberian market. If interested write Commercial Intelligence Branch, Dept. of Trade and Commerce, Ottawa, and mention reference 663.

Open New Offices. — The Wallace Barnes Company of Bristol, Connecticut, manufacturers of springs of every description, screw machine products, and high carbon cold rolled steel, has opened up branch sales offices at 50 East 42nd St., New York City, and 618 Book Building, Detroit, Mich., these offices being under the charge of District Sales Managers Lisle K. Lasher, and Brown Joyce, respectively.

Fatal Explosion.—A fatal explosion took place last Saturday on one of the boats of the Dominion Coal Company, when the bottom blew out of one of the combustion chambers of one of the boilers, resulting in the death of five of the crew, Chief Engineer C. B. McArthur, Second Engineer W. Scott, K. McDonald and two Chinese firemen, and likewise injuring the third engineer, M. Campbell, and two Chinamen

That Peterboro Bridge.—The controversy of steel vs. concrete for the construction of the Hunter St. bridge continues. The last move has been the sending in of plans for a steel bridge by Toronto engineers the structure to be 810 feet long with a fill-in at each end. Steel was practically unobtainable when the proposition was first considered, and

BROUGHT UP TO DATE



This old Bolt Cutter has been turned into an up-to-date Threading Machine by the application of a Geometric Die Head.

The Connecticut Telephone Company removed from this Bolt Cutter the solid die head with which it was equipped, and put in its place a Geometric Self-opening Die Head of the type regularly furnished on the Geometric Threading Machine.

Thread is 7-16″ diameter, 14 U.S.S., about 1″ long, on switchboard terminals of a high class copper casting.

The best part of it is, that besides getting clean, sharp threads, they have increased the work about six times over what was being accomplished with a solid die head.

Has any threading operation been given the right chance unless a Geometric figures in it?

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal.
The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

for that reason the reinforced concrete design was most favored.

New Brantford Concern.—Incorporation papers have been granted to Bayard Geekie Cobb, of the City of New York, engineer; W. J. Aikens, Dunnville, manufacturer; J. B. Detwiler, manufacturer; Thomas Hendry, insurance broker, and W. T. Henderson, King's Counsel, all of the City of Brantford, to acquire, erect, construct and operate furnaces for smelting and reduction of ores, metals and minerals, etc. The firm will operate under the name of "Electro Tin Products, Limited." Capital is $300,000, and head office and works at Brantford, Ont.

New Concern Incorporated.—Incorporation has been granted to the International Machinery and Supply Co., Ltd., Montreal, as a private company, to act as importers, exporters, and to buy, sell and otherwise deal in all kinds of goods, wares, merchandise and commodities. To manufacture and deal in iron, steel, and other metals from the ore to the finished product thereof, and all goods, wares, plant, machinery and merchandise in which iron, steel or any other metal may be used in whole or in part, etc. The capital is placed at $100,000, and Montreal is named as the chief place of business.

Putting in Machines.—Lyons & Co., of Parry Sound, are installing new machines to take care of their growing business. They are installing one or two more automatics for the manufacture of pill boxes, which this firm specialize in. This work was practically all done in the United States formerly, and this local firm are corralling the bulk of this business, going in exclusively for pill boxes, and making a success of it at that. An enlargement of the premises is contemplated shortly.

Repairs to Canal.—The Lachine Canal is now empty for the annual spring cleaning and repairs. Owing to the heavy traffic of last year considerable repairing has been necessary, but owing to the short time at the disposal of the commissioners, due to the early opening of navigation, the work will require to be hurried, and much will require to remain undone for another year. The free movement of the ice this year has prevented any serious jamming, and lock gates and bridges are consequently in good condition. It is expected that the water will be admitted about the 15th.

Change in Time.—In an effort to reduce operating expenditure, and at the same time retain its full quota of employees, the Point St. Charles shops of the Grand Trunk has been reduced to a working week of 40 hours. This action was taken after considerable deliberation, as it was felt that it was better to reduce the time for all the men than to lay off a portion and increase the number of unemployed. Mr. Sample, the superintendent of motive power, has intimated that the change will be a permanent one.

Making Water Meters.—The Neptune Company of New York, the largest manufacturers of water meters in the world, have decided to locate a branch manufacturing plant in Canada. They will be incorporated under the name of The Neptune Meter Company, Limited, of Canada. They have obtained floor space on the corner of King and Dufferin streets, in the former munition factory of the Russell Motor Company, and will, just as soon as it is practicable, equip a factory for the manufacture of water meters for the Canadian trade. The parent company has done a very large business in Canada during the past ten years, and will now be in a position to render very prompt service in the way of supplying repair parts, etc.

Adjusting Claims.—Adjustment of claims with respect to unfinished contracts entered into by Canadian manufacturers with the United States Government is being proceeded with by the Imperial Munitions Board as rapidly as circumstances will permit. The Board, together with two American officers identified with it as assessors, are considering claims, and settlements are being arrived at. Altogether there are

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Cloth; new and second-hand clothing, equipment, hardware, tents, blankets, camp supplies, etc. :: Flour, jam, canned evaporated milk, tea, coffee, etc. :: Condemned clothing, junk, old brass, metals, leather, rubber, etc.

SALES WILL BE MADE BY SEALED TENDER

Persons desiring to tender are requested to communicate with **THE SECRETARY OF THE WAR PURCHASING COMMISSION, BOOTH BUILDING, OTTAWA,** stating the items in which they are interested, whether new or second-hand or both.

Arrangements will be made to have samples on exhibition at places throughout Canada; specifications, full details, and tender forms will be mailed when ready to those who have registered as suggested above.

IF INTERESTED PLEASE APPLY NOW

Institutions May Make Direct Purchase Without Tender

Dominion, Provincial and Municipal departments, hospitals, charitable, philanthropic, and similar institutions which are conducted for the benefit of the public and not for profit may purchase goods without tender at prices established by the War Purchasing Commission.

All communications should be addressed to the Secretary, War Purchasing Commission, Booth Building, Ottawa, who will be glad to supply lists and further details to those interested.

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ALSO
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Quotations given on all classes of work. Wrought Iron Pipe Bends made to order, ¼ to 8". Pipe Cut and Threaded, ⅛ to 12".

Write for Prices.

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Plain Cylindrical Grinders

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Fitchburg Grinding Machine Co.

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This space, small though it is, is capable of producing big results if used continuously and judiciously.

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Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

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Prices on Application—Prompt Deliveries

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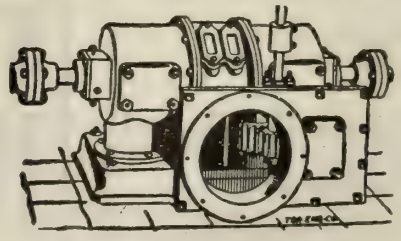
WATER POWER DEVELOPMENT



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Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

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You Know How Greatly it Increased

Production

You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

Hawkridge Brothers' steel for every commercial requirement is just such production-increasing steel as proved this "Hawk" D. Chrome Vanadium. We make

Steel of Every Description

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303 Congress St., BOSTON, MASS.
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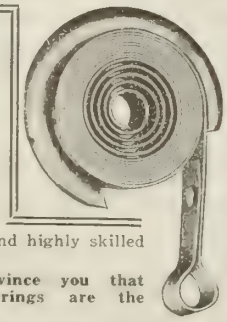
'Barnes-Made'

Springs

are unusual in service and wear.



They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-Made" Springs are the best buy.

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Increases Output
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Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

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Machine Tools for Iron & Steel Works.

We shall be glad to hear from firms contemplating improvements or complete installations.

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We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS

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about 330 contracts that are being dealt with. The American contracts constitute the great bulk of the claims that are still outstanding. Between 95 and 97 per cent. of the British contracts have been considered, and settlements have been made, and it is expected that the Munitions Board will be able to complete the adjustment of these British orders within the next few weeks.

Can Take Action.—Formal permission was received from Official Referee J. A. C. Cameron by J. M. Bullen, acting for the Toronto Harbor Commissioners and for B. Heinstein & Sons, of Christiansand, authorizing him to proceed in actions against the Polson Iron Works to recover extensive damages. The Harbor Commission sue to recover possession of part of Frederick street and water lots which the Polson Iron Works allege they hold, not on the sufferance of the Commissioners, but pursuant to an agreement for a lease with the city. They also ask $60,000 for mesne profits and for use and occupation. Heinstein & Sons sue for the return of $41,500 which they allege they overpaid for the steamer Asp, built by the Polson Iron Works. They also ask for $200 a day from August 11, 1917, upon which rate the boat was to have been completed, but was not completed until October last. The damages claimed by them total $74,600.

Australian Trade. — Two representatives of an important Australian company will shortly arrive in Canada with a view to interviewing Canadian manufacturers who may be able to supply articles required in Australia. The following lines are of particular interest to this firm: Galvanized black and steam tube, bar iron, steel boiler plates, rivets, bolts and nuts, galvanized corrugated iron, black steel sheets, aluminiumware, enamelware and engineers' requisites in general. They are engineers and contractors in a very large way of business, with warehouses under most capable management at Melbourne, Sydney, Brisbane, Adelaide and Perth. They do a very extensive trade generally, besides being successful contractors to various Commonwealth and State purchasing departments. If interested in this communicate with Commercial Intelligence Branch of the Department of Trade and Commerce, Ottawa, and mention reference number 627.

Open Montreal Office.—The Canadian Link-Belt Co. have opened a branch at 1195 St. James St., Montreal. A liberal stock of popular types of Link-Belt will be carried in stock at Montreal in the future from which all orders in that section will be promptly filled. This will not only enable the Canadian Link-Belt Company to render its customers a more prompt service than has hitherto been possible, but will also effect for them a considerable saving in freight and express. For the present the Montreal branch will serve largely as a warehouse, all engineering assistance being rendered by the Canadian Link-Belt Company at Toronto, where Link-Belt is manufactured for the Canadian market. Although shipments for the Montreal and Quebec territory will be shipped from

the Montreal branch all correspondence should continue to be addressed to the Canadian Link-Belt Company, Toronto

Munition Shops Converted.—A number of big firms in the United Kingdom are engaged in making preparations for competition with America. The work of dismantling tools, clearing away obsolete machinery and standardizing parts for mass production is well under way. Hundreds of additional acres are to be covered with workshops, and big National munition factories offered for sale by the Government are being purchased for the installation of the additional plant required. One firm is aiming at an output of 20,000 cars per annum. Another has just paid £140,000 for one of the National Aircraft Engine Factories, which cost the "Old Country" £133,000 to build. It is expected that five thousand workers will be employed in this concern, which will turn out fast pleasure cars, and heavy transport vehicles. The cars will be British built throughout, and will be fitted with British magnetos. The entire factory will be organized on the lines of quantity production from standard jigs. There are another fourteen factories in various parts of the country belonging to the nation which are available for private enterprise.

Restrictions Removed.—Advices have been received by G. T. Milne, Montreal, and F. W. Field, Toronto, British Trade Commissioners in Canada, that the following additions have been made to the list of goods which may be exported without license: Fancy goods made of morocco and light leathers; iron and steel manufactures generally except high speed steel and certain special articles; machinery of all kinds except textile machinery and machinery wholly made of brass or copper; toys and dolls; games of all kinds. Lists of export restrictions recently removed: Binder twine, barrels and casks, boilers, chrome ore, chestnut extract cork, fuel economizers for boilers, goldbeaters' skin, glue stock, dry white lead, hide clippings resins, lead coated sheets, paraffin, wax, pigskins, cast iron pipes, or steel wire, wire rope, quebracho extract, cast iron radiators, solid glucose, railway sleepers of iron or steel, railway springs, railway wheels, axles and tyres, railway constructional material except rails, silk manufactures, spirits except whiskey, tinplates, tinplates. Important prohibition relaxed: Bacon, lard, hams, hardwood, the latter until January 1st. Important relaxations revoked, licenses will be now necessary for brooms, brushes, buttons, gloves of leather and fabric, gas mantles, vegetable, tape, cotton piece goods.

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British firm manufacturing splendid line of foundry equipment such as molding machines, etc., wish to get in touch with good live Canadian representative. Box 572 Canadian Machinery.

Agencies Wanted

By firm of engineers having well-organized sales force in Canada. First-class connections with machine shops, shipyards, power plants, etc. Apply Box 573,

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For Immediate Sale

Modern Duplex Planing Machine to plane 30' x 20' x 10', two tool boxes on cross slide and two side tools, motor driven. Makers, Buckton & Co.

16" Slotting Machine with quick return and balanced ram, by Loudon Bros.

30' Plate Edge Planer, belt driven. Makers, Shanks & Co.

Belt-driven, 4-throw Hydraulic Pump, complete with accumulator, W.P. 1,800 lbs.

Apply
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LIMITED
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SPECIAL DRAW CUT R.R. SHAPERS
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STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE — WORKS: MUSKEGON HEIGHTS U.S.A.

CASTINGS
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JOBBING
GREENLEAFS, LIMITED
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BLACK DIAMOND OVENS
OVENS
Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal.
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Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

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IF YOU ARE LOOKING FOR A SUPERINtendent or general foreman, a Canadian citizen with twenty years varied shop experience in Canada and United States, a thoroughly live man with executive ability, one that can lower the cost and raise the quality of your product, just get in touch with the advertiser. Box 566, Canadian Machinery. (c14m)

SUPERINTENDENT OR WORKS MANAGER now open for position. Sound, practical man, with good initiative and executive ability. Thirty years' experience on marine and Corliss valve engines, machine tools, mining and sawmill machinery; also general repairs. Well versed in the design of tooling required to get the maximum efficiency and production. Best references. Box 568, Canadian Machinery. (c14m)

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TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

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WANTED—A CAPABLE MACHINE TOOL salesman. State experience. Box 553, Canadian Machinery. (c14m)

WANTED—DRAUGHTSMAN FAMILIAR WITH mining and crushing machinery. State salary expected. Box 565, Canadian Machinery. (c14m)

SALESMAN—MACHINERY AND SUPPLIES—City of Montreal. Man familiar with machine tools and with experience and connection in City of Montreal preferred. Good opportunity for an ambitious and capable young man. Write in detail in first instance, stating salary wanted to start. Box 569, Canadian Machinery, Montreal. (c15m)

DRAFTSMAN WANTED

EXPERIENCED ON MACHINE TOOL DESIGN. Apply in confidence to Box 570, Canadian Machinery. (c18m)

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PLANER FOR SALE, 46 INCHES WIDE, 36 inches high, 17 feet bed, has single head and screw feed, in first-class condition. Will be sold cheap. Apply The John Whitfield Co., 33 Sherbourne St., Toronto. (c13m)

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut. description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

CANADIAN WESTINGHOUSE MOTOR. 100 h.p. Serial No. 113842, full load speed, 580 r.p.m., 225 amps. per terminal, 220 volts. Constant speed, 7200 alts. Armour & Co., Hamilton, Ont. (c14m)

ONE SPINDLE, GRIDLEY, AUTOMATIC, ⅞-inch capacity, second-hand, perfect condition, slightly used. Ontario Metal Products Company, Limited. (c15m)

MANUFACTURER'S OPPORTUNITY

100 ⅛ and 1 ¼ h.p., air cooled gas engines, in semi-finished condition, with patterns, jigs, gauges, etc. Attractive bargain to serious party. Apply to
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Shepard Electric Hoists, 3 Tons Capacity with Motor Driven Trolleys, Floor or Pulpit Control $\frac{220}{440}$ Volts, 3 phase, 25 cycles. Used one year, A1 condition.

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Electric Traveling Cranes and Hoists
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WANTED—TWO TRAVELLING CRANES AND runways. Cranes to be from five to ten tons capacity with runways from 70 to 80 feet wide. Reply Box No. 571, Canadian Machinery.

WANTED—ONE TWO H.P. MOTOR, 3 PHASE, 60, 220. One 10-inch lathe chuck, 4 jaw. One 16, 18 or 20 inch, 4 jaw. Northwestern Iron Works, 1419 Scarth St., Regina, Sask., Canada. (c13m)

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MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

AGENT WANTED

By a well known Sheffield firm for tool steels and alloy steels.

Must have technical knowledge and good connection. State qualifications fully to

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Large Quantity of
USED MACHINERY
In excellent condition.

Automatic and Hand Screw Machines
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Good Used Equipment

Shaw 7½ Ton 3 Motor Crane, D.C. 220.
36" x 16' C.M.C. Triple-geared Q.C. Lathe.
27" x 16' LeBlond D. B. G., Q. C. Lathe.
Pels Type Beam Shear.
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23 x 26 W. & W. Bulldozers.
2,000 cu. ft. Can. Ing. Rand Air Compressor.
96" Fifield Hor. Boring Mill.
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The A. R. Williams Machinery Company, Limited
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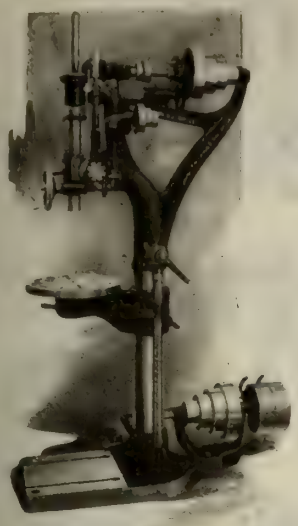

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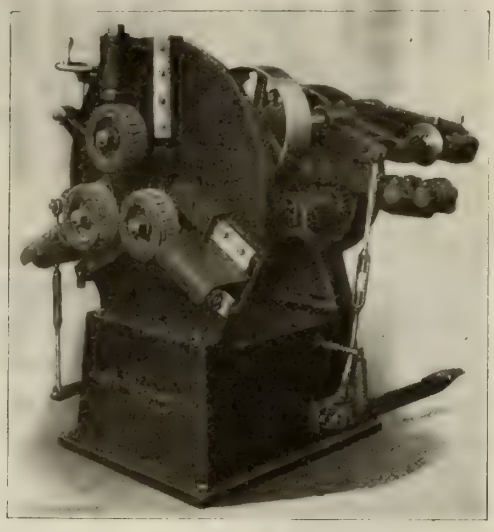

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Motors 3-Phase 60-Cycle

75 H.P., 550 VOLTS, 450 R.P.M. 2
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TRANSFORMERS....3
200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

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Prompt Delivery and Subject to Inspection.

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THE International Business Machines Company, of which Mr. Frank E. Mutton is vice-president and general manager, subscribed to 10 copies of THE FINANCIAL POST some months ago—these copies to go to their travelling salesmen. Now this company has increased the number of these subscriptions to 50 because the results of the experimental subscriptions have proved so satisfactory.

FRANK E. MUTTON

Mr. Mutton explained that the object of putting THE POST in the hands of the men of his company was to keep them intelligently acquainted with general business conditions in Canada. He said he knew no better paper than THE POST for the purpose. It would seem that his men have responded fully to effort made to keep them well informed about Canadian business affairs—so much so that the management have added 40 other men to the original 10 to receive THE POST.

When Mr. Mutton was with the National Cash Register Company as its Canadian manager, he was the king of all managers in the matter of sales records. In this position he achieved a big reputation built on solid achievements. He learned salesmanship in a school where competition was of the hottest kind, and where the competitors were brilliant men. Giving Mr. Mutton full credit for superior personal qualities and energy of the most ardent kind, it is taking nothing away from him when it is said that not a little of his success was due to his intimate and sympathetic knowledge of the other man's business. And he taught the men associated with him as salesmen to know the point of view and requirements of the men they called on to sell machines to.

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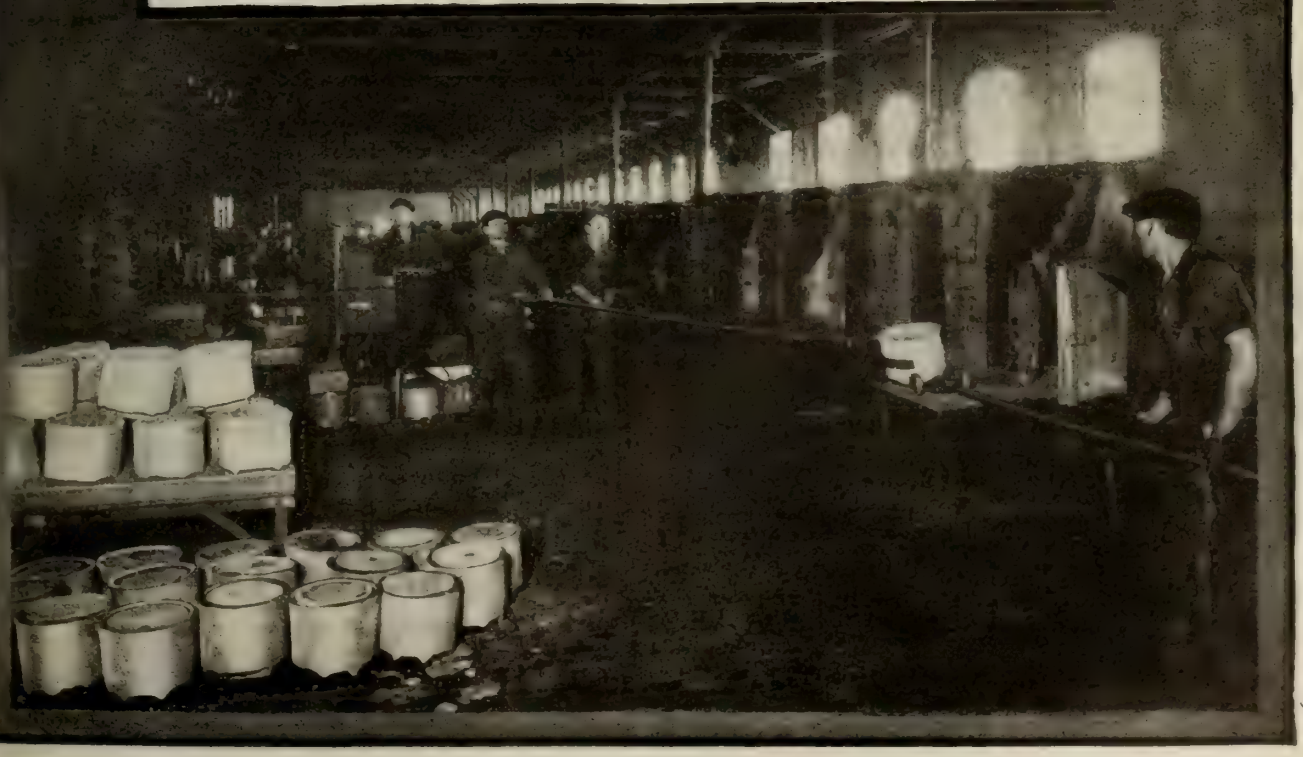

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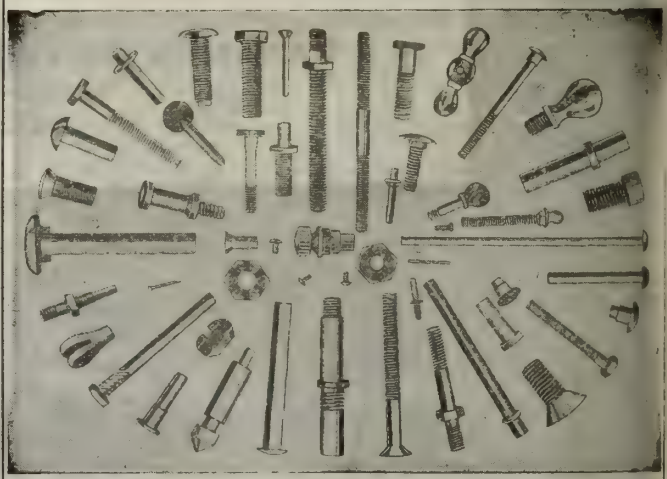

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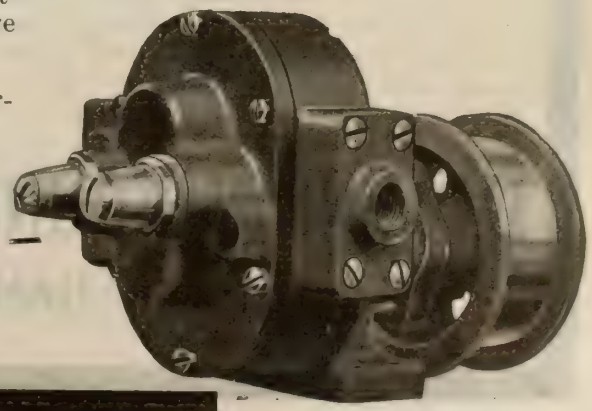

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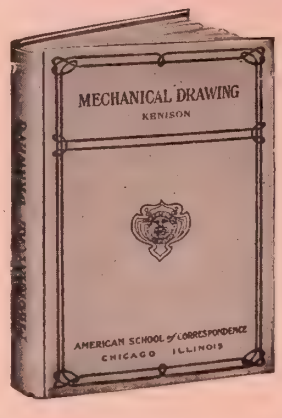

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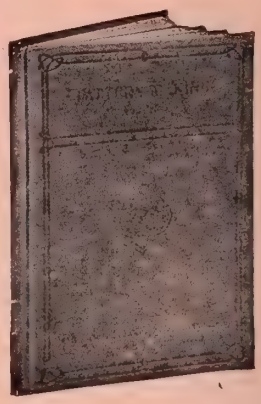

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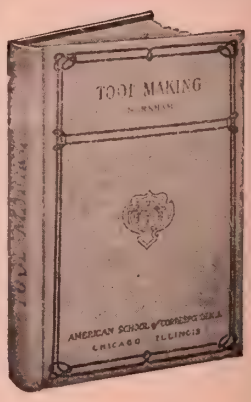

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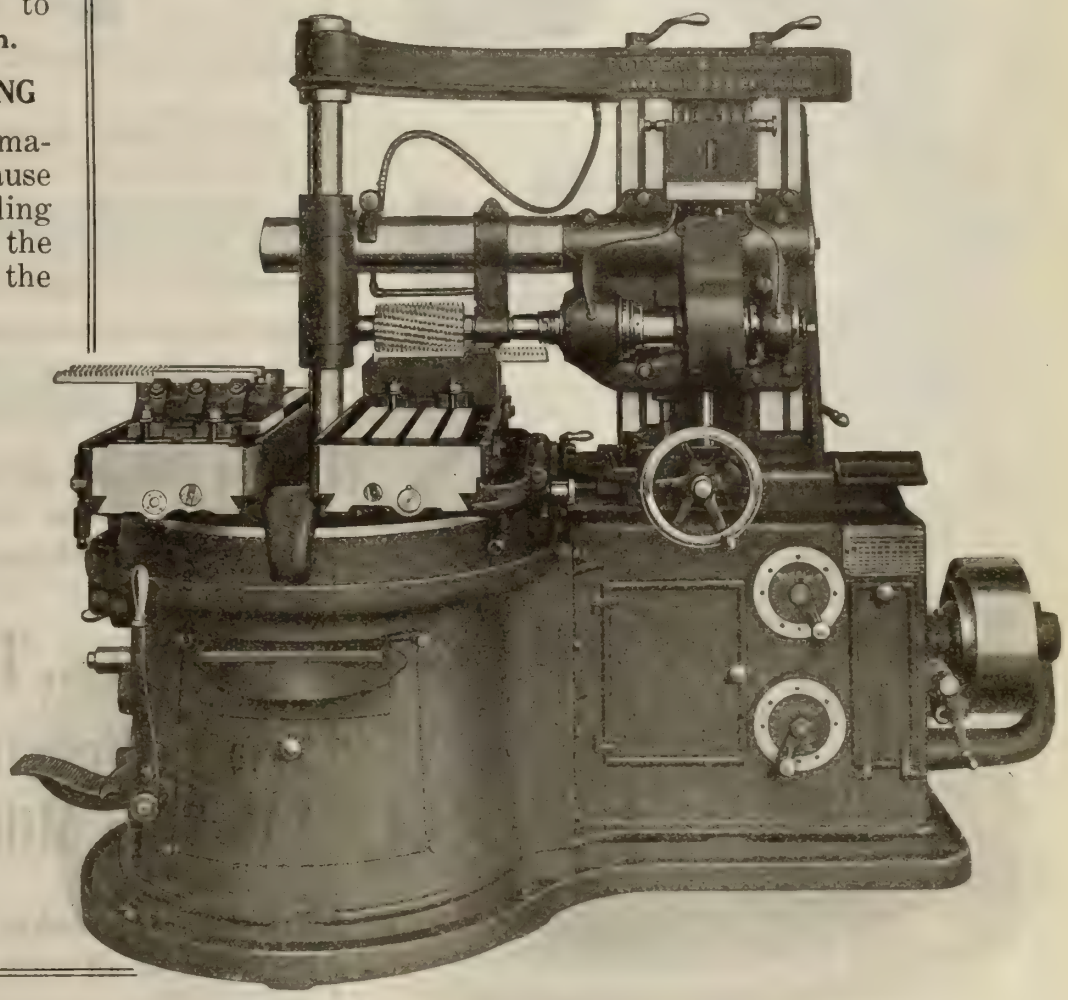

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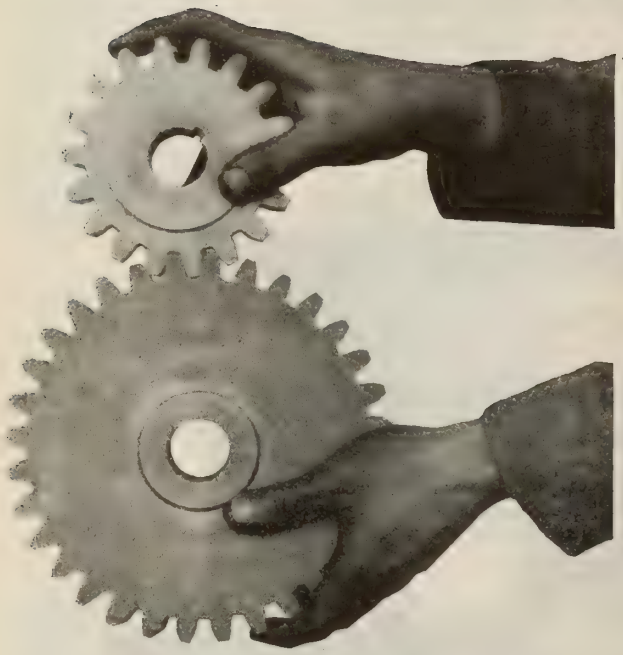

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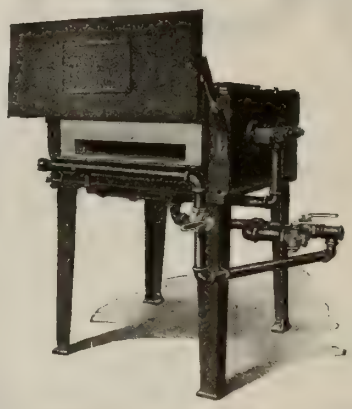

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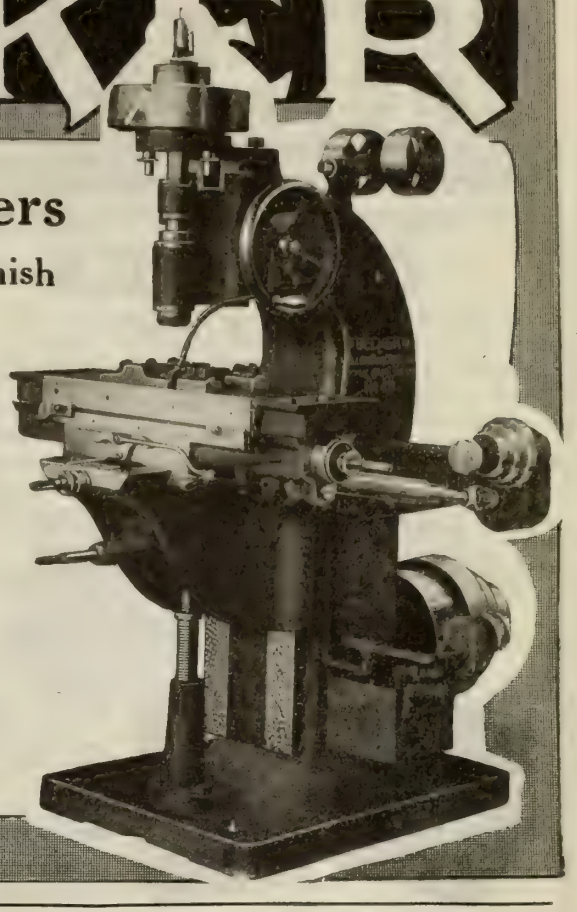

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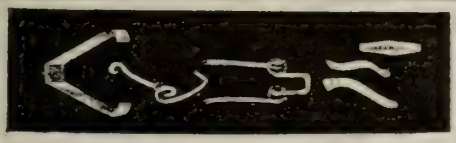

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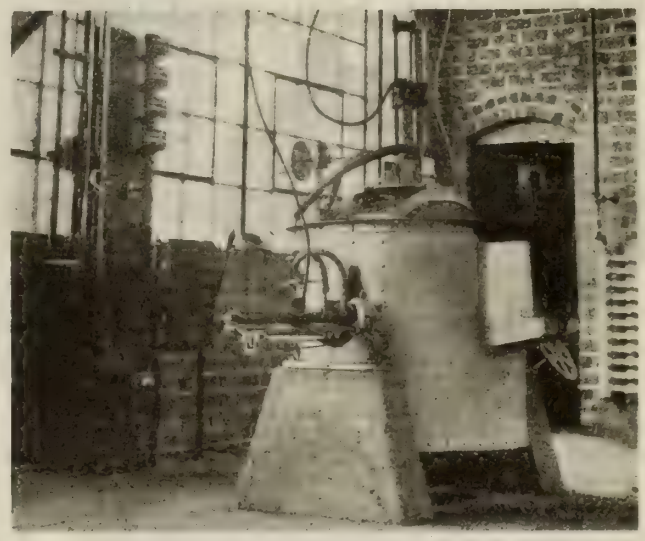

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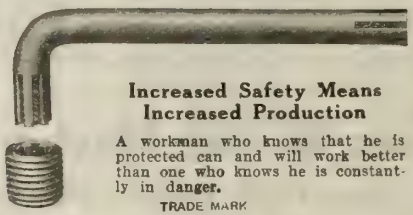

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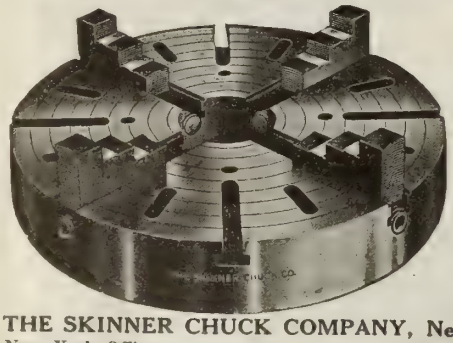

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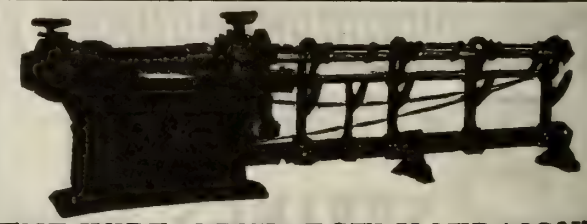

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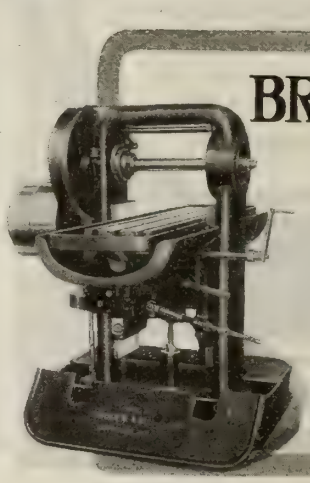

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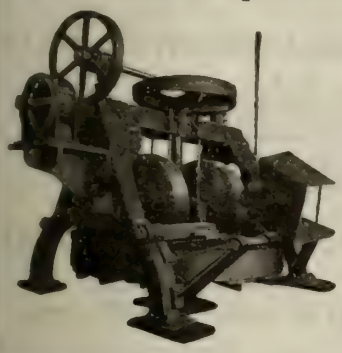

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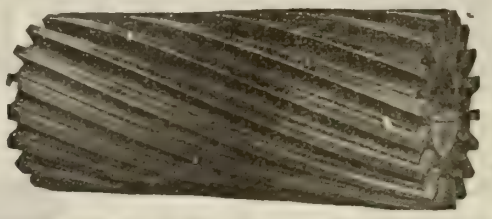

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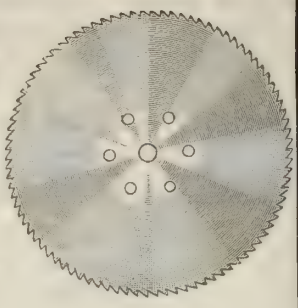

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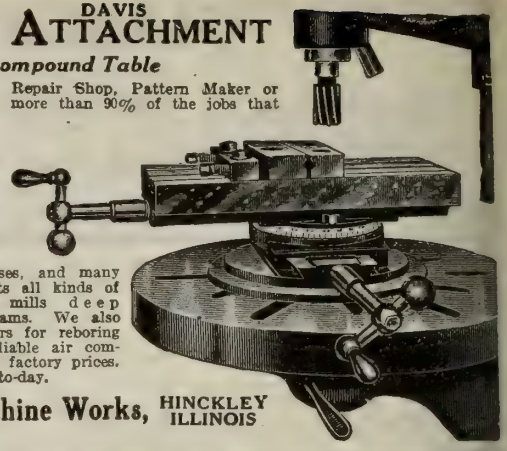

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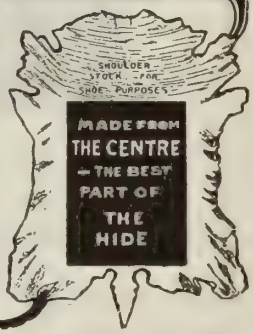

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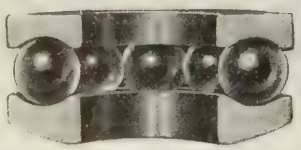

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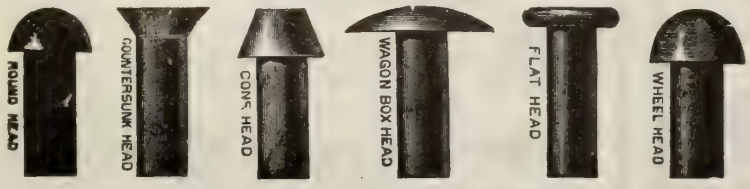

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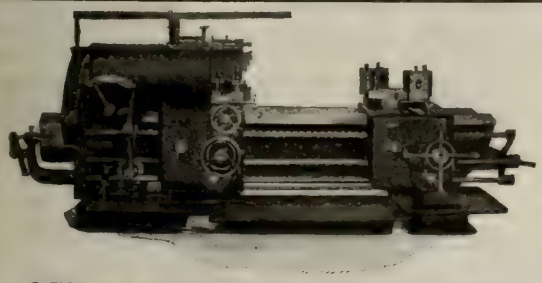

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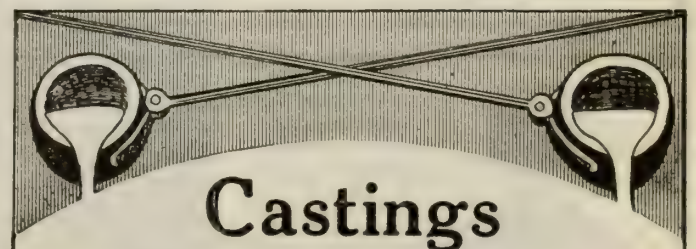

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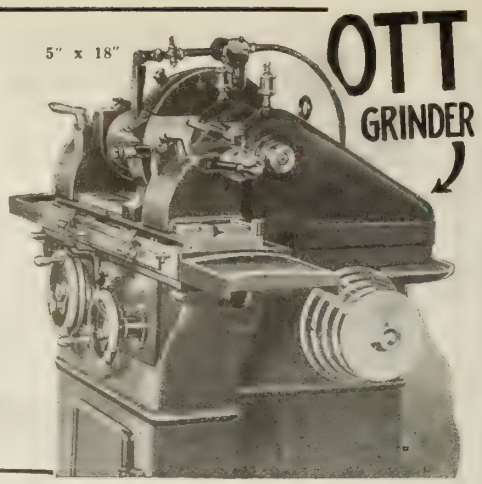

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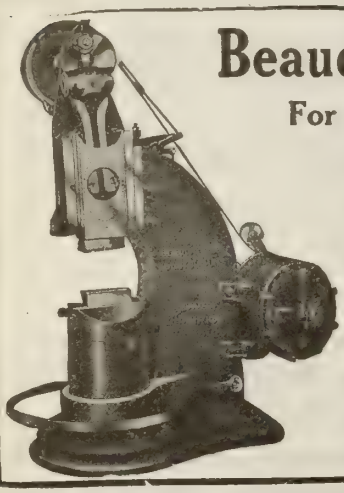

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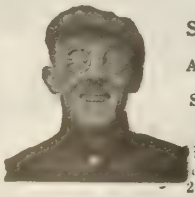

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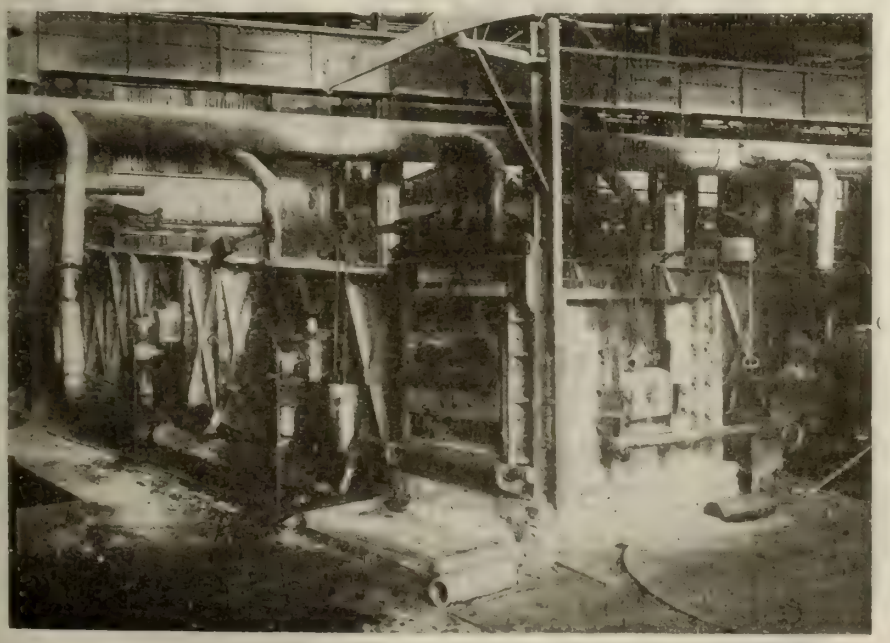

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Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENCH LEGS, STEEL
New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

BENDING ROLLS (PLUTE & AUGH)
Wickes Bros., Saginaw, Mich.

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Bertram & Sons Co., John, Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BLASTING MACHINES, SAND
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.
Williams & Wilson, Limited, Montreal, Que.

BILLET MARKERS
Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste. Marie, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLACKSMITH WORK
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Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
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Mulliner-Edlund Tool Co., Syracuse, N.Y.
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Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que.
Joyce, Koebel & Co., Inc., New York.

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Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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Can. Winkley Co., Ltd., Windsor, Ont.

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Bertram & Sons Co., John, Dundas.
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Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto.

BOLT THREADING MACHINERY
Jardine & Co., Ltd., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

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BRONZE, COPPER
Canada Metal Co., Toronto.

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Williams & Wilson, Limited, Montreal, Que.

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MacKinnon Steel Co., Sherbrooke, Que.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.

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Bertram & Sons Co., John, Dundas.
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Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Wilson & Co., J. C., Belleville, Ont.

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Swedish Crucible Steel Co., Windsor, Ont.

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Jones & Glassco, Montreal.

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Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
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Wilson & Co., J. C., Belleville, Ont.

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Hull Iron & Steel Foundries, Ltd., Hull, Que.
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CASTINGS, NICKEL STEEL
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Williams & Wilson, Limited, Montreal, Que.

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Coventry Chain Co., Coventry, England.
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Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont.

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General Steel Co., Milwaukee, Wis.
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Garvin Machine Co., New York.

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Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
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Niles-Bement-Pond Co., New York.
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Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.
Elm Cutting Oil Co., Toronto.
Ontario Lubricating Co., Hamilton, Ont.

CUTTING OIL, RECLAIMING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CUTTING AND WELDING PLANTS
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co, Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co. Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Anderson & Co. of Can., Geo., Montreal, Que.
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal, Que.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

DIES, THREADING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston, Mass.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES, BOLT, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
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Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.

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ARE TURNING OUT FOR THEIR USERS, WE CANNOT HELP A BIT OF HONEST PRIDE. WHEN WE CONSIDER THE ENDLESS PRECAUTIONS WE TAKE TO MAKE THESE REAMERS, HOWEVER, WE WOULD FEEL A BIT DISGUSTED IF THEY DID NOT WORK WELL. WE CAN HONESTLY RECOMMEND THEM AND WILL GLADLY SEND A CATALOG FULLY ILLUSTRATING THEM ON REQUEST.

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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
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Niles-Bement-Pond Co., New York.
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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
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Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
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Ford-Smith Machine Co., Hamilton, Ont.
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Landis Tool Co., Waynesboro, Pa.
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Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
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A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

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Can. Blower & Forge Co., Kitchener, Ont.
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Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

EFFICIENCY ENGINEERING SERVICE
Anderson's Efficiency Service, Toronto, Ont.

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Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

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Albany Hardware Spec. Co., Albany, Wis.

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Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

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DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

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DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS
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MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

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Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

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Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

ELEVATOR WEIGHTS
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ELEVATORS AND BUCKETS
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Curtis Pneumatic Machy. Co., St. Louis, Mo.
Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
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Can. Matthews Gravity Carrier Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Trueing Tool Co., Windsor, Ont.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINES, MARINE
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES
Brewster Co. ,Wm., New York, N.Y.

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Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL
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United Brass & Lead, Ltd., Toronto.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
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Sheldons, Ltd., Galt, Ont.

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Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

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Vanadium-Alloys Steel Co., Pittsburgh, Pa

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Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.

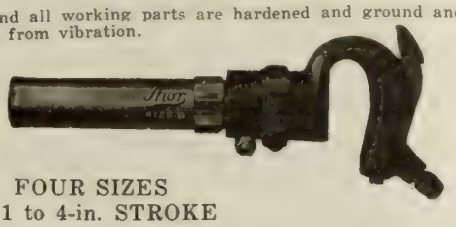
Thor

CHIPPING HAMMERS

Drilling in concrete with a size D hammer with a hexagon nozzle. Will drill a hole one inch in diameter, at the rate of one inch per minute.

Thor Predominates wherever chippers are used because:

1st. The main valve is large in size and durable, being of the balanced type and having a bearing surface of three square inches.
2nd. Two square inches of the bearing surface retain the lubrication constantly, as no air passes over to blow the oil off.
3rd. The handle is equipped with a self-seating throttle valve, which eliminates all leaks.
4th. The barrel and all working parts are hardened and ground and the hammer is practically free from vibration.



FOUR SIZES
1 to 4-in. STROKE

Riveting Base Plates with size B hammer. Let our service engineer call at your plant and explain the various uses to which these hammers can be adapted, and how to obtain the best results on your particular work.

Independent Pneumatic Tool Company

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CLECO AIR HOSE FITTINGS

Valves, Couplings, Clamps, Nipples, Menders, Hose

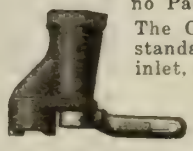
Everything required from "Pipe Line" to "Air" Tool

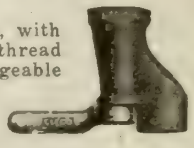
All Fittings Furnished are Interchangeable and Air Tight

CLECO AIR-SEATED VALVES

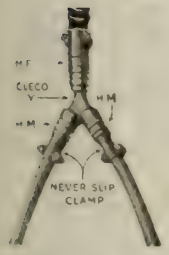
The CLECO Air Valve has but three parts: Body, Valve Plug and Handle; no Packing required, has Waste arrangement.

The CLECO Valve, style P.O., is made in sizes ½-inch to 1½-inches, with standard pipe thread. Style F.O. is made in one size only; 1-inch pipe thread inlet, and ¾-inch Female Bowes Coupling Outlet and is interchangeable with Male Ends from ¼-inch to ¾-inch.





CLECO "Y" HOSE FITTINGS



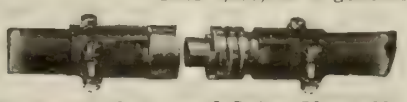
The Hose Section illustrated shows "Y" Fitting connected. The "Y" permits use of two Leader Hose Lines and Two Air Tools. Designed for Ship Yards use. Are made in four styles with Male or Female Outlets or Inlets and interchange with Bowes Male or Female coupling ends; sizes ¼-inch to ¾-inch inclusive. The two "Y" fittings illustrated are the plain style. The other two styles are each equipped with a valve having same features as Cleco Air Valves described above.

Y-Fittings may also be used in Boiler and Locomotive Shops.

BOWES AIR HOSE COUPLINGS

Over 2,500,000 in general use.

The Bowes is instantly connected or disconnected by ¼-turn.



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Write for Bulletin and Price Sheet No. 38

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Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
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FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

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GASOLINE TANKS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

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GAUGES, FUSE HOLE
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GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

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Pratt & Whitney Co., Hartford, Conn.
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Swedish Gage Co., New York, N.Y.
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Toronto Tool Works, Toronto, Ont.
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Worth Engineering Co., Toronto, Ont.

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Taylor Instrument Co., Rochester, N.Y.

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Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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Garlock-Walker Machinery Co., Toronto, Ont.
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Williams & Wilson, Ltd., Montreal, Que.

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Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

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Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

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Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Rice Lewis & Son, Toronto, Ont.

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Welding & Supplies Co., Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.

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Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie., Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

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Cincinnati Milling Mach. Co., Cincinnati, Ohio.
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Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

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Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

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Garvin Machine Co., New York.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
United States Electrical Tool Co., Cincinati, O.
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Williams & Wilson, Limited, Montreal, Que.

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Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
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Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Bristol Machine Tool Co., Bristol, Conn.

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W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
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Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
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Wing & Son, J. E., Hamilton, Ont.

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Heald Machine Co., Worcester, Mass.
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Gisholt Machine Co., Madison, Wis.
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"Imperial Relations Must be Worked Out," by Viscount Bryce. An important announcement on the future construction of the British Empire.

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"Opening the New Book," by J. K. Munro. An article on the situation at Ottawa created by the new Liberal leadership—smashing, impartial, fearless.

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"Canada's Fishmonger General," by Thomas M. Fraser. An article on a young Canadian who put Canadian fish on the diet of the British armies by a series of Barnum and Bailey advertising stunts.

"Bombing the Boche," by Lieut. J. Vernon Mackenzie. The second of the two articles that Mr. Mackenzie has written on the whirlwind campaign of raid reprisals which so frightened all Germany.

"The Transformation," by Frederic S. Isham. Illustrated by Hanson Booth. The second instalment of this sparkling new serial.

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The Review of Reviews

The best articles from all publications the world over are selected and condensed for this department. Some of the articles in the April number are:

The Man Behind Bolshevism.
Could German Fleet have been Destroyed.
The Secret Plans of the Allied Command.
Too Much Wilson.
Is the ex-Kaiser Haunted?
Next Government Will be Labor.
New Life of Deposed Princess.
A New Kind of Socialism.
Are We Communicating With Mars?
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United Hammer Co., Boston Mass.

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Norton, Ralph B., Agent, Montreal.

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HINGES
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MacGovern & Co., Montreal, Que.
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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HOPPERS
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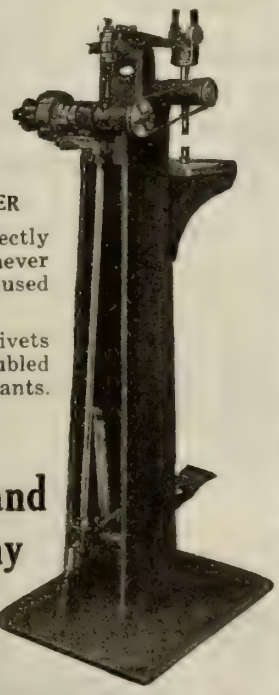

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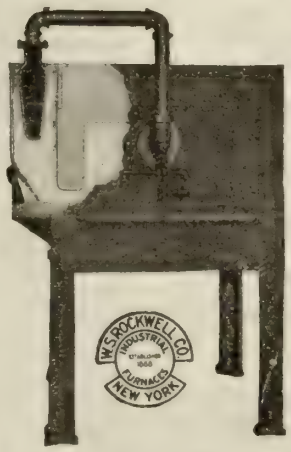

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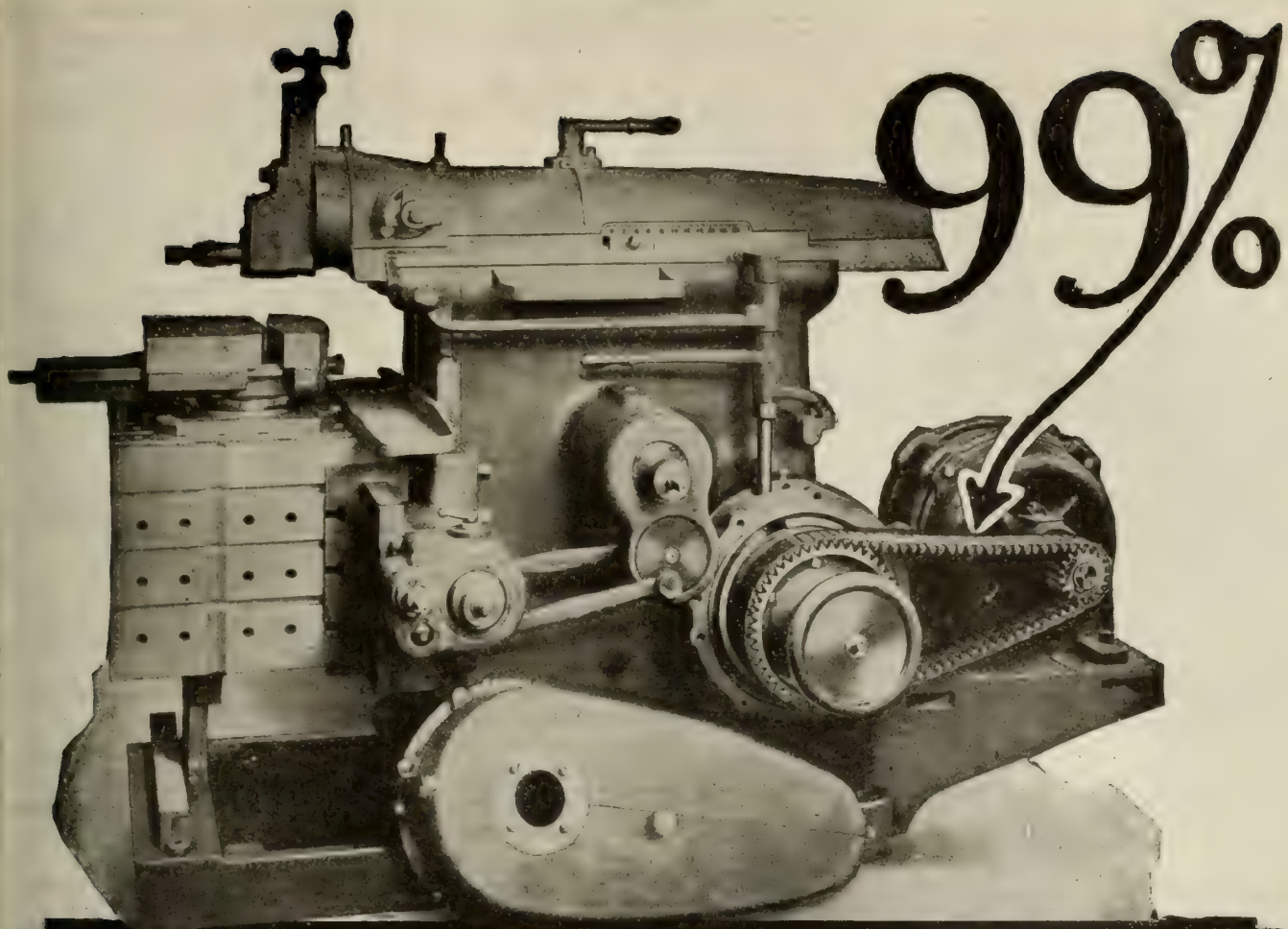

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J. F. A. Comstedt, New York City, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

NITROGEN
Carter Welding Co., Toronto, Ont.

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Williams & Co., J. H., Brooklyn, N.Y.

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National-Acme Co., Cleveland, Ohio.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, Ohio.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

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Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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OILS, DRAWING
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Sheldon's, Ltd., Galt, Ont.

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Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

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Wells Bros. of Can., Galt, Ont.

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Brantford Oven & Rack Co., Brantford, Ont.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS

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Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

OXY-ACETYLENE WELDING AND CUTTING PLANT
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Prest-O-Lite Co., Inc., Toronto, Ont.
Oxyweld Co., Ltd., Toronto, Ont.

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New Britain Mach. Co., New Britain, Conn.

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Gutta Percha & Rubber, Ltd., Toronto, Can.
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Frost Mfg. Co., Chicago, Ill.

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Bertrams, Ltd., Edinburgh, Scotland.
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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

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A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
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Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
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Garvin Machine Co., New York.
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Niles-Bement-Pond Co., New York.
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Williams & Wilson, Ltd., Montreal, Que.
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Peck, Stow & Wilcox Co., Southington, Conn
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Metalwood Mfg. Co., Detroit, Mich.
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Stoll Co., D. H., Buffalo, N.Y.
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Bliss Co., E. W., Brooklyn, N.Y.
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Toledo Machine & Tool Co., Toledo.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
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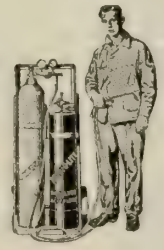

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Note, for instance, these contents of the

Financial Post

dated April 5th

Private Companies Win Decisions in Hydro Fight
U.S. Railroads are Ignoring the New Steel Prices
Big Market in Sight for Canada's Paper
Canada's Wheat Problem: Canada's Wheat Wanted
Canada is Now Buying Less in United States
Steel Reduction is Not Resulting in New Business
Crerar Unfair to the Western Land Companies
An Opening for Canada in Irish Linen Industry
Canadians Study British Industry
Trust Company is Formed by Merchants Bank
Amending the Legislation Re Loan Cos.
Labor Commission Will Aid Industry
Canada's Wheat and British Millers
Unbusinesslike Administration of Alberta 'Phones
Deny Newsprint Prices Being Cut
Fairbanks-Morse Shows 44.38 Per Cent. on Common
Weyburn Bank Has Big Balance in Other Banks
Dominion Linens is Operating a Spinning Plant
A. Macdonald, and Relations of the Common
C.P.R.'s Position Was Maintained During Year
Scotia Steel Company Would Mine From Dominion Area
Monarch Knitting Dividend Outlook
A Canadian U.S. Alliance in Bank Field
Experience vs. Training in Banking Field
The Claim of the Banker for More Salary
Business, Sentiment, and the G.T.R. (Editorial)
Finding a Job for the Idle M.P. (Editorial)
Bond Market Lapses Into Dull Condition
Big Bond Issue for an Eastern Pulp Company
Building Costs Not Likely to be Lower.
Alberta's Acts for Relief of Mortgagors
School Houses Are Becoming a Worse Hazard.

Business Building News Items Appear Each Week in *The Financial Post*

The above are only a few of the many subjects of real profit-making interest to Canadian men of affairs which have been dealt with by expert writers and editors in THE POST of April 5th. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

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Vanadium-Alloys Steel Co., Pittsburgh, Pa.
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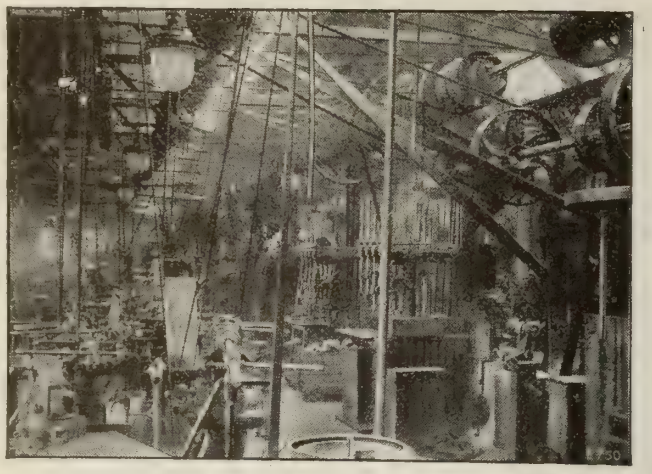

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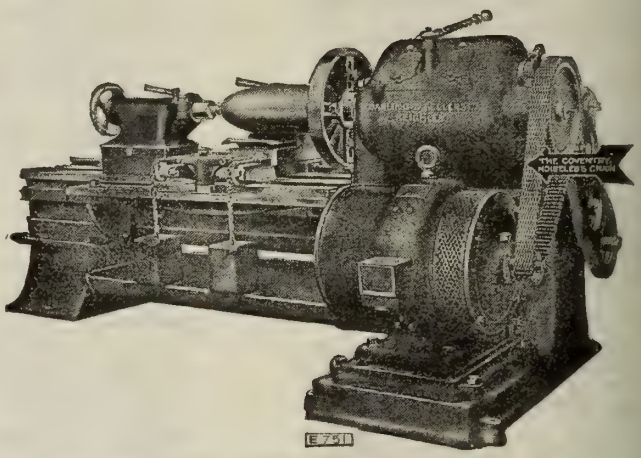

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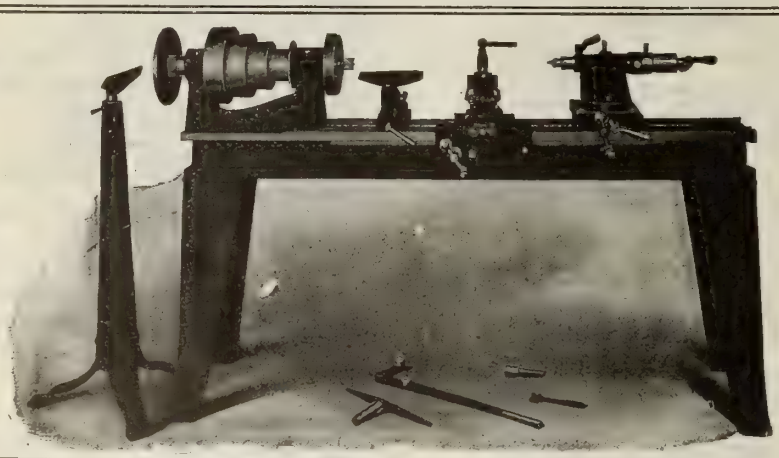

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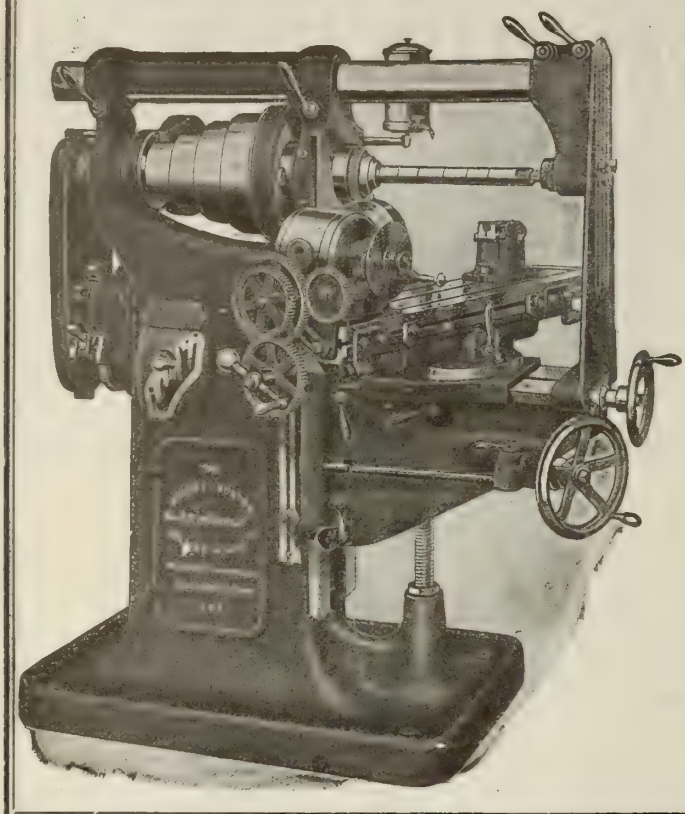

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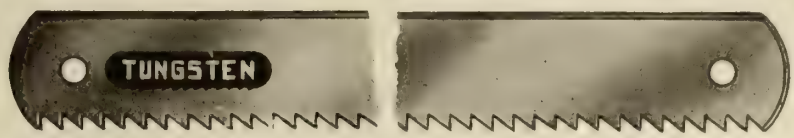

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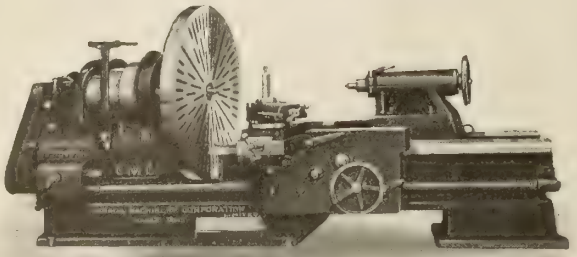

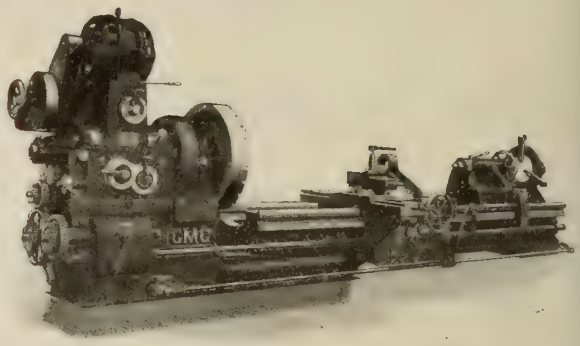

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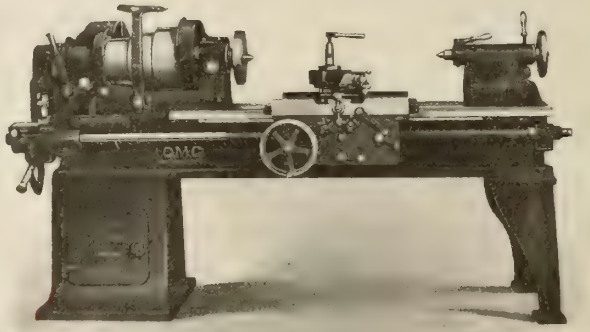

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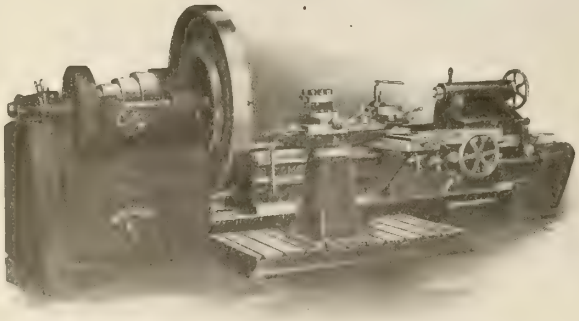

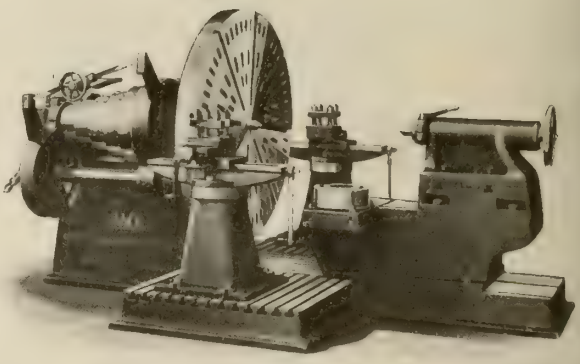

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Unfolds not only in himself. for if we scan
The product of his hands we find therein
There shines the reflex of his traits that win;
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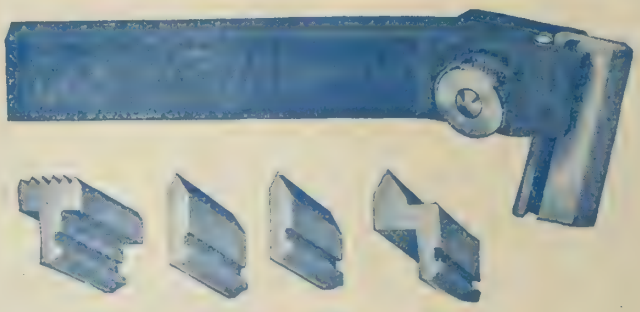

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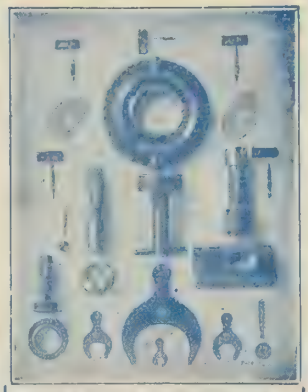

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Standards and Gauges
Accuracy Unequalled

Precision Machine Tools

PRATT & WHITNEY CO.

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Works: DUNDAS, ONTARIO

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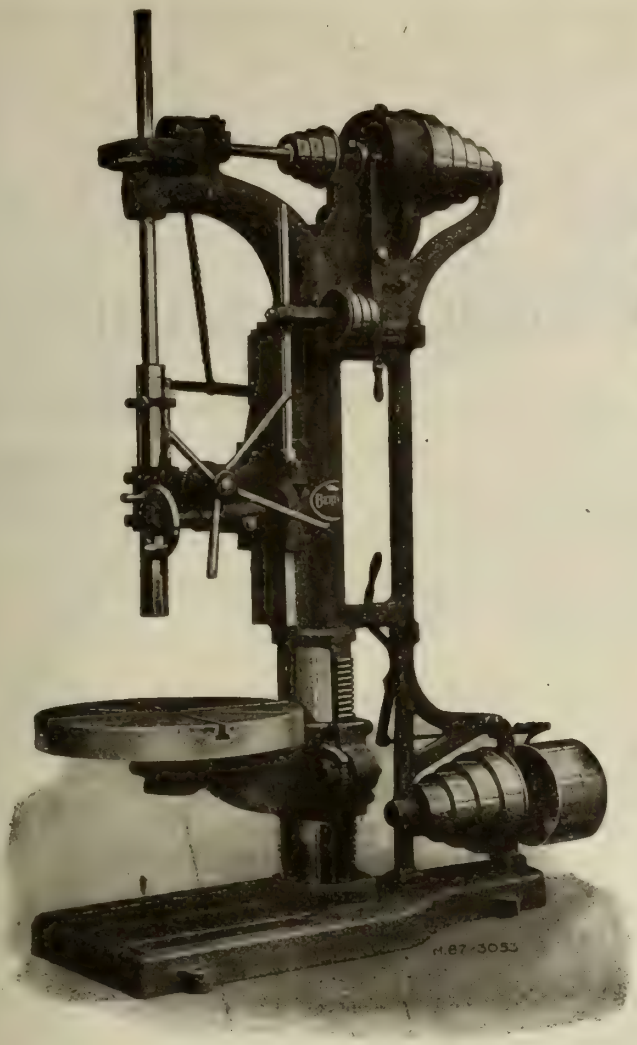

Bertram MACHINE TOOLS

Locomotive and Car Shop Equipment

Structural and Bridge Shop Machinery

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General Machine Shop Equipment

30-Inch Vertical Drilling Machine

Photographs and full particulars gladly mailed upon request.

WRITE US NOW.

We'll be pleased to submit photographs and full details on any line or lines in which you are interested.

The John Bertram & Sons Co., Limited

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1205 McArthur Bldg.

The Publisher's Page

TORONTO APRIL 17, 1919

THE BUSINESS OUTLOOK CLEARING

There is lots of encouragement for the business optimist nowadays, and before very long—perhaps before we realize it—the period of readjustment, or the critical stage of it at least, will have been passed. Last week it was announced in CANADIAN MACHINERY that the General Motors Corporation would spend $6,000,000 on an immense plant in Windsor.

Following close on this came a report to the effect that the Maxwell Company, in a plant employing at least one thousand men, would take care of their export business from their Windsor factory.

CANADIAN MACHINERY has received requests for information from several large American manufacturers who are seeking locations in Canada. They find their British trade cut off and see in the establishment of a Canadian branch an opportunity to take care of their British business under Canada's preferential tariff and at the same time handle their Canadian trade at short range.

Some of these fine bracing mornings we'll wake up to find that a lot of buyers are in the market. It will be then that the steady, persistent advertiser will thank his lucky stars that he was born with common-sense and faith well mixed.

It will be then that advertised lines will get the cream of the business and the non-advertised, dark horse stuff the skim milk.

When you're in the market for anything, be it clothes or shoes—tooth paste or a razor, a machine tool or a traveling crane, remember that the advertised product is not only best, but in the long run by far the cheapest.

And don't forget to perk up and look cheerful. The Western sky is clearing.

Canadian Machinery and Manufacturing News, April 17th, 1919. Vol. 21, No. 16. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.

Quality Service

USE GOOD JUDGMENT

And contribute your share to the prosperity
of the Country in which you live.
Spend your money where you earn it.

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar
is Worth One Hundred Cents
in Canada

THE

STEEL COMPANY OF CANADA

LIMITED

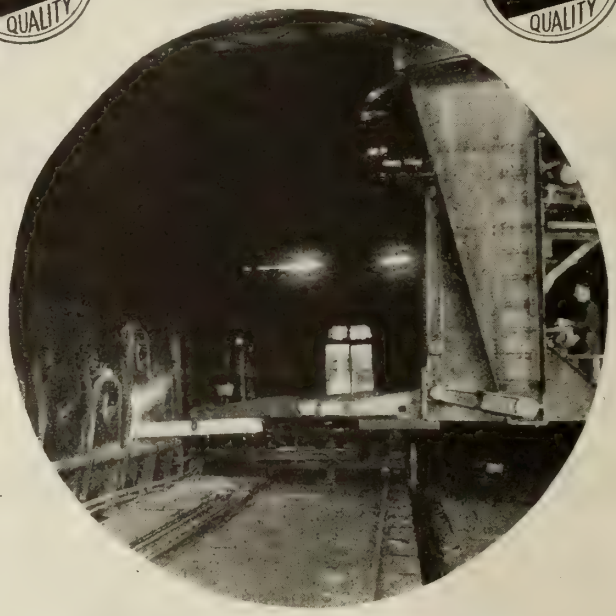
HAMILTON ▪ ▪ MONTREAL

ALGOMA STEEL CORPORATION, LTD.

SAULT STE. MARIE, ONTARIO

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

MARK OF ALGOMA O.H. QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. *Nitre Cake*

MARK OF ALGOMA O.H. QUALITY

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

BRIDGEFORD

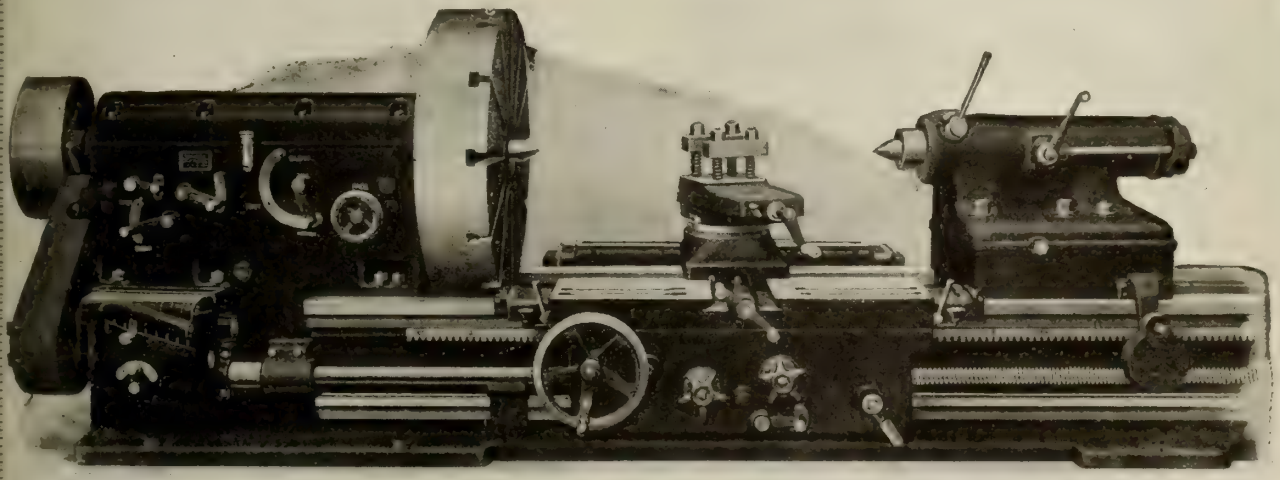
Heavy Duty Lathes

Bridgeford Lathes are standard equipment in many of the world's largest industrial plants where production, accuracy and durability are vital factors in the selection of equipment.

Their simplicity of design, rigidity of construction, facility of operation and scientifically distributed weight, enable them to meet the exacting present-day demand for service.

Bridgeford Lathes are adapted for heavy cutting, such as is made possible by the high speed steel now in general use.

The Bridgeford line of lathes includes Heavy Geared Head Engine Lathes from 24-in. to 72-in. swing, Cone Driven Engine Lathes, Axle and Journal Truing Lathes, and Manufacturing Lathes of 27 in. and 30 in. swing. Write or wire for information.

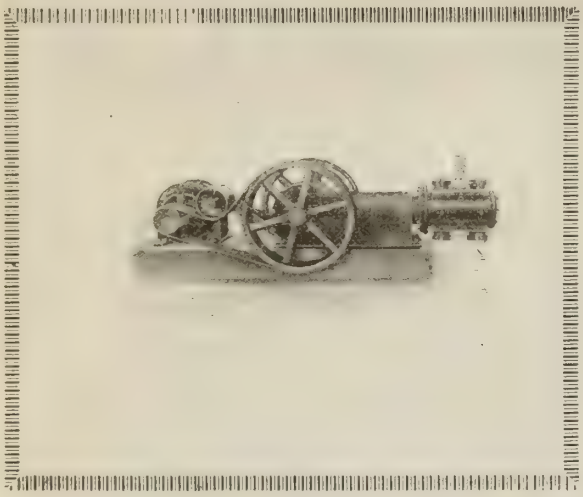


BRIDGEFORD MACHINE TOOL WORKS 161 Winton Rd. Rochester, N.Y., U.S.A.

Manufacturers of Heavy Duty Lathes for more than 20 years.

BRIDGEFORD

The Short Belt Drive For Compressors Saves Space



Have you been wondering how you can fit that compressor into your power house? Here is the solution—the short-belt drive.

We build both single-stage and two-stage machines—straight-line and duplex with this type of drive.

Less floor space
Less belt expense
No belt stretching
Capacities up to 2,000 ft. per min. with short-belt drive.

Send for our booklet on how to apply the short-belt drive to the best advantage.

Canadian Ingersoll-Rand Company Limited

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Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO.
ESTABLISHED 1900
Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company
MONTREAL QUE.

Strong in the Neck

WILT

Machine shop foremen and superintendents who invariably specify **"WILT"** when requisitioning tools know **WILT Drills** are superior—are absolutely guaranteed against defective material and workmanship—are rigidly inspected before being shipped. To produce more, use **WILT Drills.** To produce more economically, use **WILT Drills.** Elimination of breakage alone will save you much.

WILT

HIGH SPEED AND CARBON TWIST DRILLS

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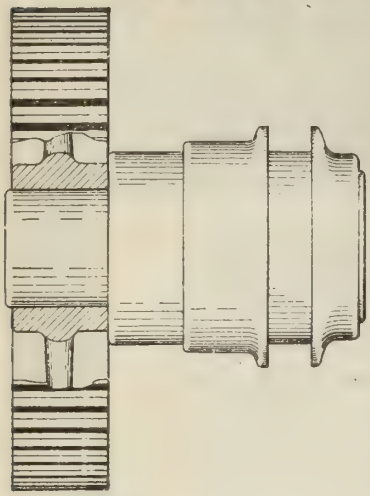
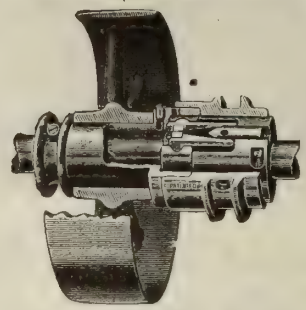
"Where there's a WILT —there's the Way."

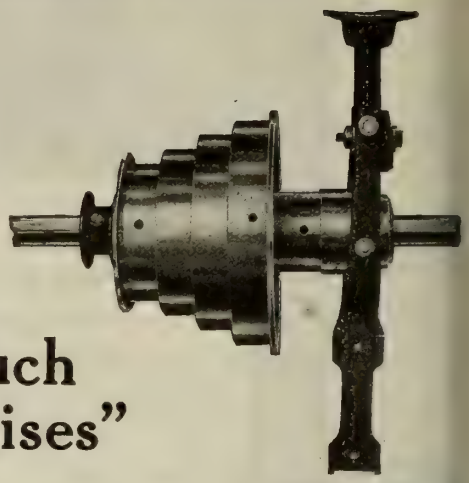
THE JOHNSON FRICTION CLUTCH



Gear Mounted on Clutch Hub.

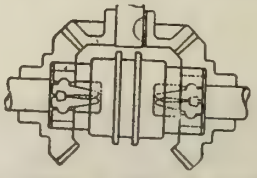


Pulley on Hub Clutch Engaged.



Cone Pulley on Hub and Style "A" Shifter

"Records are Much Better Than Promises"



Double Clutch in Nest of Gearing.

Ask us for the names of builders of machines such as you make. For every requirement there is a JOHNSON FRICTION CLUTCH.

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High Grade STEEL Castings
Of Every Description

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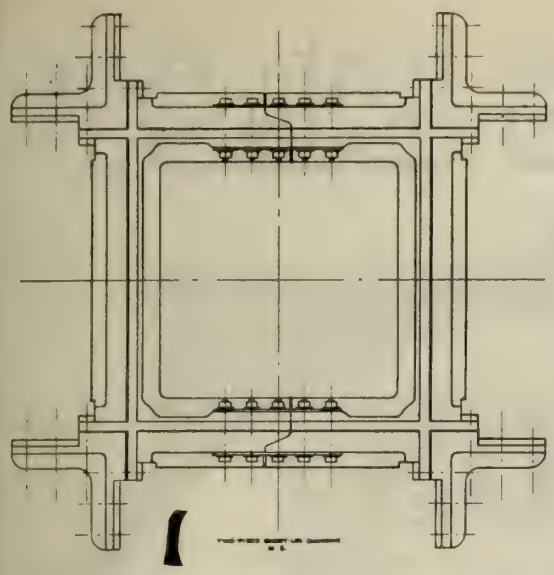
General Steel Company
Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building



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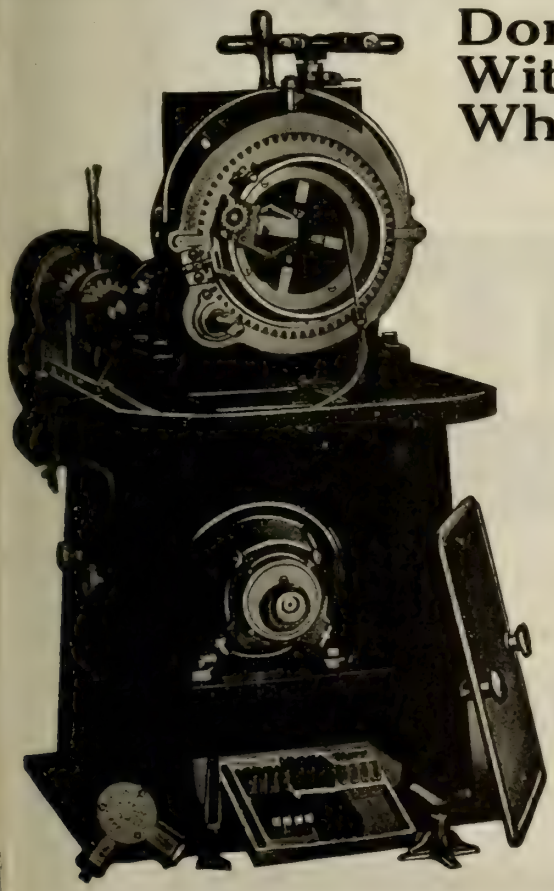
Built-up, Hard-Centre or Solid Manganese-Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings.

CANADIAN STEEL FOUNDRIES, LIMITED

Transportation Building. Montreal



Don't Talk Man Shortage With Six Men on Pipe Work Where There Should be One

Don't let urgent work lag for the want of men while you employ a gang of men instead of one man and a

Forbes Pipe Cutting and Threading Machine

on your pipe work.

The old-style stock and die method of cutting off 15-in. pipe required six men. It can now be done with one man and a Forbes Machine.

The motor-driven type follows the pipe-fitting work wherever an electric wire can be run. No hauling of heavy pipe to and from a stationary machine.

In the Forbes Machine the dies revolve. The pipe remains fixed in the self-centering vise. And the threads cut! They're the kind that make tight joints, because they're clean, accurate.

Write to-day for our catalog.

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115 Garden Street . Bridgeport, Conn.

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BRANDS OF ALLOY & TOOL STEELS

In Billets, Bars, Sheets, Hot and Cold Rolled Strips, Cold Drawn Cast Steel, Wire and Drill Rods

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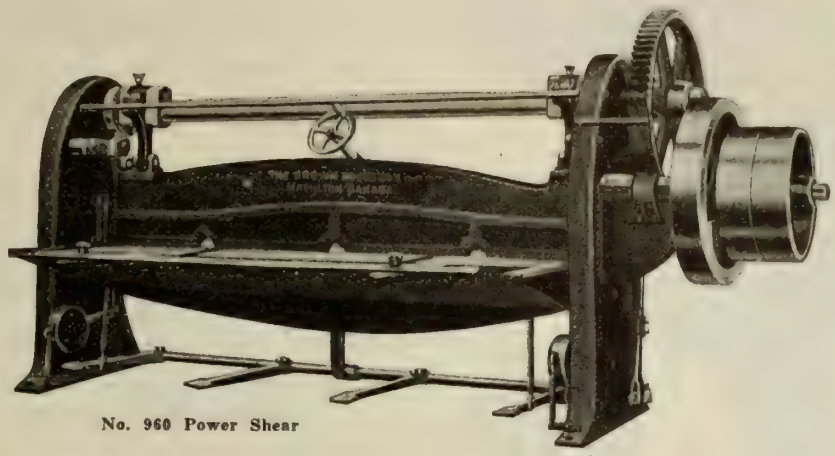
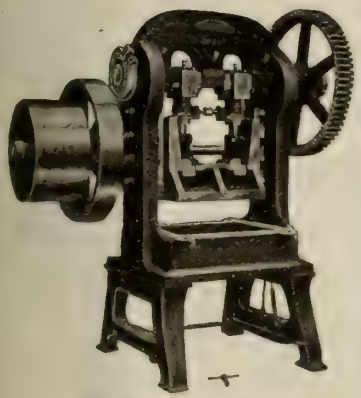
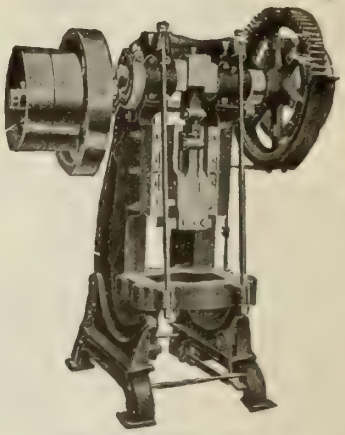


No. 960 Power Shear



No. 20½ Power Press



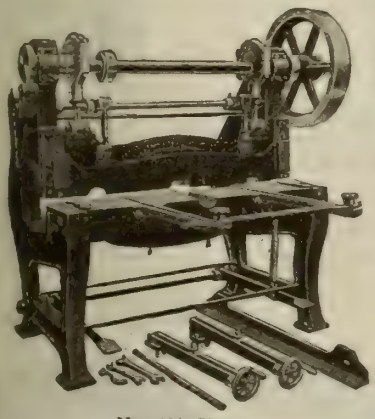
No. 215 Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

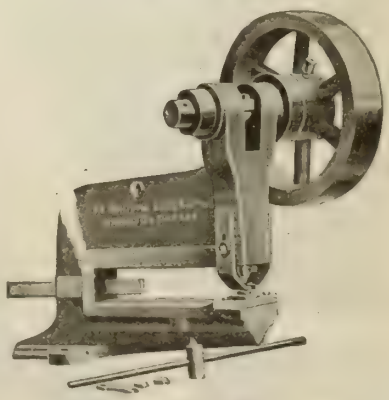
Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

PEXTO STAMINA

(Ability to see things through)

Applied to Pexto Wrenches it is ability to take hold, hang on, come through and stand ready to do the job over and over again.

Each Pexto kind is the same in this respect. Solid Handle, Solid Steel, and Pipe Wrenches are mighty significant terms when associated with Pexto. This name adds a reputation built up through 100 years of tool making. It is surety for long wrench service.

Just as Pexto Tools have played an important role in war so will they prove equally capable in the reconstruction process. Stamina is as necessary in one as in the other.

Every phase of present day activity has need for the ability that is designed and forged into Pexto Tools.

Whether you are buying a hundred tools for the shop or a single wrench for your home you'll find the same genuine economy in Pexto.

Look up the Pexto Dealer in your immediate vicinity.

THE PECK, STOW & WILCOX COMPANY

Manufacturers Mechanics' Hand Tools, Tinsmiths' and Sheet Metal Workers' Tools and Machines, Builders' and General Hardware.

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Address all correspondence to 205 W. Center St., Southington, Conn.

100% American for 100 years. Founded in 1819

PEXTO

PEXTO
Solid Handle Wrench

This solid handle Pexto Wrench is made of three strong, simplified parts with heavy wooden riveted handles. The head, bar and handle frame are all forged in one piece from high quality steel, next is the sliding jaw, and third the screw.

PEXTO
Solid Steel Wrench

Like its solid handle partner this wrench is made of three simple parts—the head, bar and handle are all forged in one piece from high quality steel. This Pexto Wrench is built for heavy duty.

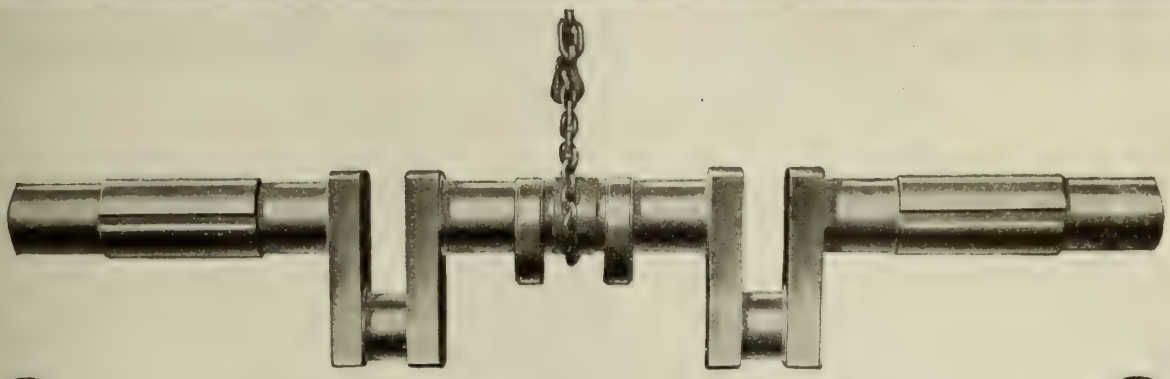
PEXTO
Pipe Wrench

This Pexto Wrench carries out the highest ideals of Pipe Wrench design. The hardened jaws of steel grip like a vise, yet they are easily tightened or released. When you get a pipe wrench be sure it's Pexto-made.

PEXTO

TOOLS FOR USE ABOUT THE HOME AND FARM
FOR THE MECHANIC IN EVERY TRADE

CANADA FOUNDRIES & FORGINGS LIMITED



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Crucible

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Open Hearth Steel

Tool Steel

"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.

1856

Frankford, Phila.
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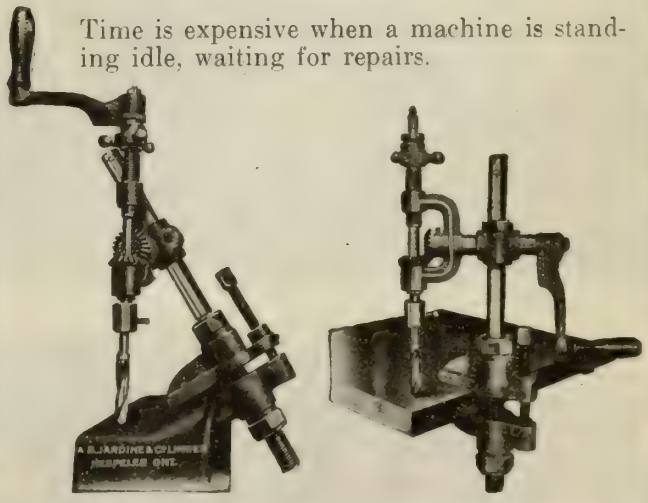
RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited

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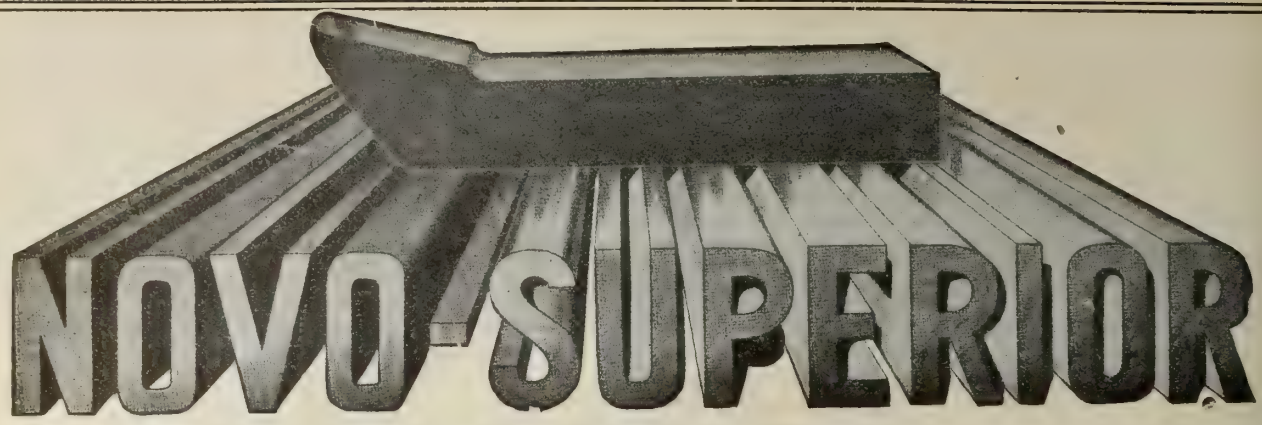

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INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
Music Wire for Springs, Steel Balls.
Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws for wood and for hot or cold metal cutting
Machine Knives--for cutting wood, paper, tobacco, agricultural.

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Insures Maximum Production

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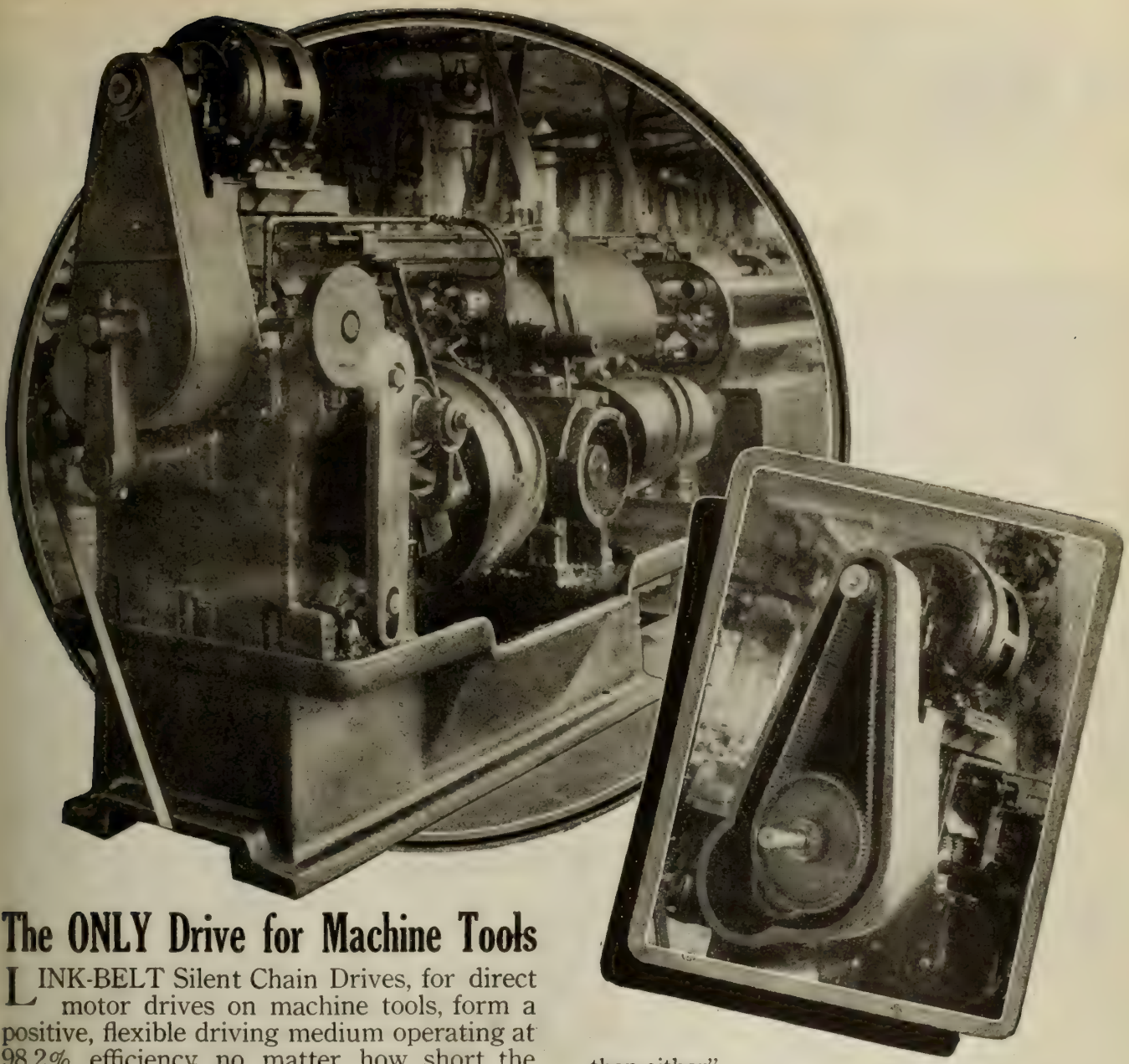


The ONLY Drive for Machine Tools

LINK-BELT Silent Chain Drives, for direct motor drives on machine tools, form a positive, flexible driving medium operating at 98.2% efficiency no matter how short the centers.

Belts slip, waste power and cause tools to "chatter". Gears wear, become noisy and afford no "cushion" between motor and machine.

Link-Belt Silent Chain Drives absorb the shock when heavy loads are applied thus lengthening the life of the machine. They never slip, never waste power and improve the product. They are "flexible as a belt, positive as a gear, more efficient than either".

Our Machine Tool Drive Book No. 312 gives details. Let us send you a copy.

CANADIAN LINK-BELT CO., LTD.

WELLINGTON & PETER STS., TORONTO

We Also Make

- ☐ Elevators and Conveyors
- ☐ Link-Belt and Sprockets
- ☐ Silent Chain Drives
- ☐ Truck and Tractor Chains
- ☐ Electric Hoists
- ☐ Locomotive Cranes
- ☐ Wagon Loaders
- ☐ Coal and Ashes Systems

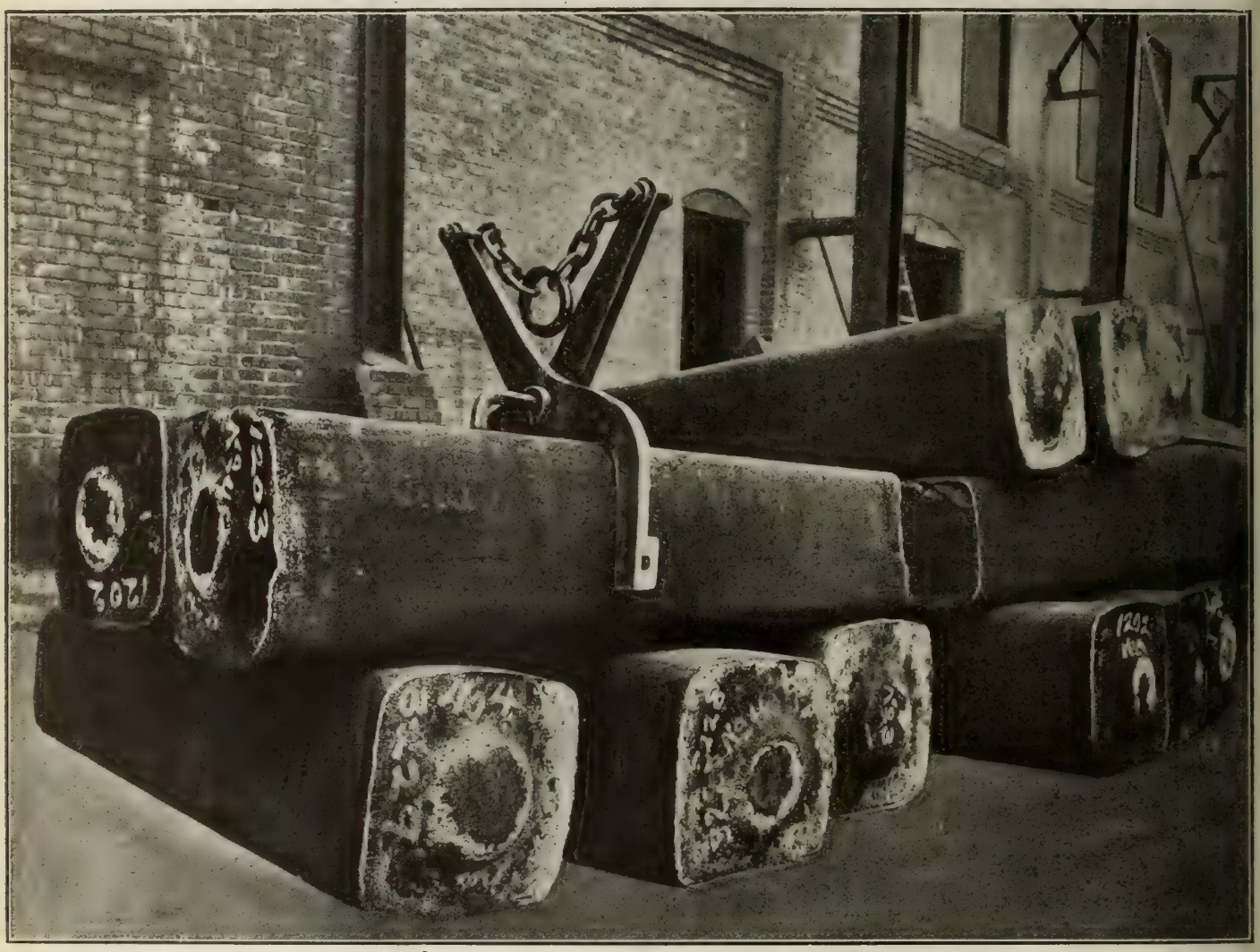
Write for Catalogs
Place X in Square

LINK-BELT
SILENT CHAIN DRIVES

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada



THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

STELLITE

"Not Steel but its Master"

PROPER PROCEDURE + STELLITE = PRODUCTION AND ECONOMY

One of Toronto's new industries was presented by us with a Tool-Holder Bit of No. 3 STELLITE to try out on Cast Iron.

They made tests with the best brands of High Speed Steel as against STELLITE, and found that they were able to run at double the speed and feed by using STELLITE.

"AS A MATTER OF FACT A TOOL BIT OF ⅜-inch square STELLITE HAS TURNED OFF 35,000 TIMES ITS OWN WEIGHT OF CAST IRON IN TEN DAYS."

As a consequence of their own tests they laid out their transmission to accommodate STELLITE and are now getting a much larger production than they had estimated.

We visited them recently and warned the Superintendent to save his shop-ends of STELLITE, as they were worth $2.00 per pound to his firm.

This was like getting money from home, as he had already decided to use STELLITE without this added incentive.

ASK FOR DEMONSTRATION.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

A "Strikingly Different"

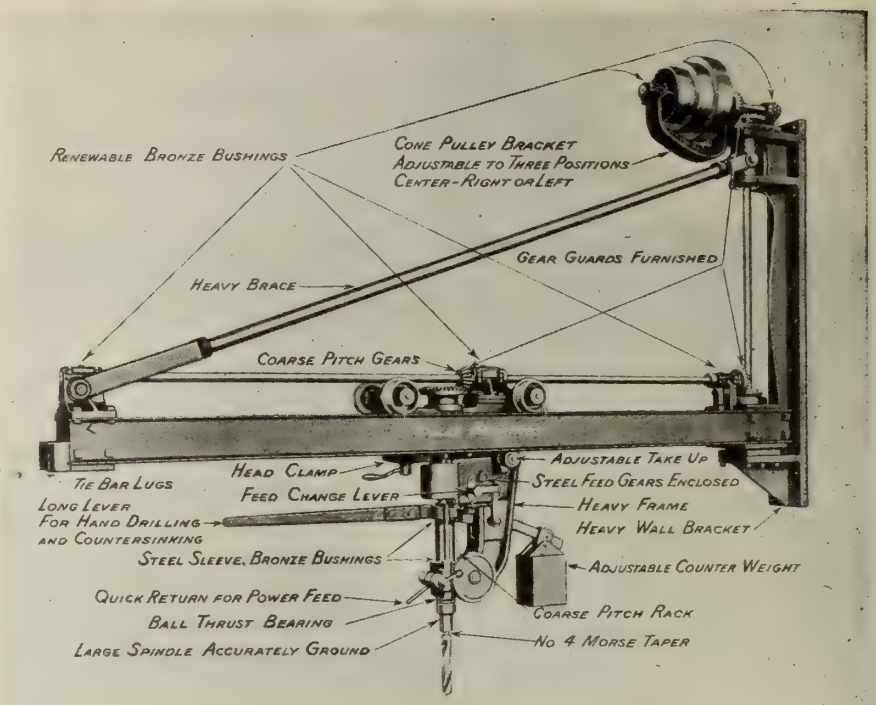
WALL RADIAL DRILL

This is a real machine tool. Careful design and high-grade materials contribute to its great success and economy. Much wider range is possible on this drill than the ordinary radial. The head is exceptionally rigid, yet moves with extreme ease from end to end of arm. For the crowded shop this drill is ideal, as when not in use it can be pushed back out of the way.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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Electrite Uranium High Speed Steel

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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Structural Steel and Steel Plate Work of every Description

Smoke Stacks, Storage Tanks, Pressure Tanks, Boiler Breachings, Bins, Hoppers, Feed and Fresh Water Tanks, Cranes, Uptakes, Shaft Bearing Seats, etc.

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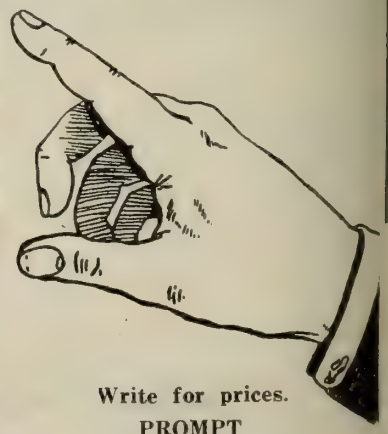

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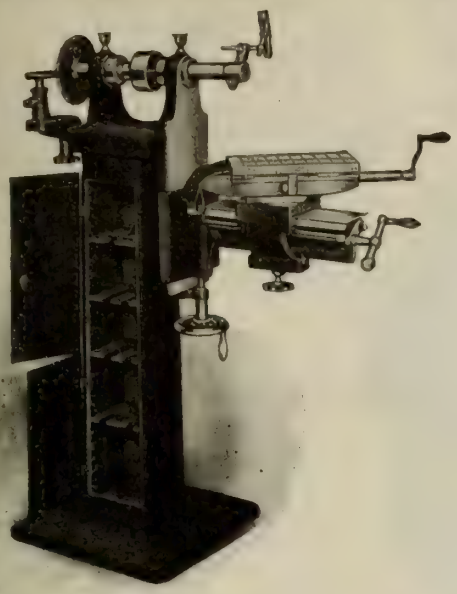

GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL

CUTTER AND SURFACE GRINDERS

Simple Light Running Accurate

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriege is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

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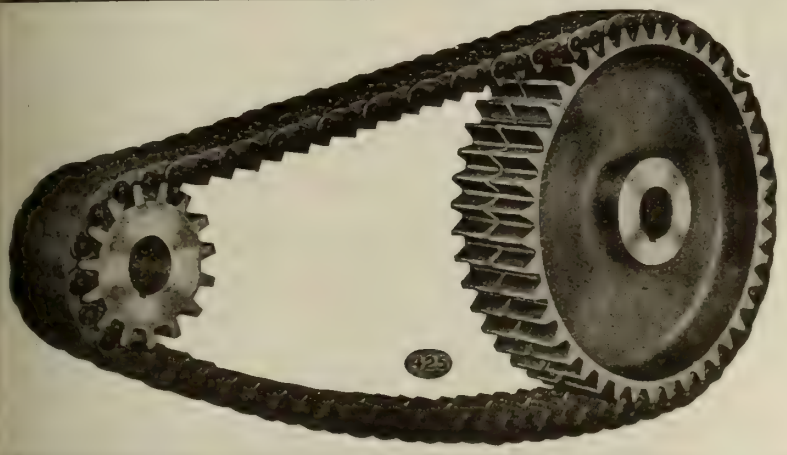

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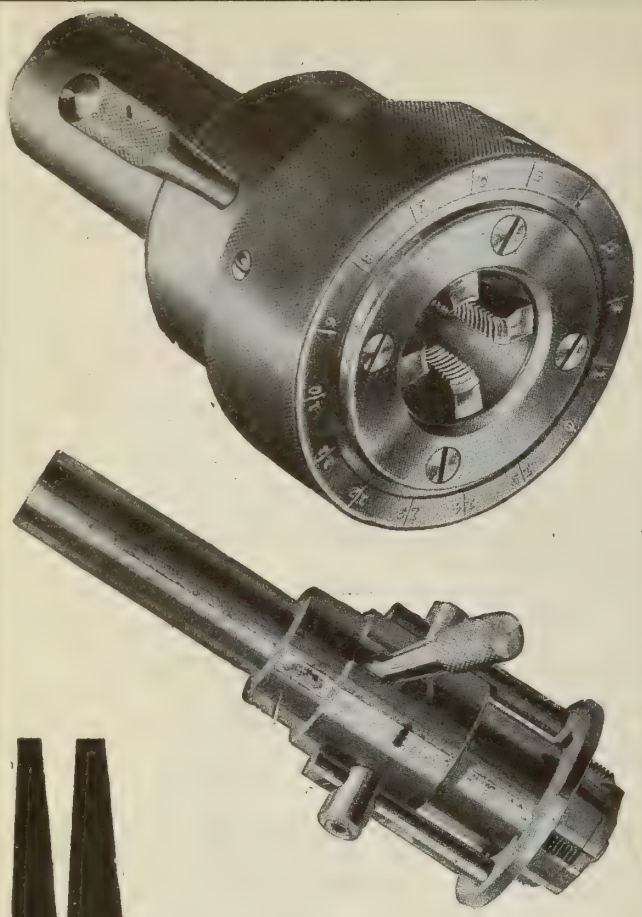
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver



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Collapsing Taps and Self-Opening Dies

No reversing—no stripping; no need of taking the shell out of one lathe and putting it in another machine.

Fifty per cent. faster and more accurate than solid tools. No chance of work getting off centre.

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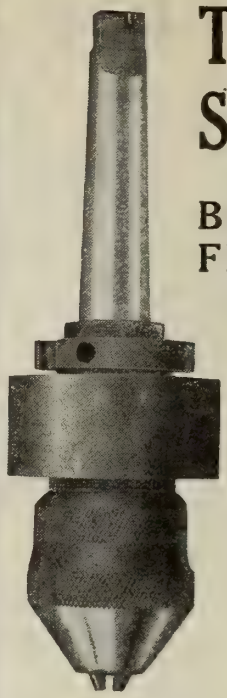

Tap Chucks that Save Tap Costs

BICKNELL-THOMAS FRICTION CHUCKS

reduce tap breakage to the vanishing point. These chucks will hold the tap to the limit of its endurance, but a sudden strain sufficient to break the tap will cause the grip to loosen instantly. They are particularly adapted for tapping to the bottom of blind holes, for special work and—owing to their compact design—for use on multiple spindle machines.

Made in four sizes—one-eighth to one inch. Straight or Morse taper shanks.

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GREENFIELD, MASS. U. S. A

We wanted something original—this is what we got

"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
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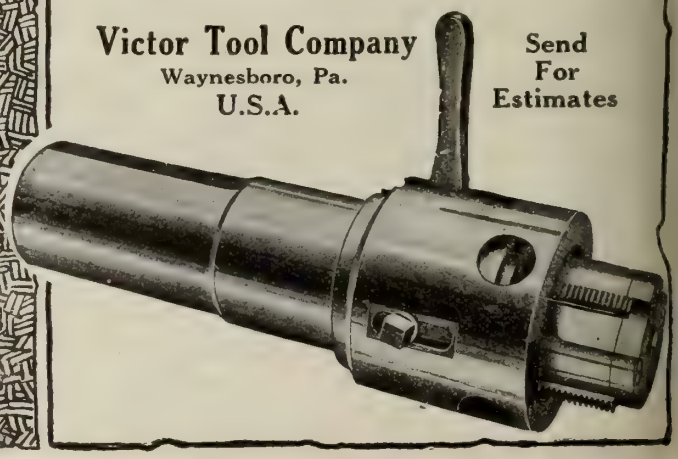
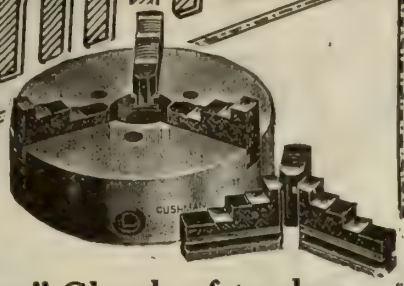


Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

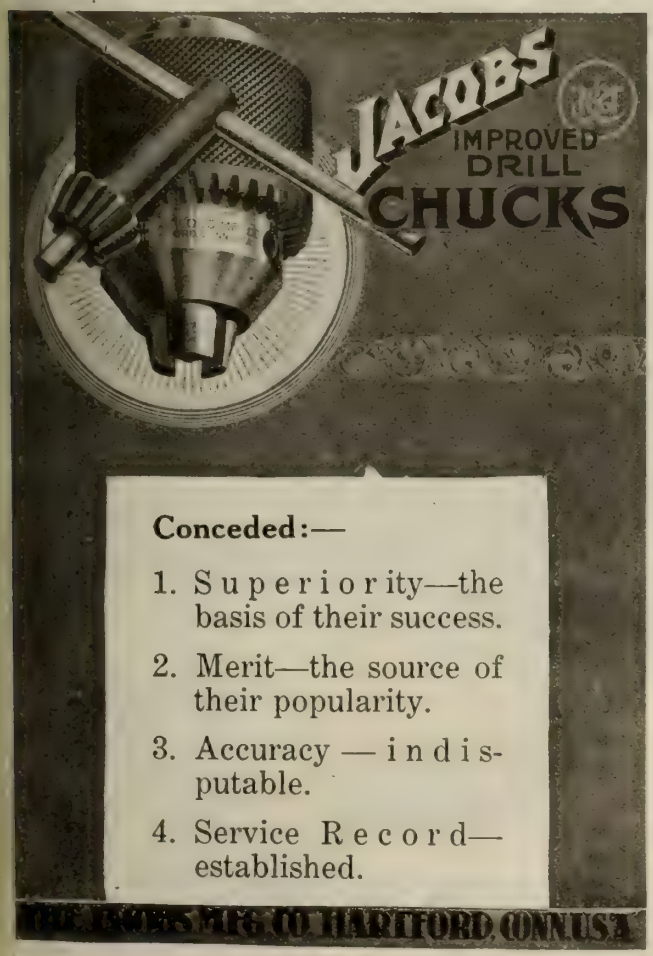
And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

CHUCKS



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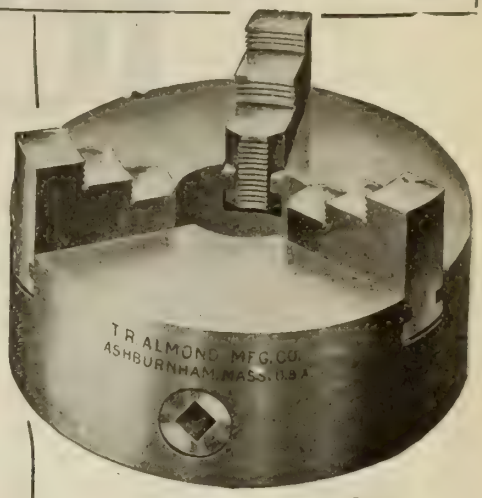
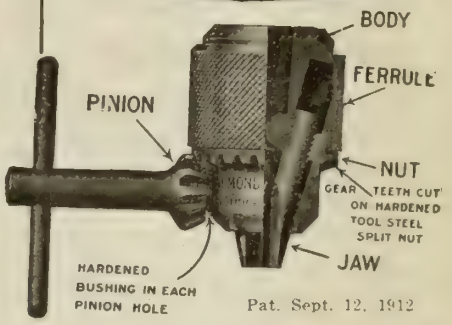
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".



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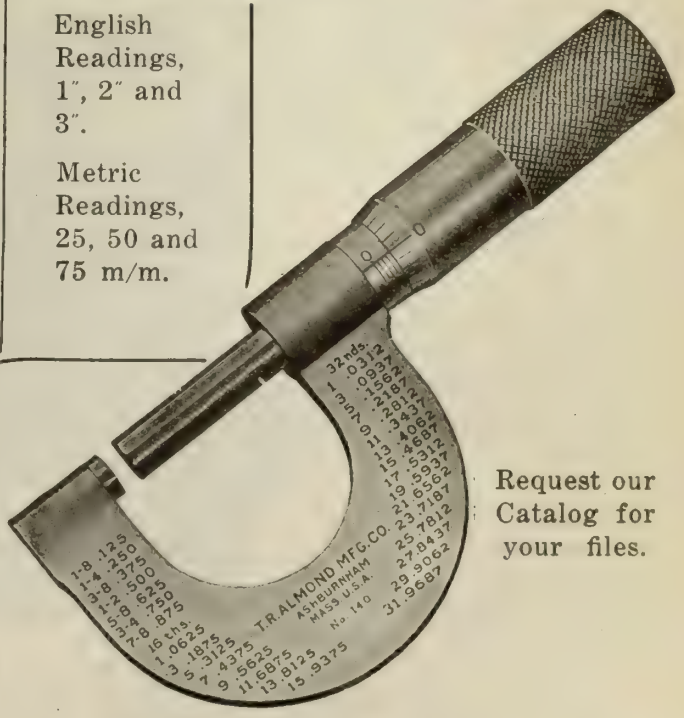
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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AUTOMATIC MILLING MACHINES

HORIZONTAL VERTICAL

EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

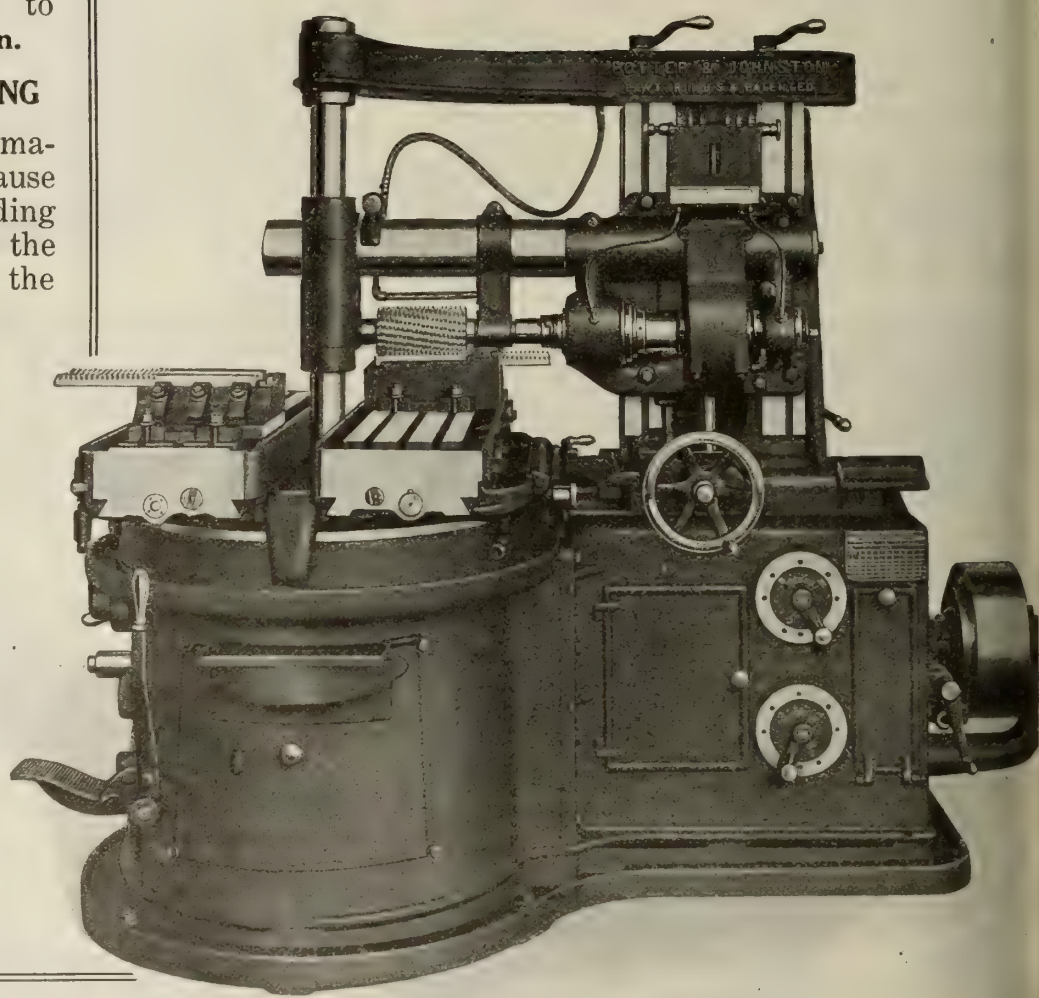
No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches. 12 Spindle Feeds, 20 to 180 R.P.M.

Send us your Blueprints and we'll gladly give you production figures.

Bulletin 36 on application.



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HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, when properly tightened, will not break away, or slip.

If you break it we will furnish a new one free of charge.

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H & G

Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

Eastern Machine Screw Corp.

New Haven - Conn.

Look at this again —closely

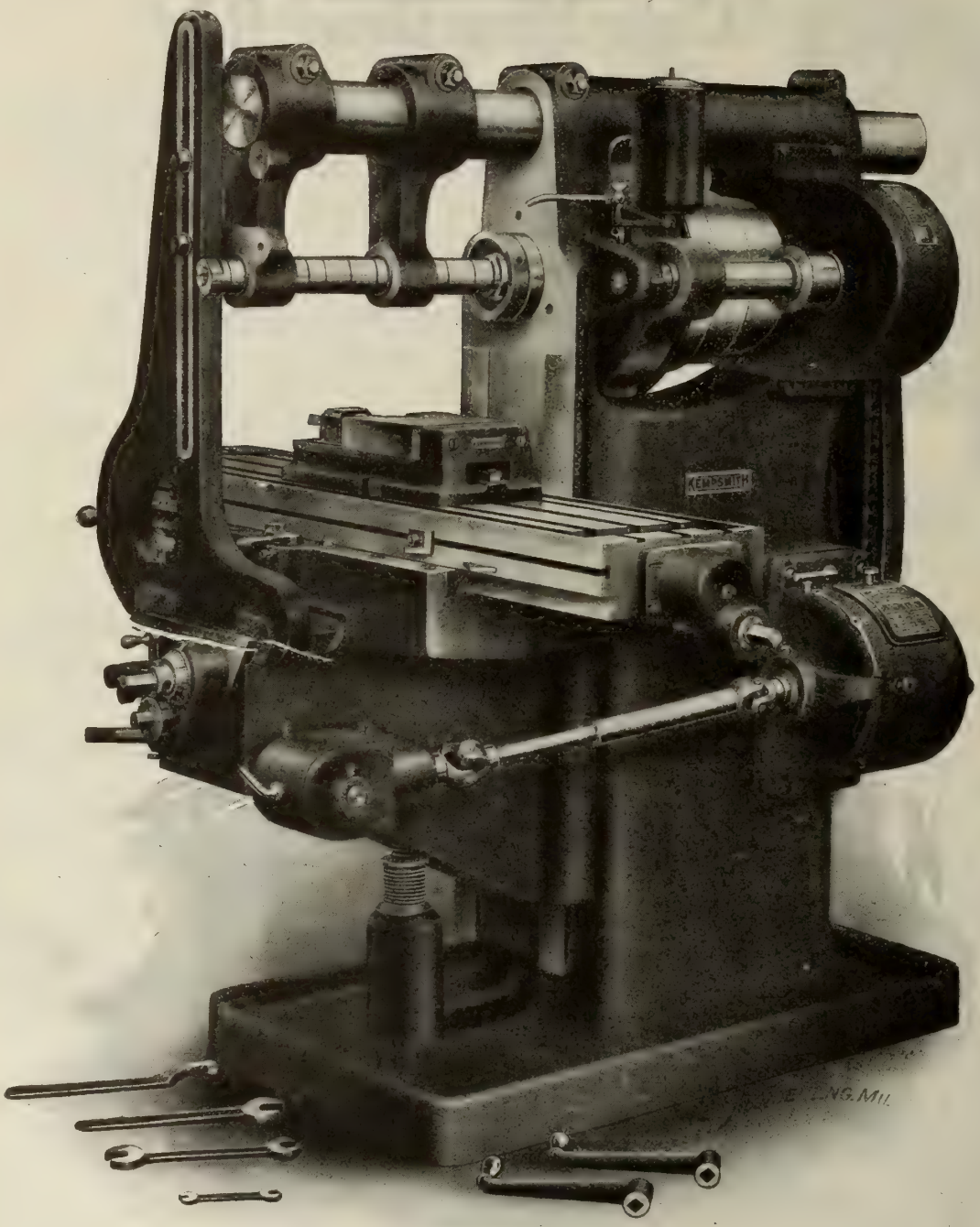
and read what we have to say below

WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.

Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

KEMPSMITH



KEMPSMITH No. 3 Plain Milling Machine

Double Back Geared.

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our Catalogue "B" describes and illustrates many notable features of the Kempsmith Miller. Write for a copy to-day.

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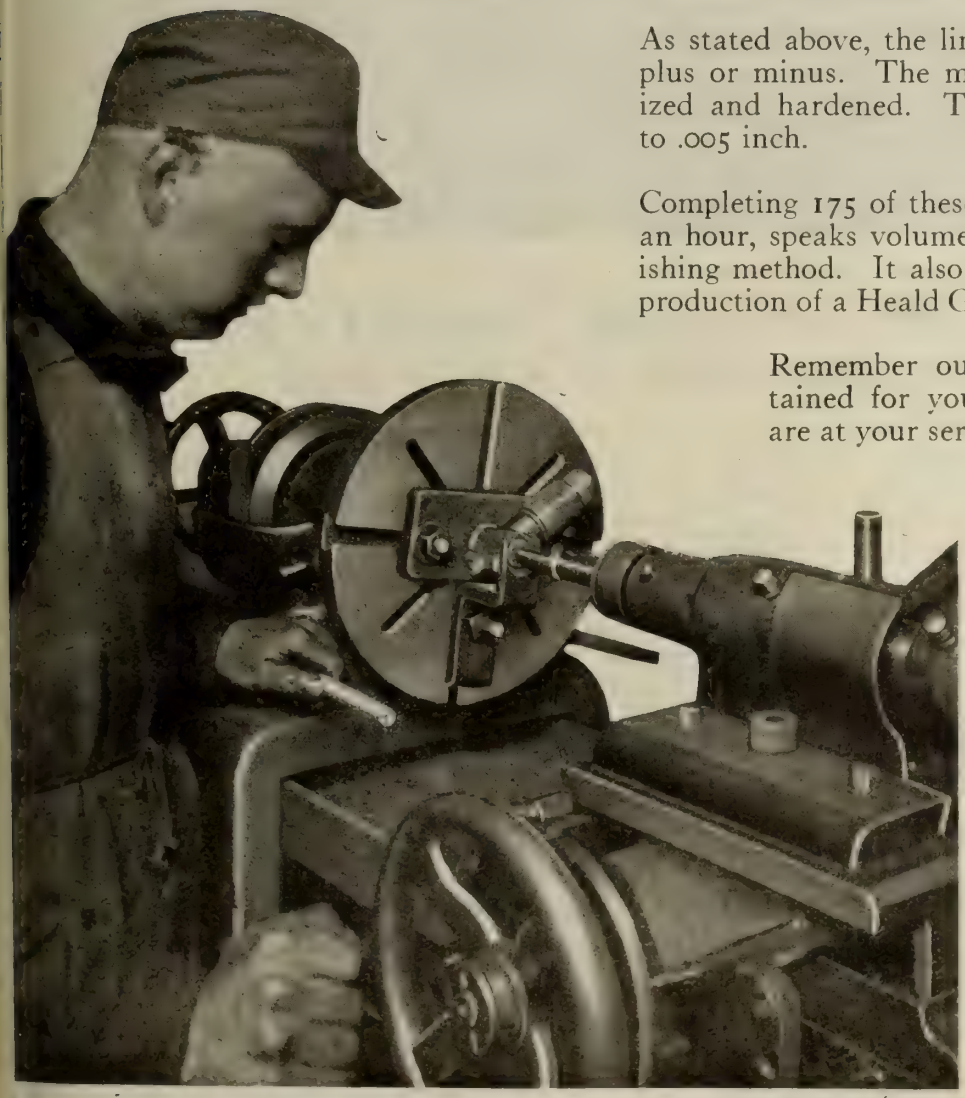
HEALD

Limits of Accuracy .0005 in. On Steering Knuckle "T" Heads

Yet a HEALD No. 75 Grinder Turns Out 20 an Hour

The illustration below shows a Heald No. 75 Internal Grinding Machine rough and finish grinding one-inch holes 1¾ inches long in a Steering Knuckle "T" Head at the Anderson Electric Car Co., Detroit.



As stated above, the limits of accuracy are .0005 inch, plus or minus. The material is steel forging, carbonized and hardened. The stock removed is from .003 to .005 inch.

Completing 175 of these pieces a day, at the rate of 20 an hour, speaks volumes for grinding as a modern finishing method. It also demonstrates the accuracy and production of a Heald Grinder.

Remember our service department is maintained for your convenience. Our engineers are at your service.

"Dependability First"

THE HEALD MACHINE COMPANY

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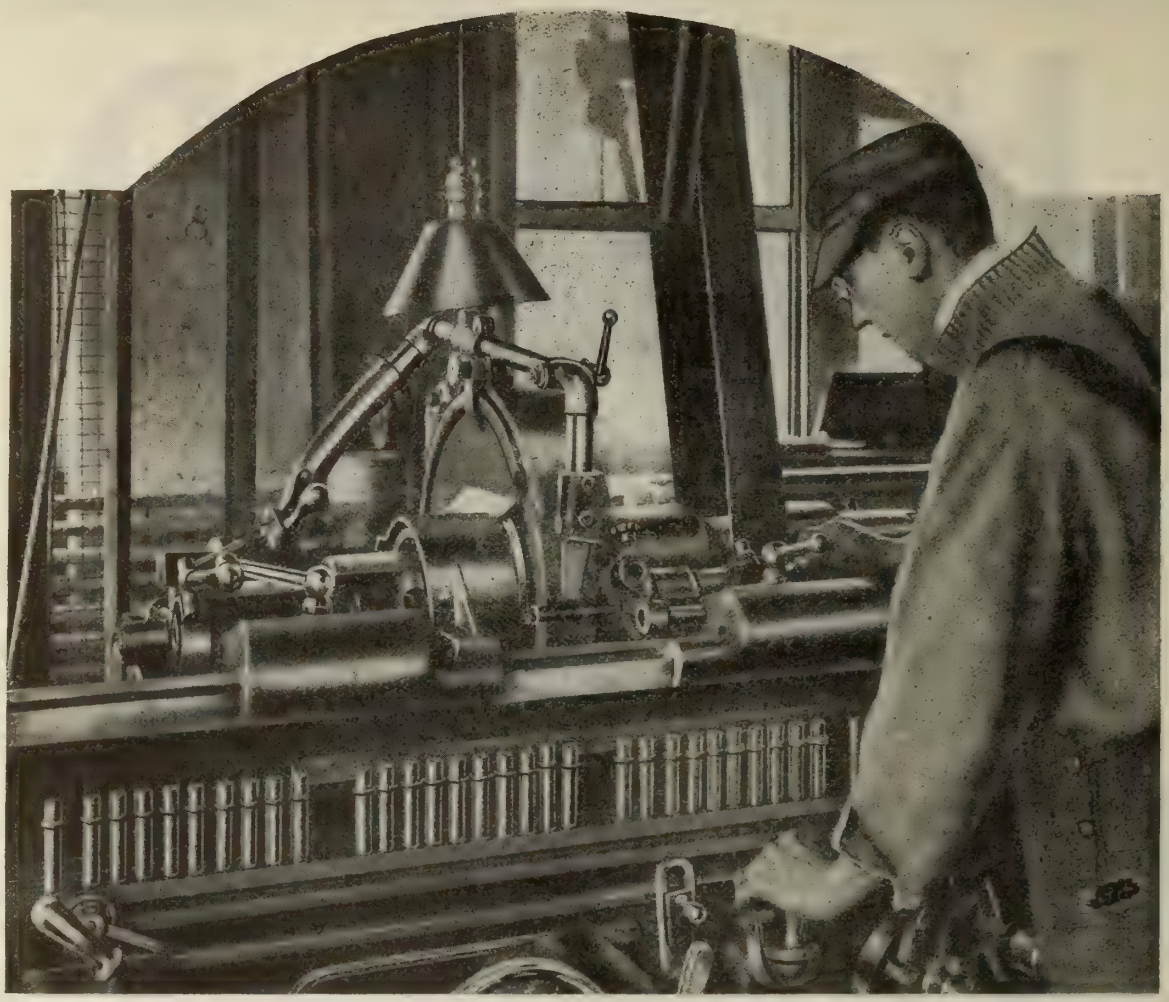

How's this for Grinding Valve Guides?

150 Finished within 0.0005 in. Every 9 Hours

Getting tip-top results from his Norton Grinding Machine is this operator's delight. He knows he has a machine which will turn out work with the highest degree of accuracy and it's his chief joy to show the other fellows in the shop just what *good work* he can do on his "Norton."

When this picture was taken he was grinding cast iron valve guides—removing 0.018 in. stock with a tolerance of 0.0005 in.—and completing 150 guides every nine hours. A pretty good record! The machine he operates is a 10 x 36-inch Norton Grinding Machine, seven years in constant service, with only a little attention to the bearings as all the repairs in that time.

Service—both as to production and long life — are "built-in" features of Norton Machines. Have you considered their possibilities on your work? Write us, enclosing prints of your work; perhaps we can help you.

Norton Grinding Company - Worcester, Mass.

Chicago Store: 11 N. Jefferson Street

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WORCESTER MASS. U.S.A.

THINK IT OVER.

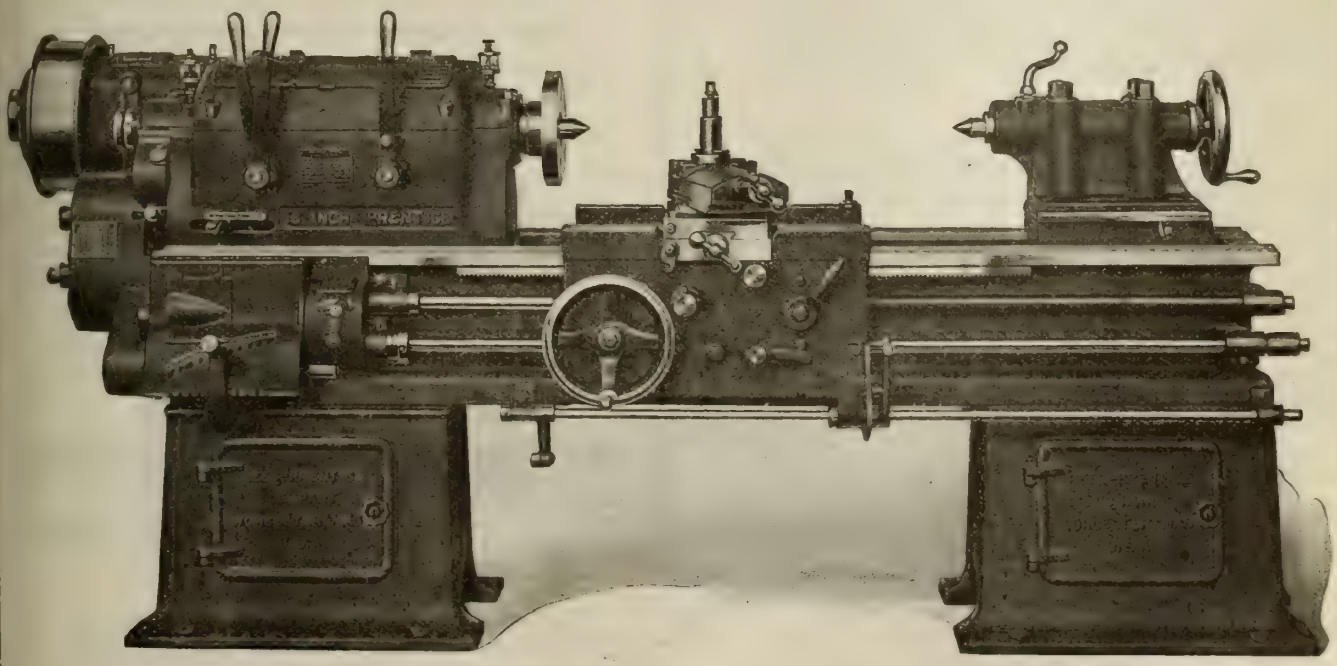
IF EVERY TIME YOU WANTED TO "CHANGE GEARS" ON AN AUTOMOBILE YOU FOUND IT NECESSARY TO MOVE FROM YOUR SEAT AND WITH YOUR HANDS, OR A STICK, SHIFT A BELT TO ANOTHER CONE—HOW LONG WOULD YOU PUT UP WITH IT?

THIS "PRENTICE" GEARED HEAD OFFERS YOU THE MODERN TIME-SAVING WAY OF CHANGING SPEEDS ON LATHES.

BESIDES BEING CONVENIENT IT SAVES BELTING BILLS, NON-PRODUCTIVE LABOR, POWER, WASTE MOVEMENTS, INJURY TO WORKMEN, FLOOR SPACE AND OIL.

THINK IT OVER.

CANADIAN FAIRBANKS-MORSE CO., LTD.
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES



Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 42A

Keeping the Wheel in Condition for Knife Grinding

The usual method of dressing the grinding wheel is by means of a Crystolon stick. The wheel face is touched lightly from time to time, the frequency depending upon the action of the wheel in use. The grinding wheel face is thus sharpened, or in other words, the dull grains are removed and new sharp, abrasive particles are presented, which in turn give more satisfactory results. It is possible also for a skillful operator to restore the shape of the wheel face with one of these Crystolon sticks.

One of the greatest objections to some of the old types of knife-grinding machines was the use of a wheel with too small a diameter. Each shop or mill usually has a certain standard length of bevel, depending upon the wood to be cut, which is measured by a gauge, and the knives must be ground accordingly. When the grinding wheel has worn an inch or more in size, the bevel produced on the knives naturally became so concaved as to weaken the cutting edge considerably. This condition is being eliminated in the modern machines through the use of larger wheels.

On the modern knife-grinding machines 30 or 36, grades J or K, Alundum, vitrified or silicate wheels will be found almost universally satisfactory. The grain and grade depends somewhat on the size of the wheel. Very little dressing is required, and a cool, rapid-cutting action is given, with a reasonable feed and traverse. Occasionally it is necessary to use wheels as soft as grade I or even H, but this is unusual.

NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT.

NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 11 NO JEFFERSON ST

TRADE NORTON MARK

P X H

TRADE MARK

What Do YOU Want in a File?

You want it to be hard and straight, quick cutting and long wearing.

All these qualities are embodied in P.H. and IMPERIAL FILES.

The highest grade of Best Clay Crucible Cast Steel, expert workmanship, and scrupulous inspection guarantee to you that

"THEY CUT FASTER AND WEAR LONGER"

Specify them on your next requisition. Your money back if they don't live up to your expectations in every way.

Ingersoll File Company, Limited

INGERSOLL - ONTARIO

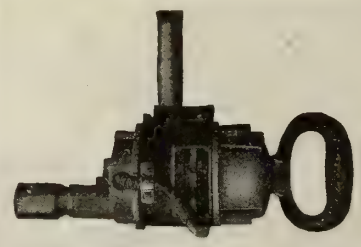
John Morrow Screw & Nut Co., Ltd.
INGERSOLL, - - - ONT.
Sole Distributors

IMPERIAL

TRADE MARK

U. S. Electric Drills and Grinders

Save Time. Labor and Money



They can be attached to any lamp socket.

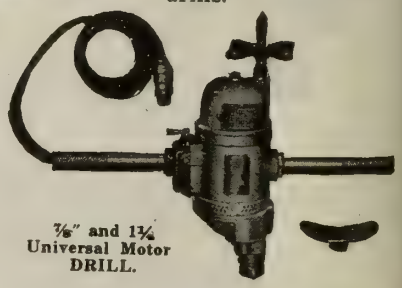
For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES
3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅞" and 1¼ Universal Motor DRILL.

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THE UNITED STATES ELECTRICAL TOOL CO.

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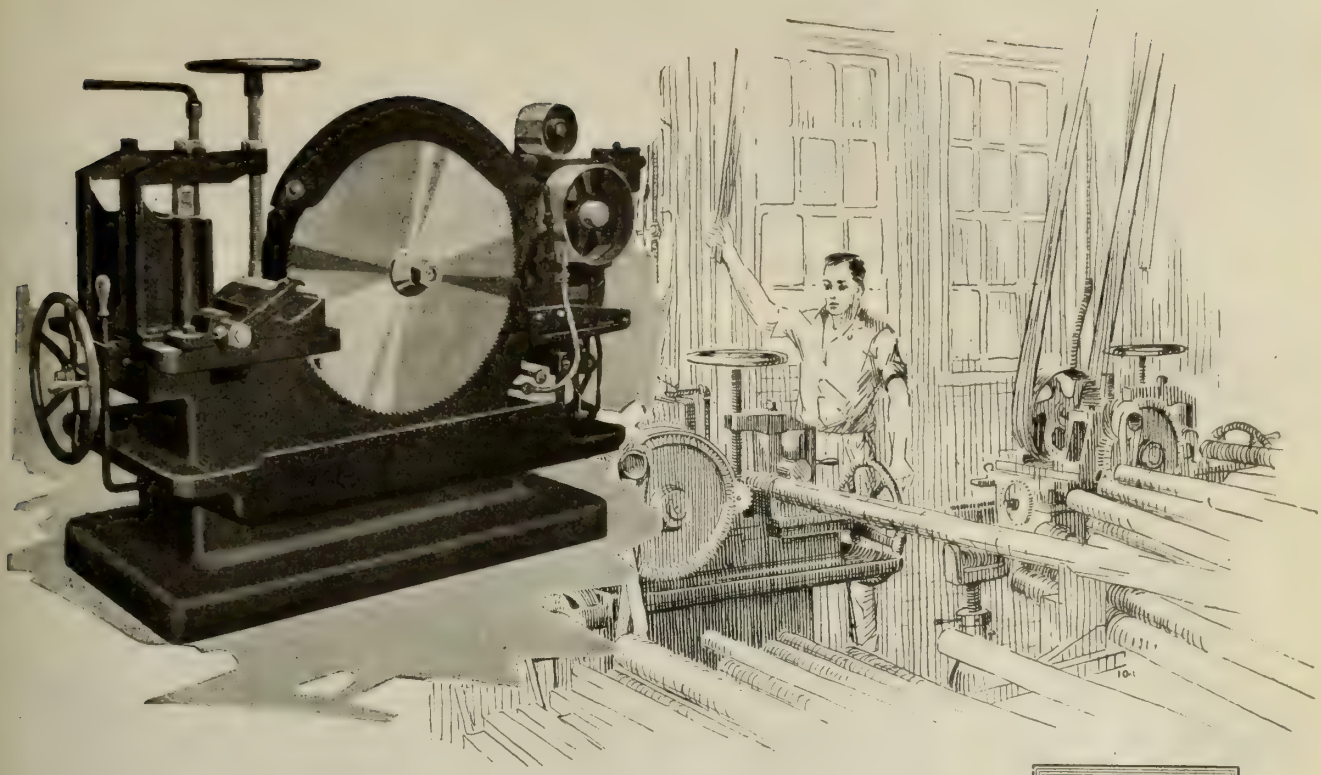

Steel Economy

The use of Nutter & Barnes Automatic Metal Cutting-Off Saw Machines in the steel shed effect a real economy in steel.

These machines fully described in Machine Tool Catalog No. 39

Got yours?

These high-powered machines drive an exceptionally small, narrow saw, considering their capacity. Consequently the wastage of steel is reduced to a minimum.

On the other hand, they are big producers. Nutter & Barnes Cold Saws are used by some of the largest shops in the world. *They can help you!*

GTD PRODUCTS
Taps and Dies
Screw Plates
Reamers
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Pipe Tools
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Threading Machines
Lathes & Screw Machines
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GTD

[MACHINE TOOL DIVISION]

Greenfield Tap and Die Corporation

GREENFIELD, MASSACHUSETTS

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WELLS BROS. CO. OF CANADA, LTD.

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Rigidity Plus

Simple Design and Convenience of Adjustments

give operator every facility for ease of operation and Accuracy in Production

Our circulars, containing complete specifications and descriptions, are ready. Write us for one.

The R. McDougall Co., Limited
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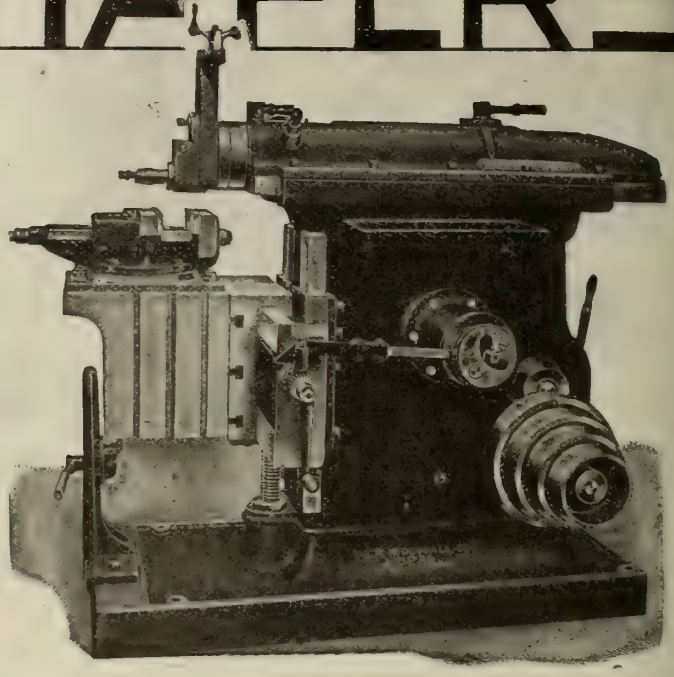

MARK YOUR PRODUCTS THE "MATTHEWS" WAY

"Matthews-made" steel stamps and lettering dies make easily read and durable marks on all classes of products. Matthews Champion Type Holders—for flat and convex surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years' experience.

Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

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Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.
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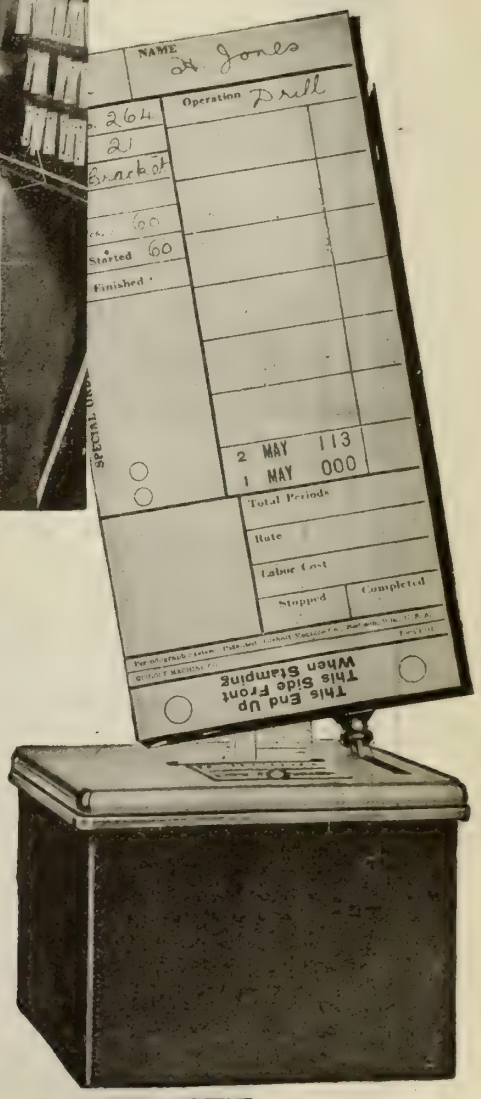

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CANADIAN MACHINERY
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MANUFACTURING NEWS

Volume XXI. No. 16. April 17, 1919.

Thread-Cutting and Spindle-Boring Tools

An Article Describing How Standard Lathes, With Certain Additions, Are Used For Important Threading and Boring Operations, the Design of Thread-cutting Lathe Being Especially Noteworthy

By J. H. MOORE, Associate Editor, Canadian Machinery

TO utilize a regular lathe for precision thread cutting seems a dangerous thing to do, yet this is what the Canada Machinery Corporation of Galt has accomplished, in fact one might say has perfected for some time past, as it is now nine years since the lathe shown at Fig. 1 was first operated for such special purpose. It is in the belief that readers would like to hear the story, and find out how such a change was accomplished, that the following article was written.

As is already well known, this firm spoken of manufacture a line of lathes, of all sizes, each of course requiring a lead screw. It was in order to be sure of the accuracy of these screws that the lathe (Fig. 1) was converted into a special precision thread cutting lathe. To illustrate to the reader the capacity, general changes to the regular machine, and other details of importance, we will follow up in sequence, first the headstock, coming down the lathe by gradual steps, after which a general summary of results will be given.

First the headstock. This portion of the lathe remains unchanged, except that it has an extra large hole through spindle, the gearing leading to the screw being simple gearing only, these gears of lead of the thread to be cut. The chuck used on the main spindle is of split jaw construction, a ring with 4 grooves, together with the usual Ryle wrench doing the tightening.

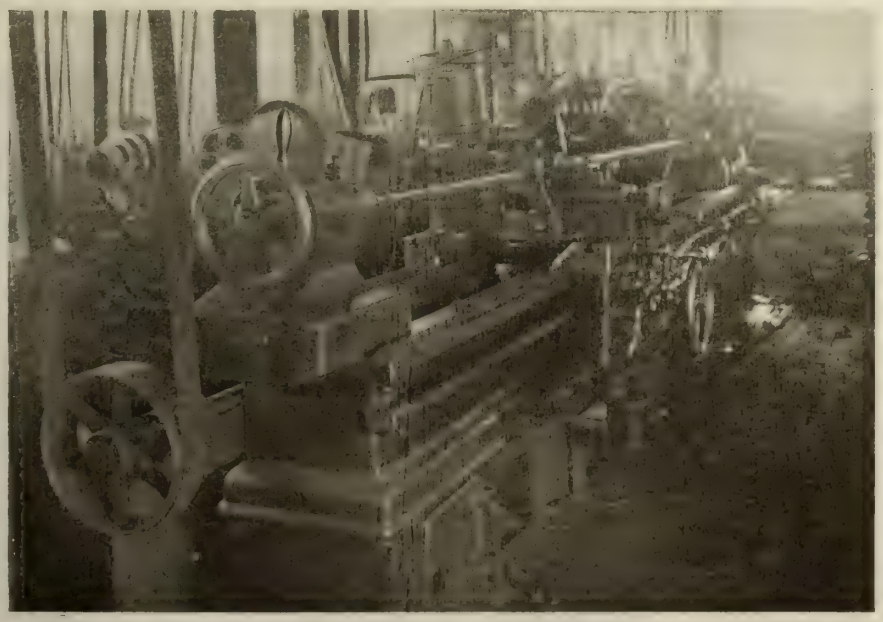


FIG. 1—GENERAL VIEW OF THE LATHE

Attached to the back of the lathe bed are two brackets, one of which is shown at "A." These brackets carry a special coarse pitch screw which is used for quick return purposes, and is connected by means of a special split nut at back, to the saddle, allowing same when thrown into place to return at a greatly increased rate of speed. Attached to the right hand end of this screw, or quick return shaft as it might be called, is a pulley plainly seen on the photograph, which drives this shaft, entirely separate from the other mechanism of the lathe.

The tailstock is of regular construction, and when the screw to be cut is of more than usual length, the tailstock is taken entirely out of place, in order to allow the screw to stick out past the length of the bed. Of course for the first 8 feet of thread cut, the tailstock is kept in place.

Purposely the mention of saddle has been left to the last, for this is the most important part of the whole machine. To clearly illustrate this portion a separate view was taken, shown at Fig. 2.

It can at once be noticed, that here is a saddle not only of special, heavy construction, with rigid design, but of very novel construction. The portions A and B are two lugs, having removable bushings, which act as steady rests, these being changed to suit the size of screw being threaded, and are held in place by two set screws noticed on photograph. Two tools are placed on this carriage; each being held rigidly in position, by clamps and screws. For roughing, both tools are used, while for finishing only one tool is utilized.

To adjust the tools very accurately, the two knurled knobs C and D are used, each knob operating its particular tool. The large lever E operates out and in quickly these cutting tools already spoken of. Before cutting these screws, the spline is previously milled in another operation.

To gauge work correctly, a split nut about 4 in. long is used. This nut is fastened over the screw by means of two cap screws, and a sketch at Fig. 3 shown to illustrate its general construction. All screws cut on the lathe, must conform to their particular size gauge nut, before being considered OK.

The capacity of this machine is as follows:

Machine will cut from 1 in. pitch to 5 pitch, and screws as long as 36 ft. have been cut on this machine with success. In fact any length screw can be cut, the only point being the supporting of same, and the fact that only 8 ft. of thread can be cut at a time. The machine has been nine years in operation, and during that time has cut over 2,000 screws varying in length from 8 ft. to 36 ft. with great accuracy, in fact at present it is cutting screws, with just as much accuracy as formerly, a record to be proud of, and one that speaks well for the class of workmanship put into the manufacture of this machine, which is really one of the regular design, only with a few added attachments for the special work.

Special Boring Lathes

Another machine of particular interest in this plant, is that of a special spindle boring lathe, shown at Fig. 4. Some parts of this machine are regular lathe parts, but in its present form it accomplishes the important operation of boring out the lathe spindles as manufactured throughout the plant.

FIG. 2—CLOSE UP VIEW OF THE CARRIAGE

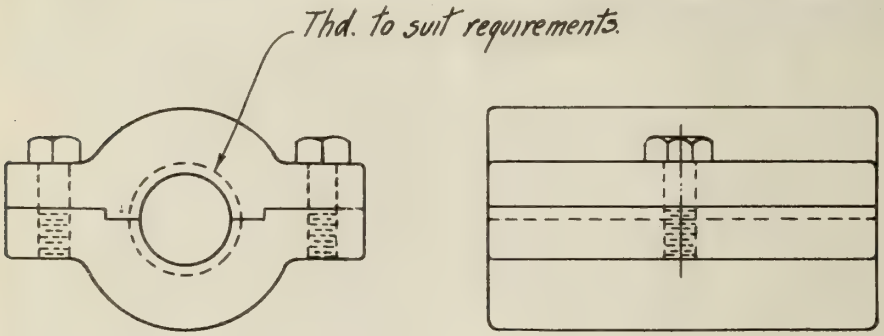


FIG. 3.
SKETCH OF GAUGE NUT

First the headstock is of very short construction, and the spindle to be bored being held inside of the spindle. The chuck is an ordinary 4 jawed independent type. A special carriage A was made, and its general construction can be clearly noted on the photo. The screw B is a permanent fixture on the machine, and continues through to the rear of the machine, and geared down by simple gearing to the lathe feed screw.

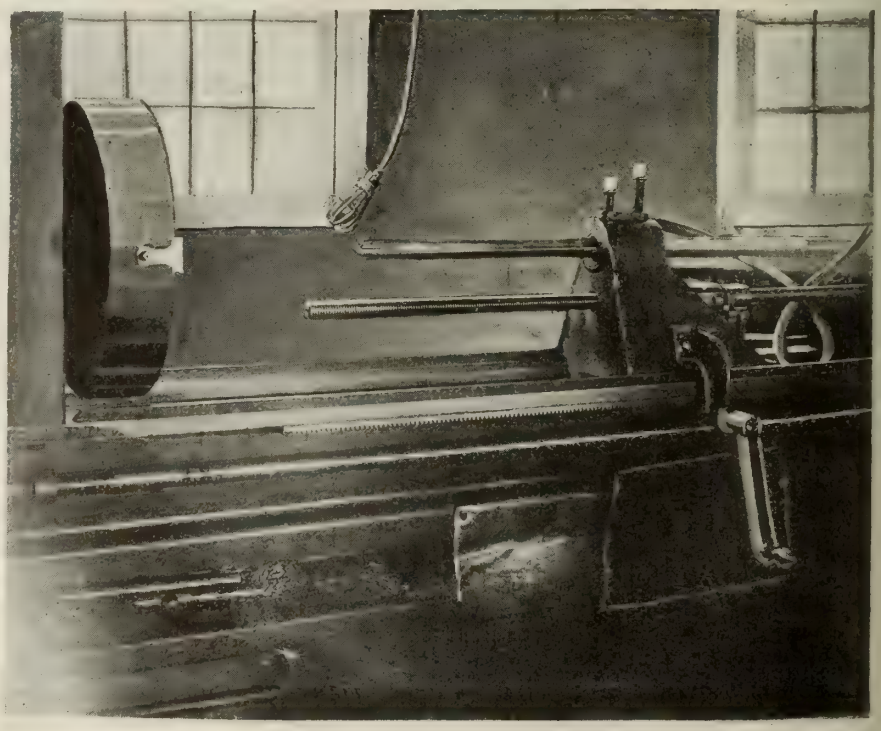
Supporting this screw at the back of lathe is the rest C. When in operation, the saddle is fed from the lathe feed screw, up through the gears, on to screw B, which of course by means of the nut D moves the saddle forward at the desired speed.

The drill itself, E, is of flat bit construction, having a round shank, which in turn is fluted out for chip clearance.

Running through this shank are two water supply tubes, the hose feeding these tubes being clearly seen on the photograph. If desired, the saddle can be fed by hand, by means of the handle F, together with the pinion engaging with the rack on bed of lathe.

Altogether these two machines spoken of in this article are well worthy of attention, for the work turned out by them is of high standard, and goes to show that by a little ingenuity any special problem can be successfully solved.

The best form of charcoal for use in gas masks as an absorbent was derived from cocoanut shells and fruit stones. This charcoal was highly absorbent and was well adapted for impregnation with the various chemicals used. The industry grew so rapidly that one plant had a storage capacity of 5,000 tons under cover and 15,000 tons in the open.



GENERAL VIEW OF THE MACHINE

Methods of Mounting Motors on Ceilings

By Mounting Motors Near the Ceiling or in the Roof Trusses Valuable Space is Saved and Economies Effected in Transmission Where Group Drive is Employed

By RALPH G. BRADSHAW

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IT very often occurs that the most desirable location for a motor for a group drive is at or near the ceiling of the room. In such a location the motor does not occupy valuable floor space, and is immune from meddling by the unauthorized. There are two possible objections to such a location. One is that the space near the ceiling is always the hottest part of the room, which is undesirable, because a motor placed in such a location may become unduly overheated. The other objection is that unless proper provisions are made, a motor near a ceiling may be difficult to inspect and repair. The last objection can be nullified, provided proper ladders and platforms are installed, from which the inspector can work.

Where a small motor is to be placed it can be bolted, inverted, directly against the ceiling. Timbers can be secured against the ceiling, into which lag bolts, passing through the bolt holes in the motor frame, can turn. Lag bolts should, however, never be used to support a motor, hence the preferable and only dependable method of supporting a motor at or near the ceiling is to fix the supporting bolts so that they will pass entirely through the floor. The most effective way to raise an inverted motor to a position against the ceiling is to thread two lines or falls through diagonally opposite holes bored through the ceiling, as above suggested. In boring these holes care must be taken to place them so that they will exactly fit over the holes in the motor frame. The lines are passed through from the storey above to the floor of the room below. The motor to be mounted is turned upside down on the floor, and each of the two lines is threaded through a bolt hole in the motor frame corresponding in position to the hole in the ceiling above through which the line passes. Then a knot is tied in the line below the motor frame so that when the lines are pulled on the knots will sustain the weight of the motor. Then helpers on the storey above pull on the lines and draw the motor in position against the ceiling. Bolts are inserted through the remaining holes in the floor and through the motor bed plate and the nuts are set up on these bolts, holding the bed plate firmly in position. Then the lines are removed and supporting bolts are pushed through the holes in the floor from which the lines have been taken and through the motor bed plate, and their nuts turned up on them.

With larger motors it is necessary to build a shelf or platform upon which the motor may rest and upon which the inspector may stand while cleaning and adjusting the machine. Fig. 1 shows a simple motor platform that has been found very satisfactory in practice. A number of supports similar to this were used in the Omaha shops of the Union Pacific Railway. Group drive motors of outputs in the neighborhood of 20 h.p. were mounted on the platforms. It will be noted (Fig. 1) that all of the platforms were arranged along the side of the building, so that a 6x8 in. timber held to the brick wall with ⅞-in. bolts formed a support for one edge of the platform. An 8x8 in. timber formed a beam carrying the outer edge of the platform. This timber was in each case

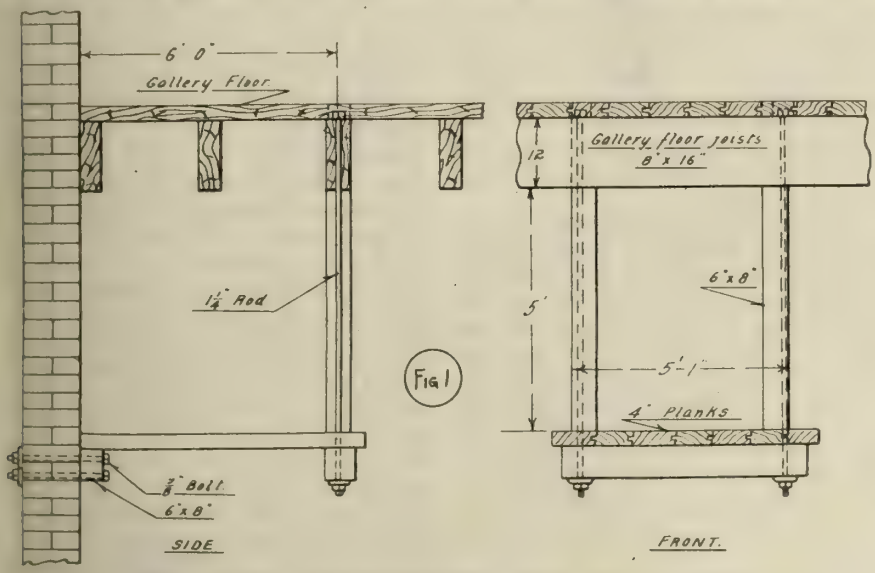


FIG. 1—MOTOR SHELF SUPPORTED FROM CEILING AND WALL

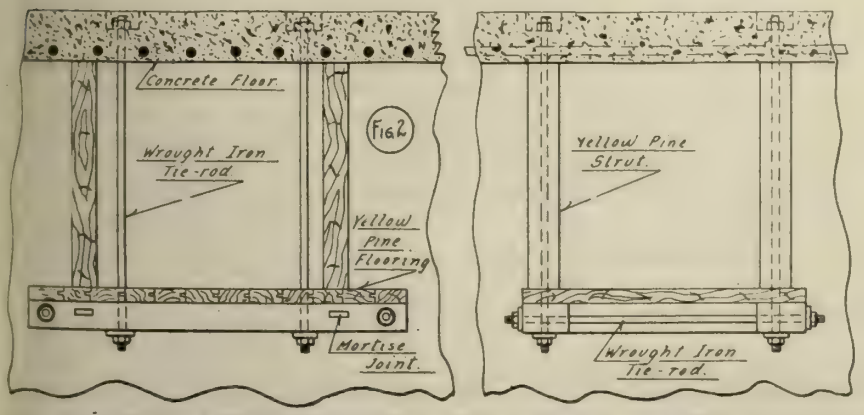


FIG. 2—MOTOR SHELF SUPPORTED FROM CONCRETE CEILING

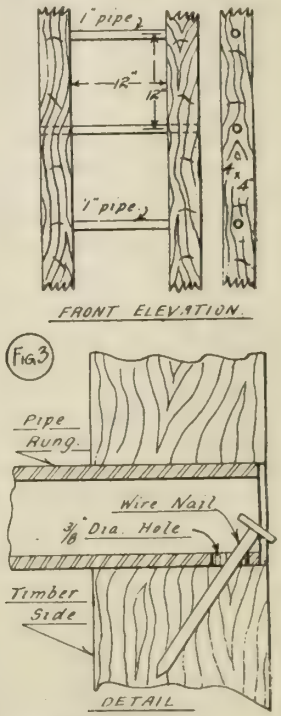


FIG. 3—CONSTRUCTION OF A LADDER WITH PIPE RUNGS

held from the floor above by two 1¼-in. tie rods that passed vertically entirely through 8x16 floor joists. Care was taken to so locate the motor platforms that the tie rods would, in every case, pass through holes in the floor joists, because the holes in the joists in which the tie rods snugly fitted provided lateral support for the platform structure and tended to minimize vibration. A 6x8 strut was clamped in at the side of each tie rod between the platform floor and the gallery floor joists. A slot was cut in the side of each of these struts for the accommodation of the tie rod, which maintained each strut in its correct position.

A platform that has been successfully used for supporting motors to ceilings in reinforced concrete buildings is shown in Fig. 2. The tie rods pass, as they should in every case, entirely through the floor, so that they will be substantially supported from above. The timbers comprising the frame upon which the floor is laid are mortised and tenoned and are held together with iron tie rods, eliminating any possibility of the shaking asunder of the frame. Where there is a considerable side pull occasioned by a belt drive from a motor platform, it may be necessary to install braces for a platform like that shown in Fig. 2, to prevent the platform from being pulled out of its position laterally. Ordinarily, however, such braces are not necessary if the platform is well constructed and the nuts of the tie rods are set up snugly.

It is, however, essential that a good ladder, or some other means of access, be provided to every motor platform. If it is difficult for the inspector to reach the platform, the motor will probably not receive the attention that it should. A splendid form of ladder that will not wear out, and which can be readily constructed is shown in Fig. 3. The side pieces are 4x4 timbers and the rungs are 20-in. lengths of 1-in. pipe. Pipe that can not be used for any other purpose, because it is rusted, or cracked, can be utilized for rungs of a ladder of this type. The 12-in. distance between centres of rungs provides a convenient spacing, but this can be increased or decreased in accordance with the practice prevailing in the plant where the ladder is installed. The holes through the 4x4 timbers for the reception of the pipe should be so bored that the pipe will fit into them very snugly, and a nail should be driven, as shown in the detail in Fig. 3, through a hole in the end of each pipe to prevent its turning as a man mounts the ladder. The nails also keep the rungs from slipping sideways out of the timbers. The nails should always be driven in far enough so that they will not extend and cut the fingers of a man using the ladder.

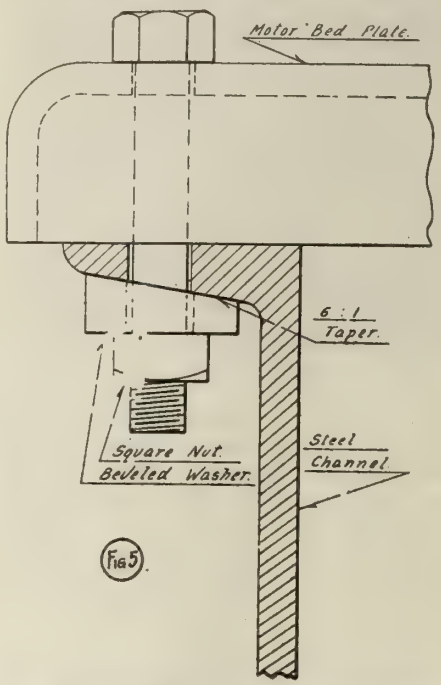


FIG. 5—DETAIL SHOWING HOW BEVELED WASHER IS USED

Ordinarily, ladders about an industrial plant are made with 2 x 4 vertical timbers, and 1 x 4 rungs and such are, of course, cheaper, in first cost at any rate, than the ladder in Fig. 3, but the rungs in wooden ladders wear out, and sometimes they break and injure a man and thereby involve a damage suit. It is for the reason that the pipe rung ladder is always safe and will practically never wear out that it is probably more economical in the long run than a wooden ladder. The pipe rungs can be cut and drilled in the pipe shop at times when the mechanics have no other work to do.

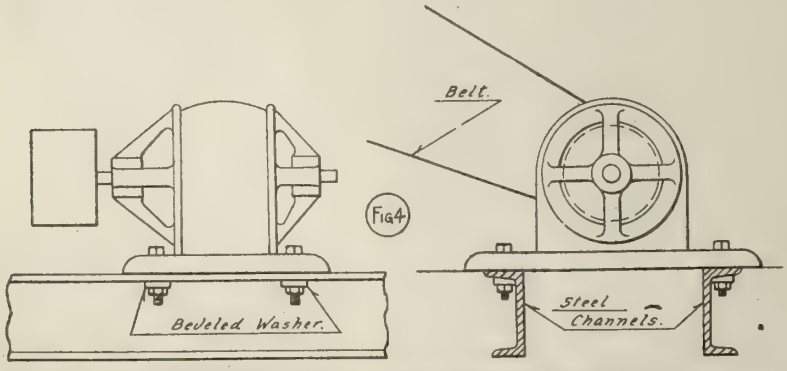


FIG. 4—SMALL MOTOR CLAMPED WITH BEVELLED WASHERS

In modern plants the practice of using structural steel for supporting motors is every day becoming more popular. In some shops wood construction, and, in fact, any construction that is combustible, is not permitted.

Structural steel is used instead and provides a permanent, rigid, and fireproof frame for the motor platforms. Small motors can be conveniently mounted on a couple of channels, as suggested in Fig. 4. The holding-down bolts of the motor pass through holes in the channel flanges and are held therein by nuts turned on at the lower ends of the bolts. Inasmuch as the sloping surfaces of channels and I-beams always slant with a 6 to 1 pitch, it is necessary to insert so-called beveled washers between the holding-down bolt nut and the flange face, as shown in Fig. 5, so that the nut will have a horizontal surface upon which to slide. Fig. 7, in connection with Table I, shows dimensions of beveled washers for use with I-beams and channels that have been found satisfactory in practice. It is not usually possible, so far as the writer is aware, to obtain these beveled washers on the open market. They can sometimes be secured from the structural steel companies, but if many are to be used it will pay any concern to make a pattern like that shown in Fig. 6 and have the washers cast at the nearest foundry. It will be noted that in the pattern of Fig. 6 a deep groove is cut between adjacent washers. A strip of a half dozen or more washers is cast from one pattern and then the washers can be broken off along the grooves as they are required.

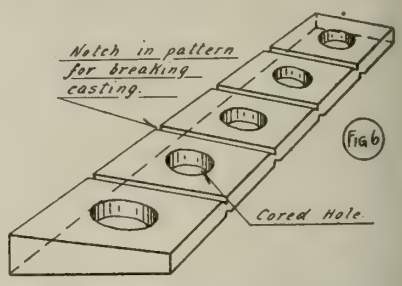


FIG. 6 METHOD OF CASTING CHANNEL WASHERS

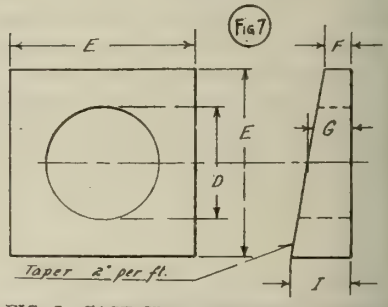


FIG. 7—CAST IRON BEVELED WASHER

With larger motors, it is not feasible or desirable to bolt them directly to the flanges of steel sections as shown in Fig. 4. The disadvantage of this Fig. 4 method is that the holes must be drilled accurately in the channel or I-beam

flanges for the accommodation of the holding-down bolts, and furthermore, that after the holes have been drilled only one position of the motor is possible. The arrangement of Figs. 8 and 9, wherein cast iron channel washers, Fig. 10, are used for clamping the structural steel members together, eliminates both of these disadvantages. No drilling is required in the channels that comprise the supporting frame, and the character of the construction is such that the motor can be readily shifted along the two channels upon which it rests, and these two channels can in turn be shifted along the members upon which they rest, so that the motor can be readily aligned with the pulley which it is to drive.

As suggested in Figs. 8 and 9, two channels are always used to form a supporting beam where the channel washers are utilized. The channel washer has two functions. The first is that it provides a means of clamping the two channels that fit into it to some other member, and the second function is that it maintains these two channels at a given distance from one another. The protection, G, in Fig. 10, maintains the channels at a given distance apart. It is seldom possible to obtain these channel washers on the market, and for this reason Table II is given to show some dimensions that have proven satisfactory in practice. These channel washers can be used for other size sections than those shown in the first column of the table, and also in combination with small I-beams.

No floor is shown in the motor platform in Figs. 8 and 9, because practice differs in regard to floors on structural steel motor supports. Some concerns insist rigidly upon the elimination of wood, in which case floors of standard checkered steel plate can be used. Such floors are, however, of necessity always grounded on the structural steel frame of the building. A man standing on such a floor is, therefore, liable to receive a severe shock. It is for this reason that it is probably usually the best practice to place a wooden floor on a steel platform around the motor, particularly if it is high up in the roof trusses, because if a man fell from such a location it would probably be fatal. The amount of wood in such a floor should be maintained at a minimum.

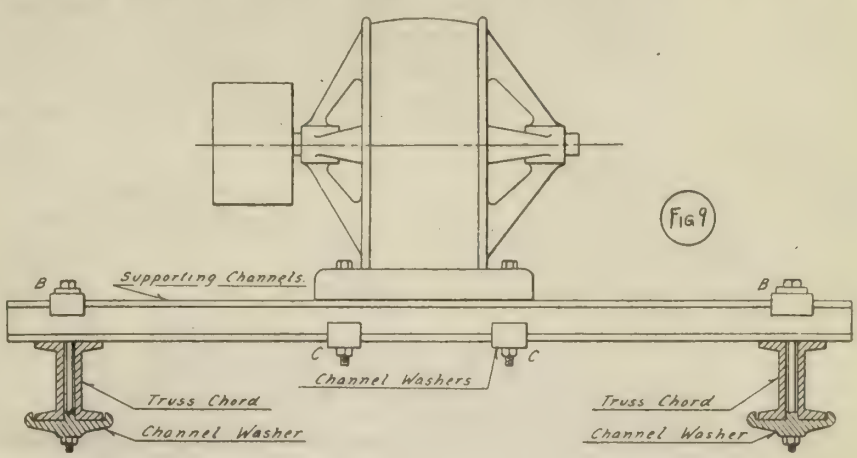


FIG. 9—SECTION A-A OF FIG. 6

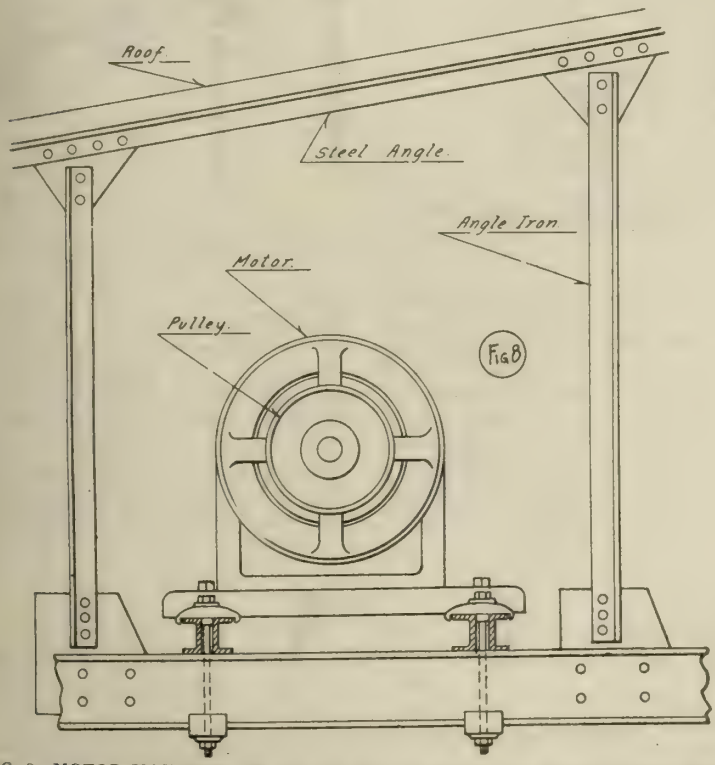


FIG. 8—MOTOR MOUNTED ON CHANNELS CLAMPED TO STRUCTURAL STEEL ROOF TRUSS.

CONVERTING A PIPE THREADING MACHINE INTO A LATHE

By J. M.

The following description as to how we made a pipe-threading machine serve the purpose of a lathe may be old to some of your readers, but on the other hand it may be new to others. We had occasion to use some lengths of 2¼ in. round iron as shafting, the ends of which had to be turned down to 2 in. to fit the couplings, and to suit the supporting bearings the shafting had to be turned down to 2 ins. at various places.

Having no lathe capable of doing the work, resource was had to the pipe-threading machine, and with fairly satisfactory results, notwithstanding that the machine was old and somewhat the worse for wear. The gripping chuck served as a driver, and the guides in the die head supported the shafting just where support was required. Two tools (right and left hand) were made to fit the tool slide rest, where the cutting-off tool usually fits, and by substituting a nut and screw arrangement for the rack and pinion gear we had a very serviceable lathe for the work in hand.

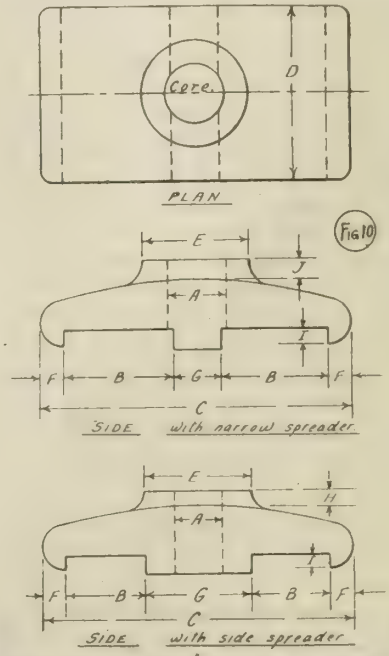


FIG. 10—CAST IRON CHANNEL WASHERS

VANCOUVER.—It is announced that the big Empresses of Japan and Russia, which have been on war duty for four years, have resumed their former route between Vancouver and Yokohama and Hong Kong.

Canadian Machinery Drafting Course---Part II

In This Second Portion We Go Still Further Into the Use of the Drawing Instruments, and Discuss the Various Type of Lines as Adopted in General Drafting Practice

By J. H. MOORE, Associate Editor Canadian Machinery

DRAFTING COURSE, PART 2

BEFORE commencing on the second part of this course, how about the first instalment? Did you study it up and derive any benefit from the same? What is equally important is this: have you sent us in a sample of your work? Remember the three prizes each issue, so get busy, if you have so far hesitated at sending your work along, for it might be your plate that will land a prize.

In Part 1 we touched on the very simple uses of the drawing board, T-square, and triangles. Plate No. 1 was simply a test to see if instructions had been followed, so now let us go still further into the various other instruments, as required in the art of mechanical drawing.

The Scale

Fig. 1 illustrates a very popular type of scale as used in drafting work. These scales are usually constructed of boxwood, and are made in a triangular section as shown. Usually they are graduated for a distance of 12 inches. The type illustrated has six surfaces for different graduations, and the scales are so arranged that the drawings may be made in any proportion to the actual size. For general mechanical work the common divisions are multiples of two, thus drawings are made full size, 1-2 size, 1-4 size, 1-8 size, 1-16, etc., etc. Should a drawing be half size of course 6 inches would then equal 1 foot, while if ⅛ scale is desired 1½ inches equals 1 foot. The scale is provided with all these necessary graduations, and the student is advised to study his scale and becomes worn and is not to be depended scales and how to use them, for later on in the course this will become a necessity.

Another very handy scale is the flat type, with beveled edge, but as the divisions on these scales are similar to the triangular type we need not discuss the scales question further. For the present, all drawings will be made full size, so students have ample time to familiarize themselves with the use of their scale.

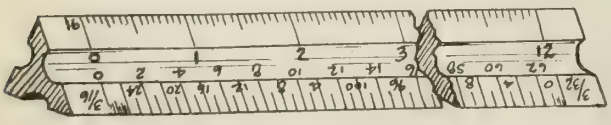


FIG. 1—GENERAL VIEW OF TRIANGULAR SCALE

The Protractor

Fig. 2 illustrates the instrument known as a protractor. This tool is used for laying off and measuring angles and is usually made of steel, brass, celluloid, or sometimes paper, but the latter is not to be recommended, as it soon becomes worn and is not to be depended upon for accuracy. For general use in this course, either of the first three stated will do, with the celluloid the favorite. If made of metal the instrument is cut away as shown in sketch, in order to allow the worker to see his drawing, while if made of celluloid the piece is solid, for the instrument is transparent, a decided advantage over the metal type. In all cases, however, the outer edge is divided into degrees, and tenths of degrees. Perhaps it would be best to sort of jack up readers' minds to the fact that there are 360 degrees in a complete circle, therefore 180 degrees to a half circle. The protractor is laid out in such a manner as to read from 0 to 90 degrees, then reverse, while in some cases both values are stamped on the instrument, as for example, opposite 70 degrees would be also stamped 110, for one would be the component of the other. To prove this in a simple manner for the reader's benefit, let us first take the 70 degree mark. This is 20 degrees less than 90, so in placing the component we must first take the 90 plus the 20, making 110, or the other marking.

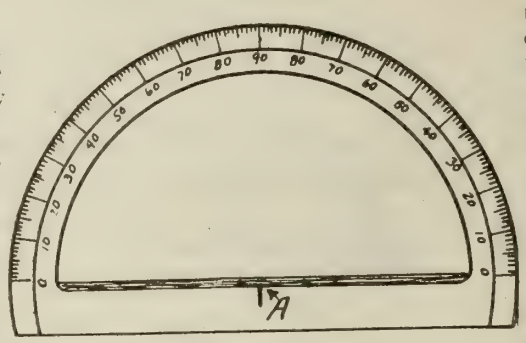


FIG 2

FIG. 2 ONE STYLE OF PROTECTION

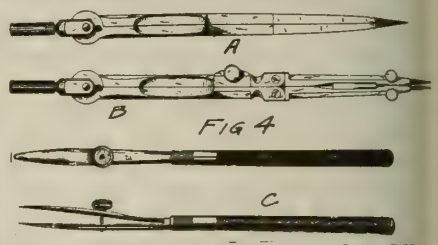


FIG 4

FIG. 4 SOME OF THE VARIOUS INSTRUMENTS USED

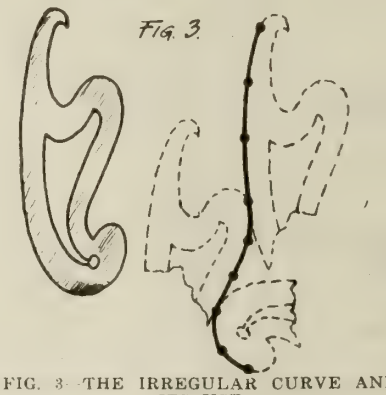


FIG. 3

FIG. 3—THE IRREGULAR CURVE AND ITS USE

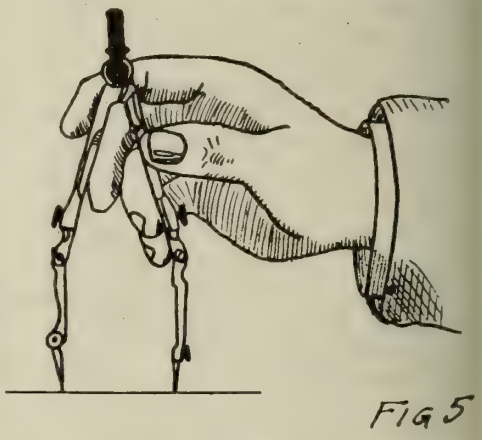


FIG 5

FIG. 5—AN EASY METHOD OF HOLDING THE COMPASS

To lay off a required angle, use a very hard and carefully sharpened pencil. Place the protractor so that the two zero marks are on the given line and the centre point marked A on sketch is at the point through which the desired line is to be drawn. Mark a point at the degree desired, mark your centre point and draw your line, which will then be at the desired angle from the horizontal.

A B C

CORRECT AND INCORRECT METHODS OF HOLDING THE RULING PEN

Irregular Curve

Perhaps as convenient a tool as the

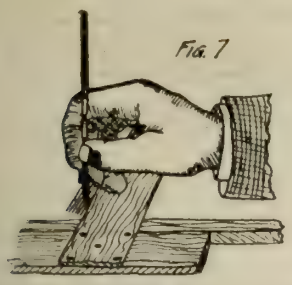


FIG. 7 THE CORRECT WAY TO HOLD THE PEN

draftsman uses is that shown in Fig. 3. This peculiar shaped instrument is sometimes called a French curve, but is generally known as an irregular curve. It is used for drawing curves, other than arcs of a circle, with either pen or pencil. These tools are made of wood, hard rubber or culluloid, and once more the celluloid is the better owing to its transparency. Any curve drawn by such means is usually termed a freehand curve.

To illustrate its use follow the sketch, which forms a part of Fig. 3. Purposely we have shown the dots through which the line has to pass, away larger than the actual thickness of the line, but for illustrative purposes only. In actual practice the line itself would cover and eliminate the dots, showing only a smooth curved line. At all times try and get your curve to pass through at least three dots, or points as they are usually called, for a much smoother curved line will be the result. Usually it is good practice to first pencil the line in lightly, then ink it over. In inking in, it is most important that the blades of the pen be kept tangent with the curve, otherwise there is a tendency to blot the work. Later on in the course, students will find they require to use this tool, but for the present at least, they will not be called upon to use it.

Compass, Dividers and Pen

Fig. 4 illustrates the instruments more used than any others, with, perhaps, the exception of the T-square. At A is shown the dividers, used in laying off distances on the drawing, either from the scale or other parts of the drawing. They are also used to divide a line into equal parts. In fact their use becomes more and more general as the student becomes accustomed to them.

B illustrates the compass, used in drawing circles and arcs of circles. One leg of these compasses has, as readers will notice, a screw which loosens and allows one leg, usually the pencil point, to come out from the lower half, and the pen point or extra length bar to go in its place. By this means the one main body can be used as a pencil compass, or pen compass, simply by interchanging, while by adding the extra length bar, you enlarge the capacity of the instrument, for this bar has also a hole in it to accommodate either the pencil or the pen. From constant practice with this instrument comes a knowledge far better than written instruction can ever give the student. Fig. 5 illustrates about as easy a method of holding the compass as any. Never use both hands, but learn to handle the instruments easily by one hand as shown.

The pen as shown at C illustrates both views clearly, first as it looks from the top, and secondly as it appears from the side when open. This pen is used for drawing straight lines, or curves that are not arcs of circles. Commonly it is simply termed the ruling pen. The distance between the pen points is adjustable by means of a little thumbscrew as

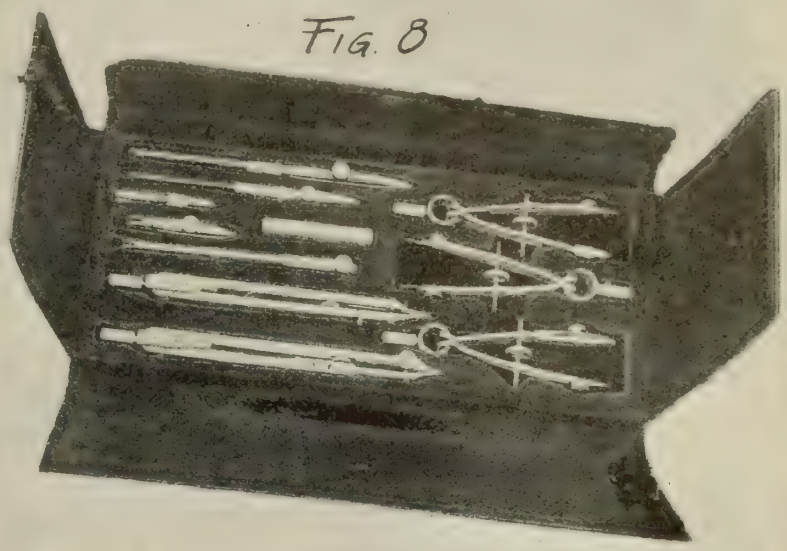
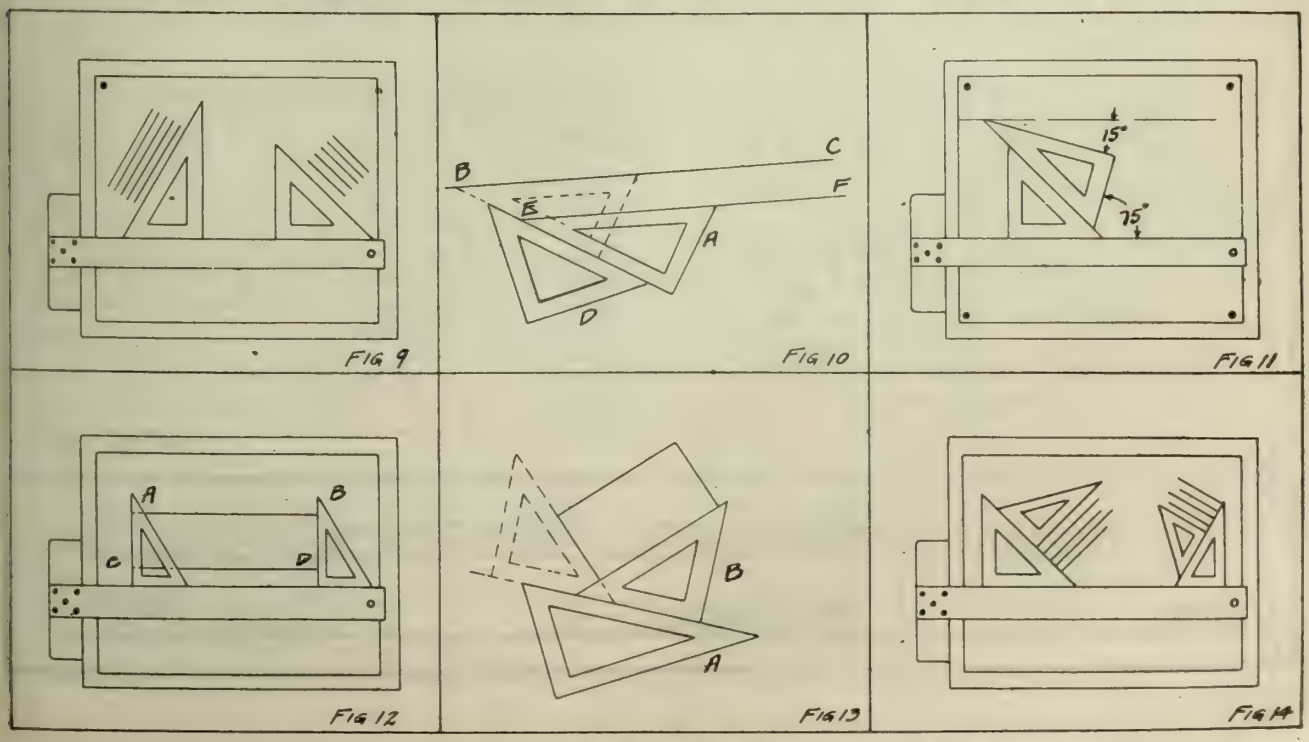


FIG. 8—TYPICAL SET OF INSTRUMENTS



VARIOUS USES FOR THE T-SQUARE AND TRIANGLE

shown. The blades are given a slight curvature, so that there will be a cavity for ink, even when the pen points are very close together. The pen should not be dipped in the ink, but should be filled by means of the quill, which forms a part of the cork on practically all India ink bottles. Do not attempt to place too much ink in the pen at once, about 1-4 to 3-8 in. will be found sufficient. Upon finishing your work always take a cloth and wipe carefully both blades of the pen, as all liquid inks corrode the blades if allowed to dry, and no good work can be done with a poorly kept pen, so students will do well to remember this point throughout the course.

In using the pen be sure that both blades bear evenly on the paper, in order that the resulting line be smooth and even. Study the chart at Fig. 6. A and B illustrate a common danger, namely, first too great a slope outward, and second too great a slope inward. Either one is wrong, and must be avoided if good work is to be obtained. C illustrates the correct method, namely keep your pen blades as vertical as possible. At Fig. 7 is shown another view of using

(Continued on page 382)

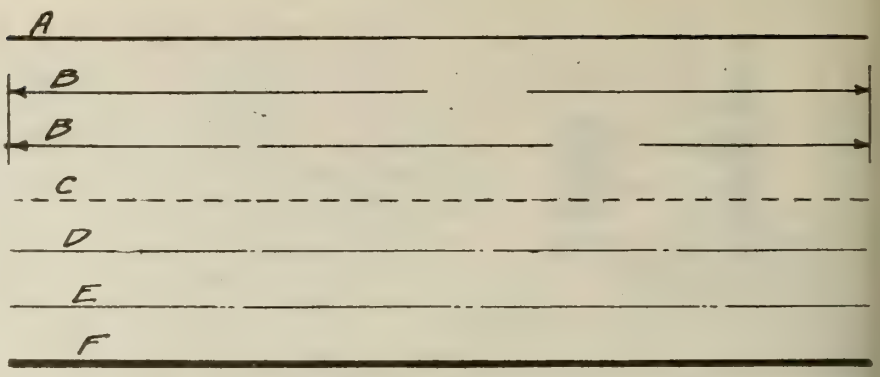
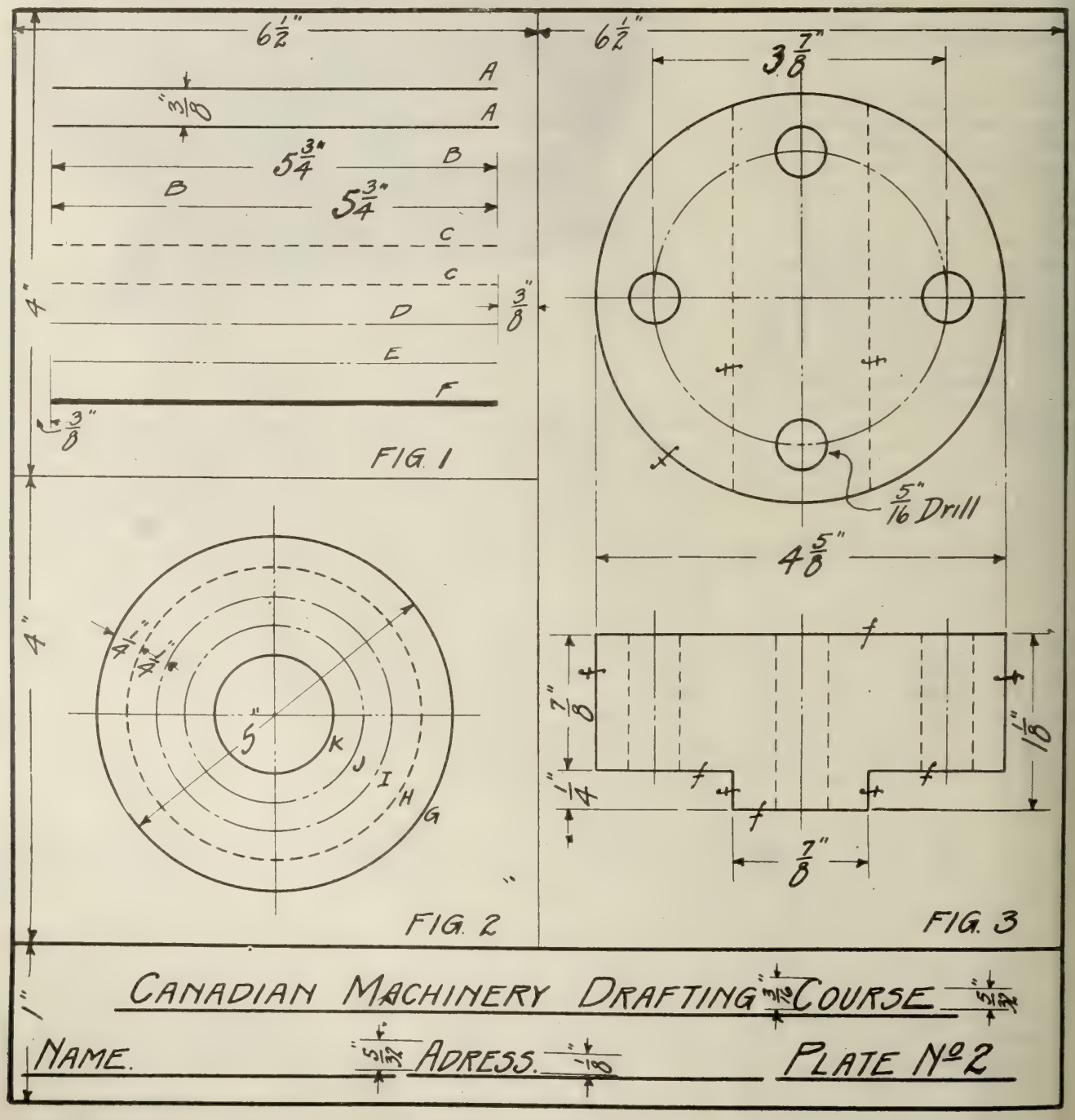
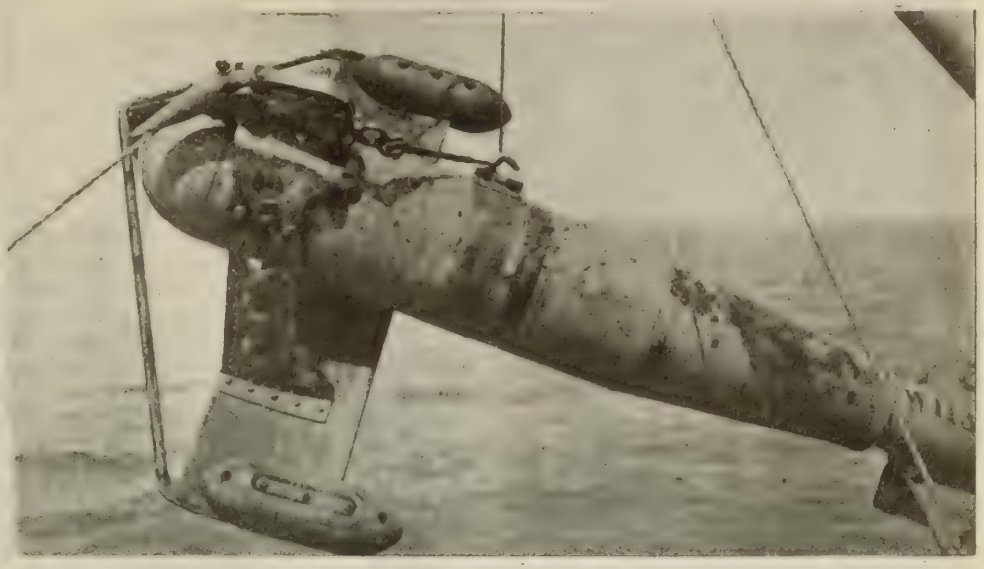


FIG. 15—VARIOUS STYLE LINES AS USUALLY ADOPTED



The Secrets of the War Coming to the Surface

The Paravane Took the Sting From German Mine



THE PARAVANE READY FOR LAUNCHING

By WILLIAM WASHBURN NUTTING

MANY of the clever devices produced under the stimulus of war are already pretty generally known. Others are not known at all, or else exist merely as names in a strange, new war vocabulary. The tank, for instance, has become a household word, while the paravane, which shares with it the distinction of being the most important of the war's big crop of inventions, is practically unknown.

The paravane or "P.V." or "otter," as it is variously known in the nomenclature of the Allied navies, is the thing that foiled the German mine. Nearly four thousand vessels were equipped with the gear by the British alone, and of this vast number there is no record of the destruction of a single ship by a moored mine. Several hundred American vessels were equipped before the signing of the armistice, and the programme was to have included practically every ship of the Navy and merchant marine. This would have meant an expenditure of ten million dollars (£2,050,000). In saving one of our first-class battleships from destruction, however, the paravane justified itself and the ten million in one stroke.

That some new device had been perfected which permitted Allied ships to traverse mine fields, theoretically deadly, with impunity has long been guessed, says W. W. Nutting, in "International Marine Engineering, but the jealous care with which the secret was guarded kept the details of the gear from the Germans to the last. Many and varied were the explanations of certain odd devices rigged on the bows of an ever-increasing number of naval and merchant vesels, and ludicrous indeed were the stories of the strange winged torpedoes which were likewise carried. This, we believe, is the first time that an authentic description of the device has been published, except in the leaded confidential books of the Navy.

Paravanes and the gear for handling them were perfected during the first two years of the war at the dock yard at Portsmouth, England, and in some quarters they are still known as the Burney gears, after Commander Burney of the British Navy, the inventor. The primary object of the paravane is the protection of ships against moored mines, although there is another type, the mysterious and deadly "Q," which is explosive and which was used with telling results against the submarine. But the protective type is by far the more important. This type is divided into three subdivisions, according to the speed of the vessel on which it is used.

How the Paravane Works

A glance at the diagram will give an idea of how the gear works. A pair of the otters, which act on the same principle as kites, is towed from the forefoot of the vessel. These stand well out forming, with their tough steel towing ropes, a huge wedge. The length of these towing ropes varies somewhat with the length of the vessel, but is, roughly, in the neighborhood of 150 feet. These wires encounter the mooring wire of the mine and deflect the mine, and frequently its mooring as well, clear of the vessel, the mine wire sliding out along the towing rope and into the cutter head of the paravane, where it is severed by serrated steel knives. When the mine rises to surface it is exploded or sunk by gun fire or reported to a patrol vessel.

The body of the otter, which is of steel, is much the same shape as a torpedo, although somewhat shorter. It is watertight and has a positive buoyancy of about ninety pounds, which is sufficient to support half the weight of its towing wire and still bring it to the surface in case the ship stops. A large steel plane, cambered like the wings of an aeroplane is attached as shown in the illustrations. When the otter is in action, this plane assumes a vertical position, pulling the paravane out away from the ship and exerting sufficient tension on the towing rope to deflect the mine. It will be noticed that there are two bulbs on the ends of the plane. One of these is a loaded steel shell, which gives the otter the proper list to cause it to assume quickly its normal position, even when starting from rest. The other is a wooden duplicate of the first, placed there not so much for buoyancy as to make the structure symmetrical and to equalize the steering effect, which would be thrown out of line if the shall alone were used.

Device to Hold Paravane at a Constant Depth

In order to be sure of picking up the mine which is ordinarily moored a couple of fathoms beneath the surface, the paravane must be made to run at a constant depth. This is accomplished by means of a horizontal rudder in the tail, operated by a hydrostatic valve placed in the joint between the tail and the body of the otter. The water pressure acting on the after face of a rubber diaphragm is backed up by a spring on the inside; the compression of this spring may be regulated to cause the otter to maintain any desired depth. When the otter dives, the increased water pressure drives the diaphragm forward, and this motion is transferred to the rudder through a valve stem and a tiller, giving it uphelm. When the otter rises above its set depth, the water pressure falls off and the spring drives the diaphragm aft, imparting down-

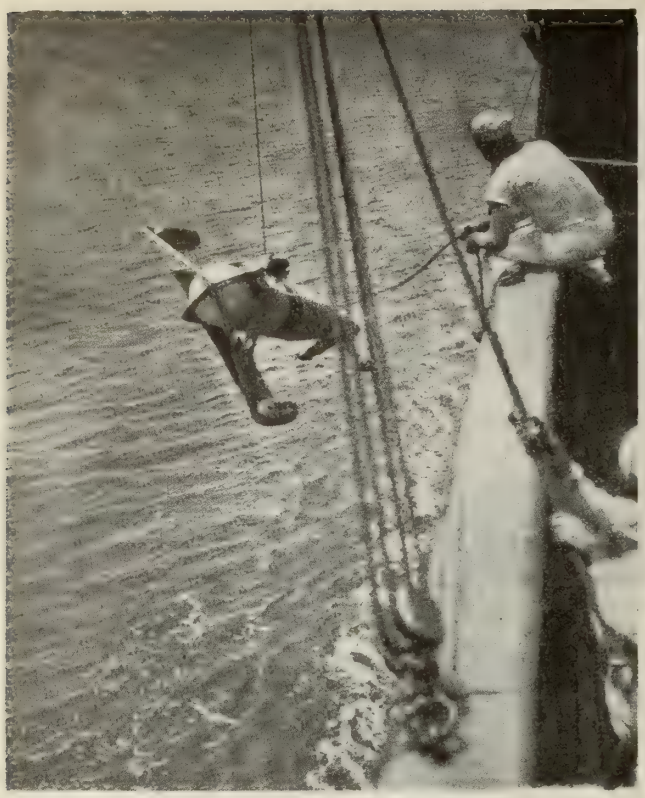


FIG. 2—SWINGING THE PARAVANE OVER THE SIDE

helm to the rudder. Consequently it will be seen that the otter cannot maintain an absolutely constant depth, but must oscillate a bit above and below the average line. It will be seen, too, that this oscillation, or "porpoising," will increase with the speed at which the otter is towed, for the reason that the greater the speed the farther will the paravane rise or sink before the hydrostatic valve has a chance to act upon the rudder.

The Action of the Mercury Oscillator

This excessive porpoising at high speeds prevents the use of the simple type of paravane just described on ships of greater speed than sixteen knots, but this, of course, would include the great majority of merchant vessels. For use on ships of greater speed, such as liners, battleships, cruisers, and the like, it was necessary to equip the otter with some sort of stabilizing device which would perform the same function as the pendulum in a torpedo. The device used—called a "mercury oscillator"—is a 6-foot tube of mercury with a diaphragm at either end through which the valve stem of the hydrostatic valve extends. This tube occupies a position between the spring and the diaphragm of the hydrostatic valve. Its own diaphragms are attached to the valve stem, imparting their effect with that of the spring and the water diaphragm.

As soon as the otter starts to dive or to rise, the head of mercury thus created causes a pressure on one or the other of the diaphragms, which, in turn, transfers it to the valve stem and thence to the rudder. This device is merely an addition to the hydrostatic valve, which works, as in the slower types, to keep the otter at approximately the right depth. The oscillator merely prevents porpoising and permits the towing of the otter at high speed. Two types are equipped with the oscillator, one for extreme speeds, such as would be attained by the destroyers and battle cruisers, and the other for intermediate speeds, such as are attained by battleships.

Towing Devices

It is obvious that, in order to protect the ship thoroughly, the otter must run at a depth not less than the draft of the vessel and that the towing point at the stem must be as low as possible. Mines are ordinarily moored a couple of fathoms below the surface. If a vessel were pitching, however, it might go over a mine unless the point of attachment of the wires was placed low. It is obvious, likewise, that the point of tow must be as far forward as possible in order not to leave any considerable portion of the bow unprotected.

The Sliding Shoe

To get the towing point as near as possible to the intersection of the stem and keel line was a problem. On ships with a deep forefoot, that is, ships which are not cut away much below the water forward, it was simple enough to lower a horseshoe-shaped forging, with the towing wires made fast to either arm, down the stem. All the gear needed was a topping lift and a couple of backhauls to hold the "sliding shoe," as it was called, in place.

This was the method used on all the new vessels of the Emergency Fleet Corporation, since it was an easy matter to build out the forefoot with a "stem extension" while the vessel was under construction. But it would have been necessary to have equipped hundreds of vessels of all types—naval vessels as well as those of the merchant marine—(and most ships, especially large, high-speed vessels, are cut away to too great an extent to permit the use of the sliding shoe)—since it would not have been practicable to build in the entire cut away portion with a skeg. And so two other towing devices were perfected, one called the "boom" type, for slow merchant ships, and the other called the "clump and chains," for naval vessels and the larger, faster ships.

The Boom

Since the boom is an unwieldy piece of furniture, weighing in the neighborhood of a couple of tons, it was only used on the slower types of freighters. It is a built-up affair of forgings connected by a length of pipe and is trunnioned on the starboard side of the ship somewhat abaft the stem and a little above the waterline. The boom is so shaped that when lowered the towing point comes directly under the forefoot. A large clip on the boom engages the stem, holding it in position.

Theoretically, this arrangement is good. It is not a pleasant thing, however, to handle in a seaway and requires a lot of gear—a topping lift over the stem head, with which the boom is raised; a control lift by which it

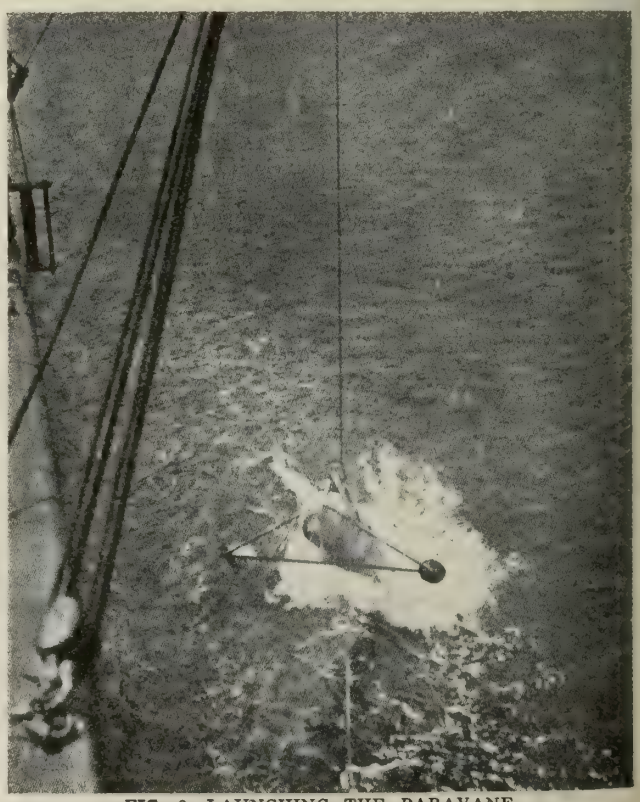


FIG. 3—LAUNCHING THE PARAVANE

is swung around to the rail, where it is secured with chains when not in use, and a backhaul extending from the clip to a point aft on the port side. This backhaul is used to guide the boom and prevent its slatting about while it is being lowered.

On large, fast vessels it is impossible to get the towing point exactly where it should be. The forefoot is usually cut away, prohibiting the use of the sliding shoe, and a

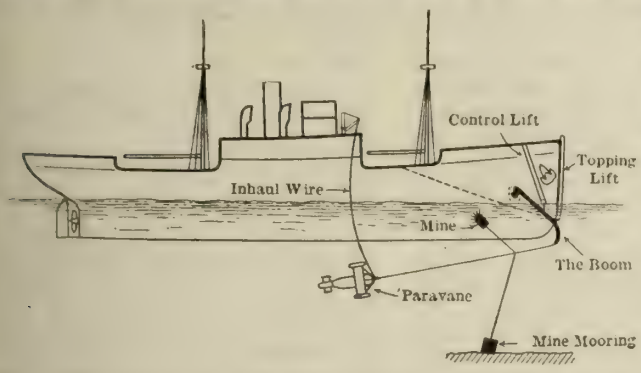


FIG. 4—OPERATION OF THE PARAVANE WHEN TOWING ROPE IS HELD BY A BOOM

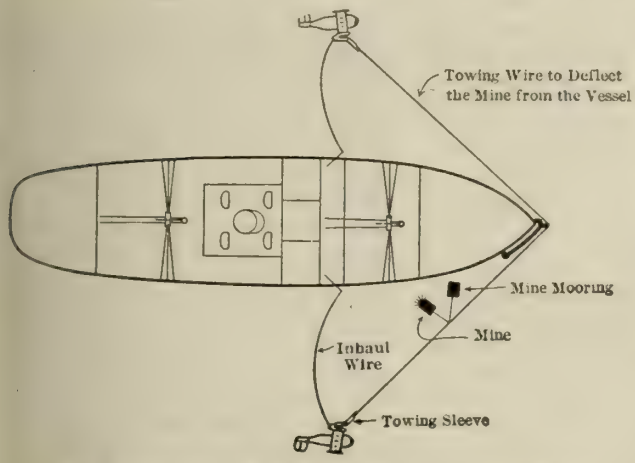


FIG. 5—DIAGRAM SHOWING ACTION OF PARAVANES

boom of the size which would be required would be out of the question. So a skeg, or "clump," is built onto the keel as low as possible without cutting the base line. Through two large holes in this skeg two chains are riven, extending from one rail to the other. These chains are run over the bow chocks and each carries a "dumbbell" and swivel link, to which one of the towing wires is attached. The towing points are lowered by hauling in on the other ends of the chains. By attaching the ends of the chains to a single tailing wire, they may be lowered simultaneously without difficulty.

The position of this skeg or clump is important. In order to prevent the possibility of the towing wires going over the mine, allowing it to come into contact with the bottom of the vessel, the skeg must be low down. This means that unless a very large skeg is used, it must be

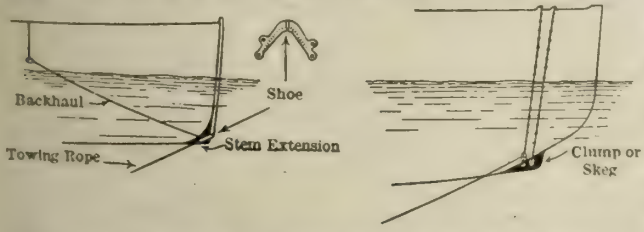


FIG. 6—ATTACHMENT OF TOWING ROPE WITH SHOE AND CLUMP DEVICES

considerably aft to the stem. The placing of the skeg, therefore, is a compromise, for, when in position just mentioned, it leaves a considerable section of the bow unprotected. But this is not so dangerous as it might at first seem, since it has been found by experiment that a mine is rarely encountered directly on the stem, or, in fact, within several feet of it. The action of the displaced water tends to throw it well to one side or the other, and the towing rope picks it up before it has a chance to strike the ship.

But let us assume that the ship did pick up a mine dead on the stem. The chances are that even in such a case it would not be greatly damaged if equipped with this gear. This is the reason: The German mine, the one with the horns, is so designed that it does not explode at the instant of contact. When a horn is bent or broken, in turn breaking the glass vial of acid which it contains, the action of the latter is not instantaneous. There is a delay of several seconds, the purpose of which is to cause the mine to explode well along the side of the vessel abreast the engine room or at some spot more vital than forward of the collision bulkhead. In such a case the towing wire would pick it up and deflect it well clear of the ship before it exploded, and the chances of serious damage would be slight.

But we need not depend entirely on theory to back us up in this statement. Over four thousand vessels have been equipped with the otter gear, and of that great number there is no record of the destruction of a single ship by a mine although it is definitely established that many a vessel has been saved by the gear.

Launching the Otters

The otters were used—and, in fact, are still used—in all waters less than a hundred fathoms deep where mines are likely to be moored. When the hundred fathom curve is reached the towing wires are bent onto whatever towing device is used and the latter is lowered away. The towing wire is draped over a hook at the rail, called the "easing-out hook," and is held by some sort of a "stopper" to prevent the bight of wire, which is dragging in the water, from pulling the rest of the wire taut and interfering with the launching of the paravane.

When this is done the paravane is swung out on a specially provided crane by means of a second wire called the inhaul wire, which is permanently attached to the otter and drags through the water. This wire is led through a hook, as shown, in order that the otter may strike the water more nearly in its normal running position, allowing it to be launched at much greater speed. When the paravane is out over the water, the stopper, mentioned above,

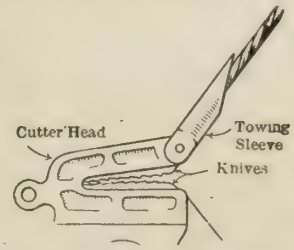


FIG. 7—DETAIL OF CUTTING DEVICE

is cast off and the paravane is dropped. There is a tendency for the otter to dive when it is first launched, and for this reason it is allowed to tow from the easing-out hook at the rail until it has found its depth and is running steadily. Then the hook is paid out and tripped, releasing the towing wire and allowing the otter to find its position a hundred feet or more from the side of the ship.

Many ludicrous statements about the paravane have appeared recently, which only go to prove how remarkable was the secrecy with which the device was guarded throughout the war. A popular misconception is that the otter is self-propelled, the current being conveyed through a wire. Another is that the mine wire is sheared off by means of some mechanical device. The jaws in general use are stationary and contain a pair of tool steel knives with saw teeth, set at a very small angle, so that a comparatively slight pull will sever the wire cable. Any rope that will enter the jaws is cut instantly. Even ⅝-inch wire, which is much heavier than could be used on any existing type of mine, has been cut with no apparent difficulty.

CANADIAN MACHINERY DRAFTING COURSE—PART II

Continued from page 378

the pen, and students cannot do better than to study carefully these two views, and practise inking until a good, straight, clear line can always be obtained. Don't be hasty to blame the pen, ink or paper; be sure it's not the operator. A little time spent in this practice work will be time well spent. The other remaining instruments are the bow pencil, dividers, and pen, so called because of their bow construction. These tools are used for smaller and finer work, and are especially adapted for circles having a radius of less than 3-4 inch, but their use and manner of using are practically the same. Fig. 8 illustrates a typical set of good quality instruments, together with case. Students need not purchase such an elaborate set as shown unless they so desire. For general work in this course a cheaper set will do equally as well. The only reason for showing such a set is to illustrate the class of tools used in the regular drafting business.

Some Triangle Problems

Now that we have gone into the various instruments as used, let us go a little further into the use of the triangles, as started in Part 1. We have so far made 45, 60 and 30 degree lines with these tools, but they have a much wider use, as illustrated in Figs. 9 to 14. Let us consider them in sequence.

Fig. 9 illustrates a very common use, namely, drawing parallel lines at an angle to the horizontal, by means of the T-square and triangle. Fig. 10 illustrates the use of triangles only, and shows the method of drawing a line parallel to a given line. First place triangle A with one edge coinciding with the given line B.C. Now take triangle D and place one of its edges in contact with the bottom edge of triangle A as shown. Hold triangle D firmly with the left hand and slide triangle A to the right or left as desired, until you reach the point through which you wish to draw the line E F.

Fig. 11 shows clearly that by combining the 45 and 60-30 triangles with T-square, you can procure angles of 15 or 75 degrees.

Fig. 12 illustrates the drawing of a rectangle by means of triangle and T-square. First draw, by means of T-square, lines A, B, C and D. Now use your triangle and draw vertical ines CA, and DB, when rectangle will be complete.

Fig. 13 illustrates another method of drawing a rectangle by means of triangles only. Place your 60-30 degree triangle A as shown at whatever angle you desire, then place your 45 degree triangle B on top of same in manner shown. In the dotted position you can draw in the short sides, while in the heavy position you can finish up the longer sides.

Fig. 14 illustrates the method of drawing perpendicular lines on given lines, by means of T-square and triangles. Either combination can be used and both are used for illustrative purposes. From these six illustrations students can get some idea of the T-square and triangle possibilities. By constant practice they will find that these tools become more and more useful as time goes on.

Lines

So far we have only discussed full lines, but now let us go into the matter deeper and find out just what type of lines are commonly used in drawing practice. Refer to Fig. 15 and follow the lines as they are marked, A, B, etc. A represents what is known as the full line, and is the most common of all. B illustrates two different types of dimension lines, each of which is permissible. C shows the dotted or hidden line, which is used to designate a line hidden from view. D is known as a construction line, and is used in various places, such as joining together two views, or projecting across from one view to another, which gives them their name, construction lines, but the name is all we wish you to get at present, for its application will be fully explained later in the series. E illustrates the centre line, which resembles the construction line, but it will be noticed that two dots in place of one go between each long dash. This line and its uses will be discussed fully later. F shows what is known as a border line. This line is similar to the full line, but twice its thickness. We only touch on this line subject in order to give students practice in the following plate, on the various lines. We wish you to memorize the names, so that when the discussion on their uses comes later, it will be that much easier for students to follow.

Now since we have covered so much ground in this second part let us close it by instructions for plate No. 2.

Draw border lines as before, 9x13, and trimming lines, 9½ x 13½, and divide sheet into four sections. Note dimensions and work to these. Study the plate carefully, for all the various lines spoken of in this article are worked in on the practice plate. Draw everything full size. In drawing the dotted lines, make each dot about 1-16 long, and allow 1-16 space between each dot. For the other type of lines study the plate. First draw the lines lightly in pencil, th ink in afterwards. Higgins' black wate proof India ink is as good as any. j careful not to make your pencil lines t heavy, otherwise your inked lines w not be as clear. After completing t plate, write on a separate sheet t style of lines marked A, B, C, D, E, at Fig. 1 on plate, also lines G, H, I, K, on Fig. 2, also on plate. The little on Fig. 3 denotes that surfaces are fi ished but the only reason we placed the on drawing is to familiarize studen with their use, for later this point w be fully gone into.

Above all take care to make your pla as neat as possible. You have t weeks to complete it and send it in, you have lots of time to study it u Remember we have three scales for t three best plates received. These scal retail at $1.25, so stick to it and se your work along, so that you are in sha to tackle the next section and plate No. in the next issue, two weeks from th date.

New Working Hours.—A change working conditions and wages in furn ture factories throughout Canada is for casted by the report of the conciliati board which held sittings at Toront Stratford, Kitchener, Hanover and Mor real, in an effort to get such informati about the furniture trade as would e able it to settle a dispute which aro between furniture manufacturers Stratford and their employees. Th board, which reported to the Minister Labor, consisted of Judge D. McGibbo chairman; J. F. Marsh, representing t employees, and Joseph Orr, representi the employers. The board states that "is able to report the successful issue the negotiations, in so far as one man facturer and the employees are concer ed." This manufacturer (The Glob Wernicke Co.) signed an agreeme which is retroactive to February 1, a which might be summarized as follow "Day's work—Nine hours from 7 a.m. 5 p.m., except on Saturdays during Jun July and August, when the hours sh be from 7 a.m. to 12 (noon). Overtime Time and one-half, but it shall not considered overtime unless one or all d partments are asked to work extra hou Wages—The same for 54 hours' work was being paid for 59."

Tear off and send with drawing

Name .....

Address .....

Position .....

Firm's name.....

WHAT OUR READERS THINK AND DO

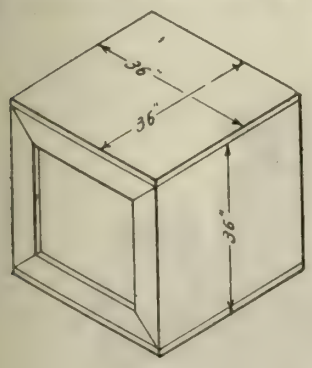
A BOX-HANDLING DEVICE

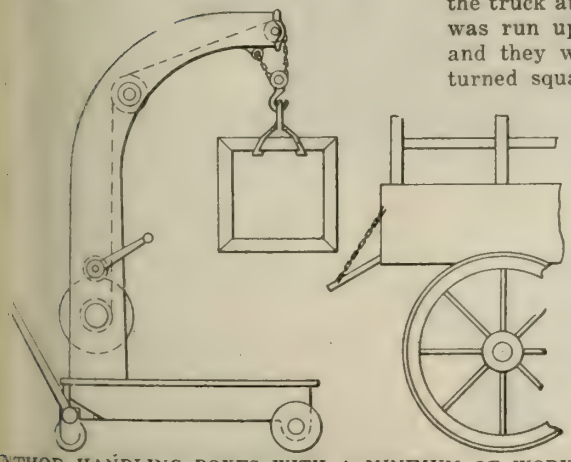
By Donald A. Hampson

Tight boxes are exceedingly unhandy load or unload if they contain over o hundred pounds and are of goodly e. Lifting cleats are dear to the art of the truckman but they are rare- used and are sometimes prohibited.

One plant was required to pack its oduct in tight wooden cases measuring inches each way. These cases weighed 0 pounds when full and, during the re- nt war, the output went to the Govern- nt on a schedule that called for enty-five such cases a week. The plant s entirely on one floor, which was prac- ally on ground level, and the work packing was facilitated by keeping the ses on the floor. The transportation stem of the plant was the same as all all machine shops—portable crane, two d four wheeled shop trucks, and lift cks; these were quite satisfactory ex- pt for loading into wagons.

To get the cases in wagons without eding half a dozen men and to do the rk in a reasonably short time, the rig shown was made and used in connection with the portable crane. This arrangement saved its cost on the first two loads and thereafter was a constant source of satisfaction as well as a back and money saver.

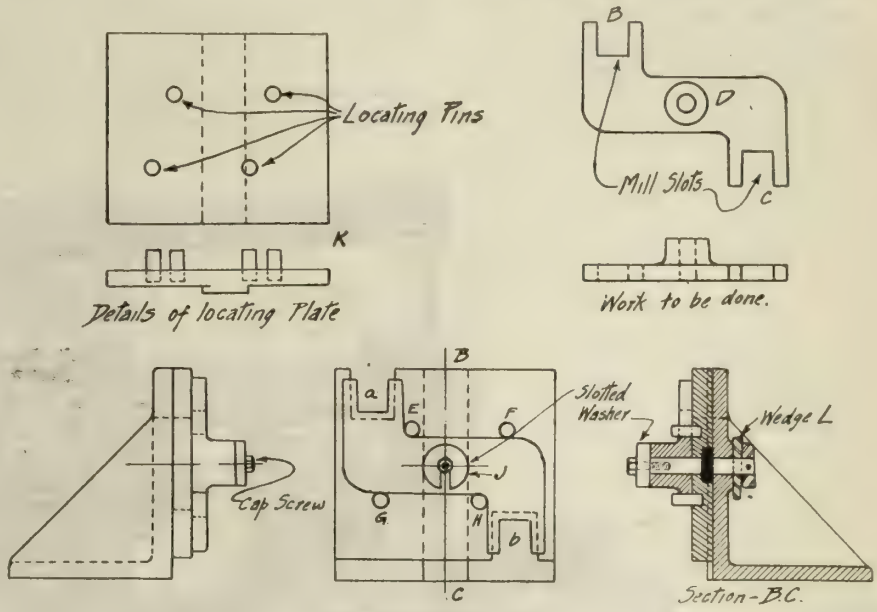




THOD HANDLING BOXES WITH A MINIMUM OF WORK

Two hooks of ¾-in. steel were forged out and were connected by a 6-in. ring, which was caught in the crane hook. The box hooks were large enough to reach over the edge of the cases and catch under the battens of the ends, an arrangement that provided a well balanced, safe lift for the cases. The size of the cases was too big to go between the frame of the truck at its forward end, so the truck was run up to the cases set diagonally and they were picked up that way and turned square as lifted above the rails: (the portable crane must always be manipulated so that the weight is very little ahead of the point of suspension on the boom or the crane will overturn with possible disastrous results).

After the cases were raised high enough the crane was pushed up to the wagon, which was backed in on the floor, and the cases deposited in the body. So well did the scheme work out that two men, one in the wagon and one on the floor with the crane, would load five of the cases in as many minutes. More than this could hardly be asked of an expensive and extensive hoist system.



TURNOVER MILL JIG

TURNOVER MILL JIG

By A. E. KIPPS

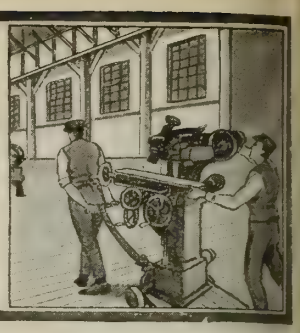
Shown on the accompanying sketch is a turnover milling jig which has proved well worth while, not only from a production standpoint, but also from a point of interchangeability. The work itself is shown at A. The operation consists of milling the two slots B and C.

Referring to the assembled view, the work is centered by a pin, which goes through the hole D, while four stop pins E, F, G and H hold work securely from rocking. A slotted washer, together with a cap screw, which goes into the centre pin as shown, complete the fastening part of the jig. A detail view of the locating plate itself is shown at K.

Briefly the action of jig is as follows. First the slot A is milled, after which the wedge L is withdrawn, and the locating plate tongue drawn out of slot in main body of pig. Work is now revolved 180 degrees, and the other slot B milled likewise.

While jig is shown on this particular piece, such an idea is easily adaptable to many other classes of work.

DEVELOPMENTS IN SHOP EQUIPMENT



AUTOMATIC MILLING MACHINES

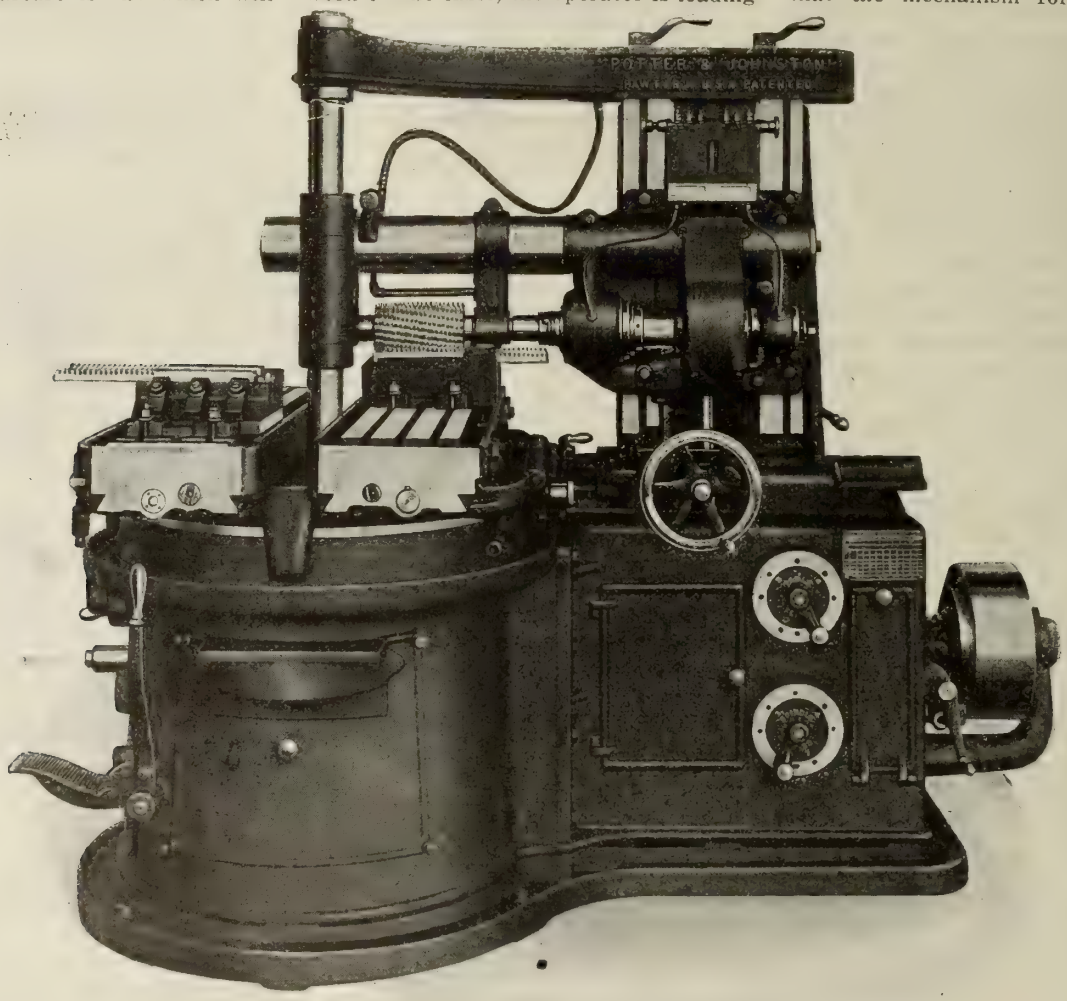
THE announcement has been made to CANADIAN MACHINERY that from now on, until further notice, E. C. Roelofson, of the Roelofson Machine Co. of Galt, will be sole representative for Potter and Johnston's Automatic Milling Machines, with headquarters at 1501 Royal Bank Bldg., Toronto, Canada. All Canadian orders will receive his personal attention, and any literature on the subject will be gladly forwarded to those interested.

This new departure is one which will no doubt please the Canadian trade in general, as the merit of these machines is already well known. A general description supplied to CANADIAN MACHINERY will follow, together with specifications on both the horizontal and vertical types.

The machines, of which the horizontal type is illustrated, have been designed for the purpose of increasing production by the elimination of machine idleness between cuts, which occurs through the use of the ordinary type of milling machine, necessitating as it does much lost time in returning the table by hand, removing the finished work, etc., etc. With the use of the automatic miller all this is avoided, for while the cutter is milling work on the table, the operator is loading up the other. The action is continuous with the exception of 10 seconds required to index the table turret and bring the work in alignment with the cutter, and advancing the table automatically to the cutting point, so that it can be clearl noted that there is absolutely no los time, thereby insuring a greatly increas ed output. There are no overhangin arms or projections to interfere with th operator while placing the work in th vise or fixture, and all controlling lever are convenient to the operator. Ther is no waste of power, as the machine t practically continuously milling.

The table base carrying the worl tables is at a fixed height, and of goo rigid construction. It is in this bas that the mechanism for revolving th table, turret, and feeding is contain ed. On top of base is a circular ri which forms a channel for the cuttin lubricant.

The tables are mounted upon a circula



AUTOMATIC MILLING MACHINE

urntable, the rotation, or indexing of ame being on the turret principle. Each able has three T slots, also provision for upporting any fixtures, at the same time designed to accommodate a splendid bricant system.

One big feature about the table feed that the screw, which is carried underneath the table, does not revolve, nor it splined, thereby adding to its life nd accuracy. Provision is made to perate the tables by hand; also to revolve the turret table when setting up. utomatic stops are provided which are djustable to suit the different working ositions. A graduated dial is furnished r the table feed screw. The tables ome to their positions automatically nd rapidly. As soon as the indexing is ompleted, the table feed is automatically thrown in. An independent fast able feed is provided, which is a big me saver for such work as straddle, oove, or space milling.

Revolving and indexing is controlled foot pressure on one lever. Ten seconds only are required to revolve and dex the table turret. At the same time e design permits all automatic mechanms being operated by hand if desired. he spindle is a crucible steel forging, ith all provision in the shape of phosor bronze bearings to take up wear. The overhanging arm, cutter, arbor, d oiling system, etc., are fully exained in their literature, and is well orth reading, as they state themselves. he automatic milling machine is a rictly manufacturing milling machine r the manufacturer who is manufacring duplicate parts on a strictly anufacturing basis. Following are the ain specifications on their 2M horizonl type:

Spindle:—Crucible steel forging, nose 4 in. diam., 3½ thds. R.H. 11 B. & S. per; vertical adjustment of spindle in.

Spindle speeds:—12 changes in geometical progression from 20 to 180 r.p.m. ree sets of hand-change gears, and ur changes to each set of hand-change ars, operated by a lever on side of mane.

Table:—Working surface 37 in. x 1½ in. Oil pan 43 x 12½ in. Three slots ⅝ in. wide. Distance from top table to floor, 39 in.

Spindle elevating and traverse screws e equipped with dials graduated to usandths of an inch.

able feeds. 16 inches in geometrical ogression from ⅞ in. to 12 5-16 in. per nute, giving a range from .005 in. to 6 in. per rev. of spindle for small ils, and from .043 to .615 for large ils. Length of table feed = 28 in.

verhanging Arm:—Made of solid stl. Distance from centre of spindle under side of arm, 4¾ in.

rbor Support: — Greatest distance fm arbor bushing to nose of spindle, 2 in. Least, 12 in.

ise:—Capacity, 6 in. wide; 1⅝ in. dep; open, 3½ in.

loor Space:—At right angles to spindle, 81 in. Parallel to spindle, 103 in.

Weights:—Net, 7,800 lbs.; dimension of case, 8 ft. 0 in. x 6 ft. 8½ in. x 4 ft. 2 in. Gross, 9,070 lbs.; cubic contents, 223½ cu. ft.

Driving Pulley:—14 in. friction pulley, 5 in. belt, 409 r.p.m. Machine is designed to drive direct from main line, but countershaft can be furnished at additional cost.

Motor Drive:—A bracket is bolted to base of machine; pulley is substituted by a clutch gear, which meshes with pinion on motor shaft. Motor reg'd., 7½ H.P.

2V-Vertical Specifications

Spindle:—As before. Spindle speeds as before. Table as before. Dials on screws as before. Table feeds as before.

Spindle slide support made of solid steel. Traverse moment of spindle slide upright, 9 in. Greatest distance from top of table to spindle nose is 11½ in.; least, 1⅝ in.

Vise:—As before.

Floor Space:—At right angles to tables, 103 in. Parallel to tables, 81 in.

Weights as before. Driving pulley as before.

Motor drive as before.

NEW TYPE ELEVATING TRUCK

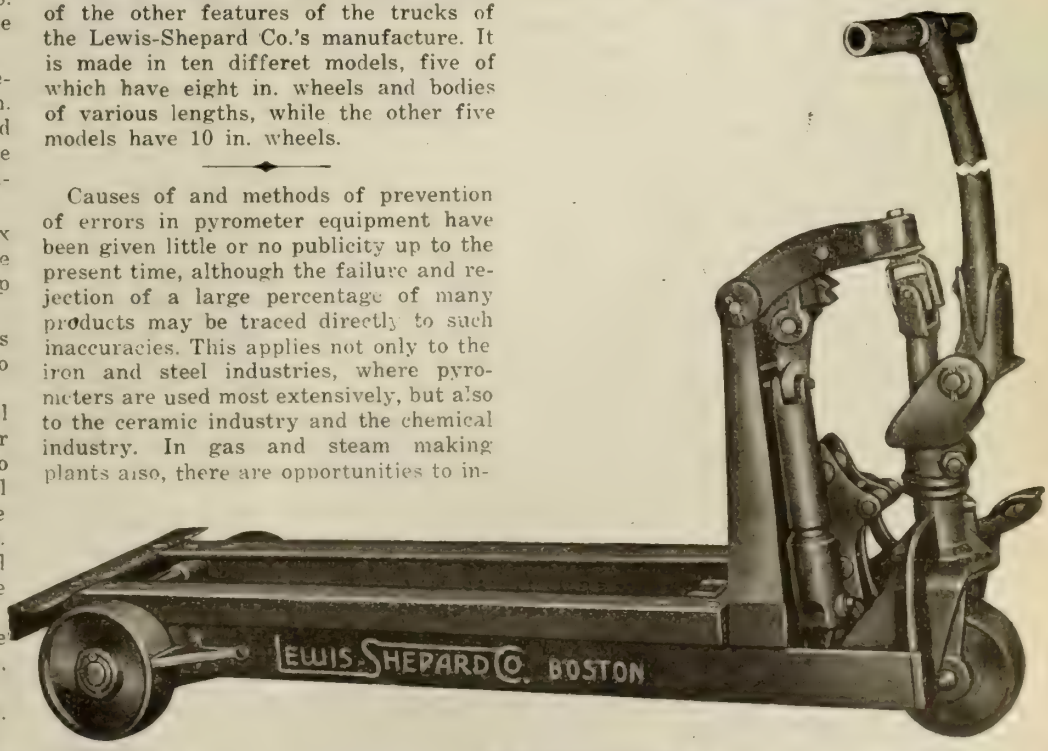
The Lewis Shepard Co., Boston, Mass., have brought out the type G "Jacklift" elevating truck. This truck differs from the type K truck, in that a greater lift of 6 in. is provided. This important feature is of great advantage when it is necessary to convey loaded platforms over steep inclines of the general nature frequently encountered in trucking work, to and from freight cars, etc. In addition to its high lift, this truck has all of the other features of the trucks of the Lewis-Shepard Co.'s manufacture. It is made in ten differet models, five of which have eight in. wheels and bodies of various lengths, while the other five models have 10 in. wheels.

Causes of and methods of prevention of errors in pyrometer equipment have been given little or no publicity up to the present time, although the failure and rejection of a large percentage of many products may be traced directly to such inaccuracies. This applies not only to the iron and steel industries, where pyrometers are used most extensively, but also to the ceramic industry and the chemical industry. In gas and steam making plants also, there are opportunities to increase efficiencies greatly by the use of pyrometers. Many of the most common errors found in pyrometer installations are due to simple causes which could be easily remedied if the user were acquainted with the necesary precautions to be observed in the installation and care of his instruments.

In a large number of plants the pyrometers are seldom or never checked. In many cases this lack of checking is because the user is not familiar with commercial checking methods and the necessity for using such methods.

These facts are brought out and thoroughly discussed in a new bulletin just issued by Leeds & Northrup Company of Philadelphia, entitled "Checking Thermocouple Pyrometers." It discusses the importance of maintaining standards and of checking in pyrometry. It points out sources of error and the remedies for troubles in thermocouples, millivoltmeters, cold junctions, and potentiometers. It outlines a commercial checking laboratory, including a special checking furnace, precision potentiometers and standardized thermocouples. This bulletin is distributed free and should certainly be in the hands of every manufacturer, the quality of whose product depends upon temperature control by pyrometric means.

SAULT STE. MARIE.—Opening navigation to the Soo last week, the earliest in 41 years, the steamer Pargny docked at Kemp's fuel dock. The steamer is the first of the fleet of winter storage wheat vessels from Georgian Bay ports scheduled to break through the ice in Hay and Mud Lakes. A great deal of ice-breaking was required.



ELEVATING TRUCK.

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An Estate That Shrunk

WHEN the Lusitania went down in May of 1915 one of the victims was Charles Frohman, reputed to be one of the wealthiest and most successful theatrical managers in the business. He was associated with enterprises, gigantic and spectacular, where millions were at stake.

At the time of his death he was spoken of as a millionaire, and his listed assets were put down as $919,383.

Almost four years later, when the appraisal was filed in the surrogate office, his actual net estate was put in as $452. In other words, his real financial wealth —or supposed wealth—had shrunk 99 per cent. Two brothers and four sisters will each receive $74 from the estate.

Frohman's presence was necessary to the well-being of the schemes he had under way. He had, apparently, no stocks or bonds, no life insurance or mortgages—none of the sure and safe forms of investment that work just as well after the investor has departed.

Men with dependents should always keep that before them in making investments that they count upon to yield earnings after they have gone. Get something that is just as valuable the day after your funeral as it is to-day.

What the Paravane Did

NOW that the British navy has completed the task that was set before it during the war, some of the "secrets" are beginning to come to the surface. Considering the efficiency of the German spy system the remarkable thing is that such remarkable appliances could have been applied to naval vessels without the secret going to the Germans.

There have been numerous stories—some of them very good ones, too—of how the British fleet was dealing with the sunken-mine menace. We have been told of mysterious grappling chains, of nets and of mysterious contrivances that gathered up the submarines and stacked them on the shore.

But the story is now out, and there is nothing mysterious or unreal about it. It was simply a case of pitting British brains against German deviltry, and in the contest British brains won. In fact, it looks as though the efficacy of the moored mine as a means of destruction had been largely discounted.

As we have said, the Admiralty equipped in the neighborhood of four thousand vessels of all types with the otter gear, and there is no question but that this vast programme paid for itself over and over again in the vessels which were saved from damage or destruction. Soon after the United States joined forces with the Allies, an arrangement was made with the Admiralty to permit the building of the gear in this country, and up to the time of the armistice several hundred vessels of the Navy and Emergency Fleet Corporation had been equipped.

A vessel was, or rather still is, engaged in the testing of paravanes after they come from the factory, for those vessels already fitted are still using their paravanes, and in all probability will continue to do so until all danger of mines has been removed.

The name of the contrivance probably gathers its first syllable from the Greek prefix "para," meaning "along side of," for that is just where the Burney gear was towed. Commander Burney was the inventor of the Paravane, and in some cases it is still referred to as the "Burney gear." The contrivance was first perfected in the naval yards at Portsmouth, England, in the dark days of the war when the mine and submarine were making it hard work for the Allies to keep their tonnage totals from going back rapidly.

The Paravane, described elsewhere in this issue, has won its place in the sphere of truly great things.

Staggering Totals

FIGURES that are being computed now in regard to the casualties of the war are so colossal in their aggregates as to baffle intelligent comprehension.

It may seem strange to make the statement, but it is a fact that the human mind gathers very little detail from the bare statement that over 7,000,000 men were killed in the war.

The figure is too big. It may be reduced by one who has a love for mathematical detail to the point where it might be a two-abreast endless procession.

There were mobilized by all the nations 59,176,864 men. Killed, 7,781,866; wounded, 18,681,257, and prisoners or missing, 7,080,580.

Civilian deaths were also large, especially in countries where whole territories were forced to flee before invaders, and where hunger and disease played havoc. In fact, figures used by the *Current History Magazine* give it that 9,185,329 deaths in civilian life were due either directly or indirectly to the war, making a total death list of nearly 17,000,000 people.

Mobilization is computed as follows:—

	Total	Killed	Wounded
Russia	12,000,000	1,700,000	4,950,000
France	7,500,000	1,385,300	2,675,000
British Empire	7,500,000	692,000	2,037,325
Italy	5,500,000	460,000	947,000
Serbia	707,343	322,000	28,000
Rumania	750,000	200,000	120,000
United States	4,272,521	67,813	192,483
Belgium	267,000	20,000	60,000
Germany	11,000,000	1,611,104	3,683,143
Austria-Hungary	6,500,000	800,000	3,200,000

In proportion to enlistment, Serbia was the heaviest loser for the Allies, with 45.5 per cent. Others follow in order:—

Serbia	45.5
Rumania	26.7
France	18.5
Russia	14.2
British Empire	9.2
Italy	8.4
Belgium	7.5
United States	1.6
Bulgaria	50.3
Turkey	18.8
Germany	14.6
Austria-Hungary	12.3

Changes Needed In Boiler Inspection Laws

(By T. H. FENNER, Associate Editor, CANADIAN MACHINERY)

TO get a clear conception of the possibilities of the order-in-council affecting the inspection of boilers in the Province of Ontario, it is necessary to look into the manner in which the law is at present administered.

This work comes under the jurisdiction of two different Government departments: one whose chief concern is carrying out the inspection of factories, under the chief factory inspector, the other the inspection of boilers under the chief boiler inspector. The work of each is apportioned as follows:

The boiler inspection department work comprises the supervision of preliminary design, the approval of plans, inspection during construction of all steam boilers of pressure containing vessels built in, or for use in the Province; all second hand boilers offered for sale for use in the Province, and all repairs to boilers that are to be used in the Province after repairs; all steam pipe arrangements in connection with these boilers have to obtain the approval of the chief boiler inspector.

The work starts with the plans of a new boiler. Any person who wishes to build a steam boiler for use in the Province must first submit the design to the inspection department. If the plans are satisfactory the chief inspector stamps them, and a register number is affixed, which is also stamped on the boiler when built. In this way it can be traced at any future date. During the construction the material is inspected, particulars of plate and stay steel submitted to the department, and the construction is followed through every step, until the final hydraulic test is made, and the boiler ready for shipment.

So far so good, but at this stage all control of the boiler passes from the boiler inspection bureau, and comes into the purview of the factory inspector's office.

The factory inspection board have as their duties the enforcing of the Factory Act, pertaining to the conduct of industrial establishments. The provision of adequate guards on gear wheels, belts, shafting, elevator shafts, etc., safety brakes on passenger and freight elevators, and safety gates on elevator shafts are among their duties, as well as seeing that punching presses, circular saws, groovers, planers, and such dangerous machines are properly protected. Sanitary arrangements in the factory and furnishing of adequate means of maintaining personal cleanliness of operators engaged in the dangerous trades, such as white lead manufacturing, are also in their line.

While making the inspection of the factory the inspector is also supposed to see that the certificate of inspection is in its place in the boiler room. He should see that it bears a date not more than one year previous to the date of his present visit. So long as this condition is fulfilled, the factory inspector is satisfied. Whether the inspection made was of any practical use or not does not worry him. Not being very familiar with boilers, he is in no position to judge on this point. The inspection may have been worthless, which is very often the case, and the boiler actually in a dangerous condition. This does not enter into the factory inspector's calculations. He is merely concerned in seeing that a certificate is in place. Very often it appears that he does not even satisfy himself on this point, as there are many cases where boilers have not received any inspection at all for many years.

The factory inspection branch sends out a form letter to manufacturers, containing a copy of the revised laws relating to boiler inspection. On the bottom of this is a polite sentence in black type. "Hoping to receive your Boiler Inspection Report." On the back of this letter, there is a form which is designated as an "unofficial form, which may be used as a guide for making out boiler inspection certificates," This form contains a number of statements covering a general description of the boiler and fittings. No mention is made on this form as to the percentage of strength of longitudinal seam, thickness of metal, or of any factor governing the safe working pressure. There is a line with the direction "Record safety steam pressure." The safe pressure is, evidently, what the engineer likes to make it. On the bottom of the form are these words: "I hereby certify that I have had charge of a boiler and engine for a period of over ..... Years, or hold a Stationary Engineer's certificate for the Province of Ontario, and that I have examined and tested by hydrostatic pressure and other tests the above boiler," and a line for the engineer's signature.

A Dangerous Practice

This is what the factory inspector, a person usually himself (or herself) ignorant of boilers, has to guide him in his opinion of the safety of the boiler. Not only this, but the form of the certificate encourages what is in fact a dangerous practice, that is the hydrostatic testing of a boiler by a person totally unfit to carry out such a test. If we accept the fact that very few engineers in the Province are competent to carry out an internal inspection of a boiler, it is a fact that still fewer of them are fit to carry out a hydrostatic test. A hydrostatic test carried out by a person not fully conversant with the principles of governing boiler construction, is very liable to hopelessly damage the boiler, and leave it in a dangerous condition, after which the tester cheerfully signs his name to a certificate recording the safe working pressure, which the factory inspection department accepts as perfectly adequate.

So we see that a boiler may be working under absolutely unsafe conditions, and the man firing it, the owner sitting in his office above it, the employees in the factory above him, and the Government department which should be looking after all their safety, all in blissful ignorance of the potential volcano in the basement. The department that is competent to regulate this matter, has had nothing to say about it since the boiler left the shop, or if it is an old boiler, never. If their attention is called to a boiler by some outside agency, and they find it unfit to work, they have no power to shut it down, except through the factory inspection department. The boiler inspection department notifies the factory inspection department, which thereupon takes steps to have the boiler closed down. These steps may take several days or perhaps weeks. If in the meantime there is a fatal accident, who is to blame?

No Exaggeration at All

The reader may be inclined to say that this is an exaggerated and alarmist view of the conditions. Let us see if that is the case. Two very recent cases will go to show that there is no exaggeration or striving for effect.

The first is that of a boiler working at 90 lbs. per square inch steam pressure. Inspection had been made at irregular intervals by the engineer operating the boiler. No insurance was carried. By some means an inspector of the boiler inspecting department was asked to make an inspection. He was amazed to find that the boiler was working at about double the safe working pressure. The boiler was about forty years of age, and made of iron with the double riveted lap joint in general use in those days. According to the department rules, which by the way are based on the rules of the British Board of Trade, the boiler had never been fit for a higher pressure than 60 lbs. per square inch even when new. Taking the facts into consideration, the inspector ordered the boiler to be put out of commission, or to be precise, recommended the factory inspection department to order it to be closed down.

Continued on page 390

MARKET DEVELOPMENTS

Firms Are Buying for Stock at New Prices

Canadian Firms Coming Into the Market More Readily Than For Some Time Past—British-Made Iron Finding It Hard to Compete With New U.S. Prices

ALTHOUGH the American market seems to be considerably disturbed by the attitude of the director-general of the railroads in refusing to acknowledge the new steel schedule and make purchases accordingly, this feeling is not reflected in the Canadian market. Buying of stock supplies is being undertaken on a larger scale here than for three years past. As a matter of fact, it has been impossible to buy for stock for a long time, but even since the signing of the armistice none has been done. The trade here apparently thinks the last announced prices will stand for some time. Warehouses are placing good sized tonnages of plates, etc. Manufacturing concerns are in the market for car lots of tubes, a thing that has not happened here for some time.

Some slight price concessions are also noted in the matter of chain. There are several similar lines that refused to make any announcement on the 21st of March as to price reductions, but most of them are gradually falling in line, and new lists reflect the drop in steel and iron.

There are no reductions in sight for small tools such as reamers, etc. In fact there are indications that in some cases increases may come before decreases. All these lines are still away above the prices of pre-war days, in some cases as much as two and three times the former price.

Pittsburgh advices tend to the belief that buying is not brisk in the steel trade; in fact, it is far from that, and one of the chief pastimes is casting about for a satisfactory explanation. It is stated in many circles that the attitude of hostility displayed by Director-General Hines toward the new prices is the cause of the trouble. This line of argument does not hold all the way through, because there was plenty of time for the general public to come in and buy all the steel it wanted long before Hines made his stand known, for it was days after March 21 that he announced his hostility to the new schedule.

English made lines of iron and steel are having a hard time trying to get established once more in the Canadian market, owing to the difference in price of competing American lines. The Old Country prices seem to have a tendency to move upward, while there have been all-round reductions in the selling figures of American products.

MONTREAL BUSINESS IS DUE TO IMPROVE AS NAVIGATION OPENS

Special to CANADIAN MACHINERY

MONTREAL, April 17.—Renewal of industrial operations on a pre-war basis is still more or less hindered by the delayed progress in the price adjustments from a war to a peace level. Many factors combine to make the problem a complex one, but little prospect of business revival can be expected until present controversy culminates in a satisfactory solution, so as to permit of reliable action being taken by those who are awaiting a definite announcement regarding a price that will be acceptable to all concerned, and on which they can base their future operations.

In general, business in this district is of fair volume and the character is apparently satisfying to manufacturers and dealers. The passing of the winter and the opening of the lakes and rivers has invariably been a signal of better times, and this year is no exception. Machine trade is not brisk, but continues steady. Old materials are again quiet after a brief period of prospective activity. Little can be said of metals, other than that the situation has developed few changes and the general demand is quiet. Speculation is shown as to the possible effect of May Day on the labor situation. Some uneasiness is felt, but hope is expressed that the amount of labor available will act as a check on strikes generally.

Business Still Deferred

Despite the fact that steel prices are gradually resuming a position more in keeping with present conditions and demands, business activity has not shown any marked tendency to increase in volume. The controversy that is still going on in the States regarding the fixing of prices, has naturally had its effect on the Canadian situation, the consequence being that the trade are in a retrenching mood regarding the buying of material for contemplated expansion or development.

Dealers here are patiently awaiting decisive action, and are uncertain as to the attitude that will be taken by the American authorities on this matter. It is not altogether improbable that restrictions will be removed, thus leaving the situation open for general trading on a basis where competitive prices will pave the way for a steady return to normal domestic business. A factor that will have to be taken into consideration with an open market, is the labor situation, as keen trade competition would eventually result in a lower wage scale than that prevailing at the present time. This is a phase of the industrial situation that will require careful handling to minimize dissension in the ranks of labor. Local trading is taking on a more encouraging aspect, due largely to the early opening of navigation, which is expected within the week. This is a period of the year when added activity is a feature, and dealers are looking forward to considerable increased business.

Few Sales But Good Inquiry

Business in new tools is still of a quiet

character, although good inquiry is reported. Efforts have been made recently to increase the interest of buyers in new machinery, but as yet this has not developed into any heavy sales. General activity, however, is quite satisfactory, as a fair volume of used equipment is still moving, with supply requirements about normal. It is again rumored that a large munitions plant here may be utilized for the manufacture of motors and tractors, but nothing definite will be announced until final settlement has been made with the American Government regarding recent shell contracts.

Old Material Quiet Again

The slight revival that was apparently anticipated from the better tone of last week's market, has again subsided and the situation has taken on its previous dullness, with dealers here awaiting further developments. Some increased buying on the part of dealers has been noted, but this was discontinued when the demand again fell off. The present situation is one where uncertainty prevents any heavy buying, and local activity is confined to immediate requirements. Conditions in the States are still unsatisfactory, and steel interests are still negotiating with the Government for a mutual understanding between the producers and the trade. Until a better working basis is established the scrap market, like that of steel, will feel the effects of pending adjustments, with little trading in the meantime. Dealers here report a quiet week, but are holding firm to quoted prices. No changes are effective this week.

BUYING NOW FOR PUTTING IN STOCK

Bigger Volume of Business Moving—No Lower Prices for the Supplies

TORONTO. — Warehouse interests claim that they are doing as much business now as they were a year ago, and it must be remembered that a year ago those engaged in the steel business had so much on their books that they were not able to get out and chase any new credits. It is a fact that warehouses are buying for their own wants now for the first time in two and a half years. During the course of the war, at least during the latter part of it, warehouses were not allowed to come into the market for the purpose of buying stock. For some time past they have simply been taking such business as comes and sending it on to the mills. Now they are stocking good sized shipments.

A number of the manufacturing concerns in the Dominion have started to buy. One Canadian dealer gave it as his opinion that the situation at present in the United States was in the hands of the steel concerns, and not of Director-General Hines of the U. S. Railroad Board, who refuses to buy at the present prices. The railroads can no more get along without buying steel than they can operate their dining cars without buying meat and potatoes, and it is only a matter of time until orders will have to come from the roads, either through the director-general or some other source.

The American situation is not being reflected in the Canadian market, as some of the large concerns in this country are out making purchases, apparently satisfied that there will be no lower prices for some months to come. One large shop placed specifications to-day for car lots of boiler tubes.

A slight reduction is noted in the price of electric weld and fireweld chains. It has not been announced yet but will work out at about one cent per pound. Chain is the same as tubes and other articles that stood pat when the new steel prices were given out. They are seeking a lower level. The belief seems general that prices are not going to be lower on a good many of the standard lines for some time to come.

Old Country goods are slow to get back on the Canadian market and it looks as though the price were having a good deal to do with the failure. While prices of American and Canadian steel show a tendency to come down in price, the Old Country material is going the other way. This can be illustrated by taking two standard makes of iron that have been sold in Canada for some time (imported). Lawnoor iron is an old Country product of good quality, and is in demand for boiler stays, chains, hooks, etc. It used to be sold for four to five cents per pound, and now it is holding a warehouse price of 10 cents per pound. After the armistice it receded slightly but has since come back to the ten cent mark. "Rome" iron is a well-known American product which is now selling at 8 cents per pound. Before the war the price was almost identical with "Lawmoor." The U. S. product has come down in price while the English has increased. In fact English prices show no tendency at all to come down to within shooting distance, with the result that little business is going to Old Country concerns from this country.

Supplies are Firm

Dealers in supplies state that they hear of nothing that would indicate any coming down in prices. In fact all the war prices have been maintained in the supply business and there is talk now of using these war levels as a start and building from them. The business of finding the selling price of any article is still quite a mathematical problem. Take, for instance, a side milling cutter that is listed at $15.05. Add to this a fixed "increment" of $8.50. Then add another $8.50, and after that is finished start again and put on another $4.25. This refers to American goods being sold in this country, so there is 40 per cent. added to the price, which makes a grand final total of $50.82. Now just to show that there are plenty of things to keep folks engaged even if the war is over for the present, American makers, on the 25th of March, put drills up ten per cent. Dealers are not talking any lessening of prices in any of the lines of supplies. In fact they seem certain that in some cases there will be increases.

Fair Volume of Business

Machine tool dealers state that they are pleased with the way in which business is coming, and they see in the circumstances indications that buying is getting better, and that orders that have been held back must soon come out into the open, where they will have a chance to convert them into real business. There are sales being made of wood-working equipment. In fact if anything this line just now is better than the metal working end. Firms handling motors are also doing a good business.

POINTS IN WEEK'S MARKETING NOTES

New York reports that the feeling among buyers is that the prices of machine tools are too high, and they are staying out of the market until reductions are made. Reductions since the first of the year have amounted to 5 to 10 per cent. with the exception of shapers and planers, which have gone down about 15 per cent.

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The American machine tool market is anxious to see the war machinery absorbed as quickly as possible, as it is a disturbing feature in the market.

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There is a feeling in Canadian centres that steel prices are reliable for some time to come, and buying is being started on a larger scale, several car lots being on order by firms that have not bought for stock for over three years.

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There is a tendency towards higher levels in the scrap market, although dealers do not feel justified yet in naming higher levels locally.

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English steel and iron are having a hard time getting a place in the Canadian market owing to price difference. British prices are going up, while U. S. prices of competing lines are coming down.

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Drills, taps, reamers, cutters, etc., hold their war-time price, and indications are that lower prices are not going to come for some time.

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Pittsburgh reports that orders received now at the steel mills are very small when compared to the volume that has been placed in recent years.

WAITING FOR PRICES TO LOWER BEFORE MAKING THEIR PURCHASES

Special to CANADIAN MACHINERY

NEW YORK, April 17.—Machine tool builders report that they are doing a fair business in the Chicago and Detroit districts, but comparatively little in the East, especially during the past two weeks, when the controversy in Washington between the Railroad Administration and the Industrial Board of the Department of Commerce has helped to intensify the hesitation among buyers. There is no denying, also, that prospective buyers of machine tools have made up their minds that present prices of tools are too high, and the most persuasive arguments of tool sellers are of little avail in closing business when the buyer is convinced that by waiting a little while he will get a lower price. Reductions since the first of the year have been moderate on most lines, not exceeding 5 or 10 per cent. as a rule, though greater reductions have been made on a few lines, notably planers and shapers, which have been reduced 15 or 20 per cent. In nearly all lines, however, there are machine-tool builders who have ignored reductions by their competitors, and are quoting the same prices that were in effect when the war ended. In defense of present prices these tool builders say that their prices were never raised inordinately, but only enough to cover advancing costs of labor and material, and as labor, constituting about 80 per cent. of the cost of precision tools, has not been materially lowered, these tool builders argue that they cannot, under present conditions, make reductions. Furthermore, many tool builders have been building tools out of material bought before the war ended and consequently they have not yet gotten the benefit of lower pig iron and steel prices.

If all of the inquiries now pending were to be immediately transformed into actual orders the machine-tool trade would have little to worry about for some months to come, but buyers are in no haste to act upon their inquiries. Hundreds of tools have been inquired for in the New York market in the past thirty days which have not been bought.

Waiting for the Peace Treaty

Export business shows no greater progress than domestic business, but there are indications that it will open up shortly after the peace treaty is signed. By that time it probably will be possible for foreign Governments to negotiate loans in the United States with which to finance purchases. A representative of a Belgian machinery concern which before the war handled German tools almost exclusively, has been in this country for several weeks and has obtained the agencies for several leading lines of American tools. His statements to machine-tool builders that German tools will not be handled in Belgium for many years to come, if ever, is encouraging. Before the war American tool builders found it difficult to meet the competition of the German machine-tool trade in countries contiguous to Germany because of the lower prices quoted on German tools.

Machinery dealers who are members of the National Machinery and Supply Dealers' Association met in Washington on Friday to discuss with the Director of Sales of the War Department the plans arranged for the disposal of Government-owned machine tools bought for war plants. There are hundreds of new tools, some of which have never been uncrated, which will be turned back to the manufacturers who built them, but in case any manufacturer refuses to take back his own tools they will be placed on the market. All used tools will be sold through dealers. A dealer will be selected in every district as a Government agent, and he will offer the Government tools for sale, receiving as his commission 7½ per cent. of the sale prices. The selling prices are to be fixed by the Government by appraisal. It is understood that there are some machinery dealers who object to the plan because it will not give them as large a profit as they receive on their regular lines of new tools. The Bureau of Aircraft Production, which hasn't as many tools to dispose of, is adopting a different method. It is sending out lists of tools which are for sale, many of these tools still being in use on airplane work. One list just issued covers about 50 or 60 tools at the plant of the Union Switch & Signal Co., Swissvale, Pa. Unquestionably the sale of the Government tools will be a somewhat disturbing market influence, and the trade will welcome action which will dispose of this equipment as quickly as is possible.

Buffalo.—One of the most spectacular launchings ever seen in Buffalo took place yesterday afternoon, when the steamer Lake Fugard was dropped over. The launching was a success in every way.

CHANGES NEEDED IN BOILER INSPECTION LAWS

Continued from page 387

The second case was one in which the conditions were reported to the inspection department by an inspector employed by a private company. A letter was despatched to the boiler owner advising him of the dangerous condition of his boiler. This gentleman replied that everything seemed to be in as good shape as at any time within the last few years, but that in any case some extensive alterations were in contemplation for the near future. He further stated, that a boiler maker had looked the boiler over, and assured him it was all right. The boiler inspection department then took the matter up with the factory inspection branch, with the result that the boiler was shut down after some delay. Every minute this boiler was working there was a risk.

Over and above this, in spite of the law, there are many boilers throughout the Province that have never had any inspection, even an incompetent one. This is a condition that should not be allowed to exist and need not be.

The boiler inspection department should have control of all boilers in the Province, if it is to carry out its work to the best advantage. By this it is not meant that the department should carry out the actual inspection, beyond the inspection during construction. The report of the inspection, if carried out by a competent man, would keep them familiar with the condition of the boiler from year to year, and they could tell at once from the report whether it had been made by a competent man or not. They should have the power to take summary action in any case where in their opinion it was needed, without waiting to refer to any other department, or any red tape of any kind.

The work carried out by the boiler inspection department is, as far as it goes, excellent. It should be carried out to its logical conclusion. They should have a complete record of every boiler in the Province, not only up till the time it leaves the builder's hands, but during every year of its life.

The Government and public could then hold the boiler inspection department directly responsible for the safe condition of every boiler in the Province. As things stand now, it is quite possible for a boiler to be working in a dangerous condition, and the boiler inspection department having no means of finding out. Where the boilers are insured, the chief inspector gets a report of their inspection, which is fully detailed, and allows him to form a reasonably close opinion of conditions. Where the engineer carries out the inspection, the report may be valueless. There may be other cases where no report is made, and no inspection carried out. The factory inspectors should see that such cases are promptly reported, and not allowed to go on from year to year, as many have done in the past. We have heard of a factory in a city, not a rural town, that had never seen a factory inspector since they had been in business.

THE WAY OF PRICE REGULATION IS A VERY HARD ONE JUST AT PRESENT

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., April 17.—The finished steel market is absolutely stagnant. The flow of orders after the price reductions that became effective March 21, soon subsided, showing that not a great deal of business had previously been held back in anticipation of the price reductions. The average of buying since March 1 to date has been much less than the average during January and February. Why the market should not become more active instead of less active is very diicult to understand. Of course the matter of price enters, but still there is always a considerable volume of business that is placed, irrespective of price. Equally difficult to understand is the high rate of operation that the mills maintain. In point of percentage of capacity the production may not seem heavy, but the case is different when one reflects that present capacity is 40 per cent. greater than capacity in 1914, being now fully 49,000,000 tons of steel ingots a year, against 35,000,000 tons in 1914. Actual production in the two best years before the war, 1912 and 1913, was only between 30,000,000 and 31,000,000 tons. Yet below are given annual rates of production in the past three months, computed from the monthly reports of the Institute, covering the output of 30 companies reporting monthly, which made 84.03 per cent. of the total steel in 1918 together with the percentage of production to capacity, taking the latter at 49,000,000 tons:

	Tonnage rate	Percentage
January	42,000,000	86.9
February	41,700,000	85.1
March	37,900,000	77.3

The present rate is about 70 per cent., or 34,000,000 tons, but that is a rate 10 per cent. greater than the best output in a year before the war. Practically complete statistics of steel ingot production in 1918 are now available, making the following comparison:

1905	19,463,180
1910	25,154,087
1915	31,284,212
1916	41,401,917
1917	43,619,200
1918	43,027,000

Price Uncertainties

Steel producers naturally take the position that the present abstention of the public from buying is due to the controversy in Washington over prices, between the Industrial Board and the Railroad Administration, but the public had an opportunity to buy at the price reductions of March 21, before it became known that the director-general would not pay them, and the public did not do so to any great extent.

There is no possibility of the director-general "accepting" the new steel prices. He has made it clear that he regards them as altogether too high, and he has also expressed disapproval of the idea that it is for best interest of the country for the public to be encouraged by announcement that prices will not be reduced for the remainder of the year, to buy at these prices if they are too high.

That the prices are very high is obvious. The Government prices were not especially high, in the circumstances of the war, but now conditions are different. There were heavy taxes, and when the war ended large sums had to be written off for various adjustments. By the time the Steel Corporation was through with its adjustments it had only $199,000,000 to report as regular earnings for 1918, this being about one-fourth more than the best showing before the war. The corporation's total profits, however, from which various deductions had to be made by reason of the war, amounted to some $550,000,000, and it may readily be computed that if in 1919 its total profits were one-half as much, or $275,000,000, its taxes would be about $57,000,000, leaving, after paying subsidiary bond interest, about $10,000,000 more than the earnings shown for 1918. As the 1918 profits were made at Government prices, with shipments at 88 per cent. of the present capacity, it can readily be seen that large price reductions can be made and leave very substantial earnings, provided there is anything like full operation.

Acid Electric
STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

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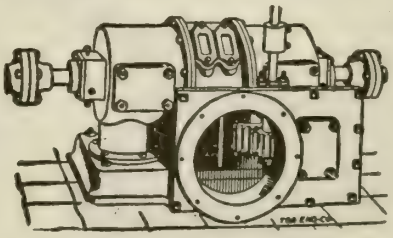
WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

The difficulty in this whole price controversy is simply this, that relatively light production is expected and large profits per ton are desired in order to pay the overhead. Thus the statement has been made that it cost $46 a ton to make Bessemer rails in January, and no doubt it did, but a very considerable part of the $46 was overhead, for the Bessemer rail production was very light.

The steel producers are now very much divided in attitude as to prices. Some, of course, hold that the director-general is wrong in his contention, and that he has done much harm in refusing to endorse the proposed prices. Others, however, and a rapidly increasing number, rather take sides with the director-general, and as price stability seems now out of the question, favor an open market as the quickest and best way to get business started. Those who want an open market are the optimists, in that they believe it is possible to get business going again. Those who want to maintain prices, however optimistically they may talk, are pessimists, believing that conditions are such that business cannot be stimulated and that it is better to get as large profits per ton out of the business that must be placed from day to day, no matter what the price.

Pig Iron

The blast furnace interests were not satisfied with the Industrial Board adjustment of prices, feeling that steel products were not reduced nearly enough in proportion to the pig iron reduction of $4.25, which they computed was 14 per cent. Since then the dissatisfaction of the merchant furnaces with attempts to regulate the market artificially have greatly increased. The merchant furnaces want an open market, as they had practically all the time before war time Government price regulation came. They had their good years and their poor years and they are willing to average up now as they did in the past. Their costs are high and they feel the way to get costs down is to blow out, which the furnaces are doing now in increasing numbers.

It may be asked why there is not an open market in pig iron if the furnaces want one. Possibly there is already. One can only ascertain by inquiring for a reasonable tonnage, and of such inquiry there is none.

The Lake Superior iron ore interests are reported to be dissatisfied with price regulation. Their trouble is that the fancy freight rates on ore from mine to lake dock have not been reduced. They are blamed with asking high prices for ore. at Lake Erie dock, when a large part of the cost is freight, and the ore roads stand to make very large earnings, which will go into the Railroad Administration's revolving fund and help to make good the lighter earnings of other roads, under the Government guarantee as to earnings.

BUYING OF SCRAP CAUSES THE PRICES TO START ON UPGRADE

THE scrap market continues to show strength over most of the country. Some large purchases have been made which have had the effect of boosting prices. Following are the reports from various U.S. centres:

PITTSBURGH.—Heavy buying by the Carnegie Steel Company has had the effect of stiffening prices in many grades, although their purchases were mostly heavy steel. Cast borings have gone from $12 to $14, while heavy breakable cast has risen from $16 to $19. The strength shown in these grades has the effect of stiffening the price in other grades. The Carnegie Company bought about 15,000 tons.

NEW YORK.—The demand for heavy melting steel and wrought material here has resulted in a still further advance in price of about 50 cents. The Government was a purchaser of shell steel to the amount of 15,000 tons, the material being sold as scrap. There has been a slight advance in machine shop turnings. Heavy melting steel is selling at $12.50 to $12.75.

PHILADELPHIA.—The market on the whole is quiet. Wrought material and clean cast borings have undergone a slight advance, wrought pipe selling at $18 to $19, and cast borings at from $13 to $14.50 delivered. There is very little demand for steel scrap. though during the past three weeks this grade had much interest shown in it.

BUFFALO.—While there is a brisk enquiry for all grades on the list, sales have been light. It is believed among dealers that it will be but a short time till the real buying movement starts. Low phosphorus is quoted at $21 and $22, and No. 1 railroad is up to $19 and $19.50. Stove plate grade is quoted at $18 50 to $19.

CLEVELAND.—The decision of Railroad Director-General Hines has resulted in a softening of the market. Offers to sell are coming out in abundance with few looking to buy. Heavy melting steel has gone back to $15.75, while No. 1 bushelling has gone to $15.50. Dealers are of the opinion that it will take three or four weeks to develop a buying market.

CHICAGO.—There has been a good demand for heavy melting steel, one of the large cousumers in this district having offered $16 a ton for a large amount around 2,000 tons being sold at this figure. The list on the whole is higher than last week. The railroads are offering fair amounts, one road offering more than 6,500, including 1,150 tons of No. 1 steel rail.

CINCINNATI.—The market here is laying low, with a marked scarcity of transactions. While it is thought by some dealers that prices will not go any lower, they are not showing the courage of their convictions by laying in stocks. Demand for heavy melting steel is slack.

BIRMINGHAM.—With no demand for heavy melting steel, and old contracts for other scrap being completed, there is almost a complete cessation of business.

MR. OSBORNE HAS RETIRED FROM C.P.R.

Has Had a Long and Successful Career in Mechanical Departments

H. Osborne, after a service of about 36 years in the employ of the C. P. R., has retired from active participation in the affairs of the company. Mr. Osborne started with the Canadian Pacific in 1883 as a charge hand, and after a term as foreman, was appointed to the position of general foreman in 1895. In 1902 he was made master mechanic, and two years later was appointed superintendent of the Angus locomotive shops. In 1912 he was promoted to assistant superintendent of motive power. In 1914 he was again promoted to the position of assistant mechanical superintendent at Montreal, and the following year was appointed works manager of the Angus shops, a position he held until his retirement. On this occasion he was presented with an illuminated address and a purse of $2,000 in token of the esteem in which he was held by all his associates.

SCOTIA WANTS TO GET COAL TRADE

MONTREAL.—A report is being circulated, and apparently it has originated in the United States, that a deputation from the Nova Scotia Federation of Miners will soon confer with the Government authorities at Ottawa upon the feasibility of placing an embargo on United States coal.

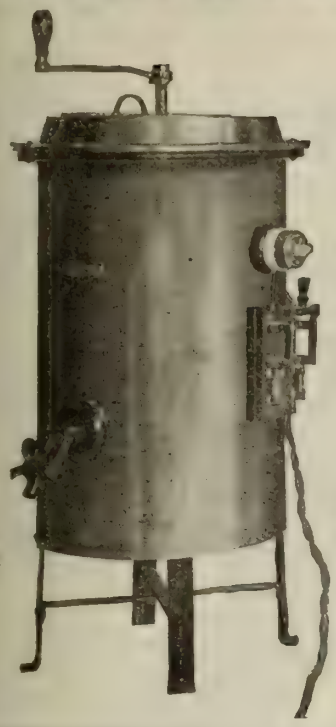
Local people who are interested in the present Nova Scotia coal situation state that there is apparently no foundation for such a report being circulated, as such an embargo would not only be impracticable, but unwise.

On the other hand, according to local opinion, it might not be impossible that a higher preferential tariff be asked, in order that the Nova Scotia people would be better enabled to get back their business lost during the war with ports on the St. Lawrence. This business since the beginning of the war has gone largely to American operators.

The present duty on soft coal coming from the United States is something like 53 cents per ton. If this were raised, the situation in Nova Scotia, according to the belief, would be immeasurably improved thereby.

It has been estimated that the petroleum beds in the United States will be exhausted in about twenty years' time and much attention has been paid to the use of the vast deposits of oil shales throughout the country.

Aikenhead's Electric Glue Heaters



Steam plants being closed down, quite a number of pattern shops are using Electric Glue Pots.

Glue has the greatest sticking strength when maintained at a temperature of 145 to 150 Degrees Fhr.

It's easy to maintain this heat with "International" Electric Glue Heaters. They operate on dry heat, utilizing every bit of heat generated because conserving it on the fireless cooker principle.

There is no evaporation of water or glue —therefore no waste. There are no burn-outs from evaporation of the bath because no water is used in these heaters. More of the glue is wasted because the electric dry heat principle prevents the formation of skin, scum or dirt on the glue.

Cost of operation is bent a trifle.

Less current than an electric flat iron consumes is ample to operate 13 one-quart Electric Glue Heaters.

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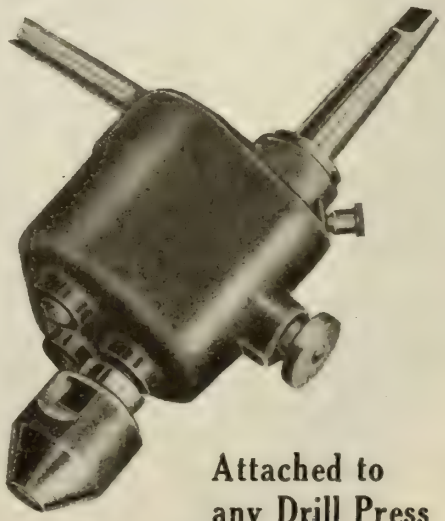
For Woodworking and Pattern Shops

AIKENHEAD HARDWARE LIMITED, 17, 19, 21 Temperance St., Toronto

The Advantage of Hand Tapping plus Drill Press Speed

Aikenhead's Wahlstrom Attachment



The oscillating movement mechanically imitates hand-tapping, though 10 times faster, and reduces tap breakage to the very minimum.

And the Wahlstrom attachment is accurate. It taps holes as squarely as they could be drilled.

It is powerful, durable, and trouble proof.

Constructed of hardened and ground steel parts throughout, and has nothing whatever that can get out of order. Takes taps of all sizes up to ½ inch.

Sent on trial. Money refunded if you are not satisfied.

Write for bulletin.

Attached to any Drill Press will quickly Pay its Cost

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SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	. 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	. 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$19 00	$20 00
Electro copper	18 50	19 00
Castings, copper	17 25	19 00
Tin	60 00	58 00
Spelter	9 00	8 50
Lead	6 75	7 50
Antimony	8 00	8 50
Aluminum	35 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	8 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 00	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	14 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

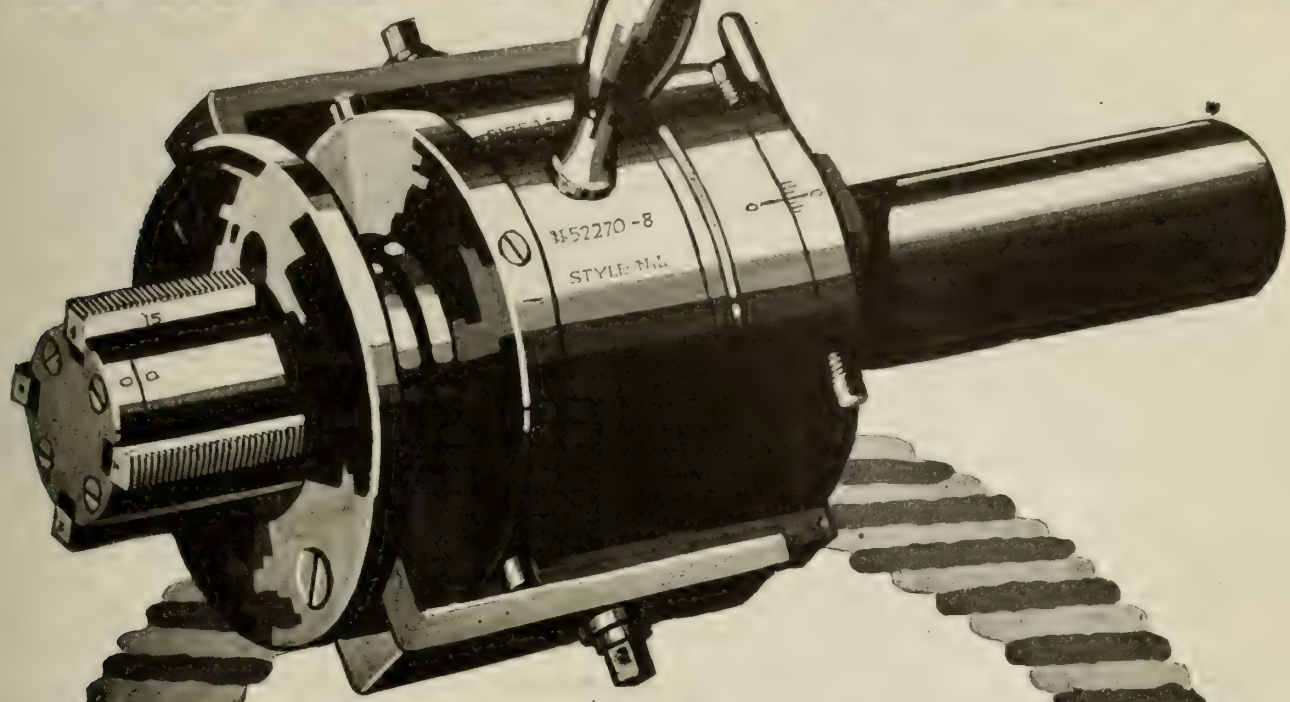
ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

GEOMETRIC



The Tap Famous For Good Work

Geometric Collapsing Taps share the popularity of Geometric Die Heads. They have the same good reputation for tapping inside threads that the Die Heads have for cutting outside threads. All objections of a solid tap are overcome in the Geometric Collapsing Tap. They are as rigid as solid taps while cutting, but collapse the chasers automatically when the required depth of thread has been cut. Are adaptable to Screw Machine, Turret Lathe or Live Spindle. Made in sizes suited to any diameter above ¾-inch in straight threads or standard pipe thread sizes.

Write for the Geometric Collapsing Tap Booklet.

The Geometric Tool Company

NEW HAVEN, CONN., U.S.A.

Canadian Agents:

Williams & Wilson, Ltd., Montreal.

The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 25
Sheets, black, No. 10	5 15	5 25
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head.28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 85
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	29 99	.....
1½ in.	32 00	28 00
1¾ in.	32 00	28 00
2 in.	36 00	28 00
2¼ in.	40 00	30 00
2½ in.	41 00	35 00
3 in.	47 00	40 00
3¼ in.	.....	47 00
3½ in.	57 00	48 00
	65 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	.....
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to	.65
Copper	.38 to	.45
Tin	.70 to	.70
Zinc	.18 to	.18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

The Specifications Call For .0001±

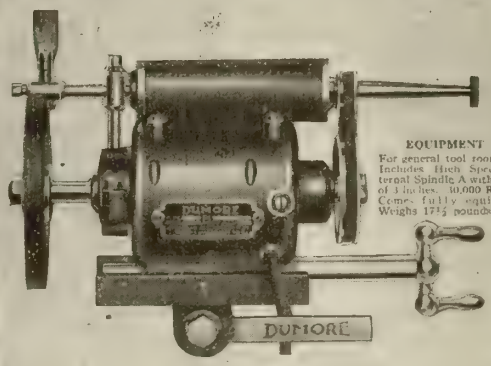
SUPPOSE you were studying the specifications for a big job—one that called for making new and expensive tools—would your present tool-room equipment let you handle it? There are only two kinds of tools—the good and the poor—there's no half-way mark. And the quality of your output is fixed by the degree of accuracy you can obtain in your tool-room.

Accuracy in grinding depends upon correct cutting speed and perfect running balance. That is why the **DUMORE** grinder has been given speeds ranging from 10,000 to 50,000 R. P. M., along with a dynamically balanced armature. With this tool in your shops you can eliminate chatter, taper or bell-mouthed grinding. Then, too, the **DUMORE** is portable, easily carried to all parts of the shop and quickly set up in any machine ready for use.

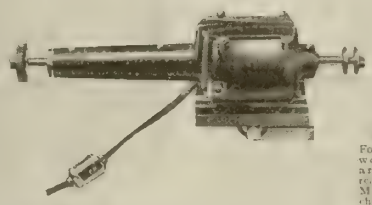
If you are interested in obtaining only the best tools, ask your dealer about the **DUMORE** grinder. If he doesn't carry it, write us for literature and prices.

WISCONSIN ELECTRIC CO.

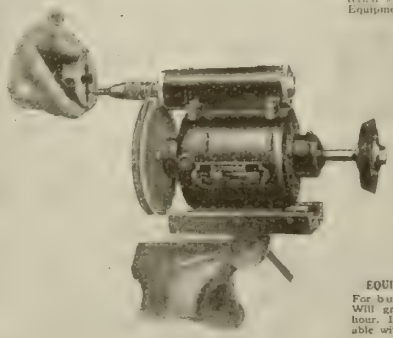
2910 16th St. RACINE, WIS.



EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches. 10,000 R.P.M. Complete fully equipped. Weighs 17½ pounds.

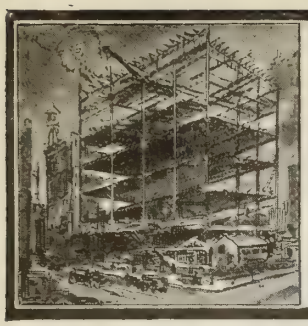


EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 70 an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

SARNIA.—Preparations are practically complete to begin at once the construction of the Metropolitan Theatre on the east side of Christina Street, just south of Lochiel Street, on the property commonly known as the Bell property, occupied at present by a livery barn. The building is to be erected by the United Theatres, Limited, who have ample capital at their disposal.

TORONTO.—When the votes for peat investigation came up in the local house, Hon. Mr. Ferguson stated that as a result of the co-operation of Dominion and Provincial authorities it was hoped to place about ten thousand tons of peat fuel on the market this year. Little work had been done last year, but he pointed out that one of the new machines was ready to be put to work early this spring.

ST. THOMAS.—The building permit has been issued by the city engineer for the construction of the mausoleum at the St. Thomas Cemetery. The entire cost of construction is estimated at $45,000 by the builders, the D. W. Mitchell Co., of Toronto, and the work will be commenced immediately. The company will use all the local material and labor they possibly can, which in the case of the latter will undoubtedly be quite large.

PERSONAL

William Bischoff is resigning from the position of assistant general superintendent of the Dominion Iron and Steel Co., to accept a similar position with the Lukens Steel Co., of Philadelphia. Before joining the staff of the D. I. and S. Co., Mr. Bischoff was superintendent of furnaces for the Bethlehem Steel Co.

Capt. Samuel Cranged, shipbuilder and master, of Toronto, passed away at his winter home in Los Angeles after a short illness. His wife was with him. Deceased was 80 years of age, and was one of the oldest masters on the Great Lakes. He was superintendent of the St. Lawrence & Chicago Steam Navigation Co., and spent thirty years of his life building steel freighters, comprising among others, the Rosedale, G. R. Crow, W. D. Matthews, James Carruthers, and J. H. C. Hagerty. The body was brought to Toronto for burial.

A very wide circle of friends will learn with sincere regret of the death which took place in Los Angeles of Mr. John H. Hall, head of the John H. Hall & Sons Company, of Brantford. Mr. Hall left with his wife a few weeks ago on an extended trip to the West, and the first intimation of his illness came through on the wire to his sons. Leslie Hall immediately left, catching a train at Waterford, to attend the bedside, and it was the following morning that the sad message telling of death came through. The late Mr. Hall was in his 65th year, and had resided in Brantford for over 40 years. His firm had taken a considerable part in war work and he was off to the West on a vacation, leaving here in the best of health. Death was due to heart trouble. The deceased was a member of Harmony Lodge, I.O.O.F.; Reba Lodge, A.F. & A.M., and the Canadian Order of Foresters. He was a devout attendant at the Park Baptist Church, in which he was a deacon. Besides a widow, four sons are left to survive: Leslie, Reginald, Ernest and Wilton, all resident in this city. The funeral arrangements have not yet been completed.

TRADE GOSSIP

Removal Notice—Ogden R. Adams, Rochester, N.Y., takes pleasure in announcing that he has removed his showroom and office from 159-161 St. Paul St., to 244-246 St. Paul St., Rochester, N.Y. The new location affords very much larger show-room space and more commodious offices, and is located on a prominent corner in the centre of the city, facing the New York Central Railroad, where he will be pleased to receive his friends.

Get After Trade.—There is every possibility that future trade development between Canada and European countries will assume considerable proportions. While there are at present nearly two hundred representatives of Canadian firms in Europe, it is the opinion of Lloyd Harris, chairman of the Overseas Trade Commission, that small manufacturers should organize, with the object of sending agents abroad, for the purpose of obtaining business that would be lost if prices and samples have to be forwarded.

On Adjustment Work.—Lieut.-Col. H. Albee and Major Sidney R. Underwood have been named by Secretary-of-War Baker as the "Canadian contract assessors," provided for by the Canadian Government in the organization of the Imperial Munitions Board. The two officers will act as the representatives of the United States in the settlement of war contracts which were placed in Canada. Lieut.-Col. Albee is well acquainted with the situation in this country, having been in charge of the U.S. Ordnance Department office in this country for some months.

Trade With Poland.—The Polish National Department is urging Canadian interest in the trade of Poland. It believes that the country will shortly be sufficiently settled to afford a good field for foreign enterprise. It confidently expects to get the port of Dantzig, to which it has given again the old name of Odansk. The Commercial and Industrial Bureau of the Polish National Department informs the Canadian Trade Commission that there are large opportunities in the development of the Polish coal mines, water power and sugar beet industries. The coal output of the territories expected to form the new Poland in 1911 equalled one-half of that of Pennsylvania. Bolshevik influence, the bureau asserts, is almost certain to be absent.

A Huge Reservoir.—The Admiralty have recently completed at Rosyth, the Scotch naval base, a large oil reservoir for the storage of oil fuel for the use of war vessels in the Firth of Forth. The reservoir is built of concrete on a rock foundation, the site being the bed of a sandstone quarry, from which stone was quarried for the purpose of building the new dockyard. The use of concrete in this class of work is considered a novelty. The amount of concrete placed in position amounted to 98,500 cubic yards. The total amount of rock excavation carried out in the construction of the two sections of the reservoir was about 300,000 cubic yards. The combined capacity of the two sections is approximately 60,000,000 gallons. The area occupied by the reservoir and surroundings is eleven and a quarter acres, the roof area being over seven acres.

Big Deal Through—One of the biggest deals on record, one that will place the famous Vickers Company in an unrivalled position in the engineering world, has just been arranged with Treasury sanction. Vickers, Limited, is to acquire the Metropolitan Carriage, Wagon and Finance Company, of Birmingham, whose shares have an aggregate value nearly equal to those of the Vickers Company itself. Vickers Limited, formerly known as Vickers, Sons & Maxim, has consistently increased its business by im-

portant acquisitions, with the result that it has either absorbed, or obtained a controlling interest in the Naval Construction and Armaments Company, the Maxim-Nordenfelt Guns and Ammunition Company, Wolsely Motors, and the Electric and Ordnance Accessories Company. Among the countries to which its interests extend are Canada, Spain, Italy, Russia and Japan. It has works in Sheffield, Barrow-in-Furness, Birmingham, Erith, Dartford, Crayford and Ipswich.

Will Finish Boats.—At a meeting of creditors of the Polson Iron Works now being reorganized, held at Osgoode Hall, it was stated that as the result of agreements come to it would be possible to declare a dividend of 54 cents on the dollar. One of the agreements comprised the offer of the Imperial Munitions Board to advance the $400,000 to $600,000 necessary for the completion of five boats under contract, to accept delivery when ready, to waive any claims for damages, and to rank with the unsecured creditors for the money it was found necessary to advance. The Hannaveig Company, who had placed with the company an order for two boats to be completed in 1919 at a cost of $665,000, agreed to take over the two boats and the material on hand and to waive any claim for damage or for the repayment of any amount overpaid. The material, which had cost $335,000, was only worth about $200,000 to-day, but the Hannaveig Company was willing to take back the material to free themselves of damage actions by the persons to whom they had sold the boats. Both offers were accepted by the creditors.

MARINE

Montreal.—The setting of the river buoys in the Lower St. Lawrence is now under way. The Canadian Government steamer Druid is now engaged in this work and the buoys will probably be in place by the end of the month.

Kingston. — One of the Dominion Government's new standard boats for the inland lake trade is to be built by the Kingston Shipbuilding Co. The keel has already been laid, and much progress has been made in assembling the various parts. The vessel is one of the largest ever built in this yard, being 260 feet long, 45 feet beam, and 30 feet in depth.

New York.—Because of the large number of vessels which have been destroyed by floating mines in recent weeks, the New York Board of Marine Underwriters have raised the war risk rate on all vessels and cargoes billed to North Sea, Baltic and Black Sea ports. To Sweden and Norway and Denmark, not beyond Malmo, the rate is now one-third of one per cent., while to Baltic ports it is one-half of one per cent. The rate to Black Sea ports has been fixed at one-half of one per cent. also.

Large Cement Factory.—The Montreal Portland Cement Company, formed of British and Belgian capital have purchased a site of 54 acres at Pointe-Aux-Trembles for $40,000, and work will soon begin on new cement plant to cost $250,000, and eventually turn out 4,500 barrels a day. The company has received exemption from taxation and free water for twenty acres from municipalities at Trenton. President Robert Dodd said no stock will be issued in Canada. The company will be producing 500 barrels daily by September.

Montreal.—The inauguration of a new steamship line from Montreal to Buenos Aires and Montevideo is announced by Messrs. McLean, Kennedy, Limited. The first sailing will be the Steamship Clan Keith, about 8,000 tons, due to arrive in Montreal May 5, to be followed by about monthly sailing thereafter from this port in summer and from St. John, N.B., in winter. This line will be known as the "Houston Lines" Canada-South America service, and will fill a want by Canadian exporters, who have hitherto been obliged to send their shipments through the port of New York.

London. — The new Cunard transatlantic liners will be oil-driven. An official of the Cunard Line verified this statement. It was told in a recent dispatch as illustrating the intense efforts the great British shipping interests are making to hold maritime supremacy. The Cunard and other associated companies, it is understood, now have twenty-nine vessels in course of construction. Most of them are of the standard type, 20,000 tons, and built to carry both passenger and cargo. They are all being fitted with engines which can be driven either by oil or coal. The alternative is provided because of the uncertainty of readily acquiring the necessary oil supplies.

Montreal.—The breaking up of the ice on the River St. Lawrence has been proceeding steadily and the river is expected to be cleared sufficiently for the starting of traffic by the end of the week. Considerable difficulty has been experienced by the three vessels engaged in the work; the Montcalm was damaged slightly when she was caught in a jam some time ago and, the Lady Grey has been held in a jam among the Sorel Islands for a couple of weeks. During their imprisonment it was necessary for several of the crew of the Lady Grey to make a trip across the floating ice to obtain provisions. Relief, however, is in sight and meantime the ship is in no danger.

Toronto. — Cargo-carriers that have slipped off Canadian ways during the last few months are now carrying goods across the seven seas. An instance of the significance of the enlarged wartime shipbuilding activities in Toronto, is afforded by a recent notification of the United States Navigation Company, that the new 100 A1 Le Quesnoy would soon commence loading for Constantinople, Constanza, Galata or other Black Sea ports. Le Quesnoy was built at the Dominion Shipbuilding Co. plant, at the foot of Bathurst Street, Toronto, and was launched last autumn. This vessel is 4,300 tons deadweight, and is a bulk cargo carrier of the improved Cunard type. Le Quesnoy left Toronto in December for the Atlantic, accompanied by tugs, which encountered rough weather before leaving Lake Ontario. Le Quesnoy completed its journey to Montreal and Halifax, and subsequently sailed for New York to enter the mercantile service.

Transfer of Dry Dock.—The Prince Rupert Dry Dock and Engineering Co., of which Newman Erb is chairman, and also president of the Ann Arbor Railway Company, with headquarters in New York, has leased from the Grand Trunk Pacific the shipbuilding plant and dry dock located at Prince Rupert. Contracts now under way are for two 8,100-ton freighters for the Dominion Government.

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OTTAWA.—It is expected that the Government will decline to grant further licenses to American shipping engaged in the coasting trade in Canadian waters, except under very exceptional circumstances. Intimation that such a course is likely to be adopted was given in the House by Hon. A. K. MacLean, Acting Minister of Marine and Fisheries. Mr. McLean read, first, the following telegram received from Washington: "Advices from our representatives for the Lakes district indicate apparent scarcity business on the lakes for American ships for this season. Coastwise permits are now almost invariably declined on the Atlantic and Pacific coasts, only exceptional situation warranting a departure from this policy." Mr. McLean added: "Inasmuch as the United States declines to confer the privilege upon Canadian vessels engaged in their coasting trade, it is contemplated that no further licenses be granted to American ships for the coasting trade in Canadian waters except under very exceptional circumstances. This will place our policy in this regard on a parity with that of the United States."

CONTRACTS

Contract Awarded.—The MacKinnon Steel Co. Sherbrooke, Que., have just taken a contract for the supply of all necessary steel work in connection with an eight-storey apartment house being erected on Drummond street, Montreal, by P. R. DuTremblay. The name of the general contractor is Alex. MacKay, Montreal. The valuation of the complete structure is five hundred thousand dollars, and the steel work will amount to approximately sixty thousand dollars.

BOOK REVIEW

Punches and Dies for Lay-Out, Construction and Use, by Frank A. Stanley, the McGraw-Hill Book Co., New York. Price $4.00

This book has been written in the object of placing before die-makers, tool makers and tool draftsmen information concerning this class of shop equipment, which is becoming increasingly important in the manufacturing industries. In the preparation of this present work the author has been given free access to the methods in practice of the leading plants of America. For this reason the illustrations, both halftones and line engravings, together with the data given in the book, are especially interesting and valuable to the man having work of this nature in his care. The following subjects are treated in this work: Press tools in general, blanking dies, piercing tools, compound dies for blanking and piercing, shaving dies, trimming and shaving, drawing dies and their action upon materials, combination and compound dies for blanking, drawing and piercing, bending, forming and other dies, dies for embossing, marking, riveting, and indexing dies. The sub-press and its dies, laying out and making templets and dies, some hardening principles applied to dies.

MANY CREDITORS IN POLSON AFFAIRS

Statement Handed Out by Official Receiver Clarkson—Some Work to be Finished

ASSETS

Materials and supplies, inventory value	$400,000
Receivables	25,000
Lands and buildings valued at	1,400,000
Plant and equipment appraised at	550,000
Total	$2,375,000

LIABILITIES

Bonded	$300,000
Preferred claims	100,000
Norwegian contractors	568,000
Unsettled damage claims	70,000
Other claims	50,000
Trade creditors	400,000
Total	$1,488,000

MEMO

The Imperial Munitions Board is the owner of five boats and materials therefor, on the premises, the completion of which is being undertaken. The cost of completing these boats is now being ascertained.

The above statement of the situation of the Polsons Iron Works was handed out by the receiver, G. T. Clarkson.

The statement shows that there are nearly two hundred trade creditors. There are two items larger than $20,000 to Canadian metal people, one of over $10,000, and the rest running all the way from a few hundred dollars to $10,000.

The preferred claims of $100,000 are made up of wages, $72,000; Compensation Board, $15,000; taxes, $10,000 and water rates, $3,500.

Two Boats Completed

Since the company went into receivership two of the five boats have been completed for the Imperial Munition Board. Another boat will be ready in May and the remaining two before the close of navigation.

It is understood that the Polsons Iron Works last year received several offers for the undertaking which would have produced a very substantial profit to the shareholders, but under present circumstances it is entirely unlikely that it will be possible to now sell the assets at prices which at the most would leave very much for the shareholders.

German textile industries not only used paper as a substitute for wool and cotton but also made great use of hair, human and from dogs and other animals. Great hopes were based on a scheme for the breeding of rabbits of the white silken-haired variety, but nothing was done as presumably rabbits made good stew or pie. The scheme which may yet be carried out involved the breeding of several million rabbits. The hair may be spun into very fine and soft threads.

IN SOME CASES THERE IS ALREADY TALK OF LOWER PRICES COMING

THERE are several factors tending to decrease the production of pig iron. The demand generally is very small, and much confusion is still in evidence over the new prices. Many more stacks are being blown out. Following are the reports from U.S. points:

CHICAGO.—There is no particular anxiety on the part of the consumers to buy for last half needs. Makers are waiting to see some action on the part of the Government before taking any steps. What buying there is, is confined to small lots for immediate delivery.

NEW YORK.—The principal factor in the market here has been the refusal of Railroad Director Hines to buy at the new price schedule. Several makers were considering the application of the new price to old contracts, and some of them had already made readjustments. Consumers now expect a further price drop. An increase in freight rates is another important factor. Several New Jersey points that have had a preferential rate over New York and Brooklyn, have now had their rate brought up to the same figure as the latter points.

PHILADELPHIA. — The slight improvement in the demand noticed recently is still being maintained, but enquiries are few. There are many enquiries for export, which do not arouse much interest. One company is inquiring for 50,000 tons a month. There are many stacks being blown out.

PITTSBURGH.—A fair number of enquiries for small lots, with little actual business and an open market are the leading features here. The recent enquiry of the Standard Sanitary Manufacturing Company for 3,500 tons southern foundry iron for its Louisville plant, has been about half covered. The order has been divided between an Ohio and a Tennessee furnace. It is believed that conditions are such that if a good-sized enquiry was to come out sharp competition would result.

BUFFALO.—Any buying that was probable has been stopped for the meantime by the controversy at Washington over prices. Enquiries are very few, but there is a hopeful spirit among producers. One local maker sold 1,000 tons basic at the usual price.

CLEVELAND.—There has been a fair amount of sales, and a pretty brisk enquiry. Foundries serving the automobile trade have been the biggest buyers. Sales amount to between 5,000 and 10,000 tons, mostly for first half delivery. The price situation is still awaiting some definite action from Washington.

CINCINNATI.—There is practically no enquiry, due to the unsettled state of the price situation. Some sales are being made of occasional carload lots and some enquiries are in evidence from parties who are trying to feel the market out. Until producers take a definite position there is not much expectation of business.

BIRMINGHAM.—Banking and blowing out of furnaces are the most prominent features of the situation. Iron production is being kept down to a minimum and sales show no improvement. There is a small amount of local buying in hopes of later improvement in business.

PROMOTIONS AT THE STEEL CORPORATION

SYDNEY, C.B.—A number of new appointments are announced in connection with the staff at the works of the Dominion Steel Corporation.

One of the most important of these appointments relates to the creation of a department for the purpose of investigating with a view to eliminating wasteful practices in the various departments of operation, and, in general, the introduction of economical processes. In this connection F. E. Lucas has been appointed as economy engineer.

A. L. Reading becomes superintendent of the rail mill, and W. Buckley becomes assistant superintendent.

W. Waishaw has been appointed roll designer, allusion being to the designing of rolls employed in the various rolling processes carried out by the company.

C. C. Graves becomes superintendent of the blooming mill.

S. Green becomes superintendent of all of the night mills.

The above appointments have all been made from men who have been in the employ of the company for at least seven years, and who have consequently become thoroughly acquainted with the employees and with the requirements of the situation. In consequence greater efficiency and smoothness of operation are looked for.

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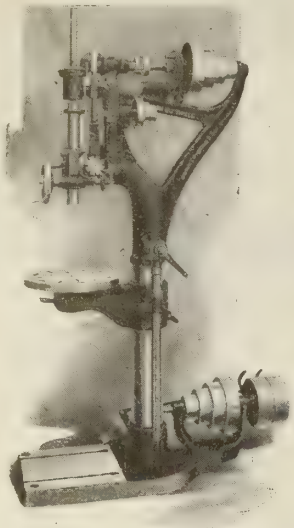

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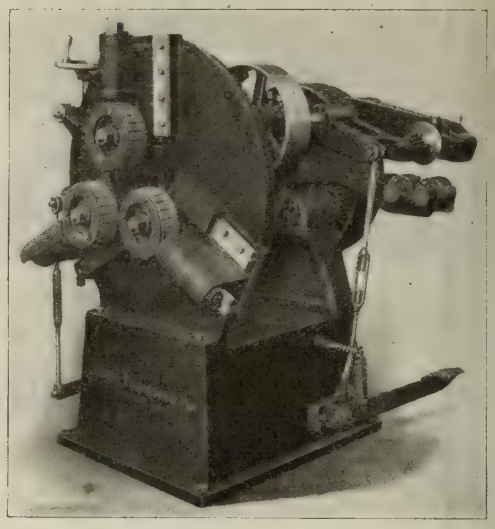

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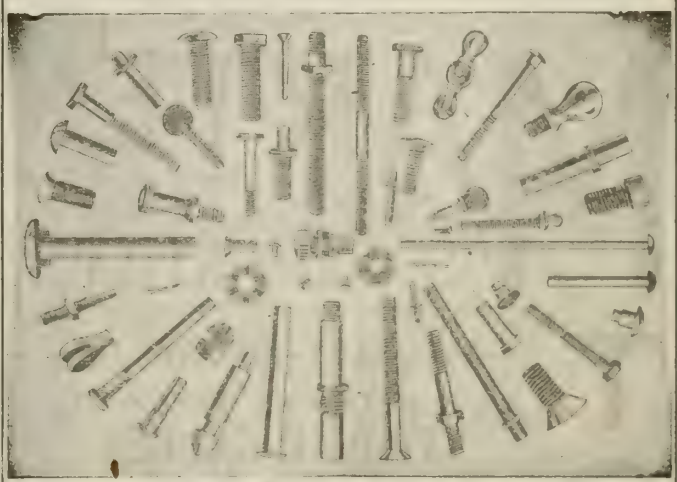

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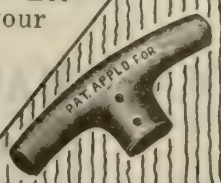

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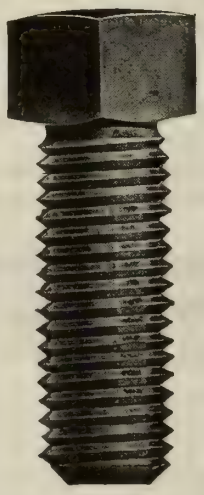

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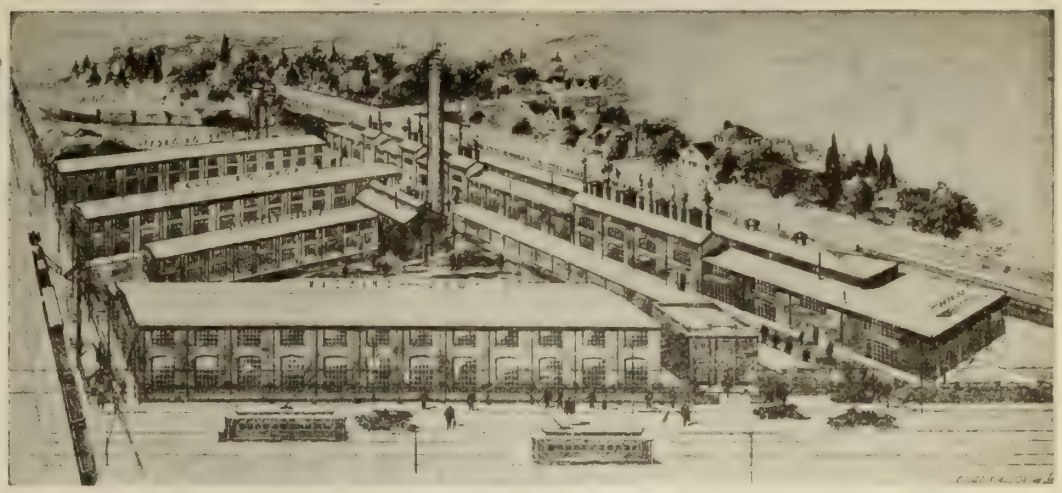

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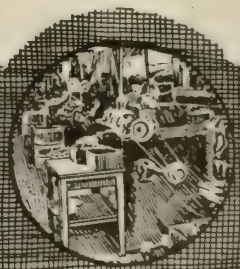

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Few parts — easy adjustments — quick change of chasers — nothing complicated to get out of order.

Strong
Solid one-piece body.
Ample support of chasers.
Positive releasing and setting action.

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All parts that are subject to wear are hardened and ground to a precise fit.

Made in Revolving and Non-Revolving types "for every threading requirement."

Quotations on request.

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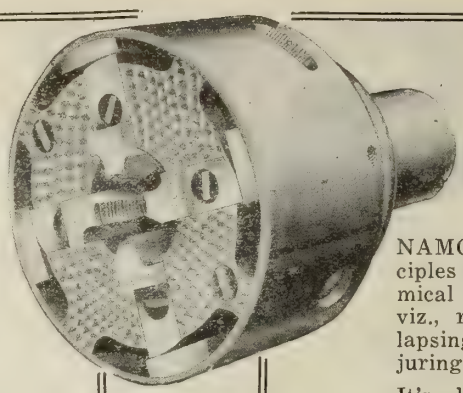

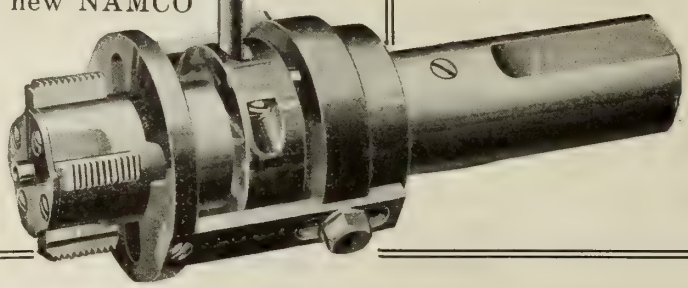

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It's all in the construction.

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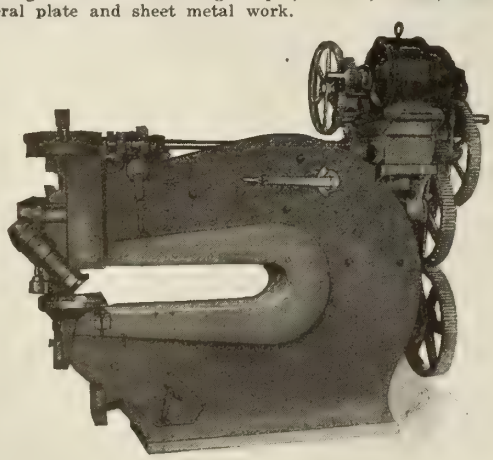

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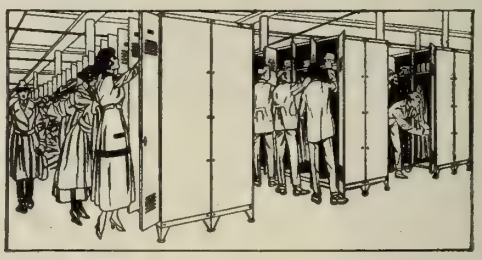

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We have pioneered in this industry and maintain our leadership by uniform excellence of product. Let our Engineering Dept. assist you with plans, detail drawings, estimates, etc. Write for illustrated folders to-day.

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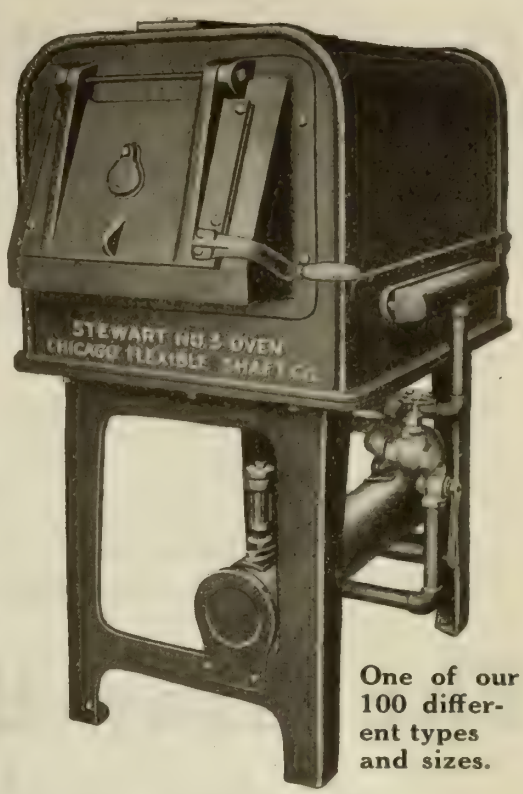

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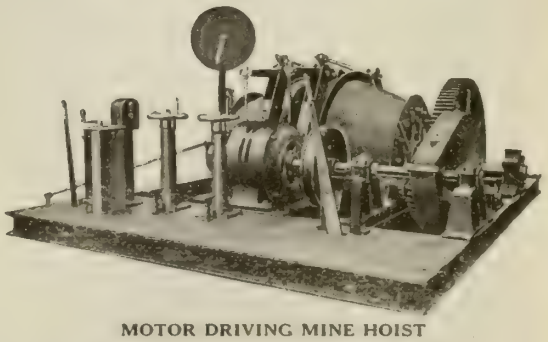

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Many operations which have hitherto been done on larger machines can be done more economically on this type of Miller.

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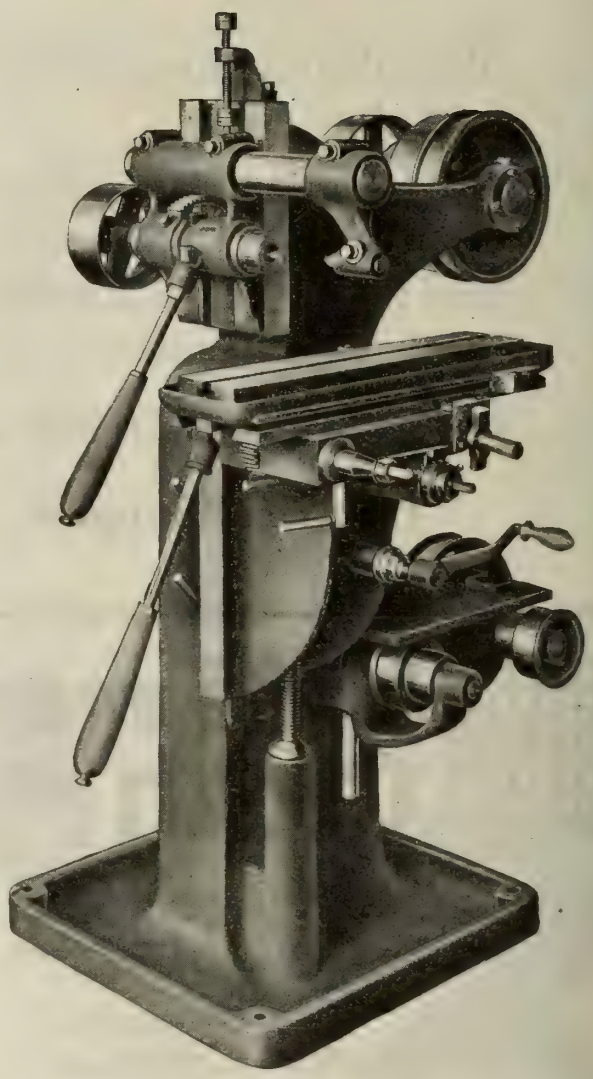

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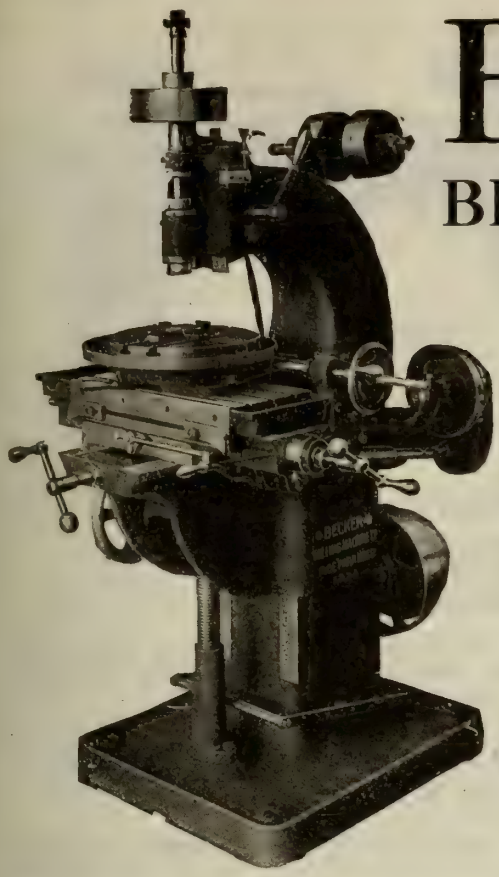

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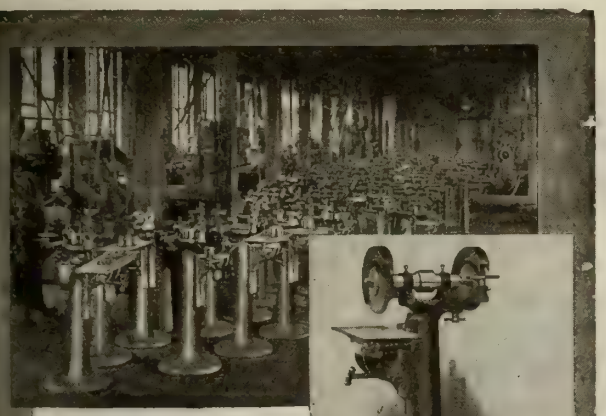

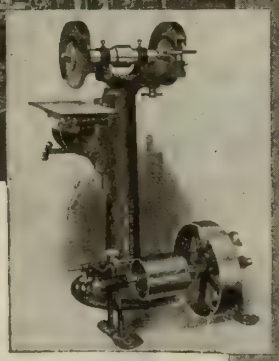

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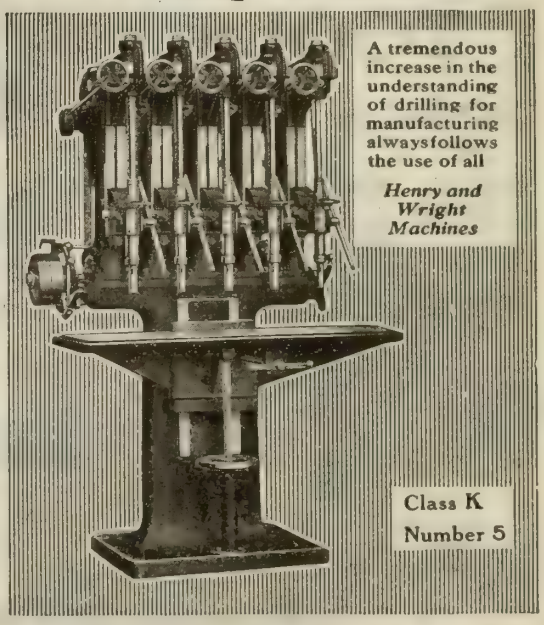

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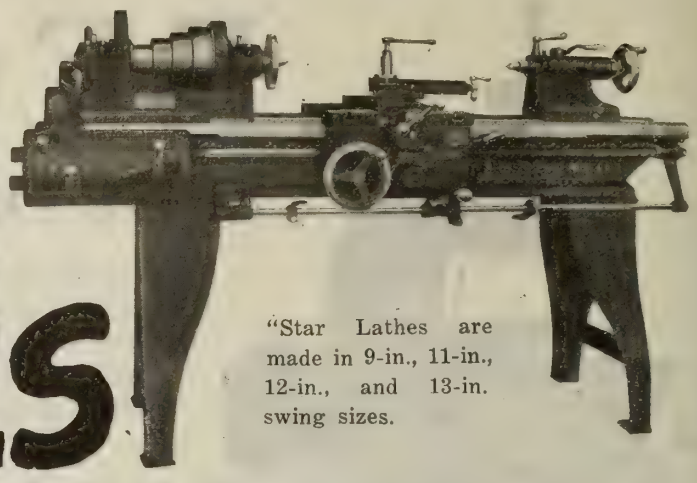

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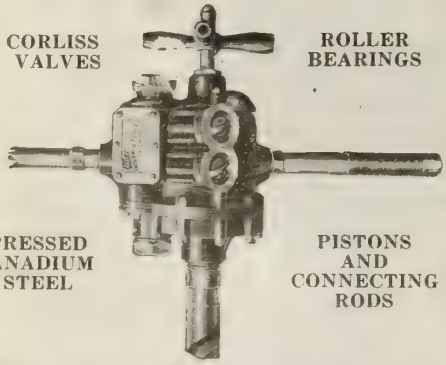

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The Lathe With the Pull
The Lathe of Simplified Accuracy

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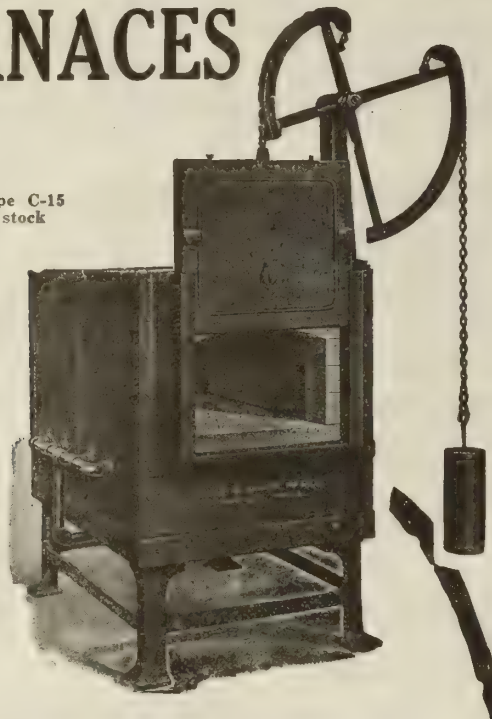

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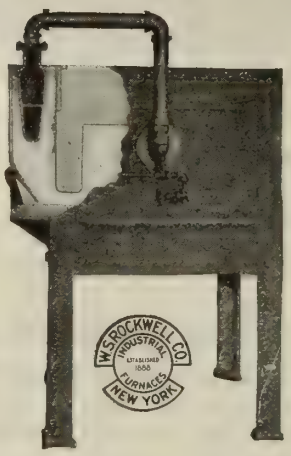

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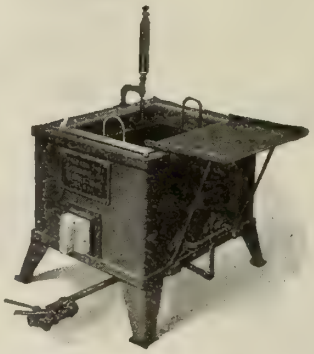

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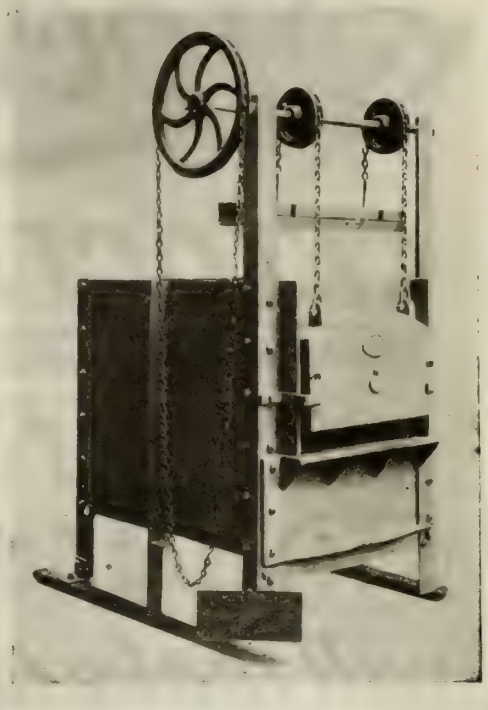

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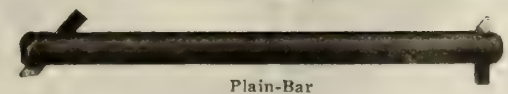
Sleeve-Bar and Holder



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Williams' "Agrippa" Boring-Tool Holders for Multiple Bars

Raise no bar against the selection of Bars. The choice is yours

The "twin-screw" fastening with V groove at top and bottom accommodates any size and shape of bar within its range.

We furnish two styles of Standard Bars, Sleeve-Bar and Plain-Bar, as illustrated above.

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The *Plain-Bar* provides for use with either style of Cutter in the simplest manner possible.

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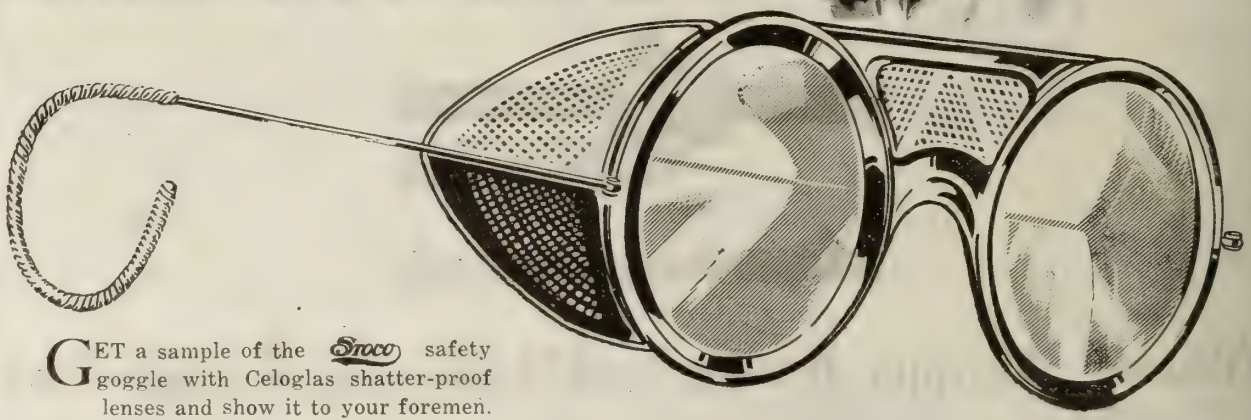
These Stoco CELOGLAS SHATTER-PROOF LENS SAFETY GOGGLES will make my men EYE SAFE



GET a sample of the Stoco safety goggle with Celoglas shatter-proof lenses and show it to your foremen. Have them give it a trial under actual working conditions, and it won't take them long to decide that it's the kind of eye protection their men need.

The Stoco safety goggle frame is the strongest ever designed for eye protection purposes. In spite of its sturdy construction it is light in weight and mighty comfortable in use.

Stoco safety goggles are supplied with either easy cable earbows or elastic headbands, and also with regular heavyweight glass lenses or Celoglas shatter-proof lenses. Celoglas lenses have a thin piece of celluloid between two glass lenses. Even though the glass may fracture from a hard blow, the lens will not leave the frame nor will particles of glass fly into the eyes of the wearer.

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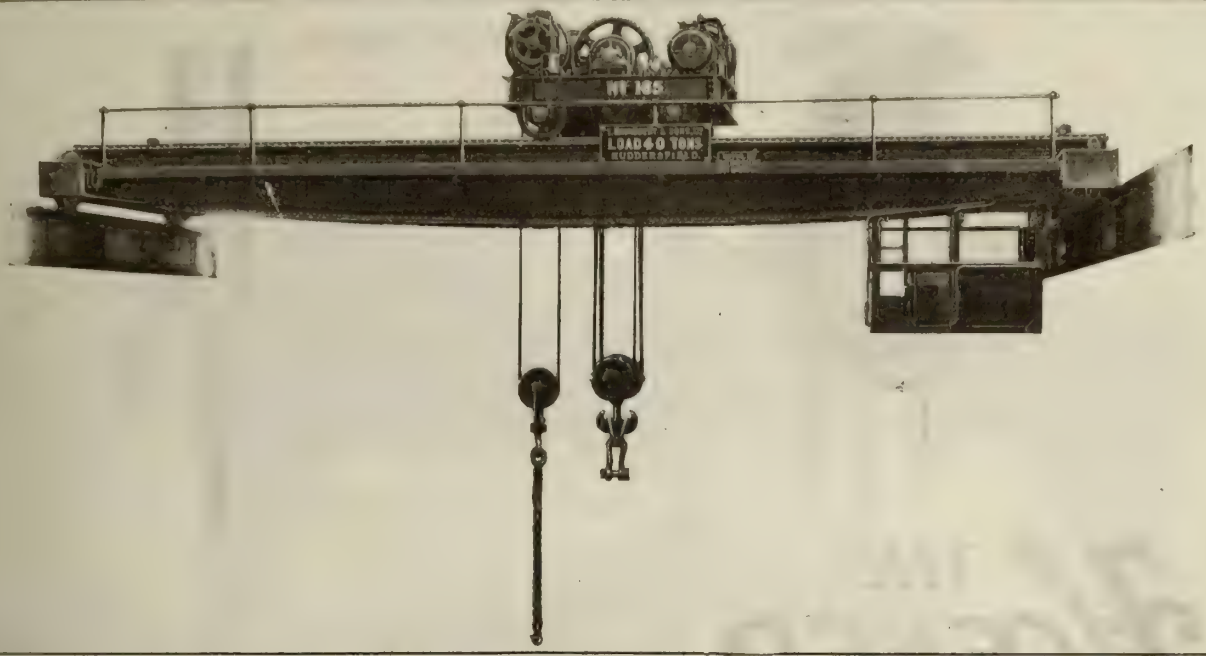

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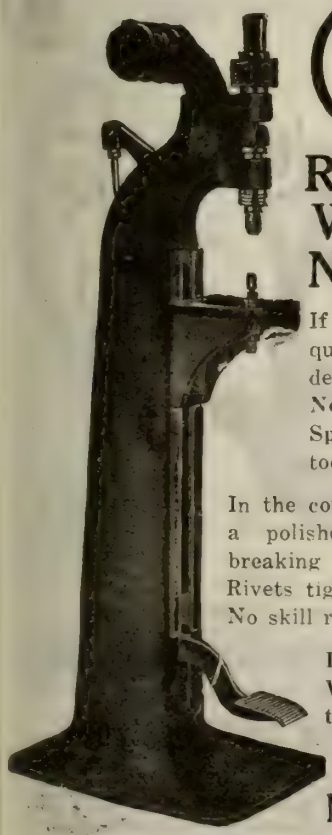

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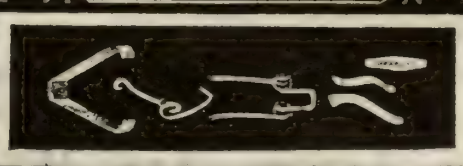

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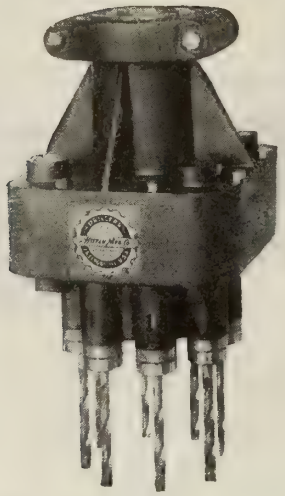

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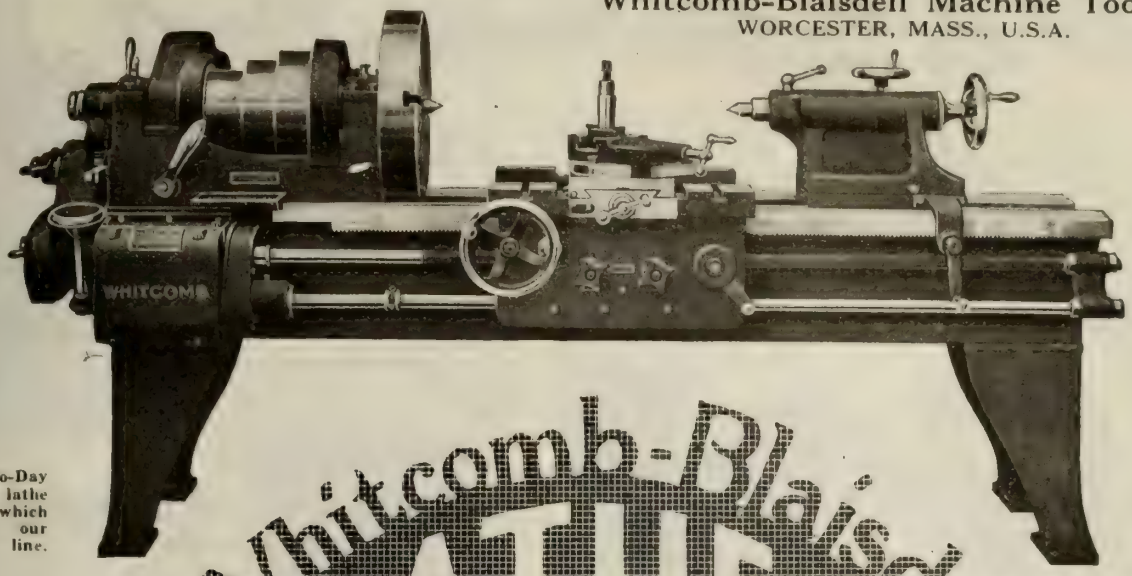

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They Both Cut
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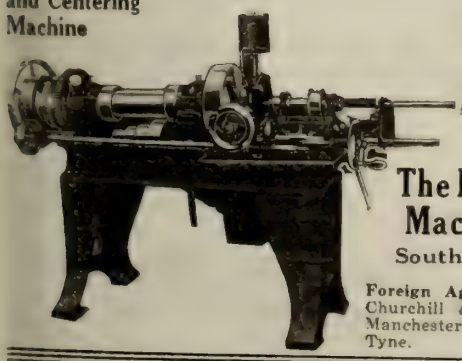

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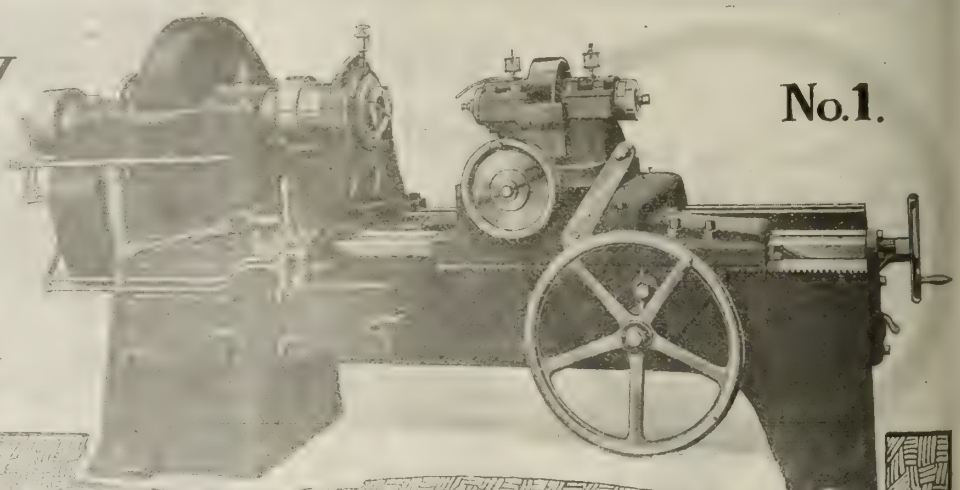

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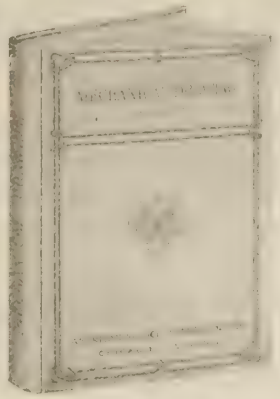

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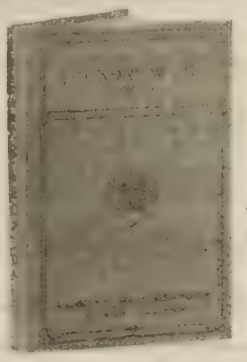

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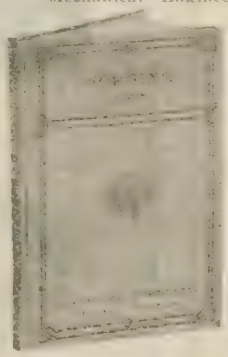

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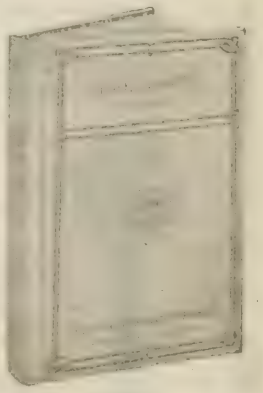

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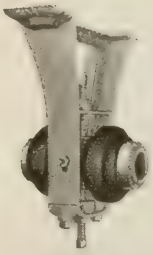

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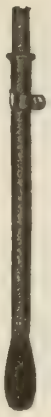

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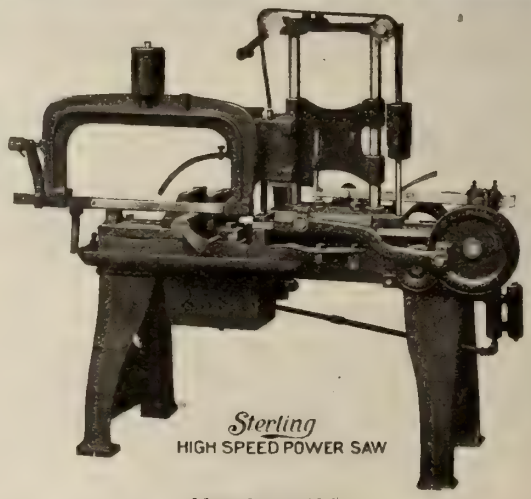

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★ **Stefansson's story will be published exclusively in Canada in MACLEAN'S. The series of articles by him, now appearing in American and Canadian newspapers, refer entirely to his experiences on previous explorations and do not deal with the journey that he undertook for the Dominion of Canada and completed last year.**

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"Imperial Relations Must be Worked Out," by Viscount Bryce. An important announcement on the future construction of the British Empire.

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"Canada's Fishmonger General," by Thomas M. Fraser. An article on a young Canadian who put Canadian fish on the diet of the British armies by a series of Barnum and Bailey advertising stunts.

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The Review of Reviews

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Could German Fleet have been Destroyed.
The Secret Plans of the Allied Command.
Too Much Wilson.
Is the ex-Kaiser Haunted?
Next Government Will be Labor.
New Life of Deposed Princess.
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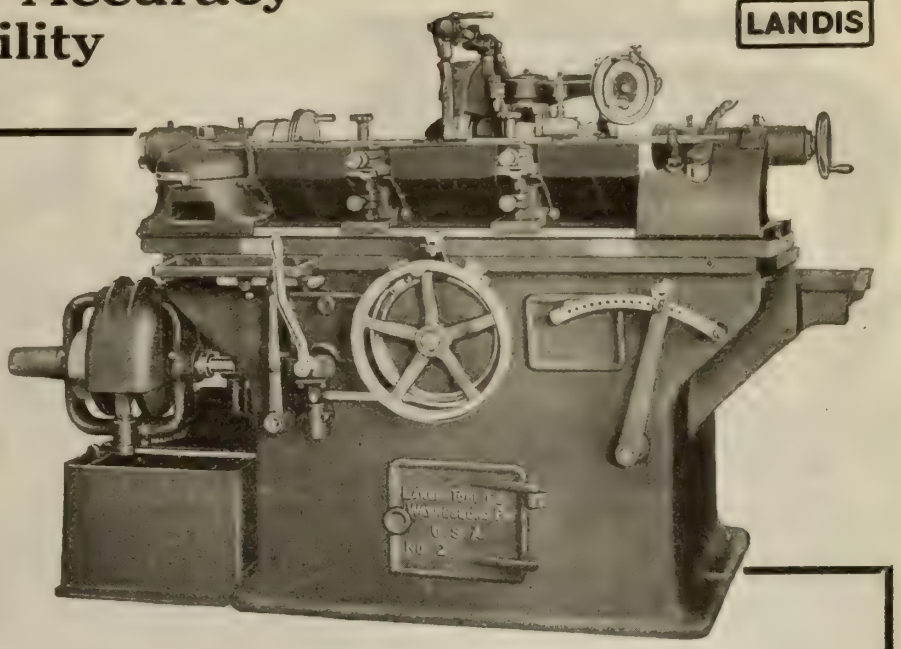

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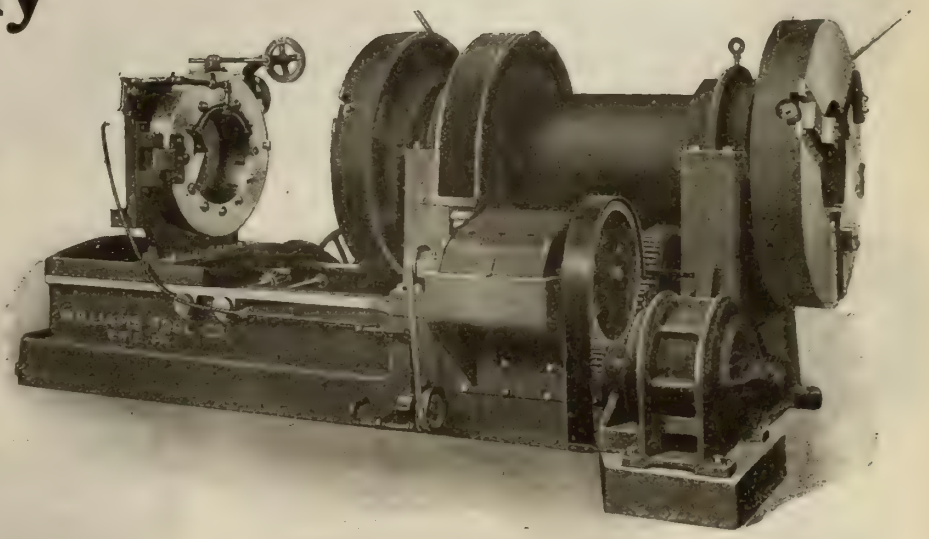

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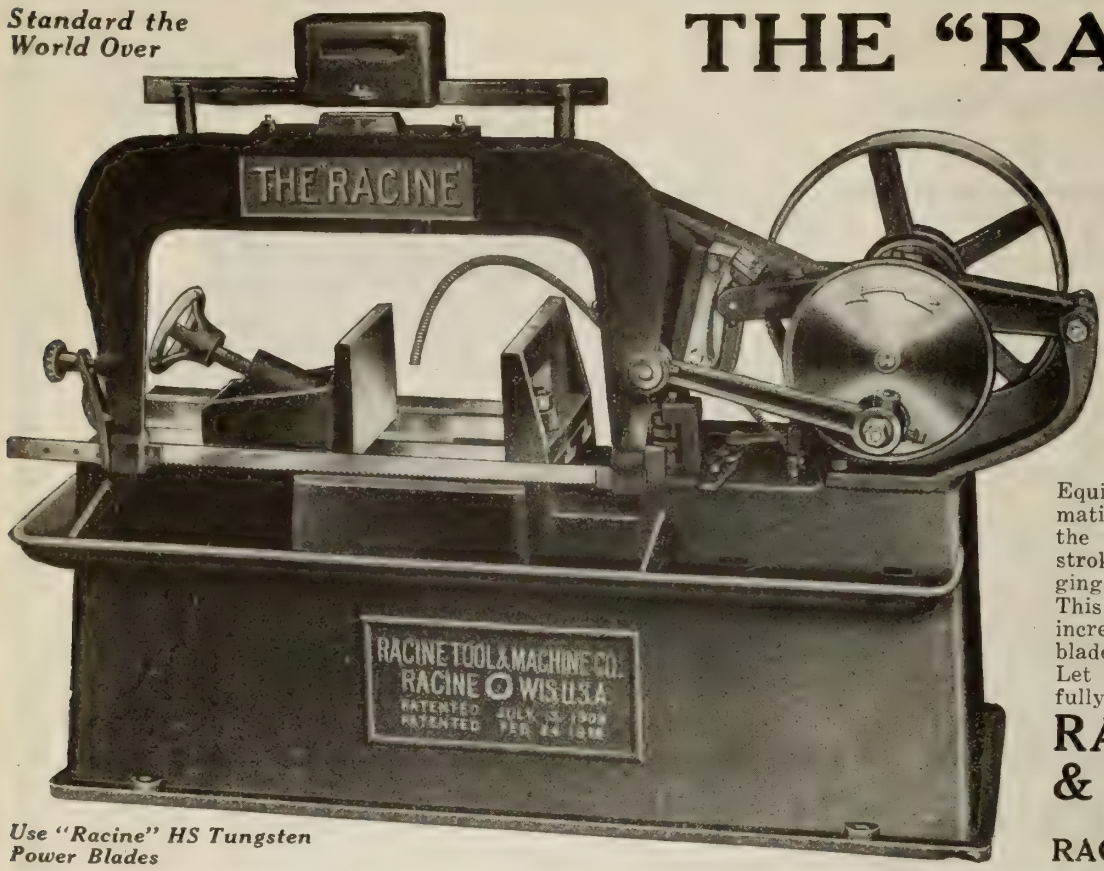

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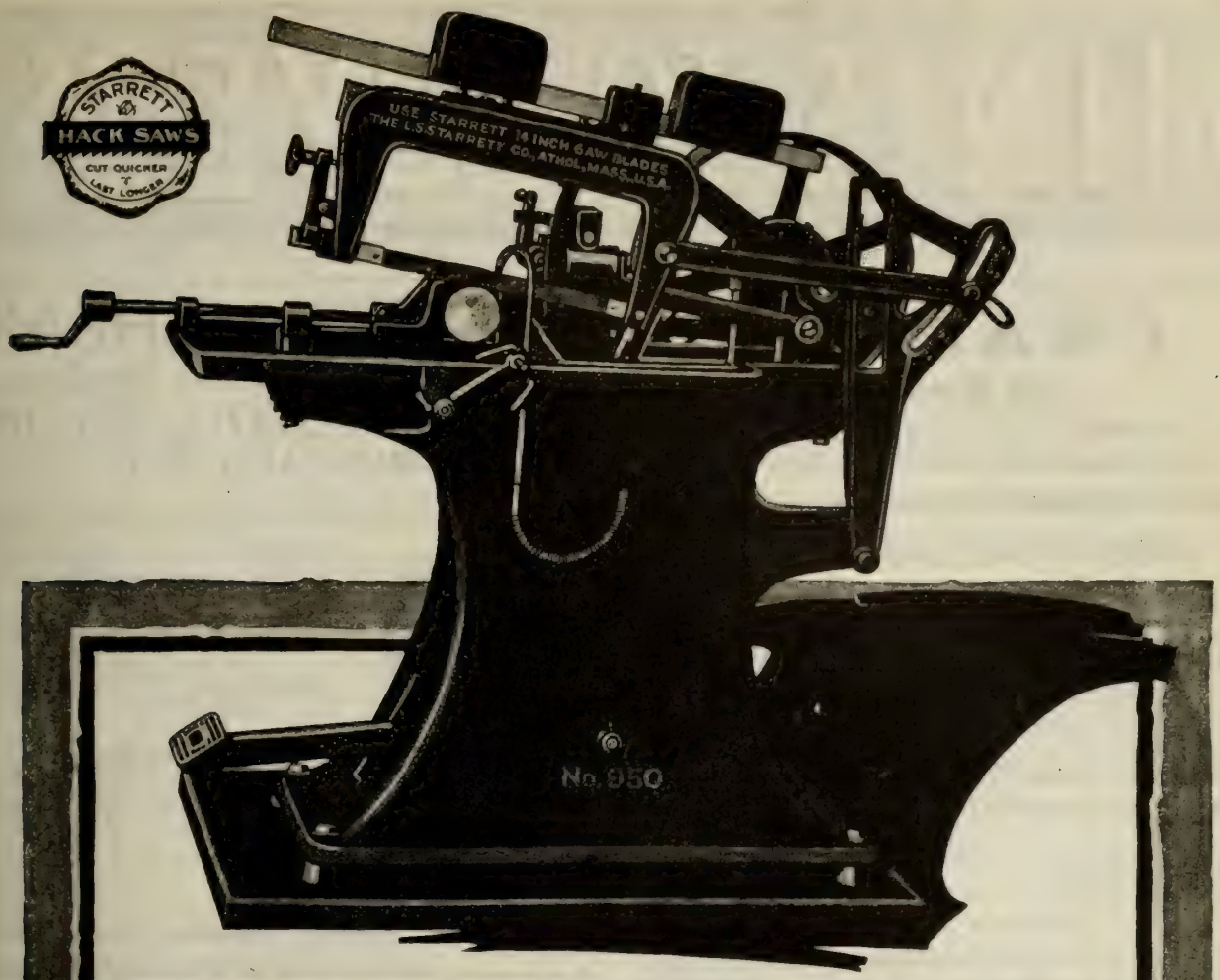

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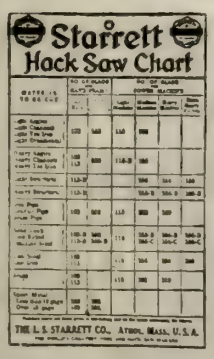

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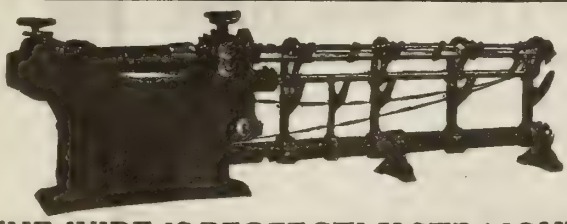

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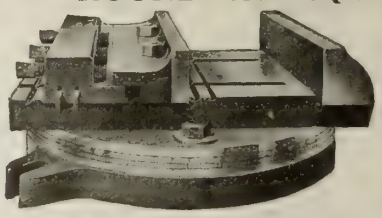

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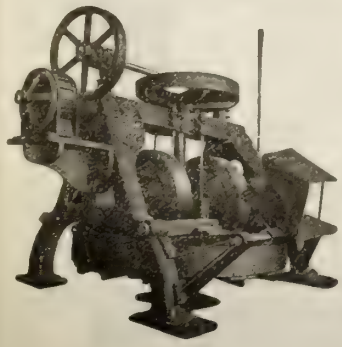

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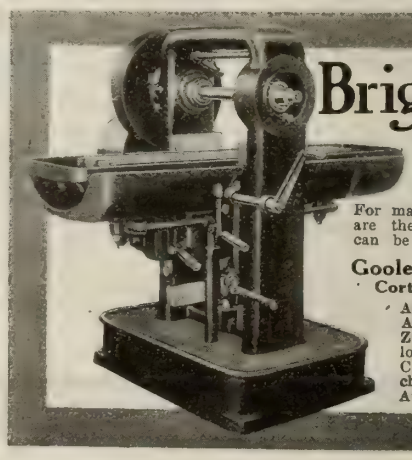

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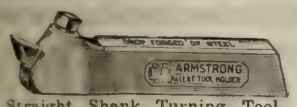

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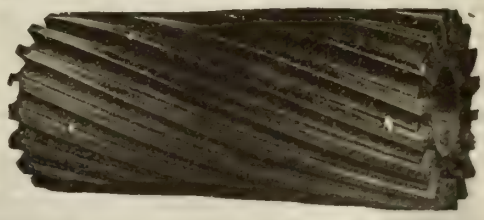

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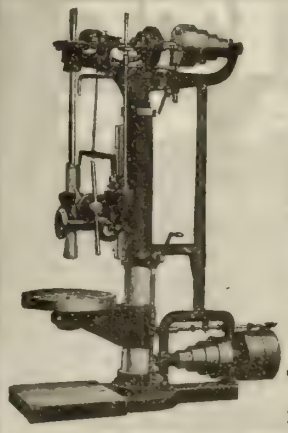

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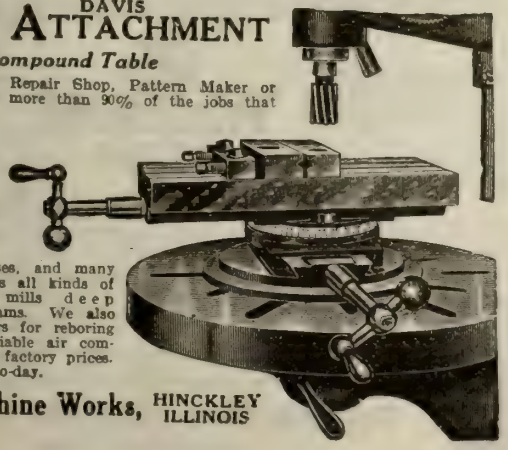

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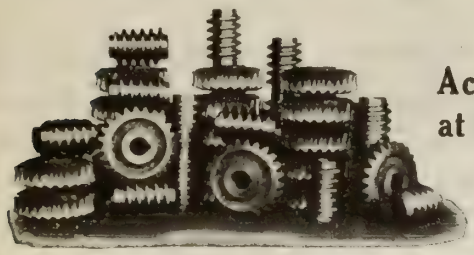

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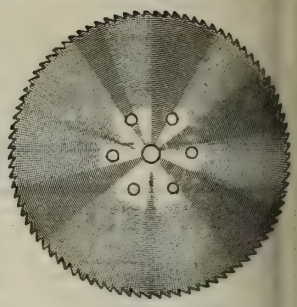

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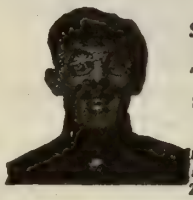

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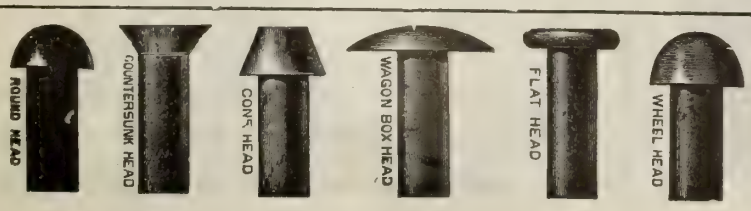

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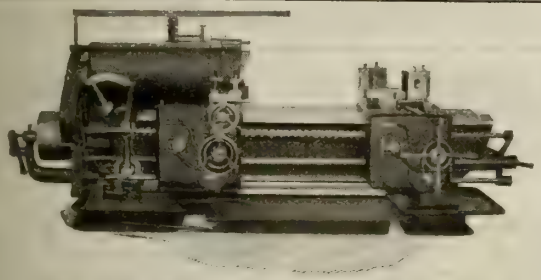

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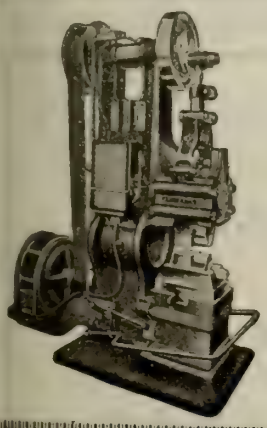

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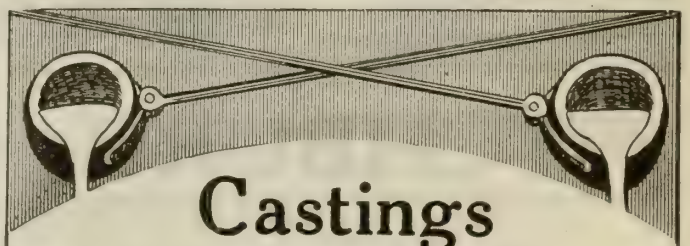

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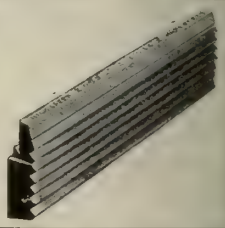

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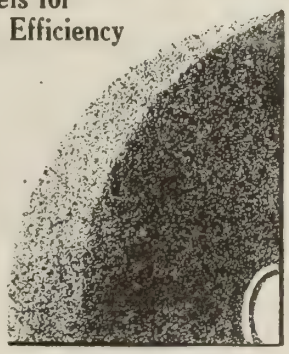

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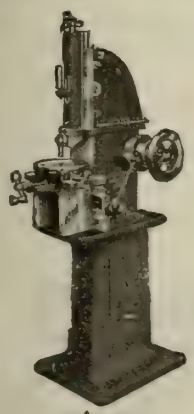
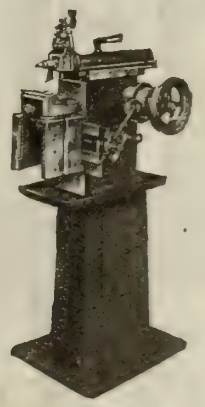
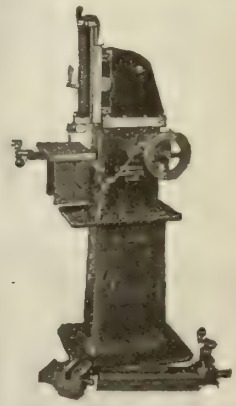


3½-inch



7-inch



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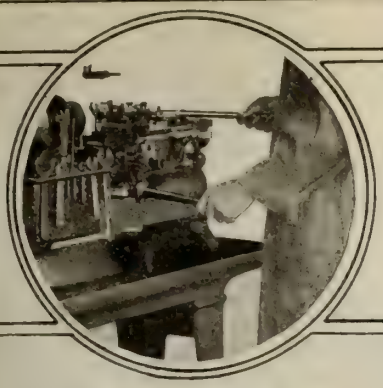

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Means

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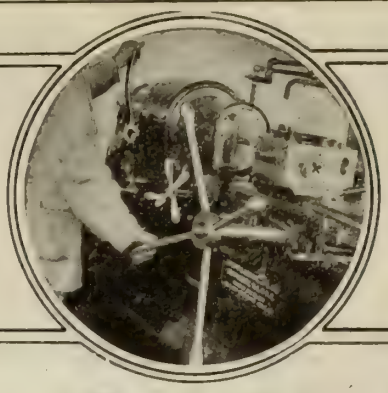

Two Lever Control

On bar stock and work of a similar nature the operator manipulates the turret by means of a lever or pilot wheel with his right hand while with his left he feeds the cross slide tools to the work, and at the end of the operation, when the piece is cut off, pushes the cross slide forward slightly, automatically bringing the next length of stock instantly into position ready for the tools. This largely eliminates making lost motions as the operator remains in the same position at all times.

Brown & Sharpe Plain and Wire Feed Screw Machines

All Levers, Clamps and Pilot Wheels right under the Operator's hands

Three Lever Control

The three lever control is on the larger type machines. The operator manipulates the turret tools by means of a pilot wheel with his right hand while with his left he feeds the cross slide tools to the work and at the end of the operation when the piece is cut off, throws the feed lever which is located on the front of the headstock, in, the stock advances till it reaches the stop and when the lever is released the chuck closes firmly holding the stock. Every crank and lever is so located that the labor involved in operating the machine is a minimum amount.

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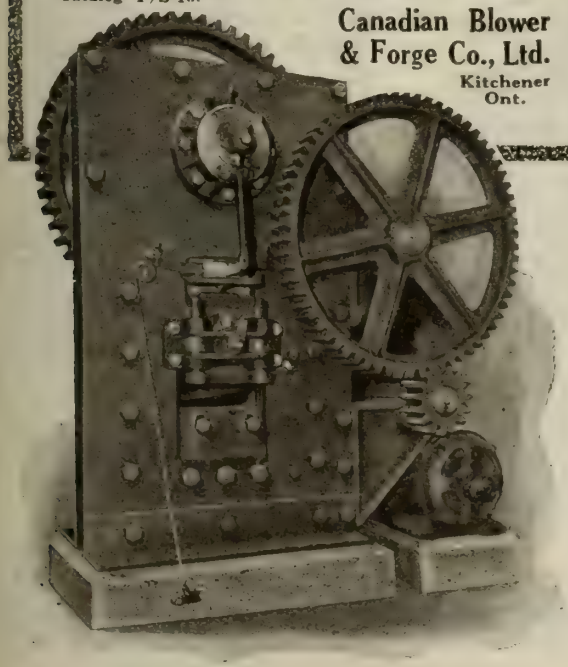

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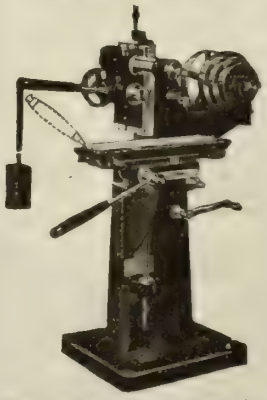
Hand Milling Machine

Thousands in Use



The Sliding Head makes the vertical feed independent of the horizontal feed. This feature permits the work to be held close to the table and enables the machine to be used for profiling. As the head is accurately counterbalanced, light milling may be done on long and heavy pieces without danger of breaking cutters.

The spindle is driven by interchangeable side pulleys giving six spindle speeds with three grade cone and four with two grade cone.

The Table has Hand Lever Feed, also Crank Feed operated by Rack and Pinion.

The Pinion Shaft is mounted in an eccentric bushing to allow for adjustment of pinion with rack.

The weight attachment feeds either head or table automatically and by varying the weights the pressure may be adjusted to a nicety.

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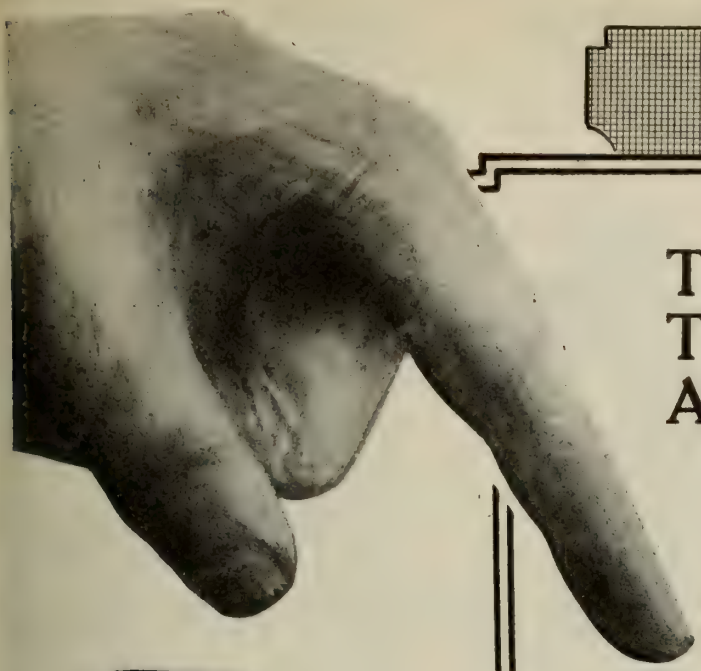

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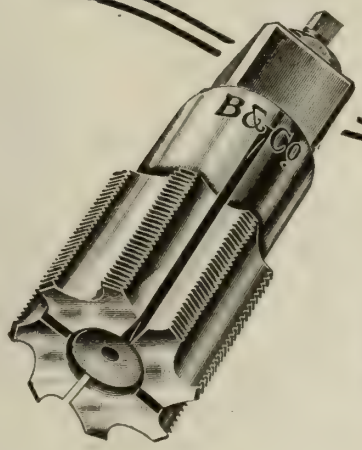

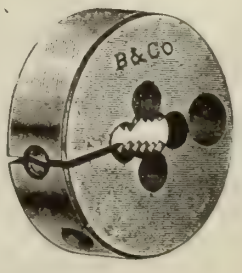

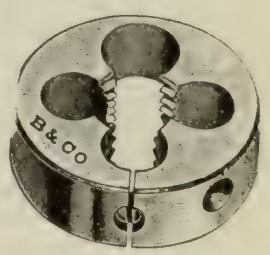

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Williams & Wilson, Ltd., Montreal, Que.

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Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
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United States Electrical Tool Co., Cincinnati.
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Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Canada Wire & Iron Goods Co., Hamilton, Ont.

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A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Wilkinson & Kompass, Hamilton, Ont.
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Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.

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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Cleveland Pneumatic Tool Co. of Canada, Toronto
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Niles-Bement-Pond Co., New York.
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Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
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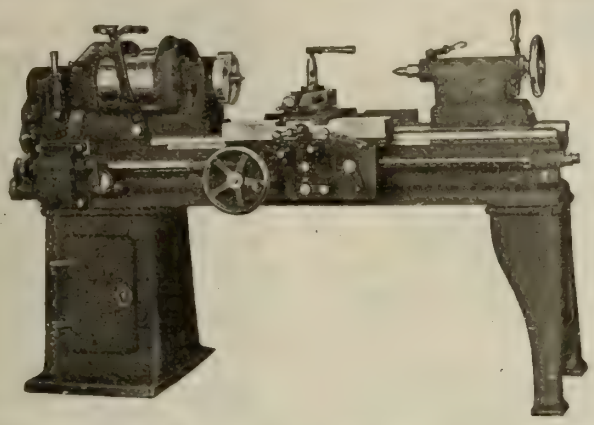

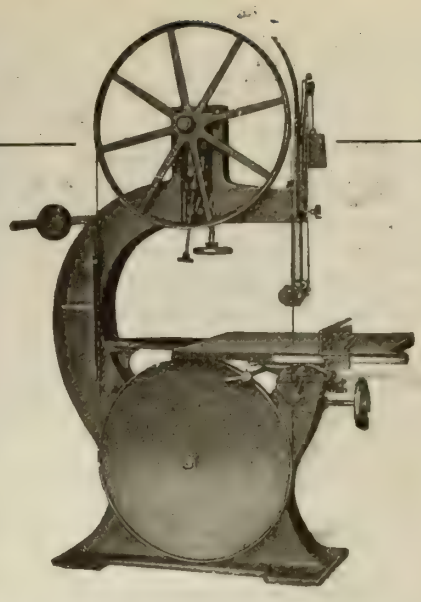

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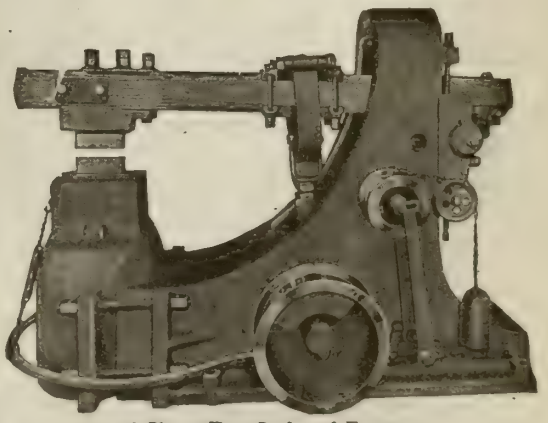

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Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
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W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Wing & Son, J. E., Hamilton, Ont.

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Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass.
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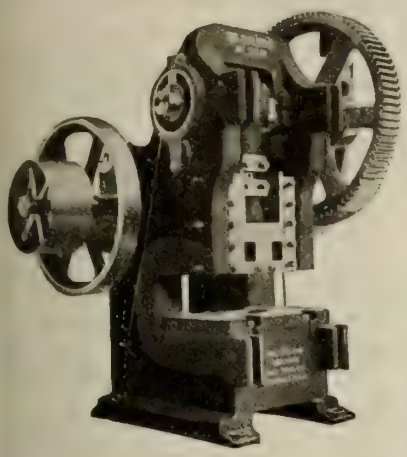

Their daily performance for the past 35 years — in the leading industrial plants of the world—tell the story of their dominant leadership. Exclusive improvements added to the basic design make them the most rugged and sturdy machines procurable for punching, shearing, perforating, bending and forming operations; trimming drop forgings, etc.

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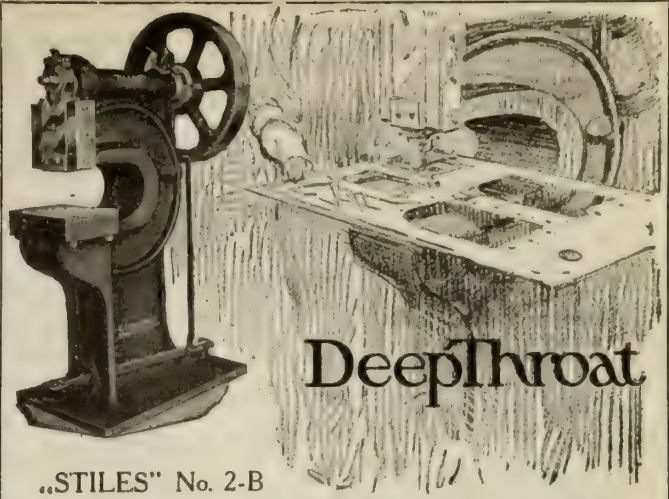

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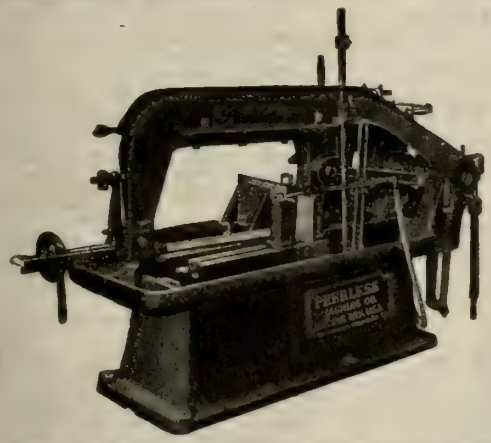

It increases production 50 to 100 per cent. with the same number of machines, at a greatly reduced cost.

Or it gives the same production with two-thirds to one-half as many machines, saving in investment, in attendance and in floor space. And in all cases it saves in expensive material and saw blades.

Proof can be furnished in the record the Peerless High Speed has made with many large concerns of international reputation. Further proof and the best proof will be to try it in your own shop; and if you think you can afford to do without it after 30 days' use, we will pay freight both ways.

Write for description, names of users and trial plan.

PEERLESS MACHINE CO.

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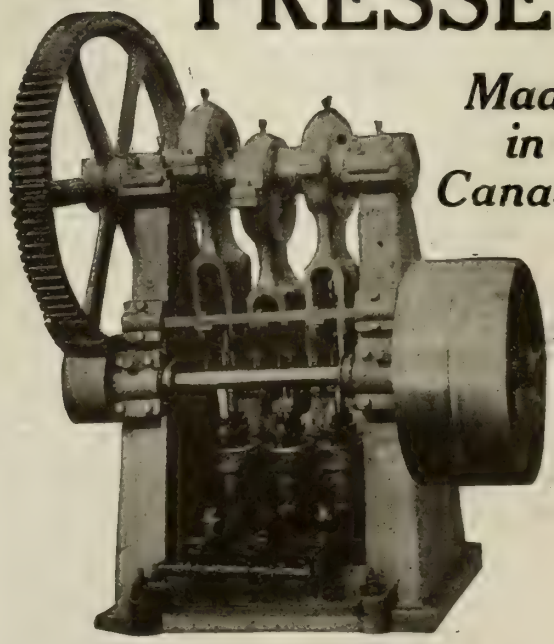

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Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
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McKenzie Machy. Co., D., Guelph, Ont.
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L. S. Starrett Co., Athol, Mass.
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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
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Canada Machinery Corp., Galt, Ont.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Limited, Montreal, Que.

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West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Matthews, Jas. H. & Co., Pittsburgh, Pa.

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Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston Mass.

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Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
Beaudry & Company, Inc., Boston, Mass.

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Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

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Sheldons, Ltd., Galt, Ont.

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General Steel Co., Milwaukee, Wis.
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Norton, Ralph B., Agent, Montreal.

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Illinois Tool Works, Chicago, Ill.

HINGES
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Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Can. Matthews Gravity Carrier Co., Toronto, Ont.
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Dominion Bridge Co., Montreal, Quebec.
Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
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Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
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Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
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Electric Steels & Metals, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
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Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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HOLDERS, ELECTRIC
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Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
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Taylor Instrument Co., Rochester, N.Y.

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L. S. Starrett Co., Athol, Mass.

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Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Williams & Co., J. H., Brooklyn, N.Y.

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Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
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Williams & Wilson, Limited, Montreal, Que.

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To-day Canadian Prairies are Giving Place to Factories

SPEAKING at Leeds, England, the other day, Lloyd Harris, chairman of the Canadian Trade Commission in London, said: "Canada must no longer be thought of simply in terms of prairies, but in terms of factories. The economic effect of the war had been to change Canada within four years from a primarily agricultural to a predominantly industrial country. In the year ending March, 1914, the value of exported manufactures was $57,000,000, against agricultural exports valued at $198,000,000. In the year ending March, 1918, the value of exported manufactures was $636,000,000, against the value of exported agricultural products of $567,000,000."

U.S. Firms to Conduct Export Trade from Canada

The announcement from Detroit that the Maxwell Motor Car Company is planning to conduct its entire export business from Windsor, and that $6,000,000 will be spent in the next eighteen months on extensions and new construction work at the plant at Walkerville, is only one of a number of contemplated industrial developments which reflect the importance of Canada's favorable trade relations with Great Britain. And in this connection the recent arrangements effected through the activities of Lloyd Harris and the Dominion Trade Mission are significant.

The Financial Post Informs You Early on Business Developments

Canada is gradually going forward into vastly greater industrial development. It will pay you to keep in close touch with the whole Dominion in this respect. For this purpose THE FINANCIAL POST is undoubtedly the paper for you. The information given above is from THE POST of April 12th (Special Insurance Issue). Here are a few more titles from the same issue:—

Advances for the Industrials Recent Feature
Discriminate Use of Pruning Knife in Tariff
Nearly $1,000,000 for Canadian Shoes
Montreal Cement Co. to Erect Big Plant
Canadian Trade Commission Gets Big Timber Order
Millers Seek Assistance of Government
Globe Attitude on Abitibi Paper is Bolshevism
Steel Industry Unsettled by Price Fixing
People Must Discharge the Debt of the Nation
Railroads for Tariff Commission
Ames, Holden Dividend in Sight
Dividend Near for Atlantic Sugar
Dominion Iron Making Claim to $21,000,000
Montreal Power Refuses to Bow to Union Demand
Goodwins Show $34,000 Gain in Gross Profits
Business Ideas in Financing Stock Raising
Reserve Bankers Favor Canadian Bank System
Can Sir Adam Beck Run Toronto? (Editorial)
Purchasers of Manitoba Bonds are Disclosed
Moose Jaw had Surplus from 1916 Operations
March Building Permits Show Good Gain Over 1918
House Demand in Toronto is Very Brisk

INSURANCE SECTION

Enormous Expansion in Fire Insurance
Marked Growth of Automobile Insurance
Burglary Insurance Co.s Meet Heavier Losses
Life Companies Swamped With New Business
Actuaries Favor 'With Profit' Life Policies
Advantages of Commercial Life Insurance Recognized
Business Grows in Employers' Liability Field
Important Part Played by Current Surplus Earnings
Influenza did not Boom Health Insurance so Much
Fire Co. Stocks may be Very Lucrative
More Demand for Mortgage Loans is Taking Place
Types of Policy that Have the Call

Business Building News Items Appear Each Week in *The Financial Post*

The above are only a few of the many subjects of real profit-making interest to Canadian men of affairs which have been dealt with by expert writers and editors in THE POST of April 12th. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

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R. McDougall Co., Galt.
Miles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
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Sidney Tool Co., Sidney, Ohio.
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Walcott Lathe Co., Jackson, Mich.
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Williams & Wilson, Limited, Montreal, Que.

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Garlock-Walker Machy. Co., Toronto, Ont.
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Plessisville Foundry, Plessisville, Que.
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Wood Turret Machine Co., Brazil, Ind.
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Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, Ohio.
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Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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Williams & Wilson, Limited, Montreal, Que.

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Ferracute Mach. Co., Bridgeton, N.J.
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Cisco Machine Tool Co., Cincinnati, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Acme Machine Tool Co., Cincinnati, Ohio.
Bertram, John, & Sons Co. Dundas Ont.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
H. C. Dodge, Inc., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co. Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

LEAD BURNING
St. Lawrence Welding Co., Montreal, Que.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LENSES FOR GOGGLES
Standard Optical Co., Geneva, N.Y.

LIDS, SCREW TOP AND HINGE
Can. Winkley Co., Ltd., Windsor, Ont.

LIFTS, PNEUMATIC
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LOADERS, WAGON AND TRUCK
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.

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Cataract Refining & Mfg. Co., Toronto.
Elm Cutting Oil Co., Toronto, Ont.
Ontario Lubricating Co., Hamilton, Ont.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal, Que.
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Marten Mach. Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINES, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

MACHINE SHOP WORK
James Ballantyne, Montreal.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Cincinnati Lathe & Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

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Katie Foundry, Ltd., Galt, Ont.

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A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co. of Canada, Ottawa, Ont.
Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

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Toronto Testing Laboratory, Ltd., Toronto.

METAL SAWS
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Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

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METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

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Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

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Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Frost Mfg. Co., Chicago, Ill.

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New Britain Mach. Co., New Britain, Conn.

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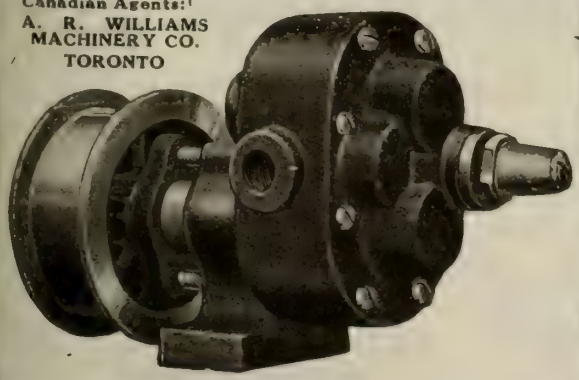

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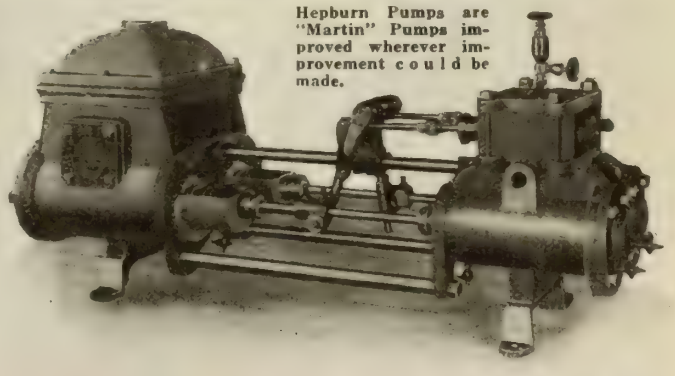

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Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
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Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn.
Williams & Wilson, Limited, Montreal, Que.

PULLEYS, BELT
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Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
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PUMPS, GEARED
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PUMPS, RUBBER CEMENT
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PUMPS, KEROSENE, OIL, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

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Trahern Pump Co., Rockford, Ill.
Williams & Wilson, Limited, Montreal, Que.

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Fry's (London), Ltd., London, England.
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Trahern Pump Co., Rockford, Ill.

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MacGovern & Co., Montreal, Que.
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PUMPS, SUD
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Boker & Co., Inc., H., Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Can Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
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Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Stoll Co., D. H., Buffalo, N.Y.
Wickes & Co., Saginaw, Mich.
Williams & Wilson, Limited, Montreal, Que.

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Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Shore Instrument & Mfg. Co., New York City.
Taylor Instrument Co., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

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Niles-Bement-Pond Co., New York.

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Niles-Bement-Pond Co., New York.

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Lynd-Farquhar Co., Boston.
Wickes & Co., Saginaw, Mich.

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Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

RAIL OVERHEAD
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RAILWAY EQUIPMENT
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RATCHETS
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
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The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, CHUCKING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, TAPER, BRIDGE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIPE, SHELL
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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REGULATORS, PRESSURE TEMPERATURE
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Taylor Instrument Co., Rochester, N.Y.

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Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada Ltd., Hamilton, Ont.

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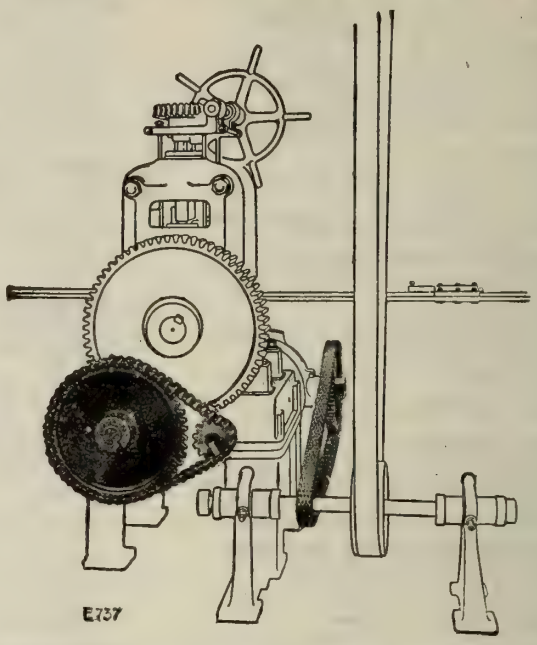

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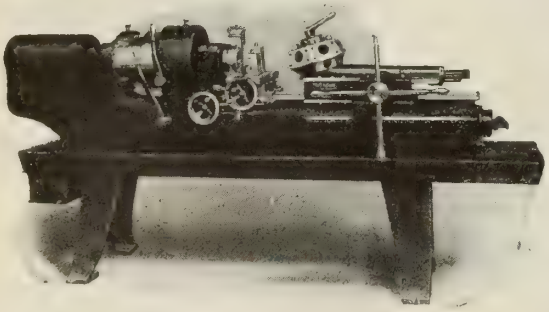

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A weekly newspaper devoted to the machinery and manufacturing interests.

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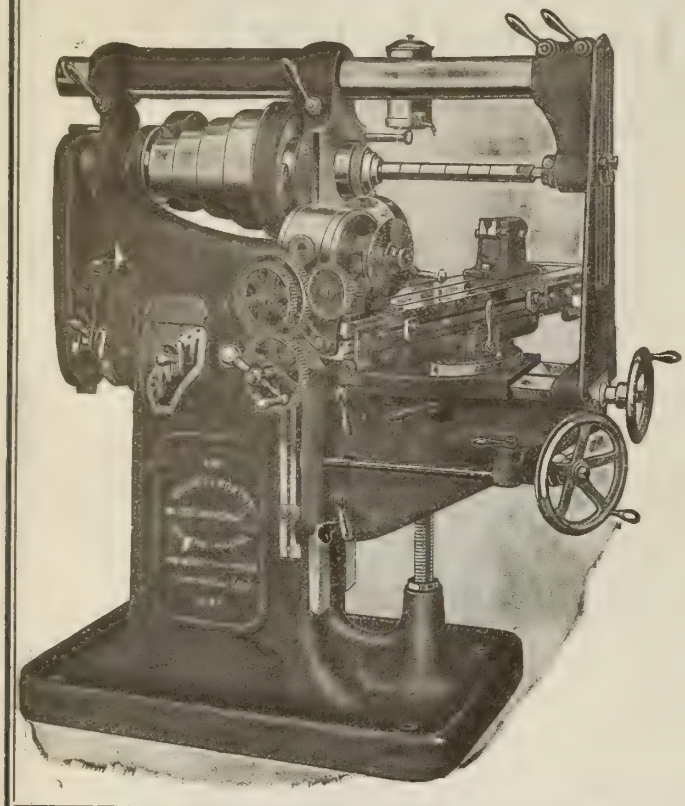

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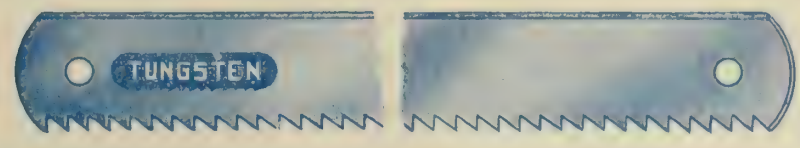
QUALITY **"FOSS"** *SERVICE*

"TUNGSTEN"
HACK SAW BLADES



We have demonstrated to more than one thousand different users of Hack Saw Blades throughout Canada the great saving that takes place in the using of our Genuine **Tungsten Hack Saw Blades,** both for Hand Frames or Power Machines.

They master all cutting-off difficulties. Efficiency and economy are the two things that every manufacturer is working for to-day, and **Tungsten Hack Saw Blades** from this standpoint are superior.

The best evidence of the superior cutting quality of **Tungsten Blades** is a trial in actual use. We want you to know by using **Tungsten Hack Saw Blades** just what they can do. Each and every blade stamped

Send trial order. You will find them even better than we claim.

The Geo. F. Foss Machinery & Supply Co., Limited

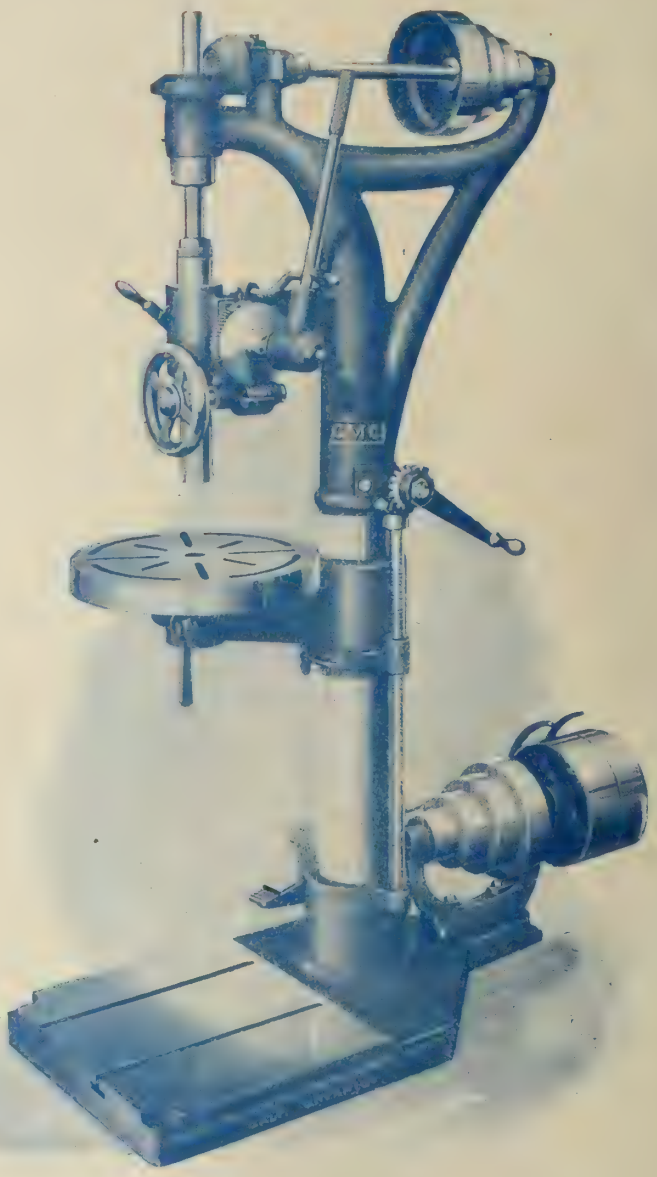
Machinery and Supplies

305 St. James Street **Montreal, Que.**

C.M.C.

20-inch Drill with

Wheel and Lever Feed



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Our 20" wheel and lever feed drill is built for accurate and reliable service. The column is heavy and rigid, the drives strong, and the operating devices handy, quick and effective.

We manufacture a similar machine with back gears and power feed. Write for special descriptive bulletin. We manufacture also a complete line of iron and wood-working machinery.

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Toronto Office and Warerooms: BROCK AVE. SUBWAY

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

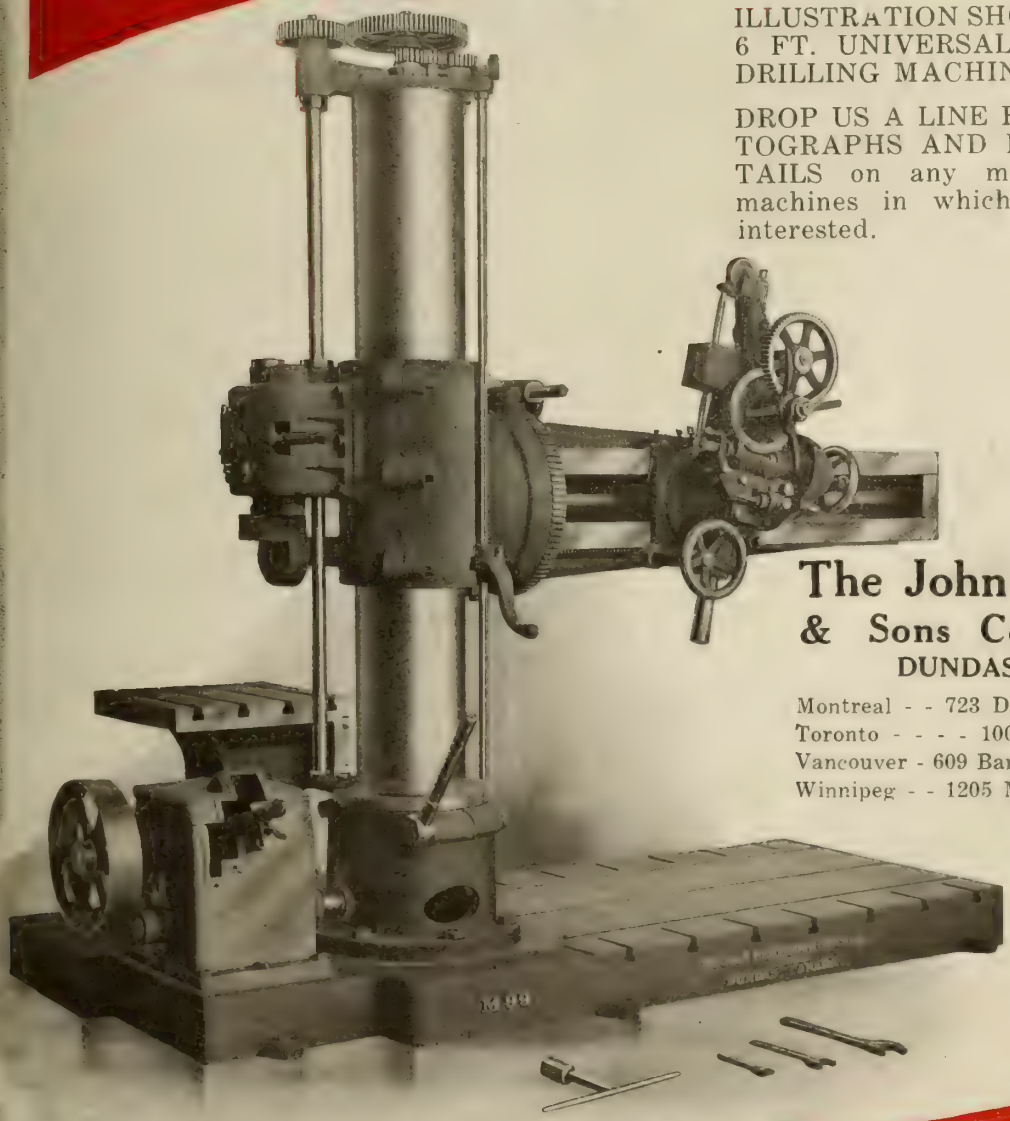
Vol. XXI. No. 17. Publication Office: Toronto, April 24, 1919 Subscription Price $3.00 per Year

BERTRAM MACHINE TOOLS

are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

ILLUSTRATION SHOWS OUR 6 FT. UNIVERSAL RADIAL DRILLING MACHINE.

DROP US A LINE FOR PHOTOGRAPHS AND FULL DETAILS on any machine or machines in which you are interested.



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DUNDAS, ONT.

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Toronto - - - - 1002 C.P.R. Building
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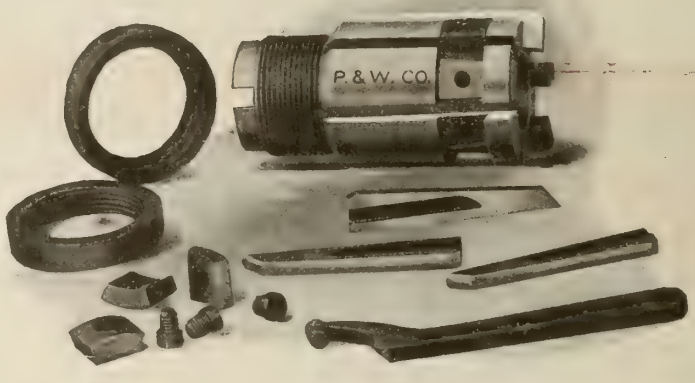
Winnipeg - - 1205 McArthur Building

SMALL TOOLS

P. & W. Adjustable
BLADE REAMERS



These reamers have eccentric relief and can be set to size without regrinding. They are unexcelled for design and simplicity and ease of adjustment. The eccentrically relieved blades are stronger than others, do not chatter, and produce a smoother hole. The hand, shell and fluted chucking reamers have interchangeable nuts, screws and wrenches. The bottom of a hole can readily be faced. By a simple adjustment of the blades the reamers can easily be set to size without regrinding.

PROMPT SERVICE

Small Tools are carried in stock. Place your order there to-day.

Precision Machine Tools--Standard and Gauges

PRATT & WHITNEY CO.
OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

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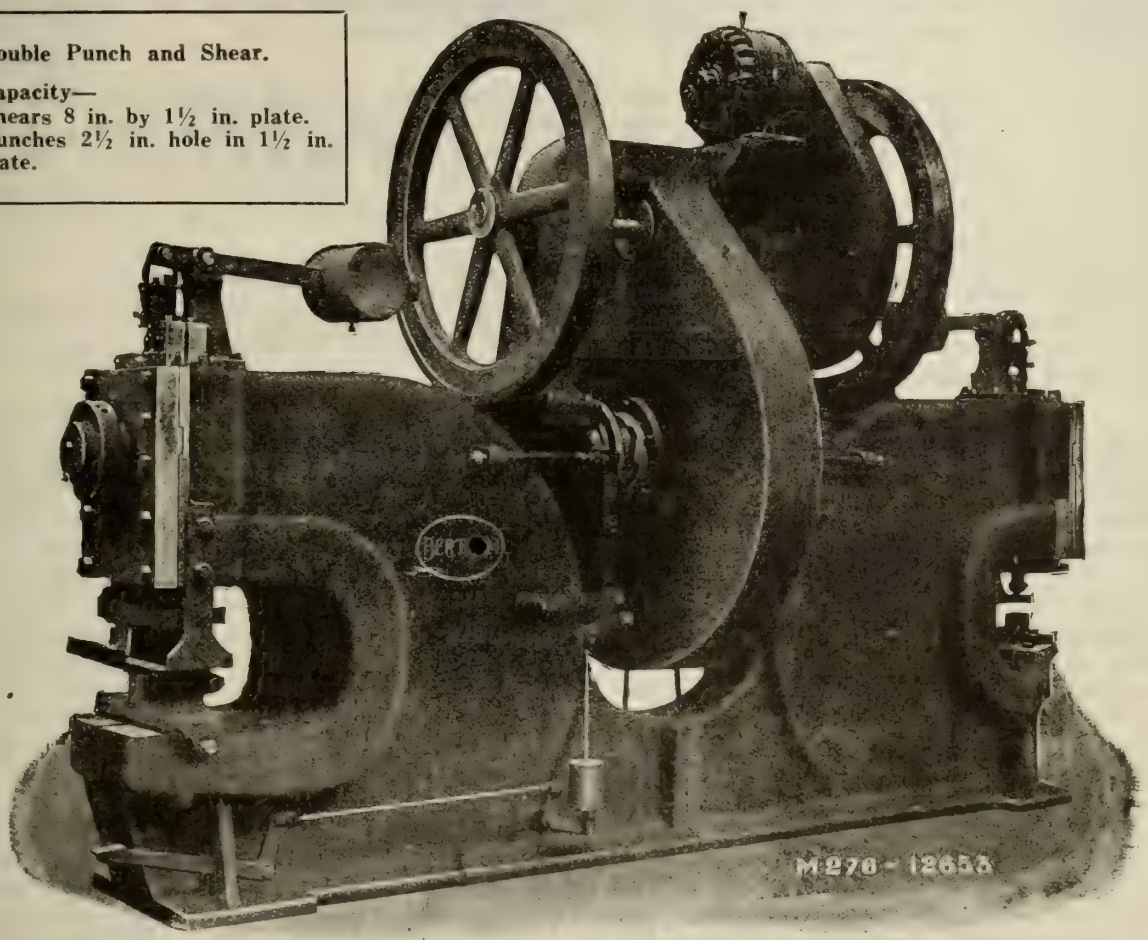
For Structural, Bridge and Shipbuilding Plants

Modern in design and built for heavy service, our line embraces a varied equipment of Punches, Shears, Bending and Straightening Rolls, Coping Machines, Rotary and Plate Planers.

The assistance and advice of our engineers are yours for the asking.

Double Punch and Shear.

Capacity—
Shears 8 in. by 1½ in. plate.
Punches 2½ in. hole in 1½ in. plate.



The John Bertram & Sons Co., Limited

DUNDAS, ONTARIO, CANADA

MONTREAL 723 Drummond Bldg. | TORONTO 1002 C.P.R. Bldg. | VANCOUVER 609 Bank of Ottawa Bldg. | WINNIPEG 1205 McArthur Bldg.

The Publisher's Page

TORONTO APRIL 24, 1919

Urges Advertising to Combat Bolshevism

Arthur Dunn Points to the Weapon of Misdirected Education Which Has Become a Menace in the Hands of Lenine and Trotzky—The Truth Will Prevail, if It Is Made Known.

IN a speech at the New York Advertising Club, on April 3, Arthur Dunn, business counsellor and former vice-president of the United Cereal Mills, issued a call to advertising men to become part of a movement to spread education as an offset to Bolshevism.

At the start of his speech, Mr. Dunn conducted a voting contest to discover the judgment of his audience as to the most successful salesman in the United States. Henry Ford, Charles M. Schwab and President Wilson received the greatest number of votes, but according to the speaker no one picked his choice, who is Billy Sunday. The speaker pointed out that the greatest sales problem in the world to-day is the sale of true education to both the workers and manufacturers.

After pointing out some of the inequalities which are at present conducive to the spread of radicalism, Mr. Dunn said that the remedy for the present situation is immediate and widespread education through advertising.

"Goods are of no value unless exchanged," he declared; "the producers of the world must produce enough for themselves and the men in non-producing lines. Bolshevism would destroy the civilization built on the Ten Commandments, would produce by vicious and ignorant energy instead of intelligent directed energy. The competing salesmen, Lenine and Trotzky, are brainy men. They do not despise the working man, thinking his education of no value, but teach him political economy of the wrong kind. It is in shutting our eyes to the educational work being carried on by our competitors that the present danger to civilization lies.

"A certain element in labor when dissatisfied with present conditions, has tried to find remedies through the strike, sabotage, shorter working hours. All these methods are wrong in that they tend to cut down production without which prosperity is impossible. Cutting down production works around in a vicious circle, cutting down welfare and prosperity in direct proportion.

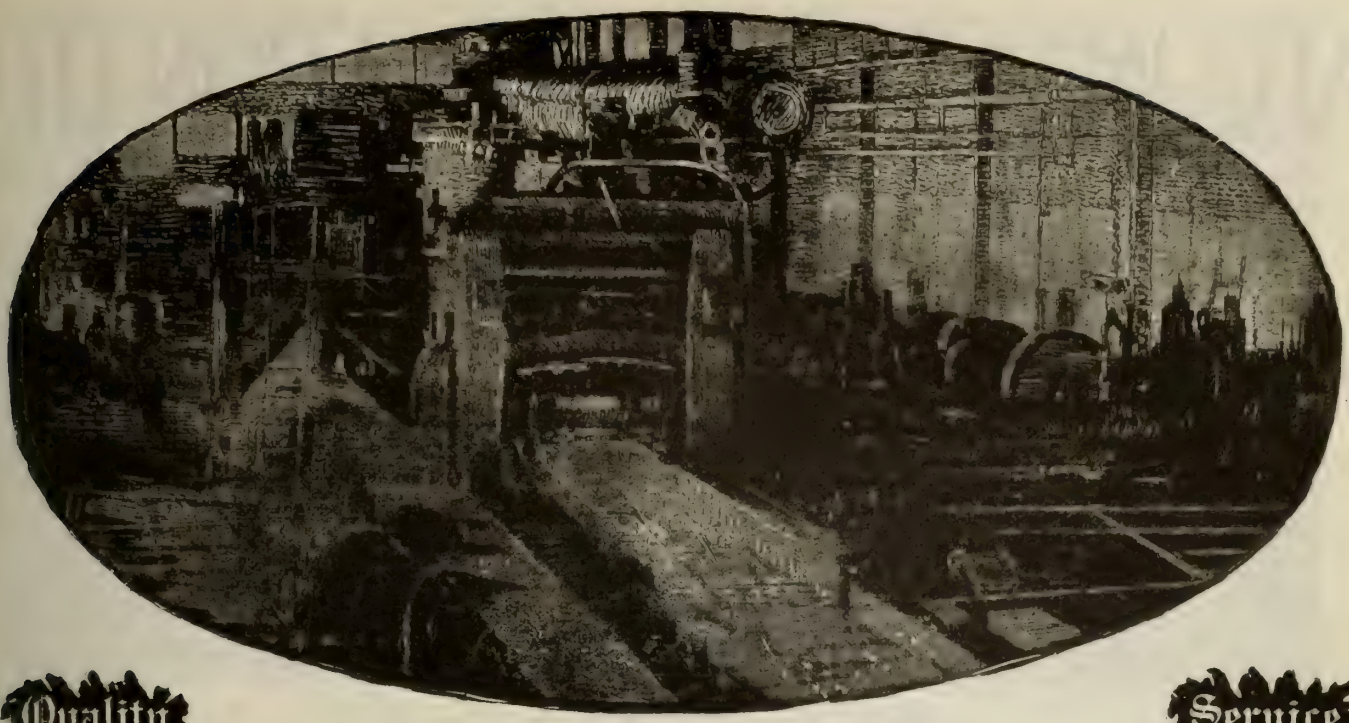
"Through advertising we can teach the workingman that prosperity and production go hand in hand. The leaders of the cult in Russia have told their followers that Bolshevism will fail unless production increases. What are we doing?

EDUCATION NECESSARY BOTH FOR EMPLOYER AND EMPLOYEE

"The workingman is not the only one who needs education; the employer needs it as badly, if not more. We must teach the employer of men that labor must have a greater share in the prosperity it helps to produce. We must show the employer that the man who works for him is entitled to a minimum wage which shall give him enough to live on and something over. We must make the employer see that a new economic system is coming, that co-operation, not competition, will rule the industrial life of the future. Competition was the habit and invention of the savage — co-operation is modern and more efficient.

"When you return to-night to your home and all that it means to you, realize that there are men in the world who would destroy it and the principles which make home life sacred, realize that these men are using modern sales methods to secure followers for their creed, then go out and get busy, urge all men in the publishing and advertising business to give their thought and their effort to offsetting the spread of these ideas by education and advertising."—PRINTERS' INK.

Canadian Machinery and Manufacturing News, April 24th, 1919. Vol. 21, No. 17. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



Quality Service

REASON IT OUT

Demand full value for every dollar by spending it where you earn it

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar is Worth One Hundred Cents in Canada

THE STEEL COMPANY OF CANADA LIMITED

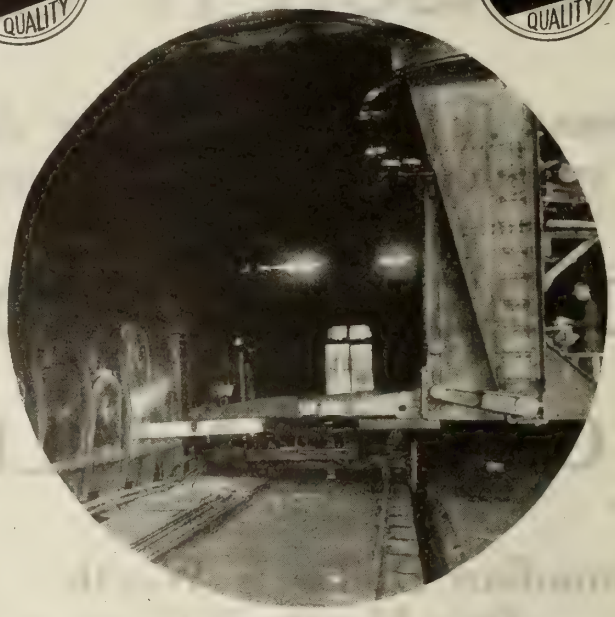
HAMILTON MONTREAL

ALGOMA STEEL CORPORATION, LTD.

SAULT STE. MARIE, ONTARIO

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

MARK OF ALGOMA O.H. QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. *Nitre Cake*

MARK OF ALGOMA O.H. QUALITY

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

BETTS

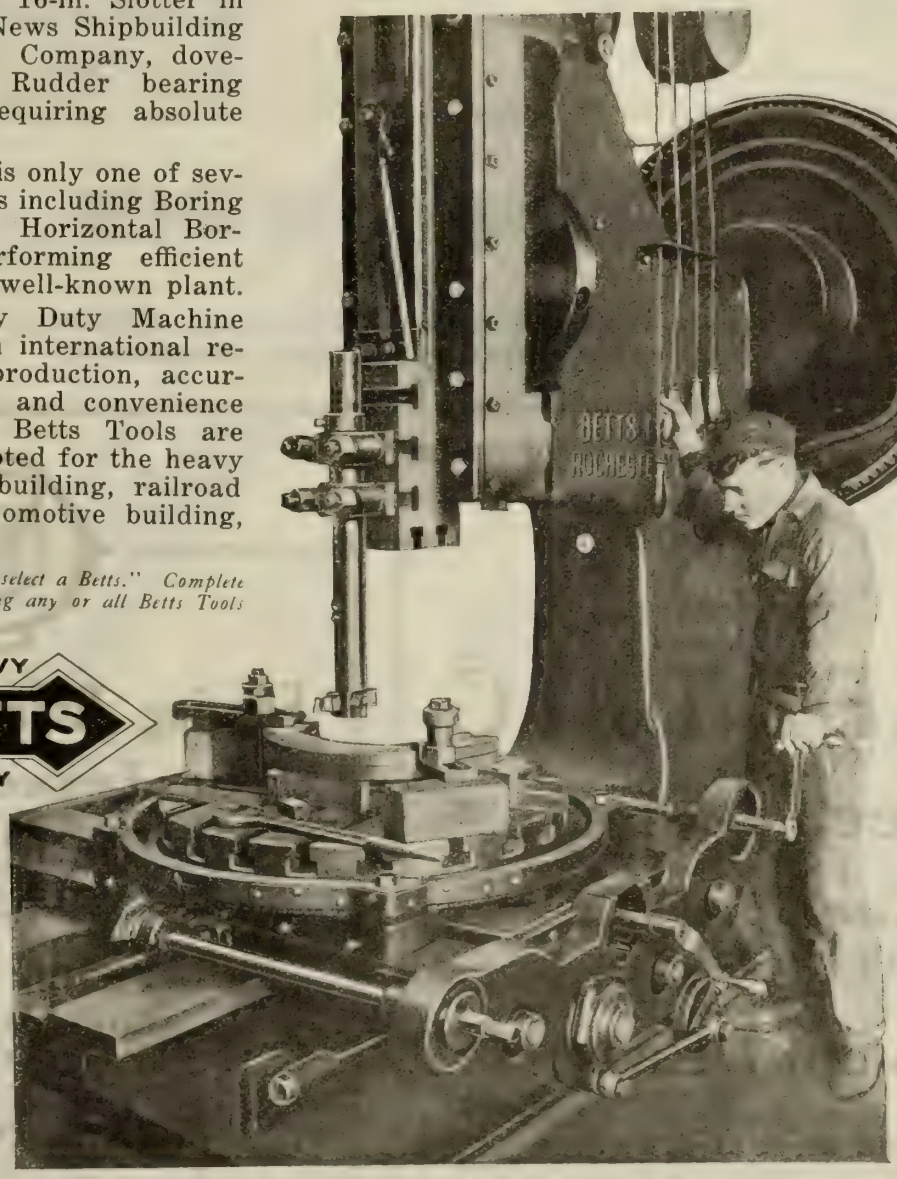
Betts 16-in. Slotter in Operation in Newport News Shipbuilding and Dry Dock Co.

The accompanying photograph shows a Betts 16-in. Slotter in the Newport News Shipbuilding and Dry Dock Company, dovetailing brass Rudder bearing ring halves requiring absolute accuracy.

This Slotter is only one of several Betts Tools including Boring Mills, Planers, Horizontal Boring Mills, performing efficient service in this well-known plant.

Betts Heavy Duty Machine Tools enjoy an international reputation for production, accuracy, durability and convenience of operation. Betts Tools are especially adapted for the heavy duties of shipbuilding, railroad repair and locomotive building, steel mills, etc.

"To avoid regrets select a Betts." Complete information concerning any or all Betts Tools promptly furnished.

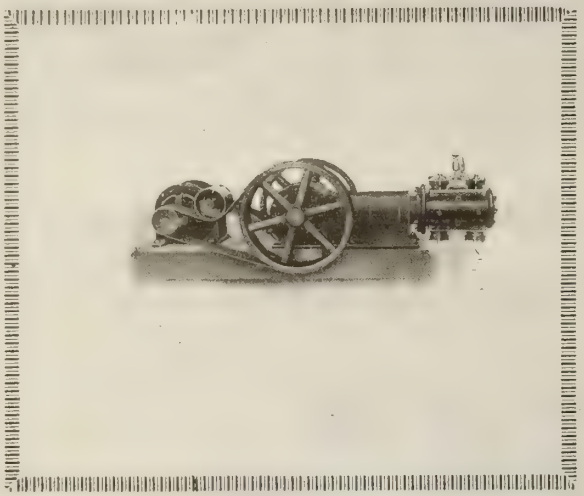


HEAVY BETTS DUTY

Planers
Boring and Turning Mills
Tire Turning Mills
Car Wheel Borers
Slotters
Horizontal Boring, Drilling and Milling Machines

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.

The Short Belt Drive For Compressors Saves Space



Have you been wondering how you can fit that compressor into your power house? Here is the solution—the short-belt drive.

We build both single-stage and two-stage machines—straight-line and duplex with this type of drive.

Less floor space
Less belt expense
No belt stretching
Capacities up to 2,000 ft. per min. with short-belt drive.

Send for our booklet on how to apply the short-belt drive to the best advantage.

Canadian Ingersoll-Rand Company Limited

SYDNEY, SHERBROOKE, MONTREAL, TORONTO
COBALT, WINNIPEG, NELSON, VANCOUVER

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Annealed—Heat Treated

Piston Rods
Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company
Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

SPEED • ACCURACY

Chemistry the Keynote of Tool Efficiency

It reveals the constituent parts of substance. It transforms weakness into strength.

Every Wilt High Speed and Carbon Twist Drill, Reamer and Milling Cutter is representative of careful chemical analysis. Exact proportions of various ingredients, which are known by practical tests to give the desired results, are carefully specified. From the chemical analysis and throughout the various stages of their manufacture, WILT PRODUCTS are carefully tested for QUALITY.

That's why tools of WILT manufacture can be driven with extreme speed and stand up where ordinary tools would fall down. That's why they are absolutely accurate in their work.

For satisfactory results use WILT DRILLS, REAMERS AND MILLING CUTTERS.

Where There's a WILT--- There's the Way.

WILT

HIGH SPEED AND CARBON TWIST DRILLS, REAMERS AND MILLING CUTTERS

Manufactured by the

WILT TWIST DRILL CO. OF CANADA LIMITED

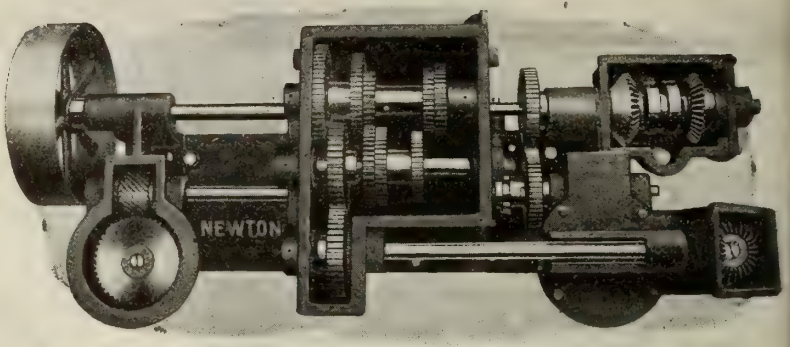
Walkerville Ontario

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, LONDON, E.C. 2 Eng.

THE JOHNSON FRICTION CLUTCH

OVER THERE

is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.



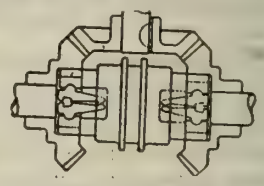
Courtesy of Newton Machine Tool Works, Phila., Pa.

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads., note the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are your requirements?

Our booklet, "Clutches as Applied in Machine Building," and Yellow Data Sheets are free

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal; The Canadian Fairbanks-Morse Co., Limited, Montreal and Branches. ENGLAND—The Efandem Co., Limited, 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth St., Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.



Double Clutch in Nest of Gears

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

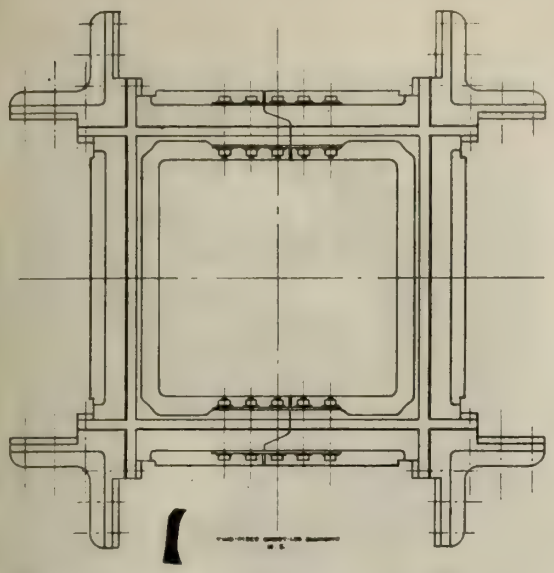
Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager



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COMPLETE INTERSECTIONS

Built-up, Hard-Centre or Solid Manganese-Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings.

CANADIAN STEEL FOUNDRIES, LIMITED

Transportation Building. Montreal

Electrite Uranium

Electric furnaces, automatically regulated, the most modern methods, and the introduction of **Uranium** — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

LOCOMOTIVE AND CAR WHEEL TYRES

HIGH-SPEED AND CARBON
TOOL STEEL

MISCELLANEOUS SHOP TOOLS

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27 King William St. HAMILTON
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The Last Word in Accuracy and Production

In the keen competition about to begin both for home and export business, only the efficiently equipped and economically run shops will succeed. The use of Ford-Smith Millers for accurate, general work, and quantity manufacturing will help you to the desired results.

Get in touch with us. Our service is at your disposal.

The Ford-Smith Machine Co.
LIMITED
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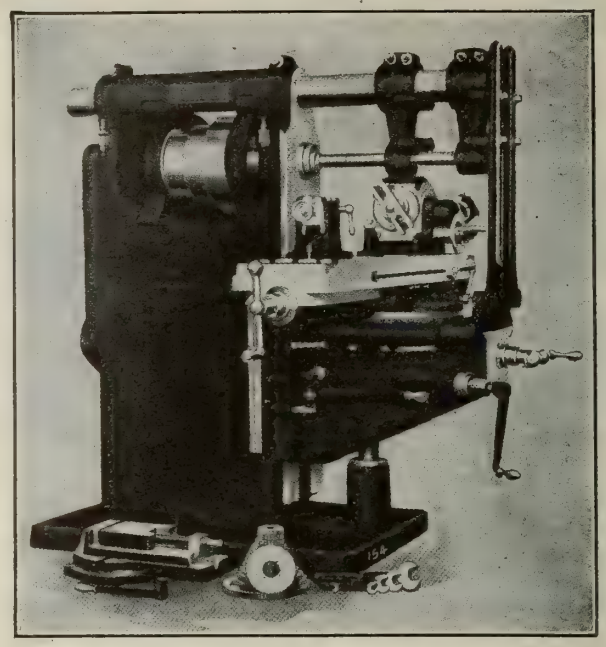

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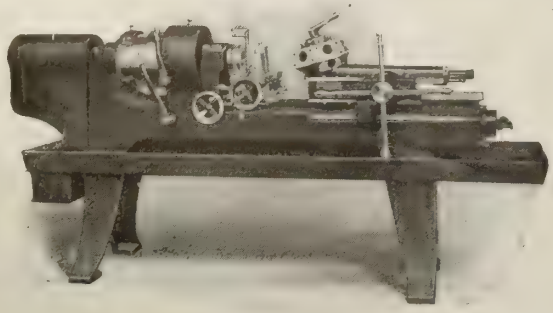

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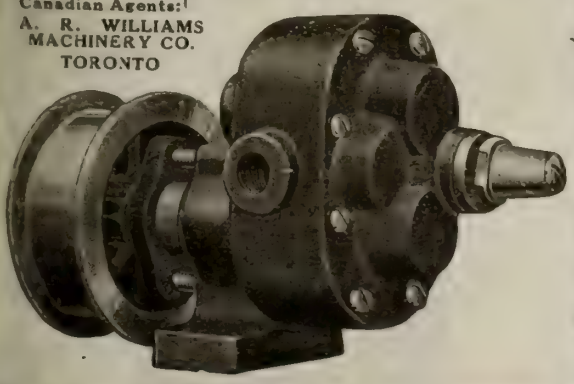

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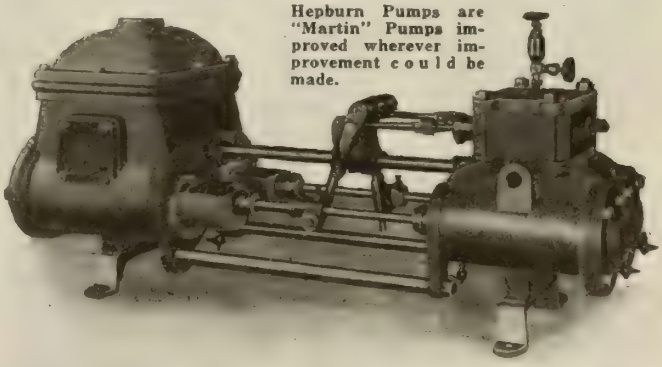

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PROMPT SHIPMENTS from large stock

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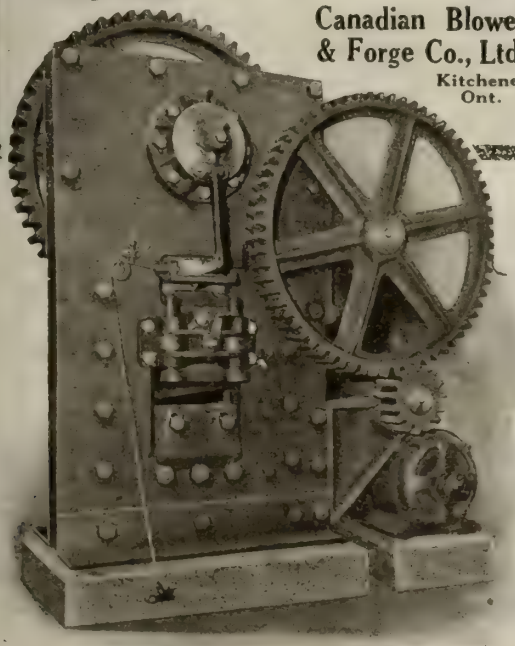
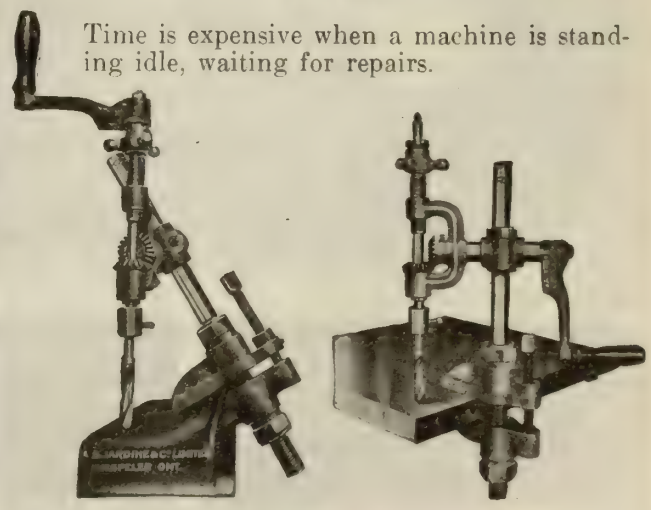


Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

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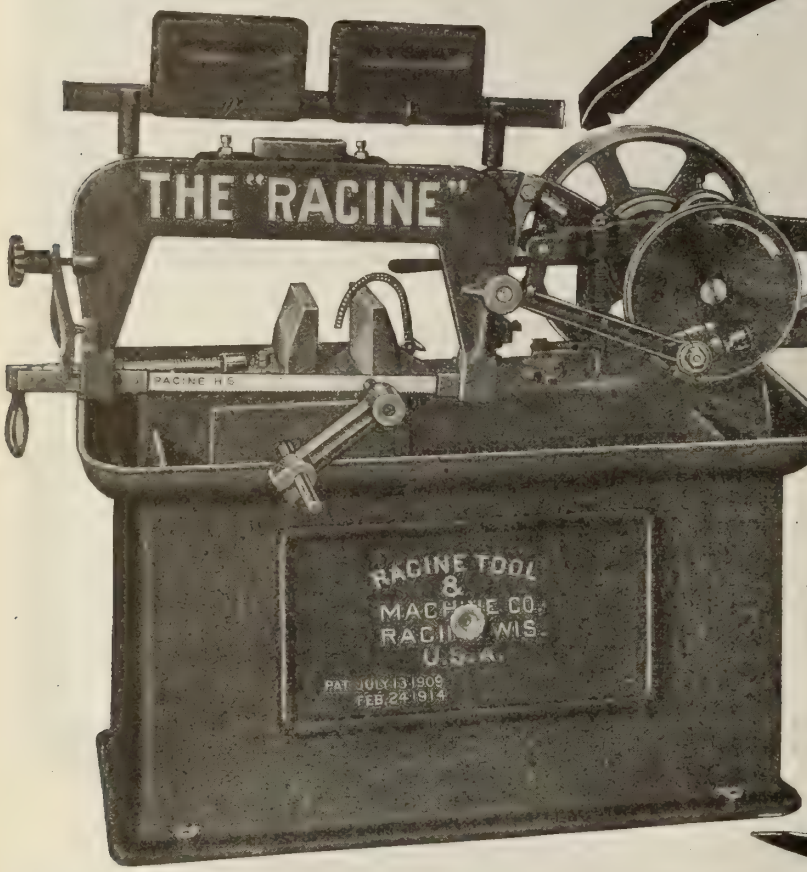
"THE RACINE"
High Speed Metal Cutting Machine



Reduces Blade Expense

Aside from its ability to turn out more work than any other metal cutting machine, the "RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

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Use "Racine" H. S. Tungsten Power Blades

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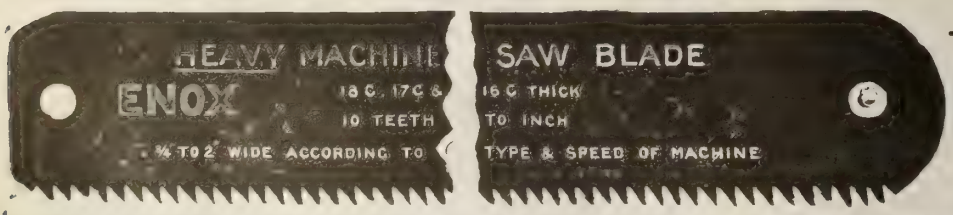

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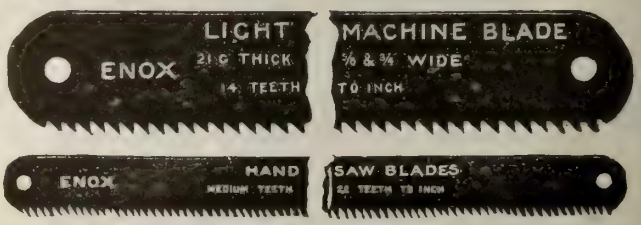

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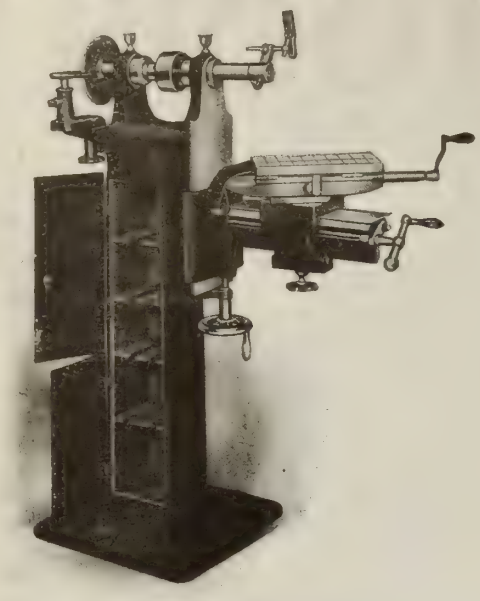

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The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriege is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

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Machine is designed to keep its original factory accuracy.

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guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

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It is in a class by itself. In your shop it will operate with the greatest degree of economy and efficiency.

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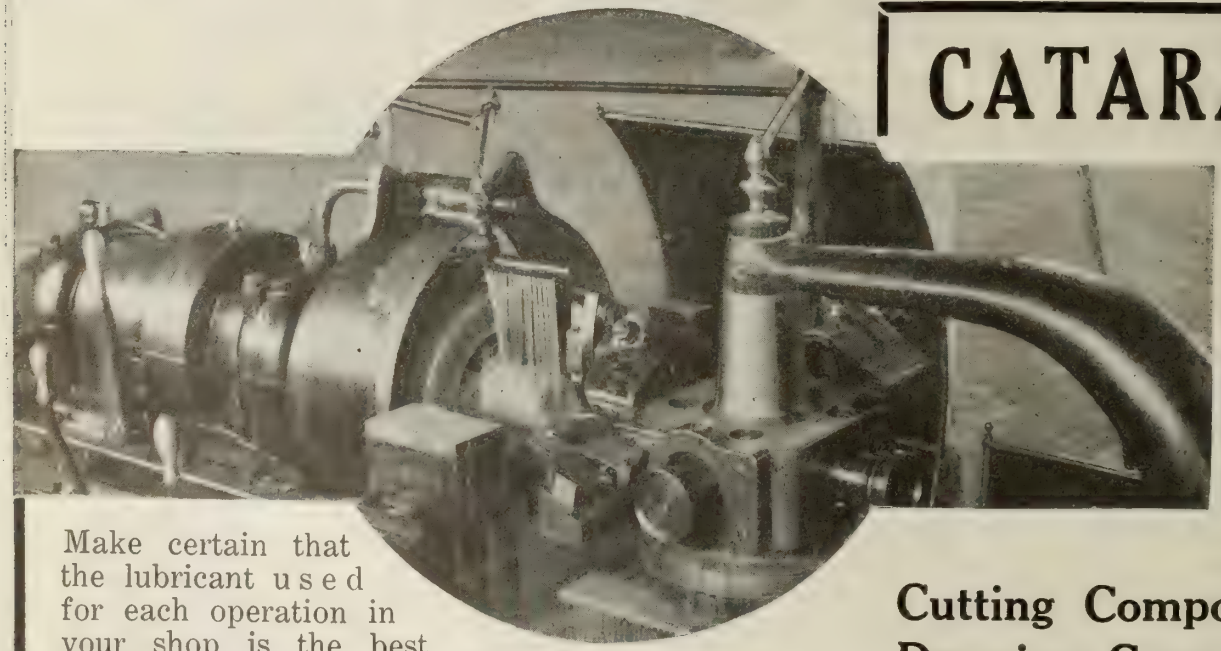

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Write us to-day that we may demonstrate how Cataract Lubricants can increase production and reduce cost in your plant.

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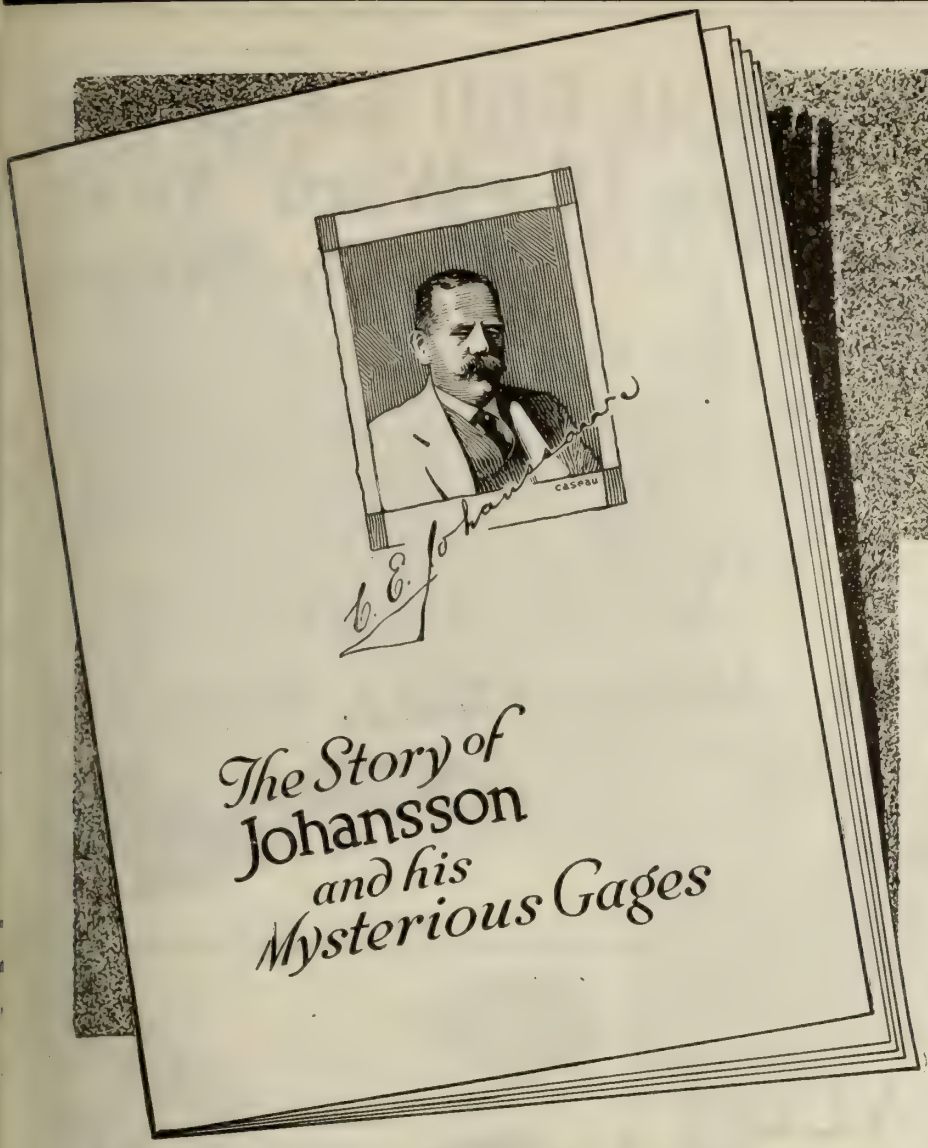

CONTENTS

Who is Johansson?
The Toolmaker Who Searched For Accuracy.
Solving the "Impossible."
Accuracy Almost Beyond Imagination.
What is 0.00001"?
Johansson Accuracy Once Doubted.
Flat Surfaces in Steel.
Parallel Surfaces in Steel.
Accuracy as to Size.
Treatment of the Steel.
The Limit System.
100% Perfection—Is It Possible?
Personal Equation.
Yes or No.
Effect of Johansson's Work Upon Industry.
Of What Use is Accuracy?
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The Modern Machine Shop, etc., etc.

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Where is the shopman who has not wondered just who Johansson is, what he is like, how he works and produces his mysterious Gages?

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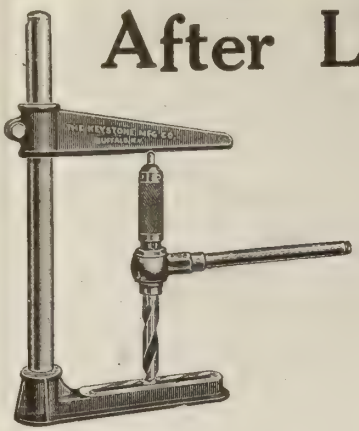
"Keystone Quality" Will Still be There After Long Use Has Worn Away The Name



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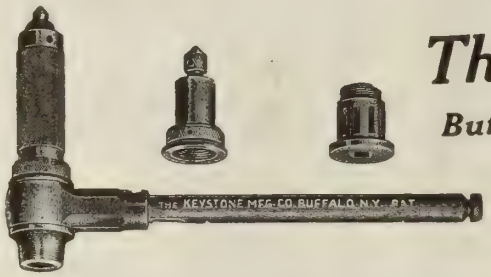

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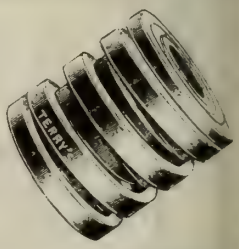

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You Cannot Afford to Take Such Chances

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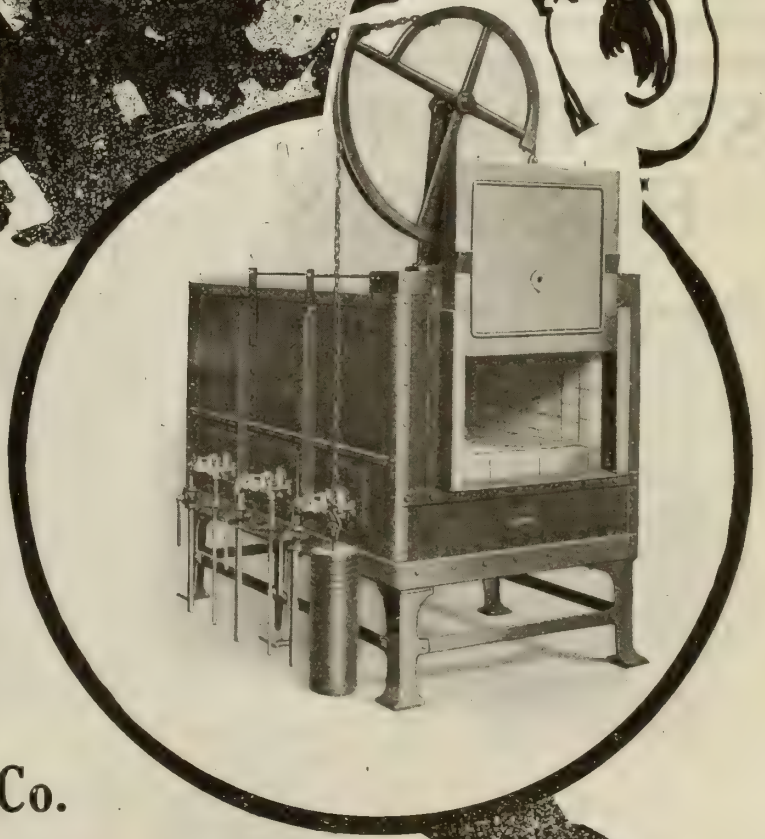

insure uniform high quality of produce because they are designed right and built right. The combustion in a G. & R. Furnace is 100% efficient, temperature control is one of the big features, the heat is uniform **always**, the result is a finished product of maximum tensile strength which will stand up under the hardest usage.

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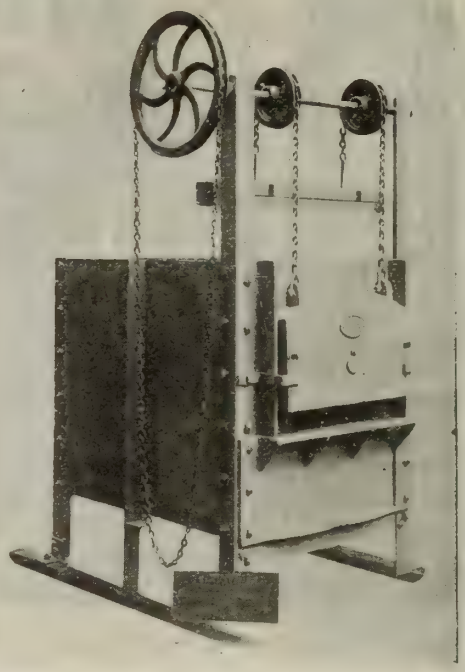

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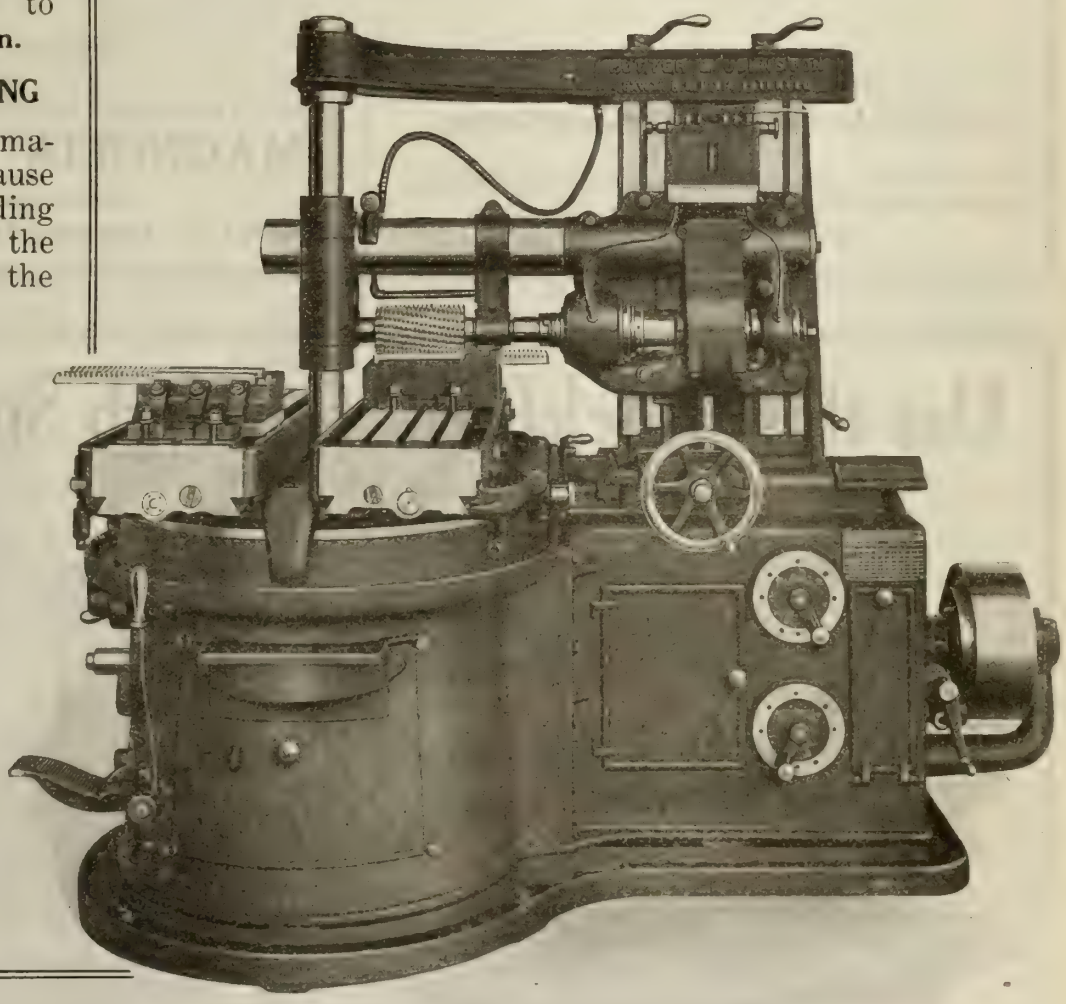

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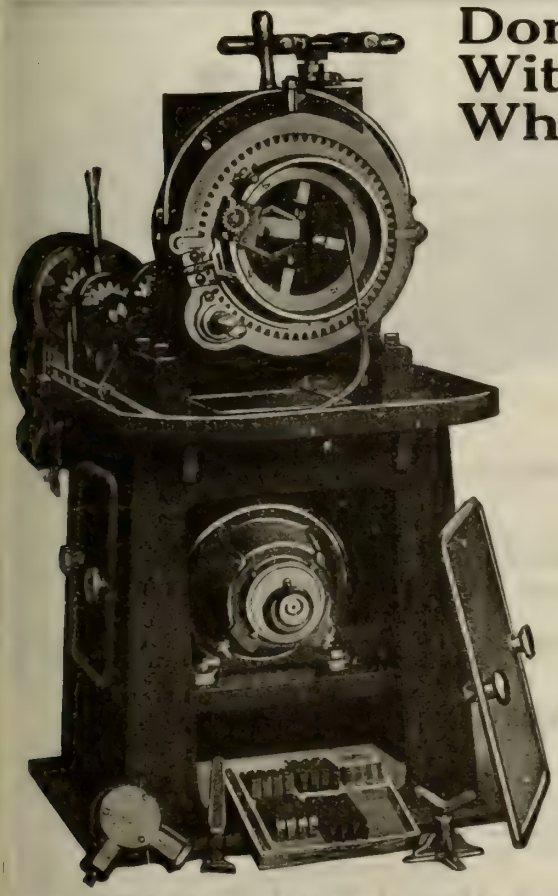

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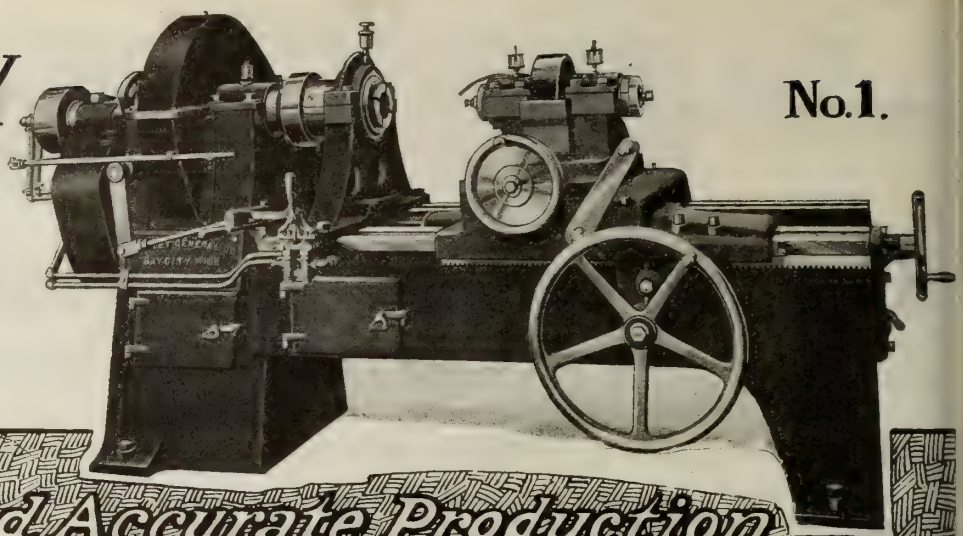

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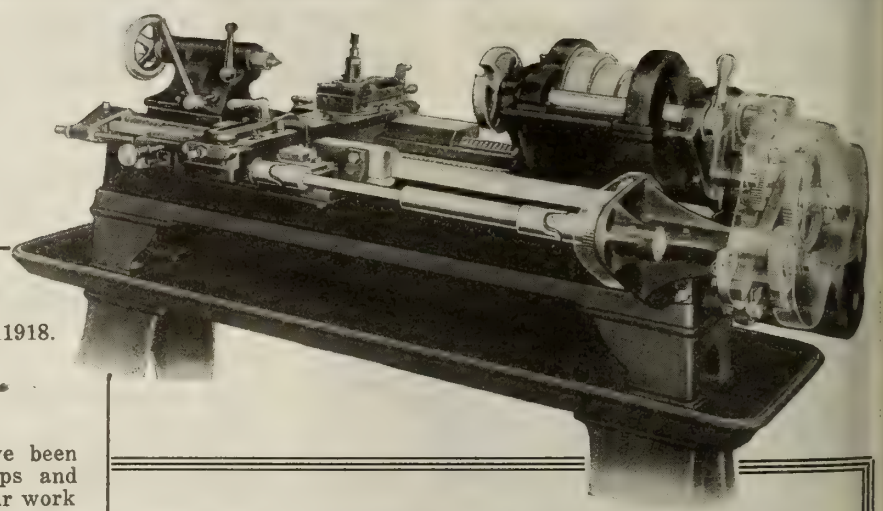

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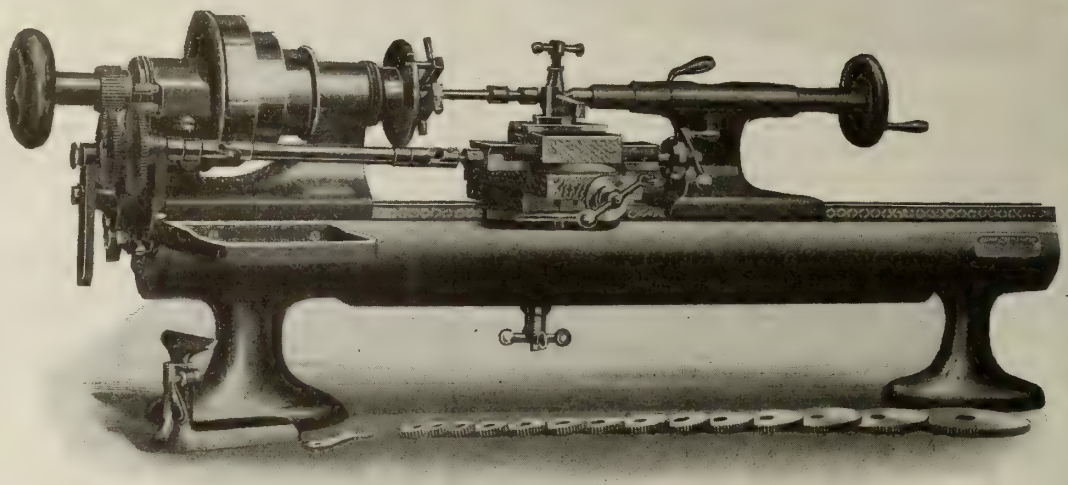

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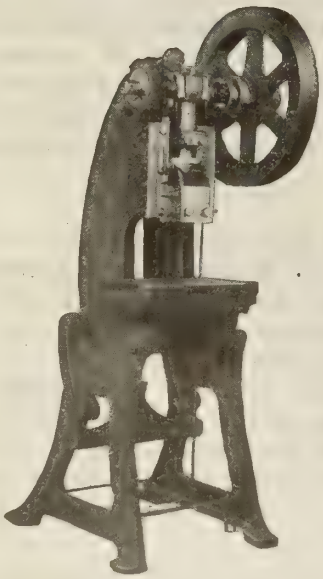

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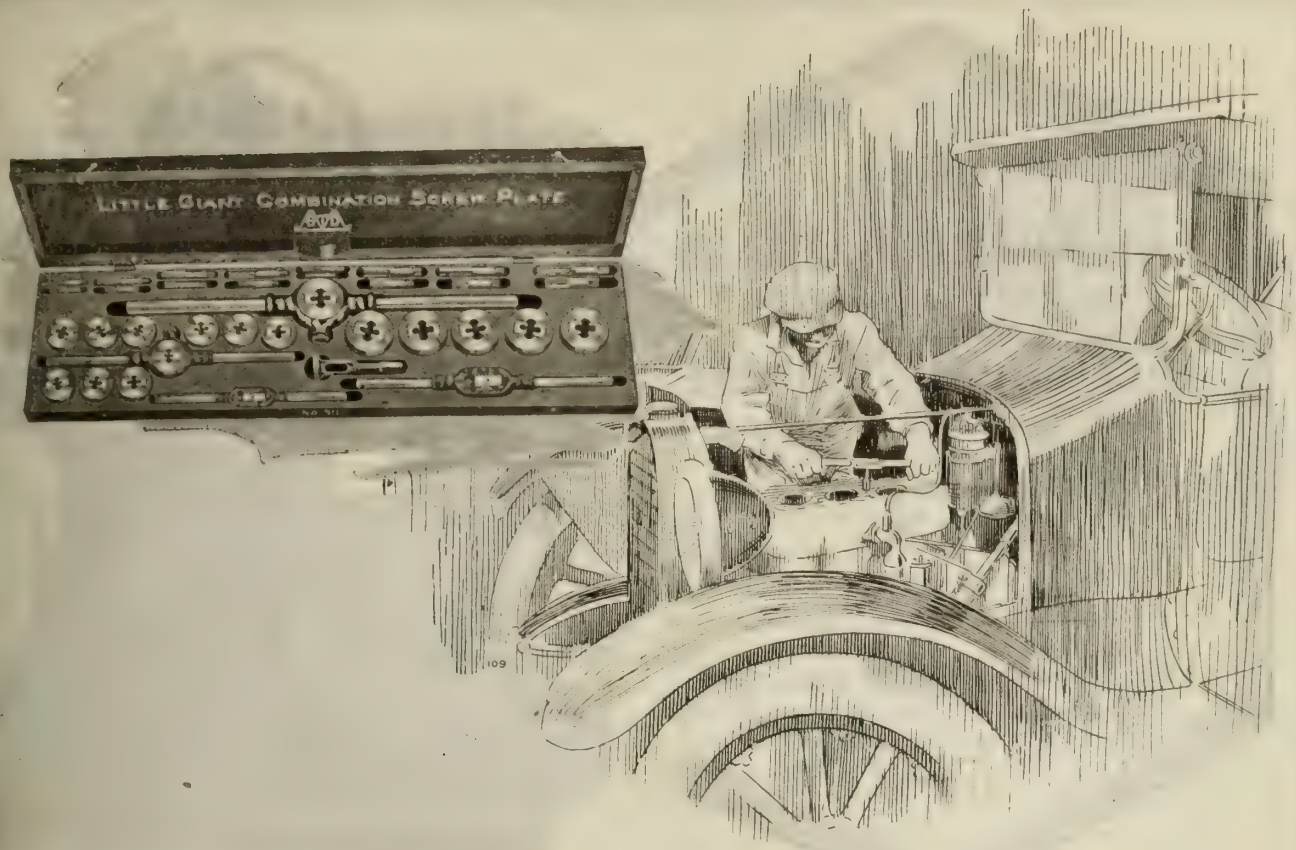

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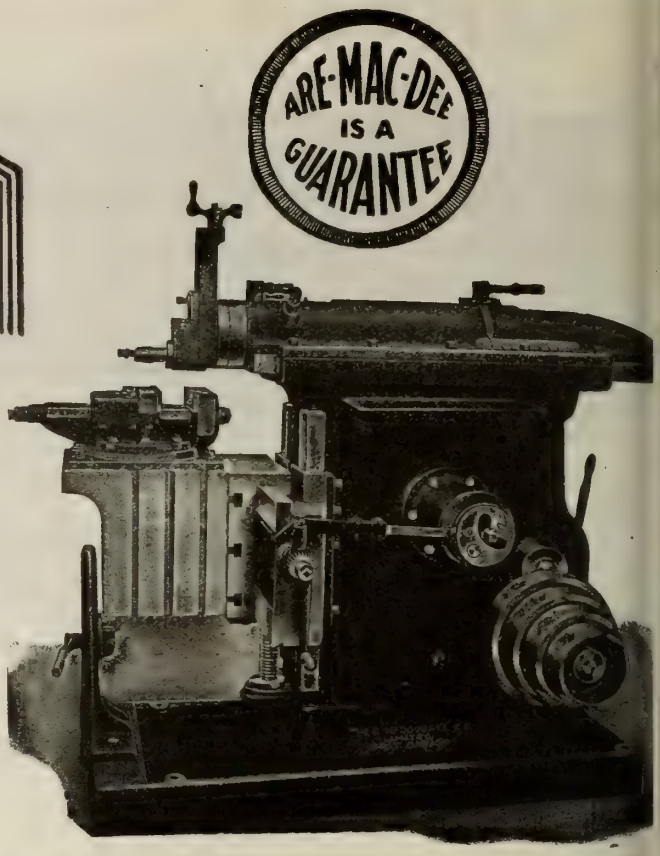

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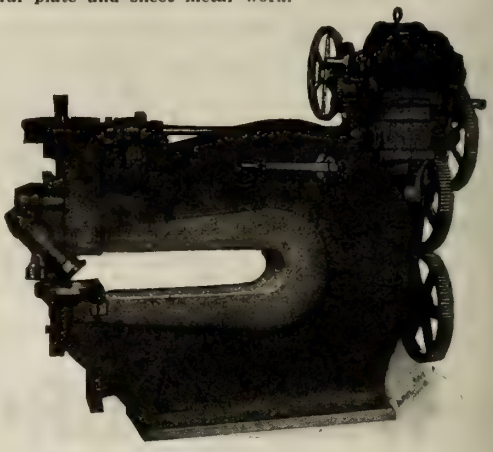

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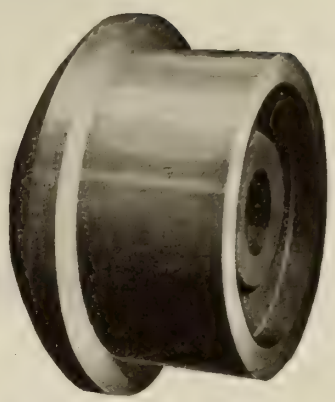

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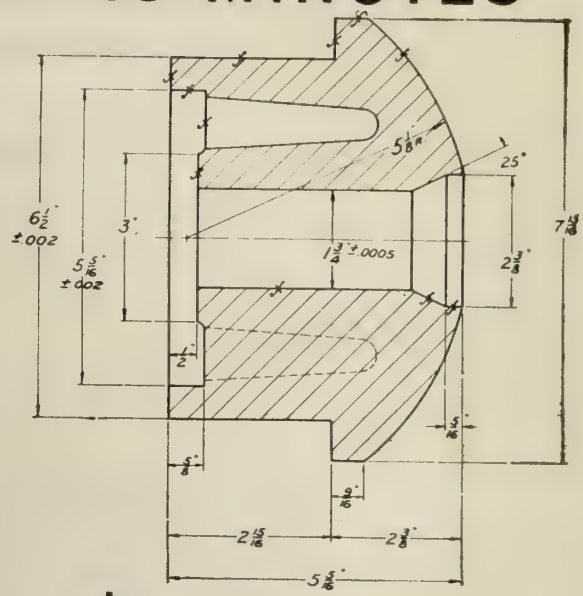

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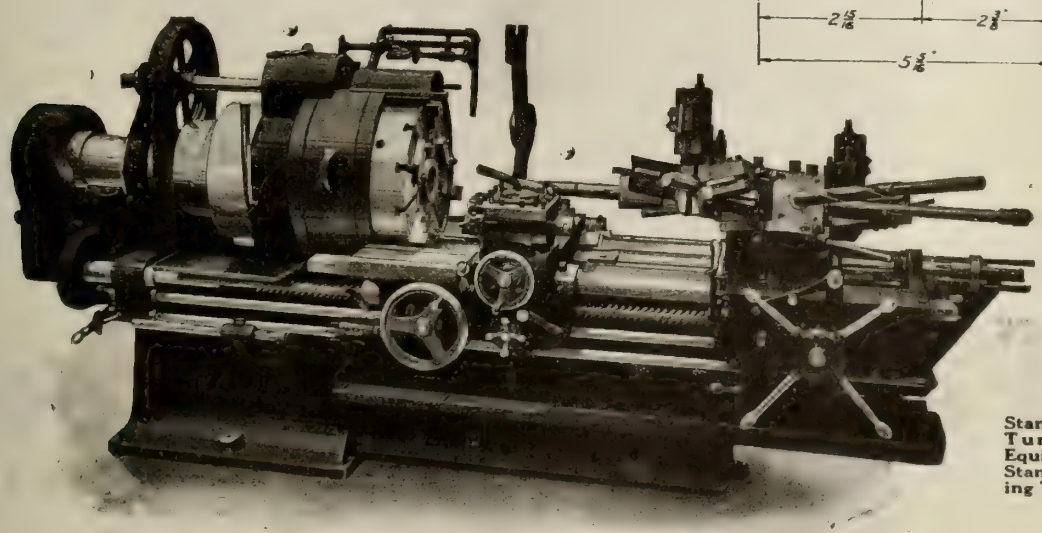

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CANADIAN MACHINERY
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MANUFACTURING NEWS

Volume XXI. No. 17. April 24, 1919

Manufacturing the Banner Hosiery Machine-III

A Further Instalment on the Two Previous Articles on the Subject of the Construction of These Interesting Machines

By ROBERT MAWSON

IN the previous instalments of this article we have discussed at some length various fixtures and methods used on Jones and Lamson automatics. The Hemphill Manufacturing Co., Pawtucket, R. I., have also designed many fixtures for use on the milling machine, and some of these will be illustrated and described in this section.

In Fig. 1 is shown the operation of form milling the sinker cams on a Briggs milling machine. This type of machine is admirably fitted for work of this nature.

It will be seen that the arbor which drives the cutter is well supported on the outer end in a long bearing of large diameter, thus reducing any danger of chattering and permitting a good feed to be taken.

The sinker cams are made from a special mixture of chrome vanadium steel. The fixture is of simple construction, being a special set of jaws attached to a milling machine vise which is located by tongues and held on the machine table by means of two bolts. The close jaw type of fixture is not used as much as it might be; it has the advantage of being cheap in construction and may be adapted very well for almost any part, having a flat section as well as other simple elements. After the jaws are once fastened the pieces are always held rigidly for the machining operation. In this fixture fifteen parts are held in one setting, being located by a stop plate at one end against which they are pushed by the operator.

The table is then raised to the correct height and the revolving form cutter machines the proper contour on the pieces. In the illustration Fig. 2 is shown the fixture used when milling the middle pulley. The casting is located by a plug which fits into a previously reamed hole.

After the pulley has been dropped into position a socket wrench is placed in the square shown in the centre of the plug and as this is of the expansion type a slight turn expands the locating plug and holds the pulley securely. The slot shown, which is ½ inch wide and 5-16 inch deep, is then machined, using a side milling cutting of the same width as noted, the operation being performed on a horizontal milling machine. The fixture is located by tongues and held on the machine table with bolts fitting in the slots shown at the ends of the fixture. The gauge used to test the correctness of the machining operation is shown at the left of the fixture.

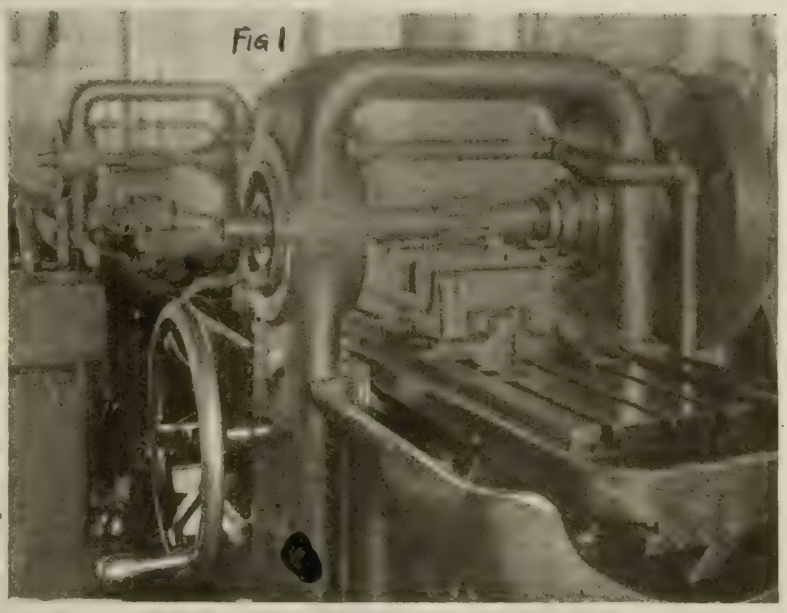


FIG. 1—FORM MILLING THE SINKER CAMS

Milling the Instep Raise Cams

The next half-tone is very interesting, being the fixture used for milling the instep raise cams. These pieces are machined with a groove down the centre in a previous operation.

The clamps, twelve in number, are made with a tongue of the same width as this milled groove, and as the cams are pushed in from the end of the fixture the tongue is used as the locating medium.

Each clamp is wide enough to hold two pieces as shown, and after the bolts are tightened down the cams are both located and held accurately and securely.

The fixture is again located by tongues and held on the horizontal milling machine by means of bolts. Two angular cutters correctly placed are then fed across the pieces, the table feeding in the usual manner.

The desired contour on both ends of the cams are thus produced in one operation on top of the fixture and also in front may be observed some of the finished machined parts.

The half-tone Fig. 4 shows the fixture used when straddle milling the stitch cams. This work is performed on a horizontal milling machine, two fixtures being mounted on the table at once, one holding a left hand and the other a right hand piece.

The cam is located by four pins A, the piece fitting inside these pins. At B the fixture is provided with an expansion by tightening the screw in the plug which expands the stitch cam is held securely.

The two fixtures are set vertically on the machine table in the position shown, being located by tongues and held down by means of bolts. The sides or edges of the cams are milled in this fixture, the cutters being correctly spaced to obtain the proper width.

By referring to the illustration it will be seen that the fixture is made with a recess on each side of the stitch cam when in position which enables the cutters to machine the part without interference. The table is then moved across

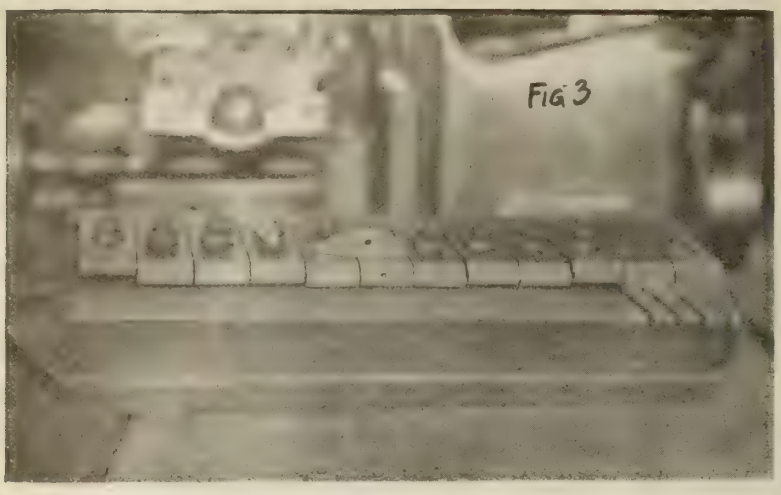


FIG. 2—FIXTURE FOR MILLING THE MIDDLE PULLEY

to the fixture holding the other hand of cam and the operation repeated. In front of the fixture is shown two of the stitch cams which have been milled in this fixture.

Cutting Raise Cams

The half-tone Fig. 5 shows the interesting and somewhat unusual method of employing an index head for a milling fixture. This tool is used for sawing apart the raise cams.

These pieces are made from tool steel rings which have been machined all over to the required dimensions. On the spindle of the index head is attached a large plug, the outside diameter of which is a good sliding fit for the bored hole of the ring.

The cam ring is then placed on this plug and held securely by means of the nut A. The table is afterwards raised to the proper height so that the saw B will pass through the ring section. The table being fed against the revolving saw type milling cutter the first slot is machined and the table fed back so that the cutter is clear of the fixture. The index head is then revolved and of course this turns the ring to the next position determined by the index plate and dial and the machining operation repeated. By this method all the sections cut from the ring are similar in length.

At D is shown one of the rings before being sawn apart, and at E two of the sections cut from a ring, each of which makes six sections.

The illustration Fig. 6 shows the fixture used when straddle milling the clutch forks. It will be noticed that the fixture is designed to hold two forks one in each vertical arm. Under these conditions the operator is inserting a fork at one end whilst another is being machined, thus making the milling operation practically continuous.

The fork is placed in a hole A which is made a snug fit for the shank of the piece. An adjustable parallel is then placed under the fork which projects out of the fixture and the parallel is slid under until the surface of the piece is horizontal. The set-screw B is then tightened on to the shank, thus holding the fork securely. The piece is then straddle milled with a ⅞ inch radius and to .250 inch thick, using the gang set up of three cutters shown. Two of the finish milled clutch forks are shown resting against the fixture.

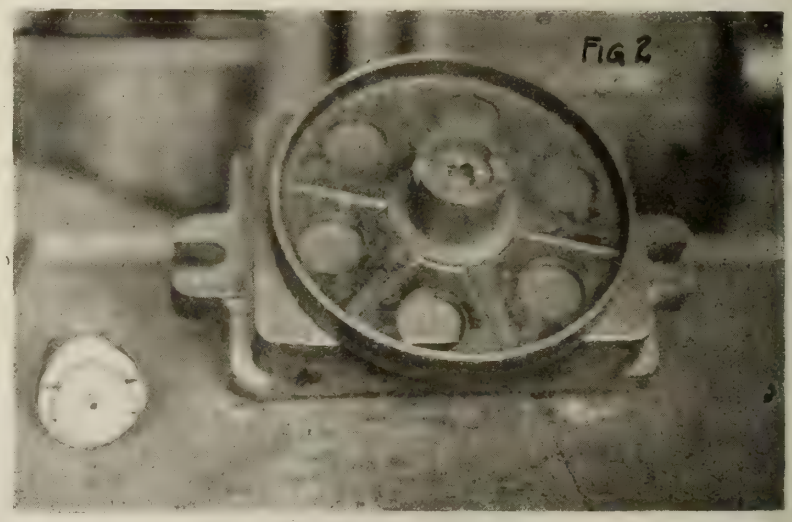


FIG. 3—MILLING THE INSTEP RAISE CAM

Milling the Fashion Cams

The fixture shown in Fig. 7 is used for milling the fashion cams. This tool is designed to hold 36 pieces at one setting which are located on the pins shown one on each side of the vertical arms of the fixture. The cams are then held in position on the fixture by means of clamps, some of these being shown as set-screws of the tool.

This is located by tongues and held in a horizontal milling machine by means of bolts fitting in the slots at each end of the fixture. The table carrying the pieces is then fed against a revolving face mill and the ends of the cams milled at the correct angle and at the proper distance from the reamed hole used for locating them on the tool. One of the finish milled fashion cams is shown resting against the fixture at A.

The half-tone Fig. 8, shows the fixture and operation of milling the angle on the stitch cams. This work is being performed on a Van Norman duplex milling machine with the head set vertically as shown. The fixture proper is made from a rectangular iron block held between the jaws of the milling machine

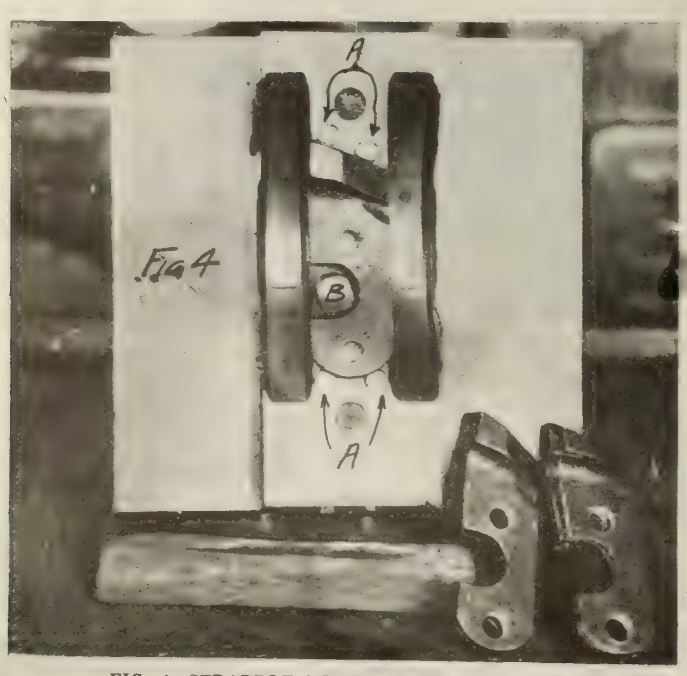


FIG. 4—STRADDLE MILLING THE STITCH CAM

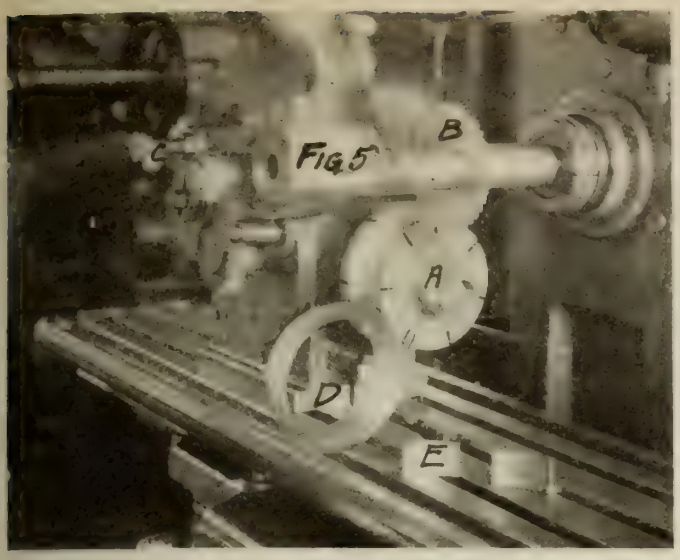


FIG. 5—CUTTING THE RAISE CAM

FIG. 6—STRADDLE MILLING THE CLUTCH FORK

vise. In this block are machined two angles A, a counterpart of those which the stitch cams must have.

The cams, one right, the other left hand, are located in the fixture by means of pins which fit accurately in two previously drilled holes. After two of the pieces have been located the strap B is swung back, being held with the set-screw C. The two screws D are next tightened on to the stitch cams, thus holding them securely in the fixture.

The table and fixture are then fed under the revolving end mill E and the angles on the cams machined. In front of the fixture may be seen two stitch cams, one right and one left hand which have been machined on their angular surface in this operation.

In the illustration Fig. 9 is shown the fixture and method used when facing the pad on the 104-tooth gear. The gear has been previously turned on its periphery, the hole bored and the hub faced to the correct width.

The casting is located by means of a pin which fits into the bored hole and through holes in both vertical walls of the fixture. A pin is also placed through the front vertical wall and into the slot shown directly above the large bored hole. The function of this latter pin is to hold the gear in a convenient position for the milling operation.

The fixture is located on the table by means of tongues to ensure the machined pad being square with the bored hole in the gear. Bolts at each end of the fixture hold it securely on the milling machine table. The pad is then faced off to the correct height with the revolving end mill A. At B is shown one of the gears which has had the pad faced in this fixture.

FIG. 7—MILLING THE FASHION CAMS

Milling Oil Pans

In Fig. 10 is illustrated the fixture and milling machine set-up for machining for pads on the upper side of the oil pan. The casting is located by being pushed against the inside of the two clamps shown at the right and one at the left of the fixture screws through these clamps are then tightened onto the oil pan. Two straps, one on each end, are also fastened as shown to assist in holding the piece. By using these five holding mediums the oil pan casting is held rigidly on the fixture, enabling a better finish to be obtained with the cutter.

The end mill shown is used to machine the four pads, the table being set so that the correct height will be obtained. In front of the fixture is shown an oil pan with the pads finish milled with this operation as described.

The half-tone Fig. 11 shows the other milling operation on the oil pan. This is machining the various bosses on the lower surface. The fixture used for this operation and shown in the illustration

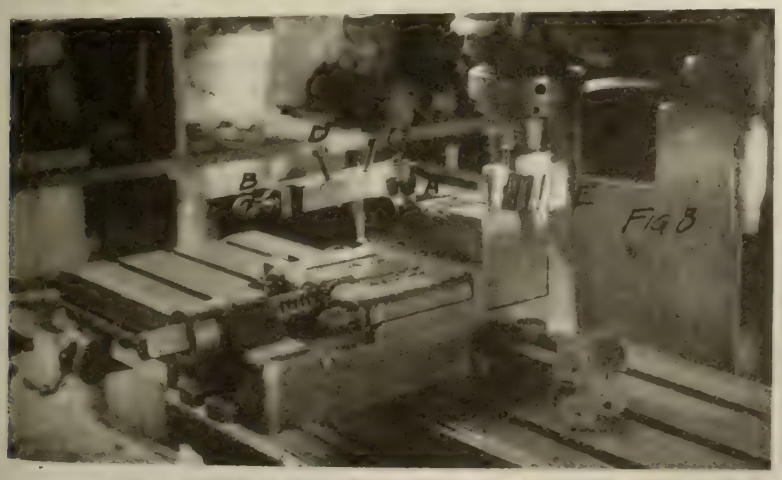


FIG. 8—MILLING THE ANGLES ON THE STITCH CAM

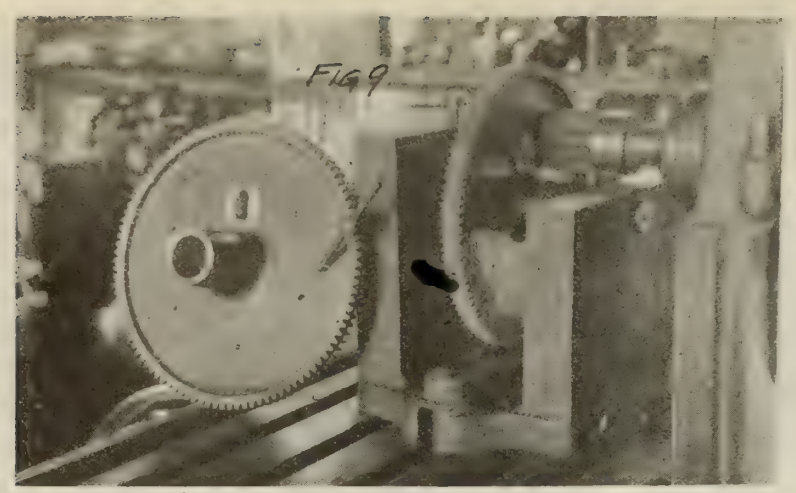


FIG. 9—FACING THE PAD ON 104T GEAR

is provided with three locating pins on which the casting rests.

Three clamps are then tightened to hold the piece securely on the fixture. Two of these holding devices may be seen at A. It is obvious that a clamping device at the rear of the fixture would be very inconvenient for the operator to manipulate if made with a set-screw as those shown at A. To provide a quick and easy method of fastening the third clamp it is operated by means of a long screw, at the outer end of which is the knurled knob B. Therefore, after the operator has tightened the clamps A by simply turning the knob B the rear clamp is operated, thus holding the oil pan down with three fastenings. The cutter C used for the operation is somewhat unusual, being 12 inches wide, made with spiral teeth and about 1-16th of an inch of metal is removed. The surface produced is smooth as shown by the finish machined oil pan in front of the fixture and a true face is also obtained by using this manner of tooling.

Milling Clutch Cams

The half-tone Fig. 12 shows the fixture set up on the machine for milling clutch cams. These parts are made from cold rolled steel 11-16 in. wide by ¼ in. thick.

The fixture is designed with a slot slightly larger than the rectangular bar and deep enough to accommodate seven pieces at one setting. The bars are slid in from the end A and pushed back against the stop B. The two clamps C are next swung over the bars and being tightened down hold them securely in the fixture. The milling saw D used is 10 in. in diameter and 3-16 in. thick. The table is first fed along and the cutter mills through the slot E with the index pin against the stop F.

The index pin is next pushed against the stop G after the table has been fed back out of the path of the milling saw. The table is then fed along for the second cut, the saw passing through the slot G. By this method, the first cut machines the rear end at an angle with the longitudinal axis of the bar and the second cut is straight with the axis. One of the sections of bar cut in this fixture is shown in front of the tool at H. The picture Fig. 13 shows the fixture and milling machine as used when machining the clutch tooth slot.

The gear has been previously bored, turned and the teeth machined in previous operations. The piece is located in the fixture by means of a pin which fits accurately in the bored hole. The two clamps A hold the gear on the fixture, which is itself held in the jaws of a milling machine vise as shown.

The slot is produced with the form cutter B, the table being set so that it will pass through the centre line of the gear. When the table has been adjusted to the correct height it is fed across against the revolving form cutter and the slot machined on both sides of the hub, the illustration shows the beginning of the operation.

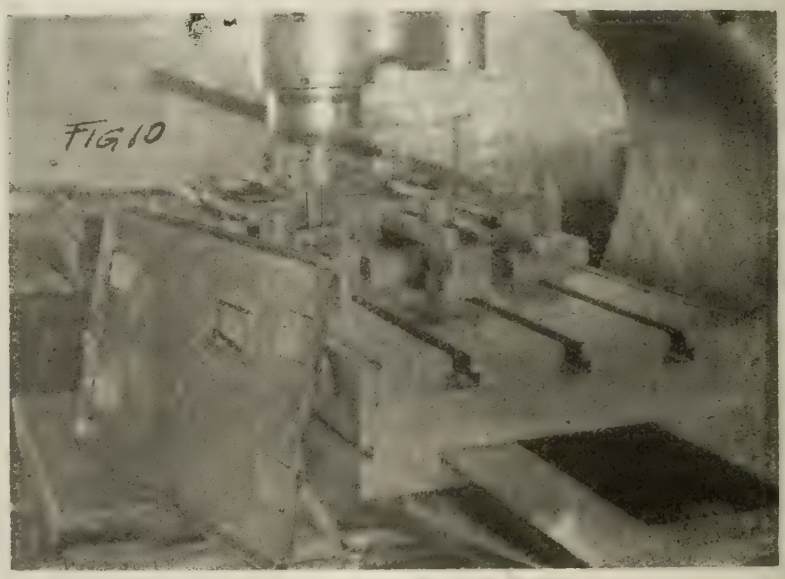


FIG. 10—MACHINING THE PADS ON UPPER SIDE OF OIL PAN

In the next section we will illustrate and describe some of the special tools and methods employed when machining the frame of the hosiery machine.

See cuts on page 395

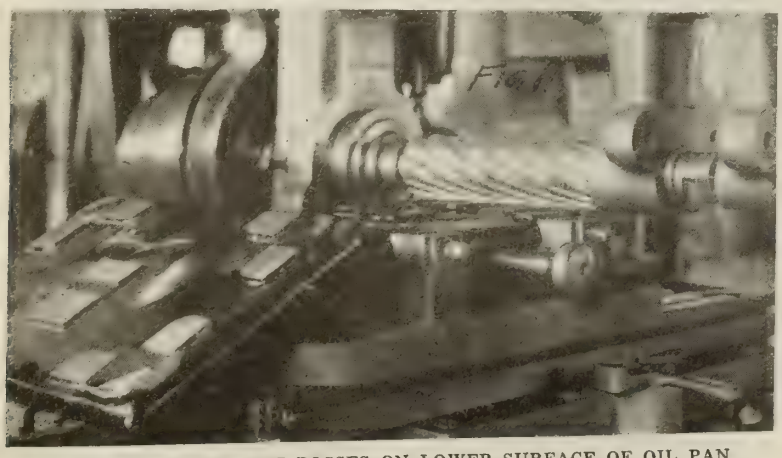


FIG. 11—MILLING THE BOSSES ON LOWER SURFACE OF OIL PAN

Canadian Trade for Australia.—Speaking recently at a meeting of the Board of Trade of Hamilton, W. A. Lingham, a broker of Sydney, N.S.W. emphasized the necessity of Canadian business men making a bid for Antipodean trade. He cautioned them that United States merchants were getting busy in this field, and would corral the whole of the business if prompt measures were not taken to compete with them. The opening of a Canadian branch bank in Australia and a marine insurance office to look after marine risks would be a step in the right direction from Mr. Lingham's standpoint. He also counselled the use of an advertising campaign.

The Machine Tool Designer Speaks Up

A Criticism on the Article Entitled "Technical Education Plus Horse Sense" Which Appeared in a Former Issue of "Canadian Machinery"—This is Worth the Reading

By J. H. HARRISON

ABOUT the best proof required that CANADIAN MACHINERY is read intelligently by its readers comes to hand in the following article, which is a direct reply to the article by R. Mawson, which to the author of this article at least, seemed to hit at the machine tool designer. This article is well worth reading for the author's views are placed in an open, frank manner, but we will let readers judge for themselves, so now to read in the author's own language his views on the subject.

Regarding your article, "Technical Education Plus Horse Sense," which appeared in March 27 issue, I note this article was written by R. Mawson, and while the author of this article has no personal animosity toward Mr. Mawson, still there are several statements which in the article spoken of will not bear close examination, and with the viewpoint of the machine tool designer in mind I will endeavor to point out why I cannot agree with your former article.

If such a lathe as mentioned in paragraph 6 were manufactured with change gears and shifting mechanism inaccessible for operation and repairs, would not the whole machine be considered of poor design, irrespective of whether it stood up to the work or not? With such essential features as these of poor design, it certainly could not be said to be of good design.

How any reliable machine tool manufacturer would allow a young man with a technical education only and no experience, a mere beginner we may say, to design a machine tool is beyond comprehension, and the result of any mistakes that he would make should be blamed on his employers for maintaining an inefficient shop organization.

From this article one would judge that these mistakes were made by a draftsman or tracer, lacking in experience, and not by a designer, for a designer is one who develops the idea of a device or machine for accomplishing a definite purpose and is able to proportion correctly the parts as to strength, appearance, and requirements of shop practice. While a draftsman may only be able to take the completed design and work out the details, he must, in some measure, be able to design. There is no sharp or clearly-defined line between the work of a draftsman and the work of a designer, for while a designer is always a draftsman, it does not follow that a draftsman is always a designer.

The above remarks also apply to this statement that "if the designer had received some practical training in the foundry and machine shop, he would have seen the foolishness of designing such a piece." Again I repeat that a designer must have a good working knowledge of the methods and practices employed in the shop.

A designer must have originality and ability to adapt former inventions to the work in hand, and also an open mind, so that he can make use of the ideas presented to him from whatever source they may come. But he must also be on his guard so that he will not have his mind prejudiced by taking, without due analysis, the advice of the knights of the overall.

To illustrate this, take the actual case of where the design of a special machine of an entirely new type was under consideration. The opinion of the shop foremen and other practical men was asked, with the result that in their opinion the design was impractical and ridiculous. However, the designer prevailed upon the management and was allowed to try his idea, the outcome of which was that the machine was more cheaply manufactured, more efficient, and altogether a huge success.

To be fair to the designer, we should not blame him for the mistakes of the draftsman or tracer, and also we should not accuse the draftsman of lacking "horse sense" until we have investigated and are sure that he has had sufficient experience for the work in hand.

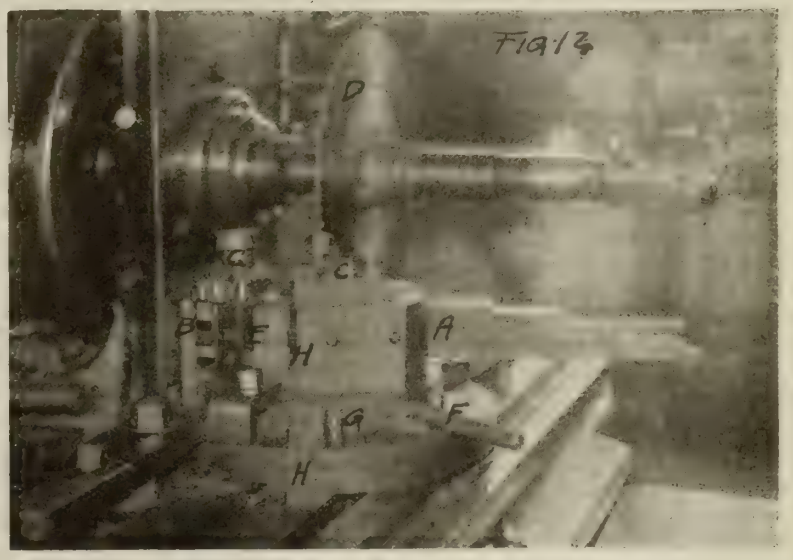


FIG. 12—MILLING THE CLUTCH CAMS

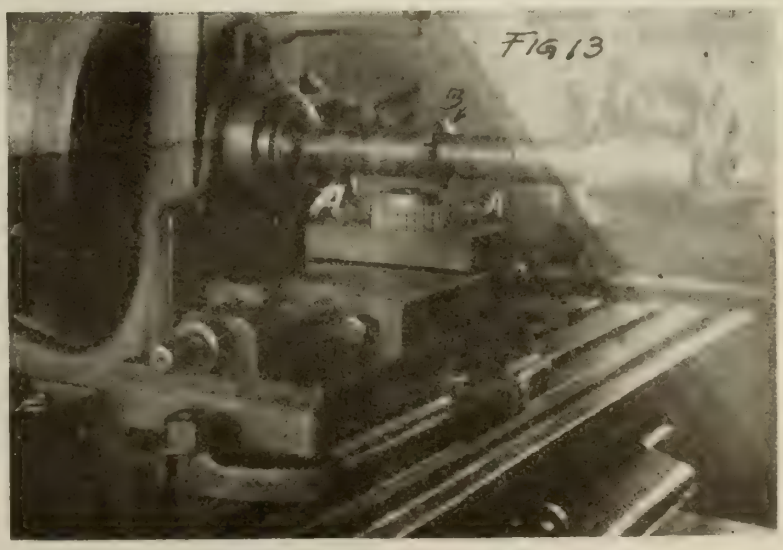


FIG. 13—MACHINING THE CLUTCH TOOTH SLOT

Heat Treatment of Low-Carbon Steel

In the Following Paper, Read Before the Toronto Section of the American Society of Mechanical Engineers, the Author Treats of the Characteristic Structures Found in Steel, Their Formation by Heat Treatment and the Effect Each Has in the Quality of Steel

B. W. M. WILKIE

STEEL is made up of iron combined with certain percentages of carbon, manganese, silicon, phosphorus, sulphur and other elements, each one of which by its presence in varying quantities imparts some special quality to the steel. It is, however, the writer's intention to confine himself to a study of the more usual combinations of iron and carbon that exist in low-carbon steels, for the whole subject of heat treatment is really a study of the different forms or phases in which the various combinations of iron and carbon exist, and the conditions under which they are formed. That is, knowing the particular quality a certain form or phase imparts to steel, and the treatment required to produce it, we are in a position to prescribe the treatment necessary for producing steel of any desired quality.

From microscopic examinations of polished and etched sections of steel, it has been found that there are a number of characteristic structures under which steel exists, each being the result of some special treatment. To determine these characteristic forms and the reason for their formation, a study should be made of the different kinds of treatment that steel receives in ordinary commercial practice. These may be divided as follows:

1. Unworked steel, i.e., cast steel, cooled slowly, cooled rapidly, and reheated.
2. Hot-worked steel, cooled slowly, cooled rapidly, and reheated.

Cast Steel Cooled Slowly

In molten steel the carbon exists as chemical compounds of iron and carbon of varying composition, called carbides. The most common of these has the composition FeC_3 and is called cementite. These carbides are found dissolved in the molten iron in the same way as salt is dissolved in water; also as the steel solidifies, the carbides continue in solution and form what is known as a "solid solution."

The solid solution of iron and the carbide FeC_3 is called austenite, and is the usual form or phase that iron is found in just after freezing.

Austenite, owing to its instability at lower temperatures, is rarely ever found in steel unless special precautions are taken, such as by cooling very rapidly from temperatures above 1000 deg. cent. (1768 deg. fahr.) It has a crystalline structure, which becomes coarse the slower the steel is cooled, due to the fact that as no mechanical work has been done on the steel, adjacent crystals tend to assume the same orientation and merge into a larger crystalline grain. Such slowly cooled, coarse-grained steel is brittle, has minimum tenacity and toughness, and can only be used where it is possible to make up strength by using large masses of metal.

Along with the growth in the size of the grains, the rate of cooling is uniform until a temperature somewhere between 900 deg. cent. and 700 deg. cent. (1652 and 1292 deg. fahr.) is reached. At this point the rate of cooling is gradually retarded, until finally the temperature becomes either stationary or even slightly higher. After a short interval the temperature will again fall at a gradually increasing rate until it becomes uniform, at which it continues to cool to atmospheric temperatures.

The explanation of this peculiar phenomenon is that a change occurs in the structure of the steel during this change of temperature, caused by the austenite, now having reached a temperature at which it is no longer stable, proceeding to change into the more stable phases of lower temperatures. This change is accompanied by a liberation of heat, which explains the change in the rate of cooling. A similar but reverse action takes place when steel is being heated.

The range of temperature within which this change occurs is called the critical range, while the upper and lower limits of this range are known as the upper and lower critical points. The lower point is about 690 deg. cent., (1274 deg. fahr.) for all percentages of carbon content, whereas the upper point ranges from 900 deg. for pure iron to 690 deg. for steels containing 0.85 per cent. carbon. These points also vary slightly with the amounts of other elements besides carbon present, also depending on whether the steel is being heated or cooled. The critical range and its limits are important points to remember in heat treatment, and it is necessary to become thoroughly familiar with the reactions that occur in this range.

The slow-cooling steel under consideration has now reached the upper critical point where the martensite is no longer stable and begins to change into some more stable form such as pearlite, ferrite or cementite.

Pearlite is a definite mechanical (not chemical) mixture of the carbide FeC_3 with pure iron or "ferrite," with a carbon content of 0.85 per cent. Steels having such a carbon percentage will, after annealing, be all pearlite and are known as "eutectoid" steels. If the carbon content is *less* than 0.85 per cent., all the carbon is combined with iron to form the carbide FeC_3 or cementite, which by the addition of a further amount of iron immediately is converted into pearlite, while any excess iron is left free. Such steel is called hypoeutectoid steel, and consists of pearlite and ferrite when in the annealed condition.

If the carbon content is *over* 0.85 per cent., there will be an excess of cementite over the amount required to make pearlite from the free iron present, and so we have the two phases, cementite and pearlite, when the steel is annealed. Such steel is known as hypereutectoid steel.

Pearlite is a constituent of all slowly cooled steels, the greater the proportion of carbon—and hence of pearlite—the stronger and tougher and less ductile will be the steel, until the eutectoid composition is reached, when the steel has maximum strength, as all additions of carbon above this composition only result in the formation of cementite, which has no strengthening power.

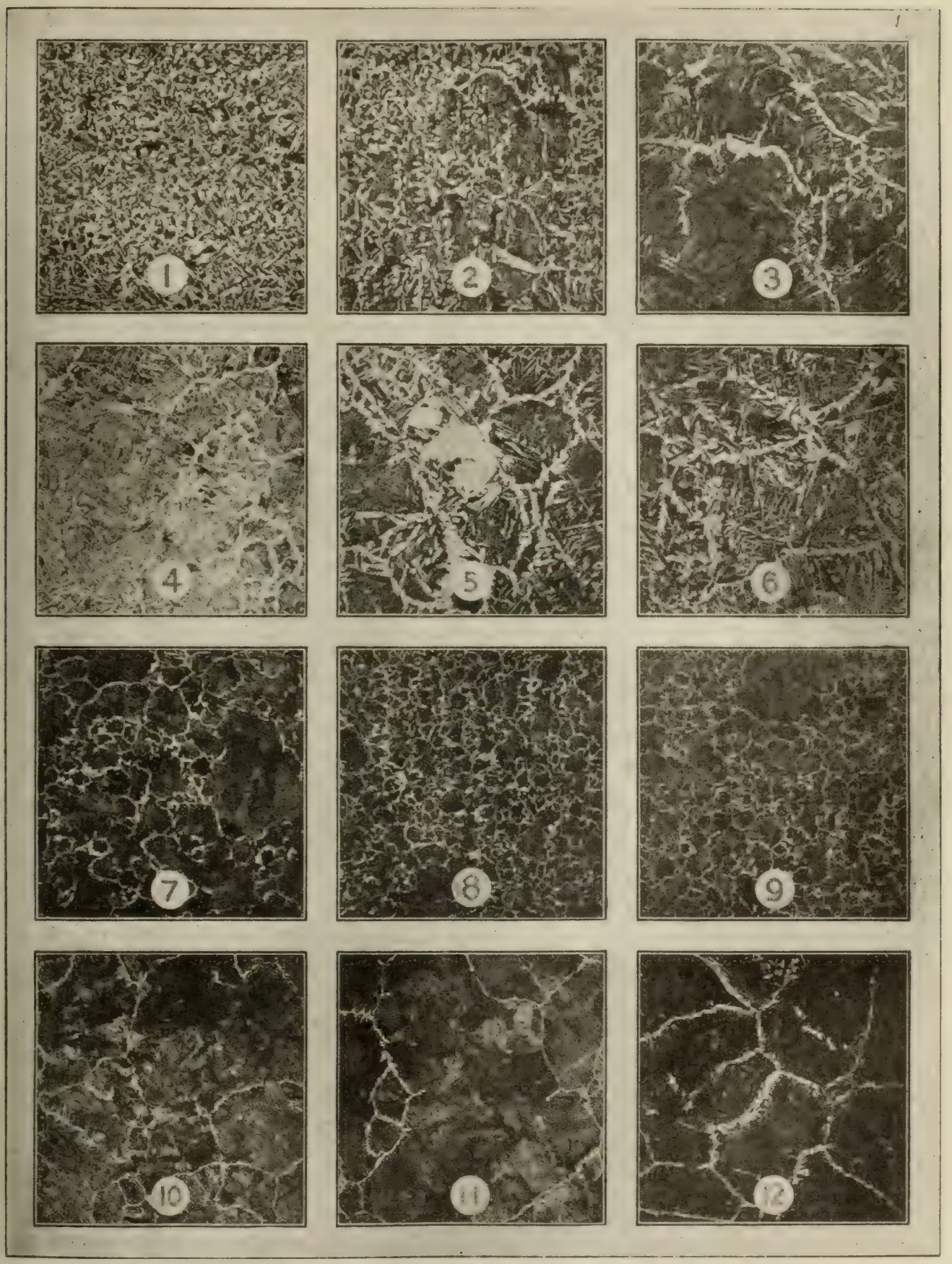
Pearlite also by its ability to take up free ferrite and change into austenite is the hardening consituent of steel, so that eutectoid steel is the composition that has maximum hardening powers, though eutectoid steels are not necessarily the hardest, as hypereutectoid steels may be harder as the result of the hardness caused by the presence of cementite.

Ferrite is the name of pure iron and it is the constituent of all low-carbon slowly cooled steels. It is very soft, ductile, relatively weak, and has no hardening power.

Cementite is a substance about which little is known. It is a definite chemical compound, FeC_3, and it may be assumed that it is very hard and brittle, and therefore lacks tenacity and ductility. It has no hardening power beyond the extreme hardness it itself confers on the steels.

The properties of these three constituents of steel as given by Howe are set forth in Table 1.

When the slow-cooling steel has reached the upper critical point, it will be coarse grained because of the very slow cooling. At this point each grain of austenite tends to transform into the pearlite composition by throwing off the excess ferrite or cementite it contains, and if the cooling is carried on with sufficient slowness, it will be found that by the time the lower critical range is reached each original grain of austenite has changed into the pearlite or eutectoid composition, while the excess iron in the hypoeutectoid steels, or the excess cementite in the hypereutectoid steels, has been liberated as follows:



FIGS. 1 TO 12—PHOTOMICROGRAPHS, SHOWING CHANGE IN GRAIN STRUCTURE CAUSED BY ANNEALING TO VARIOUS TEMPERATURES. SEE NOTES UNDER TABLE 3.

TABLE 1—PROPERTIES OF CONSTITUENTS OF STEEL

Constituent	Tensile strength, lb. per sq. in.	Elongation, %	Hardness	Hardening power
Ferrite . .	50.000	40	Soft	None
Pearlite . .	125.000	10	Hard	Maximum
Cementite .	5,000?	0	Very hard	None

1. As a film or envelope around the original grains.
2. Between the cleavage planes of the crystalline grains.
3. As a combination of both.

The first form results with fairly rapid cooling, whereas the second form is the result of very slow cooling.

As the steel cools past the lower critical range the changes are all completed, and any further cooling has no effect on the internal structure, provided it is not rapid enough to set up strains.

Having followed the changes in a slow-cooled cast steel, it is found that the final condition is a coarse-grained, softened steel, which owing to its coarse-grained structure lacks strength, toughness and ductility, but is relatively soft, and has for its constituents the phases pearlite, combined with either ferrite or cementite, depending on the carbon content.

Cast Steel Cooled Rapidly

In cooling steel very rapidly, by quenching it in oil or water, we find marked differences from the slowly cooled steel. First, the grain structure is finer, the growth of the grains being prevented. Second, the steel is very hard and brittle, because the reaction in which austenite transforms into pearlite, with a residue of ferrite or cementite, can only take place completely when the cooling is very slow. If the steel is cooled rapidly, the reaction only partially takes place, and as a result there are a number of new phases formed which are really part-way transformations between the austenite phase and the phases of soft steel.

The most important of these forms is martensite. This is really an allotropic form of austenite, whose most characteristic features are its needle-like structure, with the crystals crossing each other at 60 deg., and its extreme hardness. It is formed by quenching steel in water, if the pieces are fairly large, or in oil in case of small objects, from above or near the upper critical point. This rapid cooling causes rapid contraction, which sets up great pressures and results in the crystals assuming the structure indicated above.

Martensite is the form or phase giving maximum hardness to steel, so that the more rapid the cooling and, consequently, the greater the amount of martensite, the harder and more brittle will be the steel. Extremely brittle steel is, however, of very little use commercially.

If the steel instead of being quenched in water is either allowed to cool slowly to the middle critical range and then quenched, or is quenched in oil in case of small sections, another form, called troostite, is formed. This is a further stage in the transformation from austenite into pearlite, i.e., the grains have gone a step further toward reaching the eutectoid composition. Troostite occurs in dark-colored, irregular areas or nodules, and is nearly always accompanied by martensite and sorbite. It is slightly softer and has more ductility and toughness than martensite.

If the steel instead of being quenched in oil or water is cooled rapidly in air, or a large piece of steel is quenched in oil, a new constituent called sorbite is formed, which is another stage in the transformation of austenite into pearlite. It is considerably softer than martensite, and in fact is not a constituent of hardened steel. Its properties more nearly approach that of pearlite, i.e., it is stronger harder and less ductile than pearlite, but softer and more ductile than troostite. Its composition also approaches more closely to the pearlite composition than the solid solution of iron and ferrite found in austenite; in fact, sorbite is the last stage in the transformation from austenite to pearlite.

Accordingly, unworked steel cooled slowly contains the phases of soft steel, but owing to the coarse-grained crystalline structure it is brittle and lacks strength and ductility. Similarly with rapidly cooled unworked steel the rapid cooling tends to retard the growth of large grains, but unless great precautions are taken to cool the steel very rapidly, it will still have a fairly coarse granular structure, which, combined with the brittleness caused by rapid cooling, leaves a material having little commercial value.

Cast Steel Reheated

To overcome these difficulties it is necessary to give the steel some special heat treatment—in this case, annealing. Theoretically, in annealing the steel should be heated to the upper critical point, and then cooled slowly, but the rate of cooling has to be varied, depending on the particular steel required.

The theory of this treatment is that as the steel is heated above the lower critical point, the phases of softened steel, i. e., pearlite, ferrite, and cementite, tend to change into austenite. This reaction continues through the critical range accompanied by the absorption of heat which causes a retarding in the rate of heating, similar but opposite to the action in cooling, and when the upper critical point is reached it is found that the steel has been all converted into martensite, provided sufficient time has been given in heating to permit this reaction to occur completely. The result of this transformation is to break the coarse-grained crystals into a finer-grained or even an amorphous structure.

Such is the treatment required theoretically, but in cast steel there are certain conditions that prevent the reaction from occurring a expected so that it becomes necessary to soak the steel for a long time at temperatures considerably above the upper critical point before obtaining an annealing action. These conditions will be discussed in detail under annealing.

In the case of cast steel which has been quenched (unlike actual practice), we have the usual hardening of steel. Any reheating will result in changes similar to tempering. Hardening and tempering will be discussed in later paragraphs.

Hot-Worked Steel Cooled Slowly

In cast steel it was found that the size of grain structure was dependent on the rate of cooling, but with steel subjected to mechanical treatment such as rolling or forging, we find that the crystalline growth is much slower, if not altogether discontinued, during the time the steel is being so treated. The extent of this retardation of the crystalline growth is controlled by:

1. *The nature of the work being done.* Light hammering, with only a slight reduction in size, may leave the steel almost like cast steel, while pressure under a hydraulic press, combined with a large reduction in area will leave it with a fine-grained or even amorphous structure. The latter is an ideal condition.
2. *The temperature at which work was stopped.* As soon as we discontinue working the steel the growth of size of crystalline grain again commences and continues to the upper critical range.
3. *Rate of cooling from time of completion of work to the upper critical point.* If steel is cooled slowly from the temperature at which work is stopped (especially if this temperature was high) to the upper critical point, the result is a coarse-grained structure of the phases of softened steels. Due to the relatively large grains of pearlite the tensile results, including the elongation, will be found to be low. This is a condition frequently met in the forging of shells where the finishing temperatures are around 1800 deg. fahr. or even higher. In high-carbon heats the forging manufacturers attempt to soften the steel by long-continued cooling, and if this rate of cooling is sufficiently slow we reach the above conditions and find heats failing on yield with an ultimate strength of about 43 tons, where the normal results should be 50 tons and over. To overcome this condition it is necessary to carefully anneal the steel to remove the coarse-grained structure.

Where the mechanical treatment is continued to the upper critical point the structure is fine-grained and is in its ideal condition, but the cost of working steel down to this temperature usually forbids it, so that any crystalline structure that is formed between the finishing temperature and the upper critical point must be removed by reheating (annealing) the steel to the upper critical point and then cooling either slowly or rapidly, depending on the product required.

Annealing of Steel. The purpose of annealing steel is:

1. To increase the softness and ductility of steel in cases where it is too hard for machining;

2. To remove strains and refine grain structure and reduce brittleness or other defects caused by:
   a High finishing temperature while hot-working, leaving a coarse-grained structure
   b Coarse granular structure due to slow cooling as in castings
   c Strains caused by cold-working of steel below critical temperature;
3. To soften steels too hard and brittle as the result of too rapid cooling.

In annealing the operation consists in (1) slowly raising the steel to its upper critical temperature; (2) holding it or soaking it at this temperature for a certain time, depending on size of piece being treated and condition of previous treatment; and (3) cooling from annealing to atmospheric temperature.

Theoretically, as the steel is heated to the lower critical point the usual transformation from the phases of softened steel to austenite is commenced, and continues through the critical range, so that when the upper critical point is reached the steel should be all austenite. As a result of this transformation all pre-existing structures, no matter how coarse, are obliterated and the mass assumes an amorphous structure, providing sufficient time has been taken in heating to permit these changes to occur.

Further, if the temperature is carried above the upper critical point the tendency is for this amorphous structure to again become crystalline. Hence, in annealing steel its temperature should theoretically be raised to the upper critical point only, but practically there are conditions that modify this. For example, in cast steels we find that temperatures considerably higher (as much as 100 deg. cent. above the theoretical temperatures), combined with long soaking, are required to break up the coarse-grained structure. The reason for this is rather obscure. One theory that has been advanced claims that each grain in cast steel is surrounded by a film of sulphides, phosphides and silicides of iron which prevent the crystals from breaking up under ordinary treatment, but with long soaking at high temperatures these impurities tend to migrate to the centre of the grains and leave the surface of the crystals free to break up.

TABLE 2—ANNEALING TEMPERATURES FOR STEEL

Range of Carbon Content	Range of Annealing Temperatures	
	Deg. Cent.	Deg. Fahr.
Less than 0.12 per cent...	875 to 925	1607 to 1697
0.12 to 0.25 per cent. ...	840 to 870	1544 to 1598
0.30 to 0.49 per cent. ...	815 to 840	1499 to 1544
0.50 to 1.00 per cent. ...	790 to 815	1454 to 1499

Mechanical work on steel seems to have the same effect, i. e., it breaks up this intercrystalline film, and as a result we find that the more a piece of steel has been worked the claser the annealing temperatures can be kept to the upper critical point, while the nearer the steel is to the unworked or cast condition the higher the temperatures must be. The ranges of temperatures given in Table 2. have been recommended by the committee on Heat Treatment of the American Society for Testing Materials.

The time of soaking depends largely upon the size of the object being annealed, but sufficient time should be given to permit the object to be heated throughout to the annealing temperature and allow the internal changes to occur. Pieces 12 in. thick require about one hour.

Hot-Worked Steel Cooled Rapidly

The rate of cooling after annealing is controlled by the product required. If a maximum softness and ductility is desired, i. e., for easy machining, we cool as slowly as possible, by either burying the article in a bed of insulating material or allowing it to cool in the furnace. If, however, we wish to retain a certain amount of hardness and strength we must cool faster, as in air or, if a very low-carbon steel, in water, but to do so we must sacrifice a certain amount of ductility and softness. As a general rule, the lower the carbon the more rapid may be the cooling. For example:

a Steels with carbon contents below 0.15 per cent. can be quenched in water and remain ductile and at same time have maximum hardness and strength.
b Steels with carbon contents below 0.20 per cent. can be quenched in oil with results similar to 0.15 per cent. carbon quenched in water.
c Steels with carbon above 0.30 per cent. cannot be cooled so rapidly without destroying the ductility of the steel and so must be either cooled in the furnace, or in the air when extreme softness is not required.

The size of objects must also be considered along with the product desired. Other things being equal, the larger the object the more quickly must it be cooled, so long as the cooling is not too rapid to set up strains.

As an example of the effect of rate of cooling on the strength of steel, we have a system of strengthening steels on high-explosive shells known as the Sandberg air-cooling method. By this method air at pressures ranging from 6 oz. to 15 oz., usually around 10 oz., is either passed around the shell forging or forced to impinge on the revolving shell in such a way that a shell that would normally cool in about thirty minutes or more in the open air, is cooled in six to eight minutes. As a result the ultimate strength is raised from 4,000 to 10,000 lb., with an increase in the elastic ratio but with very little variation in the ductility of the steel. This process is really an intermediate treatment between annealing and the regular hardening of steel, due to the formation of sorbite, which, as explained before, is a transformation phase between martensite and pearlite. Another way to get this sorbitic steel is to first quench steel from the upper critical range, thus retaining its fine-grained structure but leaving the steel very hard and without ductility. The steel is now reheated close to but below the lower critical range, say, from 500 to 650 deg. cent. (932 to 1202 deg. fahr.), when it loses its hardness and becomes ductile. The reason for this is that the steel has been changed from martensite to sorbite. This is really a hardening and tempering treatment, but is referred to here because it is sometimes called a double annealing treatment.

Photomicrographs of Annealed Steel. The photomicrographs reproduced in Figs. 1 to 12 illustrate graphically the distinct change in grain structure caused by annealing to various temperatures. Figs. 1 to 6 apply to one grade of steel, A, and Figs. 7 to 12 to another grade, B. The properties of these steels, after ordinary forging, but before annealing, are given in Table 3.

Hardening of Steel. The most common constituents of hardened steel are martensite and troostite, and as we know the conditions under which they are formed, it is only necessary to treat the steel so as to produce either or both, depending on the hardness required.

To obtain martensite the steel must be raised to the upper critical range so as to transform the pearlite and ferrite, or pearlite and cementite, into austenite. We must not let the temperature rise above the upper critical point, as by so

TABLE 3—ANALYSES AND PROPERTIES OF ANNEALED STEELS, A AND B

Steels	Carbon, per cent.	Manganese, per cent.	Phosphorus, per cent.	Sulphur, per cent.	Stretch at 19 tons	Ultimate breaking load, tons	Elongation, per cent.
A	0.40	0.61	0.062	0.057	0.0	40.3	26.0
B	0.55	0.80	0.058	0.057	0.0	47.9	18.5

HEAT TREATMENT

Figs. 1 and 7: Samples heated to 1500 deg. fahr., held for 2 hr., withdrawn, and cooled in air.

Figs. 2 and 8: After the above heat, samples were heated to 1600 deg. fahr., held for 1½ hr., withdrawn, and cooled in air.

Figs. 3 and 9: After the above heats, samples were heated to 1700 deg. fahr., held for ½ hr., withdrawn, and cooled in air.

Figs. 4 and 10: After all the above heats, samples were heated to 1900 deg. fahr., held for ½ hr., withdrawn, and cooled in air.

Figs. 5 and 11: After all the above heats, the samples were heated to 2100 deg., held for 20 min., withdrawn, and cooled in air.

Figs. 6 and 12: After all the above heats, samples were heated to 2275 deg. fahr., held for 20 min., withdrawn, and cooled in air.

In samples A the grain structure increases progressively from the start. In samples B the grain is finest at 1600 deg. fahr., Fig. 8, and increases thereafter. At 1900 deg. fahr., Fig. 10, signs of overheating appear, while samples A show damage only in Fig. 6, at 2275 deg. fahr.

doing we coarsen the structure, and our aim should be to keep this as fine as possible. So we should quench the steel just as it issues from the upper critical range in the quenching medium selected, due to the fact that long exposures to temperatures above the critical point will increase the grain size. However, in deciding on the temperatures to be used we must consider the previous work and treatment given the steel. For example, a piece of cast steel will require considerably higher temperatures for reasons similar to those given under annealing, while steel that has had considerable work done on it (especially when work is continued down to the upper critical range) need only be heated to the upper critical range before quenching. The hardening temperatures in Table 4 are given by E. F. Houghton & Co.

TABLE 4—RELATION OF HARDENING TEMPERATURE TO CARBON CONTENT

Carbon Content	Hardening Temperature to Use	
	Deg. Cent.	Deg. Fahr.
Up to 0.20 per cent.....	871 to 899	1600 to 1650
0.20 to 0.35 per cent. ...	843 to 871	1550 to 1600
0.35 to 0.50 per cent. ...	815 to 843	1500 to 1550
0.50 to 0.70 per cent. ...	787 to 815	1450 to 1500
0.70 to 0.90 per cent. ...	760 to 787	1400 to 1450
0.90 per cent. or over ...	732 to 760	1350 to 1400

It is difficult in quenching steel to control the percentage of martensite and troostite that will result, or, in other words, to get uniform results from hardening alone, as the various factors that control these percentages as size of piece, rate of cooling, etc., vary so much. So the practice is to endeavor to get the maximum amount of martensite by as rapid a cooling from above critical point as is permissible without unduly setting up cooling strains which might rupture the metal. This leaves the metal too hard and brittle for ordinary requirements, but by tempering we can arrive at any degree of hardness or toughness required.

Steel is most commonly quenched in oil or water. In either case care must be taken, especially with high-carbon steels, to prevent cracking as the result of strains set up by too rapid cooling. If oil or water is used the object should be withdrawn from the bath before its temperature has fallen below 100 deg. cent. (212 deg. fahr.), and the drawing or tempering treatment should follow immediately.

Hot-Worked Steel Reheated (Tempering)

Steel that has been hardened is generally harder and more brittle than is necessary, and in order to bring it to the condition that meets our requirements a treatment called tempering is used. This increases the toughness of the steel, that is, decreases the brittleness at the expense of a slight decrease in hardness.

There are several theories to explain this reaction, but generally it is only necessary to remember that in hardening we quench steel from the austenite phase, and, due to this rapid cooling, the normal change from austenite to the eutectoid composition does not have time to take place, and as a consequence the steel exists in a partially transformed and unstable condition at ordinary atmospheric temperatures. But owing to the strains and rigidity set up by this rapid cooling the steel is unable to change into its more stable phase until these strains are removed by the application of heat. The higher the heat, the greater the transformation into the softer phases. As the transformation takes place, a certain amount of heat of reaction, which under slow cooling would have been released in the critical range, is now released and helps to cause a further reaction, the result of which is that if a piece of steel is heated to a certain temperature and held there, the tempering color, instead of remaining unchanged at this temperature, will advance in the tempering-color scale as it would with increasing temperature. This means that the tempering colors do not absolutely correspond to the temperatures of steels, but the variations are so slight that we can use them in actual practice.

Temperature to Use. As soon as the temperature of the steel reaches 100 deg. cent. (212 deg. fahr.) the transformation begins, increasing in intensity as the temperature is raised, until finally when the lower critical range is reached, the steel has been all changed into the ordinary constituents of unhardened steels.

If a piece of polished steel is heated in an ordinary furnace, a thin film of oxides will form on its surface. The colors of this film change with temperature, and so, in tempering, they are generally used as an indication of the temperature of the steel. The steel should have at least one polished face so that this film of oxides may be seen.

An alternative method to the determination of temper by color is to temper by heating in an oil or salt bath. Oil baths can be used up to temperatures of 500. deg. fahr.; above this, fused-salt baths are required. The article to be tempered is put into the bath, brought up to and held at the required temperature for a certain length of time, and then cooled, either rapidly or slowly. This takes longer than the color method, but with low temperatures the results are more satisfactory, because the temperature of the bath can be controlled with a pyrometer. The tempering temperatures given in Table 5 are taken from a handbook issued by the Midvale Steel Co.

It will be noted that two sets of temperatures are shown, one being specified for a time interval of eight minutes and the other for one hour. For the finest work the longer time is preferable, while for ordinary rough work eight minutes is sufficient, after the steel has reached the specified temperature.

The rate of cooling after tempering seems to be immaterial, and the piece can be cooled at any rate, providing that in large pieces it is sufficiently slow to prevent strains.

How are we to know if we have given a piece of steel the very best possible treatment? The best method is by microscopic examination of polished and etched sections, but this requires a certain expense for laboratory equipment and upkeep, which may prevent an ordinary commercial plant from attempting such a refinement. However, I would certainly recommend any firm that has any large amount of heat treatment to do, to install such an equipment, which can be purchased for from $250 to $500. Its intelligent use will save its cost in a very short time.

TABLE 5—TEMPERING TEMPERATURES FOR STEELS

Temperature for 1 hour		Color	Temperature for 8 min.		Uses
Deg. F.	Deg. C.		Deg. F.	Deg. C.	
370	188	Faint yellow	460	238	Scrapers, brass-turning tools, reamers, taps, milling cutters, saw teeth
390	199	Light straw	510	265	Twist drills, lathe tools, planer tools, finishing tools
410	210	Dark straw	560	293	Stone tools, hammer faces, chisels for hard work, boring cutters
430	221	Brown	610	321	Trephining tools, stamps
450	232	Purple	640	337	Cold chisels for ordinary work, carpenters' tools, picks, cold punches, shear blades, slicing tools, slotter tools.
490	254	Dark blue	710	376	Hot chisels. tools for hot work, springs
510	265	Light blue	660	349	Springs, screw drivers

TABLE 6—RESULTS IN TEMPERING BY AIR BLAST

Percentage Analysis		Before Treatment			After Treatment			Theoretical ultimate strength, tons
Carbon	Manganese	Stretch at 19 tons, in.	Ult. strength, tons	Elongation, per cent.	Stretch at 19 tons, in.	Ult. strength, tons	Elongation, per cent.	
				Electric Steel				
0.36	0.57	0.1	37.9	23.0	0.0	40.4	24	36
0.35	0.73	0.2	37.9	27.5	0.0	39.1	26.5	39
				Basic Steel				
0.47	0.64	0.1	37.7	27.4	0.0	41.8	25	41
0.52	0.53	0.1	39.5	23.0	0.0	46.6	20.5	42

The other method is by examination of fractures of small test bars. Steel heated to its correct temperature will show the finest possible grain, whereas underheated steel has not had its grain structure refined sufficiently, and so will not be at its best. On the other hand, overheated steel will have a coarser structure, depending on the extent of overheating.

To determine the proper quenching temperature of any particular grade of steel it is only necessary to heat pieces to various temperatures not more than 20 deg. cent. (36 deg. fahr.) apart, quench in water, break them, and examine the fractures. The temperature producing the finest grain should be used for annealing and hardening.

Similarly, to determine tempering temperatures, several pieces should be hardened, then tempered to various degrees, and cooled in air. Samples, say six, reheated to temperatures varying by 100 deg. from 300 deg. cent. to 800 deg. cent. will show a considerable range of properties, and the drawing temperature of the piece giving the desired results can be used.

Precautions to be Used in Heat-Treating. The following precautions should be observed in the heat treatment of steel:

1. Do not put a cold piece of steel into a highly heated furnace. Either reheat it or put it into a cold furnace and allow it to heat up with the furnace. This precaution is especially applicable in cold weather. Also remember that the changes occurring in the critical range are not instantaneous. The steel must be given time to change. It does not pay to rush the heating. Raise the temperature slowly.

2. Allow the piece to soak at the quenching temperature until it is uniformly heated throughout, the length of time depending on the size of the piece and the rate of heating.

3. Do not allow the piece to be directly on the hearth of the furnace, but have it supported at a sufficient height to allow a free circulation of gases on all sides. Long pieces should have sufficient support to prevent sagging.

4. Never allow a piece, especially if it has points or sharp corners, to come in contact with flame.

5. In quenching, immerse the piece with the axis vertical. This will prevent excessive warping or cracks due to unequal contraction in cooling.

6. Care should be taken that no sharp grooves, corners or seams are left on pieces to be quenched, which may develop into cracks.

7. In drawing the temper of a large piece in a furnace never put a piece into a furnace hotter than the drawing temperature nor allow the furnace to exceed the required temperature, otherwise the steel will be softer than required.

8. In drawing large pieces, soak a sufficient time at the desired drawing temperature, to allow the heat to affect the centre of the piece.

9. Annealing and quenching never depend on the eye to judge the temperature; use a pyrometer.

Results Obtained—Sandberg Air-Cooling Treatment

(In an appendix to his manuscript the author gave details of the results obtained in heat-treating cast-steel billets for large shells to meet the specified requirements of 19 tons yield, 35 to 49 tons ultimate breaking load, and 14 per cent. elongation in a 2-in. test piece. For example, a cast-steel blank containing 0.60 per cent. carbon and 0.87 manganese was soaked for four hours at 1575 deg. fahr., allowed to cool in the furnace to 1350 deg. fahr., removed from the furnace and cooled quickly to black in air; then reheated to 1275 deg., soaked for 2½ hours and allowed to cool in the furnace. On test this sample showed over 19 tons yield, 46.2 tons ultimate breaking strength, against 51.2 tons theoretical, and 19.5 per cent. elongation, which indicates very good annealing.

In a second appendix the author gives details of O. F. A. Sandberg's patented method of blowing air upon hot annealed steel for the purpose of increasing its toughness, elastic limit and ultimate strength over that of normal forged steel, the use of which method was allowed free to manufacturers of forgings for the duration of the war. The method is also to be applied to steel rails to improve their wearing qualities. It involves the distribution of air at ½ to 20 lb. pressure over the pieces being treated to rapidly abstract the heat from the steel. The lower the carbon content, the more rapid should be the cooling.

OPENINGS FOR TRADE

The department of Trade and Commerce, Ottawa, have the following inquiries for information regarding Canadian goods. In writing the Department (Commercial Intelligence Branch) use the numbers given with each item.

707. Agricultural Machinery — A party at Cremona, Italy, would represent manufacturers and exporters of agricultural machinery, implements, sundries, etc.

703. Agricultural Machinery, Marine Motors—A party at Bologna, Italy, asks to be put in communication with manufacturers of agricultural machinery and marine motors (for launches).

724. Minerals—An English firm possessing an established connection among buyers would be glad to hear from Canadian producers wishing to secure an export outlet for Cobalt metal, Cobalt oxide, nickel, nickel matte, molybdenum concentrates ferro-molybdenum, ferro-silicon, ferro-vanadium, vanadic oxide and concentrates, silico-manganese, silico-manganum aluminium, ferro-chrome, and chromite concentrates, including lead ores and concentrates, pig lead, copper, other metalliferous ores, ferro and nonferrous alloys, also graphite. Full particulars at the Commercial Intelligence Branch, Department of Trade and Commerce, Ottawa.

725. Iron and Steel—A firm in the north of England, which has been importing steel blooms, billets, slabs, sheet bars, wire rods, etc., would be glad to consider propositions from actual Canadian manufacturers.

726. Electric Motors and Dynamos—A London electrical company wishes to hear from Canadian manufacturers of electric motors and dynamos, both direct and alternating current.

HOW THE RECENT REDUCTION WILL AFFECT SOME OF THE POWER CONSUMERS

BRANTFORD.—That Hydro rates to the consumer will be appreciably lowered in this city was the prediction of Andrew McFarland, chairman of the local board. With the large surplus from last year's operation of the system and with a reduction in the rate charged by the the Ontario Commission a lowering of the rate to householders will be easily made.

WINDSOR.—It is unlikely that any reduction in rates charged to local consumers can be made by either Windsor or Walkerville Hydro-Electric Commission, according to statements made by the managers of the two branches. At present between 4,000 and 4,500 horsepower is being used here at a cost of $38. At the reduced rate to which Windsor will be entitled by the announced cut in provincial rates, the saving is so small that divided among the hundreds of users, the reduction would be negligible.

KITCHENER.—The Hydro rates for power users in Kitchener will be reduced $1 per horse power as the result of the reductions as announced by the Hydro Commission. The new rail rate will be $19 per horse-power. Reduced rates for the domestic consumers are also expected to be announced in a few days.—Mail & Empire.

CHATHAM.—It is anticipated that the general reduction in Hydro power rates will result in the price of Hydro power being reduced in Chatham about six per cent. from $30.78 to $29 per horse-power, according to an opinion expressed to-day by Manager J. G. Jackson of the local system.

Logical Wish

On the outskirts of Philadelphia is an admirable stock farm. One day last summer some poor children were permitted to go over this farm, and when their inspection was done, to each of them was given a glass of milk. The milk was excellent.

"Well, boys, how did you like it?" the farmer said, when they had drained their glasses.

"Fine," said one little fellow. Then after a pause, he added: "I wisht our milkman kept a cow."

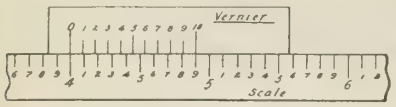
As General Gunn pointed out, the returned soldier has valuable first-aid information, which was intended to assist him in saving life on the battlefield. You can take advantage of this and have your employees who are returned men render good service in this way.

Shop Arithmetic; the Vernier Scale

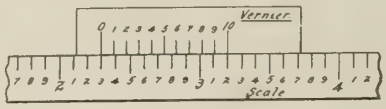
The Fourth of a Series of Practical Mathematics For the Mechanic and Those Learning the Machinists' Trade—The Present Article Takes Up the Subject of the Vernier Scale and Its Use

By J. H. RODGERS

IN our last lesson a brief description was given on the application of the micrometer and its relation to the decimal system of measurement. It was shown how distances, with variations as low as one one-thousandth of an inch, could be accurately determined by scientific means. Modern engineering practice, however, is not satisfied with "near accuracy," as present requirements in the finer branches of mechanical science demand still closer measurements than the 1-1000 part of an inch. Many micrometers or measuring instruments are only graduated to read to one-thousandths of an inch, so that when fractional parts of a thousandth are required they cannot be determined accurately on a tool of this kind, unless further facilities are provided. For greater refinement, therefore, it is necessary to provide other, or additional means of subdivision. The recognized method adopted for this purpose is by means of the "Vernier" scale, so called from the name of the inventor. The advantage of this scale is the possibility of obtaining very fine measurements through the slight variations in the graduations of a unit of length on each of two sliding edges or surfaces. These graduations could be made to suit any desired subdivision, but in order to conform to the general practice of the decimal system, and extend its application, tenth divisions are invariably used in standard practice. A sketch will show more clearly the general principle of the Vernier scale.



One inch—or any predetermined unit—on the true scale, is graduated into 10 equal divisions, while the Vernier scale is so graduated that 10 equal divisions will coincide with 9 of the divisions of the true scale. Thus, it will be seen that each subdivision on the Vernier is equal to 9-10 of one of the divisions of the true scale. If the scale in the above sketch was divided into even inches and subdivisions of tenths, the reading would be 4 inches. To obtain a reading of 4 1-10 (4.1) inches the arrow, or the initial line on the Vernier would have to coincide with the first subdivision on the true scale; this would likewise bring the 10 on the Vernier in line with the 5-inch graduation on the scale. For any other even tenth of an inch division the cipher line on the Vernier would be located in line with the division desired. For 2 3-10 (2.3) inches, the setting would be as follows:—

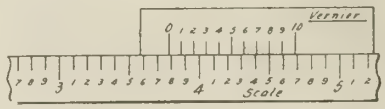


It has been shown that when the initial graduation of the Vernier has been moved to coincide with one of the scale graduations, the setting has varied in tenths of the primary unit. For finer measurements the intermediate divisions on the Vernier are considered. As each division on the Vernier is equal to 9-10 of one of the divisions on the scale, it will be seen that if the graduations 1, in the first sketch, were brought in line, the Vernier would have been advanced 1-10 of one of the scale divisions, or:—

$$\frac{1}{10} \text{ of } \frac{1}{10} = \frac{1}{100} = \cdot 01 \text{ inch}$$

and the reading would be 4.01 inches.

Suppose we wish to get a dimension of 3.78 inches, what would be the setting on the scale? It is at once seen that the initial graduation on the Vernier must lie between the seventh and the eighth division of the fourth inch, and as our exact reading is to be 8-10 of this subdivision, the line 8 on the Vernier scale must be the one to coincide with the graduation on the true scale, thus:—



It has been explained how fairly accurate readings can be obtained from direct observation by the use of the Vernier scale, as applied to measuring instruments. As mentioned before, however, fine measurements must be derived by scientific means, hence the micrometer and other precision measuring tools.

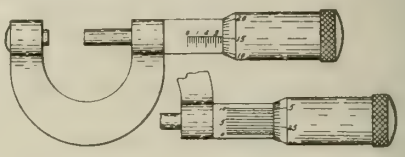
In the preceding lesson it was shown how thousandths of an inch were easily and accurately determined. Further subdivision is obtained by the application of a Vernier scale to those graduations already placed on the micrometer barrel and thimble. The Vernier graduations are located on the barrel of the micrometer parallel to the reference line, but on the opposite side. As before stated, the graduations are so made that the ten Vernier divisions are equal in length to nine of the governing unit—in this case, the graduations on the edge of the tapered portion of the revolving thimble. An example will serve to illustrate the application of the principle. It is required to obtain a reading of:—

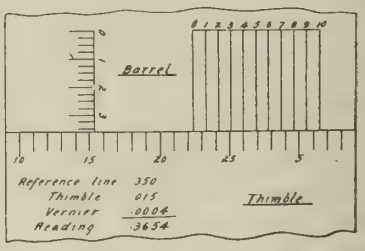
$$\cdot 3654 = \frac{3654}{10000} \text{ inch}$$

Previous instruction showed that graduations on the reference line indicated .1 for each main division, and .025 for each subdivision on the barrel, so that the third main graduation and two of the short ones would show for the dimension here given. The thimble graduation for the above dimension would then be:—

$$\cdot 3654 - \cdot 350 = \cdot 0154 \text{ or } 15+$$

The + representing the .0004. The setting of the micrometer would be indicated as in the sketch here shown, the reference line to the left, and the Vernier reading to the right (this being on the opposite side of the barrel). To make the application of the circular Vernier more clear, the above setting is developed on an enlarged scale, to illustrate the exact setting of the different graduations.





While the above treatise on the reading and setting of micrometers may not be a practical phase of shop arithmetic, there are many points involved that require a concise and often rapid knowledge of addition and subtraction of decimals to make one efficient in the proper manipulation of these tools. It is, likewise, a demonstration of the everyday use of the decimal system that will lead one to recognize the importance of calculations to the solution of many shop problems.

Percentage

A term with which nearly all of us are more or less familiar, but which few of us could properly define, is that of the word efficiency. Experts are engaged to study the operation of plants, with a view of suggesting or adopting

ways and means to increase the efficiency. A man that cannot meet the requirements of a situation is classed as inefficient; on the other hand, one that fills every requirement is invariably recognized as 100 per cent. efficient. Engines, motors, lathes, and all kinds of machines are frequently stated as being —— per cent. efficient. Without going too far into the technical definition of the term itself, the prefix (per cent.), by which the value of the word is determined, should receive some attention by young students, to enable them to follow this section of mathematics whenever met with.

In some respects it might be said that percentage is another method of calculating by fractions, in which the denominator is understood to be hundredths. The symbol used to express per cent. is (%), as 6%, but in working out a problem the expression is invariably into one or other of the two forms, 6-100 or .06; thus:—

$$6\% \text{ of } 100 = \frac{6}{100} \text{ of } \frac{100}{1} = 6 \quad \text{or } 100 \times .06 = 6$$

There are five elements upon which percentage are based, namely, base, rate, percentage, amount, difference. The base or principal is the number on which the per cent. is computed, and is equal to 100-100 of its value. The rate is the number of hundredths of the base considered. The percentage is the portion of the base represented by the rate. The amount is the sum total of the base and the percentage. The difference (as the word implies) is the difference between the amount and the base. The rules for calculating the problems in percentage may be expressed as follows:—

Base = Percentage ÷ Rate
Difference ÷ (1 — Rate)
Amount ÷ (1 + Rate)

Rate = Percentage ÷ Base
(Amount ÷ Base) — 1
1 — (Difference ÷ Base)

Percentage = Base × Rate

Amount = Base × (1 + Rate)

Difference = Base × (1 — Rate)

We generally associate the use of percentage to business transactions, such as bank interest, etc., but very frequently we have expressions in the shop, like: five of that batch were rejected as being under size; three out of ten are useless; and similar expressions. The workmen understand such phrases, but when the office records are prepared, it is generally on a basis of percentage that calculations are made. Losses of so much per cent. Men are only — per cent. efficient. If a plant is operating at 65 per cent. of its capacity, and the full output would be 50 lathes per month, what is the reduced capacity? The base in this case is the capacity turnover of 50 lathes, and the percentage of the output would be:—

$$50 \times .65 = 32.50 \text{ lathes}$$

In the operation of a steam engine the brake H.P. is found to be 125, and the indicated H.P. 160; what is the efficiency of the engine, and what percentage is lost in overcoming the friction of the moving parts? The efficiency is the result obtained by dividing the power delivered by the power supplied; therefore, the efficiency in the above case would be:—

$$\frac{125}{160} = .78125 = 78\tfrac{1}{8}\%$$

and as the loss through friction equals 160 — 125 equals 35 H. P., the percentage of loss would be 35 ÷ 160 equals 21⅞ per cent.

An allowance of 5 per cent. on spoiled work was given to a workman, over which he was to forfeit 80 per cent. of the cost of production. He was paid 3 cents per piece, and after a day's run of 180 pieces it was found that 16 pieces had to be rejected; what was his loss over his regular allowance? His allowance clear would have been 5 per cent. of 180, or:—

$$180 \times .05 = 9.00 \text{ pieces}$$

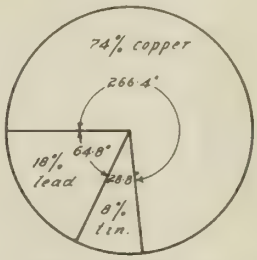
With 16 pieces rejected he would be out 80 per cent. of the cost of 7 pieces, or:—

$$7 \times 3 \times .80 = 16.8 \text{ cents}$$

A bronze mixture is to be made containing 74 per cent. copper, 18 per cent. lead, and 8 per cent. tin. If the total weight is to be 600 lbs., what would be the relative proportions? Illustrate same by circular chart, showing relative size of sectors.

600	600	600	444 " copper
.74	.18	.08	108 - lead
444.00 lbs.	108.00 lbs.	48.00 lbs	48 - tin
			600 - alloy

To construct the chart, draw a circle and find the angle for each sector, the same as above. A complete circle contains 60 degrees, therefore, the respective angles would be: —

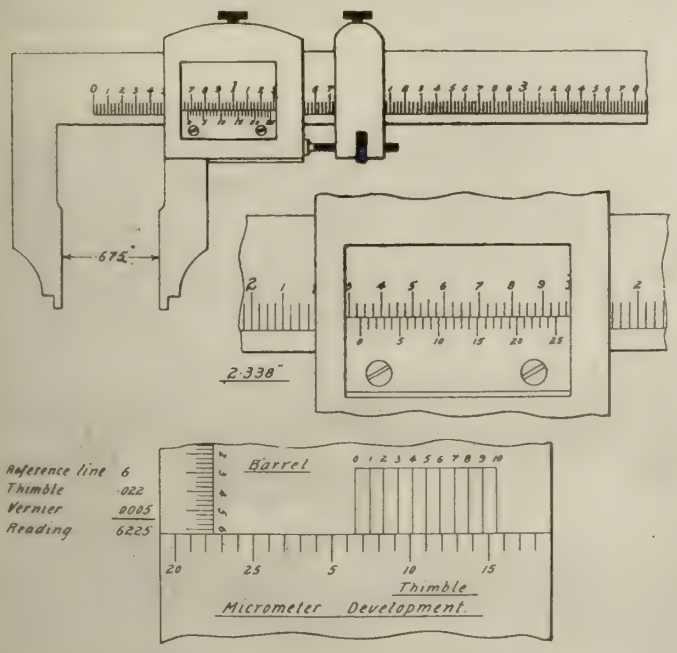


360
74
1440
2520
26640

360
18
2880
360
6480

360
08
2880

(Continued on page 416)



THE VERNIER SCALE

The Vernier caliper here shown is graduated for adjustment in 1/1000 of an inch.

Scale graduated in fortieths or .025—same as the reference line on a micrometer.

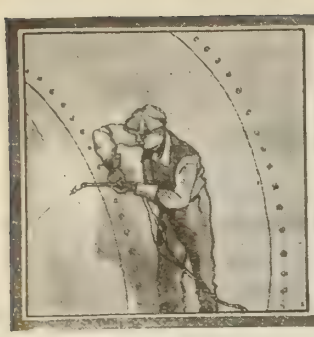
Each main division represents 4/40 or .1 of an inch.

Vernier has 25 equal graduations, equal to 24 graduations on the bar scale, giving a variation in width of the respective divisions of 1/25 of 1/40, which equals 1/1000 of an inch.

When the two cipher graduations are in line the faces are together and no reading is obtained.

The reading on the enlargement is 2.325 on the scale, and .013 on the Vernier, the setting being 2.338 inches.

At the lower left is shown a micrometer development, the reading being .6 on the reference line, .022 on the barrel, and .0005 on the Vernier, giving a dimension of .6225 of an inch.



WELDING AND CUTTING

Repairing a Broken Crankshaft by Thermite

An Interesting Repair Job on a 10-in. Upsetting Press Crank Which Had Been Broken Through the Severe Work It Was Called Upon to Do

By W. F. SUTHERLAND

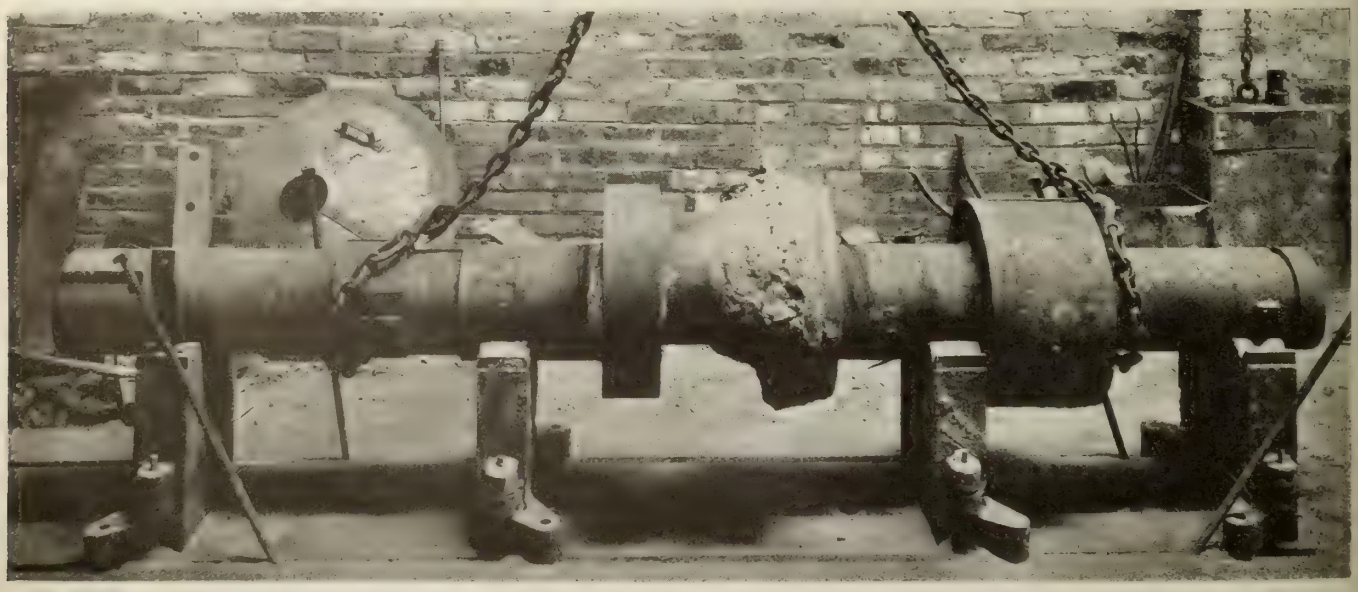
THE accompanying illustrations show an interesting repair job on a 10-in. shaft for an upsetting machine. The shaft had broken off at the web of the crank. The first step in the making of a repair was to burn off or cut away sufficient metal at the break to leave a one-inch clear space. In welding crank shafts it is customary and best to align the shafts on vee blocks. These vee blocks, as may be seen from the illustration, are heavy pieces accurately machined and sliding in the machined slot of a heavy bed plate. The vee blocks should be spaced along the bed plate so as to correspond to the journals or bearings of the shaft. Parallel to the main slot of the bed plate and on either side of it are smaller slots similar to those in planer beds. The heads of the holding down bolts are placed in these slots opposite the vee blocks and a short bar or channel placed across the shaft is bolted down, holding the shaft rigidly in alignment.

The vee blocks should be so placed on the main journals that the shaft can slide at least ¼ in. either way, parallel to its axis, without a shoulder or crank throw striking any part of the vee blocks. It is usually desirable to line up the shaft with the throws in a horizontal position.

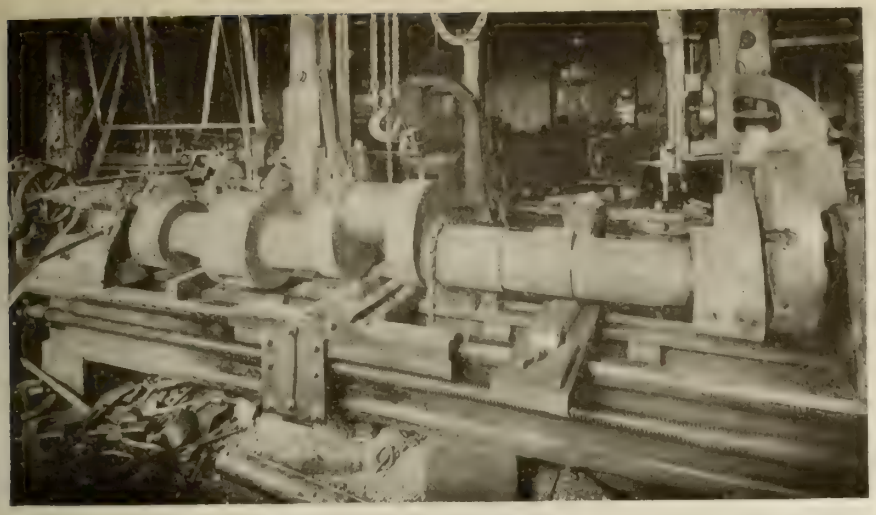
Special types of vee blocks are made which accommodate the expansion and shrinkage movements of the steel shaft and of the web of the crank.

After the correct alignment has been

PRETREATING THE SHAFT.



THE CRANKSHAFT AFTER WELD HAS BEEN MADE AND GATES CUT OFF.



TURNING UP THE CRANKSHAFT.

secured the wax pattern mold is made by melting the wax and building it up in the mold to the shape desired for the weld. The various risers and gates are made in the sand mold by means of wooden patterns.

The molding material used is one part fire clay, one part ground fire brick, and one part fire sand. This is the facing material and the rest of the mold is backed up with a mixture of one-third fire-clay and two-thirds good silica sand.

After the mold is rammed up the wax is burned out and the mold preheated, as shown. In the illustration only one burner is shown, although there are two in operation, the other one being on the other side of the mould. The burners used employ compressed air and burn kerosene.

The automatic crucible containing the thermite charge and of the proper size to hold the right amount is placed over the pouring gate. In particularly large jobs it is sometimes necessary to provide more than one crucible and more than one pouring gate.

The conical steel crucible has a bottom opening with a magnesite thimble closed by a plug with a striker or tapping rod attached. The crucible is lined with a magnesia tar lining. This lining, when necessary to renew it, is made up by putting through a foundry screen and then heated until it becomes plastic. It is then rammed into the opening formed by the shell and a sheet metal cone, is placed inside to act as a form. The lining is then baked in an oven at a red heat.

Fig. 2 shows the shaft after having been welded and the thermite metal is clearly visible, as the rough portion in the centre of the illustration, the gates and risers, have been removed by the oxy-acetylene torch before the picture was taken.

Fig. 3 shows the shaft in its finished form after having been machined. This job of welding was done at the Metal and Thermite Corporation plant, Toronto.

NOT SO LONG AGO

In 1898 gasoline sold for six cents a gallon.

The first New York motor car show was held in 1900.

The first 4-cylinder car was brought out in 1900.

In 1896 Barnum & Bailey announced they would exhibit throughout the country a "horseless vehicle."

In July, 1898, the news was given that a plant would be built to turn out "one motor carriage a week."

It is hard to conceive that in 1896 there were but four motor cars in the United States.

The first long-distance tour was made from Cleveland to New York, It took from July 28 to Aug. 7.

In March, 1897, in the New York Journal, a writer described his first motor car ride as follows:

"In search of a new sensation I went yesterday and rode in a horseless carriage. I dreamed once that I walked down Fifth Avenue in my pyjamas in the full tide of the afternoon promenade and almost died with shame before i awoke. Yesterday I had something of the same strange feeling as I sat there and felt myself pushed forward into the very face of grinning, staring and sometimes jeering New York."—New York Telegram.

INTERESTING THERMIT WELDS

By C. O. F.

The illustrations show a blooming mill spindle 26 feet long and 22 inches in diameter, being repaired by the Thermit process. This spindle was badly worn, and had been sent to the scrap heap, when it was decided to build up the worn parts by means of welding, and the Thermit method was adopted.

There were in all eight patches to be made, and instead of making these in eight distinct operations it was decided to make one job of it and pour the eight patches at once. To do this a gate was made right round the circumference and one leading in to each patch. A riser was made from each patch, and after careful preheating the job was ready for pouring. This was accomplished successfully, resulting in a large saving of time and money.

BUILDING UP WORN BLOOMING MILL ROLL.

It is estimated by the fuel conservation engineer of the United States Fuel Administration that scale in the ordinary boiler causes a waste for every ton of coal burned; for 1-50 in. of 100 lbs., for 1-32 in. of 140 lbs., for 1-25 in. of 180 lbs., for 1-20 in. 200 lbs., for 1-16 in. of 220 lbs., for 1-11 in. of 300 lbs., and for 1-9 in. of 320 lbs. Thus a scale less than ⅛ in. thick causes a loss of 15 per cent. of the fuel burned.

WHAT OUR READERS THINK AND DO

Is There Such a Thing as Easy Money Now?

This article is written by one who has found the way, and is willing to leave the door open for any others who care to come in.

EASY Money? What a lure there is in these two words, and yet we hear the skeptics sneer, "There ain't no such animal." But hang the skeptics. Is there no possibility that these aforementioned growlers may be wrong, and that somewhere there is a lot of easy money laying around to be picked up at very little effort?

To begin with, what is easy money? To the writer's opinion, anything which comes easy, comes without much effort, or in other words, comes entirely outside of one's regular income. Get the idea. Some extra cash we didn't know we could procure. As some people term it, "Velvet Money," or something pretty soft.

But enough of the definition of the luring words, so now let's see how we really can get into this easy money game, for strange to say, "The more the merrier" in this case in point. There is a wide field, in fact a mighty wide field, and no crowds aiming to grab off the spoils, that's the funniest part of it all.

Perhaps the writer had best start off with his personal experience.

About—oh, well, never mind how many years ago, the writer heard there was some easy money to be made in writing for the press, especially the technical press, if one was at all competent to do so. That word COMPETENT stuck me. I could not (in my own mind at least) classify up to that standard, so I sat back sorrowfully for another year or two thinking of all that easy money I had heard of passing me by.

One day a friend of mine (I didn't know how good a friend he was at the time) said to me, "Say, Blank, why don't you get busy and write up some ideas for the magazines I see you reading?" Of course I laughed and said I wished I could. "Why not?" my friend replied. "You've seen some ideas in your time, haven't you?" "Yes, but I can't place them in such form as I'd like," I replied, "in fact I'm no hand at grammar." "Don't let that worry you," was my friend's parting advice, so after his departure I thought the whole thing over and decided to take a chance.

Wow—when I think of that first article, even now I laugh. It sure was rough. Words all twisted, and the sketch I sent sure was dirty, for I was in the machine game at this time and hadn't learned the art of keeping my hands clean. After I had posted it, I got a bad case of cold feet. I fully expected to receive a polite notice from the magazine to whom I had sent the work that from now on, kindly keep my ideas to myself, but imagine my surprise in a space of a little over a week's time to receive a check for $1.00.

Did you ever realize how big a dollar can be under certain conditions? Personally that dollar to me was a gold brick, for it was least expected. To make a long story short, and in order not to tire the reader with the detailed climb up to bigger things, let the writer say briefly that those dollar days are over, and now the road is easy to travel at a bigger rate per article than before. And why?

Simply because he stayed with it. Kept sending his ideas along, finding that editors, instead of being the crabs they are supposed to be, were gentlemen in the true sense of the word, eager to help, encouraging you on to bigger and better things. Advice was sent to me on numerous occasions from editors, without even a request for such being made. "We want articles dealing with die problems," wrote one editor, going into the details of various type of dyes that would especially appeal to him.

Immediately I went through the shop I worked in, snooped around, if I may use that expression, and gathered in ideas, placed them on paper, and later received what I cannot help but term easy money, for it was easy.

Most of my work was done in my spare time in the evenings. As to just how much I made, well, that's a personal matter, not for publication, but enough to say it was sufficient.

But why all this story? I imagine readers ask. Simply because I believe as I said at the start of this article, that there is room for all, from the lowly apprentice in the shop, to the superintendent in the plant, yes, and to the drafting trade in general, even to the plant engineer.

It's not a disgrace to write for the magazine, rather the reverse, but from the hesitating attitude of some members of trained machine forces you would imagine that to be writing for a technical paper was wasting your valuable time.

The writer feels sure that if the editors of the technical press were consulted they would say with energy "Send your stuff along, and we will see that it gets up in proper shape if at all suitable." (Editor's note.—We agree with the foregoing to the limit.) So a word to the reader, get busy, send your work to the various papers, especially CANADIAN MACHINERY, where the writer of this article knows you will get the very best of treatment, and see how much easy money you can make in a year.

But how shall I send it? you ask. For beginners' benefit, let me go through the method of preparing an article for the press, or better still, let us suppose the writer intends sending an article to CANADIAN MACHINERY.

Now first of all, it should be the aim of all readers

eager for this easy money to be readers of the magazines they're interested in, therefore, I take it for granted you all read CANADIAN MACHINERY.

As you are aware there is a section called "What Our Readers Think and Do." Naturally if it's just a little idea you've seen throughout the shop or on your travels, the idea belongs in this section, so let us get to work.

If at all possible make a sketch of the idea, no matter what it is, jig, die, etc., etc. Should a sketch be impossible, then get a photograph, from the best angle to show to the best advantage the particular part you are going to speak about, then write your text, as it called.

First, write up a rough draft of what you intend sending, then polish it up a little before actually sending it on its way. This will not be necessary when you become accustomed to the work, but for the start, is a good idea.

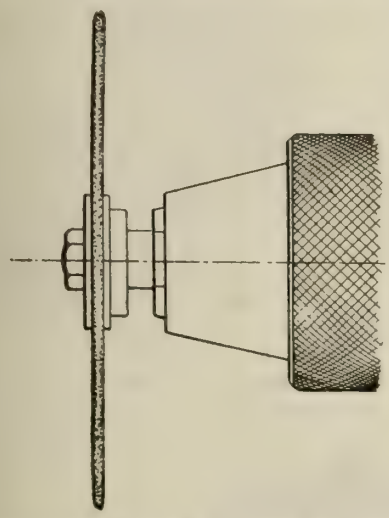
Now enclose your sketch or photograph, together with text matter to the editor, and watch the results. They will surprise you. Should you not hit the bull's eye the first time, try again, for there is easy money in this game, if you've got real ideas to sell.

Of course, if the idea is a bigger one, the same course applies, only it means more work preparing the text, sketches, etc., but it means more money in the old sock at the end of the year, so in conclusion let the writer say that there is easy money, and that it's to be found by writing intelligently for the technical press.

No person is barred, and the very ones who least expect that they can win in this game come out on top, so make a stab at it, try your hand at it, for you never know your luck until you try.

SOME of the dealers state that since the closing of the shell shops the sale of 14-inch files has fallen off. Now that the rough spots have been turned off the Huns, there is not the same demand for the equipment.

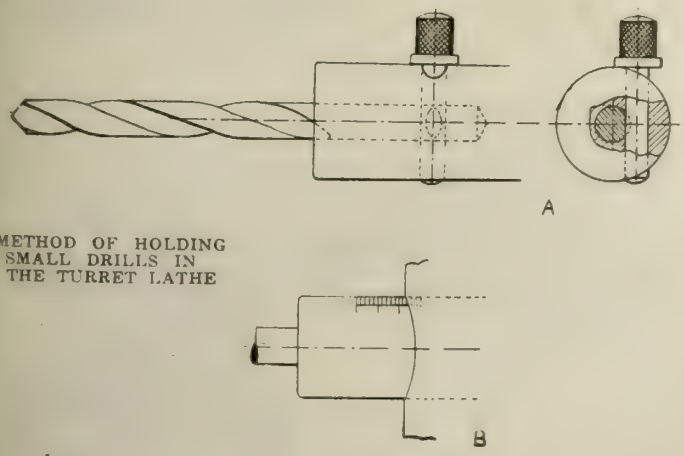
THE STATIST, a London financial journal, is offering an award of one thousand guineas, or about five thousand two hundred and fifty dollars, for the best scheme for dealing with the Empire's debt created by the war. The scheme must be practical, non-party, informative, and original, governed by economic conditions within the Empire, and give a due regard to our political, economic, and commercial relations with other countries. The basic principles underlying money and trade and the duty of those who control wealth and encourage production are to be observed, and only those of British or Colonial birth will be permitted to compete.



DRILL CHUCK USED FOR HOLDING GRINDING WHEELS

HOLDING SMALL GRINDING WHEEL IN DRILL CHUCK

THIS is a dodge to enable a small wheel, for thinning drill points, sharpening various tools, etc., to be used in the sensitive drill, the occasion being when the regular machine is in use by other men, or it is dismantled temporarily for repairs or cleaning. The wheel is mounted on a plain parallel arbor, as shown, this being gripped in the chuck. Of course in a large shop the need for such a dodge would scarcely be felt, but in a small one with limited equipment conditions are very different.—FRED HORNER.



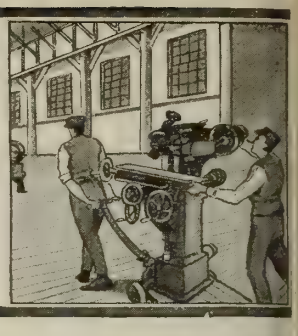
METHOD OF HOLDING SMALL DRILLS IN THE TURRET LATHE

HOLDING SMALL DRILLS CONVENIENTLY IN THE TURRET LATHE

IN cases where it is desired to get holes very closely to size, and a small drill gives trouble from the edges chipping (the material being hard and of irregular quality) it is necessary to have the drill easily removed from the turret socket, so that the point may be touched up as desired, and the drill replaced with the minimum waste of time. A simple dodge which has been found convenient is that seen at A in the figure. A loose peg is dropped into a hole in the socket, the hole being located so that the pin cuts across a shallow groove filed in the drill shank.

The frequent touching up of the point naturally affects the depth of drilling, and the second suggestion, at B, is that of graduations marked on the drill socket, so that the latter may be replaced either exactly at the same amount of projection, or given a slight forward adjustment, so saving altering the turret stop for the purpose. FRED HORNER.

DEVELOPMENTS IN SHOP EQUIPMENT

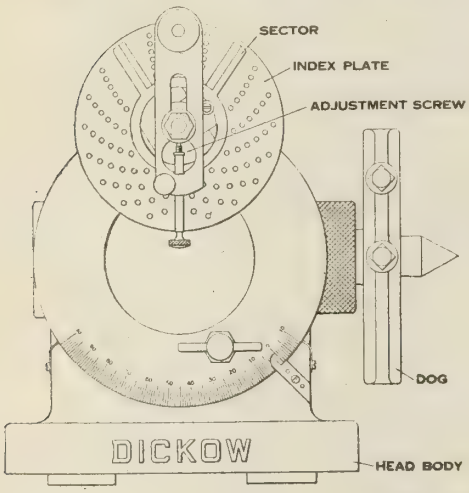


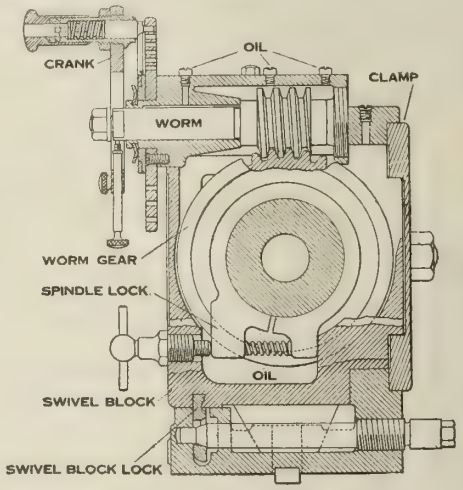
10-INCH UNIVERSAL INDEX CENTRES

Fred C. Dickow, S. Desplaines St., Chicago, has recently brought out a new and improved index centre, which is illustrated herewith. These centres were designed for heavy and accurate milling and are simple and accurate in construction. The capacity is such that they will swing a piece 10 in. in diameter. The worm gear is 5 in. in diameter and is located centrally inside of the swivel block between the large front and rear spindle bearings. The worm is in one piece and runs in a long bearing; end wear can be taken up by adjusting the end thrust nut. The wear between the worm and worm gear is then taken up by four screws, at the top of the worm case.

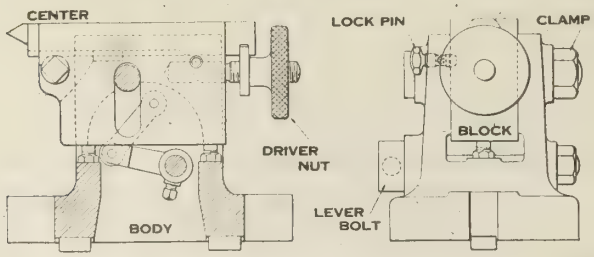
The swivel block which carries the spindle is graduated and can be set any angle from 10 degrees below the horizontal to 10 degrees beyond the perpendicular, and is held firmly at any angle by two rigid and durable clamps.

The spindle is provided with a simple and positive docking device which cannot force the spindle out of line. This locking device relieves the form, worm gear, and index pin from all strain during the cutting operation. The spindle can easily be adjusted and has a B & S No. 10 taper hole through spindle, the nose being threaded for a chuck.

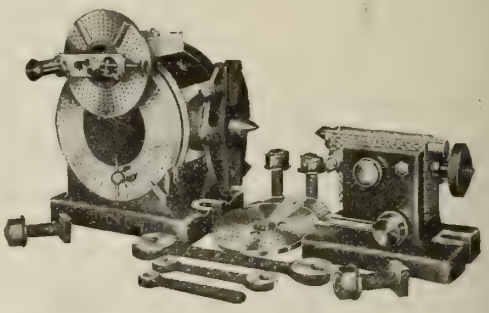




DETAILS OF CONSTRUCTION



DETAIL OF TAILSTOCK



INDEX CENTRE COMPLETE

The tail stock centre can be raised vertically and set at any angle in a vertical plane by loosening clamp, and lever bolts. The block, body insides and bottom are scraped to surface plates and perfectly fitted. The body is provided with taper lock pin to lock block to body. This prevents the block from moving in the body under a heavy cutting operation.

Three index plates are furnished dividing all numbers to 50 and even numbers to 100 excepting 96-T. The index chart furnished gives all divisions obtainable to 380.

The testing of index centres is an important part of their manufacture and a number of the tests used to determine the accuracy of this centre are of inte est.

Figure 4 shows the method used i testing the accuracy of the worm gear i every tooth. The perfect square i mounted to the spindle, and through pr per manipulation of square and test ind cator a very accurate test of every too is made, and the accumulative err reading .0001. The accumulative err allowed in spacing of the entire circu ference of the worm gear is .0005; t average is .00025.

Figure 5 shows the testing of ta stock centre parallel alignment wi sides of tail stock block, the error, whi is the error allowed, .0002.

Figure 6 shows testing of spind alignment with base spindle alignme with T slot; also testing ho much spindle runs out at end of 16-in test bar. Spindle alignment with ba error allowed .00025, using 16-inch te bar. Spindle alignment with T sl error allowed .00025, using 16-inch te bar. Spindle test error allowed .0005 end of 16-inch test bar.

Figure 7 shows the testing of alig ments of the tail stock centre with he centre, using 12-inch test bar. Err allowed, .0005.

Figure 8 shows the testing of spin

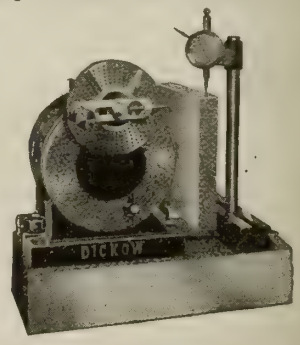


FIG. 4

FIG. 5

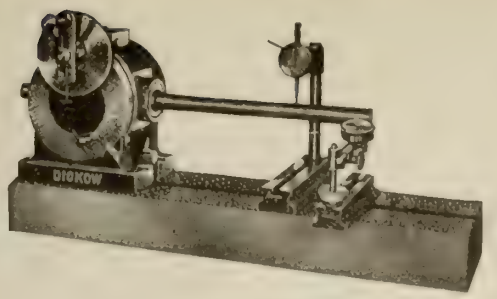


FIG. 6

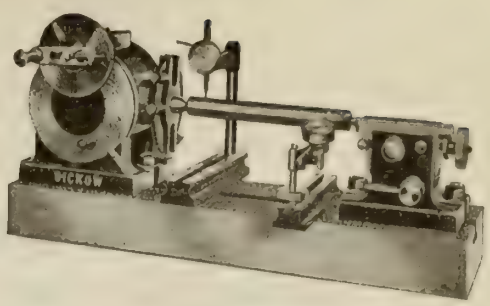


FIG. 7

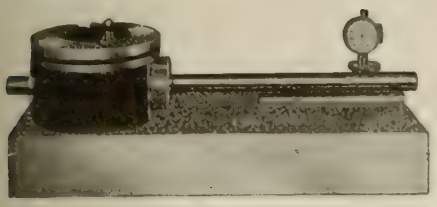


FIG. 8

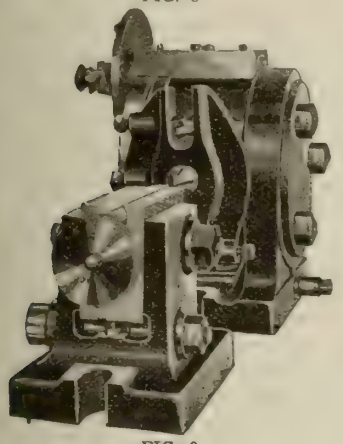


FIG. 9

parallel alignment with back of swivel block, using test bar 24 inches long. Error allowed is .00075 in 24 inches.

Figure 9 shows the side and back view of dividing head and tail stock.

PRODUCTION SPOTFACERS

A cutter designed primarily for production spotfacing is illustrated herewith. It is made with two lips instead of four or six, which obviates the heavy breakage experienced with other types. These cutters are made of high speed steel, properly hardened and ground and manufactured in all sizes from ⅜ in. to 3 in. Pilots are standard in 64th in. sizes and holders are provided with either straight or Morse taper shanks. All parts are interchangeable. These spotfacers are especially adapted for machining irregular or sandy castings as teeth of cutter do not drag but remove scale in one revolution. Ease of grinding and long life are additional features of this Spotfacer which is made by the Production Tool Co. of America, Detroit, Mich.

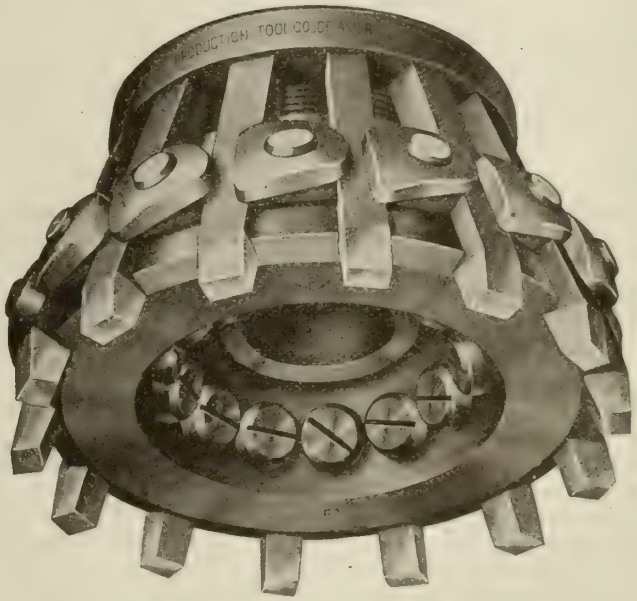
"PRODUCTION" SURFACE MILLING CUTTERS

A Surface Milling Cutter designed to stand heavy feeds of high duty milling machines and to produce a finished surface with one cut has been designed by the Production Tool Company of America, Detroit, Mich.

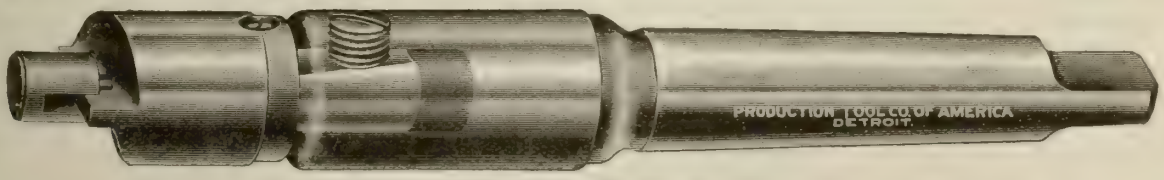
Its free-cutting qualities and firmness of clamping methods enables the tool to give the same results on solid steel pads and thin or chilled castings.

Standard square bits of high speed steel are used and provision is made to allow for repeated adjustment for a new series of grinding before bits are finally short enough to be used on lathe or shaper tools.

Low first cost and long life are additional claims for this type of cutter. The construction of this cutter may be seen from the accompanying illustration.



GENERAL VIEW OF THE CUTTER



GENERAL VIEW OF THE TOOL

To Help Export.—A new procedure has been adopted to facilitate export from Canada to Denmark, Norway, Sweden, Holland and Finland. The Canadian Trade Commission can now approve licenses for rationed commodities direct without waiting for approval from London. This will relieve the telegraphic congestion which has been so troublesome of late.

New Board of Trade.—An organization has been formed and arrangements completed by the wholesale merchandise brokers of Montreal for the furthering of the interests of the brokerage business. It will be known as the Wholesale Merchandise Brokers' Association and will be incorporated as a branch of the Board of Trade. It is expected that every important broker of the city will become a member of the association.

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Conditions in Europe

A WELL-KNOWN Canadian who has has been in the Old Country for some time on legal business, and who was formerly in the Parliament of Canada, had an interesting conversation with a representative of CANADIAN MACHINERY.

He had a good deal to say regarding conditions in Great Britain and Europe of interest to Canadian business men. He claims that there is a good deal of misunderstanding existing in Canada as to the real conditions in Europe. He could find no sign of food scarcity, for example, either in Paris or in the country districts in the parts of France he visited, and the same is true of Belgium. "The people of Paris say," said he, "and this was confirmed by American officers who had been in Germany, that there is no sign of food scarcity along the Rhine, at least. One American officer with whom I conversed, quoted what had been said to him by the widow of a German officer, at whose house he was billeted. In speaking of the sending of food supplies from the United States, she said: 'All we really need is a little soda and pepper.'

"French and Belgians are all at work on reconstruction, and hustling to set their countries to rights again. In Great Britain there is a fine spirit evident. The business men and the working men are going to work to effect reconstruction, instead of sitting down and talking about it, as we seem to be doing in Canada; and I saw no such spirit of expecting a time of waiting and prolongation of the war time sentiment of hopelessness as there has been in Canada.

"The tenure of office of the Lloyd George Government seems somewhat insecure. It is confidently anticipated that peace will be signed this month. The future of the present Government in Great Britain depends largely on the personal energies of Lloyd George. It seems questionable whether internal troubles will not result in an early defeat of Union Government in Great Britain. The lack of strength due to the conflict of party ties, and the fact that the Government is disposed to yield to popular clamor from day to day, is having its effect on public sentiment.

"There should be no trouble in our doing a large trade with Europe, even without Government assistance, but for the fact that Canada was the only country in the world which found itself, at the conclusion of the war, without transportation facilities by sea. Early in the war, Australia purchased forty large freighters, which earned large profits for her while hostilities were on, and are available to-day to carry the products of that country abroad wherever they are required. The United States, too, is reaping the reward of the shipbuilding policy which she pursued during the past two years, and for this reason is in the position of being able to compete with Great Britain.

"It was a fatal mistake for Canada to have allowed the Imperial Munitions Board to build ships here which went into the hands of shipowners in Great Britain. In 1916-17 I urged on the Government the necessity of embarking on a shipbuilding programme, but nothing was done until 1918. Consequently, we are now dependent for transportation on such shipping as we may get from other nations, and for which we have to pay rates which are almost prohibitive. If we had the shipping in our own hands, our manufacturers might be in the European market to-day with sale for our surplus products.

"Mr. Lloyd Harris and his commission have been doing good work in Europe. He has pressed upon the British Government the removal of discrimination against Canada in the matter of exports from this country, is showing great energy in all respects, and is trying to induce the people of Great Britain to divert their attention from their own problems to those of Canada."

Should Develop Canada

AN interesting idea has come out of the West regarding the natural resources of Canada, and what might be called a national policy of development. Prof. R. D. McLaurin, of the University of Saskatchewan, was in Ottawa recently, trying to forward the idea with the Government, and the Western members, who have formed a Committee of Natural Resources, have the matter before them.

They urge the Government to undertake a constructive policy looking to the development of the natural resources of Canada, particularly oil, iron and coal. Prof. McLaurin makes a rather interesting suggestion for solving the tariff hostility of the two sections of the country and bringing the East and West together. He argues that by developing the mineral resources of the West, and thus supplying materials for creating industrial communities there, we should develop basic national industries which every Canadian, even the grain grower, should be willing to see protected if necessary. "It is a different proposition," says Prof. McLaurin, "to protect industries necessary to the peace and security of a nation, from protecting a manufacturer who imports his raw materials from foreign countries and sells merely the finished product. By the latter method, economic independence for Canada is impossible. We should produce our own raw materials for the educational and economic benefit of our people. A nominal political independence is of less value to Canadians, when we are dependent on the United States for basic materials."

It is pointed out that the Government at Washington is co-operating in a most effective manner with the coal, oil, and steel industries of the United States, and if our own Government fails to inaugurate a policy which will serve Canadian and British capital to develop and control resources within the Empire, we can rest assured that Washington will not be asleep at the switch.

Canada now imports 95 per cent. of her iron ore; 98 per cent. of her crude oil; 50 per cent. of her coal, and large quantities of other raw materials, which are available here. A more energetic policy of survey, exploration, and propaganda in connection with the development of our resources, particularly in the Northern and Western areas, would seem to be desirable.

IT IS claimed that flying has been brought to a high state of perfection, in fact, that it can be commercialized. But flyers have waited for ten days or so to get good enough weather to cross the Atlantic. Imagine putting on your Sunday suit, packing your tooth brush and nightie in a carpet bag and then waiting ten days for the weather man to put on the O.K. signal!

A Standard System of Dimensioning Drawings?

An Article, Wherein Starts a Wail of Woe Based Upon the Fact That a Search Has Been Made For a Standard System of Dimensioning Drawings, But Without Success

By I. M. CURIOUS

I SHOULD have been content in the first place to let well enough alone, but still it is too late now to turn back. My name is even against me, for it spurs me on from investigation with the undying flame of my curiosity ever burning, sometimes a little low pernaps, but nevertheless burning. True, at times the answers I have received have been somewhat discouraging, still I keep on trying to find the ideal standard system for the dimensioning of drawings because even although I am discouraged still I do believe that somewhere at some time I may find out where the confusion started. So now that the idea of my search is out, you can readily see why this article was written. I am out for information, so readers lend me your ears, and answer (not all at once, please). "Is there a standard system of dimensioning drawings?" If there is such a curio where is it to be found? If there is not, why not?. Is there a law against such a thing?

To get right down to brass tacks, and speaking with all seriousness, why in the name of Allah will one drawing office persist in calling every dimension over 12 in. by the name of feet and inches, for instance 14 inches would be specified 1 foot 2 inches, while in another drawing office the same figure would be meekly called 14 inches? Then again we will suppose we are still in drawing office No. 2; here they are content to keep to inches up to 24. Anything above that reverts to feet and inches, as for instance 29 inches equals 2 feet 5 inches in this room.

But wait, here we have a drawing office No. 3 which believes that all dimensions under 36 inches should be simply termed inches, but that above this figure away we go once more to feet and inches. Last, but not least, we enter drawing office No. 4. Here we find a deep disapproval of the terms feet and inches. Stick to the word inches is the chief slogan here, no matter how high, the sky is the limit, so round we go, merrily finding champions of each of the systems spoken of.

So now, since the systems have been mentioned, let us see what the humble author found on his tours of earnest and annoying questioning.

"What's the bright idea of calling for feet and inches over the 12 in. mark?" I queried of chief draftsman No. 1.

"Simply because it aids accuracy," was th confident reply. "A 12 in. scale is almost sure to be made of steel, which is a distinct improvement over the two or three-foot wood rule, so, concluded my victim, I always call for feet and inches over the 12 in. mark."

"But," I suggested humbly, "there are some pretty fine 2 ft. steel scales on the market." "Not many," was the brisk reply, so, leaving him with the feeling that he must be correct, I passed on to chief No. 2.

"That is quite a system you have of dimensioning anything over 24 inches by feet and inches," I opened up, and so did the chief. "You bet," he replied. "You see," he continued, some people have an idea that anything over 12 inches should be called feet and inches, but don't you believe them for the 2 ft. rule is the handiest rule of all, and they are more used than any other kind." "But isn't the 12 in. steel scale more accurate?" I chimed in. "Now who told you that" was the reply. "Why there are 2 ft. rules on the market just as accurate as ever the 12 in. ones were ever made; why, even the wood rules are down to the fine point now-a-days. Believe me, pal when I say that if you ask the man in the shop he will shout out 'The 2 ft. rule for me.'" So, agreeing he must be correct in his views I moved on to chief No. 3.

"Why is it," I started boldly, "that you do not mention feet and inches before the 36 in. mark is reached?" He gave me a look of pity. "Don't you know that the workman in the shop would rather work to that system?" he asked me. "No," I replied meekly, "I imagined he would rather work to the 12 in. size, or perhaps the 24 in. or 2 ft. size," I finished lamely for his eagle eye was on me.

"So you've heard all that bunk about the accuracy of the 12 in. scale," he shouted at me, "and how handy it is to carry a 2 ft. rule around and so on and so on, well, let me tell you," he said confidently, "that if you take the trouble to enquire you will find that the average workman swears by the 3 ft. rule every time. It is accurate and handy. Why, he would rather use that size than any other." "Yes," I replied brokenly, and made my hurried departure to chief No. 4.

"Please sir," I said. "for he was a big guy, "why is it that you refuse to use the term feet and inches" This chief was a good sort for he laughed out loud. "Don't you know that a workman hates to see the term feet and inches on a drawing?" he asked me between the laughs I shook my head in the negative, for I was sort of dazed at this turn of events. "You go out and ask the workmen on the subject," this chief kindly suggested, so thanking him I bowed myself out of his presence, believing such a fellow as this who could afford to laugh about it must be right.

So after a few days, in which I worked up further courage, I went into the shop and tackled foreman No. 1. After chatting pleasantly on the lovely weather, etc., I suddenly noticed as if for the first time, a drawing, and peering at it said wonderingly, "Why, everything above 12 inches is marked in feet and inches." "Yep, ain't it a deuce of an idea; why can't they make it feet and inches over the 24 in. mark so that we can use our 2 ft. rules?" This from the foreman of the shop where chief No. 1 was consulted and who absolutely was convinced that the 12 in. idea was the only one. "Why not tell the chief draughtsman about it?" I suggested. "Tell him—say, I've talked till I've needed throat tablets, but he's a bug on the 12 in. idea, so there you are." Yes, there I was all right, stuck once more, so I got out before I collapsed.

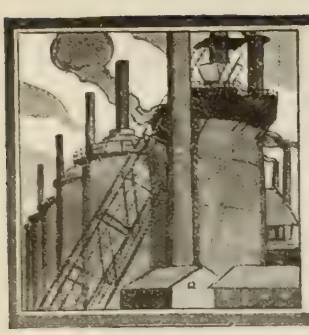
Off to No. 2 shop I went and started the same old story, but with what a result. "So you've noticed that the dimensions are marked feet and inches after the 24 in. mark? Wouldn't it make you tired? There is only one real method, that is over the 36 in. mark call them feet and inches, but before that, nothing doing." "Did you ever mention your views to the chief draftsman," I enquired in a humble tone of voice. "Sure I did, but what good did it do, his ideas and mine never did mix."

I had my hat in my hand by this time and bid my host No. 2 adieu, making a bee line for foreman No. 3.

It was easy to open up the subject at this point for the foreman was full of it. "Of all the darn fool ideas," he started,"to have all the dimensions marked in inches up to 36, then to call the rest feet and inches." "What would you suggest?" I asked enquiringly. "Carry the inch idea throughout, don't mention feet and inches at all," he replied. "A scheme such as this saves time in the long run, but there is no use in talking, our chief draftsman here can't see it that way, so there you are," Yes, I was there again all right, so I wished him good day, and started for the last, but not the least, foreman No. 4.

"I understand you use the straight inch dimension idea here." I opened up fire with. "So the bad news has travelled to you?" says foreman No.4. "Isn't it a shame to wish a system like that on us? Do you see that man down there bent over his bench?" I looked in the direction the foreman pointed and admitted that I did, also that he appeared to be very busy. "I agree with you," said the foreman with a sneer. "No wonder he looks busy for he is trying to find out how many feet and inches there are in 197 inches." "What principle do you favor?" I asked, with fgear in my voice, "There is only one real idea," was the reply, and that's the 12 in. one.

(Continued on page 416)



MARKET DEVELOPMENTS

Price Fixing Having a Hard Time Trying to Live

U.S. Naval Department Refuses to Consider Bids on 20,000 Tons of Steel Because the Prices Were all the Same—Machinery Dealers State That the Volume of Business They are Doing is Satisfactory

THE business of price-fixing is having a hard time of it. In fact, there are not a few who would be willing to make the guess that its days are numbered. There is a growing feeling that Director-General Hines of the U.S. Railroad Board was right in refusing to come into the market for steel and recognize the price-fixing programme. He has now secured very good backing from the Navy Department, which in the past few days opened tenders that came in response to specifications sent out. When the figures from the various firms were looked over it was found that they all agreed, being based, of course, on the schedule of fixed prices. The Navy Department returned the bids on the ground that the law required in such cases that there should be competitive bidding. Many of the reports have been colored on the point to show that the Railroad Administration was wrong in refusing to recognize the prices, but there is a growing feeling that the Railroad Administration is right. Whether the present muddled situation will hasten the return of the open market is problematical, but it is sure to come, and it is being demonstrated all over that the fixed price idea is not popular.

Machinery dealers in this district are doing a fair volume of business. There are several large concerns that have mapped out before them their programme of manufacturing, and they are now in the market in a substantial way buying equipment. Large outlays are made on this, and it will be some months of costly preparation during a period of high costs before they can hope to secure any return at all on their money. The motor car industry is responsible for considerable buying, while the National Railways continue to send out a nice line of specifications.

Some dealers are wondering just what to do with the stock of war supplies they have on hand, such as hobs and chasers, two small tools that were used exclusively on shells, and for which no commercial use has since been found. These run into a lot of money, being almost entirely of high speed steel. Scrap prices at so much per pound is their present value. No provision is made by the Government to share the loss the dealers will suffer, although they stocked in order that shell shops might have a quick place to secure needed material.

LABOR TROUBLE IS HOLDING UP BIG BUSINESS IN MONTREAL NOW

Special to CANADIAN MACHINERY

MONTREAL, April 24.—With the opening of the port, Montreal has taken on the appearance of greater activity, and trading circles generally are showing increased optimism on the future outlook. The third of the Government fleet of steamers was launched from the yards of the Canadian Vickers, Limited, last Saturday afternoon. The Hon. C. C. Ballantyne stated that every effort would be made to stimulate this shipbuilding branch of Canadian industry, and expressed the hope that present activity would be continued for some years to come. The harbor is now a busy spot after the quiet winter months, and a few weeks will see a return of pre-war enterprise, to which will be added many new activities in the way of additional trading with world markets. Business developments show no new features, but trading is far from dull. The labor situation is still unsettled, and with strikes now on and others pending, with the granting of increased wages, it would appear that readjustment is still a problem of vital importance. Definite reconstruction plans are virtually impossible under the existing atmosphere of general unsettlement. The iron and steel market here is apparently unaffected by American conditions, as the tone is increasingly encouraging, but there is undoubtedly an underlying influence that prevents a reopening of general domestic enterprise, and this condition will likely continue for some little time yet. Little active interest is displayed in metals, and dealers report a quiet market with a light, but steady demand. A slight falling off is noted in machine tool trading, particularly in second-hand equipment. Old material trading is quiet, as the market is a speculative one under the present uncertain conditions.

Business Improves Slowly

The hope expressed by many, that some basis of price adjustment would be established, so that domestic consumers of steel could get back into harness and commence some program of reconstruction, appears to be almost as remote as in the days immediately following the signing of the armistice. With the heads of the industry and the Government still in debate on this question, the trade is still patiently, or impatiently, awaiting decisive action, of the time when the market will become an open one, a goal to which present operations are heading. It would seem that some anticipate a return to pre-war conditions, should a competitive market result, but saner minds cannot see where such is possible under the present high state of wages that prevail in most industries, and the strikes that are pending for further advances. The logical plan would appear to be for the trade to recognize the true nature of the situation and start on a reconstruction program at once, leaving some of the issues of readjustment to some future date, when the time is more opportune to lower the level of present costs of manufacture. Local activity is steadily improving, but not rapidly.

Warehouse supplies are increasing as dealers are adding to their stocks. Few price changes are noted and quotations are relatively firm.

Quieter Tone in Tools

Machine tool dealers here, while reporting a fair volume of business, are, nevertheless, anxiously awaiting the outcome of present negotiations in the States regarding a satisfactory arrangement for the disposal of Government-owned machinery. This situation, at present, has no direct bearing on Canadian conditions, but the fact that many old shell plants that had received contracts from the U. S. Government, are well stocked with machine tools, much of which is still in the original shipping crates, has had an unseen influence in the activity of this branch of industry. Many purchasers of machinery are under the impression that this equipment may be sold at a sacrifice, and may be waiting for the opportunity to grab some of it when the same is offered for sale. The method of disposal has not been definitely decided, as manufacturers are holding out for a better selling commission than that proposed by the Government authorities. Sales of used machines are not as plentiful, but a fair business is still reported and dealers are apparently content with existing demand, believing that the future has better in store. Hopes of a radical drop in prices are not entertained by many, as conditions are not conducive to much lower prices.

Dullness in Scrap

Lack of interest appears to dominate the scrap market, as dealers are reluctant to predict the possibilities of the near future. The situation here is more or less influenced by trade developments, and with these of an uncertain character, the dormant nature of scrap is a natural consequence. Price changes effective this week are on medium brass and stove plate, the former quoted at 7 cents per lb. and the latter reduced to $12 per ton.

WELL PLEASED WITH VOLUME OF BUSINESS

TORONTO.—There is more business going on in machine tool circles than may be popularly imagined. Dealers state that they have no complaints to make regarding the volume of trade that is moving. In fact they are ready to admit, even when things are not moving any too fast that their business is much better than they ever thought possible at the time when the signing of the armistice took place. They were ready to state at that time that things would be dull for a few months. In fact they were quite ready to anticipate that the first four months of 1919 would be poor and lean, and in this way they have been disappointed. Transportation has been all to the good for one thing, and movement of shipments is accomplished in a fraction of the time that was taken up for the same period in 1918.

POINTS IN WEEK'S MARKETING NOTES

There is quite large buying being done in Toronto by several concerns which have definite manufacturing lines laid out before them.

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Dealers report noticing a dropping off in the sale of the larger sized files, for which there was a keen demand during the war.

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The discounts on cold-rolled shafting at Toronto warehouse are now list plus 25, and at mills list plus 5.

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Sheets came down $5 a ton. This means that the whole $7 cut made in U.S. prices is not passed on to the Canadian consumer. Dealers claim they cannot make a fair profit under the present rate of 6c for No. 28 black.

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U. S. Navy Department refuses to buy under the fixed prices for steel. They opened bids recently for 20,000 tons of steel, and finding all the bids the same returned the lot as they claimed it to be illegal.

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There is a growing feeling that the fixing of prices is not going to remain very long. An open market is much preferred by many of the large buyers, and its return would cause no surprise.

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Lack of orders, rather than high production costs, seems to be the chief concern of many of the steel mills.

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There is some dissatisfaction yet in regard to the manner in which the U. S. Government is going to dispose of the machine tools that were used in war work. Some of this equipment is at present in Canadian shops.

Adjusting Sheet Prices

Sheets were moved down about 25 cents per hundred this week. That makes a reduction of $5 per ton, and is $2 short of the cut recently made in the United States. This refers, of course, to warehouse prices here. The warehouse interests claim that they are quite justified in not passing on the full $7 per ton cut, as they have only a fair margin now in which to clear themselves on sheets.

The Canadian trade watches closely what is going on in United States in regard to the attitude of the railroads there. At present no selling is being done to the roads. The trade does not believe that an open market would serve to bring prices much lower, as present quotations, it is claimed, are about as near to the mark as can be expeeted. The intention of the U.S. Government, in allowing price fixing for steel, was no doubt to provide a safe stepping-stone by which the industry could come down from war-inflated prices to peace-time values, without endangering the stability of the whole industry. The feeling seems to grow that it will all be settled sooner or later behind closed doors, and that there will not be much of a fight in the open on this ground. The railroads, it is stated, are in such shape that they cannot stay out of the market indefinitely. The longer they defer purchses the more they will have to purchase. This line of argument, of course is intended by those who advance it to support the theory that the whip hand in the situation is in reality held by the mills, and not by the railroads.

Good Orders Come In

But apart from all this, the fact remains that there is a big volume of business going through the warehouses, and the indications point to buying being well sustained in future. Some of the paper mills and saw mills are buying to a considerable extent, the former taking a large number of steel forgings, such as grinder shafts, etc.

There is also a good volume of marine business moving and some of the shops capable of handling big business are sending out enquiries for big lots of boiler tubes. This leads to the belief that new contracts are placed, or about to be placed. One story is that the French Government is again in the market for a number of small wooden ships.

Machine Tool Business

Dealers are selling more machine tools at the new price than was thought possible a few weeks ago. Totals of business done this year in many cases compare very favorably with that for the same period last year. The only difference is that this year much of the business, as far as the dealers are concerned, consists of the handling of materials turned over by the Imperial Munitions Board, and resold. It is a fact, though, that there are sales being made in greater volume of new tools. Willys-Overland and the National Railway have been in the market in a fairly large way. Other concerns in this district are in the market for big purchases, and although they have not placed their business yet they have it pretty will lined up. Advertisers probably do not realize all the time the extent to which firms wanting new equipment watch the advertising pages of the mechanical papers.

Cleveland, O.—After the meeting of the Lake Carriers' Association here recently, it was announced that a voluntary offer of reduced rates would be made to the Government. It was thought that this would stimulate shipping. The rates on coal, ore and grain will drop in proportion to the lowered rate on steel shipments. The wage scale in force at the close of last season was adopted for the beginning of this season. The line will be known as Houston Lines, Canadian South American Service.

DISPOSING OF WAR MACHINE TOOLS IS NOT AN EASY MATTER TO HANDLE

Special to CANADIAN MACHINERY

NEW YORK, April 24.—The machine-tool situation remains practically unchanged, there being a fair number of inquiries but relatively little buying, and sellers generally attribute the lack of business to the expectations of prospective buyers that prices will soon be further reduced. Manufacturers of engine lathes have made a downward revision of from 10 to 20 per cent. and a well-known milling machine has also been reduced, but many machine tool builders continue to assert that they will make no reductions at present and probably none before July 1 at the earliest.

A deadlock has occurred in the negotiations between the machine-tool trade and the War Department over the methods of disposing of Government-owned tools, both new and used. The Government plan meets with approval in most particulars except as to compensation. All new tools, according to the plan proposed are to be taken back by the companies which produced them and re-sold at present market prices, with a commission of 7½ per cent. to the manufacturer. To this plan the machine-tool manufacturers have dissented because they maintain that 7½ per cent. is not a sufficient commission to cover expenses of handling and to pay commissions to their recognized distributors in various territories, whose commissions as fixed in their contracts are 10 per cent. or more. Even on the re-sale of these tools it is presumed that many dealers would insist on their full commission.

The question of compensation is also the chief point on which the machine tool dealers and the Government fail to agree. The Government plan was to have dealers appointed in all important manufacturing districts to handle sales of the second-hand tools from war plants, and a 7½ per cent. commission was also offered to the dealers. However, through their organization the National Machinery and Supply Dealers' Association have offered a counter proposal, which in brief is as follows: One dealer shall be appointed in each of 15 districts and this dealer alone shall be responsible to the Government for the sale of all Government-owned tools in his district. His commission shall be 2½ per cent. on the gross sales. He shall have the power to arrange with other dealers in his district for the sale of those makes of tools which each dealer handles. The commission proposed for these sales is 12½ per cent. Thus, the Government would be obliged to pay 15 per cent. commission on the sales of all used tools and is asked also to furnish warehouse space without cost for storage of the tools until they are sold.

The office of the director of sales of the War Department has so far refused to accept the plan proposed by the machine tool dealers, while the dealers state that they will not have anything to do with the distribution of the Government-owned tools on any other basis. They argue that it would not be good business for them to market many millions of dollars' worth of Government tools at a lower profit than they can make on their regular lines. The Government officials have used the argument of patriotism, but in the opinion of many in the trade this argument is uncalled for. It is pointed out that the machine-tool trade was working 100 per cent. for the Government during the war, that it took full share of Liberty bonds, and in every way supported the Government in the prosecution of the war, and that now it should not be asked to sacrifice profits from its business to help the Government, which is fully able to pay its way.

Just what the outcome of the difference will be does not appear just at present, but it is presumed that the War Department will eventually be obliged to meet the terms which the machine-tool trade proposes.

Many of the tools which the Government must dispose of are in Canada, several shell plants having been equipped at the expense of the Government not long before the war came to an end.

Meanwhile the Government has not completed its inventory of the tools it will offer for sale, but it is probable that the total will be somewhere between $30,000,000 and $50,000,000. Many prospective buyers are known to be holding off awaiting the disposition of these tools, hoping to pick up "bargains." It will be the aim of the Government, however, to dispose of the tools with as little disturbance to regular trade as possible. The new tools will be sold at the same prices which the manufacturers are now asking for tools shipped from their plants, while the used tools will be appraised at prices based on present prices of new tools.

Aside from this controversy there is little of interest developing in the machine-tool trade. Only one inquiry of importance is before the trade, that being from the Studebaker Corporation, South Bend, Ind., which wants about 90 tools. This business will go to Chicago and Cleveland sellers. Export trade is quiescent and will probably remain so until after the peace treaty is signed.

BUSINESS AT U. S. STEEL MILLS IS ALL FOR PROMPT SHIPMENT

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., April 24.—The pig iron and steel markets have shown no improvement in the past week, but rather have grown quieter. There is universal complaint among steel producers as to the small amount of business they are receiving, their reference to market conditions suggesting the notion that they are booking practically no business at all. Cross questioning, however, develops the fact that they really are booking a moderate amount of business every day, the objectionable feature being that it is all for immediate shipment, evidencing no confidence in the future prices on the part of buyers, while the volume of business is quite insufficient to support present mill operations, which are predicated to a considerable extent upon old orders. While mills operated at an average of 77 per cent. during March they are operating only between 65 and 70 per cent. at present, and half or nearly half the production is against old orders.

In pig iron business is even lighter than in finished steel, but there is no complaint on the part of the merchant furnacemen. They recognize that conditions are not propitious, and are quite content to let matters work out. They have had very high costs, and costs are still quite high, and the merchant furnacemen recognize that the only way to get costs down is to have a period of relative idleness. An open market, which the steel producers seem to fear, has no terrors for the merchant furnacemen, since until the Government took control by reason of the war, pig iron always had an open market. The furnaces made money in one or two years out of three, and they are content to take an off period now.

Feeling Regarding Industrial Board

About few things is a wider difference of opinion expressed than about the operations, or perhaps failure to operate would be a better expression, of the Industrial Board at Washington. It will be recalled that the original program announced by Secretary of Commerce Redfield was that the industrial board would be set up for the purpose of restoring the play of the law of supply and demand, inflating prices, bringing buyer and seller together and starting business on the move. As to restoring the play of the law of supply and demand, what the board did was to set prices for the remainder of the year. As to deflating prices, it brought about reductions in steel prices averaging 9.4 per cent., leaving them 81 per cent. above the ten-year pre-war average, while copper had dropped to its pre-war average. As to bringing buyer and seller together, what the industrial board did was to reach an agreement with the sellers, the committee of the iron and steel industry, then tried to induce the railroad administration to endorse the prices and place orders, which the railroad administration refused to do, claiming first that the prices were unreasonably high, and secondly that the whole thing was illegal. The Navy Department opened bids for 20,000 tons of steel, after the industrial board's prices had been announced, and finding that they were all at the same

prices returned the bids, on the basis that the law requires competitive bidding. With the railroad administration the industrial board got into a controversy, which has been given much space in the daily newspapers, while with the Navy Department it appears to have had no communication.

The curious thing about the situation is that the daily press despatches from Washington have been uniformly colored along the line that the railroad administration was wrong and the industrial board's efforts to help the country were being needlessly interfered with by the railroad administration. On the other hand, strangely enough, among the very people most interested in prices being maintained, namely the pig iron and steel producers, there has been a constantly growing feeling that the railroad administration is right. Of course, the producers are making no effort to advertise their attitude, but no difficulty is experienced in ascertaining that many of them hold this view.

It may be that these producers have turned against the industrial board simply because it has not succeeded. A more plausible theory, which, of course, it would be difficult to confirm specifically, is that the producers' real cause of dissatisfaction is that the industrial board misrepresented its prospects of securing approval of the Department of Justice. This much is frankly admitted, that at one time the producers regarded it a settled fact that a system of steel price maintenance had been established, not with the Government as neutral in the matter, but with its active countenance and support. This view has, of course, been entirely dispelled by the Attorney-General stating flatly that he has not approved the plan and will not do so. The steel producers lose more by that than by the holding back of a few railroad orders, as there was not much business to be placed in any event.

The only thing that has kept the subject alive at all has been the fact that at the close of last week Secretary Redfield received a cable from the President, to whom both the industrial board and the railroad administration had made appeals, stating their respective viewpoints. The text was not made public, but one might reasonably infer that the President asked that the industrial board endeavor to offer better terms to the railroad administration. If the President had desired to instruct the railroad administration to accept the steel prices, as the industrial board had expressed hopes he would do, the cable presumably would have been sent to the railroad administration instead of to the other party in the controversy.

Market Prospects

The steel market is telling its own story, however. Prices are being strictly maintained, indicating that while the producers have lately been talking much of prospects of an open market they are not yet ready to put such a thing into operation. The buyers are not taking hold, and evidently are waiting for lower prices, perhaps for various other things as well. Among middle interests, well trained in observing matters from a neutral viewpoint, there are predictions made that there will be further steel price reductions by about the middle of June. Whether there will simply be formal reductions or irregular reduction, with more or less of open market conditions, whatever that often-used term really means, is the chief matter of doubt.

There is no question that steel prices can be very greatly reduced without serious injury to producers. The small producers, who are given so much sympathy in the trade and daily press, are in many cases closed already, not because of high costs but because of lack of orders. The high costs frequently cited by large steel producers are due largely to the inclusion of overhead, which is very heavy at present because tonnage is so light. Undoubtedly the steel producers would not make their reductions now if they felt business would be greatly stimulated. Evidently they are not sanguine about the near future in business, but when the peace treaty is signed they may become more hopeful and be willing to make terms with buyers. Even if plans to do so were fully formulated no inkling of the fact would be allowed to leak out.

Pig iron presents theoretically an open market, but inquiry has been for such extremely small lots, generally carloads to 100 tons, that there has been no inducement thus far to quote cut prices. The furnaces will be glad to cut prices when actual demand develops, but by that time few will be in operation, and no great decline is to be expected, at least in the near future.

PIG IRON REVIEW

Pig Iron Market Shows Little Activity—Stocks Increasing and Stacks Blown Out—Waiting for Settlement of Prices

While furnaces are showing willingness to make small concessions in order to get business, little buying is in evidence. That this condition is general is borne out by reports from various points, as follows:

PHILADELPHIA.—An enquiry for 250 tons basic for N. & G. Taylor Co., Cumberland, Md., plant, showed that furnaces are willing to give some concessions to get the business. They were agreeable to standing from 15 to 20 cents of the freight charges against them. Most sales have been for small tonnages. One lot of 750 tons of No. 2 X was sold at $28, Buffalo furnace, for second and third quarter delivery to a Baltimore maker. Two more furnaces have been blown out during the week.

NEW YORK.—A number of export enquiries are going around, from South America, Japan and England, but in most cases no sales result, as foreign buyers find freights too high. Domestic enquiries are very poor and new business light. The price stabilizing plan is admitted to be a failure, and the trade is waiting to see how the market will act when open trading is again in force.

PITTSBURGH.—There is no demand from buyers beyond the present half year, and producers are not anxious to make commitments beyond that period. Producers are instructed to hold their customers to the terms of the contracts already made, and the only revision has been on monthly requirements. Two furnaces are preparing to blow out by the end of the month. The Carnegie Steel Co. have only 36 of their 59 stacks now in full blast.

BUFFALO.—As a contrast to the general stagnation in this district was the report of a sale of 2,300 ton basic and foundry evenly divided, and 600 ton foundry, all for export. Production is very low, in some cases being down to fifty per cent. of capacity. Makers are in general sitting tight, waiting developments.

CLEVELAND. — Some small sales have been made here at the $26.75 base furnace price, mostly in carload lots. The expansion noted last week by some interests dropped off sharply. A sale of 200 tons has been made to a pump manufacturer in the state, and a sale of Alabama high carbon iron for prompt shipment at $26.75 Birmingham. It is probable that more furnaces may be blown out in the near future.

CHICAGO.—Until the price situation at Washington has been cleared up little business is expected. What business is offering is for small quantities for second half delivery. There is a lot of iron piled in yards, and furnaces are still being blown out.

ST. LOUIS.—Furnaces banking and blowing out, with an absolute cessation of business is the state of the market here. This is put down mostly to the upset in Washington, but the trade generally is philosophic.

BIRMINGHAM.—Some furnaces are being blown in but they are more than balanced by others being blown out. Shipments are down to vanishing point, and enquiries infrequent.

SCRAP METAL MARKET

The quietness in the finished steel market is reflected in the scrap metal market. There is some variation in different districts, but the general advance has been halted. Following are reports from districts:

PITTSBURGH.—Some of the large buyers having withdrawn from the market, prices have eased off somewhat. The price controversy in Washington has had a bad effect on the boom that was coming to the scrap market. A sale of car wheels was made recently, 500 tons of car wheels at $24. Heavy melting steel is quoted from $15.75 to $16.

NEW YORK.—Buyers and sellers are awaiting news from Washington. There is a very slow movement in heavy melting and wrought material, and the general situation is one of sitting tight.

PHILADELPHIA. — Prices remain steady, with little business in most grades. Railroad wrought and wrought pipe are the materials most in demand,

and sales are reported in these grades at the advanced prices.

BUFFALO.—There has been a good movement of buying by outside interests, and they are keeping up a good demand for turnings, borings and malleable scrap. Heavy melting steel is in good demand. Prices remain at about the same as last week.

CLEVELAND. — Prices have not changed actually, but the sentiment of the market is towards lower prices. There is not only no buying, but consumers will not even hint as to when they will buy. They are looking for an open market in the near future.

CHICAGO. — The market here has been quieter, but prices remain firm. Any enquiry seems to result in a stiffening of prices. What goods are being offered by the railroads find a ready market. An enquiry for iron and steel axles by a western mill resulted in a sharp advance in both grades.

CINCINNATI. — Some orders have been received here from Pittsburgh and Cleveland for scrap, to be shipped before July 1. Some grades are firm, heavy melting steel and bundled sheet having advanced 50 cents to $1 a ton.

ST. LOUIS.—The scrap market here is irregular. Some consumers are trying to cancel contracts, and dealers who have been filling their yards now seem anxious to unload, even at less than purchasing price. Railroads are offering between 6,000 and 7,000 tons.

BIRMINGHAM.—No sales and no enquiry is the report from this district. Dealers do not expect any improvement until the railroads begin buying.

BALL-BEARING MANUFACTURERS COMBINE

Of interest to all users of bearings is the just announced combination, effective May 1st, of the Hess-Bright Manufacturing Co., the SKF Ball Bearing Co., the Atlas Ball Co., and the Hubbard Machine Co. The new company, under the name of SKF Industries, Inc., will offer a comprehensive line of ball bearings, including the Hess-Bright deep-groove type, SKF self-aligning radial and thrust bearings and ball-bearing pillow blocks and shafting hangers.

Through the medium of its engineering organization, backed up by a well-equipped laboratory, the new company will be able to place at the service of bearing users the knowledge gained in many years' study of anti-friction bearings of all kinds. On request manufacturers' problems will be analyzed in detail and that type of bearing recommended which (independent of sales considerations) is best suited to the conditions met. In addition the laboratory staff will carry on research studies affectisg anti-friction bearing design and application.

SKF Industries, Inc., is the consummation by physical consolidation of a merger begun some time ago of the four companies mentioned under the direction of B. G. Prytz, president; W. L. Batt, vice-president; J. P. Walsh, controller; and S. B. Taylor, sales manager. The principal office will be at 116 Broadway, New York City, with branches at Boston, Philadelphia, Atlanta, Buffalo, Cleveland, Detroit, Cincinnati, Chicago and San Francisco.

LOOKS FOR BUSINESS TO BECOME BETTER

Canadian Bridge Co. Expects Trade Will Develop to Some Considerable Extent

Windsor.—Willard Pope, vice-president of the Canadian Bridge Company, Ltd., Walkerville, in a statement, declared there are absolutely no grounds for the persistent rumors that that company was about to be absorbed by Canadian Steel Corporation, Ltd.

"The Canadian Bridge Company will continue to run, as in the past, an independent corporation," said Mr. Pope, "and all rumors to the contrary are absolutely without foundation."

Owing to the cancellation of war contracts, the Canadian Bridge Company has been compelled to considerably reduce its staff, but officials are very optimistic as to the future and believe that when peace finally is signed structural work in Canada will again boom.

At present the Canadian Bridge Company is completing the last of eight fabricated merchantmen built for United States Government. Construction work has all been done at Walkerville plant and parts have been shipped to the American seaboard to be assembled. Each of these freighters gave employment to approximately six hundred men for a period of one month. During the continuance of the war the company was entirely engaged in the production of munitions, and when running at full capacity carried a staff of approximately one thousand six hundred hands.

Discussing future prospects for Canadian construction, Mr. Pope said the recent action of the United States Industrial Board in fixing base prices for structural material for 1919 at approximately $7 per ton lower than prevailing prices was sure to have a stimulating effect upon Canadian business.

"During the war," he said, "a lot of structural work was suspended, and now that purchasers who have been holding off in anticipation of lower prices know there will be no further drop in steel this year they will go ahead with all urgent and necessary work."

Another sign that indicates the company soon will have every anvil ringing and every lathe turning is the fact that G. F. Porter, the engineering genius who, as chief engineer of construction, successfully built the Quebec Bridge, will shortly return to assume duties of chief engineer for the company here.

STANDARD SYSTEM OF DIMENSIONS

(Continued from page 411)

After 12 inches all dimensions should be stated as feet and inches."

So I bid my last prospect good bye, and wearily wended my way homeward, where I sat down and wrote this tale of woe. It will save me walking around, and perhaps I'll get to hear of a standard system, or at least hear of a reason why there should be a standard system, or perhaps hear that such a thing is impossible. Personally my spirit of enquiry is weakening. I need oil for my lamp, so, readers in general, do you know of any real, honest-to-goodness proven system, and what success it has had, and why it was adopted?

I'm hoping to read very soon through these columns why we muddle through in such fashion, so out with your views.

SHOP ARITHMETIC

(Continued from page 403)

Considerable experiment was done in obtaining a solder for a particular purpose; when it had reached the proper constituency it was found that it contained 10 lbs. of tin; 43¾ lbs. of bismuth; 25 lbs. of lead; and 11¼ lbs. of cadmium. What are the relative percentages of the formula? The total mixture would contain 10 + 43¾ + 25 + 11¼ equals 90 lbs. This then would represent 100 per cent. To find the different rates, divide the percentages by the base; thus:—

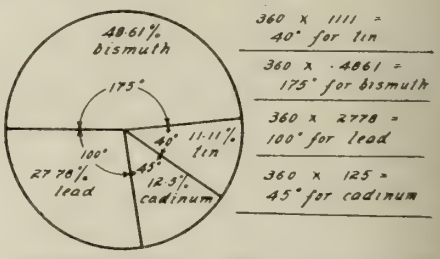
$\frac{10}{90} = \cdot 1111 = 11.11\%$ tin

$\frac{43.75}{90} = \cdot 4861 = 48.61\%$ bismuth

$\frac{25}{90} = \cdot 2778 = 27.78\%$ lead

$\frac{11.25}{90} = 125 = 12.5\%$ cadinum

100.00% mixture



To construct the chart, draw a circle and find the desired angles corresponding to the different percentages by multiplying 360 by the various percentages expressed decimally.

"Sorry, Brown," said the doctor after the examination, "You're in a very serious condition. I'm afraid I'll have to operate on you." "Operate?" gasped Brown. "Why, I haven't any money for an operation. I'm only a poor working man." "You're insured, are you not?" "Yes, but I don't get that until I am dead." "Oh, that will be all right," said the doctor consolingly.

"Is your husband much of a provider, Malindy?" "Well he jes' ain't nuthin' else, ma'am. He's gwine to git some new furniture providin' he gits de money, an' he's gwine to git de money providin' he goes to work; an' he's gwine to go to work providin' de job suits him. I shoh' never did see sich a providin' indowidgil in all mah bohn days."

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$19 00	$20 00
Electro copper	18 50	19 00
Castings, copper	17 25	19 00
Tin	60 00	58 00
Spelter	9 00	8 50
Lead	6 75	7 50
Antimony	8 00	8 50
Aluminum	35 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 00	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	12 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd. brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	**$8 50**
Structural rivets, as above	**8 40**
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 5%
At warehouse ..... list plus 25%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings. 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	16
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

FINDING OUT FOR CERTAIN WHAT THE RETURNED SOLDIER CAN WORK AT

THE industrial survey, introduced and developed in Canada by the vocational branch of the Invalided Soldiers' Commission, has proved of such service that it is being extended to industrial and mercantile establishments of all kinds. The idea has been developed in the following manner:

To discover, classify, and systematize the possible openings for discharged disabled soldiers, the director of the vocational branch, Mr. W. E. Segsworth, engaged the services of Mr. Gerald Boate, who has made extended and minute study of the industrial survey. Returned men of suitable experience and character were engaged and rapidly instructed in their duties. The work was begun in the autumn of 1917. The first survey was conducted in the Angus shops of the Canadian Pacific Railway at Montreal, and what was done there will illustrate the general principle and operation of the survey.

In October, 1917, permission was obtained from H. Osborne, works manager of the Angus shops, to investigate that establishment. Between six and seven thousand workmen were employed there, the work falling into two broad divisions—the engine shops, and the car shops. In all, there are about 130 specific kinds of jobs regularly performed. It was the task of Mr. Boate, who was the surveyor, to find out the requirements of each job in respect of physical effort and mental capacity, and to state what kind of degree of physical disability did or did not unfit a worker for each kind of employment.

The electrical department of the engine shop was first visited. Here Mr. Boate found four sub-classes of work, as follows:

1. Motor and generator armature winding.
2. Inside electrical repairs.
3. Electric crane operators.
4. Outside electrical maintenance men

A summary of the description of subclass number one will illustrate the whole method.

Motor and Generator Armature Winders

Several women had been employed for about nine months and had become very proficient. One man with a deformed spine was working there. The work is done sitting and requires little muscular exertion, and is thus suited to many kinds of physical disability. The job consists of stripping motor and generator armatures ranging in size from one-eighth to 450 horse power. One thousand motors between Halifax and Fort William are kept in repair by this department. Seventy-five per cent. of the following light bench work may be done sitting: coil winding, taping, soldering, connectng coil ends and assembling commutators and coils in the armature. There is such a variety of operations that training should be given where the work is done, or at least the final stages of training should be carried on in the shop. Five or six months is su cient to make a workman efficient. The general work most closely related to this is lathe work and kinds of coil winding on lathes; outside lighting and motor winding in factories, power-houses, and car shops. Necessary experience is gained while working at repairs on various kinds of coils under instructios of the foreman. It is possible for those taking part of their retraining course at this shop to attend the C.P.R. apprentices' school. Apprentices are allowed to attend school in the plant two hours a day twice a week during their apprenticeship.

It is necessary that a workman should be able to read, write, keep time-cards, and be of average intelligence. In the opinion of the superintendent of the department, the retraining necessary covers arithmetic, science applied to electricity, making time-cards, handling and reading arnmeters and voltmeters, familiarity with the sizes and makes of wire, and geseral shop practise. The surroundings are not favorable for those suffering from lung wounds or diseases. Good eyesight is necessary, but partial deafness will not disqualify. The worker must have good

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

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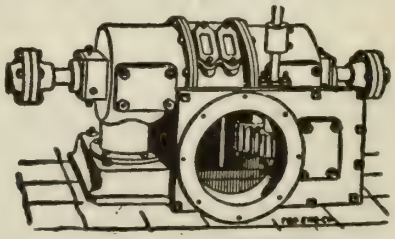


Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

arms and hands, with very supple fingers; but loss of or injury to other limbs does not interfere with his usefulness very much.

The above is given as a typical analysis of the different jobs in the Angus shops. The relation of physical disability to each specific job s determined. The physically handicapped discharged sol dier is given the training to fit him for a given job, and the job is chosen to suit his capacity.

The industrial survey, therefore, furnishes the groundwork for a very comprehensive scheme of employment. Already hundreds of industrial and mercantile concerns have been surveyed, and many hundreds of partially disabled men have been placed at suitable work.

The system of industrial retraining is applicable to more than the returned soldier. It will apply to that great and ever growing army of industrial cripples from the railways, mines, factories, and other industrial lines. The industial survey, properly applied, will make it possible to lift the disabled from a condition of dependence to that of the self-respecting wage earner; and the vocational branch has blazed the path.

EXTENSIONS ARE BEING MADE TO PLANT OF STEEL CORPORATION

SYDNEY—The Dominion Steel Corporation is making progress in the extension on the plant which have been planned for and which have been found necessary to meet the dem nd for their products and to meet the demand for labor employment.

Work on the construction of the new power house has been started by the Foundation Company. The plans for the building which were finally accepted by the engineer of the company. A. G. Thurkaff, were drawn by A. E. Dore of the Foundation Company staff. The building is specially designed with a view to further extension when that shall be necesary to future plans of the company which it is understood will include the operation electrically of all departments. The present building will be used in conjunction with the old building but later the old building wil be discarded entirely. The new power house will be built just north of the blast furnace boiler house where there is plenty room for enlargements.

The second battery of coke ovens which were under construction by the By-Products Co., are being made ready for the first bank which will likely be placed and lighted on the first of April. This marks the completion of two years' work by the By-Products people, the first bank of sixty ovens having been opened last year.

Wabena, the Steel Company's source of ore supply in this country, it to have a new power house also. The mine at Wabana has always been electrically operated and the new power house means the extension of the work there. There will be a large power house with two generators of 2,000 k.w.'s each and three sub-stations for the lower voltage. The construction on this has already started.

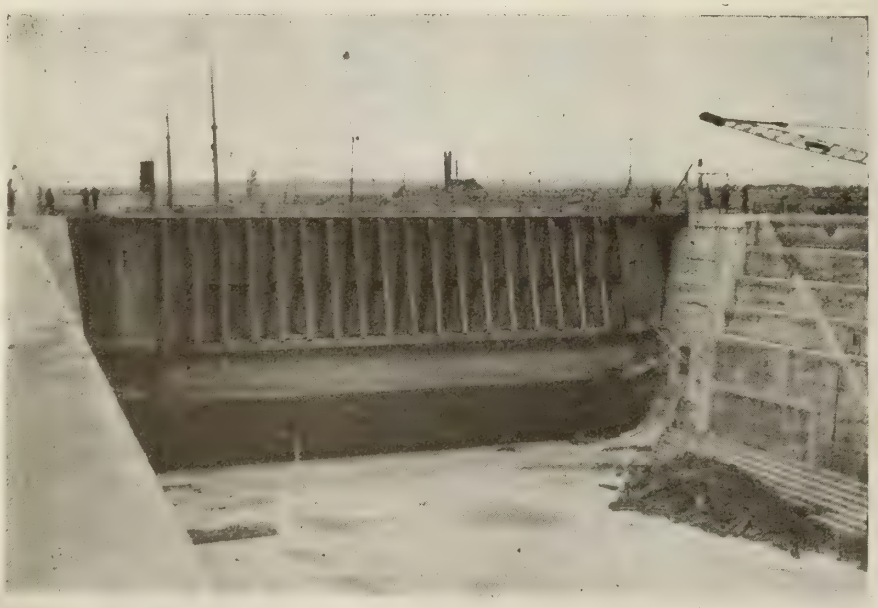
STEEL COMPANY'S STATEMENT FOR 1918

Steel Company of Canada's annual statement, which reached the shareholders on Saturday, proved to be much in line with general expectations, the gross earnings for 1918 being $5,367,120, as compared with an excess of $6,000,000 the previous year, or an actual falling off of $673,198. Gross for 1918, however, is $345,729 over that of 1916, and, altogether the showing was regarded as a highly satisfactory one.

After all deductions, including the allowances for fire insurance, reserve and pension fund, there remained available for dividends on the outstanding $11,500,000 of common stock the sum of $1,815,017, or equal to 15.7 per cent., as compared with 19.5 per cent. in 1917 and 18.4 per cent. in 1916. The balance brought forward to the credit of profit and loss account at the end of the year was $7,322,872, or $1,125,017 more than at the end of 1917, representing over 40 per cent. of the combined preferred and common stock of the company outstanding.

The company continues to enjoy a comfortable financial position, current assets exceeding current liabilities by over $12,000,000, or less by about a million than was the case in the previous statement. Actual cash on hand of $805,828 is less by some $565,000 than at the end of 1917, but the difference is accounted for by a corresponding increase of about the same amount in "other securities," which include Government bond issues, to which the company was a generous subscriber during the war.

Current Events in Photograph



MAIN CAISSON OF HUGE DRY DOCKS

The banks of the St. Lawrence River, near the ancient town of Levis, are once more resounding as in days gone by, to the ring of axe, adze and caulking hammer, also to the more modern clatter made by pneumatic riveters and the snap of plate punches. The reason for all this is the great shipbuilding activity going on at Lauzon, a village just below Levis. One of the new dry docks, of which the main caisson is shown in the photo, is claimed to be the largest in the world.

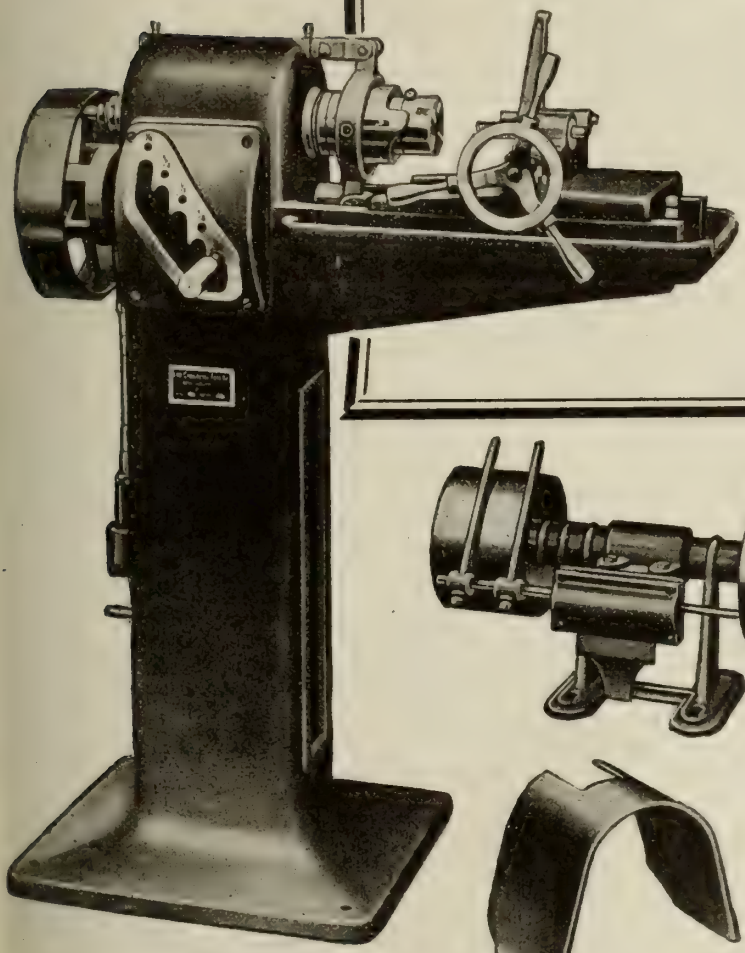
THE BETTER WAY

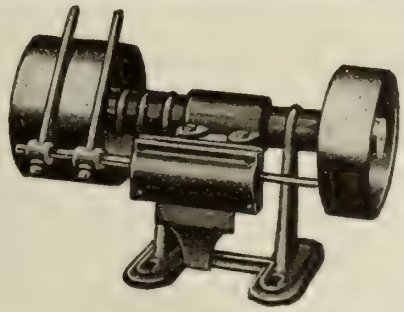
Just the way that suits. Small parts are most economically threaded with the Geometric Threading Machine. Busy automatic screw machines cannot profitably be slowed down to cut threads when there is a Geometric Threading Machine at hand. Especially since a Geometric Threading Machine costs one-tenth the price of automatics.

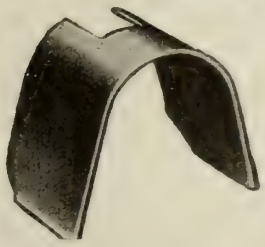
Geometric Threading Machines are employed on a large class of small threaded parts that cannot be produced economically on the ordinary screw machine.

Made in three sizes—to cut 1/8 to 1/2 inch, 1/4 to 3/4 inch, and 3/4 to 1 1/2 inch diameter threads. The carriage is mounted on slides and on the largest size machine is moved back and forth by rack and pinion, and in the smaller sizes by hand.

Spindle speed changes readily made, adapting the machine to the diameter and material of the work. An adjustable stop assures accurate length of thread, and automatically opens the die head, permitting of drawing the work straight back.





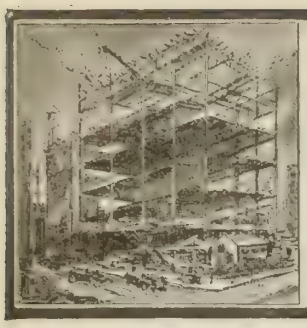


A line from you brings full details regarding this machine. Tell us your threading requirements — let us recommend the proper Geometric Collapsing Tap or Self-opening die.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Philadelphia.—The Electric Furnace Construction Company, Finance Building, Philadelphia, reports the successful starting up of a special "Greaves-Etchells" type of electric furnace for the manufacture of corundum at the works of the Wm. W. McGregor Co., Airdrie. The material used for the charge is the waste dust accumulated from the crushing of natural corundum. This was practically useless and was considered to be a waste product. A charge of 7 tons of this material was treated in approximately eight hours. The total energy consumption was 3,500 units and the usable corundum ingots weighed nearly four tons. Results of the tests made gave great satisfaction and promise a new field for the electric furnace. We understand that a fairly constant load was obtained throughout the whole of the operation.

TRADE GOSSIP

Victoria.—The mechanical equipment of the Cholberg yards has been increased by the addition of a new steam driven air compressor, and a large increase in the pipe line is contemplated.

New Nurses' Home.—Work will shortly be commenced on the new nurses' home to be erected by Jacob Kaufman, a prominent manufacturer of Kitchener. This will be for the nurses in the Kitchener and Waterloo Hospital.

Victoria.—A company has been formed, with a capital of $100,000, to build and equip a floating drydock, and to build tugs and small craft. A thoroughly modern machine shop is to be erected, and the company will specialize in repair work.

Checking the Coal Dealer.—By a new law put on the statute books this session, a coal dealer is prevented from taking orders for coal early in the season, under promise of later delivery. Unless he is in the position to deliver the goods, he is not allowed to take the order. This will help to protect the consumer.

Greeks Looking for Trade.—It is understood that a Greek commercial mission will shortly leave Athens for Canada. The object of the mission will be to determine to what extent Canadian industries can supply Greek requirements, and to arrange means for the placing of Greek orders in Canada.

VICTORIA.—The Harbor and Marine Co., Ltd., is being incorporated to build a plant for the construction of two 8,100 ton steamers for the Dominion Government. The head of the new firm will be C. J. V. Spratt, of the Victoria Machinery Depot, Ltd. The vessels will be commenced as soon as steel is received.

To Investigate Lumber.—The British timber controller, Sir James Bell, is coming to this country shortly to investigate the possibilities of the Dominion's timber. Sir James has been in frequent communication with Mr. Lloyd Harris, of the Canadian Trade Commission, on the question of importing timber from Canada.

Natural Gas Development. — A company is being organized, under the name of the Western Natural Gas Corporation, Limited, under Dominion charter. It is understood that their representatives will apply shortly to the Winnipeg City Council for a franchise to supply the city with natural gas from the fields in Western Saskatchewan.

Trouble in Nova Scotia.—Hints of a general strike unless the Government passes the eight-hour day legislation before July 1, were embodied in a resolution unanimously passed by the labor men of Cape Breton in a big meeting held at Sydney, N.S., Sunday afternoon. C. C. Dane, president of the Provincial Labor Congress, presided. It was stated that the resolution was intended to facilitate the consideration of the bill which it was claimed should have been disposed of in March last. A committee consisting of C. C. Dane, Michael Barnes and J. A. Gillis, was appointed to go to Halifax to urge the necessity of the eight-hour day upon the local House.

CHASE TRACTOR PLANT EXPECTS TO OPERATE IN THE CLUFF BROS.' FACTORY

The first of the large number of American industries which are expected to locate in Canada as a result of the impending British Imperial Preferential Tariff is being located in Toronto through the efforts of E. L. Cousins, City Industrial Commissioner, and R. J. Cluff, of Cluff Brothers, manufacturers of munitions and plumbing supplies. The industry is the Chase Tractor Company, Limited, which will commence shortly to manufacture in Toronto the Chase motor tractor, for the purpose of meeting the great demand for agricultural implements, which is expected to follow the conclusion of peace. The company will open operations in the building lately occupied by the Cluff Ammunition Company at 28 Atlantic avenue, but when the business develops a site will be secured in the Eastern Harbor Terminal at the foot of Cherry street, and a modern plant will be erected at that point.

Headquarters in Toronto

The Chase motor tractor was invented and manufactured by the Chase Motor Truck Company of Syracuse, N.Y., and has proven a great success in the United States, so much so that it attracted the attention of R. J. Cluff while he was in Dayton, Ohio, superintending the manufacture of shell forgings by the Dayton Ohio Production Company, which was controlled by the Cluff interests. As a result of his investigations Mr. Cluff became satisfied that this tractor has a great future and will appeal strongly to the Canadian farmers, and negotiations with the owners of the patents resulted in the purchase outright by the Cluff interests of all the rights and patents to this tractor held by the Chase Motor Truck Company, followed by the removal of the site of this industry from Syracuse to Toronto.

The Syracuse factory has been closed down and the Chase Company has also discontinued the manufacture of motor trucks, so that the headquarters of the new company will be in Toronto, and from this point the trade of the world will be supplied with these tractors.

R. J. Cluff, president of the company, expresses the greatest optimism over the outlook for the new company in particular and Canadian industries in general.

"Canada is going to experience a great period of expansion," said Mr. Cluff, "and we are simply trying to take advantage of the good times that we feel are coming."

"I am very much pleased at being able to secure this industry for Toronto," said Mr. Cousins. "I believe it will develop into a very large industry which will occupy an important location in the Eastern Harbor Terminal, and I think it is only a forerunner of many other industries which will locate in Canada as a result of the British preferential tariff, and of which we hope to secure a good share for Toronto."

BELTING

What Belts Should I Use

? FOR HIGH SPEEDS
FOR WET PLACES
FOR HOT PLACES
FOR COMPRESSOR DRIVES ?

The advice given herewith, if followed closely, is sure to increase your belting service and save money, time and worry.

HIGH SPEEDS

From 3,000 to 3,500 feet per minute is considered a normal belt speed. Four thousand feet per minute and over is a high speed, and are in the selection of the belt must be exercised. A belt that is quite flexible is required, and if the pulleys are small, this is absolutely necessary. For this work a leather belt especially adapted for this kind of work is good. Balata belts also give good results. They should be as light as the requirements will allow, and should be put on tight to avoid slipping. It is extremely desirable to use as light a belt as possible on high speed work in order to obtain flexibility. A great many plant managers have belting troubles through ordering too heavy a belt.

WET PLACES.

It is very necessary to distinguish between drives in which the belt is subject to wet conditions all the time, and one in which the belt is only wet some of the time. In the latter instance the belt must be really waterproof, not just "waterproofed." The general types of belting that come under this heading are Balata belts and Rubber belts. The method of making a Balata belt (saturation of the fabric with the gum) makes a belt that is thoroughly waterproof. The method of manufacturing a rubber belt (rolling the rubber into the fabric) does not make a belt that is thoroughly waterproof. When the belt wears down to the canvas the exposed surface of the canvas absorbs moisture. In places where the belts are always wet, either of the above types can be used, but we can offer another that will give at least as good service and is considerably cheaper. Scandinavia belting, our solid woven belting, is admirable for this purpose. It is true that it shrinks when wet, but if the belt is always to remain wet you can readily understand this makes no difference. The wearing qualities of this belt under these conditions is great. Scandinavia belting would not be satisfactory under conditions that change from wet to dry, as the belt would shrink and expand as the wet conditions changed to dry.

HOT PLACES.

We recommend Scandinavia and Rubber belts for drives when the temperature is over 110° F. We have Scandinavia belts running in temperatures that are around 200° F., and giving splendid satisfaction. Before putting Scandinavia belt on a drive of this kind, it should be well heated by leaving it for some time in a hot place, as over a boiler. If the belt is then put on with a belt stretcher, most of the stretch can be taken out at once. Do not use Balata belts in temperatures over 110° F., as the gum softens at about 120° F., and if the belt happens to have a spliced joint the splice would come apart. The plies would also have a tendency to open up.

COMPRESSOR DRIVES

On Compressor Drives and on similar work when the load is intermittent, we recommend Lanco Balata Belting, except where extra weight is required on the belt. Some compressor manufacturers do not allow enough face on their pulleys to carry a belt of the proper width. In cases like these it is hard to get the necessary weight in a Balata belt. Where the pulleys are wide enough for a Balata belt it makes a particularly good means of transmission for this class of drive. A cemented joint is generally required for this class of work, and a belt with as little stretch as possible should be used. Balata fulfils the above requirements, and in addition, will stand all kinds of cold weather. In fact, it will stand practically all atmospheric conditions except those of heat. In figuring out the size of belt for compressor and similar drives, always figure a belt 40% heavier than would be required under normal belt conditions. This 40% is allowed on account of the intermittent load.

SCANDINAVIA BELTING

Watch for our next article giving advice on the belts you should use for

MAIN BELTS AND DIRECT DRIVES, SHIFTERS, OILY PLACES, FOUNDRY CASES, ETC.

NO BELT IS GOOD FOR EVERY SERVICE.

TRADE MARK LANCO BALATA BELTING

FEDERAL ENGINEERING CO., LIMITED

172 John St., Toronto

A Good Sized Order. — MacKinnon Steel Co., Sherbrooke, Que., are starting the erection of two large tower derricks with 90 foot booms, all steel work for which has been fabricated by them, for the Davie Shipbuilding & Repairing Co., Lauzon, Que. This company has recently completed a 70x480 foot crane runway, for the same company.

Plant to Resume.—The E. Long Manufacturing Co., of Orillia, having completed their adjustments with the Imperial Munition Board, arising out of their shell-making activities, are now turning their attention to getting on a peace footing. They have about 25 men at work dismantling and removing the shell machinery, and installing new machinery, with a view to resuming the making of saw mill and mining machinery. Some of the shell machinery will be adapted to the new purpose but most of the machinery will be new. The company hope that within a year they will have a larger business than in pre-war days.

A Famine in Lumber.—That the world was facing a famine in lumber was the statement made by Roger E. Simmons, before the legislative committee of Congress. Mr. Simmons was sent to Russia in 1917 as a member of the United States Government Commission, to study the lumber situation in the war swept countries. Incidentally he was captured by Bolsheviki, and at one time sentenced to be shot. He said that prices of lumber were bound to rise for the next few years, as there would be an unprecedented demand from all countries devastated by the war, and most of this demand will have to be met by the United States and Canada.

Will Return Soon.—A despatch from Paris states that Lloyd Harris, head of the Canadian Trade Commission to Europe, is returning to Canada shortly to discuss with the Government and impress the people of Canada the growing opportunities of increasing Canadian trade in Europe, especially the Balkans. After a thorough investigation and study of all the phases of the situation, together with his knowledge of Canada's agricultural and natural wealth and industrial achievements, he is convinced that with courage as well as discipline the great war debt will be wiped out in a few years by the extension of Canada's foreign trade. He will urge this policy on the Government and impress on the industrial leaders the need of immediate action to organize Canadian effort. Sir Robert Borden, who has been in close touch with the situation, shares the views of Mr. Harris.

May Have Nitrogen Industry.—An interesting address was heard by the Toronto branch of the Society of Chemical Industry, at the Engineers' Club recently. The lecturer was Dr. A. J. Harker, director of research for Munitions Inventions Department, London, Eng. The speaker told of the good work that had been achieved in England in the production of ammonia nitrate and how the difficulties had been overcome and new processes worked out. The production of ammonia nitrate had been stimulated by every possible means. There were three possible ways available. Nitrogen from the arc process, using much electric power; (2) the cyanide process from nitrogen and calcium carbide; (3) the Haber process for ammonia from liquid nitrogen and hydrogen. It was pointed out that the large available water powers of the St. Lawrence might be used to supply the ever-increasing demand for nitrates in farming operations, and to establish an industry that could compete on the world's markets.

Piano Business Good.—That times are good in the piano trade is evident from the reports coming from two of the leading firms. An announcement was made recently by the Bell Piano & Organ Co., that in future the factories would work only nine hours a day, but the employees would receive pay for the ten hours as before. Almost simultaneously comes the announcement that the C. W. Lindsay Co., after paying dividends of 7 per cent. on the preferred and 8 per cent. on the common, voted a bonus of 10 per cent. cash, payable on May 1, to all employees who have been in the employ of the company since March 1, 1918.

Purchasing Agents Organize.—At a meeting held at the Walker House, the Purchasing Agents' Association of Toronto was formed, twenty-eight (28) members being admitted to chartered membership. The objects of the association are to provide for the regular meeting together of purchasing agents, with the resulting exchange of ideas and opportunities for closer relationship between them, to foster and promote among the members at the meetings and elsewhere, by means of speeches, discussions and whatever other means possible, a more thorough knowledge of the products bought by the members, more uniform and efficient purchasing routine and methods, better standardized specifications, classifications, etc., and more improved methods for disseminating market information and whatever else may be deemed proper and advisable to secure the advance of purchasing to a higher level and the individual betterment of its members. The discussion of prices, discounts or other confidential information will not be permitted at any meeting. J. I. Nicholson, of Gunns, Ltd., was elected president; W. F. Dodd, of Canadian Kodak Co., vice-president; G. P. Beswick, Polson Iron Works, secretary, and W. McG. Brown, of Brown's Copper and Brass Rolling Mills, treasurer. Application has been made for affiliation with the National Association of Purchasing Agents, which has a membership of forty-eight hundred (4800). Regular monthly meetings will be held.

THIS WEEK'S MONTREAL NOTES

Extensive improvements are anticipated by the Montreal Harbor Commissioners this year, chief among which will be the electrification of all the railway mileage on the water front. This improvement is a part of the original plan in 1914, but was interfered with by the war. Connected with the scheme is the joining up of the electrified C.G.R. with the harbor system by overhead tracks from Lagauchetiere street, the present terminal of the line.

Plans are now under way for the erection of a large hippodrome in the east-end for the accommodation of sporting events and automobile exhibitions and general displays of manufactured articles and farm products, etc. Seating capacity will be provided for 20,000 people.

The Montreal Municipal Garage is nearing completion and is expected to be in operation by the first of June. It is the policy of the Commissioners to centralize establishments with the view of economy, and the building, which is 380 feet long, 100 feet wide, and 177 feet high, is provided with every facility for efficient and economic operation.

The C.P.R. are planning to engage in more active construction work this year, especially extension of lines in the West and the general improvement of road facilities. In speaking of prospects, Mr. E. W. Beatty, the president, stated that he was looking for a decided improvement in the labor situation. He believes that the present stress is gradually easing off and that everyone is contemplating to step more briskly when the peace treaty is finally signed.

Through the intervention of Hon. G. D. Robertson, Minister of Labor, the Canadian Express strike has been called off, both the employees and the company agreeing to submit their differences to the Canadian Railway Board for settlement.

The Association of Montreal Building and Construction Industries are co-operating with the Administrative Commission, with the object of revising the building by-laws of the city. Those appointed by the association are J. P. Anglin, K. D. Church and E. B. Evans.

Moving this year in Montreal is going to be still more expensive owing to the strike of carters that threatens to disarrange the annual moving programme, 90 per cent of which takes place within a couple of weeks about the first of May; 3,000 are now out.

The Mechanics' Institute on Attwater Ave. is now complete and the books are now being transferred from the old building. Available book space in the new home will provide for 30,000 volumes. Some changes are to be made in the policy of the Institute; the rooms are to be free to readers, and as the building is to be used for the furtherance of education it will be exempt from taxation.

BOOK REVIEWS

The Dominion Forge & Stamping Co., Ltd., Walkerville, Ont., have issued quite an attractive catalogue, showing exterior and interior views of their forge plant, their sheet metal plant and the automobile frame plant. The company are equipped to make all kinds of forgings,

stampings and heavy drawn steel parts to specification, and from this catalogue a manufacturer can obtain an idea of the excellent facilities the company have for turning out this class of product, particularly in large quantities. For instance, illustrations are shown of the steam hammer shop with its twenty steam hammers ranging in capacity from 6,000 to 600 pounds, of the board hammer shop with its fifteen Board hammers, ranging in capacity from 800 to 2,000 pounds, of the forging machine department, with its five up-setting machines. Also there are shown illustrations of the stamping plants with their three hundred presses, capable of forming steel sheets cold up to ⅜ in. thick. Illustrations of special note are the two die sinking and tool making departments where all the forging and stamping dies and tools are made. There are also four pages of illustrations of typical forgings, stampings and heavy steel-drawn parts made for various customers. Any manufacturer using forgings or steel stampings of any kind should be much interested in this catalogue, copy of which will be sent on request.

PERSONAL

Captain W. B. Elliott, son of W. J. Elliott, manager of the Whitman & Barnes Manufacturing Company factory, located at St. Catharines, has returned from overseas service. Capt. Elliott, who is but 20 years old, is credited with taking part in 100 bombing raids, having led the majority of the raids. He was employed at the office of the Whitman & Barnes' factory prior to enlistment. He will resume studies at the University of Toronto. He has been awarded the Distinguished Flying Cross, and the "London Standard," in an article published recently, paid tribute to his conduct. The "Standard" article follows: "This officer (Captain W. B. Elliott) has taken part in one hundred bombing raids, in the majority of which he has been the leader, a position for which he has the essential qualities in a marked degree, viz., courage, resolution and resource. While leading one bombing raid his formation was attacked by thirty hostile machines, ten of these being destroyed, the objective successfully bombed, and the formation returned without the loss of a machine. This brilliant success was mainly due to Captain Elliott's skilful leadership."

MARINE

The vessel is a sister ship to the General Currie and General Morrison, recently launched, and is of full canal size, 261 feet by 43 feet 6 inches by 27 feet 6 inches deep. The usual triple expansion engines and Scotch marine boilers are fitted.

Toronto.—The launching of the General Turner was attended by a Masonic organization in full regalia, the sponsor being the wife of the Illustrious Potentate, Rameses Temple, Mystic Shrine. The Shriners attended in full regalia, with their band, and made quite a dash of color in the prosaic shipyard.

Montreal. — The Canada Steamship Lines, Ltd., have arranged. in conjunction with the Compagnie Generale Trans-Atlantique, for a service between Montreal and French ports. This, it is hoped is but the beginning of a foreign trade that will carry the Canadian flag to all parts of the world.

New Company. — The International Mfg. & Supply Co., Ltd., have a Dominion charter and will handle railway and marine supplies, including a complete line of flexible and metallic packing. W. J. Carrigan is managing director and J. T. Dohne is manager. The head office is 471-3-5 St. James Street, Montreal.

Montreal.—The Houston Lines are inaugurating a service between Canada and Argentine. The first sailing will be by the Alan Keith, from Montreal, about May 5. This will be followed by monthly sailings, St. John, N.B., being the winter port. This will be of great benefit to Canadian shippers, who have hitherto been compelled to ship their merchandise via New York.

Quebec.—Officials of the Canadian Pacific Ocean Services, at a conference with Mayor Lavigueur, held recently, stated that if the scale of wages decided on by ship laborers was carried through, they would have to abandon their intention of making Quebec their summer port for all their vessels. The ship laborers are demanding 60 cents an hour for an eight hour day, 90 cents an hour for overtime, and $1.20 for all Sunday work.

Bridgeburg, Ont.—The two vessels remaining to complete the contract for four steamers at the Canadian Allis-Chalmers Co., have been commenced. One has been launched and the second one is ready to launch. One drawback has been the lack of housing accommoda-

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tion in the vicinity of the yards. The city council has decided to appeal to the Ontario Housing Committee for aid to local families in order to erect suitable dwellings.

Liverpool, N.S.—The Nova Scotia Shipbuilding & Transportation Co., Ltd., of Liverpool, N.S., had another successful event, when the schooner "Faustina, built for J. F. Creaser Co., Ltd., of La Have, and John Penny of Newfoundland, was launched, J. S. Gardner being the master builder. The dimensions are, net tonnage 150, length over all 117 ft., breadth 26 ft., depth of hold 12 ft. 6 in. The keel of this boat was laid down in January and the construction has been rapidly gone on with owing to the mildness of the winter and no loss of time. The above company are now busy upon two beam trawlers and are laying a keel for a 200-ton, three-mast schooner upon the same spot as where to-day's launching took place.

Montreal, Que.—The Anderson Co., of Beaver Hall Hill, have closed an important contract with the British Government, for the purchase of steam trawlers and wooden drifters from the latter. The contract involves about 150 vessels, and $10,000,000, about 100 of these vessels having been built in Canada. These were built for the Imperial Ministry of Shipping, and were mostly for use as mine sweepers. Since the cessation of hostilities there has been a brisk demand for fishing vessels, and these craft are very suitable for deep sea fishing. The vessels are now lying at Halifax, and will probably be disposed of from that port. Enquiries have been received for these vessels from the French, Dutch and even the British Government, while the Government of the Philippine Islands has bought six.

BOOK REVIEW

Industrial Good-will, by John R. Commons; the McGraw Hill Book Co., New York. Price, $2.00.

In the present period of industrial uncertainty, this volume on the relations existing between capital and labor is a welcome aid in the understanding of many of the movements in the labor world, and in the title, Industrial Goodwill, is found the solution of many of our most pressing problems.

As a commodity labor is subject to the law of supply and demand, which determines wages. The introduction of machinery and later the piece-work method of payment have changed the worker's status in industry, and the present practice of efficiency engineering leads to what the author calls the machinery theory of labor.

The machinery theory, like the commodity theory of labor, is not false, it is incomplete. While the law of supply and demand cannot be overcome it can be modified, and scientific management has its limitations. Successful business is always a scheme of finding that correct proportion of different factors which brings the largest net income of all of them together. An additional factor

which enters into the relations between employer and employee is that of good-will, and in the achieving of good-will costly labor turnover is minimized. It is this latter phase of industrial relations that the author develops, and through it points out the successful overcoming of many of the problems confronting the employer of labor.

Democracy in industry is dealt with and the co-operation of both parties is advocated. Other phases of the subject dealt with are compensation laws, the elimination of unemployment, and the related problem of finding work for the unemployed. Industrial insurance, the health of the worker, shop government and working conditions are treated at length, and education, technical and national, form an important part of this work.

CANADIAN PATENTS.—The following is a list of Canadian patents recently issued through the agency of Messrs. Ridout & Maybee, Kent Building, Toronto, from whom further particulars may be obtained. James C. Cockburn, animal trap; John Fraser, churn; Thomas D. Kelly, planes for aeronautical machines; Wm. P. Perry, apparatus for distilling; Paul Wilde, plants for warming and moistening the soil surface; John West and Wm. Wild, retorts and methods of working same; Sigmund Willmer, accumulator electrogrids; Toronto Type Foundry Co., Ltd., universal tool grinding machines; Nels A. Anderson, buckling devices; J. Stone & Co., Ltd., valves for fluid pressure systems for operating bulkhead and like doors; Edward P. Leach, concrete mixer.

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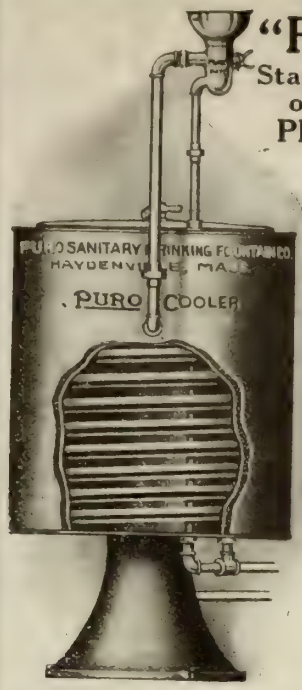

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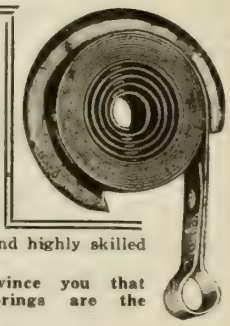

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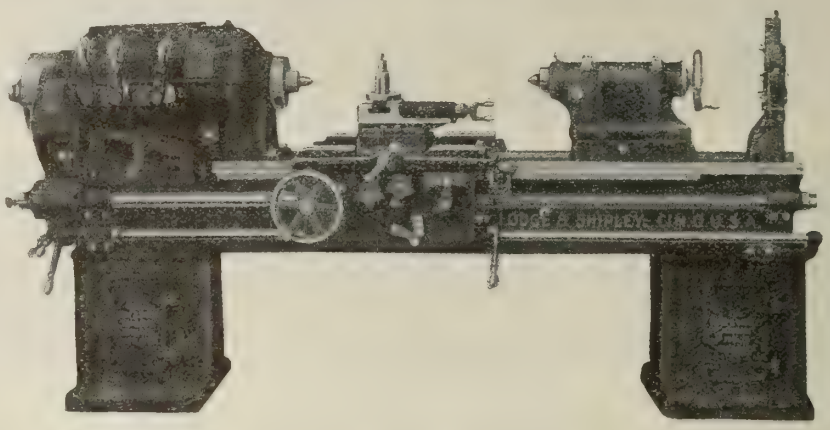

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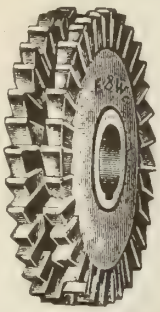

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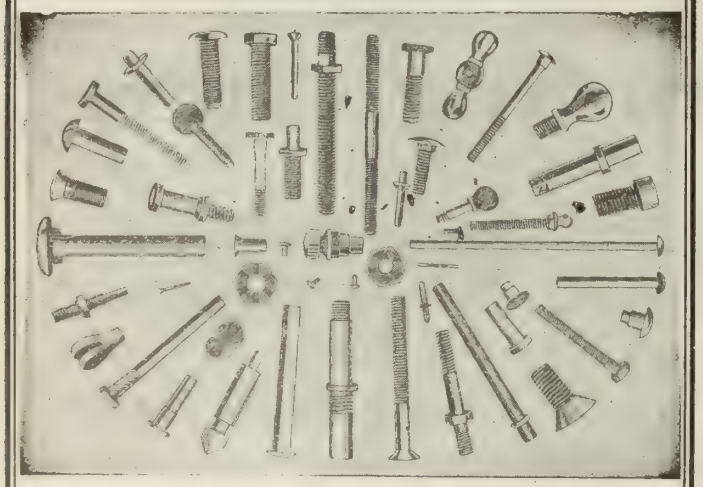

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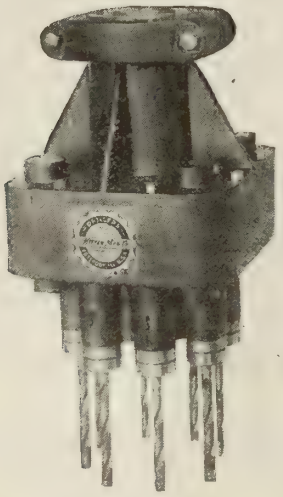

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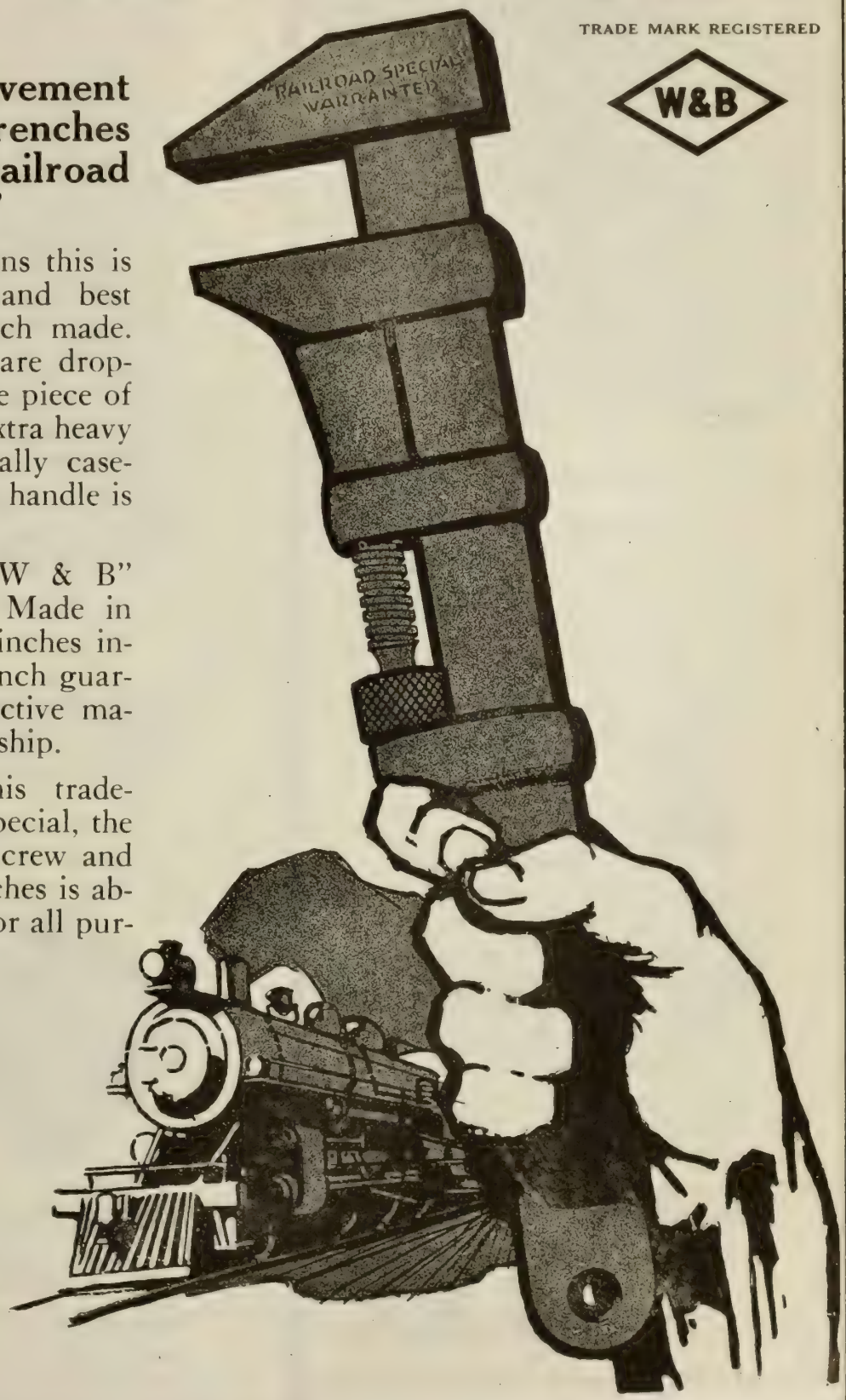

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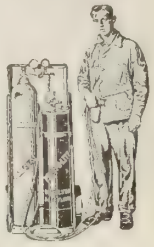

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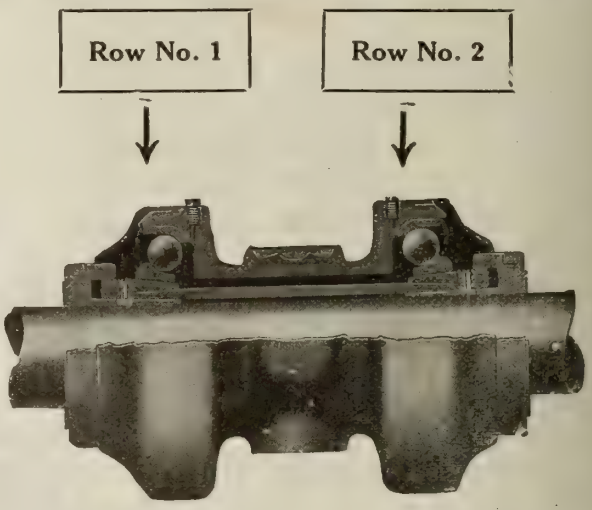

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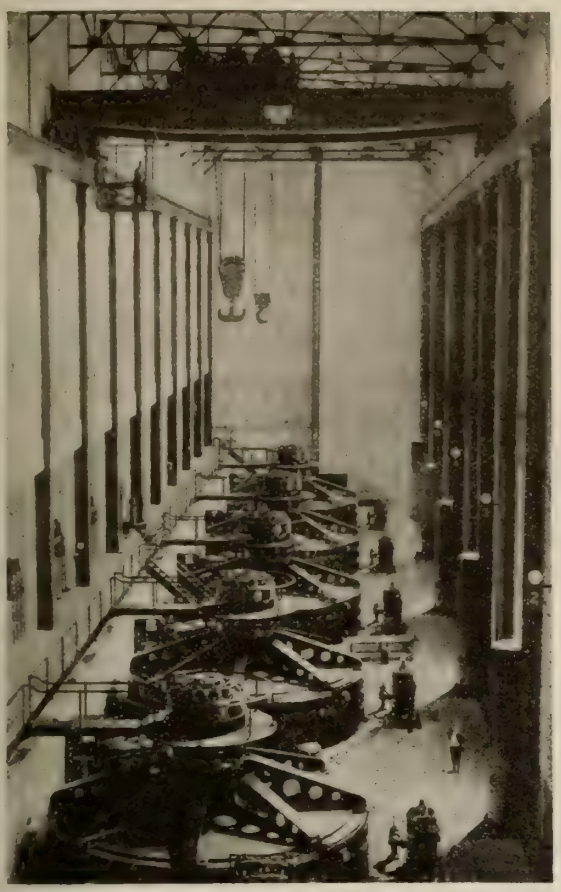

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7—No. 2 Warner, Swasey Screw Machines, geared friction head with power feed to turret, automatic chuck bar feed, plain head.

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3—No. 1 Foster Plain Head Screw Machines, with automatic chuck.

4—No. 2 Foster Geared Head Screw Machines, with automatic chuck, bar feed power feed to turret.

4—No. 4 Foster Geared Friction Head Screw Machines with automatic chuck wire feed.

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OWN STORY *of his*

FIVE YEARS *in the* ARCTIC

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Mr. Stefansson's story will be published exclusively in Canada in MACLEAN'S. The series of articles by him, now appearing in American and Canadian newspapers, refer entirely to his experiences on previous explorations and do not deal with the journey that he undertook for the Dominion of Canada and completed last year.

Other Outstanding Features of April MacLean's

***"Imperial Relations Must be Worked Out,"** by Viscount Bryce. An important announcement on the future construction of the British Empire.

"Reconstruction in Turkey," by Stephen Leacock. A humorous article on the present condition of things in Turkey as seen by Canada's great humorist, and applied to Canadian conditions.

"Bulldog Carney," by W. A. Fraser. A splendid novelette of the Canadian West, complete in this issue. Illustrated by Charles L. Wrenn.

"Opening the New Book," by J. K. Munro. An article on the situation at Ottawa created by the new Liberal leadership—smashing, impartial, fearless.

"The Sun Gazer," by Charles G. D. Roberts. A remarkable animal story. Illustrated by Arthur Heming.

"Canada's Fishmonger General," by Thomas M. Fraser. An article on a young Canadian who put Canadian fish on the diet of the British armies by a series of Barnum and Bailey advertising stunts.

"Bombing the Boche," by Lieut. J. Vernon Mackenzie. The second of the two articles that Mr. Mackenzie has written on the whirlwind campaign of raid reprisals which so frightened all Germany.

"The Transformation," by Frederic S. Isham. Illustrated by Hanson Booth. The second instalment of this sparkling new serial.

"Man and Wife," by C. W. Stephens. Illustrated by R. M. Brinkerhoff. The first instalment of a three part story of Canadian life by a new Canadian writer—a delightful love story with a background of business intrigue.

The Review of Reviews

The best articles from all publications the world over are selected and condensed for this department. Some of the articles in the April number are:

The Man Behind Bolshevism.
Could German Fleet Have Been Destroyed?
The Secret Plans of the Allied Command.
Too Much Wilson.
Is the ex-Kaiser Haunted?
Next Government Will be Labor.
New Life of Deposed Princess.
A New Kind of Socialism.
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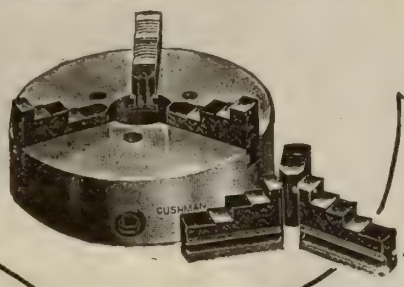

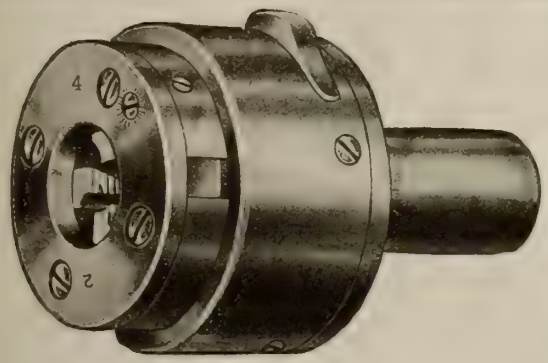

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are of small outside diameter compared with the size of work they do.

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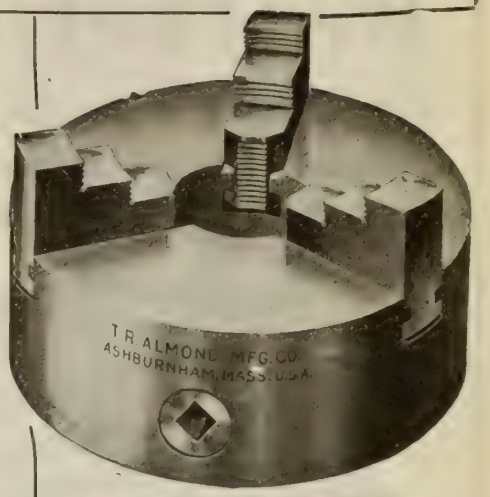
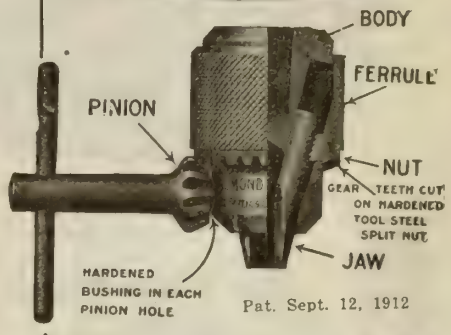


Geared Nut Drill Chucks, in various capacities, 0" to 1".



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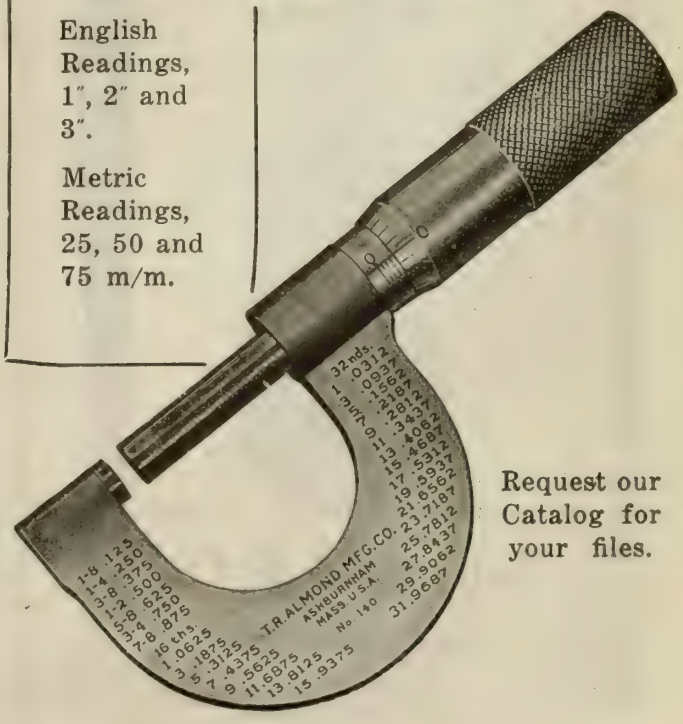

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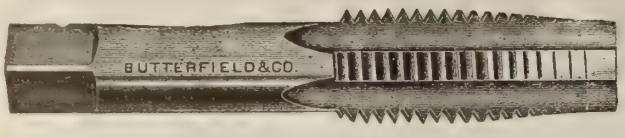

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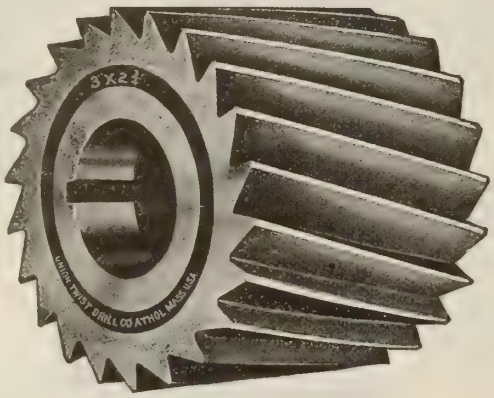

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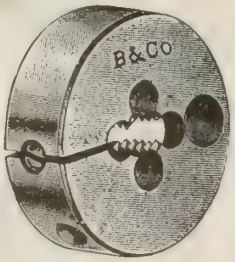

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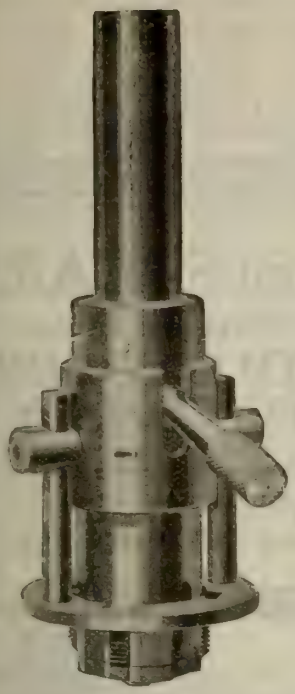

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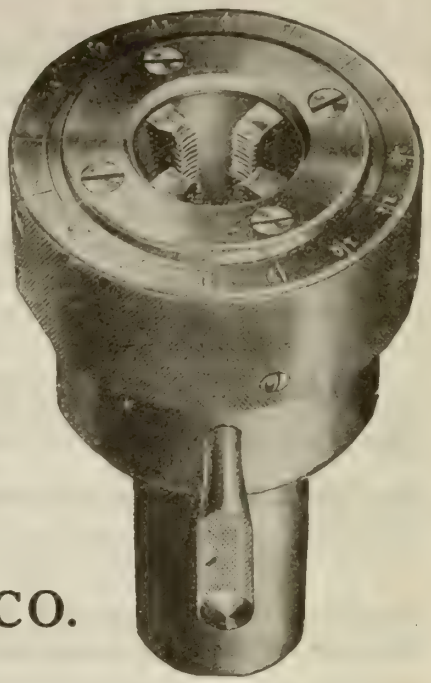

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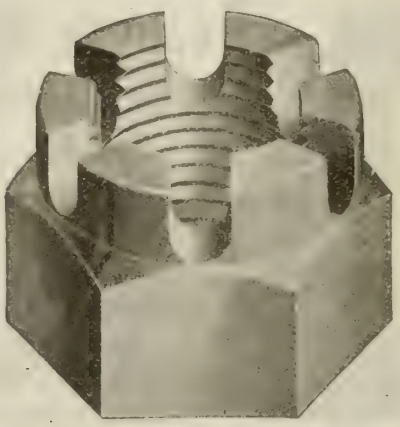

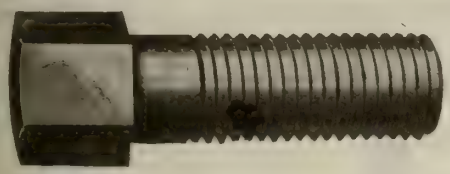

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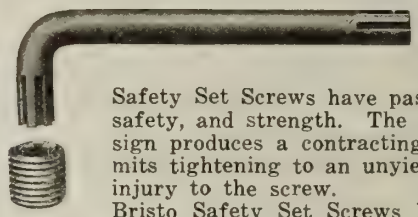

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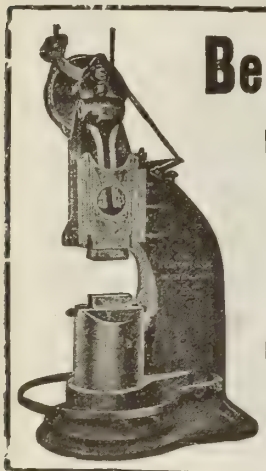

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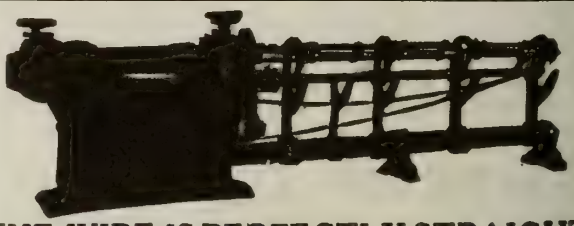

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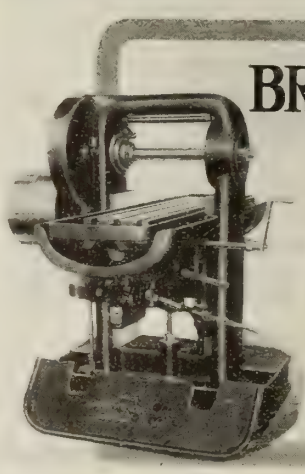

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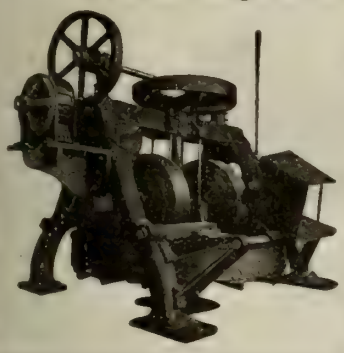

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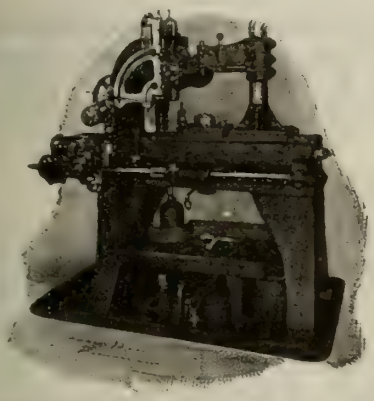

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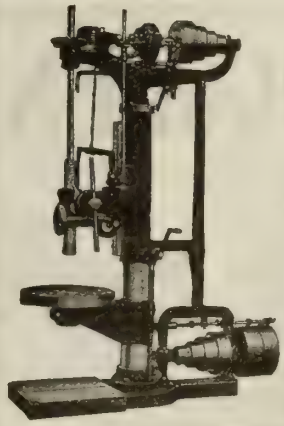

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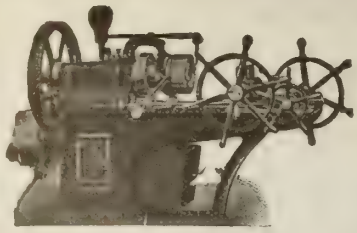

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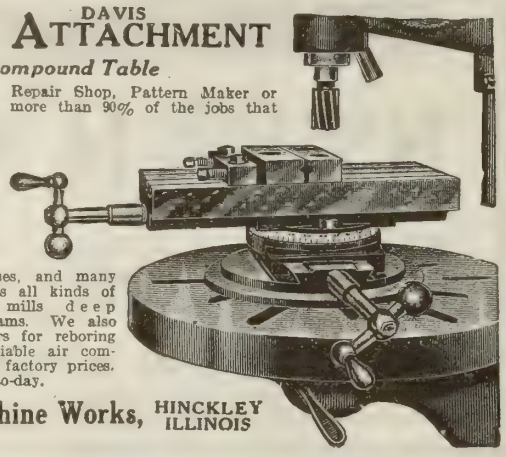

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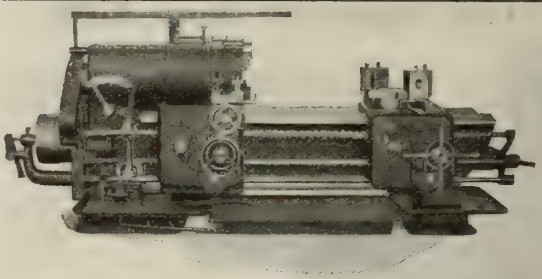

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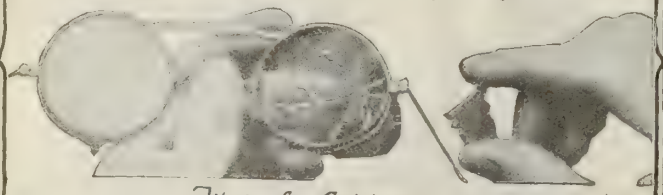

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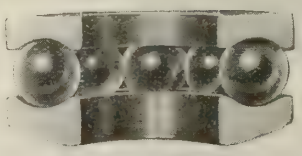

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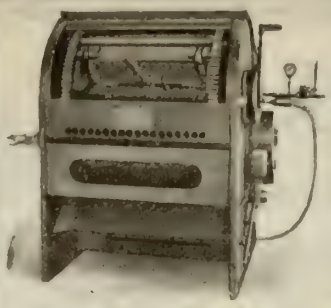

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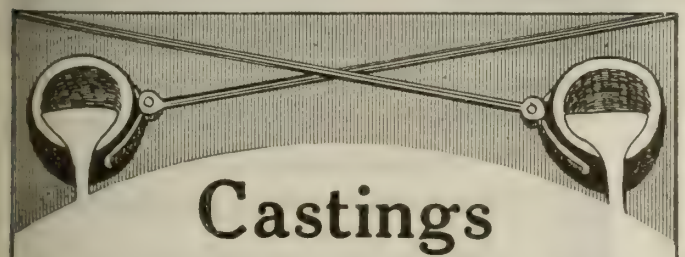

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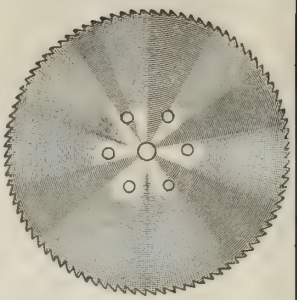

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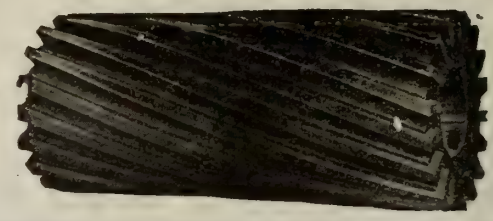

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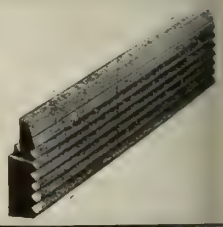

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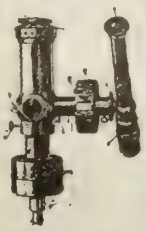

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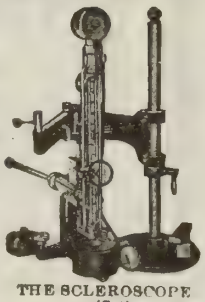

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Do High Prices of Machine Tools Hinder Sales?

THE question asked of a considerable dealer in Toronto by THE FINANCIAL POST is answered by him in THE POST of March 8th, in part, as follows:

> "New lists that are coming out do not show concessions in prices. As long as firms can sell at the present prices there is not much chance for a lower level of values."

The rest of that article in THE POST is interesting, and here are some other extracts worth noting from POST items of this week:

Implement Manufacturers May Unite for Export Trade

"Representatives of the implement manufacturers have been at Ottawa in consultation with the Canadian Trade Commission to arrange for the pushing of their export business. What is likely to be proposed to them is that they should work in concert, and their orders abroad should be placed through a central selling body, the expenses of conducting which should be maintained by a pro rata tax on each member of the association. They will provide their own credits from a common fund, which can be created by contributions gauged according to the respective interests involved."

Steel Market Is Still Unsettled

Big American Interests Co-operating in Secretary Redfield's Plan

The talk of lower prices for steel continues in the market. It is a fact that the "set prices" of the war period have, in many ways, spoiled the trade for what has followed. When prices were fixed, buyers and sellers knew their ground for the coming three months. Not only so, but they were quite certain that when changes would be made they would not be radical, and would be in keeping with the cost of material and labor entering into the output.

Last week a number of prominent steel producers were meeting in New York, and according to the authorized version they "discovered" that George N. Peek, recently named by Secretary Redfield as chairman of "The Industrial Board of the Department of Commerce" was in town, and accordingly they invited him in to explain Secretary Redfield's plan for the deflation of war-time prices. Indications are that the steel producers are going to make a show of resisting the movement, but will gracefully yield at the last moment.—"The Financial Post," March 8, 1919.

Above is part of a front-page news item in THE POST of March 8th.

Latest Activities of Steel and Iron Using Interests

Stove Manufacturers Out For Export Trade

"The Canadian stove and enamelled ware manufacturers are making an aggressive effort to develop export business and to secure orders from Europe, Australia, New Zealand and South Africa. A. M. Smith, sales manager of the McClary Manufacturing Company, will, on behalf of the manufacturers, make a personal investigation of European prospects."

New Ship Repair Plant For Vancouver

"Seattle men propose to build at Vancouver, B.C., a steel dock of 25,000 tons, capable of handling the largest ships which make the Port of Vancouver. Embraced in the enterprise will be a shipbuilding and repair plant, the whole to cost in the neighborhood of $4,000,000."

New Iron Industries For Border Cities

"Plans are being made for the location of a large malleable iron corporation with extensive connections in the United States, on the Windsor industrial site. Negotiations to this end have been pending for considerable time. Altogether, 12 large manufacturing firms with headquarters across the border are negotiating for sites in the Border Cities."

Business Building News Items Appear Each Week in *The Financial Post*

The above are only a few of the many subjects of real profit-making interest to Canadian men of affairs which have been dealt with by expert writers and editors in THE POST of March 8th. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

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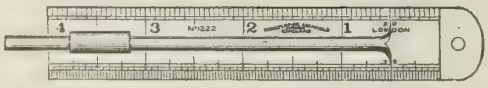

Steel Depth Gauge

Steel Pocket Vernier Gauge

Canadian Representative:
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TOOLS, DIES and GAUGES

Manufacturers of UNIVERSAL CYLINDER RE-BORING TOOLS.

Windsor Machine & Tool Works
Windsor, Ont.

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CANADIAN MACHINERY
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The Geo F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
Plewes Ltd., Winnipeg, Man.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Rice, Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

ACETYLENE
Carter Welding Co., Toronto, Ont.
Canadian Welding Works, Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACETYLENE GENERATORS
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACORN DIE AND HOLDERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

ACCUMULATORS, HYDRAULIC
Canadian Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Williams & Wilson, Limited, Montreal, Que.

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Smalley-General Co., Inc., Bay City, Mich.

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Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.
Welding & Supplies Co., Montreal, Que.

AIR WASHERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

ALUMINUM
Canada Metal Co., Toronto.
United Brass & Lead, Ltd., Toronto.
Tallman Brass & Metal Co., Hamilton
Williams & Wilson, Limited, Montreal, Que.

ALLOY, STEEL
Armstrong, Whitworth, of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal Que.
Firth & Sons, Thos., Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hawkridge Bros. Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Standard Alloys Company Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ALTERNATING CURRENT, ELECTRIC WELDING EQUIPMENT
Arcwell Corporation of Can., Toronto, Ont.

ARBORS
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
J. C. Wilson & Co., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Co., Walkerville, Ont.
Sheldons Ltd., Galt, Ont.
Pangborn Corporation, Hagerstown, Md.

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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

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Baird Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Natonal Acme Co., Cleveland, O., and Windsor.
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto, Can.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.

AUTO SHEET METAL MACHINERY
Quickwork Co., St. Marys, Ohio.

BABBITT METAL
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont
Williams & Wilson, Limited, Montreal, Que.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company Toronto
Rochester Ball Bearing Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BALLS, STEEL
Boker & Co., Inc., Montreal, Que
Williams & Wilson, Limited, Montreal, Que.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Katie Foundry, Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill
Williams & Wilson, Limited, Montreal, Que.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y
Williams & Wilson, Limited, Montreal, Que

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie, Ont.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BEADING MACHINES
Quickwork Co., St. Marys, Ohio.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont
Williams & Wilson, Limited, Montreal, Que.

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BEARINGS, HIGH SPEED, OR HEAVY DUTY BRONZE
Wentworth Mfg. Co., Hamilton, Ont.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT-LACING MACHINES, HOOKS AND PINS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

BELT HOOKS, WIRE
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Can. Consolidated Rubber Co., Ltd., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, LEATHER
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Gutta Percha & Rubber, Ltd., Toronto, Can.

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Dominion Belting Co., Hamilton, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.

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Federal Engineering Co., Ltd., Toronto, Ont.

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New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

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Williams & Wilson, Limited, Montreal, Que.

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Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Matthews & Co., Jas. H., Pittsburgh, Pa.

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Swedish Steel & Importing Co., Ltd., Montreal.
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Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

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Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

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Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

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James Ballantyne, Montreal.

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Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont
Welding & Supplies Co., Montreal, Que.

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Commercial Camera Co., Province, R.I.
Mulliner-Edlund Tool Co., Syrcause, N.Y
Wickes Bros., Saginaw, Mich.

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Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal Que
Joyce, Koebel & Co., Inc., New York.

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Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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MacLean Publishing Co., Toronto.

BOILERS
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MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
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Williams & Wilson, Limited, Montreal, Que.

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Rice, Lewis & Son, Toronto, Ont.
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United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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Can. Winkley Co., Ltd., Windsor, Ont.

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Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto.

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Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Canadian Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.

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Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Gisholt Machine Co., Madison, Wis.
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Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Niles-Bement-Pond Co., New York.
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Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
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Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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MacKinnon Steel Co., Sherbrooke, Que.
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Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
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BRONZE, COPPER
Canada Metal Co., Toronto.

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Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

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MacKinnon Steel Co., Sherbrooke, Que.

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Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Parmenter & Bulloch Co., Gananogue, Ont.

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Oberdorfer Brass Co., M. L., Syracuse, N.Y.

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Pangborn Corporation, Hagerstown, Md.

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Lufkin Rule Co. of Can., Windsor, Ont.

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Brown's Copper & Brass Rolling Mills, New Toronto.

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Bliss, E. W. Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J
Brown, Boggs & Co, Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

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Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal.

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CASTINGS, MACHINERY
Winnipeg Iron Foundry Co., Winnipeg.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.
Wentworth Mfg. Co., Hamilton, Ont.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland, Ont.

CARRIERS
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Sheldons, Limited, Galt, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
International Malleable Iron Co. Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Itnaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Limited, Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada
Canadian Fairbanks-Morse Co., Ltd., Montreal
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Limited, Montreal, Que.

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Swedish Gage Co., New York, N.Y.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCK SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

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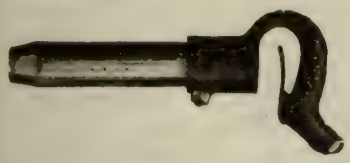
MOST POWERFUL AND EFFICIENT AIR TOOLS ON THE MARKET

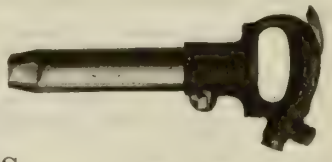
Cleveland Pocket - in - Head Riveters are made in 15 styles, with Outside and Inside Latch, and have driving capacities of ¼-in. to 1½-in. rivets in Boilers, Tanks, Stacks, etc.

The New Cleveland Pocket-in-Head Riveter is shorter over all, hits a harder blow, uses less air in operation; has higher speed with less recoil than any riveter on the market. Let us prove it in your shop.



CLEVELAND CHIPPING HAMMERS

are made in 19 styles and sizes to suit all classes of work. They are ideal tools for foundries, as they have high speed, no recoil, and are practically dust-proof.



CLEVELAND WOOD-BORING MACHINES

FOR BUILDING WOOD CARGO SHIPS

The Cleveland No. 20W Wood Boring Drill illustrated is a light-weight, high-speed machine with a capacity of 2-in. in wood; it is very compact and easily handled by one man. We make four sizes, covering a range in wood from 1 inch to 4 inches. We also manufacture 61 types and sizes of Air Drills for Metal Drilling, Reaming, Tapping, etc.

IN STOCK: Riveting and Chipping Hammers, Air Drills, Wood Drills, Sand Rammers, Bowes Air Hose Couplings, Rivet Sets, etc.

Write for Latest Catalog No. 14.
Address all inquiries to the

Cleveland Pneumatic Tool Co. of Canada, Limited

84 Chestnut Street, Toronto, Ontario

A. R. Williams Machinery Co., Toronto, St. John, N.B., Winnipeg, Vancouver
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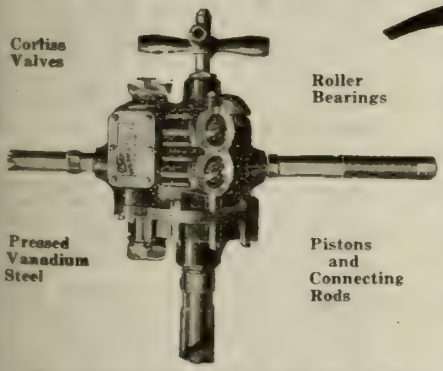
Thor

Pneumatic

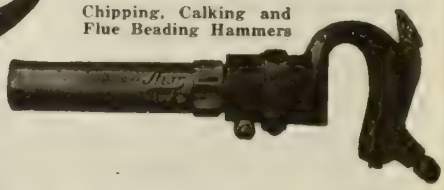
Piston Air Drills and Reamers



Four cylinder type, two on each side. Semi-Corliss valve close to each pair of cylinders gives greater efficiency and power, saves clearance losses and allows air to enter cylinders at full pressure of the pipe line.

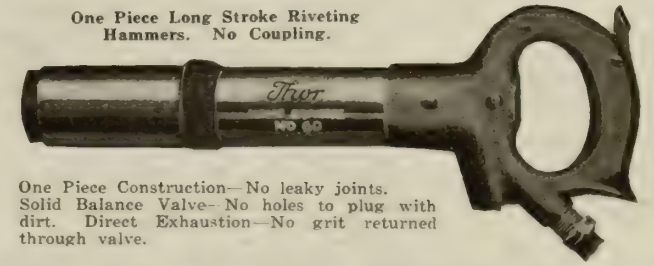
Tools

Chipping, Calking and Flue Beading Hammers



SPEED UP YOUR PRODUCTION AND BE PREPARED FOR THE COMING BOOM

One Piece Long Stroke Riveting Hammers. No Coupling.



One Piece Construction—No leaky joints. Solid Balance Valve—No holes to plug with dirt. Direct Exhaustion—No grit returned through valve.

Four sizes, 1" to 4" stroke. The barrel and all wearing parts are hardened and ground, making the Thor Chipper practically free from vibration.

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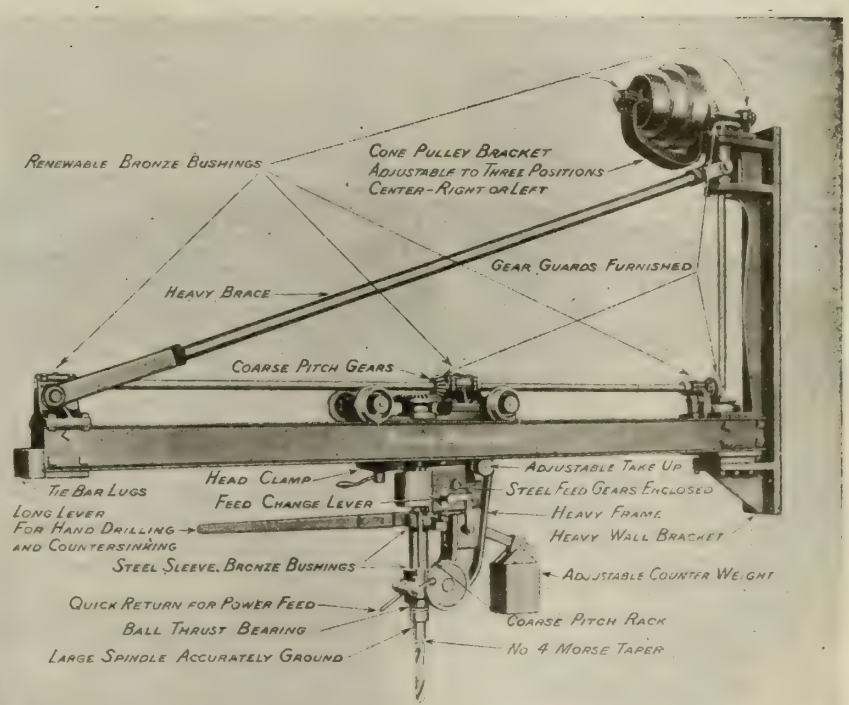
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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United States Electrical Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal, Que.

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Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Anderson's Efficiency Service, Toronto, Ont.

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General Steel Co., Milwaukee, Wis.

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Canada Wire & Iron Goods Co., Hamilton, Ont.

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Cleveland Twist Drill Co., Cleveland.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
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Cincinnati Electrical Tool Co., Cincinnati, Ohio
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
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Wilkinson & Kompass, Hamilton, Ont.
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Albany Hardware Spec. Co., Albany, Wis.

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Canadian Fairbanks-Morse Co., Montreal.
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Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
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Wilkinson & Kompass, Hamilton, Ont.
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A. R. Williams Machy. Co., Toronto.

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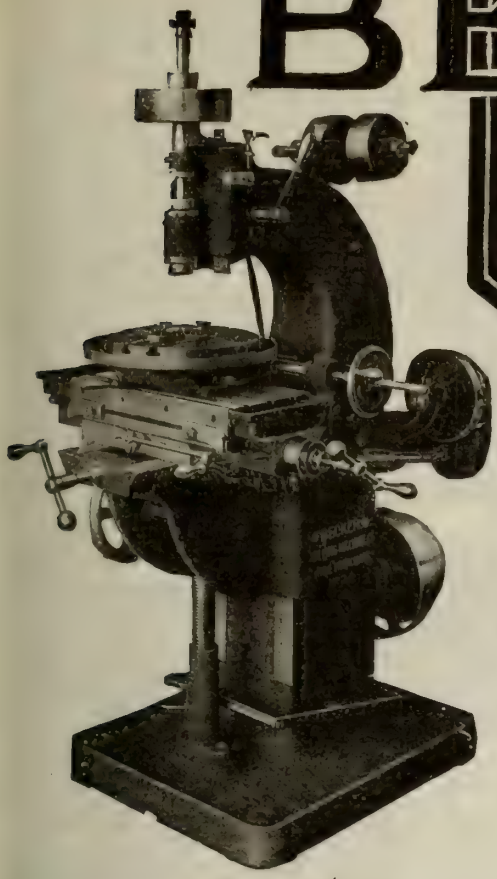

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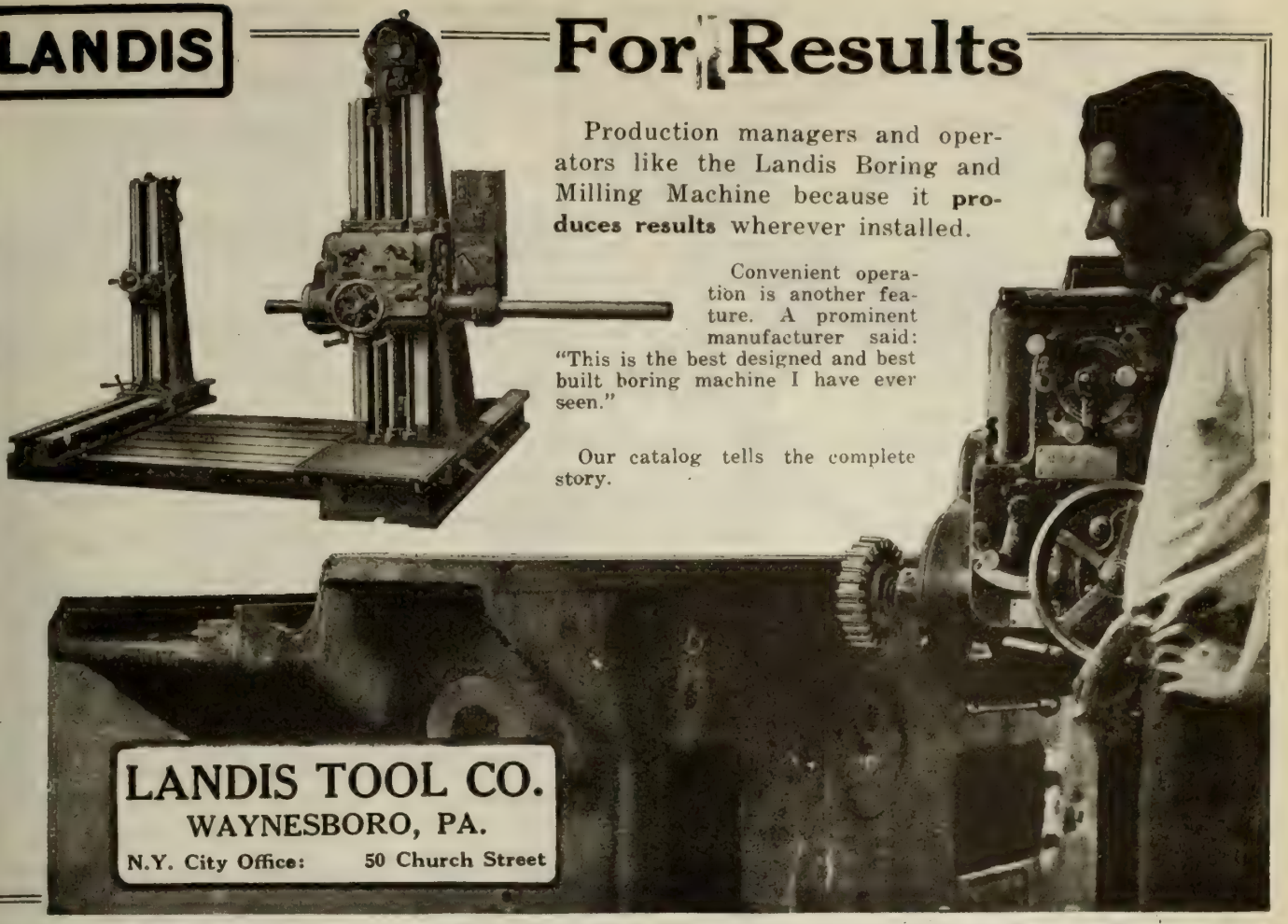

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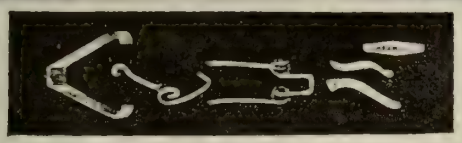

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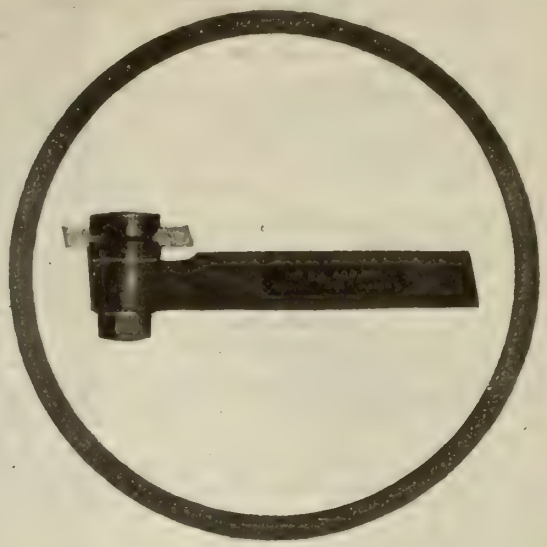

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International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

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METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

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Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

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Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

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Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
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Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co. New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

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MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

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Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

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National Machy. Co., Tiffin, Ohio.

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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
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Landis Machine Co., Waynesboro, Pa.
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Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
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Williams & Wilson, Ltd., Montreal, Que.
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West Tire Setter Co., Rochester, N.Y.
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Canada Machinery Corp., Galt, Ont.
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Consolidated Press Co., Hastings, Mich.
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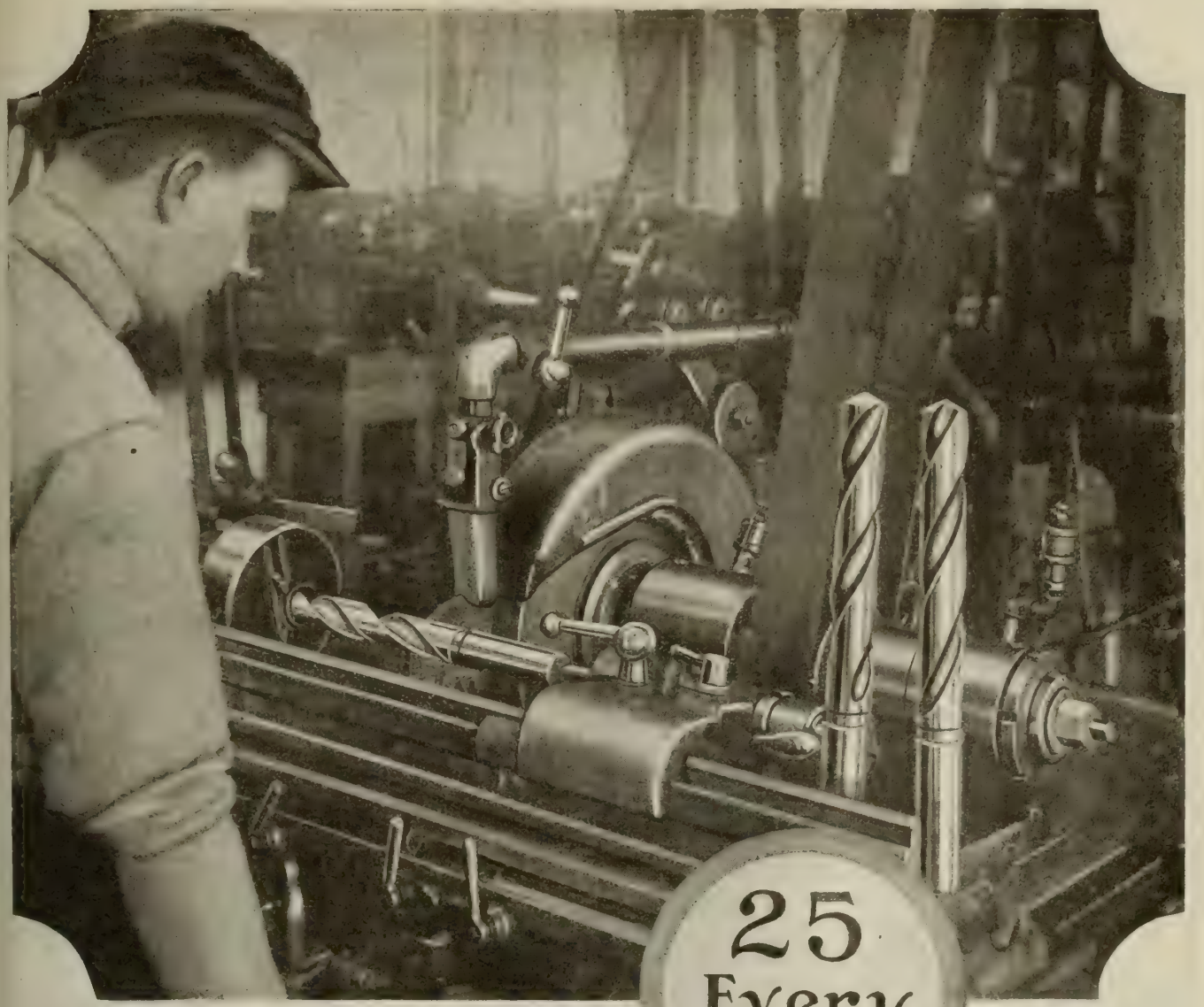

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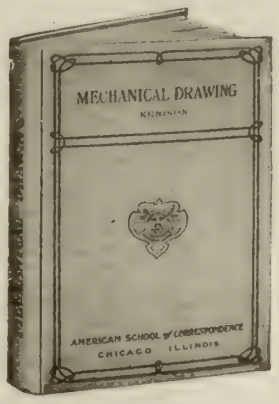

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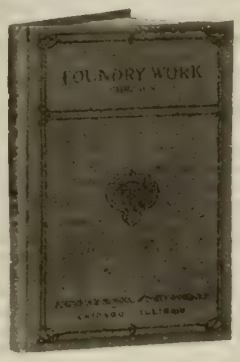

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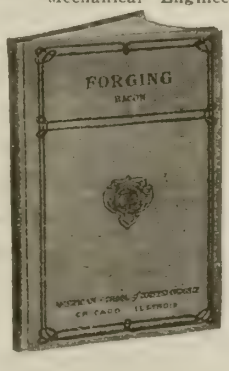

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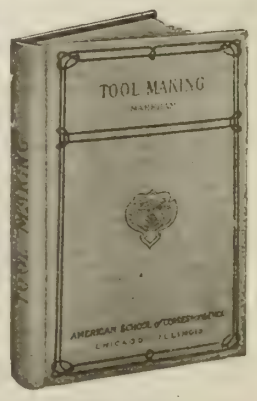

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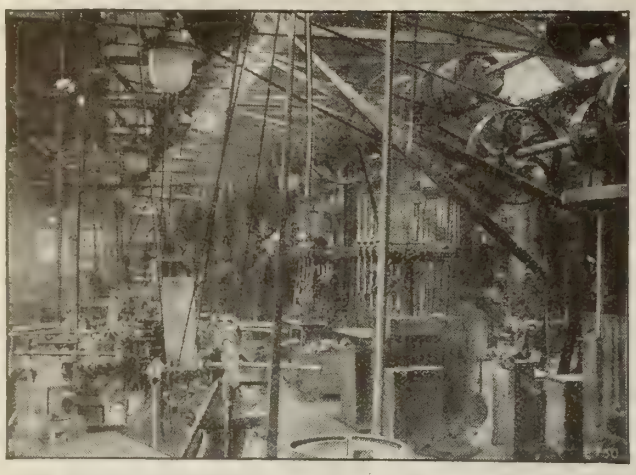

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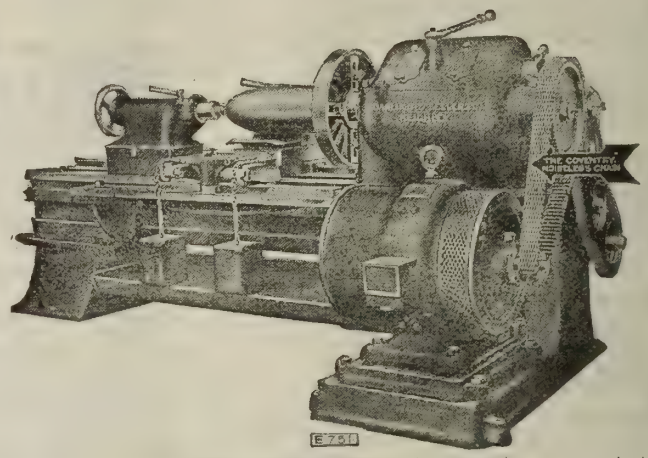

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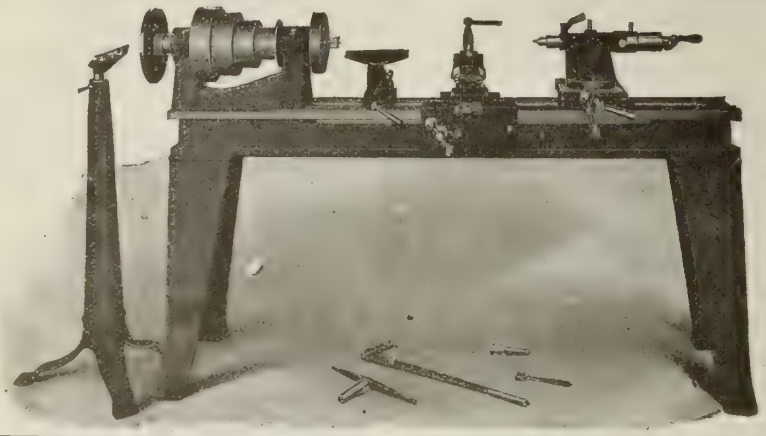

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A weekly newspaper devoted to the machinery and manufacturing interests.

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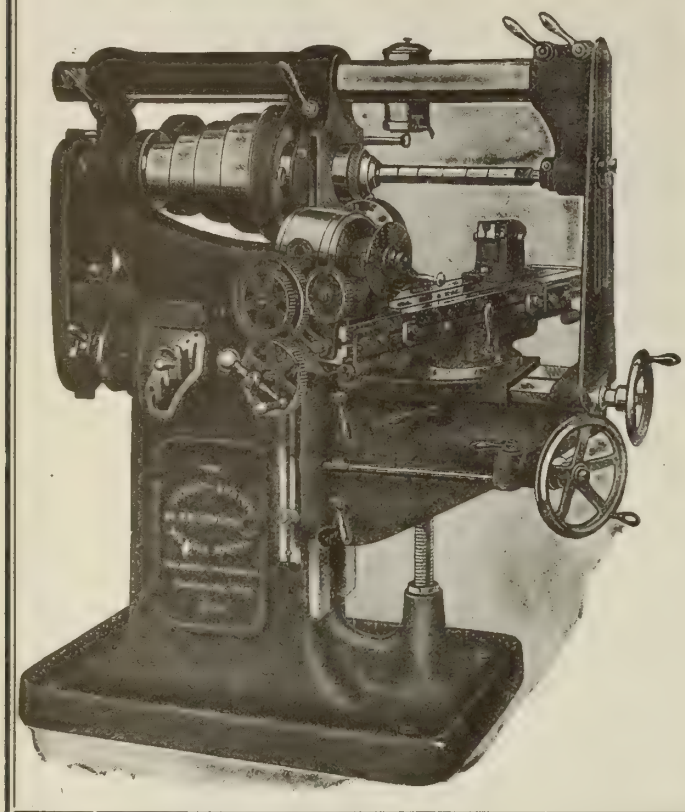

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The Wallace Bench Planer

Speeds Up Production
- - - Cuts Cost - - -

THE bulk—or about 70 per cent.—of your fitting, trimming, jointing or surfacing is on work less than 4 feet long and 4 inches wide. For lack of better facilities you have had to **do** all this work by hand—at an enormous cost. If every operation were as costly you'd close up shop. You can't afford to run to the big stationary jointer with each piece of work —yet that cost must be cut.

THE Wallace Bench Planer was designed especially for small work. It is the quick action machine you need to turn out that bulk of your planning, surfacing, beveling, jointing and fitting efficiently—economically. That's why it's busy in the General Electric, Westinghouse, Reaser Furniture, Long Furniture, Brunswicke-Balke-Collender, National Malleable Casting, Pierce-Arrow, Jackson Sash and Door, and hundreds of other shops, from the biggest to the "one man" cabinet, pattern, carpenter shops, etc. In many shops it takes care of **all** the work.

It is portable—works right on the bench —handy at the elbow of your men.

Try this remarkable, simple, cost-saving machine. Stop those daily losses!

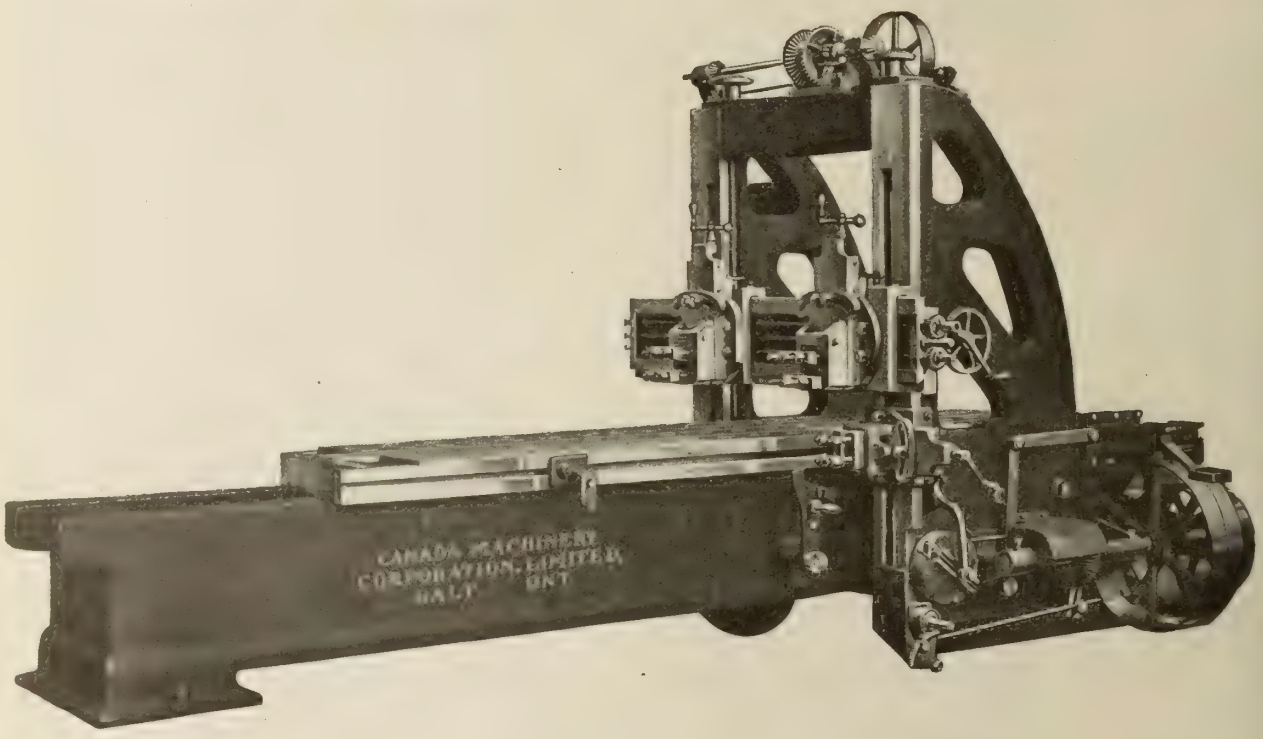
The Geo. F. Foss Machinery & Supply Co., Limited

Machine Tools and Supplies

305 St. James Street - - - Montreal, Que.

C.M.C.

36-inch Planer



THIS MACHINE is built to combine solidity with convenience and speed of operation. An unstinted and intelligent use of metal gives the machine an absolute rigidity under the heaviest cuts, while the operating mechanism and adjustments are as simple, effective and convenient as possible.

DRIVES—The machine is regularly built with single speed countershaft and standard drive, but can also be supplied as illustrated with parallel drive or with two speed countershaft or four speed cone variator. Machine may also be arranged for motor drives as follows: With motor connected to first gear shaft; with motor mounted on housings and known as plain motor drive; with motor mounted on top of housings and connected to two or three change gear box.

For sale direct and by all leading machinery dealers

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: BROCK AVE. SUBWAY

EXPORT NUMBER

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 18. Publication Office: Toronto, May 1, 1919 Subscription Price $3.00 per Year

Where the Best in Service Meets the Best in Machinery

OUR ELABORATE NEW BUILDING 84 INSPECTOR STREET

Our 28 years of extensive experience—our knowledge of varied requirements—our facilities to make special analyses, and our almost unlimited sources of supply enable us to assume full responsibility for results and to serve you with dispatch.

Williams & Wilson, Limited
MONTREAL, P.Q.

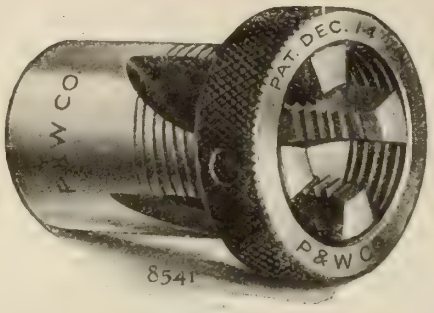
SMALL TOOLS

Taper Thread Adjusting Collar

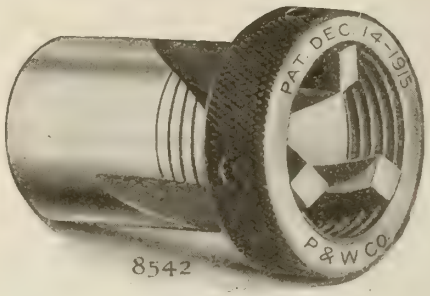
Insures Uniform Concentric Adjustment

P. & W.

Spring Screw Dies and Hollow Mills



Spring Screw Die



Hollow Mill

Advantages of the Taper Thread Adjusting Collar

Ease and delicacy of adjustment to FINE LIMITS are secured without trouble and loss of time.

All lands or prongs of the die or hollow mill are adjusted in or out exactly the same amount by merely turning the collar, thus giving rise to the term CONCENTRIC ADJUSTMENT.

This concentric adjustment results in each land or cutting edge doing its proper share of work, and as a perfect circle is always maintained, accurate results are assured.

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Write for 4-page descriptive Circular giving size and dimensions.

Precision Machine Tools, Standards & Gauges

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OF CANADA, LIMITED

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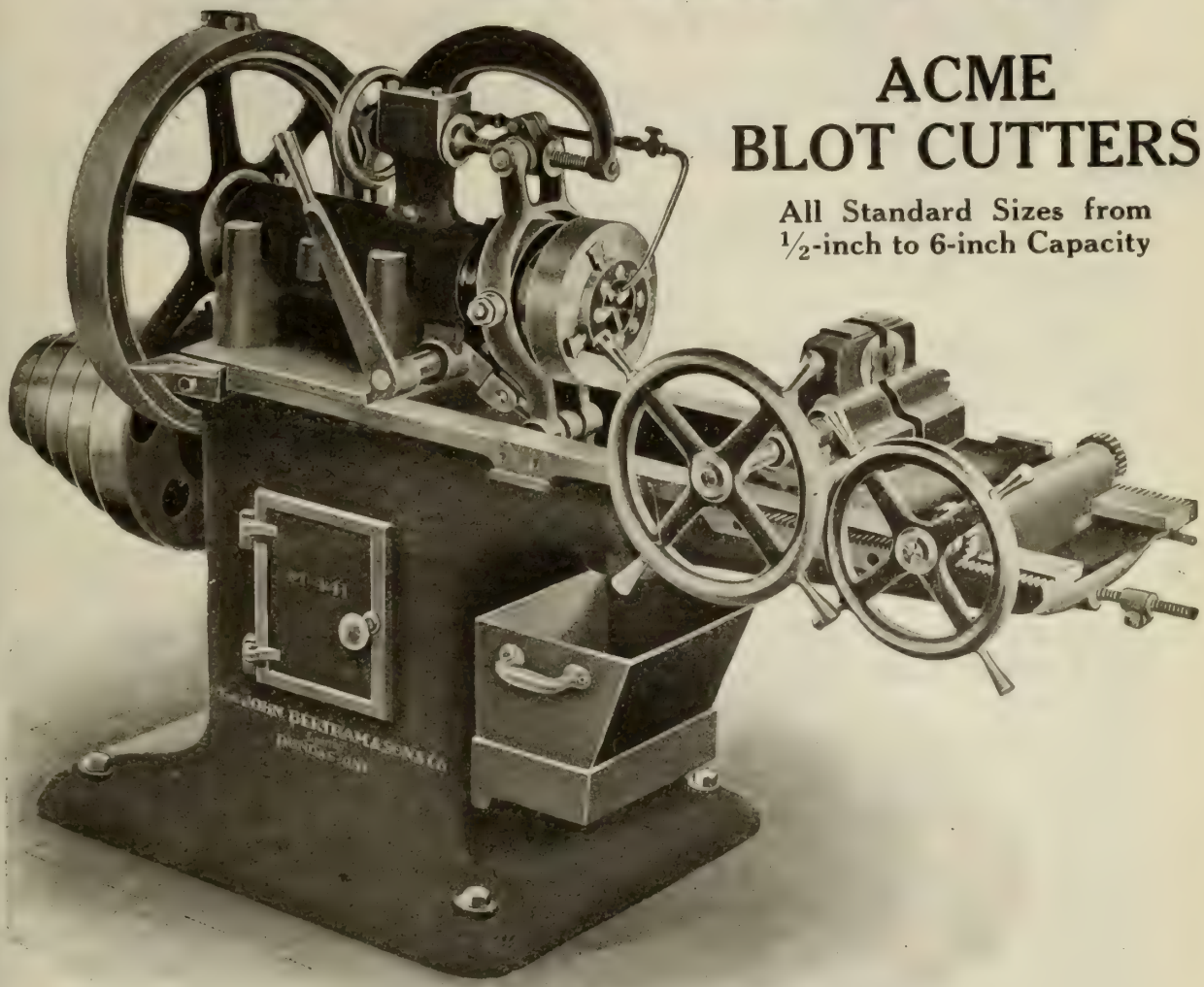
BERTRAM MACHINE TOOLS

ACME BLOT CUTTERS

All Standard Sizes from
1/2-inch to 6-inch Capacity



Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of Pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE
OR MACHINES IN WHICH YOU ARE INTERESTED

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Limited

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The Publisher's Page

TORONTO MAY 1, 1919

WOULD you be surprised to know that an order for about $150,000 worth of machinery has been placed by a large concern without a machinery salesman knowing anything about it?

The old idea was that the salesman had to dig up the prospect. After that he had to camp with him—persuade him—show him—dine him—and finally land him.

It is necessary to have salesmen and good ones, too, and we are not quarrelling with them—not for a minute. But there are still some salesmen who are not quite willing to admit that the advertised article is easier to sell than one that is not advertised. In fact, we doubt if these salesmen would admit that their prospects had been "sold" on a particular line or article before they ever went to see them, and that the "selling" had been the result of judicious and effective advertising.

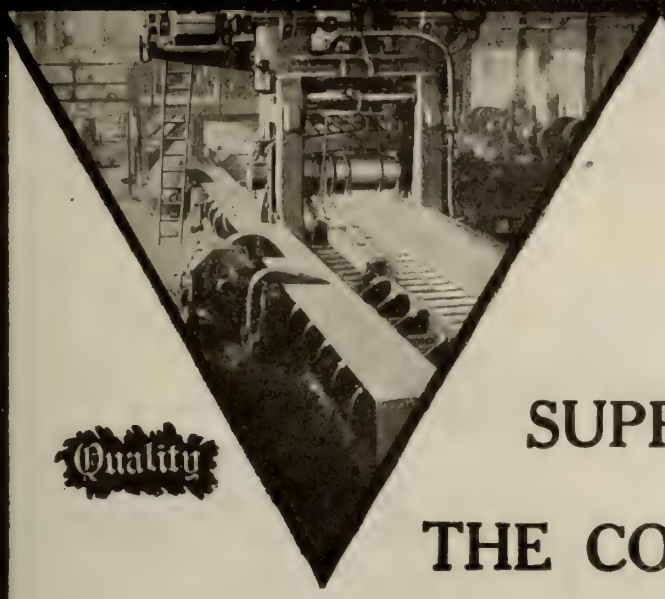
But it is a fact that thousands of customers are "sold" — unconsciously perhaps—on certain lines of goods. And the wise and successful salesman realizes this truth. The customer goes into the store. He buys a "Gillette" or an "Auto-Strop" Razor. He doesn't ask the clerk about it at all. He wants to try the thing because he has been "sold" previously. The actual closing of the deal is when he goes to the store and secures the article.

But to get back to this $150,000 order of machinery. The purchasing agent was sitting in his office when I met him. He had his plans and specifications. He knew how many drills, presses, cutters, etc., he wanted. He knew also just what make and kind he required for the work, and he simply sat down and made out the list.

At his elbow were a number of catalogues, with the corners of pages turned in, and beside him was also a copy of this very paper you are reading—CANADIAN MACHINERY.

Was your message in that issue or in previous issues? Big plans, where hundreds of thousands are involved, are being worked out and planned out right now in the period between war work and peace time trade. Sales are really being made when manufacturers in some cases are slack. Once they have everything framed up, once they know what they want and where they can get it, it's too late then to rush in with your sales story. The advertiser who has been persistent and consistent in driving home his story during the apparently slack season has been keeping his message right there when it will do more good than after everything starts to hum.

Canadian Machinery and Manufacturing News, May 1st, 1919. Vol. 21, No. 18. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



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Service

SUPPORT

THE COUNTRY

THAT SUPPORTS YOU

If you consider your personal interests—the interests of your family and the community in which you live, you will

PURCHASE THE PRODUCTS

OF

CANADIAN MILLS

A Canadian Dollar
is Worth One Hundred Cents
in Canada

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STEEL COMPANY

OF

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LIMITED

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BILLETS,
SLABS,
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MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

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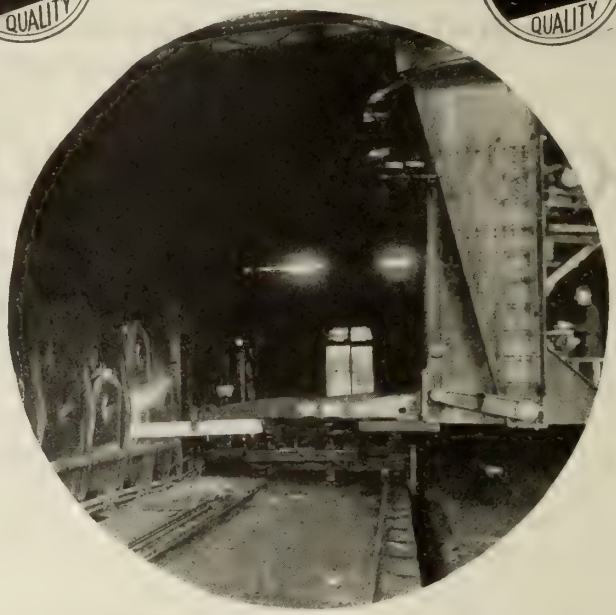


Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

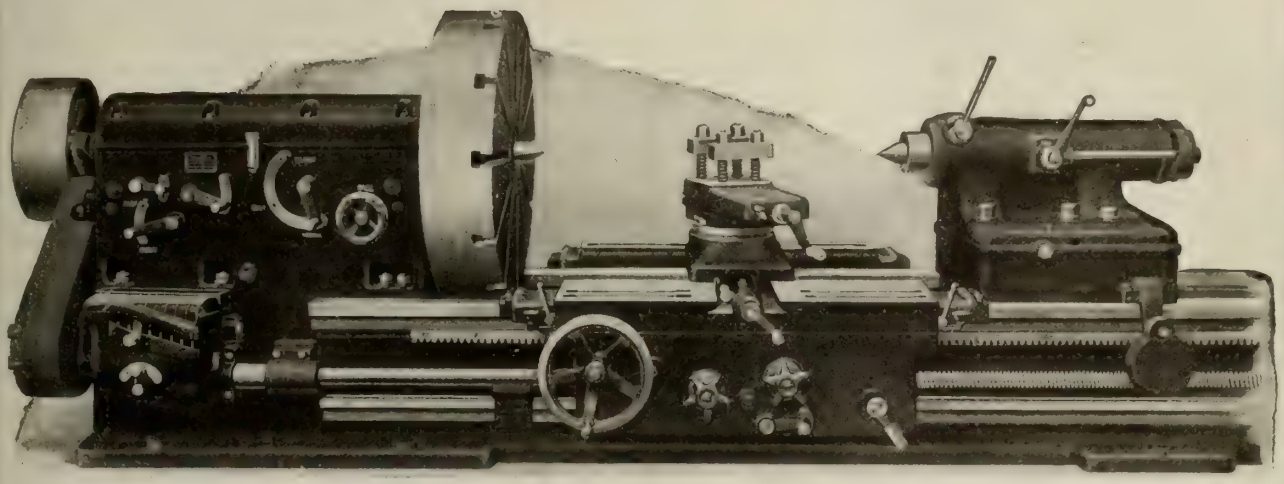
MARK OF ALGOMA O.H. QUALITY

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

BRIDGEFORD

Many of the World's Largest Industrial Plants are Bridgeford Equipped



A Few Bridgeford Equipped Plants

Bethlehem Steel Co.
Carnegie Steel Co.
Midvale Steel Co.
Pennsylvania Steel Co.
Cambrai Steel Co.
American Car & Foundry Co.
New York Central R.R.
General Electric Co.
Pennsylvania R.R.
Westinghouse Electric & Manufacturing Co.
Baldwin Locomotive Works
American Locomotive Co.
Erie Forge Co.
International Harvester Co.
Timken Detroit Axle Co.
American Bridge Co.
Packard Motor Car Co.
Pierce Arrow Motor Car Co.
Union Tool Co.
Standard Oil Co.

What better endorsement of quality and reliability could be obtained than the fact that many of the world's largest industrial plants are Bridgeford equipped?

Let the judgment of "big business builders" guide you in the selection of lathes.

Listed at the side are a number of representative plants using Bridgeford equipment—convincing evidence of the popularity and reliability of Bridgeford Heavy Duty Lathes.

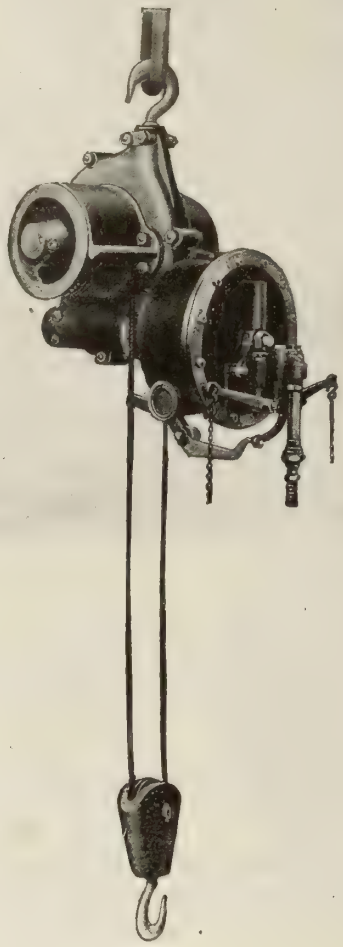
The Bridgeford Line of Lathes includes Heavy Duty Geared Head Engine Lathes from 24-in. to 72-in. swing, Cone Driven Engine Lathes, Axle and Journal Truing Lathes and Manufacturing Lathes of 27-in. and 30-in. swing.

There's a Bridgeford for every heavy duty lathe requirement. Write or wire for details showing how Bridgeford Lathes increase production and cut costs. We are in a position to make prompt deliveries.

Bridgeford Machine Tool Works 151 Winton Road, Rochester, N.Y., U.S.A

Manufacturers of Heavy Duty Lathes for more than 20 years

The "IMPERIAL" Hoist Saves Time



An "Imperial" hoist on jib crane or monorail will cut handling times in half for your large machine tools, and pay for itself in a few weeks. The construction of the motor is of the simplest type; fewer parts and stronger. The control is accurate to a fraction of an inch.

The Automatic Stop Insures Safety First

For 100 ten-foot lifts per day, the power cost of the 4,000-lb. "Imperial" hoist is 30 cents per day. Sizes from 1 ton capacity to 5 tons, and the "Imperial" hoist will always take its full rated load.

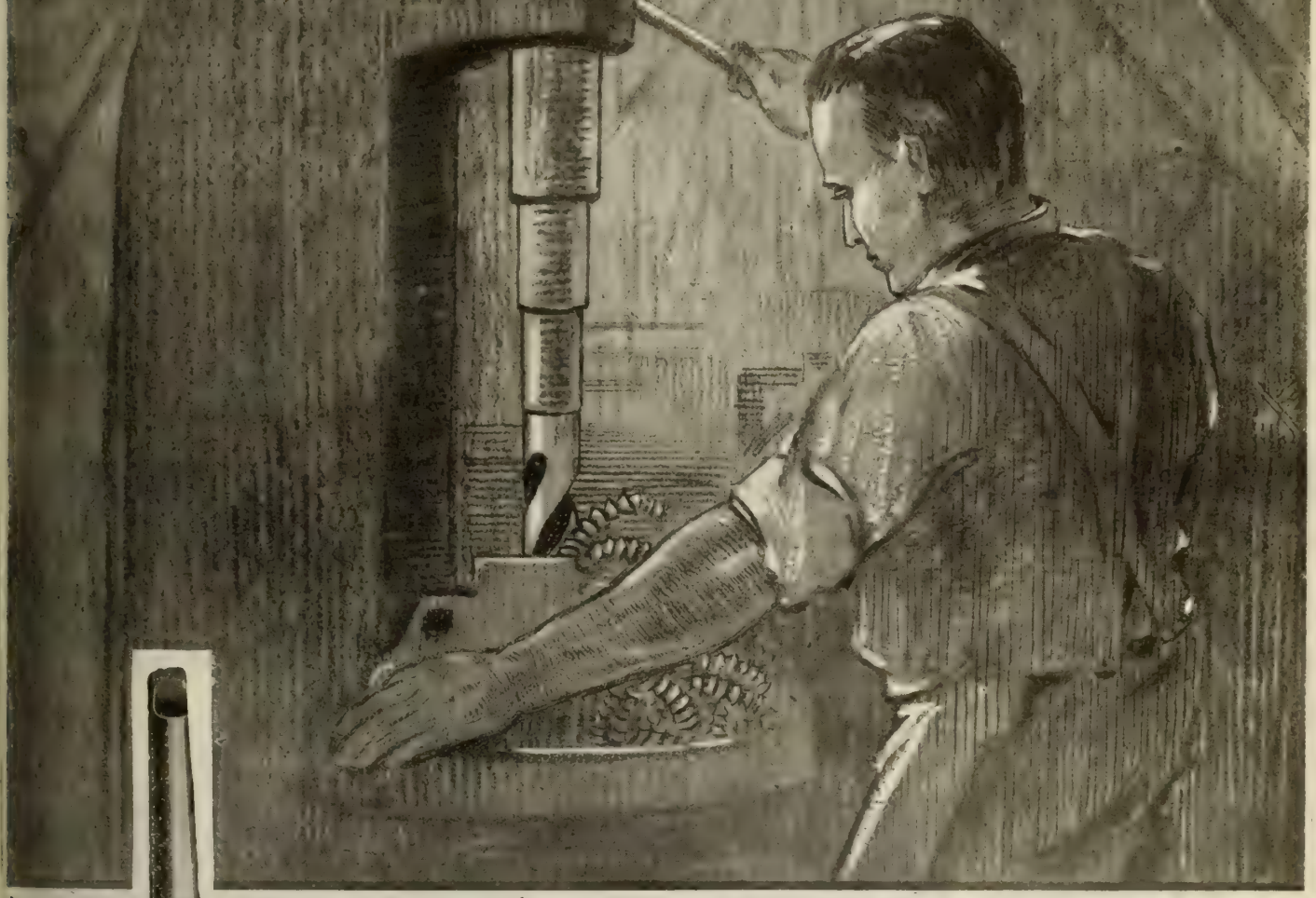
We have the size for your particular need

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

WILT

HIGH SPEED AND CARBON TWIST DRILLS, REAMERS AND MILLING CUTTERS



Quality Tools a Vital Necessity

Where there's a WILT--There's the Way.

Equip your plant with modern tools of the best quality. It is the vital necessity of the day to manufacturers. Competition of the present and in the future demands it.

For your drilling, reaming and milling cutter operations, choose *WILT High Speed and Carbon Drills, Reamers and Milling Cutters.* As compared with any ordinary tool they cut faster, more accurately, require less power, require less re-grinding and give longer service—and they cost no more than ordinary tools.

Put them to the test--you'll find them best.

Wilt Twist Drill Company

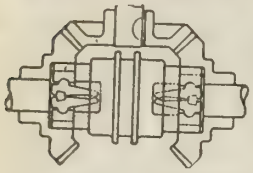
OF CANADA, LIMITED

Walkerville ∴ Ontario

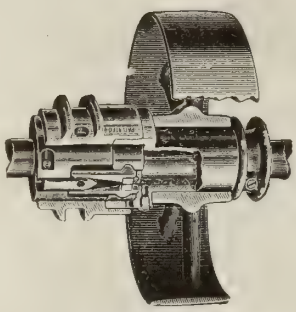
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England.

THE JOHNSON FRICTION CLUTCH

FOR SERVICE



DOUBLE CLUTCH IN NEST OF GEARING



STANDARD CLUTCH with Pulley Clutch Engaged

Note the Parts of This Clutch

The leading engineers are specifying *Johnson Friction Clutches*. Our years of experience in manufacturing friction clutches place us in an excellent position to take care of your requirements. The *Johnson Friction Clutch* has but few parts and is easily modified to meet any conditions. Have *you* noticed the concerns who are using *Johnson Friction Clutches?* There's a reason. Service is in back of it all. What are your requirements?

You Should Have Our Yellow Data Sheets and Booklet "Clutches As Applied in Machine Building"

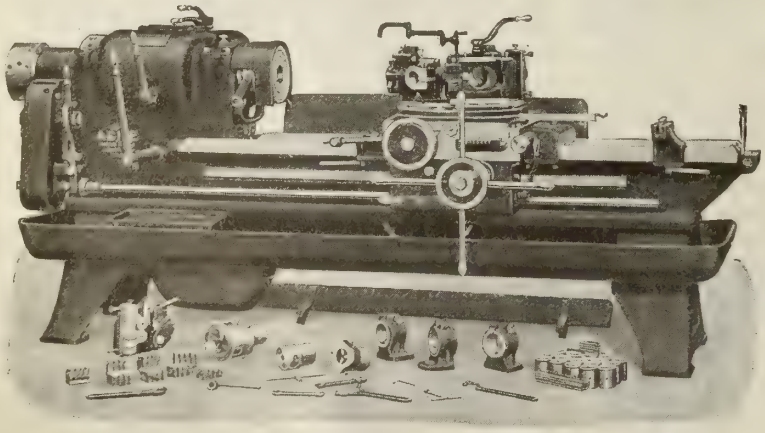
AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Doubly Efficient—Does Both Bar and Chuck Work

This Cincinnati Acme Flat Turret Lathe is a double-production, geared head machine of the sliding gear type. It operates on minimum power because the only gears running are those doing the actual work.

This machine saves remarkable time and labor machining either bar work or chuck work up to 16 in. diameter.



3¼ in. x 36 in. Flat Turret Lathe Equipped for Bar Work.

Head is cast solid with the bed. You know what that means: accuracy, rigidity, constant and perfect alignment of spindle with vees, upon which the turret carriage travels.

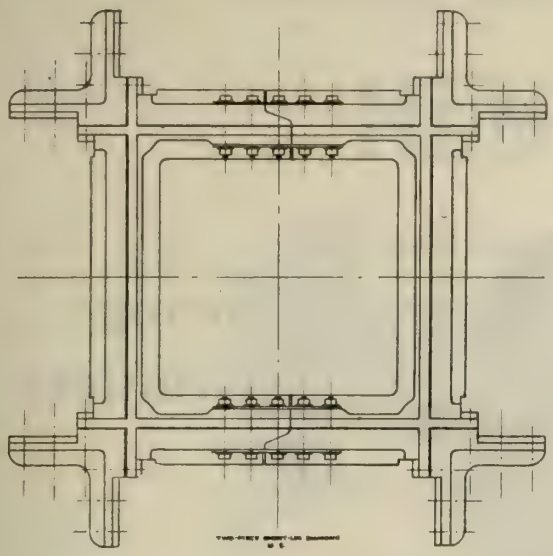
We also make a full line of Screw Machines and Turret Lathes.

Write for Valuable Bulletin

The Acme Machine Tool Co.

Cincinnati, Ohio

Canadian Agents: Rudel-Belnap Machinery Co., of Montreal and Toronto



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COMPLETE INTERSECTIONS

Built-up, Hard-Centre or Solid Manganese-Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings.

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Victoria FOUNDRY & MALLEABLE

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Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

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FORD-SMITH

Milling Machines

Swing Grinders

Water Tool Grinder

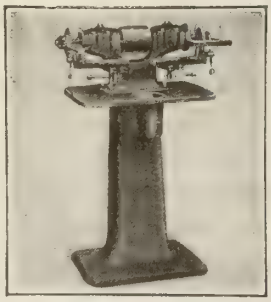
Disc Grinders

Special Machinery

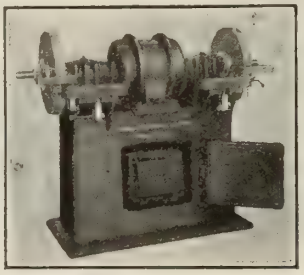
Polishers

Write for our latest

Catalogues and Price List



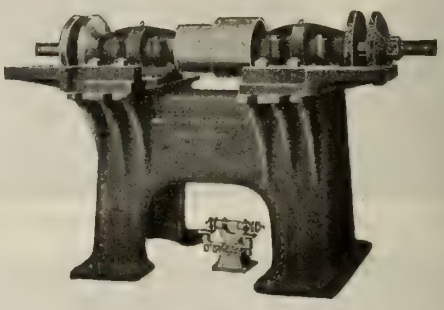
General Purpose Grinder



Motor Driven Floor Grinder

We solicit the privilege of quoting on your

Special Machinery



Heavy Type Floor Grinder

Manufactured by

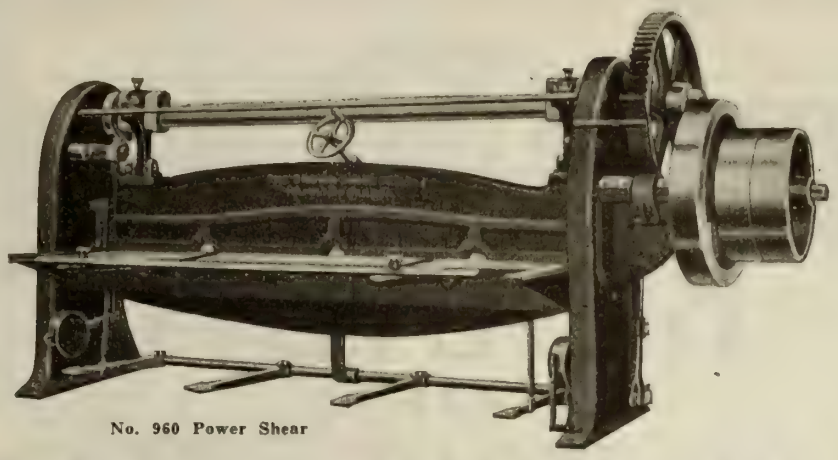
The Ford-Smith Machine Co., Ltd.

Hamilton, Ontario, Canada

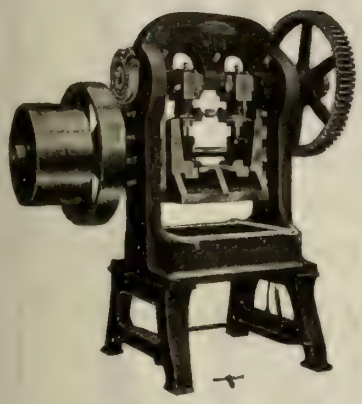
Foreign Agents:

W. E. Storey, 3 Arundel Street, London, Eng. Alf. Herbert, Ltd., 54 Dey Street, New York

Stood The Test



No. 960 Power Shear



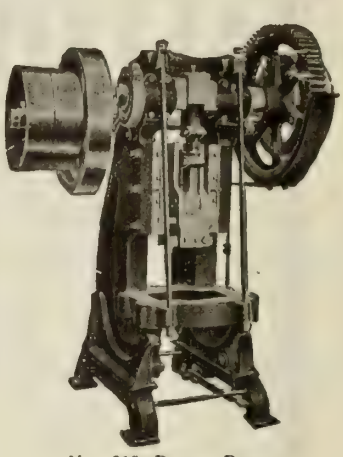
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press

No. 404 Shear

No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

BRITAIN'S BEST

KE

BRANDS OF ALLOY & TOOL STEELS

In Billets, Bars, Sheets, Hot and Cold Rolled Strips, Cold Drawn Cast Steel, Wire and Drill Rods

HIGH GRADE STEEL FOR ALL PURPOSES

KE KELOCK

Principal Trade Marks

KAYSER ELLISON & Co LTD

ESTABLISHED 1825 SHEFFIELD, ENG.

Complete Stock - Montreal Warehouse

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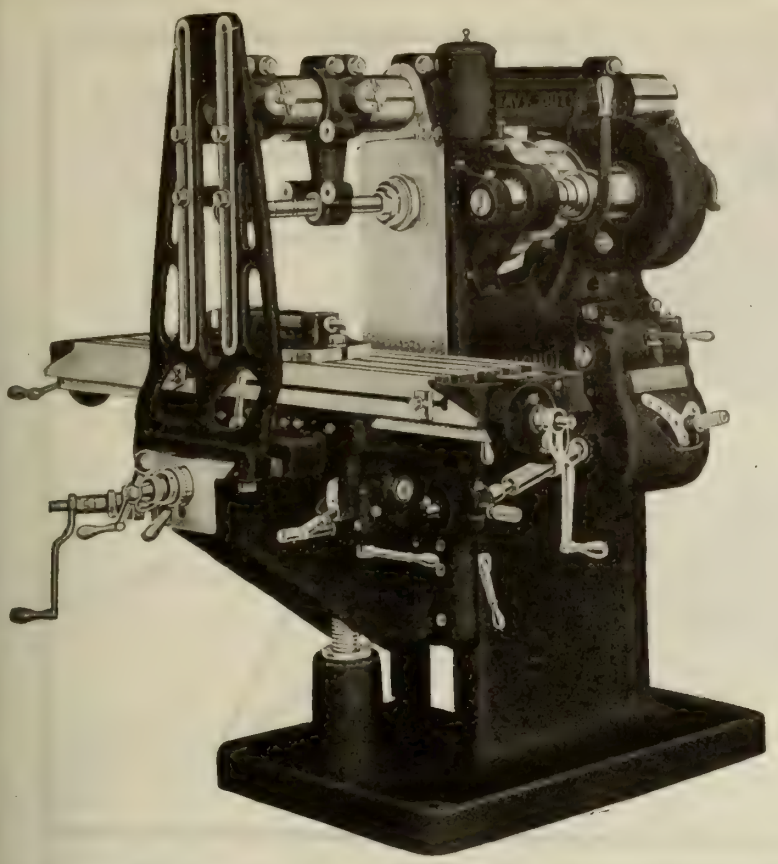

LeBLOND
Heavy Duty Milling Machines

Plain or Universal Types—Cone or Gear Drive. All commercial sizes No. 0 to No. 5.

Adapted for the Heaviest Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

Patent Self-Aligning Arbor Supports—

Hardened Steel Spindle Bearings—

Double-Friction Back Gears—and the simplest type of right-hand control, contribute to an increased production and longer life as a precision machine.

The R. K. LeBlond Machine Tool Company

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Canadian Agents:

THE A. R. WILLIAMS MACHINERY CO., LIMITED
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E&M

ELECTRIC
Steel Castings

High Grade STEEL Castings

Of Every Description

Prompt Deliveries

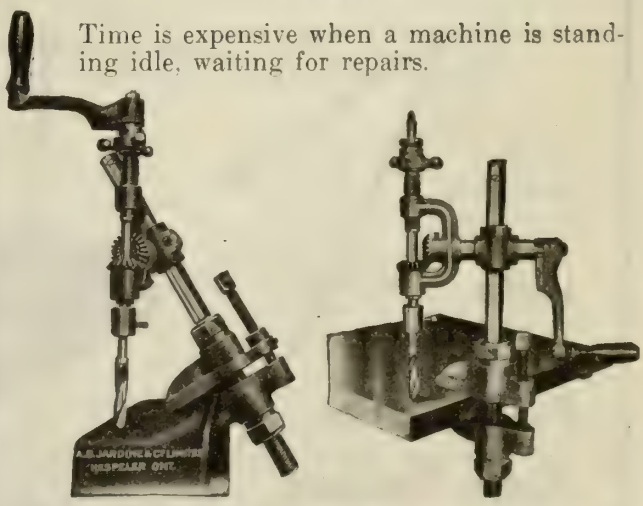
Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited

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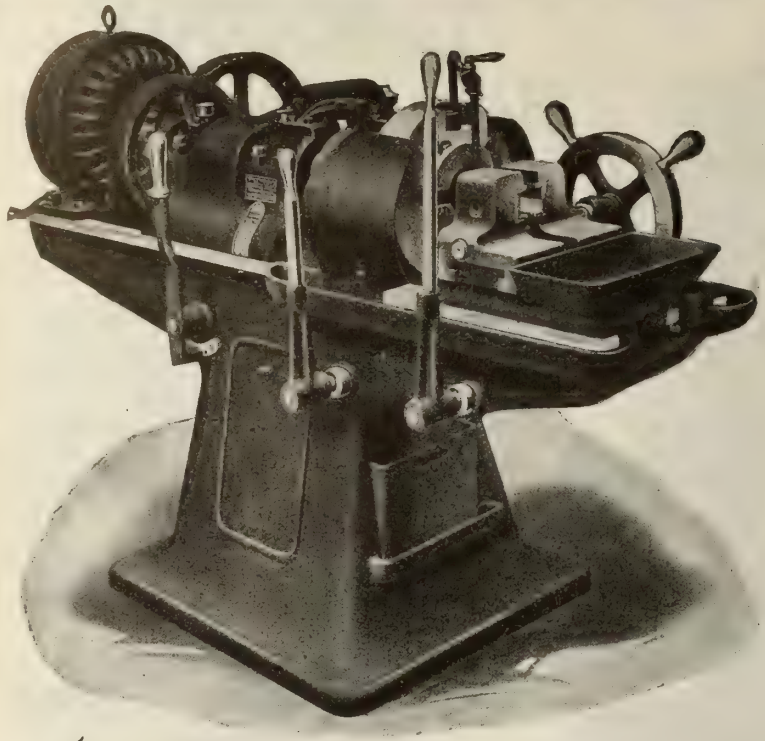


FRONT VIEW
2-I ngle Head Nipple Machine—Motor Drive

Our New 2" Single Head Rapid Nipple and Pipe Threading Machine—Motor Drive

Constant Speed Motor
All Gear Drive - Change Lever
6 Changes of Speed
Large Reservoir
Special Oil Trough
Cutting Box
Many Other Features

JOHN H. HALL & SONS, Limited

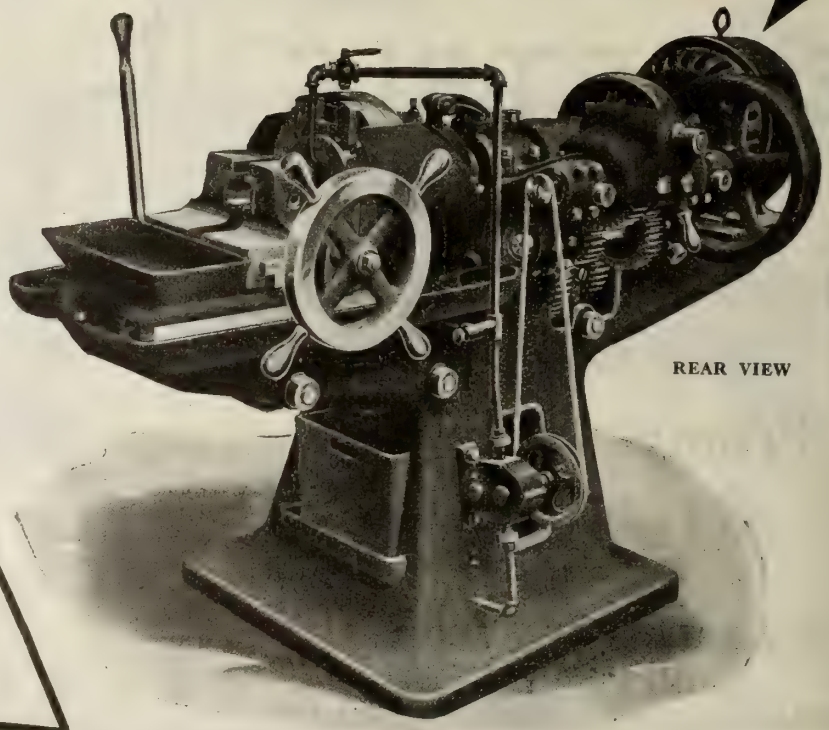
Manufacturers of

Pipe Threading Machinery

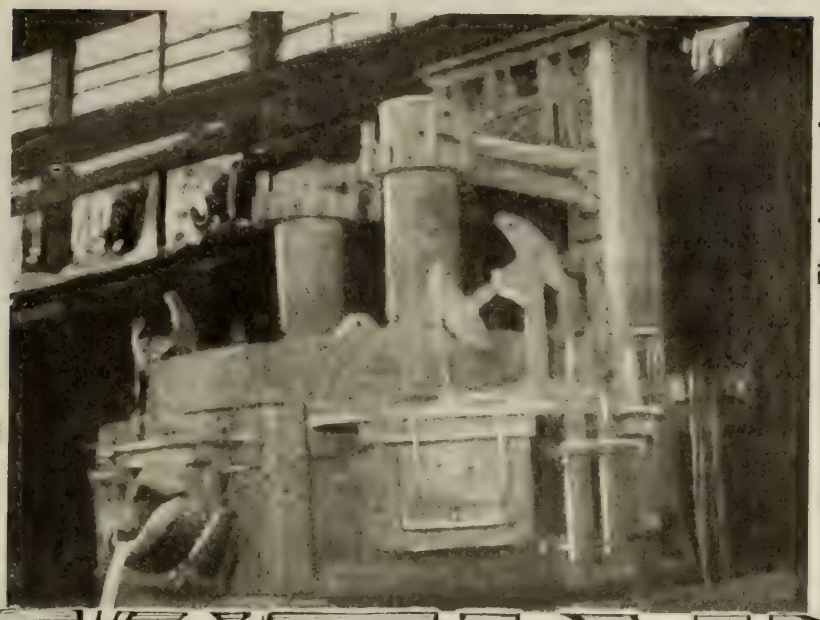
We Manufacture All Sizes

Roller Cutters
Pipe Machines
Nipple Machines
Special Machinery

WRITE FOR NEW DESCRIPTIVE BULLETINS JUST ISSUED



REAR VIEW



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High Speed Steel

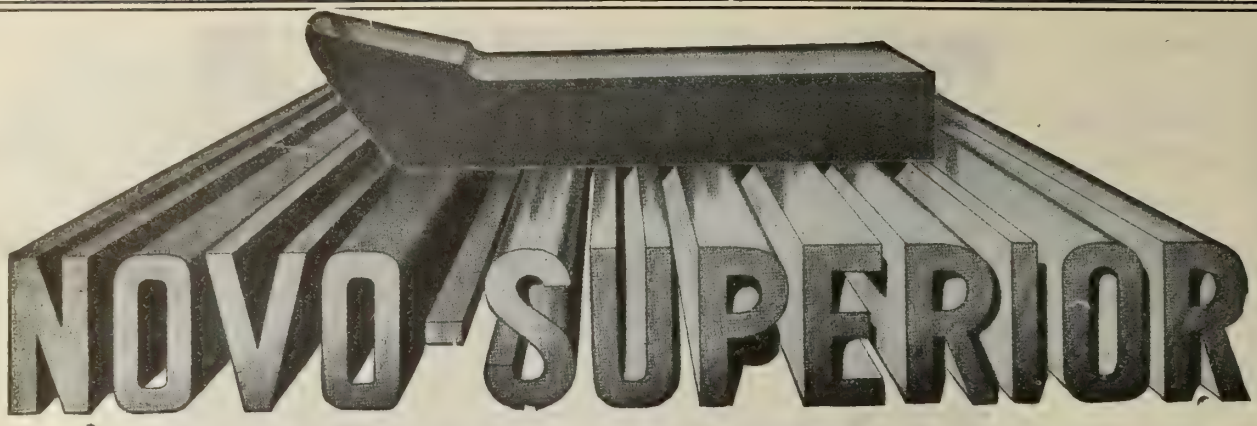
SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art; Electric Furnaces—entirely infallible, automatically regulated, delivering the same result time after time.

Uranium—This rare element, cousin to Radium, effects a profound change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.
LATROBE, PENN

URANIUM



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INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc., Music Wire for Springs, Steel Balls. Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws—for wood and for hot or cold metal cutting
Machine Knives—for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James St., Montreal, P.Q.

Swedish Steel & Importing Co., Limited

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Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS "DOUBLE ESS"

PROMPT SHIPMENTS from large stock

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

Milwaukee, Wisconsin

DETROIT—823 Dime Bank Building

CANADA
FOUNDRIES & FORGINGS
LIMITED

A SOLEMN WARNING

A flood of business will overwhelm this country inside of two months. Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hesitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, "Don't blame us because you didn't see this vision."

Canada Foundries & Forgings, Limited
WELLAND, ONT.

HAMMOND DIE BLOCKS

The STANDARD FOR QUALITY

ALL SIZES FOR IMMEDIATE DELIVERY

HAMMOND STEEL CO., SYRACUSE, N.Y.

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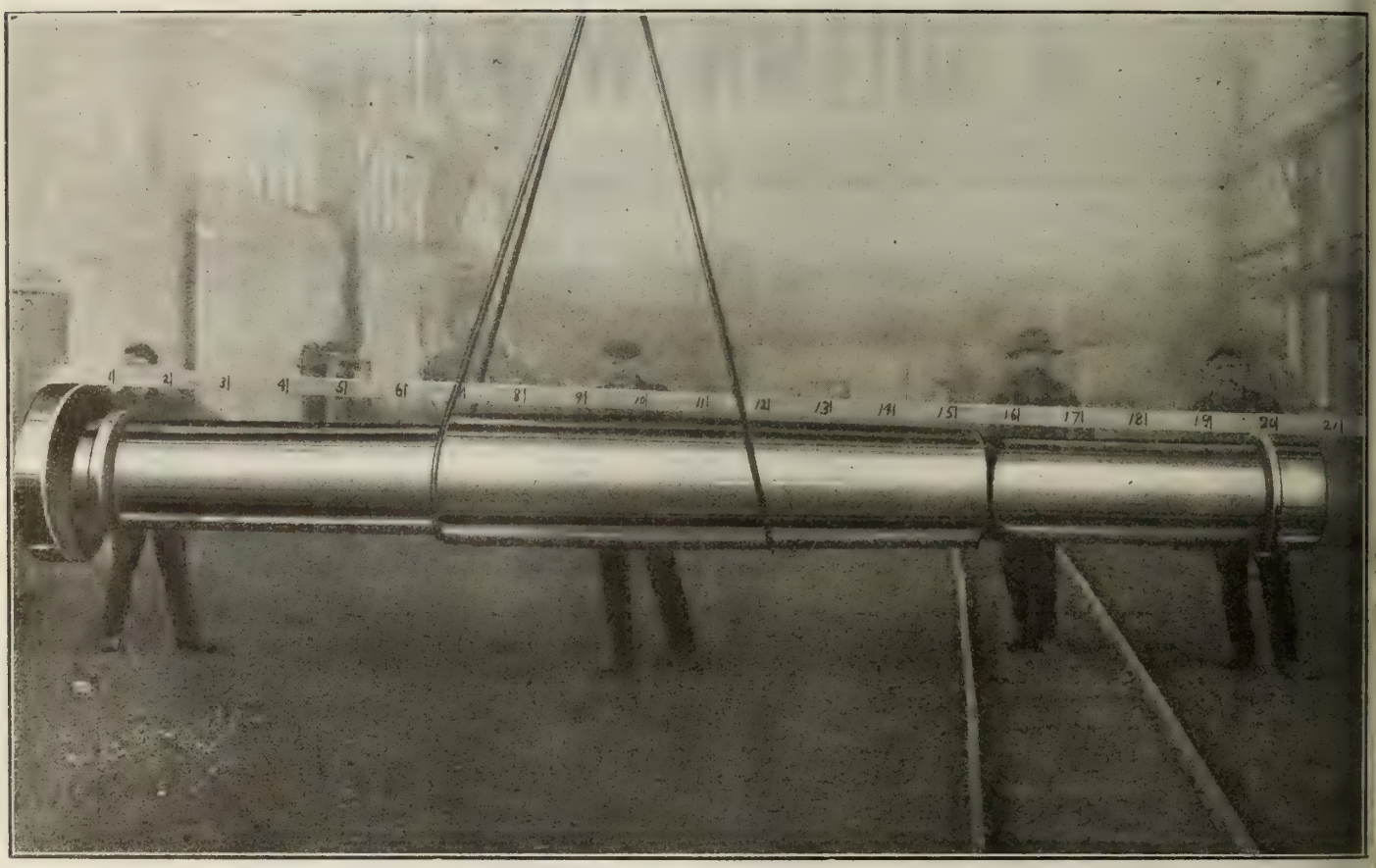

FINISHED COUPLING SHAFT, 18 IN. DIAMETER BY 21 FT. LONG

Heavy Marine Engine Forgings in the Rough or Finish Machined

Our Steel Plant at Sydney Mines, N.S., together with our Steam Hydraulic Forge Shop and modernly equipped Machine Shop at New Glasgow, N.S., place us in position to supply promptly Marine Engine Crank and Propeller Shafting, Piston and Connecting Rods; also Marine and Stationary Steam Turbine Shafting of all diameters and lengths, either as forgings or complete ready for installation, and equal to the best on the American Continent.

SaBeN ExTrA
HIGH SPEED STEEL

The Highest Achievement of British Tool Steel Metallurgy.

SABEN

H.A.DRURY COMPANY. LIMITED
STEEL

MONTREAL TORONTO NEW YORK

2

IMPERIAL GENUINE BABBITT METAL *The High Grade Manufactured*

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

HOYT METALS

"Frost King"
"Trojan"
"Nickle Genuine"
BABBITTS

Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.

Annual sales over $5,000,000.

Hoyt Metal Co., Toronto
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WOLFRAM
HIGH SPEED STEEL

VULCAN
TOOL STEELS

for Every Purpose

Vulcan Special Vanadium—For Punches and Dies. Has wonderful wearing qualities.

Vulcan Non-Shrinkable—For Intricate Dies. Does not warp. Does not shrink.

Vulcan Regal No. 2—For Fine Finishing Tools. The highest grade tungsten finishing steel.

Vulcan Hecla—For work requiring great strength. The first high grade Chrome Vanadium steel produced in America.

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Vulcan Crucible Steel Co.

ALIQUIPPA *Established 1900* PA., U. S. A.

Makers of Wolfram High Speed Steel

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ANNOUNCEMENT

We will exhibit our line of **Bolt and Pipe Threading Machines** at the M.M. and M.C.B. Convention which will be held at Atlantic City, June 18th to 25th inclusive.

Daily demonstrations will be given with a 2" Double Head Bolt Threading Machine and a 4" Landis Pipe Threading and Cutting Machine. We will also show our Stationary Pipe Die Heads, Chaser Grinder, and **new Automatic Die Head.**

You are cordially invited to visit our booth, Spaces 131 and 133, Young's Million Dollar Pier. We believe it will pay you.

LANDIS MACHINE CO.

WAYNESBORO, PA.

Crucible

AND

Open Hearth Steel

Tool Steel

"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.

1856

Frankford, Phila.
New York Office 217 Broadway

RALPH B. NORTON, AGENT
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STEEL CO., LTD.

Engineers, Manufacturers and Erectors of Steel Structures

Industrial Bridges, Buildings, Towers, Smoke Flues and Stacks, Chutes, Coal Bins, Ore Bins, Tanks, Cranes, Engine Houses, Grain Elevators, Derricks.

Structural Steel and Steel Plate Work, and a combination of the two lines.

Prompt Deliveries Assured.

MacKINNON STEEL CO., LIMITED
Sherbrooke, Quebec
Montreal Office: 404 New Birks Building

The Human Element

That power in man that makes of him a man
Unfolds not only in himself, for if we scan
The product of his hands we find therein
There shines the reflex of his traits that win;
So, if the actual man himself is sought,
Look not on him, but see what he has wrought.

It is the intelligent interest and co-operative spirit combined with the skilful hands of our manufacturing force which give that undisputed excellence to

"Red Cut Superior"

THE NATIONALLY KNOWN—FIRST QUALITY

HIGH SPEED STEEL

THE BEST FOR ALL MACHINE WORK

VANADIUM-ALLOYS STEEL CO.

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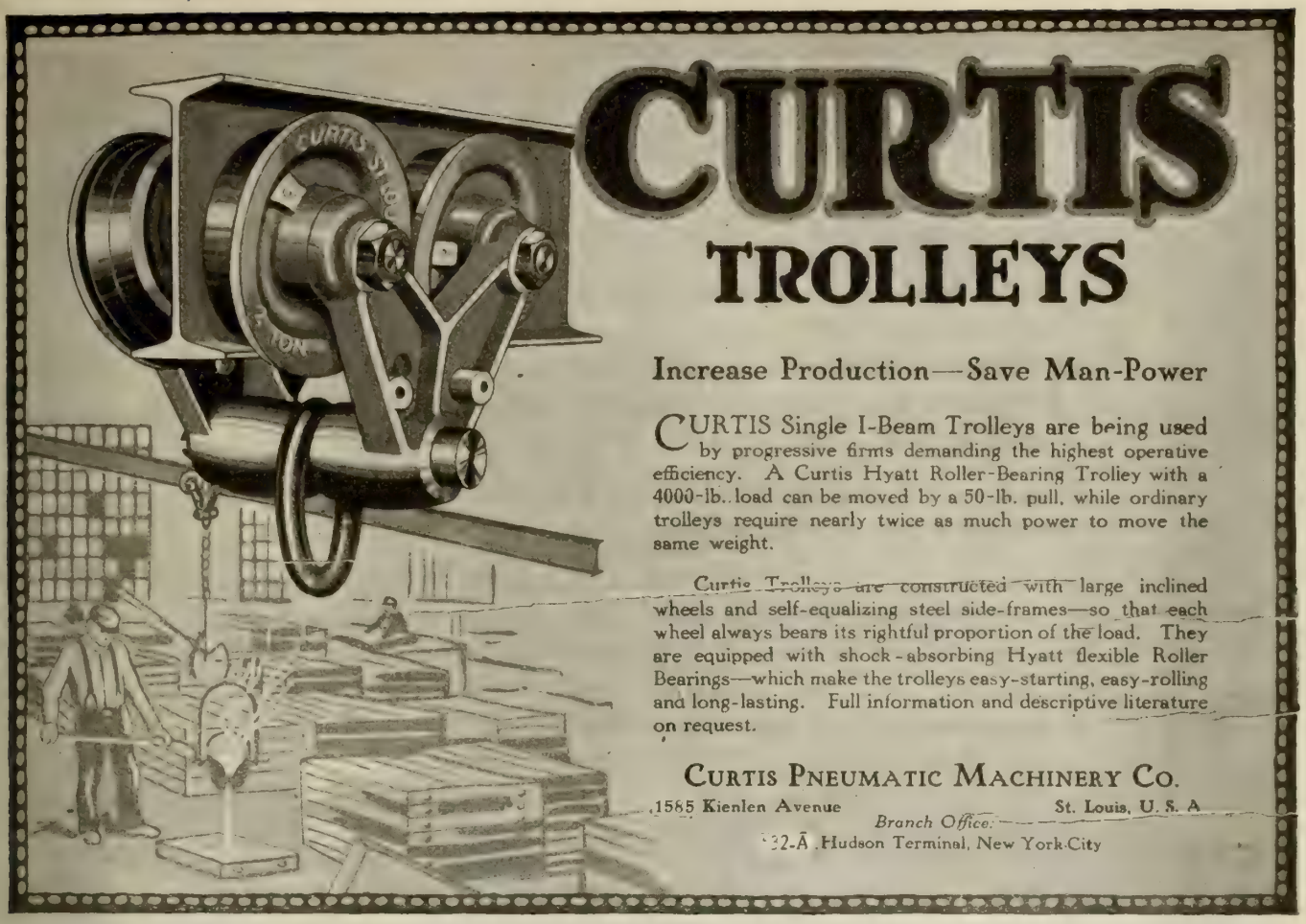
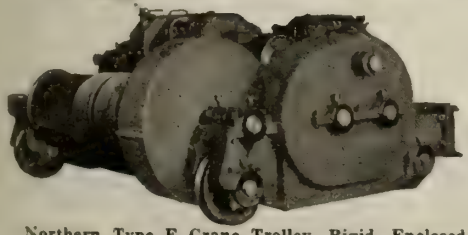


CANADIAN MADE CANADIAN MADE

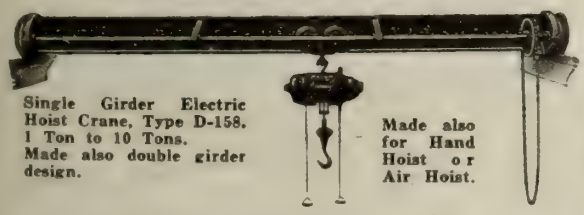
Electric and Hand Traveling Cranes

Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons



Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.



Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.

Type D Electric Hoists —½ to 10 Tons.

Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

Northern Crane Works, Limited

Walkerville, Ontario, Canada

HIT OR MISS GRINDING HAS NEVER YET PAID

THIS idea of using a grinding wheel just because it is a grinding wheel is poor business. Using the right wheel in the right place is good business.

It is the only way to show increased production and a consequent reduction in the cost of grinding.

If you are grinding malleables or steel castings, your grinding sense tells you to get a wheel that is hard, sharp, and fast cutting—a tenacious sort of wheel that stands up yet cuts fast.

In other words an Aloxite Wheel.

If it is a case of grinding cast iron, brass, bronze or aluminum it's an entirely different sort of wheel you need. A wheel that is hard, sharp, fast cutting, but of an entirely different nature.

In other words a Carborundum Wheel.

When it comes to recommending certain grits and grade for your particular work our service department will see to it that you get

The Right Wheel in the Right Place

THE CARBORUNDUM COMPANY

NIAGARA FALLS, N. Y.

NEW YORK CHICAGO BOSTON PHILADELPHIA CLEVELAND CINCINNATI PITTSBURGH GRAND RAPIDS MILWAUKEE

No Lifting or Movement of the Work

The illustration below shows the Heald 10-in. x 32-in. Flat Magnetic Chuck on planer work. It is taking a chip 5-16 in. deep with 5-32-in. feed at 60 feet per minute table speed, with no tendency to lift or move on the chuck.

HEALD MAGNETIC CHUCKS

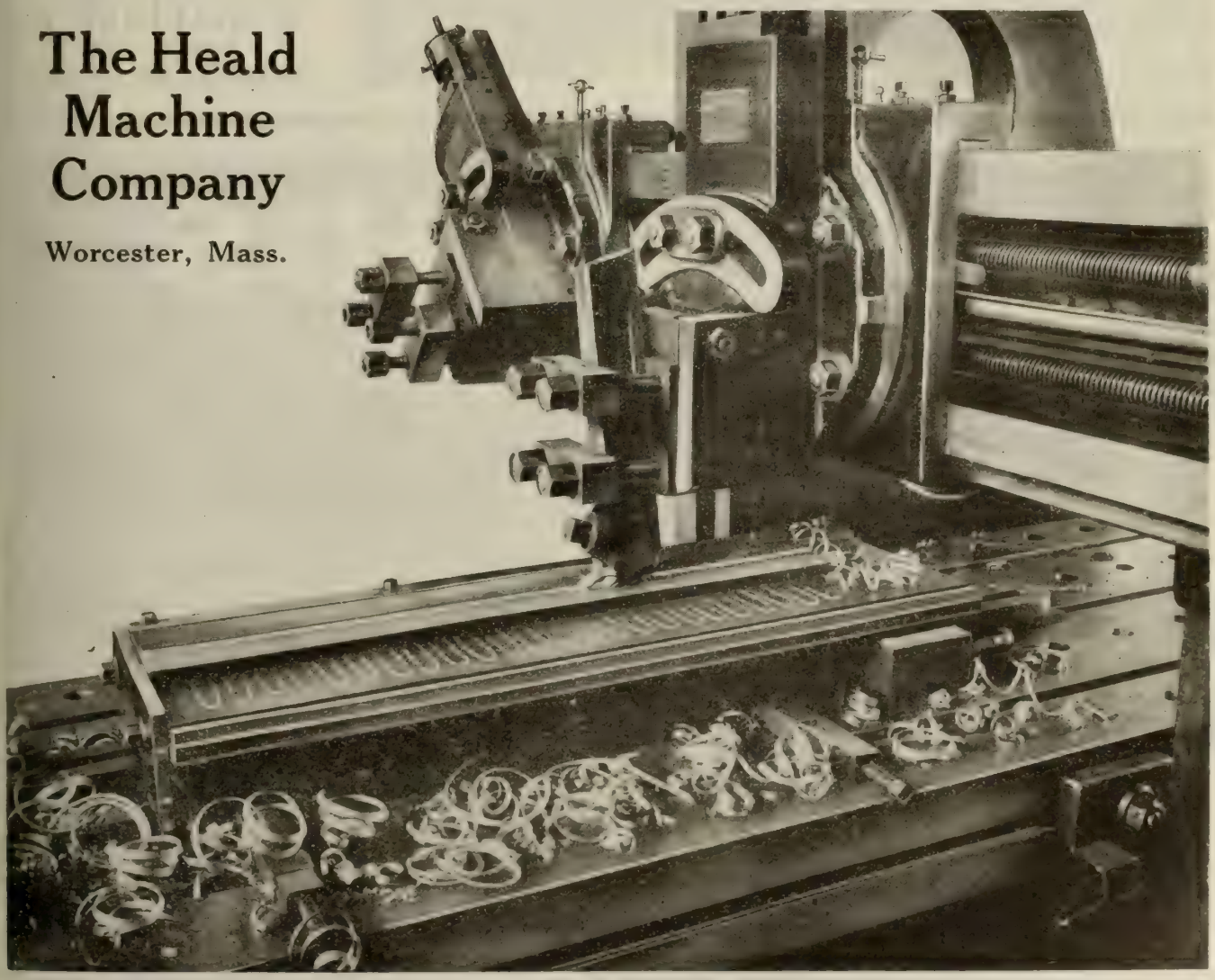
have great holding power, and consequently permit heavy cuts, coarse feeds and rapid work speeds.

All Heald standard rectangular chucks have both ends accurately machined so they can be placed end to end for holding long work. When grouped together they can be wired so as to be controlled either separately or together.

Ask your local machine dealer for bulletins No. 371 and 372, and other information.

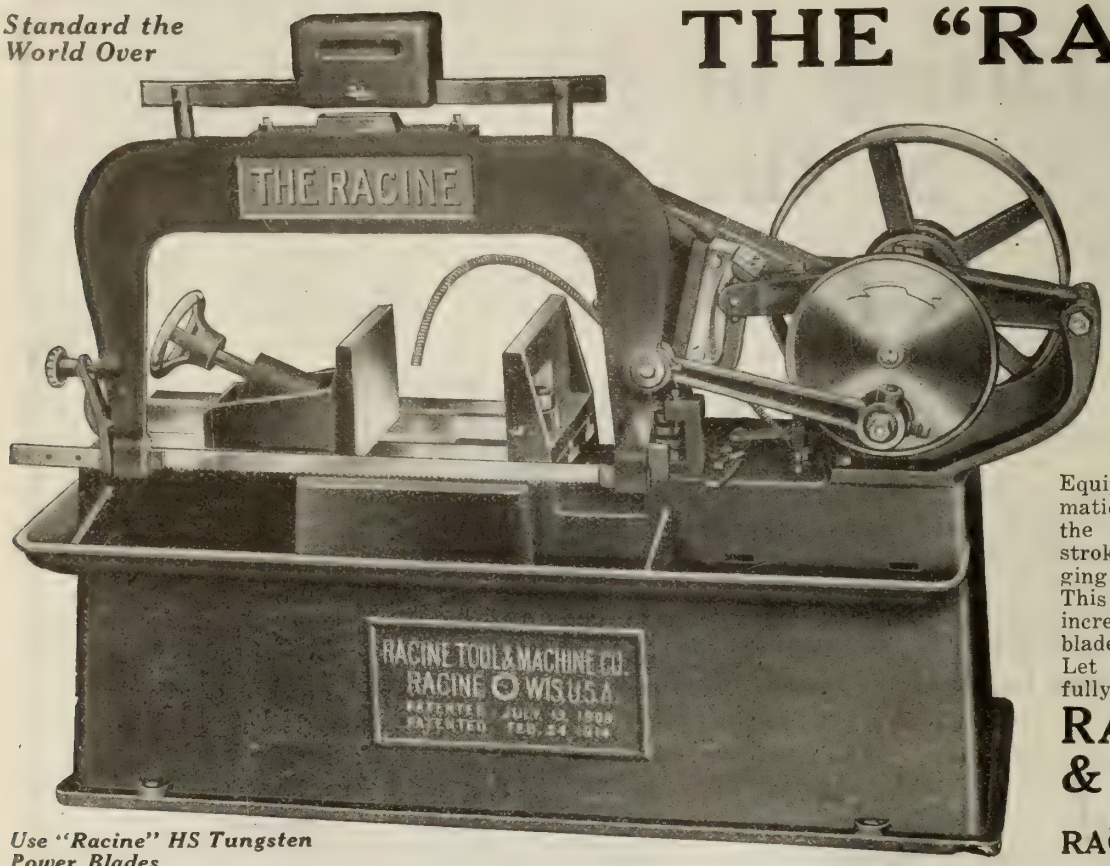
The Heald Machine Company

Worcester, Mass.



Standard the World Over

THE "RACINE"



Use "Racine" HS Tungsten Power Blades

The Machine for High Speed Metal Cutting

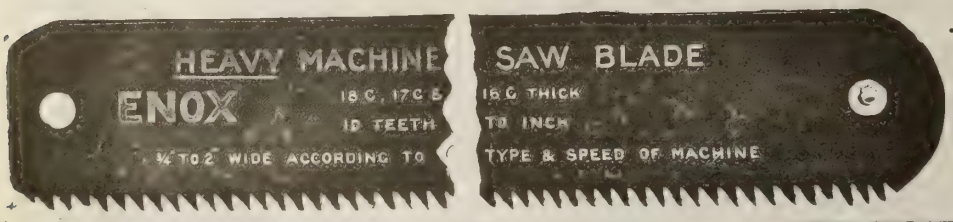
To successfully meet competition in the future you must adopt modern machines; machines that mean **quality** as well as **quantity** production. The RACINE is the tool you need. It increases speed, minimizes waste, reduces cost and is absolutely accurate.

Equipped with patented automatic lifting device which raises the blade of the non-cutting stroke and eliminates all dragging and strain on the blades. This means a saving in material, increased speed, long life for blades and greater production. Let us explain the machine fully. Write.

RACINE TOOL & MACHINE CO.
Melbourne Avenue
RACINE, WIS., U.S.A.

SIMONDS
HACK SAW BLADES
UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER



ENOX
Hacksaw Blades
ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.

The Starrett *Combination*

Saw—Chart—Machine

Will Increase the Efficiency of Your Cutting-off Department.

The Starrett Saws do the most work in the least time, because there is a blade for every metal cutting requirement.

The Starrett Chart tells you quickly which is the proper blade to use. You can depend upon it because it is based on exhaustive tests.

The Starrett Machine cuts on the draw stroke; automatic locking device prevents saw dragging. Adjustable for stock from 1″ to 6″ in diameter.

Send for the Starrett Chart 3 and Machine Folder No. 950.

The L. S. STARRETT CO.

The World's Greatest Toolmakers

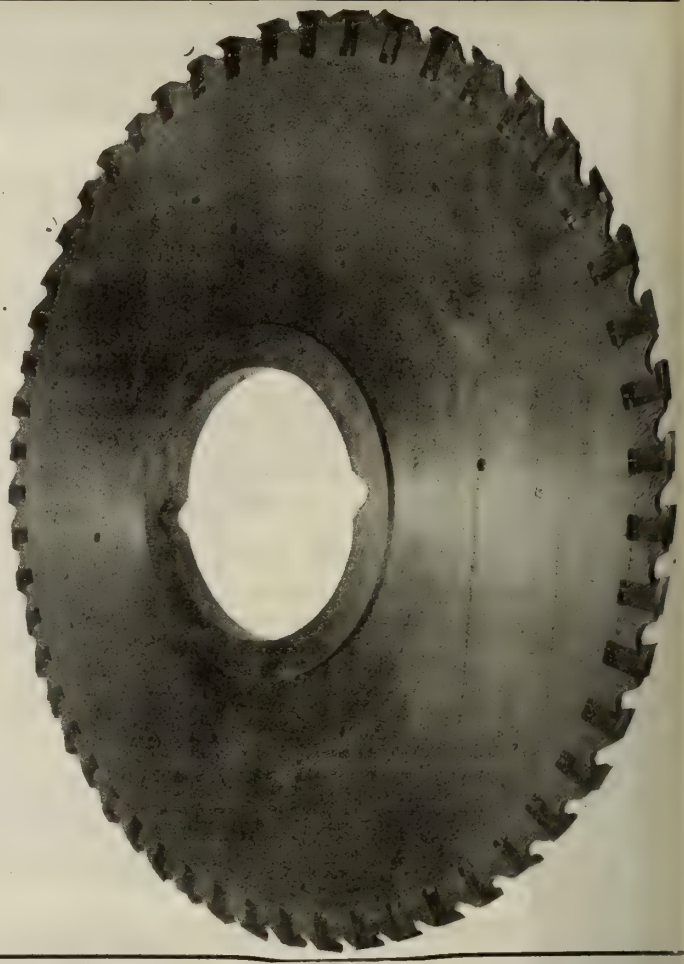
Manufacturers of Hack Saws Unexcelled

ATHOL, MASS.
NEW YORK, LONDON
CHICAGO

42-928

90-inches
in diameter

Cut on right shows a Hunter Duplex Inserted Tooth Saw used by the Erie Forge Co. for cutting gun forgings. It is the largest inserted tooth saw blade we know of ever having been made in the United States or any other country —1" plate, 1 5/16" kerf, and contains 56 high-speed steel teeth, and weighs approximately 3,000 lbs.



Hunter Duplex Saws

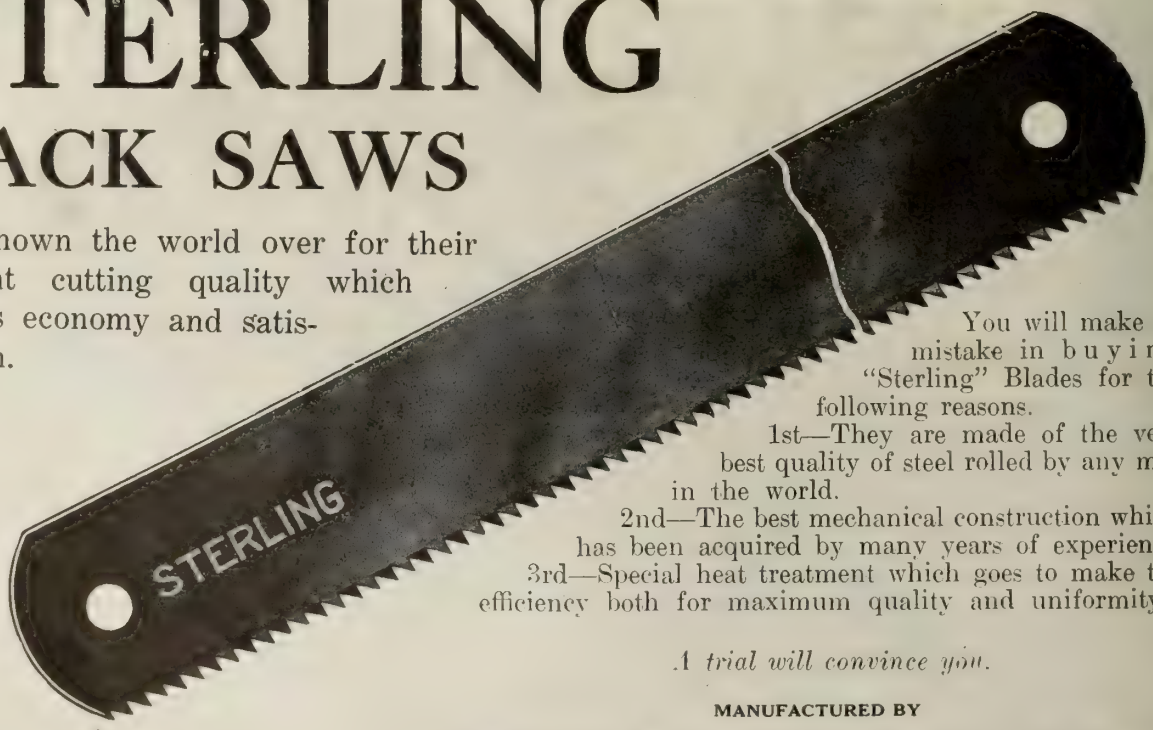
No matter what your sawing requirements may be, there is a Hunter "Duplex" Saw that is just right for the work. The discs are made of Chrome-Vanadium Steel, oil treated.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Grinders. Hardened Steel

Hunter Saw & Machine Co.
Pittsburgh, Pa., U.S.A.

STERLING
HACK SAWS

Are known the world over for their efficient cutting quality which insures economy and satisfaction.



You will make no mistake in buying "Sterling" Blades for the following reasons.

1st—They are made of the very best quality of steel rolled by any mill in the world.

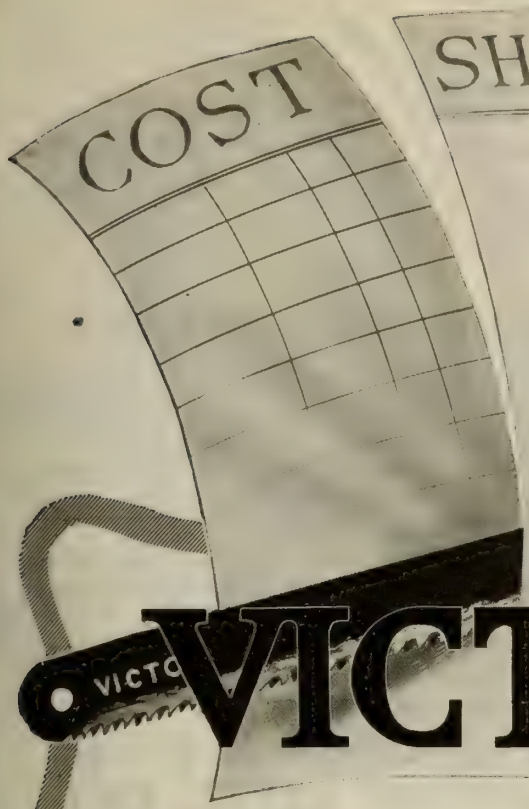
2nd—The best mechanical construction which has been acquired by many years of experience.

3rd—Special heat treatment which goes to make the efficiency both for maximum quality and uniformity.

A trial will convince you.

MANUFACTURED BY

Diamond Saw & Stamping Works
BUFFALO, N.Y., U.S.A.



CUT YOUR CUTTING COST WITH VICTOR Flexibles

The high cost of tools should emphasize more than ever the importance of quality.

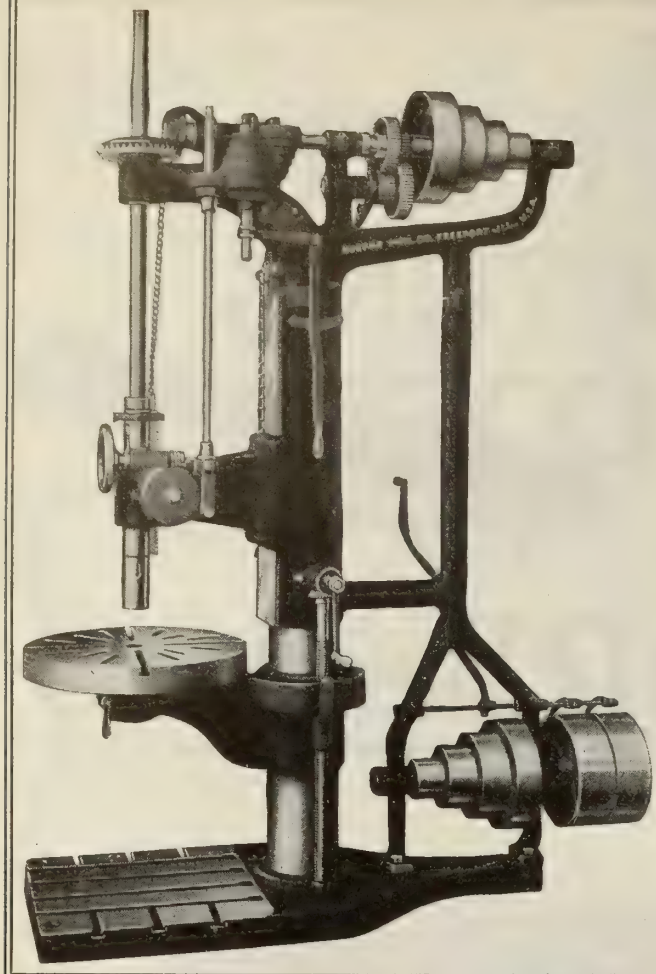
The high cost of hack saw blades ought to drive every hand blade user over to the saw that does not break in ordinary hand work.

VICTOR FLEXIBLE HACK SAW BLADES have exactly the same cutting power as the finest All-Hard on the market, and that they cannot be broken in use except by intentional abuse is an undisputable fact—which will represent a saving from twenty-five percent to thirty-three and one-third percent in breakage alone.

Seventy-five percent of the All-Hard blades used in hand frames break before they are worn out. Watch the All-Hard blades in your own shop and see the enormous amount of breakage—then use VICTOR FLEXIBLES and note the economy.

VICTOR SAW WORKS LTD - HAMILTON, CANADA

VICTOR HACK SAWS



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for PRECISION DRILLING

For over 25 years the name Hoefer has been associated with drilling equipment. Drillers have been our specialty.

Hence it is only natural that Hoefer Drillers should embody the latest word in design, efficiency and accuracy.

And they do. Regardless of the size of press, drilling to a fine degree of precision is always possible.

Hoefer Drillers are looked upon as a recognized standard—the standard by which satisfactory service can be measured.

Catalog showing complete line on request.

HOEFER MFG. CO.

FREEPORT - ILL.

DRILLERS

A WALL RADIAL DRILL

That Puts Dollars In Your Pockets

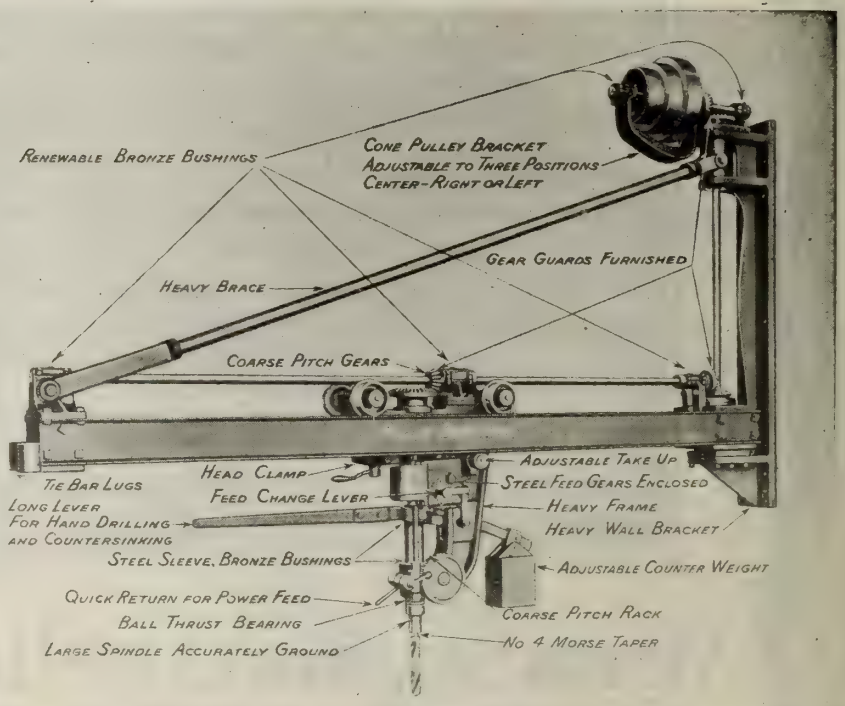
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the machine is made of high grade materials throughout and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling proposition in your pocket, by the installation of this machine.

Send for detailed bulletin.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

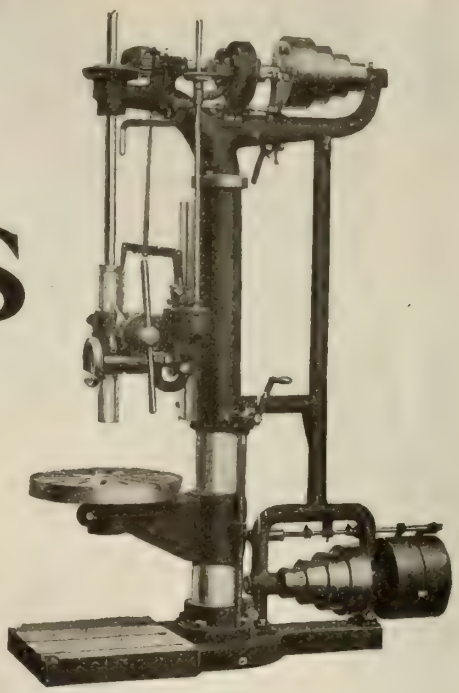
419-425 Atlantic Avenue BOSTON, MASS.

Meet the keen competition of peace times by putting into your shop faster, stronger and more accurate upright drilling machines. Sixty-four years' drill building experience is back of these perfected

Silver Drills

The 25″ Silver Drill has eight spindle speeds and six positive geared feeds. The 20″ Silver Drill is built in four distinct styles with round or square base. Furnished singly or in gangs of 2, 3 or 4 spindles.

Write for further facts.



SILVER Salem, Ohio U.S.A.

The Silver Mfg. Co.

290 Broadway

SALEM OHIO

Prompt Deliveries

H. COLLIER SMITH

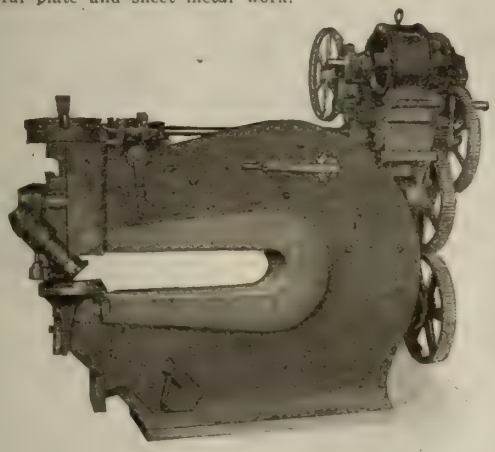
"QUICKWORK"

Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

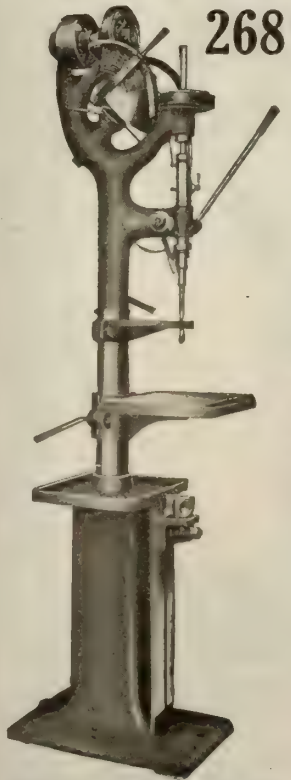
SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

Write for Catalogue

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

Ten Speeds Ranging from 268 to 2140 R.P.M.



The Albany high-speed drill is provided with every means for the rapid and accurate drilling of all kinds of work. For rapidity of stopping and starting of spindle; for quick change of drills, chuck and speeds, and for accurate drilling to depth, it is decidedly distinctive. With an index of drill speeds on head and a micrometer gauge for depth as part of the machine, the average operator is enabled to get those good results that are usually attained only by experts.

FOREIGN AGENTS. F. W. Horne & Co., Tokyo, Japan, China, Korea. R. L. Scrutton Co., Ltd., Sydney, Australia and New Zealand. Litton's Machine Tool Co., London, England. A. Berthoin, Grenoble, France. V. Lowner, Copenhagen Denmark. Aktiebolaget, Rylander, Asplund, Stockholm, Sweden. Gillespie Bros. & Co., South Africa (New York City). Monti & Oscuro, Milan, Italy.

Details will show why. Shall we send them?

ALBANY HARDWARE SPECIALTY MFG. CO.

ALBANY WISCONSIN

"CANADIAN"

ACCURATE work demands accurate and efficient tools.

The Canadian No. 5 has some features worth considering.

Eight speeds, three power feeds—also hand and lever feeds.

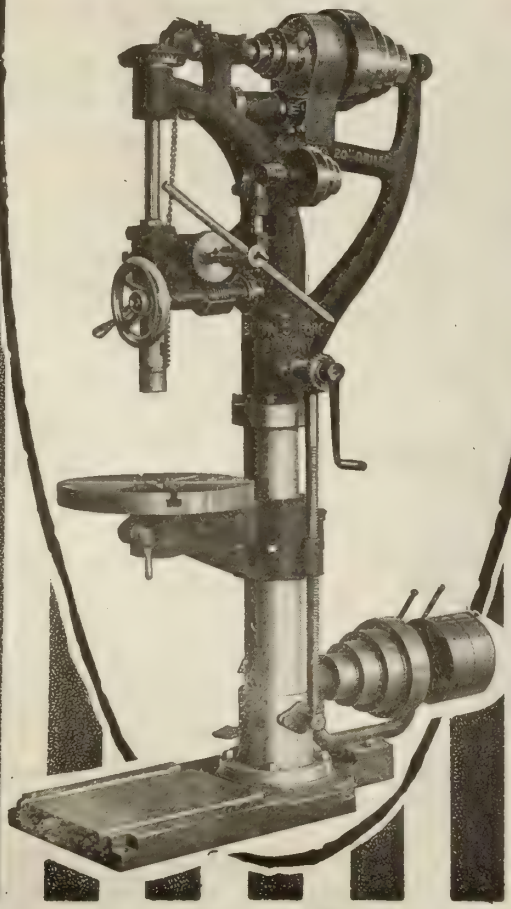
The twist of a knurled knob changes instantly plain drive to back geared drive—no tools to get lost or bother with.

An adjustable automatic trip throws out power feed when piece has been drilled to required depth.

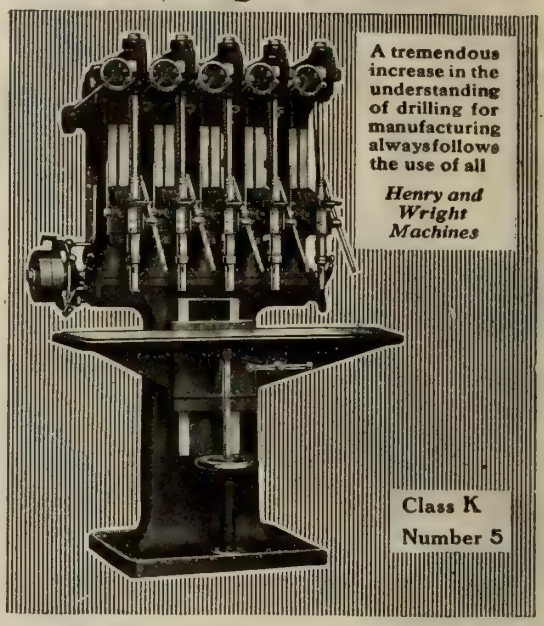
Split adjustable bearings, ball bearing graduated spindle—but then there are so many features — for complete description write for literature.

Circular 1199-16 describes the whole Canadian Upright Series

Canadian Blower & Forge Co., Limited
Kitchener, Ontario

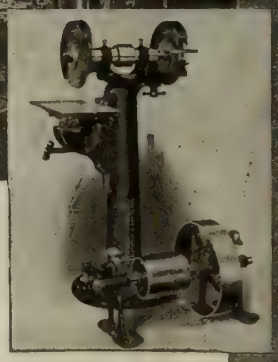


HENRY & WRIGHT
Drilling Machines



The Henry & Wright Mfg. Co.
Hartford, Conn.

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.



WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful Waterbury Grinder at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable, practical grinding outfit.

The Blake & Johnson Co., Waterbury, Conn.

BROWN'S

Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting. Extruded shapes.

Guaranteed Ingot Metals—Yellow, Red and Composition Ingots.
We are Purchasers of Copper Bearing Material.

Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

MALLEABLE AND CAST IRON PIPE FITTINGS

The Brand That Has The Quality

"Quality" and "Reliability" are two essentials demanded of *Cast Iron* and *Malleable Fittings*, by all sanitary and heating engineers.

Time and money are lost by improperly made fittings. All our cast iron and malleable fittings are properly recessed and every fitting bears the above trade-mark of quality.

We make a complete and full line of both flanged and threaded fittings from ⅛-inch up, and can make deliveries from stock, both standard and extra heavy.

When ordering from your jobber be sure you buy—"the brand that has the quality." They are different. A trial order will convince.

International Malleable Iron Company, Limited
Guelph, Ontario, Canada

Sacrifice in Machinery

Greatly Reduced Prices

Wood-working Machinery

3—No. 613 Defiance-Wood-turning Lathes.

1—No. 314 Fay & Egan Carving and Freizing Machine, combined.

1—No. 312 Yates Chain Feed Band Rip Saw.

1—Defiance Stock-turning Lathe.

1—Hayes Single End Tenoner with cut-off saw in rear, double capes.

1—No. 1 American Single Spindle Reversible Shaper with ball-bearing.

1—No. 19½ Holmes Automatic Shaper.

1—16″ x 10½″ E. C. Francis Veneer Press.

1—No. 133 E. C. Francis Glue Press, 12′ x 4′ 6″ O.D., with extra cross sections and 32 screws.

1—Beam Press, E. C. Francis make, comprising 16 No. 3 Double Clamps without Guides, 4 No. 3 Double Clamps with Guides, 4 Wrench Wheels.

1—60″ Sheldons Low-speed Steel Plate Exhaust Fan.

1—50″ Double ABC Fan.

1—No. 1 Obler 60″ Lathe.

Metal Machinery

1—No. 12 Pratt & Whitney Gear-driven Profiler.

1—No. 3 Garvin Plain Hand Miller.

2—No. 1 Standard Hand Millers.

1—Globe Universal Tool and Cutter Grinder.

3—No. 2 Eureka Metal Jig Saw.

1—12 x 12 Sullivan Air Compressor with unloader, Class WG3.

1—36 x 42 American Wadsworth Sand Blast Tumbling Barrel.

1—26″ Gardner Disc Grinder.

1—No. 6 Diamond Disc Grinder with 26″ Disc.

1—No. 1 Gray Sheet Metal Cutter.

1—18″ x 10′ bed Hendey Lathe.

1—18″ x 26″ x 12′ South Bend Gap Lathe.

2—2-Spindle Allan Drill Presses, Hand Feed.

2—3-Spindle Allan Drill Presses, Hand Feed.

10—Rickert Shafer Tapping Machines.

3—No. 6 Whitney Hand Millers.

2—No. 4 Warner, Swasey Screw Machines, geared friction head with power feed to turret, automatic chuck bar feed.

7—No. 2 Warner, Swasey Screw Machines, geared friction head with power feed to turret, automatic chuck bar feed, plain head.

1—No. 1½ x 9 Acme Screw Machine, power feed to turret.

3—No. 1 Foster Plain Head Screw Machines, with automatic chuck.

4—No. 2 Foster Geared Head Screw Machines, with automatic chuck, bar feed power feed to turret.

4—No. 4 Foster Geared Friction Head Screw Machines with automatic chuck wire feed.

1—½″ Landis Double Head Bolt Cutters.

1—16″ Cincinnati Shaper, NEW.

1—15″ Potter & Johnson Shaper, NEW.

2—No. 730½ Brown-Boggs Geared Press.

Miscellaneous Items

1—60 H.P. Westinghouse Motor, 3-phase, 25-cycle, 550-volt, 720 R.P.M., with bedplate, pulley and starter; NEW.

1—42″ Cameron Combination Model No. 24 Slitting Machine.

1—20 M lbs. Olsen New Universal Wire Testing Machine, hand-operated, arranged to test tensions and compressions up to 8′, with regular equipment.

4—Mattison Balancing Tools.

Canadian Aeroplanes Limited

Dufferin and Lappin Avenue **TORONTO**

WILSON FEARED THE BRITISH

THE American President crossed the Atlantic in the first place with the idea in his mind that his ideals would be thoroughly in accord with those of the French statesmen; but he was rather afraid of a conflict with the British delegates. He found in reality that his plan for peace terms was as far removed from the French plan as the two poles. Then he crossed to London and was surprised to find that the ideas of the two Anglo-Saxon powers were identical.

This situation, according to J. W. Dafoe in the May issue of MACLEAN'S MAGAZINE, explains much that has developed at Versailles. Further, it contains the promise of a close *rapprochement* between the two great English-speaking democracies for all time to come.

Mr. Dafoe has contributed a remarkably interesting article to this number of MACLEAN'S, lifting the curtain on many of the puzzling situations that have arisen overseas. As the editor of the Manitoba *Free Press*, he is the dean of Canadian newspapermen; as the representative of the department of Public Information on the Canadian Mission to the Peace Conference, he was in a special position to learn what was transpiring. He tells of the really big part that Canada has played in the Proceedings and points out that Canada's status as a nation was firmly established in the eyes of the world when she was allowed separate representation.

A Dozen Other Features---Nationally Important

This May issue is full of articles of unusual significance for Canadian readers.

"SOLVING THE PROBLEM OF THE ARCTIC"
—By Vilhjalmur Stefansson

The second instalment of his remarkable story of the four years of exploration that he undertook for the Canadian Government in the region of the "Pole of Inaccessibility"—a harder place to reach than the North Pole.

"ORGANIZING FOR PEACE"
—By George Pearson

An article of the Great War Veterans' Association by a well-known author-soldier.

"THE CANADIANS IN SIBERIA"
—By Capt. W. E. Dunham

A graphic story of what our forces did in combatting the Bolsheviki, by an officer who has just returned.

"SAFE IN THE SADDLE"
—By J. K. Munro

A review of affairs at Ottawa in which the opinion is expressed that Union Government for the time being is safely entrenched.

The National Idea

The articles in this issue of MACLEAN'S reflect the national idea—Canada's part in the Peace Conference, the political situation at Ottawa, the exclusive report of Stefansson's national explorations, the national organization of our returned men, the work of our forces in Siberia. The reader of MACLEAN'S gets a broad idea of what Canada as a whole is doing. The value of this issue—and of all issues—is very great, therefore, from an educational standpoint.
MACLEAN'S is the one magazine that should be selected for young Canadians to read.

Four capital stories by famous authors—W. A. Fraser, Lloyd Osborne, Frederic S. Isham and C. W. Stephens.

The Review of Reviews

An unusually fine array of articles is given in this department, selected from the best in magazines and periodicals the world over. Some of the titles are:

Planned to Destroy British Fleet.
How Mackensen Was Caught.
Events of War Foretold by Stars.
What is Life Like Beyond the Grave?
A High-born Bolshevik.
The New Life in Dry America.
Germans Were Ready to Capitulate.
Japan's New Foreign Policy.
The Many Kings of Jerusalem.
Is British Foreign Office Against League?
Ambassador Tells Story of Peace-Ship.
Hindenburg—After the Armistice.

Over 65,000 Canadian Families Buy

MACLEAN'S

"CANADA'S NATIONAL MAGAZINE"

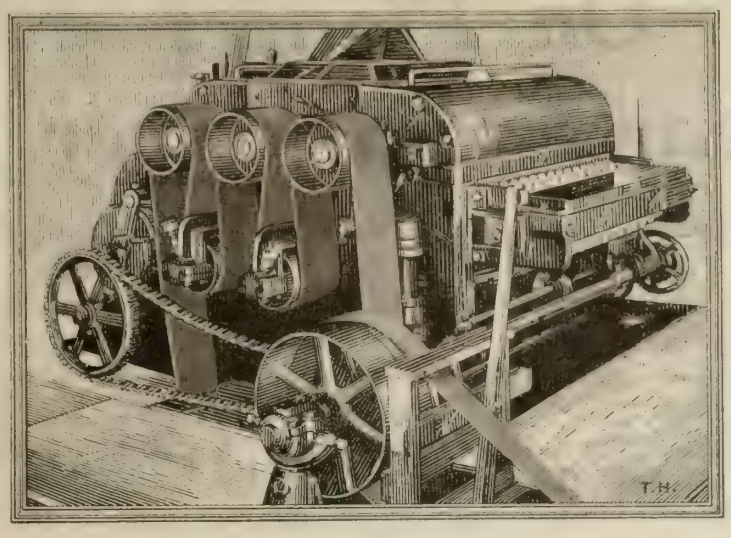
MAY ISSUE *Now On Sale At All News Dealers*

20c PER COPY. $2.00 PER YEAR

Dealers who have not been handling MACLEAN'S should secure copies at once from their nearest wholesaler.

If there are no newsdealers in your town, or if your newsdealers cannot supply you, send 20 cents for a sample copy or $2.00 for a whole year's subscription to MACLEAN'S MAGAZINE, 143-153 University Avenue, Toronto, Canada.

This illustration shows a Graton & Knight veteran in a Spartan Double Belt, 46 feet long and 8 inches wide. It is running every day in the plant of the Leroi Furniture Company, St. Louis, Mo. It has seen 4½ years of service. This belt-eating sanding machine wore out three 9-inch ordinary belts in eighteen months. Its cost has been 40 cents a week with long service to come.



For all drives designed in our Engineering Department the belts are proportioned so that the stress, due to the horse-power being transmitted, is never more than one-tenth of their ultimate strength. The rules employed are the result of extensive experience, and applied to your problems may show that you are using a belt too good or one not good enough for the work to be done.

The Right Belt in the Right Place

Here is punishment for *any* belt. And as usual SPARTAN is the belt that is game for it. It shows the right belting material in the right place. SPARTAN, greatest of pulley-grippers, flexible and elastic, is solving the problem of the trouble-making drive in thousands of plants. There is one answer and one reason—leather properly tanned and fabricated for a given purpose—a Standardized Series.

You can't think of any belting material that stands hard knocks the way leather does—or one that can be satisfactorily spliced or repaired. Leather has the tightest of frictional grip. It gives and takes as the need arises. It doesn't fray under the side slapping of shifters. After a long and useful life on main drives you can cut it into smaller belts and keep it earning money.

Graton & Knight Standardized Series Belts are made for the work to be done—from the first step in tanning. Very nearly 300,000 steer hides pass through our hands yearly. Think of the broad selection that gives us, the uniformity of quality possible. And installing any G. & K. Standardized Series Belt means the right belt in the right place—not merely a belt, but a belt for a *given* purpose.

Many of the best belted plants ask us to specify the belting for every drive. Try the plan yourself. Then, when buying, call for "Graton & Knight Brand—or equal." This won't commit you to buying our belts. It will put your buying on the one basic consideration—the work to be done.

Write for information about Standardization as applied to Belting

THE GRATON & KNIGHT MFG. COMPANY, Worcester, Mass., U.S.A.

Oak Leather Tanners, Makers of Leather Belting, Lace Leather, Leather Packings and Specialties

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Canadian Graton & Knight, Ltd., Montreal. Canadian Representatives: The Canadian Fairbanks-Morse Co., Ltd., St. John, Montreal, Ottawa, Toronto, Hamilton, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria

GRATON AND KNIGHT

GRATON & KNIGHT

Standardized Series

LEATHER BELTING

Tanned by us for belting use

On Planers---
Goodyear Extra Power Belting

The final test of belt efficiency is found on both large and small high-speed planers in woodworking plants.

Planer drives are of two types, the cylinder drive and the side head drive.

Feed drives are hard to belt, as they are belted top and bottom—each belt must also run over another pulley, which allows the roller to turn and move the board ahead, as it is planned.

The side head drive is found the most difficult to belt, because of the maintenance of exceptional high speed, the difficulty of installation, and the necessity of stretch elimination. Sidehead belts operate by two-quarter turns on the under side from a vertical shaft to a horizontal pulley. To make these turns, two idlers are necessary, running the belt over four pulleys—each sidebelt in contact with two pulleys.

It is with real satisfaction that we receive testimonials of the exceptional service by Goodyear Extra Power Belting on work of this kind.

The Crow's Nest Lumber Company, of Wardner, B.C., operate a Berlin type side-head matcher and resaw equipped with a 5-inch, 5-ply Goodyear Extra Power—it has a record of eleven months' continuous service.

Mr. Laird, Superintendent, says: "No trouble whatever has been experienced. Extra Power has been entirely satisfactory, giving a greater service than had ever been secured in the mill."

Mr. Laird adds that, while this particular record is outstanding, Extra Power has given splendid results through the mill on all types of machine, countershaft and main drives.

Belt men trained by Goodyear are at the service of any industrial in Canada. Discussing your problems with Goodyear places you under no obligation. Phone, wire or write the nearest branch.

The Goodyear Tire & Rubber Co. of Canada, Limited

Branches: Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, London, Winnipeg, Regina, Calgary, Edmonton and Vancouver.

Service Stocks in Smaller Cities.

GOODYEAR
MADE IN CANADA

EXTRA POWER BELTING

Down Come Costs

Another Example
The following is a report from one of the best known plants in the country. (Name on request.)
"The man on the machine where the cutter was tested says that it is the best cutter he ever had. He says it stood up for 19 hours without stopping and then could have been put into perfect shape with a little oil stone. The best they get out of their own cutters is between 10 and 11 hours.
"The material was cast steel, full of sand holes and chilled spots; the feed, ⅝-110-40."

THE greater your outlay for materials, the more necessary to turn them back into money as rapidly as possible.

The greater your outlay for labor, the more important to get every possible cent's worth of value from it.

Faster production is the answer; and the way to the faster production is by

DAVIDSONIZED
HIGH SPEED STEEL TOOLS

Actual performance in many plants which rank among the largest-scale producers in the world, is our authority for the blunt statement that

Davidsonized Tools will give you more pieces per hour and more pieces per grinding than any other tools you are using or ever have used.

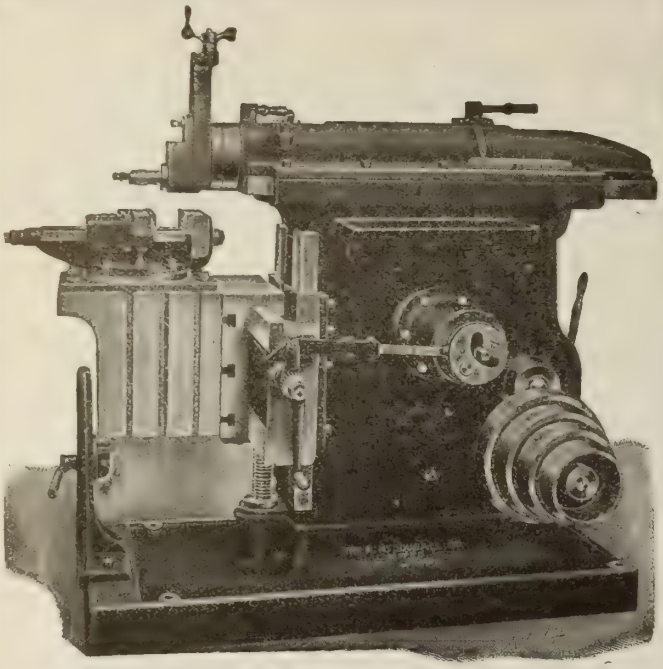
There is a flat, unconditional guarantee back of that statement. If the tools do not outperform those you make yourself or buy elsewhere, return them and we will cancel all charges.

As a matter of fact, these Davidsonized Tools, produced by an altogether new process which represents a radical advance over previous high-speed steel practice, have made a record in actual use which promises to revolutionize production standards. You should know about this. Correspondence invited.

Special Service to Concerns Who Make Their Own Tools

We will supply Davidsonized High Speed Steel Blanks, in the semi-finished state, hardened and finished within grinding size (about .015 to .020 stock to be removed from working surfaces). This service enables the user to obtain these tools of unequaled quality at a cost which compares favorably with that of tools made from the solid bar.

THE DAVIDSON TOOL MFG. CORP.
Main Office: 118-122 Maiden Lane, New York
Works: 56-62 North 6th Street, Brooklyn, N.Y.



McDougall SHAPERS

Combine the best features of all machines which have hitherto been placed upon the market, and nothing has been included, except those points which experience has shown to be essential.

An examination of the construction will reveal features that make for increased production, ease of operation and accuracy.

Write for descriptive literature.

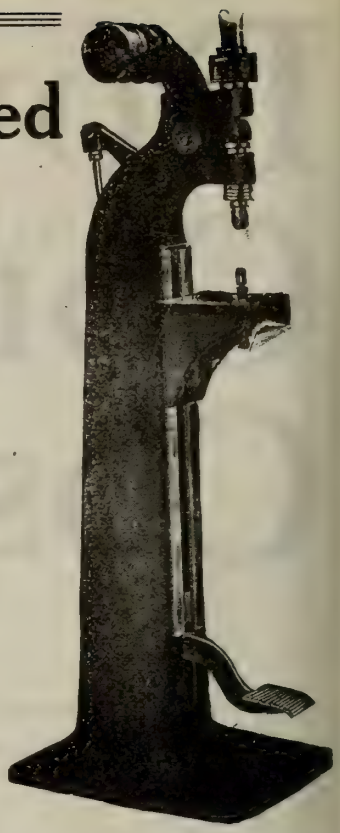
The R. McDougall Company Limited

Manufacturers

GALT, ONTARIO, CANADA

ARE-MAC-DEE IS A GUARANTEE

Rivet Speed



One every second is a speed which this Grant Rivet machine will keep up indefinitely, in any degree of tightness or looseness desired. Each rivet is finished with perfectly shaped head, polished and with no hammer marks showing.

We claim this is the only machine manufactured that will accomplish this feat. Our claims are unchallenged. By writing for our catalogues you may obtain full information regarding the ability of this machine.

We are rivet machine specialists. Get in touch with us.

Grant Man'fg. & Machine Company

Holland Avenue - - Bridgeport, Conn., U.S.A.

P X H

TRADE MARK

The satisfaction of a job well done follows the use of

P.H. & Imperial Files

"They Cut Faster and Wear Longer"

Ingersoll File Company, Limited
Ingersoll, Ontario

John Morrow Screw & Nut Co.
LIMITED
Ingersoll, Ontario
Sole Distributors:

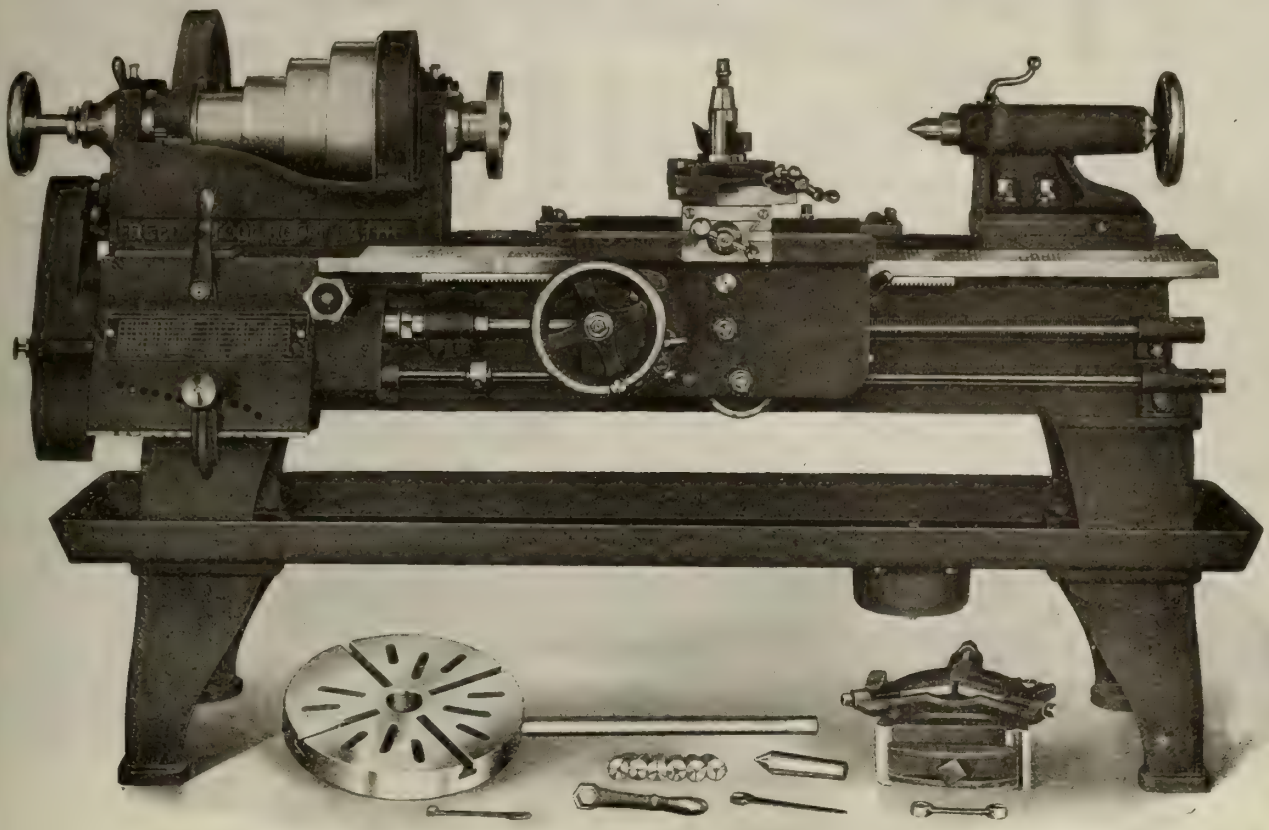
IMPERIAL

TRADE MARK

REED-PRENTICE COMPANY

R-P

WORCESTER MASS. U.S.A.



"REED" ACCURACY

YOU CAN TRAVEL PRETTY MUCH ALL OVER THE WORLD AND FIND MEN WHO HAVE AT ONE TIME OR ANOTHER USED "REED" LATHES.

WERE YOU TO ASK THEIR OPINION OF THIS MAKE OF MACHINE YOU WOULD UNDOUBTEDLY BE IMPRESSED BY THE UNIVERSAL REPLY—"ACCURATE."

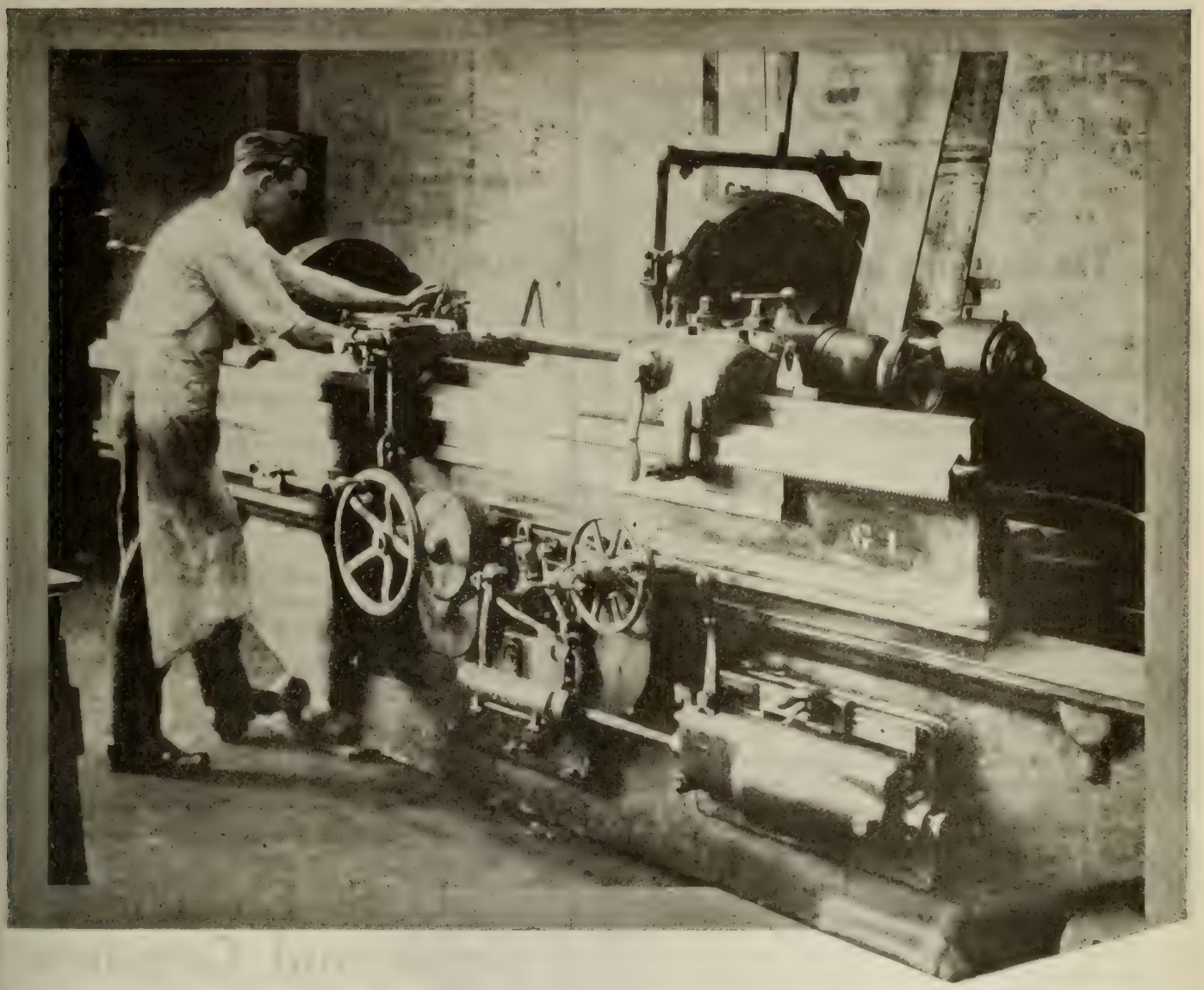
THERE IS ONLY ONE WAY OF GETTING ACCURACY OUT OF A MACHINE TOOL. IT MUST BE PUT THERE DURING THE MAKING. WE DO THAT.

MAY WE HAVE THE PRIVILEGE OF SHOWING YOU SOME OF THE REASONS AND DEVICES THAT MAKE "REED" TOOL ROOM LATHES THE FIRST CHOICE?

MANNING, MAXWELL & MOORE, INC.
CANADIAN FAIRBANKS-MORSE, LTD.,
FENWICK FRERES

Tractors have revolutionized modern warfare—their remarkable capacity and versatility have proved superior to other methods for hauling. So have Norton Grinding Machines revolutionized machine shop practice and proved superior to other methods of finishing. They are operated in every important industry for cylindrical grinding on account of their accuracy and manufacturing economy.

Norton Grin



Witness this operator in the shops of the Holt Manufacturing Company, Peoria, Ill., grinding main drive shafts for the famous "Caterpillar" tractor on a "Norton." Were there a better grinding machine the Holt people would use it.

Our Specification Sheets may be interesting to you and our Service Dept. is at your disposal

Norton Grinding Company, Worcester, Mass.

Chicago Store: 11 North Jefferson Street

Vonnegut Machinery Company, Indianapolis, Ind. **Robinson, Cary & Sands Company**, St. Paul and Duluth, Minn. **Manning, Maxwell & Moore, Inc.**, St. Louis, Mo. **Henry Prentiss & Co.**, New York, N.Y.; Boston, Mass.; Buffalo, N.Y.; Rochester, N.Y.; Syracuse, N.Y.; Scranton, Penn. **The Motch & Merryweather Machinery Company**, Cleveland, O.; Detroit, Mich.; Pittsburgh, Penn.; Cincinnati, Ohio. **Eccles & Smith Company**, San Francisco, Calif.; Los Angeles, Calif.; Portland, Ore. **The Canadian Fairbanks-Morse Company, Ltd.**, Montreal, Que.; Toronto, Ont.; Vancouver, B.C. **C. T. Patterson Company, Ltd.**, New Orleans, La. **Kemp Machinery Company**, Baltimore, Md. **W. E. Shipley Machinery Company**, Philadelphia, Penn. **English Tool & Supply Company**, Kansas City, Mo. **Alfred Herbert, Ltd.**, Coventry, Eng.; Paris, France; Milan, Italy. **The F. W. Horne Company**, Tokio, Japan. **Iznosskoff & Co.**, Petrograd, Moscow and Ekaterinburg.

N219

ing Machines

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 40A

The Snagging of Annealed Malleable Iron Castings

Machines Used

The annealed white iron or malleable iron castings are usually ground on floor stands with 1½″ or 2″ spindles. Occasionally small castings are ground on bench stands mounting 10″ or 12″ diameter wheels, 1″ to ½″ thick, with 1¼″ hole. Also some of the heavier types of castings are more conveniently ground by means of swing frame grinding machines. In this case, 18″ to 24″ diameter wheels are used down to about 14″ diameter, when they are transferred to floor stands for smaller castings, and thus used down to about 8″ diameter.

Question of Abrasive

The surface, at least, of malleable cast iron is essentially a low carbon steel and has similar physical properties. Therefore, this automatically determines that the proper abrasive is Alundum or some aluminous abrasive.

Sizes and Shapes of Wheels

In a majority of cases straight wheels are used, but we find quite a few bevelled wheels, tapered both sides ½″ and ¾″ per foot, in service. As it is usually possible to have the wheel guarded by a protection hood, there is no real reason for the use of the bevelled wheel. Such wheels cost more to make and command a higher price than a straight-sided wheel of the same diameter.

The following sizes are considered good practice on floorstands:

Diameter	Thickness	Diameter Arbor Hole
14″	1½″-2″	1½″
16″	1½″-2″ -2½″	1½″
18″	2″ -2½″-3″	1¾″
20″	2″ -2½″-3″	2″
24″	2″ -2½″-3″	2″

NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT. NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 1110 JEFFERSON ST.

NORTON

MARK YOUR PRODUCTS THE "MATTHEWS" WAY

"Matthews-made" steel stamps and lettering dies make easily read and durable marks on all classes of products. Matthews Champion Type Holders—for flat and convex surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years' experience.

Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

Canadian Fairbanks-Morse Co., Limited

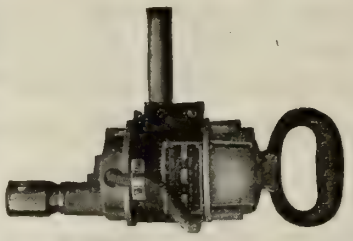
Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

U. S. Electric Drills and Grinders

Save Time. Labor and Money



They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES

3-16 in., W.G.T., 6 lbs.
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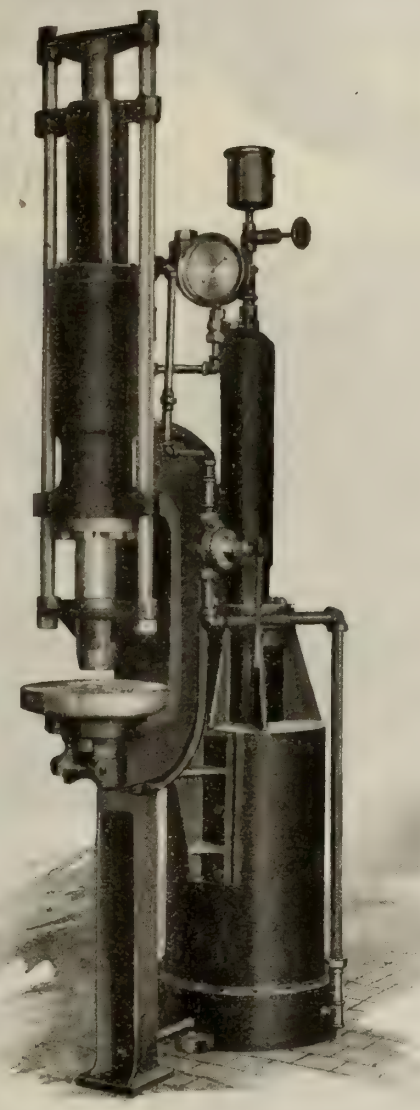

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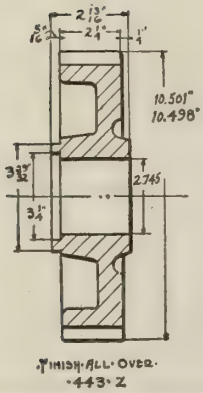
Standard Turret Lathes



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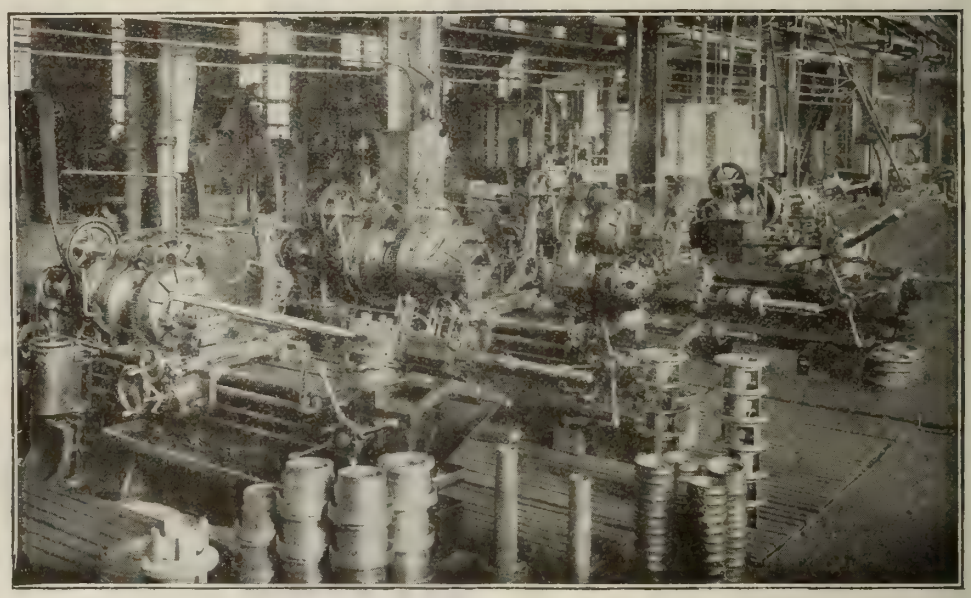

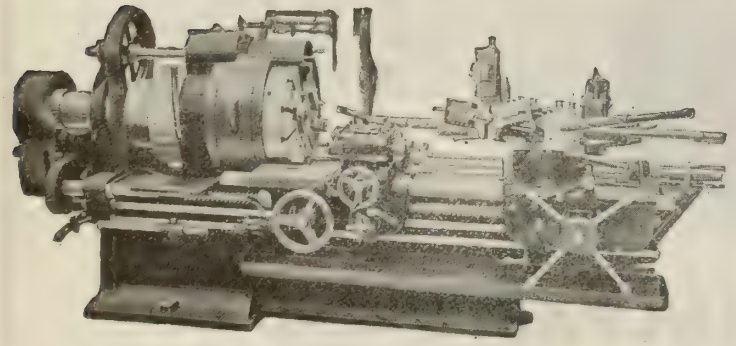

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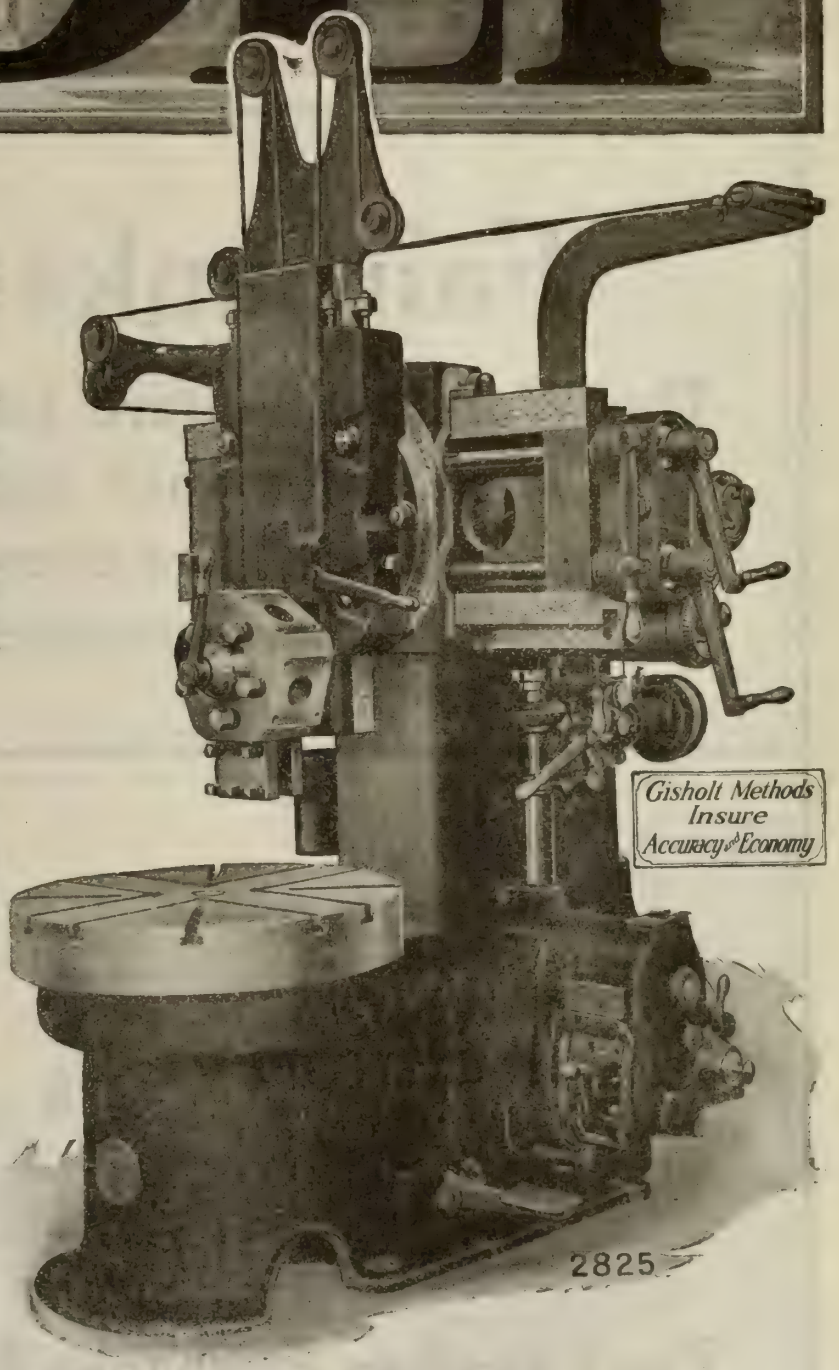
Gisholt Vertical Boring and Turning Mills assure the same successful boring tactics of our boys in France. The answer to each achievement is the same: the strength of *organization* and the *exceptional qualities* of men and *machines*.

Renewed competition calls for the best equipment on your part to meet it. Gisholt Boring Mills, like *every* Gisholt product, assure tangible results which represent the outcome of years of experience.



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CANADIAN MACHINERY AND MANUFACTURING NEWS

Volume XXI. No. 18. May 1, 1919

The New Home of Williams & Wilson, Limited

Montreal Firm That is Now Established on Good Business Footing, Played a Big Part in the Equipping of Munition Plants in This Country

WE illustrate on our front page the new premises which are owned and occupied by Williams & Wilson Limited, 84 Inspector Street, Montreal. Without exaggeration we can safely say these offices and warerooms are unequalled for the purposes for which the building is designed. Before giving a description of the warerooms, the following short sketch of the company is, we think, not only interesting, but instructive, and should be encouraging to others who are ambitious and who have faith in the future of Canada.

Some twenty-eight years ago Mr. F. C. Wilson, then a very young man, started his career in a very modest way at 305 St. James Street, Montreal. From the first he had the happy faculty of attaching to himself men of ability and integrity. The unswerving loyalty of the staff is the keynote of the success that has attended the company from its inception. Each year added new friends and greater responsibilities. By the time the war broke out the company was doing a large business and had a very strong organization.

In connection with production of ammunition a crucial test was put upon the brains of the mechanical world. Canada was heavily handicapped, as we had no experience and no training of any kind with the exception of the Dominion Arsenal at Quebec. Notwithstanding this handicap our country developed a production of munitions which was of vital importance to the fighting forces on every front. To quote Mr. Winston Churchill, British Minister of Munitions: "Canada's remarkable output of munitions has played a large part in the munitioning of the British armies, and will remain a testimony to the high value in that great struggle of all those, whether manufacturers or workpeople, who shared in the work."

To be able to lay out the tools for the infinite variety of operations in the manufacture of all sizes of shells, fuses, etc., and to anticipate the market and secure delivery of the vast amount of equipment required, this was the task which fell to the engineering staffs who supplied the manufacturers with their machinery. Some of the largest and most successful plants were equipped almost entirely by Williams & Wilson, Limited. Their efforts are recognized as playing no small part in the happy results of which Mr. Churchill speaks in such glowing terms.

The continued expansion of the company's business necessitated larger and better premises. To this end four lots were purchased—two on Inspector Street and two on Montfort Street, making a block 45 ft. x 185 ft. from street to street. On this lot has been erected a four-storey reinforced concrete building as illustrated, with a basement having a 14 ft. headroom, the entire building having a floor space of 40,000 sq. ft. The office occupies the entire second floor. It is considered the handsomest business office in Montreal. A ten foot dado of maple, our Canadian national wood,, maple counters and facings, floor of Tennesse marble—these features have combined to make one of the most happy and artistic effects in modern office architecture.

The company carries a large stock of machinery and machinery supplies. It represents the leading Canadian and American manufacturers and an inspection of the basement, first, third and fourth floors will prove the claim that this company is in a position to supply from stock all lines that they could reasonably be expected to carry.

Thus, after a quarter of a century of sturdy effort Mr. Wilson finds himself the president of a Canadian company of the first rank, with a paid-up capital sufficient for all the exigiencies of business, and every share of which is owned by himself and his staff, and with handsome, well-appointed warerooms and offices, and a staff of engineers and salesmen of which he is justly proud. Of the personnel of this staff we speak in another column. Mr. Wilson says it is

EXECUTIVE PRIVATE OFFICES SHOWING M. B. BRONSTETTER, E. KINGSLAND AND W. C. RICHARDSON.

thanks to his staff, and not to him that the success of the company should be attributed. It is a tribute to Canada, and particularly to the metropolis, that such a reward for efforts, however well directed, should be obtainable in such a comparatively short time.

DESCRIPTION OF BUILDING

The new building has a frontage of 44 feet on Inspector Street, running through to Montfort Street in the rear, a distance of 188 feet, and comprises 4 storeys and basement. The structure consists of a reinforced concrete frame of beam and slab construction, with brick curtain walls. The Inspector St. facade is built up of Indiana limestone pilasters, bonded to the concrete frame and worked up in three bays. The centre bay is 25 feet wide to provide a large "show" window on the ground floor to allow an unobstructed view of the contents. Between pilasters the entire front is built up of architectural ironwork and glass to the ceiling of the top floor, over which limestone is arched to give the pleasing appearance shown in the illustration.

The ground floor is 4 feet above the level of Inspector Street, and the "show" window floor is supported on a concrete beam at the street level.

The main entrance door is of oak with an ornamental iron grille to protect the glass and brass kickplates. Two ornamental lighting fixtures are mounted on the outside walls at the entrance. The entrance porch is panelled with marble, the panels, capping and base of Venosa marble, and the styles of light vein, and the steps with Venosa marble treads and risers.

Cantilever Footings

One of the engineering difficulties to be overcome on this building was caused by the necessity of placing the column footings on sand, in which was a heavy flow of ground water, as the basement floor is several feet below sewer level. The wall footings also were not extended beyond the property line. To meet with these requirements the footings were designed as cantilevers, of heavy, reinforced concrete. The basement floor, which is made 12 inches thick, to prevent uplift, and walls are waterproofed with "Tockolith" put in the mix, to prevent the entrance of ground water.

The floor slabs are designed for heavy loading, as follows: ground floor, 300 lbs.; first floor, 100 lbs.; upper two floors, 250 lbs.

Shipping Facilities

Excellent shipping facilities have been arranged on Montfort Street, where the ground floor frontage is entirely taken up by two large shipping doors, which, besides the ordinary wood doors, are equipped with steel roller fire curtains. From Montfort Street the trucking floor runs 35 feet into the building at street level, then 3 feet above is the shipping floor proper, which allows the goods to be trucked direct on to motor trucks, which are backed into the building so as not to obstruct the traffic on Montfort Street. A complete equipment of Bowser gasoline and oil pumps is installed in the shipping room.

VIEW OF THE GENERAL OFFICES ON FIRST FLOOR.

Office

The entire second storey is used as an office. The floor is laid in marble squares, in which are inserted flush boxes for individual telephone service at each desk, doing away with unsightly telephone wires. The walls are panelled in selected white maple. The lighting for this floor is accomplished by specially designed lighting fixtures. The third floor is laid in cement, with a special hardened cement finish, treated with two coats of cement dressing. The top floor is equipped as a machine and woodworking shop. The shafting hangers are carried on inserts set in the concrete beams.

The Montfort Street elevation is laid up in red brick, with exposed concrete beams and lintels. All windows have steel sash, wire glazed. The ordinary type of iron fire escape, with scuttle ladders, is mounted on this elevation. The interior stairs from floor to floor are of steel, with slate treads, and all are enclosed in fireproof steel and wire glass enclosures. Each floor is equipped with lavatories of the latest type. Two Leonard boilers provide the necessary heating which is of the Webster vacuum system. On account of the length of this building

VIEW OF THE GENERAL OFFICES, SECOND FLOOR.

it was necessary to provide a light well, 53 feet long, on the north side, to let daylight into the centre of the building.

A 5-ton, direct-connected elevator, with 8x12 foot platform, is installed to handle heavy machinery, and is equipped, at each floor with "Peelle" interlocking fire-doors. Provision is made for the installation of a light elevator.

The building was designed and erected under the supervision of T. Pringle & Son, Ltd., engineers and architects, of Montreal and Toronto.

CARBORUNDUM DEPT. ON GROUND FLOOR.

M. B. Bronstetter

Michael Benjamin Bronstetter was born and educated at Morrisburg, Ont., and while still a youth he joined the firm of Williams & Wilson (before it was incorporated) and with this company he has been ever since. For over twenty years, and Mr. Bronstetter is still under forty, he has been with the company. He started at the lowest rung, and by conscientious, hard and brainy work, he has now reached the position of sales manager.

The trouble about "Mike" is that while he makes friends right and left he never loses any. He was never known to go back on his word or "crawl" on a bargain. Much of the success of the company's organization is due to his cool judgment, backed by his bed-rock principle. Such men can never fail. The word "failure" is not conceivable in characters who have built up their own positions by industry, ability and God-fearing lives.

Walter C. Richardson

Walter C. Richardson was born at Brantford, Ont., in 1886. When one hears of Brantford one naturally thinks of the Waterous Engine Works. It was in this plant that the first five years of Mr. Richardson's training was spent, as an apprentice mill-wright, and when he had completed his four years training as mill-wright was promoted to the engineering department, and after this a course at a business college fitted him for his start, and he joined Williams & Wilson, Ltd., twelve years ago.

During this twelve years, Mr. Richardson has developed a contracting, conveying department which has been constantly growing. One branch of this department is locomotive coal handling machinery, and Mr. Richardson has taken the contracts and built and installed some of the plants on Canadian railways. These mechanical coaling plants can be seen at most of the divisional points of the Canadian Pacific Railway, also on the Transcontinental Railway from Winnipeg to Moncton.

Last week there was exhibited in one of the "movies" in Montreal a reel showing the harbor of Halifax, and the Olympic coming to in to be coaled. Then appeared the coaling towers, and the monster alongside being fed at the rate of 200 tons per hour. The reel went on to say that the Olympic saved three days on this trip by using this new bunkering and coaling plant. One naturally stops to think what the Olympic's overhead for three days would be, and if the Olympic can save three days a trip, and other ships pro rata, how long will it take to save a quarter of a million dollars and write off the plant?

The Imperial Government placed the order for these coaling towers with Williams & Wilson, Ltd., last July, and Mr. Richardson is to be congratulated on the complete success of the plant.

One of the most valuable assets in any business man is versatility. At the starting of the war, there was more or less of a lull in the conveying and elevating lines, and when the great rush came along for machine tools, Mr. Richard-

MR. B. BRONSTETTER.

W. C. RICHARDSON.

MR. KINGSLAND.

son did not take long to adapt himself to this line, and it was not any time before he was very much in the machine tool line, and from the start of the rush to the end he was very active in equipping munition plants. Some of the largest shell and fuse plants were practically entirely equipped by him.

Ernest Kingsland

Ernest Kingsland was born in Ottawa 37 years ago. For the past thirteen years he has been connected with Williams & Wilson, Ltd., and has for some time been a director in the company.

After leaving high school Mr. Kingsland entered the Canada Atlantic Car and later started apprenticeship in the Canada Atlantic Locomotive shops where he served for five years. From these shops he graduated to the Canadian Pacific Railway shops at West Toronto, where he remained for about a year.

With this training Mr. Kingsland came to the front very rapidly when he started his career as a salesman of machine tools. From the start his ability was appreciated, but it takes more than education and more than technical training of a high order to establish confidence in the minds of those responsible for the mechanical equipment of railroads and industrials.

Without making any assertions as to Mr. Kingsland's ability in mechanics, or his salesmanship, it is only necessary to follow the history of the operations of the Imperial Munitions Board to find that the man the mechanical organizations within hail turned to was "our spoke." Without exaggeration it can be said, and in justice should be said, that no other man assisted so much in the rapid and successful manufacture of munitions in Canada. The writer of this article wishes to make no invidious comparisons, but a reference to the experts employed by the Imperial Munitions Board will justify the above statement.

MACHINERY SUPPLY DEPT. ON THE GROUND FLOOR.

The man who could rise to this occasion, and such an occasion! is the most valuable asset a company can have and one of the most useful citizens of any country.

THE WORLD'S FASTEST SUBMARINE

The fastest submarine vessels in the world were designed and constructed for the British Navy during the war. They were evolved in response to the demand for submersible craft which could keep station with the fleet when cruising, and also undertake long voyages without the aid of mother craft. Many new features were embodied in this class, which has proved itself a conspicuous triumph of British engineering. Unlike other submarines they are fitted with steam turbines, which are used during operations at a high speed on the surface. Secondary propelling power is obtained from a heavy oil engine of 800 brake horse power, which drives a dynamo supplying electricity either to electric motors geared to the propeller shafts (for surface cruising at moderate speeds) or to electric batteries which store energy for propulsion under water. When submerged these vessels have a displacement of 2,1570 tons. They are nearly 340 feet long and have a double hull except at the ends. An exceptionally powerful wireless telegraph intallation is fitted for long-distance work. The aerials are carried on long, telescopic masts operated by a telemotor system. Electricity is also used for driving the air compressors and bilge pumps, while the steering gear and the hydroplane driving gears are controlled by a special hydro-electric system.

SHIPPING DEPT. ON MONTFORT STREET.

CUTTING STEEL UNDER WATER

An oxy-acetylene blowpipe of special construction has been used for some time past by a French firm for cutting steel under water, a feat hitherto considered practically impossible. The apparatus consists of a cutting blowpipe supplemented with a small diving bell to which compressed air is admitted to expel the water. The pressures of oxygen and acetylene required are much higher than those usually employed, and, naturally this pressure will depend upon the depth at which the apparatus is worked. At the trials now being carried out, ships' plates have been cut at a depth of 27 feet under water. It has been proved that arc cutting can be carried out in a similar way, but the apparatus is slightly more elaborate.

Some Jigs and Fixtures of General Interest

In This Article Are Shown Three Fixtures, Used in the Manufacture of a Well-known Line of Millers—Although Not Elaborate, They Accomplish Their Object Admirably

By J. H. MOORE, Associate Editor CANADIAN MACHINERY

IT is absolutely necessary in the manufacture of any machine tool that parts be interchangeable; therefore, to ensure this point the various parts must be jigged. This is especially true in the manufacture of such an accurate machine tool as a milling machine, and the following three jigs, as shown on photos accompanying this article, are used for such class of work.

Lathe Fixture

At Fig. 1 is illustrated a jig used on the lathe, and for the purpose of finishing and facing the saddle of the miller. A is simply a gib which goes with this fixture. To further show the design of this jig, the sketch, Fig. 2, was made, and in this sketch is shown the two views, the side view being partly in section to show up the various details.

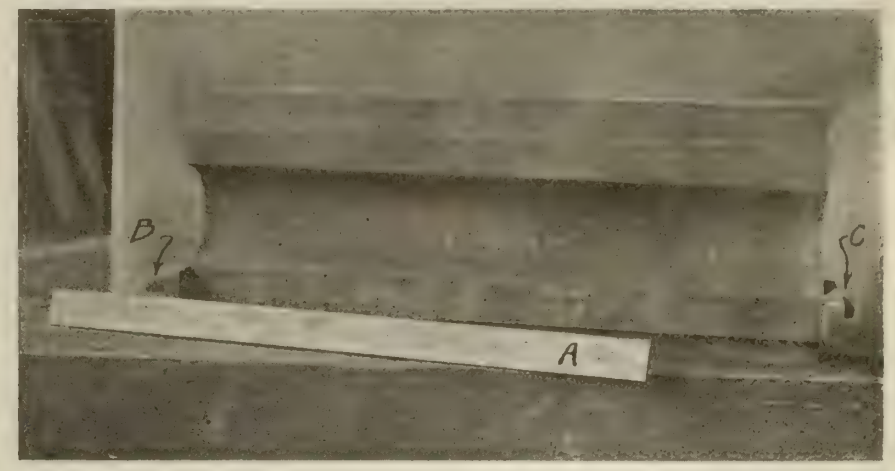


FIG. 1.—LATHE FIXTURE FOR FACING SAD DLE.

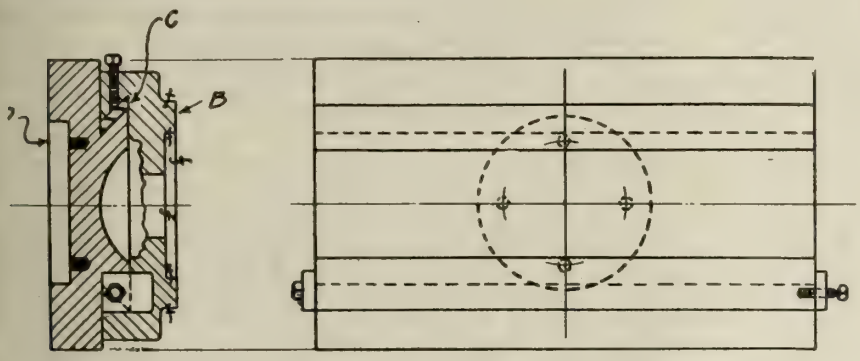


Fig 2.

FIG. 2.—SKETCH OF LATHE FIXTURE FOR SA DDLE.

First, the saddle B is placed in position as shown. The gib C is also inserted as illustrated. The regular set-screws on saddle tighten against this gib, and holds the work securely in place. Referring to Fig. 1, two stops will be noticed, B and C, the latter a solid stop; the former adjustable. These are also used for locating purposes.

As will be noticed on sketch, Fig. 2, the back portion of jig is recessed at D to suit the size of face plate on lathe, being also drilled to accommodate four cap screws for fastening purposes. The fixture by this method always centres itself, while by means of the adjusting screws already spoken of the work is centred to its proper position.

Drilling Fixture

At Fig. 3 is shown a very simple, yet efficient jig, used to drill the elevating screw hole in the knee. The method of placing this jig in position is rather interesting, so a description is given to aid the reader in following its use. The space A is slipped over the support boss in knee and the faced side of boss is butted up against the adjustable stop B. The set-screw C is then tightened. Through holes D, E and F go guide pins, which in turn come through holes already drilled in the knee. These pins coming from various directions in this way, guarantee that the fixture is in correct location, relative to the holes already drilled. Altogether, although a simple fixture, it accomplishes its purpose quickly and easily.

Taper Turning Attachment

The last of the three fixtures, illustrated at Fig. 4, is used to turn the taper portion on the main spindle of miller. The fixture differs from the

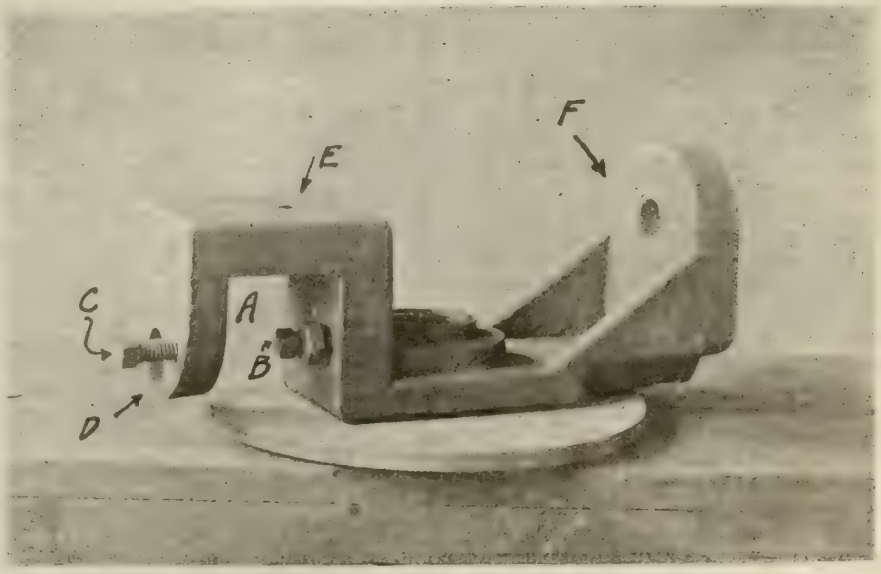


FIG. 3.—DRILLING FIXTURE USED ON KNEE.

FIG. 4.—TAPER TURNING ATTACHMENT

usual lathe type of taper turning attachment in some respects, and a detailed description is given herewith, in order that readers can follow exactly how it is used. The piece A bolts directly to the cross slide by means of the two cap screws shown on this view, while the piece B in turn sits on top of the piece A, a bolt with T head going into the slot on piece A, and coming through the slotted hole on piece B.

Pieces C and D sit on top of ways of lathe bed, and fasten underneath by means of the two clamps E and F. The bar G is, of course, the guide to the taper desired, and readers can readily see that the two blocks H and I are adjustable, so that they can be set to any angle desired. Such a fixture as this is worthy of installation, its rigidity and capability for accurate work being its chief assets.

In fact, all the three fixtures as shown in this article can be used for other classes of work equally as well, simply by making slight changes in the general design to suit particular conditions.

UNLOADING GRAIN BY AIR POWER

The two powerful floating pneumatic grain elevators recently put into service at the Port of London are admirable examples of modern British labor saving equipment. Each elevator floats on a 60-foot pontoon, carrying a 220 h. p. oil engine, which drives a high-speed turbo-exhauster by means of which a partial vacuum is caused in a suction pipe line. The air rushing in at the free end of the line sucks up the grain from the vessel's hold and deposits it in a receiving chamber, from which it is discharged through a valve, and thereafter handled mechanically. Two suction pipes are provided with each float and they are raised and lowered by means of an electric winch driven by an explosion proof electric motor. A similar type of motor (rendered necessary by the inflammable type of dust raised in handling grain) drives an elevator which delivers the grain into a weigh-house, where the grain is automatically weighed. Thence it passes through chutes into sacks or into hopper barges alongside the pontoon. A 35 h. p. oil engine supplies the current for power and lighting purposes. All the plant and equipment is British throughout. Pneumatic elevators of this type not only saves labor by thoroughly cleaning out a ship's hold without re-trimming, but they are much healthier for the workmen than any other equipment, as special machinery is used to extract the dust. Both pontoons have been in regular service for some time and have proved thoroughly satisfactory. Each has a capacity of 100 tons per hour when working with wheat.

The rapid development of electric welding in Great Britain, fostered by the Admiralty for ship construction and other purposes, has led to some highly important improvements in this useful means of forming a close union between plates and other sections of iron or steel. The British experts who carried out successful work of a novel kind have made excellent use of "flux-covered" metal electrodes. In this system the metal electrodes, between which ahe arc for melting purposes is struck, are covered with certain materials which flow under th eheat of the arc and protect the metal from oxidation during the process. In welding steels alloyed with special substances, a flux can be used containing the alloys, thus supplying them to the weld as it is being made. By this means the weld is made uniform in composition with the remainder of the metal. Special attention is also being given by British engineers to the testing of welds by "radiometallography." The weld is examined under the X-rays much as aportion of the human body might be, and internal imperfections are thereby revealed although they may be covered by a solid, close-grained surface. Many British men of science are devoting themselves to research in this direction, which is calculated to be of great practical value to all users of metals. It may be recalled that Great Britain led the way in the microscopic study of the structure of metals—a study which laid the foundations of modern scientific metallurgy.

THE way in which response is being made to the invitation for apprentices in drafting rooms to send in their work on CANADIAN MACHINERY drawing lessons is one of the most gratifying things that has happened for some time. Apprentices realize that it is the real thing, and journeymen draftsmen know it is what the learners need, and are recommending them to follow the course right through.

The apprentice should see to it that he has his own copy of CANADIAN MACHINERY—he should subscribe and file away all the references he sees to drafting and drawing. It is the cheapest form of education he has a chance to get.

Here is what a draftsman thinks of the course. The letter was unsolicited and speaks for itself:—

277 Mary St., Hamilton, April 6, 1919.

Canadian Machinery,
Toronto, Canada.

Gentlemen:—The writer has just finished reading the first instalment of your new Mechanical Drawing Course.

Being a draftsman himself eliminates him from the contest, but not from a perusal of your articles. If all the future issues measure up to the original style of this first one, the course will do a lot of good as it fills, in the writer's opinion, a long-felt want.

The usual conventional style is missing, but in its place is practical talk, touching on the parts that really count and giving beginners a clear idea of how to use tools in the proper way.

Your prize idea is a new one on the writer, and should prove a winner as it adds an incentive to neat work—which is sadly needed with beginners—and a greater interest to the contestants.

You probably had only the machinist apprentice in mind when you started this course, but the draftsman apprentice will also benefit from following these articles.

Wishing you every success with the course, and also in your entire paper, believe me,

Sincerely yours,
A. R. ANDERSON.

Mr. Shell Runs into Red Tape Brigade

The Story of an Amusing Encounter a Toronto Manufacturer Had With Ottawa's Officials During the First Days of the Great War —A Contract That Wasn't

By WILL E. MACDONALD

BECAUSE my friend Mr. Shell thinks it best at this late date that no trouble be stirred up for certain misguided individuals who stood too much on ceremony and blocked the way for action in the first days of shell production in Canada, it is necessary to omit the proper names of the characters in one of this country's most amusing war-time farces. Probably the main injury was suffered by Mr. Shell himself and therefore he has the greatest right to bury the identity of the characters under fictitious titles.

Be it known that Mr. Shell is a competent business man as well as a clever mechanic, who controls one of the largest machine businesses in Canada. But though working night and day to assist in the turning out of munitions he still found time for a little humor. When it is realized that the humor was obtained at the expense of Ottawa's shell committee, most munition manufacturers will take off their hats to Mr. Shell.

The General Writes

When war broke out Mr. Shell was one of the first to wire and write Ottawa that he was prepared to make munitions. An answer came promptly from General Knowledge that the Government had munitions on hand and that it did not look as if any would be manufactured in Canada outside of the Dominion Arsenal, but Mr. Shell's letter would be kept on the writer's desk. Yes, indeed! Mr. Shell waited a few days and then decided he'd better mind his own business.

Perhaps three months had passed when Mr. Shell received another letter saying that his name was still before General Knowledge but that no action had been taken. A Shell Committee had been formed and the letter would be sent to them.

Mr. Shell then got wind of the awarding of contracts for shells and he started a little private scouting work. About this time a financial institution asked Mr. Shell to inspect a plant in the city and report on how much money would be required to put it on a munition-making basis. Mr. Shell made the inspection, and a written report to the institution and promptly forgot about it.

The Missing Contract

A short time later Mr. Shell ran across Col. Bluffgood, home from Ottawa and the Shell Committee for the week end.

"How's the contract getting along?" asked Col. Bluffgood.

"What contract?" enquired Mr. Shell.

"Why your contract for munitions which the committee awarded you," was the reply.

"You're off your nut." laconically replied Mr. Shell. "I haven't any contract."

Col. Bluffgood took on fresh dignity.

"You certainly have a contract, and here is the number of it and the quantity of shells you're to turn out," said he, reading the information from a notebook. "You had better get in touch over the phone with General Orders."

Mr. Shell dashed madly to a phone and got General Orders on the phone.

"Nope, nuthin' doin'," is about the vernacular of General Orders' reply to Mr. Shell's enquiries.

Mr. Shell went back to his desk and his business with various thoughts about shells and the so-called "big guns" at Ottawa. He then called Col. Bluffgood on the phone.

"That is very funny because I was there when your contract was awarded," was Col. Bluffgood's reply.

Ottawa on the Wire

Mr. Shell wired and wrote. He phoned. He worried, but to no avail. And while all this was going on official Ottawa was preparing, via its busy typewriter, fresh horrors for him. Right in the midst of all this came one of those terribly official-looking documents which are sometimes dictated by fussy private secretaries and signed by empty-headed chiefs. It said:

"Your shell order No. ——.

"You have not sent in any of your tensile strength reports. Your contract clearly states that you are to make these tensile strength reports before turning out shells," and so on. That was not just the exact wording, but the general idea of the letter is conveyed.

The humor of the thing dawned on Mr. Shell. He was busy night and day making lathes and other shell machinery for the lucky manufacturers who secured contracts, and he thought that he might as well have a little fun as well as Ottawa, so he paid no attention to the letter. A few days passed, and along came another of the dangerous-looking missives. This was sterner in tone and demanded immediate reports on tensile strengths. Mr. Shell forgot to answer that also.

Shell Men Call

On the heels of this letter two representatives of the Shell Committee appeared at Mr. Shell's plant.

"How are you getting along on your contract, Mr. Shell?" they asked.

"Oh, so-so," answered Mr. Shell.

The two representatives looked very serious. Their faces indicated grave displeasure.

"Well, we'll look over your plant," they decided.

Mr. Shell took them out, and they at once noticed that no shell-making machines were installed.

"Why, man, you're not half ready!" they exclaimed. Mr. Shell puffed his cigar and said nothing.

"Where are your lathes?" they asked.

"I'm making two lathes a week," said Mr. Shell, but he didn't volunteer the information that the lathes were being rushed to munitions plants.

"Well, if you are making two lathes a week, where are they?"

"I'm making them, that's all you need to know," said Mr. Shell.

Enter Mr. Softjob

"How long will it be before you have the lathes up to begin your contract?" they asked.

"Can't say," grunted Mr. Shell.

"Will you be ready in a month?"

"That all depends."

Both representatives seemed fairly well disgusted as they wended their way out of the plant.

"We'll report this to the committee," they said.

"Sure thing," Mr. Shell called out.

Then another letter from Ottawa. This to the effect that Mr. Softjob would be around to see how much steel Mr. Shell required on his contract.

Mr. Softjob breezed in.

"Came to see how much steel you need," he began.

"Can't say yet," was Mr. Shell's retort.

"Well, I'll look over your plant and tell you myself," Mr. Softjob answered.

Mr. Shell and he went out to the plant.

Mr. Softjob was horrified.

"Why, you'll not be ready for a long time. Where are your lathes?"

"Making two a week," said Shell.

"Well, you won't need steel for a long time," opined Softjob. "I'll advise Ottawa." he remarked.

"Sure thing," agreed Shell.

What Brass Hat Said

By this time Ottawa's typewriter was busy again, backed up by the telegraph wires. The officials had evidently tired of the fun to be derived from breaking the letter carrier's back so they took to trying to break down the telegraph lines.

"Must have your reports immediately on tensile strengths. Wire when you are sending these reports. Most important."

This was about the substance of the wires received by Mr. Shell.

Shell did not answer the wires. He was thoroughly into the joke.

Col. Brass Hat arrived at the plant a short time later. He strutted into Shell's office and found the latter studying blue prints.

"You are Mr. Shell," he accused, striking his cane against the floor.

Mr. Shell entered a plea of guilty.

"I am Col. Brass Hat of the Shell Committee," was the next piece of startling information handed out.

But even then Mr. Shell forgot to bow.

"You have a shell contract, sir. Have you sent in any tensile strength reports?" demanded Col. Brass Hat.

"No," meekly replied Mr. Shell.

"Then why haven't you?" This in a thundering tone.

"Can't be bothered. Have a cigar," invited Mr. Shell.

"Cigar de d——d," stormed the Col. "Couldn't be bothered, eh? Well, let me tell you that for letting shells leave your factory without tensile strength being approved you can be court-martialed and shot, and by gad I'l make it warm for you. What kind of a man are you to send poor ammunition to our boys, and perhaps have it explode among them and kill them. What do you mean, sir! The idea of making shells and not taking tensile strengths. A man like you shouldn't have a contract. You're worse than the Germans. And . ."

Mr. Shell Speaks Out

But that is as far as he got. Mr. Shell found his voice.

"You happen to be in my office, and I don't allow people to talk to me like that in my office," said he. "I offered you a cigar a moment ago and you refused it, and now you can choke for one. But this thing has gone far enough. I haven't a contract; never had a contract, and what's more, I don't want a contract. You bunch of practical jokers at Ottawa have had a nice time with me and I have been so busy rushing out machines to manufacture munitions that I could stand a little humor, but you can go back to your Shell Committee and tell them that Shell never had a contract, and wouldn't take one now no matter what price they offered. And you can get out of my office as soon as you like."

Col. Brass Hat was flabbergasted but managed to stumble out a few apologies as well as to accept a cigar. He then left.

"I'll report to Ottawa," said he.

"Sure thing," agreed Mr. Shell.

The Shell Game

And that is the story of how Mr. Shell was shelled by the Shell Committee over a shell contract that he didn't get. And for arm-chair sleuths who may wonder as to where the contract went, let it be pointed out that elsewhere mention is made of a report Mr. Shell made on another plant for a financial institution. That is where Mr. Shell's contract went, but how and why can only be understood by those who appreciate the significance of the old expression, "a shell game."

Pointers on the Designing of Wire Rod Mills

The Principles of Rolling Mill Practice — Special Problems Encountered in Rolling Small Sections—Physical Characteristics of Rolled Shapes — The Proportioning of Rolls For Wire Rod

By W. S. STANDIFORD

LARGE quantities of barbed wire were used by the belligerent in the great war as it was found out by experience, that when wire entanglements were used in front of the trenches, that fewer men were needed to hold the trench against enemy attacks. As the basis for wire is wire rods, the designs of the roll passes and the difficulties encountered in the manufacture of the rods will, undoubtedly, be interesting to the readers of this magazine.

Most mill managers and others who are not in any degree familiar with the principles upon which roll passes are constructed, or who have no theoretical or practical knowledge of roll designing, seem to have an idea that all that is necessary in the designing of rolls, is to turn a series of passes in the rolls having the form of the finished bar. A trial of such passes for producing the common round or square would demonstrate some of the elementary principles of roll design, namely: That rolls can only reduce metal in a line angular to their axes; that the general direction of one or both of the surfaces of the rolls between which the reduction takes place must be angular to the plane of rotation; and that passes do not lessen the dimensions of the bar which is parallel to the axes of the rolls, but in all cases, increase it more or less. For the latter reason, when the section is wider than the groove, the metal extending between its sides is not pressed into the body of the section, but is pinched out between the collars forming the sides of the pass and makes a thin rib along the sides of the bar, which is technically called " a fin." All mechanical design is a compromise in parts to secure the best general result as a whole. So it is in roll designing. Passes are modified in their form and details in view of their relation to each other and to the layout of their train of rolls, its capabilities and the character of the work they are required to do. The ordinary diamond passes, while excellent for some classes of work, have been found out by experience to be far too slow for use in rolling wire rods, as they allowed the rods to cool very quickly. With the demand for small sized rods, a quicker and more effective form of pass became a necessity, the result being the adoption of a series of alternate oval and square passes, which proved to be very efficient and also more rapid as they have a draft equal to two or three times that of the diamond pass. There are few forms of grooves in which the section reduces evenly, that is to say, where the draft is proportioned to the thickness of the section in all of its parts. The length of a bar increases as the area of its cross section decreases, and as the increase in length must be co-extensive in all parts of the section, it follows that if one part is subjected to a heavier draft than another, the metal must flow into that part having the least, and any form of pass which favors the flow of metal, works the easiest.

Iron or steel may be wrought to a degree of malleability greater or less. This property as commonly applied to iron indicates that it may be worked; that is to say, it may be heated to a degree of plasticity and reformed and drawn out without a fracture. The mechanical means used for these purposes, with which we are familiar, are the hammer, the press and the rolls. We are also familiar with the difference in the structure of a hammered and a rolled bar as shown in a fracture, the latter being finer and more uniform in texture, because the roll pressure is applied over all, or nearly all of the entire section directly or indirectly, and throughout the entire length of the bar, and at a practically even temperature. We know that under the law of inertia, one particle in a mass may be moved so quickly by the impact of a rapidly moving body, that it has not time to impart

its motion to its neighbor. This is, to a certain extent, the effect of the impact of a hammer upon a body of metal. We may assume therefore, that the rolls, from a mechanical standpoint are more conducive to a uniform structure and higher degree of elasticity than the hammer, from the fact that the pressure

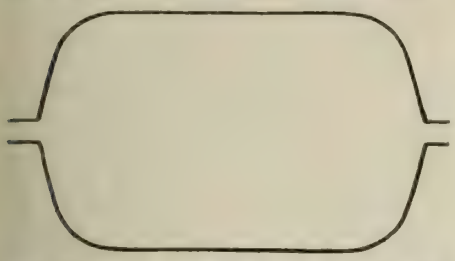


FIG. 1—SHOWS SHAPE OF BOX PASSES USED IN ROUGHING ROLLS IN WIRE ROD WORK.

is applied deliberately, thereby giving the particles of metal time to readjust themselves to the new form; in short, to induce a flow. In this lies one of the points of superiority of the press over the hammer.

Iron and steel heated to a sufficiently high temperature, will become liquid, and flow by gravity, but as the temperature lowers, it can only be induced to flow by pressure, as in the press and the rolls, and as the temperature lowers the flow diminishes and finally ceases as the metal sets, after which further working tends to disintegrate the mass. Cold working, such as cold rolling and wire drawing, are everyday practices, but they can only be done to a limited extent, depending almost entirely upon the grade of the material; but unless it is frequently annealed, which gives the particles of the metal an opportunity to adjust themselves to relieve internal strains, the metal becomes crystallized and its ductility impaired. Generally, steel can be worked at a lower temperature than iron. The latter is required to have a welding heat to properly unite the mass, yet, while the heat may be right, it is always, except under extraordinary care with the best materials, more or less imperfectly done owing to the presence of foreign matter which has not been worked out and other causes. Such material, when rolled at too low a temperature, works irregularly in the rolls, especially in the smaller sizes, while steel, having a more homogenous structure, maintains its regularity but becomes abnormally hard and close grained. For the latter reason, some consumers require that the higher grades of steel shall be rolled at as low a heat as possible. The form of the pass, the more or less perfect physical structure of the metal, and the degree of heat are the important factors in determining the draft in passes for wire rods and small sections. We can deduce from the above principles, that with a high temperature, a radical change in section, as from a square to an oval, may be attended with considerable reduction in sectional area; while low temperatures render such a change in section impossible, and as the temperature lowers, the sectional change and drafts must be modified.

From the above facts, it is essential in designing passes for this kind of work, not only to decrease drafts, but to make the ovals thinner and wider as they decrease in size. In designing rolls, it is the custom of roll turners to make the rolls of such a diameter as to allow sufficient strength to prevent breakage, but the diameters are usually out of all proportion to that necessary for strength, particularly in the case of the smaller passes for wire rods. It is difficult to state in a general rule just what amounts of draft could be put in a square or oval, but it can be ascertained by taking the mean of a series of passes and formulating a rule therefore, and apportioning the drafts in the others according to the conditions of the train of rolls which differ more or less in every mill. Taking the average grade of low carbon steel, maximum draft on a 3-inch square billet is about 75 per cent.; while on the smallest square in the series (in the finishing oval) not more than 15 per cent. is allowable. The wide difference in the grades of metal rolled makes an arbitrary rule of roll drafting impracticable, if not impossible. These conditions vary in themselves. Some trains are constructed in which the diameters and lengths of the

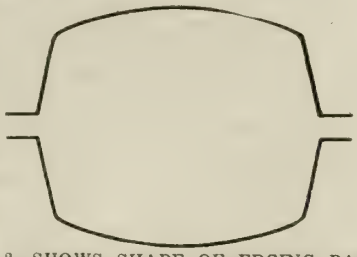


FIG. 2—SHOWS SHAPE OF EDGING PASSES USED IN WIRE ROD ROUGHING ROLLS.

rolls are adapted to the passes that are to go in them and have ample strength and they are capable of resisting stresses of the heaviest drafts that can be put upon them. In some other roll trains, the passes and drafts have to be modified, it all depending on the engine power, thickness of rolls, and the quality of metal rolled. Thus a low carbon steel can be reduced 15 to 20 per cent. faster than the softer grades of iron. On the other hand, tool steel which can only be heated moderately, cannot be subjected to a heavy draft, because a heavy reduction in section when the metal begins to set and the flow ceases, will injure the metal and most likely break the rolls.

The standard size of billets as used in the average wire rod mill is 4 x 4 inches square, their weight ranging from 100 to 200 lbs. Eighteen passes are generally used to reduce the 4 x 4 inch billet down to a number 6-rod (Birmingham wire gauge), which is .209 thousandths of an inch. The longest series of alternate square and oval passes are those used in wire rod manufacture. As from three to eight rods are rolled at one time, using alternate square and oval passes, it is necessary to have a number of duplicate grooves in the rolls, so that when one wears out, another pass can be used. An oval pass could be used for the first pass, but the rolls would be unnecessarily large in diameter for those preceding it. By using eighteen passes to reduce the 4 x 4 billet, the draft in the first two passes may be modified, so that smaller rolls can be used. Those rolls as a rule are 18-inch pitch diameter. As the modified draft in the first two passes is not enough to use an oval to advantage, a change in the form of these passes is necessary. The form adopted in most mills for the first two grooves, are the box and edging passes. As the billet comes from the furnace, it is at its highest temperature and will allow of considerable reduction in the box pass shown in Fig. 1. Box passes reduce the billet mostly on the top and bottom, there being very little work done on the sides. In order to allow the billet to go through the groove easily, it is necessary in designing these passes to make the sides tapering allowing the billet to fit snugly at the bottom. If the sides of the groove were made straight, the billet would be torn at the joints of the rolls, and spread out between the collars, would break the rolls. The tight fit of the billet at the bottom, prevents it from turning over in the pass and jamming the rolls. The use of large fillets in the bottoms of both box and edging passes ensures that the corners of the billet are worked equally which makes the metal fibrous in character, the latter condition making iron and steel have their maximum strength. As the billet has had only two of its sides reduced in the box pass, it is turned over at a right angle to its previous position in the box pass, and inserted edgewise in the edging pass shown in Fig. 2, which squares the billet up, making it 2¾ inches in size and ready for the alternate oval and square passes. The oval used for roughing passes is constructed geometrically by the intersection of two circles of equal diameter depicted in Fig. 3. Lines drawn from the points of intersection of the circles to the centres, are the angles of the oval. The length of the lines subtending the points of the intersection —the chord of the arcs—is called the

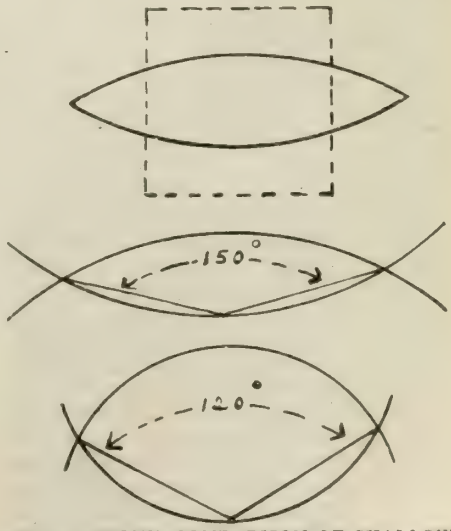


FIG. 3—DEPICTS COMPARISON OF SHALLOW AND DEEP OVALS ILLUSTRATING THE METHODS OF DRAWING THE ANGLES TO PRODUCE HEAVY AND LIGHT DRAFT PASSES.

width; and the sum of the two radii, less the distance between the centres of the intersecting circles, is the thickness.

It is plain that as the centres of the angles approach each other, the oval becomes relatively thinner, and that the angles and the number of degrees in the arcs increase. Fig. 3 illustrates ovals having different angles of 120 and 150 degrees of arcs. An oval is used between two squares, and by its proportionate width to thickness, it is made capable of light or heavy draft and a greater or less allowance for spread in both the oval itself and the square. The draft in an oval varies inversely as the number of degrees contained in the arc. In even figures, an oval having an area between 1 and 1½ square inches, and having an angle of 150 degrees, will reduce a low carbon steel billet 80 per cent. And an oval having an angle of 120 degrees will reduce a billet 50 per cent. The percentage of drafts in oval and square passes used in rolling wire rods must be decreased, as the rod cools through the successive passes and is reduced in size. The relative width and thickness of an oval not only affects its own draft, but the draft in the square following in like proportion, for the reason that the thin oval allows itself greater spread in the

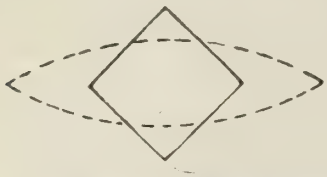


FIG. 4 — ILLUSTRATES THE METHOD THE ROLLER USES IN PUTTING THE SQUARE BAR IN THE OVAL PASS. THE VIOLENT CHANGE IN SECTION, FROM A SQUARE TO AN OVAL BAR RESULTS IN THE METAL HAVIN GA MORE FIBROUS NATURE.

square and it will therefore stand considerable reductions in sectional area before the square is filled out. As the drafts in the first two passes in the roughing rolls are modified for the reason given in this article, and as the last two passes in the series are not depended upon for reduction, but merely to round up the rod from the last square, which is usually the same size as the diameter of the round, leaves 14 passes, seven ovals and seven squares, in which the draft must be distributed to reduce the billet delivered from the first two passes to a square equal in size to that of the finished round.

A series of passes showing the drafts used is appended in the table with this article. In passes designed for wire rod mills, the drafts in the smaller passes are made very light, principally to avoid making large loops between the passes, also partly on account of the large diameters of the rolls in the finishing trains, which causes the rod to spread more. The general practice is to use rolls from 10 to 12¼ inches in diameter for the last eight passes to gain speed in the delivery and strength in rolls long enough to contain a sufficient number of grooves to run a considerable time without changing rolls. These diameters of rolls are out of proportion to the size of the rod, which causes the latter to draw less and spread more than if the rolls were smaller in diameter, which have less, and a sharper contact with the rod. The great disparity in draft between the largest and smallest oval illustrates this point. The diameters of each set of rolls also require to be so proportioned, so that one set of rolls will not draw the metal faster than another set, as in this case, the rod would be stretched (it being reduced in two sets of rolls simultaneously). When a rod is stretched, its sectional area is reduced correspondingly, which would be advantageous if it were uniform throughout its length, but as the stretching takes place in the middle of the rod, it causes a variation in its size when finished; the middle portion being smaller than the ends. If the square is stretched, the rod will be more or less scant in size when finished in that part of the length. If the oval is stretched, it will be scant, and if to an unusual extent, it will not fill out the square pass it is entering, the result being that it will turn over in the pass and should the rolls happen to be running close together, a fin will be formed that will mark and spoil the rod. The same thing would be apparent in a wire rod train of the continuous type, except where the pull on the rod would be within its elastic limit. In this case, the rolls would grind away the metal and cause undue wear on the rolls and loss of power.

In the process of rolling the rod, one and the same end of it usually after the first six passes (in some of the newest trains through the whole series) is entered in the rolls first all the time, so that in relation to itself, the rod runs in one direction all the time, which gets the first end through the last pass with scarcely any perceptible loss in temperature while the last end loses rapidly through radiation and in contact with the floor plates. It takes about one minute to run a No. 6 rod weighing 150 pounds through the finishing rolls of a mill running fast enough to deliver a rod at the rate of 1,400 feet per minute, which makes a considerable difference in the temperature between the first and last ends. As has been explained, a difference in temperature causes the rod to work differently in the passes, the visible effect being greater spread. This peculiarity is not so noticeable in the oval passes as it is in the squares, for the reason that when a square pass is not filled out, it makes the diameters of the rod through the corners long and short, which causes the square to turn over in the oval. This also shows the reason why an oval will overfill from opposite causes, namely, the square being too large or too lean. Rods are said to be "lean" when they have not filled out the area of the groove. The leaner the rod, the greater tendency it will have to lie over in the oval, and when the square is very lean as occurs not infrequently, it turns over completely in the oval, and although there may be no more draft than is sufficient to drag the bar through, yet it will spread out of the pass, which is precisely the same result as though the square was too large instead of not being large or full enough.

It is for these reasons that the draft in the last passes is necessarily very light. Allowances in the turning of the passes should also be made for the space or opening between the collars of the rolls, as it is not advisable to run the rolls with their collars in contact with one another as it will cause pieces of metal to break out on the edges of the grooves and ruin them. The amount of space varies from ¼ of an inch in the roughing rolls, down to 1-64 of an inch in the smaller passes. In all the squares, the corners of the rolls should be filleted, so that they will be as wide as those at the opening of the pass between their collars where the rolls come together, so that the rod will not have two long and two short corners, it being necessary in order to make a uniform sized rod as possible, to have the corners of equal diameter. In all roll trains, particularly wire rod passes, it is necessary to obtain as large an output of metal as possible. One of the most important details to this end, is a proper division of the work throughout the mill, that is, to so arrange the passes in different sets of rolls so that no one pass or set shall be overcrowded, or delayed in waiting for others. Passes designed especially for wire rods adapted to the modern wire mill with its enormous production, need modifying before they would be suitable for use in a train for rolling small merchant rods that are to be straightened and cut to lengths. It is much better and more satisfactory in every way to design passes, and specially adapt them to the train in which they are to be used and also to the size of the billet or pile they are to be used with. The grade of stock is also an important consideration; as a hard, even grade of metal can be reduced more rapidly than a soft or irregular grade. Conditions like these, with others, vary in almost every mill, and it does not follow by any means that, because a series of passes work well in one mill, or train of rolls ever that it will do the same in every other under different circumstances. Train for rolling small merchant rods in th

Dimensions of passes for wire rods reducing a 4 x 4 inch square billet down to 0.207 thousandths of an inch, a number 6-rod.

No. of pass	Name of pass	Size of squares	Reduction in per cent.	Angle of pass deg.	Width of ovals	Depth or thickness of ovals
1	Box Pass	4 x 2¾	0.45	100	.....	....
2	Edg. Pass	2¾ x 2¾	0.45	95	.....	....
3	Oval	.....	0.735	..	4.183	1.52
4	Square	1.7	0.50	90	.....	....
5	Oval	.....	0.70	..	2.612	0.9506
6	Square	1.076	0.47	90	.....	....
7	Oval	.....	0.64	..	1.734	0.598
8	Square	0.703	0.43	90	.....	....
9	Oval	.....	0.57	..	1.1932	0.388
10	Square	0.478	0.38	90	.....	....
11	Oval	.....	0.49	..	0.6367	0.2626
12	Square	0.341	0.32	90	.....	....
13	Oval	.....	0.39	..	0.656	0.148
14	Square	0.258	0.26	90	.....	....
15	Oval	.....	0.26	..	0.536	0.124
16	Square	0.209	0.19	90	.....	....
17	Oval	.....	0.18	..	0.3592	0.1498
18	Round	0.207	0.10	..	.....	....

Above is the finishing round size of the finished wire rod.

average guide mill have rolls of small diameter, they usually being eight or nine inches in diameter, and using billets weighing from 12 lbs., and upwards. The billets being small and being worked through the several passes, each end being in the passes alternately, the result being that there is hardly a perceptible difference between the first and last ends of the bar when finished. As to the difference in size between the first and last ends of a rod, it is due apparently to the difference in temperature, directly or indirectly. Rollers on bar and guide mills know, that outside of the train, any irregularity in the working of the bar or rod indicates one or two things, namely, uneven heat or a stock of variable density, such as scrap, which in these days is liable to contain anything from Norway iron to tool steel. In the case of uneven heat in the length of a bar, such as a series of hot and cold spots on the bar, the cold spots will resist the rolling pressure and spring the rolls, the result being that the bar will be larger in diameter on the cold part than it will be on the hot portion. Should the hot part of the bar be unusually hot in comparison to the cold spot, the rolls in springing back into position after encountering the cold spot, will compress the hot metal and cause the bar to be marked at the joints of the rolls. Should an unevenly heated bar be in a pass next to the finishing one, it will cause the finishing pass to overfill slightly and mark the finished bar.

These are well known manifestations occurring in the daily working of iron and steel, and they show that the variation in the size and contour of the rod under normal conditions is due mainly, if not altogether, to the difference in temperature at which the rod passes through the finishing rolls. Therefore we may infer from this, that the quicker the rod is run through the rolls, the more uniform in size it will be, and that an invariable size and uniformity in section is impossible in the rolling of wire rods. Another factor contributing to the lack of uniformity in the gauge of wire rods, is due to the thrust exerted by the other rolls upon the finishing ones, it being customary to roll a number of rods at one time in order to get a large tonnage output. The shape of the rods are not round, but are accepted as marketable in the United States when they are No. 5 gauge one way, and No. 7 another. True, in a lot of 1,000 tons, quite a large proportion will be 5 by 6 and some may even be found 5 by 5 gauge. When a roller in a wire rod mill sets the rolls to make a number 5 rod by means of trial bars, he adjusts his rolls so that the finishing ones will make a rod that measures 5 by 5 gauge over all of the sides; but the stresses set up in the mill soon throws the sizes out of balance, the thrusts of the metal in the different sets and the wear on the brass bearings contributing to this result.

As there is only a few thousandths of an inch difference between a rod that is number 5 one way, and number 7 the other, the variation is remarkably small when we consider that from six to eight rods are being rolled at one time; each rod being at a different temperature, exerts a vibration and thrust on the finishing rolls that alters the sizes of the rods. As wire rods are to be drawn through dies, which makes them into round wire, the lack of accuracy of gauge is accepted, but would not be tolerated in any other finished sections in iron, steel or the non-ferrous metals. The customers demands are becoming more exacting in this respect every year.

ORGANIZING TO PUT IN BRITISH GOODS

Representatives of British Manufacturers Have Meeting in Toronto and Montreal

The Canadian Association of British Manufacturers and their representatives has been established with branches at Toronto and Montreal. Similar associations have existed in Australia and New Zealand for several years. The objects of the Association as set forth in the constitution are as follows: To further the interests of British trade throughout the Dominion of Canada and to affiliate with and work in concert with kindred associations in other centres of the Dominion having similar objects.

Provisional committees were appointed to draft the constitution of the association. The Toronto committee comprised:

Mr. G. A. Marshall, chairman (steel); Captain Harris (shoe polish); Mr. A. C. King (dry goods); Mr. C. W. Beal (pottery); Mr. E. V. Pannell (aluminum); Mr. H. Wilson (dry goods); with Mr. F. W. Field, the British Trade Commissioner in Ontario, acting as secretary pro tem of the committee. The Montreal committee comprised:

Mr. J. H. Peattie (dry goods); Mr. G. H. Bishop (dry goods); Mr. F. H. Scott (silver and electro plate); Mr. A. K. Drury (heavy metals); Mr. F. I. Spielman (paints, etc.)

These committees drafted a uniform constitution.

Those interested in the formation of the association naturally wish to increase Great Britain's share of the import trade of Canada. As Canada is buying a considerable volume of merchandise abroad each year, it is desired that the United Kingdom shall obtain a substantial share of that business. It is felt that the progress which Canadian manufacturers have made, especially during the past few years, will be exceeded by the manufacturing developments in Canada in the future. This is recognized as a welcome and gratifying feature, because as each unit of the British Empire becomes stronger industrially and agriculturally, each developing its resources, so will the great British Empire grow in stability, prosperity and influence.

The executive council of the Toronto branch of the new association comprises:

J. Wilson, president (dry goods); G. A. Marshall, vice-president (steel); H. V. Andrews (wools); C. W. Beal (pottery); Captain Harris (shoe polish); J. Haywood (groceries, coffee, etc.); E. V. Pannell (aluminum and electrical lines).

The executive council of the Montreal branch will probably be elected in the near future.

The government of the association consists of a supreme council, and each branch of the association will have its own local executive council. The supreme council will consist of the chairman and one councillor from each local executive. The association will consist of British subjects only.

(a) British manufacturers and wholesale exporters from the United Kingdom.

(b) Representatives and agents of British manufacturers and wholesale exporters from the United Kingdom.

No representative or agent of British manufacturers who enters into any agency agreement with, or in any way represents any manufacturers or wholesale exporters whose principal works or place of business are situated in any country deemed by the supreme council to be or to have been hostile or unfriendly, will be entitled to membership in the association.

Assistance in the formation of the new association has been rendered by Mr. G. T. Milne and Mr. F. W. Field, the British Government trade commissioners in Canada.

There are several hundred manufacturers of the United Kingdom represented in Canada by branch houses or agents and it is anticipated that a large number, both of British manufacturers and their representatives will enrol as members of the new association.

A substantial number have already been enrolled.

NEW WAYS OF RAILWAY SIGNALLING

British engineers built the pioneer railways in all parts of the world, and have left their stamp even upon the details of equipment. Thus the methods of signalling adopted on railways are generally a direct evolution from the British system. The development of power-operated instead of hand-operated signals has increased the safety and reliability of signalling, replacing the heavy labor of former days with the simple movement of an electric switch. Some railway engineers prohpesy that in the near future all signals will be worked by electric power, and that the clear position will be up instead of down. At present a signal arm accidentally dropped may give a false "clear" indication. In connection with the "up clear" arrangement a British railway has adopted an ingenious arrangement of light signals to replace the old familiar red and green lights. When the signal is at danger, four white lights show in a horizontal line. At "caution" they stand at an upward angle of 45 degrees. At "clear" they are vertical. There is no change in color, as the distinctive position of the lamps is enough to give an unmistakable indication. The mechanism operates not by moving lamps, but by switching on either the horizontal, the sloping or the vertical row automatically as the signal is operated. Only four electric wires are needed to control the mechanism.

The Booth-Hall Electric Furnace

A Conducting Hearth Electric Furnace Having Auxiliary Electrode for Starting. Automatic Control and Careful Design Produce Economical Operation

By W. K. BOOTH
Chief Engineer, Booth, Hall & Co., Chicago

THE principal difference between the various makes of electric furnaces is the method in which the power is introduced in the furnace. The general metallurgical operations of practically all electric arc furnaces are the same. The method of power regulation bringing the power to the furnace frequently means greater or less cost in furnace operation, and governs, to a considerable extent, the manner in which the furnace lining may be put in and consequently the refractory cost and the loss of time due to furnace shutdowns.

Electric furnaces may be broadly divided into two classes.

1. Vertical arc furnaces:
   (a) Conducting hearth.
   (b) Non - conducting hearth.
2. Horizontal arc furnaces.

It is not the purpose here to enter into a discussion of the merits of the various types of arc furnaces, but more particularly to describe a new type of electric furnace, which has been developed during the past year and a half, and which is known as the Booth-Hall electric furnace.

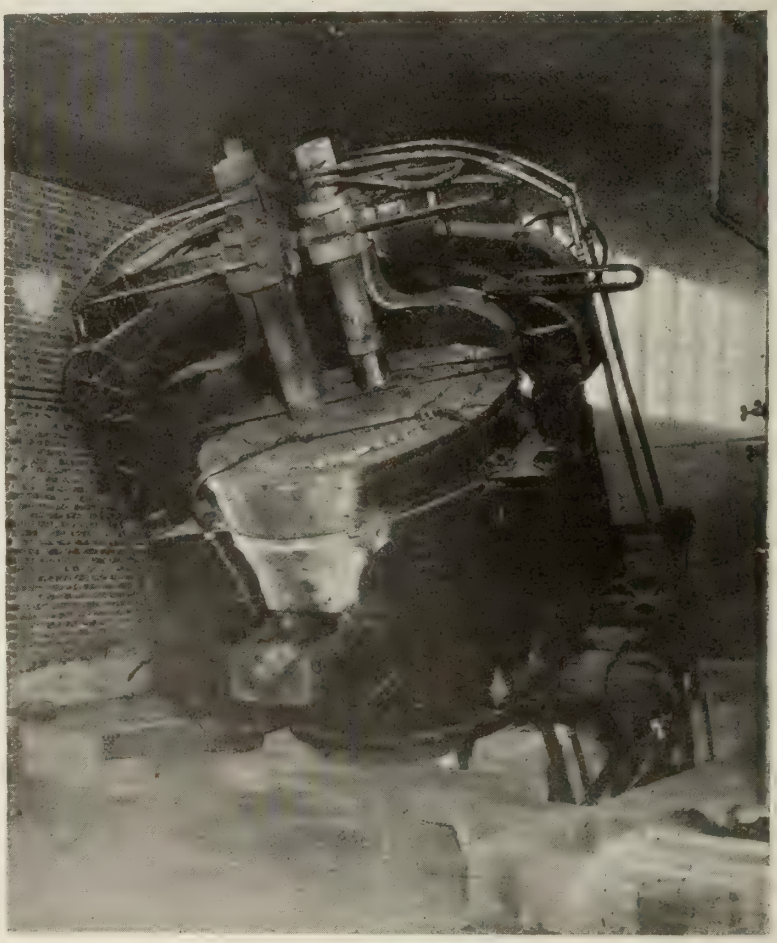
The Booth-Hall electric furnace comes under class 1-a above, and is illustrated diagrammetically in sketches Figs. 1 to 4, and in the photographs from operating furnaces.

Fig. 1 is a longitudinal section of the two-phase electric furnace, with the auxiliary electrode furnace resting upon the charge and arcs drawn between the main electrodes and the charge. A pool of metal is shown forming on the hearth of the furnace.

Fig. 2 is a diagram of a transverse section of the two-phase electric furnace, showing the crossing action of the current in the bath, and the grids embedded in the hearth.

Fig. 3 is a diagrammatic representation of the electrical connections for the two-phase electric furnace, employing two single-phase, Scott-connected transformers. This diagram shows the connections from the transformer terminals to the main electrodes and to the auxiliary electrodes and grids. A two-phase electric furnace so connected gives a balanced load on a three-phase power service. The auxiliary electrode is shown in black.

Fig. 4 shows diagrammatically the arrangement of main and auxiliary electrodes in single, two and three-phase Booth-Hall furnaces. The auxiliary electrodes are shown in black.



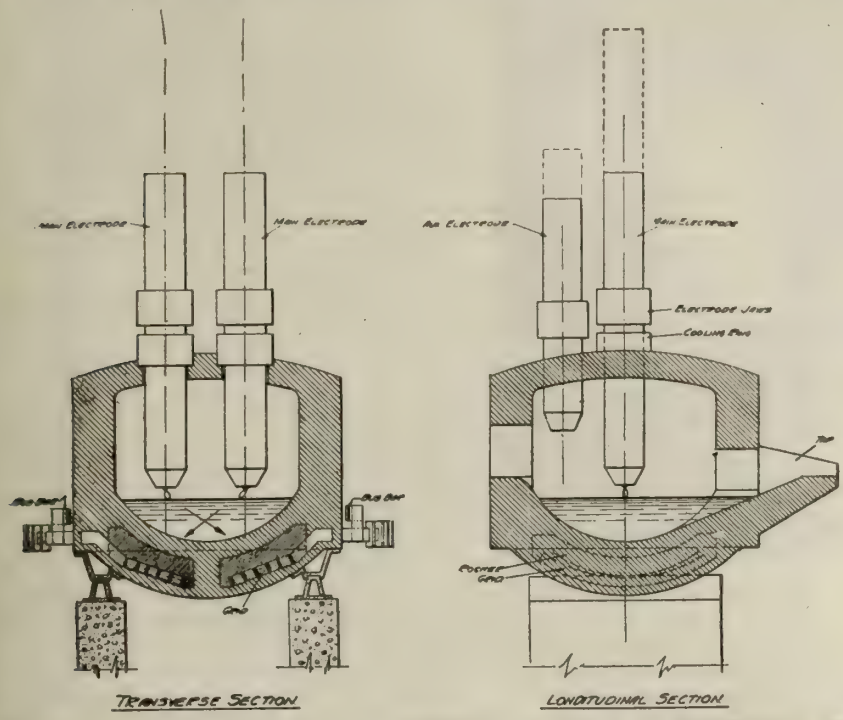
ONE AND ONE-HALF TON BOOTH-HALL FURNACE IN POURING POSITION.

The furnace is built either in single, two or three-phase to suit the conditions at the place of installation, the general principle being a furnace having a solid hearth which becomes conductive of electricity when hot, and the use of an auxiliary electrode which acts as a return for the electric current until the hearth becomes heated and conductive.

In starting furnace operation on a cold charge the auxiliary electrode is lowered until it rests on top of the charge, and the arc is then drawn between the charge and the main electrodes or electrode, as the case may be, the auxiliary, acting as a return for the main electrode or electrodes. The auxiliary is so arranged that it presses with its entire weight on top of the charge and consequently no arc can form underneath the auxiliary: experience has demonstrated that no arc forms. The auxiliary is connected in parallel with the conducting hearth, and when the main electrodes or electrode have -melted enough metal to form a pool on the bottom the hearth becomes conductive and

William K. Booth, Chief Engineer of the Booth-Hall Company, is the patentee and designer of the furnace, and a graduate of Ohio State University. He was identified for several years with the Snyder Electric Furnace Co. He is a member of the American Electrochemical Society, associate member of the American Institute of Electrical Engineers, and a member of the Iron & Steel Institute of Great Britain.

the auxiliary is withdrawn from contact with the charge. In a cold furnace the auxiliary is in operation from thirty to forty-five minutes, and in a furnace that is hot, less than fifteen minutes; that is, only long enough to assure a positive start of the furnace and a balanced load on the power company's line.



FIGS. 1 AND 2—TRANSVERSE AND LONGITUDINAL SECTIONS OF BOOTH-HALL TWO-PHASE FURNACE.

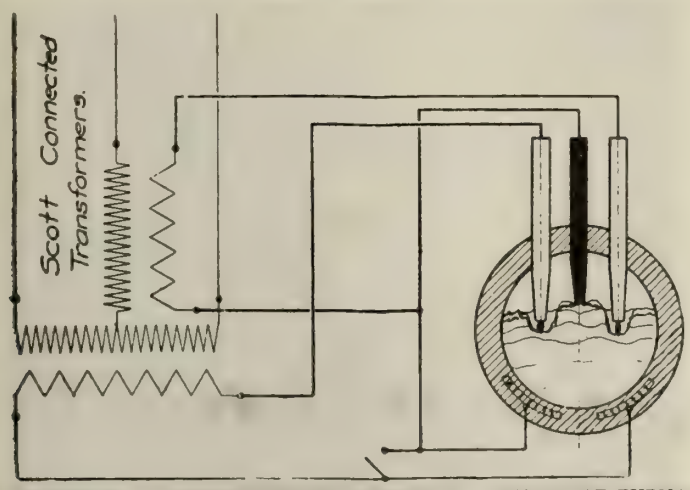


FIG. 3—ELECTRICAL CONNECTIONS OF BOOTH-HALL TWO-PHASE FURNACE

Furnaces from one-half to six tons holding capacity are generally built for two-phase operation, taking power from three-phase service by means of Scott-connected transformers, as shown diagrammatically in Fig. 3. In the hearth of the Booth-Hall two-phase electric furnace two sets of grids are embedded, which are electrically insulated from each other and are so related to the main electrodes that the current of the two phases crosses in the bath, thus giving a maximum of circulation of the molten metal and causing, in conjunction with the effect of the bottom heating, a very thorough mixing of the metal in the bath. This action can be readily observed in looking into the furnace after the charge has entirely melted. The conducting grids are placed as far as possible from the heated interior of the furnace, and experience has shown that they never become over-heated or require special cooling. The grids are so constructed as to handle large currents, furnishing large areas of contact with the material of the conducting bottom, and preventing local heating due to contact resistance.

By use of the auxiliary electrode a positive start of the furnace is guaranteed, and there is no possibility of failure to secure contact. Each main electrode is independent of the other, as there are no arcs in series, and consequently the regulation of the furnace is very simple, giving a balanced polyphase load on the power service lines. As with the two-phase connection there are only two electrodes to regulate, this offers the minimum number of electrodes for a balanced polyphase load, and the smaller the number of electrodes requiring regulation, the smoother becomes the furnace operation.

The hearth is either acid or basic, as desired, and in each case, the bottom is at least 24 inches (60 cm.) in thickness, being sintered in place layer by layer and forming a monolithic mass. By using the main electrodes in conjunction with the auxiliary, the materials of the hearth are sintered together in thin layers similar to open-hearth practice, thus forming a very durable bottom, and making the danger of run-outs a minimum. The furnace hearth is consequently solid, with no water cooling of any kind. With the basic hearth, dead burned dolomite or magnetite is used to maintain the slag line; in the acid furnace ground ganister is used for the same purpose. The conducting hearth gives a uniform bottom heating of the entire bath, prevents sculls and makes speedier and more thorough distribution of the heavier alloys, which tend to sink to the bottom of the bath. The effect of this bottom heating is considerable, and has been accurately measured on Booth-Hall furnaces in continuous operation.

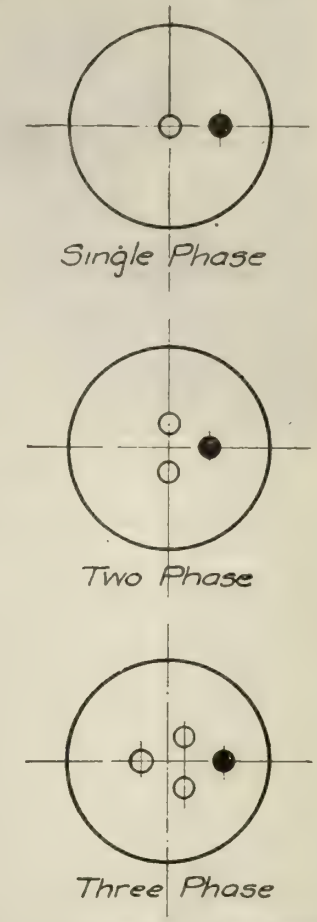


FIG. 4—DIAGRAMMATIC REPRESENTATION OF ELECTRODE ARRANGEMENT.

With the two-phase electric furnace a mimimum of electrode consumption is secured, due to the fact that a minimum number of electrodes for a balanced polyphase load is used. This means less electrodes to handle, less electrode breakage, and less surface burning. The loss on the auxiliary electrode is small because it is in operation for such a comparatively short time. The electrode jaws are made so that the electrodes can be gripped or released by turning a handwheel or lever at the side of the furnace, and it is not therefore necessary for the mel-

ter to climb on top of his furnace when changing the grip on the electrodes. The electrode jaws are arranged in segments so as to take up and adjust themselves to the inaccuracies in the surface of the electrodes.

TRANSFORMER ROOM SHOWING OIL SWITCHES AND TRANSFORMER.

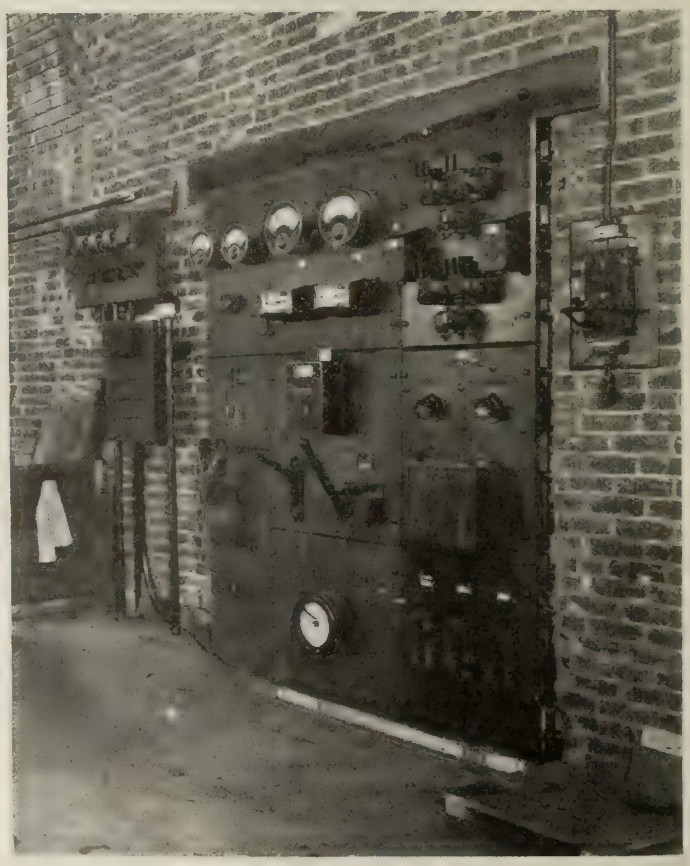
A roomy charging door of special construction is provided in the rear of the furnace and another door provided in front over the tap. This construction is very similar to the open hearth and permits a battery of furnaces to be arranged side by side and a charging machine to serve them all.

The furnace tilts or rocks backward as well as forward, and slagging operations can be handled either from the rear or front as desired. The door is shown in the various photographs. It is designed so that it comes flush against the door frame, sealing the opening, and cannot swing open of its own accord. This prevents air getting into the furnace and also prevents excessive losses of heat through the door. The door can be opened anywhere from a few inches to a full open when inspecting the bath, taking tests or pushing scrap from the sides of the furnace into the bath, thus protecting the melter from the heat of the furnace and preventing great radiation loss. Any warping of the door or frame does not affect the operation of the door or its sealing of the opening when closed.

The furnace is motor tilted, in all sizes, for pouring, but is arranged so that it can be tilted up by hand in emergency if the motor fails to operate. The smaller sizes of furnace are built for hand operation only if desired. All parts of the tilting mechanism, including gears and motors, are arranged so that they do not come beneath the furnace, and, therefore, there is nothing under the furnace that can be injured in case of a run-out.

The main electrodes are arranged for automatic regulation and also, in every case, so that they can be regulated by hand in case the regulators or motors should require repair.

The importance of power control is universally recognized, especially when refining operations are carried on. In the Booth-Hall electric furnace the power input can be maintained at any point from one-fourth to full load by means of proper voltage reduction and control switches. The average power factor will run between 90-95 per cent.



SWITCHBOARD AND AUTOMATIC ELECTRODE CONTROL.

In making steel for the ordinary grade of steel castings, the Booth-Hall electric furnace has operated with a power consumption as low as 446 kilowatt hours per 2,000 pounds (906 kg.) of steel poured, but the average will run between 500 and 550 kilowatt hours per net ton, for continuous operation. In one of the three ton furnaces a considerable quantity of tar phosphorus pig iron has been made, running under 0.035 per cent. in phosphorus and sulphur, also special steels requiring refining with two or more slags; the power consumption, of course, depending upon the degree of refining required.

Although the Booth-Hall furnace has been on the market only a year and a half, furnaces have been placed in operation or are under construction for the following companies:

Midland Electric Steel Co., Terre Haute, Ind.; 3-ton furnace (basic) (ingots and pig iron).

Avery Co., Peoria, Ill.; 2 1½-ton furnaces (basic) (castings).

Duriron Castings Co., Dayton, O.; ¾-ton furnace (acid) (special).

West Michigan Steel Foundry Co., Muskegon, Mich.; 3-ton furnace (basic) (castings).

Queen City Foundry Co., Denver, Col.; ¾-ton furnace (basic) (castings).

Monroe Steel Castings Co., Monroe, Mich.; 1½-ton furnace (acid) (castings).

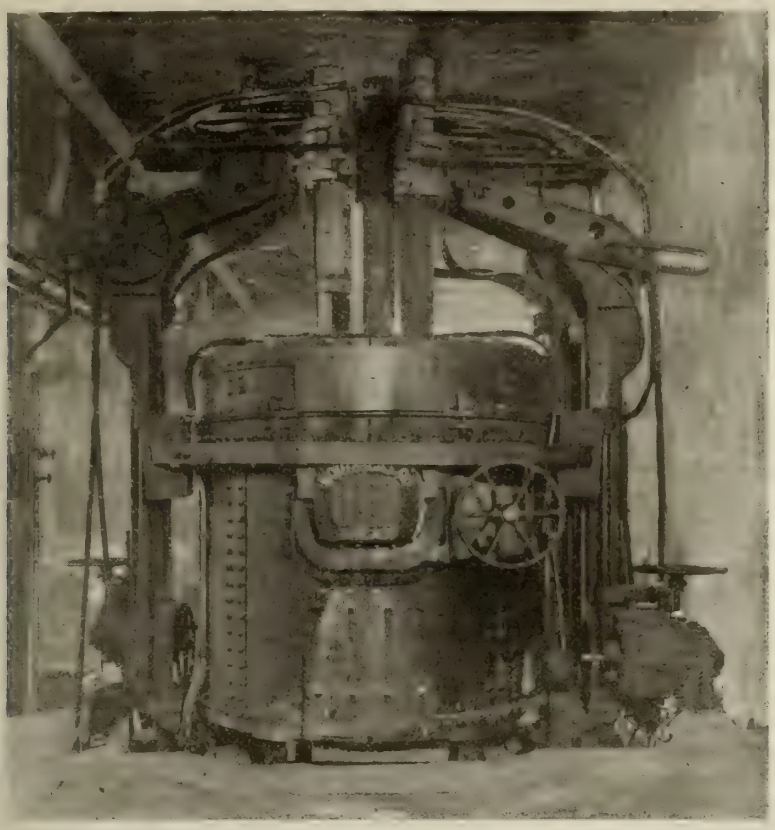
New England Steel Castings Co., East

Longmeadow, Mass.; 1½-ton furnace (acid) (castings).

Four Wheel Drive Auto Co., Clintonville, Wis ; ½-ton furnace (acid) (castings).

Ecorse Foundry & Machine Co., Ecorse, Mich.; 3-ton furnace (basic) (castings).

Consumers Steel Corporation, Chicago, Ill.; 3-ton furnace (basic) (tool steel) .



REAR VIEW OF ONE AND ONE-HALF TON BOOTH-HALL FURNACE.

DON'T TAKE IT FOR GRANTED

By D. MIDDLETON

Many of the mistakes and delays that occur in the machine trade come from taking things for granted; and the things which are taken for granted turn out to be different, when a searching investigation is made. Though they may be trivial in themselves, their effect may be far reaching and of the multiplying kind that spreads and spreads. A machinist in the repair and jobbing business should be the last person in the world to take anything for granted, yet the temptation is strong when the information comes from reliable sources.

Over at the steel plant they had a small pump that served the furnaces with fuel oil. It had got out of order and the engineer had done his best to fix it up. Finally they sent for a machinist from a nearby shop. The trouble was in the steam end of the pump, and, being of the single cylinder type, the machinist naturally suspected a shifting of the valve mechanism or some sticking of the chest piston. Inquiry of the engineer brought out the fact that the cylinder and piston were all right and in good working order—he had had the head off that morning and made a thorough examination of both. These parts are so familiar to any engineer and so simple that the machinist took that part of the work for granted.

His investigations were directed toward the valve gear and he spent a couple of hours trying to make the pump work, but to no avail; the piston would run one way all right, but would not come back unless given a start. In desperation, he took off the cylinder head and found the piston loose on the rod, almost a half inch of play there. How that had occurred, how it had escaped the notice of a supposedly competent engineer were not explained. But, when tightened up, the pump ran beautifully.

Another plant had installed a new heating system, doing it in the summer well in advance of the severe winter of 1917-18 so there would be no hitch to delay the war work on which they were engaged. A trial was made of the plant at the time and it seemed to be all right, but a trial in zero weather would have been more a test under actual load conditions. When started up in the late fall, the boiler did not seem to draw well and the firm who put in the plant was asked to make it right. They did everything they could, and yet the draft was poor. They finally fell back on the excuse that the stack was low and the fuel bad. These conditions were remedied and still no results. A representative of the factory making the boiler did no better.

A local machinist took a look one day, just out of interest. "I believe you'll find it's damper trouble," he said. And true enough it was. When set for wide open, it was only half open. A freak casting had caused the trouble, and instead of the squared end and flattened centre being proof against mistakes, the twist in the casting had thrown everything out. Everyone had taken it for granted that those parts, which were made "positive," were so, and had built upon that foundation.

We had figured out the speeds and pulleys and shafts for the new printing plant and after it had been going a week, they called us up to say that some of the presses were not running as they should. The press room was so shaped that quite a number of belt drives were required—these were driven by one large motor, which the electric company had put in. The motor we had never seen, but the electric company said it was of 1,200 r.p.m.: it had met with an accident in shipping and the pulley been broken; we had supplied a new 8 in. pulley to fit, along with all the other pulleys in the press room.

Knowing that the pulleys were all correct for the speeds desired, we suspected belt slip, and sent a man over to treat the belts and to take up any that had stretched. He did this and there was some improvement, but not speed enough yet. The motor was set on a frame up near the ceiling, and climbing up there I read the name plate, "Full Load Speed, 1,120 R.P.M.", and trying an indicator I found it to be but 1,110. There was the trouble in taking for granted the electric company's statement of speed, which was really 90 r.p.m. too high.

The file plant used fuel oil for their furnaces and forges, but had one small furnace used for hardening specials that was fired by city gas with a positive pressure blower built into the set. They had so much of this work that the furnace was kept busy all the time. However, it was not satisfactory in operation, because the heat could not be maintained constant—when regulated just right, it would gradually lower and the work cool off—if a trifle above the "just right," the heat would increase to the burning point. Different burners were tried without success; a receiver was attached in an effort to steady the flow of air. No results. By constant juggling of the air valve, a good operator could keep his fire fairly even, but it was a source of trial and a waster of time.

A visitor in the plant stopped for a few minutes to watch the work at this furnace. Without knowing of any trouble, his glance fell on the valve in the air pipe. He must have been a man of observation or have had practical experience, for he remarked: "I thought I saw that valve wheel move a little then." That chance remark showed the difficulty. The valve stem was just loose enough to turn with the pulsations

(Continued on page 439)

The Bessemer Process of Steel Manufacture

A Continuation of How Steel is Made in the Big Mills Using the Bessemer Process—One of the Most Spectacular Performances Witnessed in Industrial Life

CANADIAN MACHINERY has published previously two sections in the story on the Bessemer process of steel manufacture. The following is the synopsis of the first and second chapters, together with the third section. The material is written by P. N. Case, former mixer foreman of the Bessemer mill of the Lackawanna Steel Co., and is taken from the *Dragon*, the house organ of the Fafnir Bearing Co.

Synopsis of Chapters I and II

In the initial chapter of this article which appeared in the February issue of the *Dragon*, we observed: (1) that generally speaking, the manufacture of steel is a refining operation, in which the excess of impurities, such as carbon, silicon and manganese, are removed from the pig iron; (2) that in the Bessemer Process those impurities are "burned" out of the pig iron by means of an air blast; (3) that the "burning" or, strictly speaking, the oxidation of those impurities is very rapid and generates all of the heat necessary for the process; (4) that the oxides of the impurities thus formed, being lighter than metallic iron, make a layer of slag on the surface of the metal, from which they are subsequently separated; and, finally, that to the virtually chemically pure iron (containing only the original phosphorus and sulphur, and traces of other elements) which is left, the proper amounts of carbon, silicon and manganese are added to impart to the finished steel the desired percentages of those elements.

In Chapter II. printed in the last issue of the *Dragon*, we saw: how the pig iron from the blast furnace is transferred in ladles to the Bessemer, where it is stored in the mixers until needed for charging the vessels; that the Bessemer vessel is simply a refractory lined container, open at the top and pierced at the bottom by tuyeres through which the air blast enters; how, in order to prevent the molten iron from running down into the tuyere openings, the vessels are charged while lying flat, in which position they are held until the blast is turned on; and that the blow is directed by the blower and his assistants who are stationed on a platform, called the stage, which is located directly in front of the vessels on the opposite of the mill.

Chapter III.—A Continuation of the Story of How Steel is Made in the Bessemer Mill

The control of the blow and the sequence of chemical reactions which take place inside of the vessel are extremely interesting. While too complicated to be considered in detail in an article of this nature, a general description of these chemical changes, and the phenomena attending them, should prove enlightening to many of our readers.

After the blast has been turned on, the silicon is "burned" (oxidized) first; since, at the existing temperature, that element has the greatest chemical affinity for oxygen. This is the initial period of the blow, and usually lasts several minutes. Moreover, during this period, the temperature of the molten metal is greatly increased. This is because the oxidation of silicon is accompanied by the generation of a large amount of heat. Furthermore, since the oxide of silicon is not volatile, the heat thus generated is largely retained by the "bath" of metal.

Next the manganese is oxidized, and finally the carbon. It is very evident when the carbon begins to "burn" since this stage of the blow is marked by the formation of an increasingly large, and very luminous, flame. This is because carbon monoxide (CO) is volatile and is carried out of the mouth of the vessel by the force of the blast. As it comes into contact with the atmosphere, the carbon is further "burned" to the carbon dioxide (CO^2) resulting in the above mentioned flame. At this point, it will be appreciated that since the products of the combustion of the carbon are immediately lost, very little heat is thus utilized in raising the temperature of the bath. This is the final stage of the blow, and when the carbon is about all consumed, the iron itself begins to "burn" appreciably. This marks the end of the blow, and we will now see how the blower determines it.

During the final stage of the blow, when the last of the carbon is being consumed, the flame pales ever so slightly so that only an experienced eye can detect any change. A few seconds later, the flame shows symptoms of becoming ragged or frayed out at the edges, and has a tendency to shorten or drop—which accounts for the expression, "drop of the flame"—marking the end of the blow.

Notwithstanding erroneous statements which have frequently been made, the "drop of the flame" is not accompanied by any such radical change as the name would seem to imply. On the contrary, the change is so slight that only an expert can observe it. To be sure, if the blow were continued too long, the appearance of the flame would undoubtedly become greatly modified, but this would also result in ruining the "heat" of steel. Thus one will appreciate the responsibility of the blower who not only determines the drop of the flame, but also controls the blow from beginning to end.

For instance, it is essential that the temperature of the metal in the vessel be kept within limits—neither too hot nor too cold. In the former case, the blower cools the "bath"—as the molten metal in the vessel is termed—either by injecting into the vessel live steam which absorbs heat when it is decomposed, or by dropping steel scrap into the vessel's mouth. In case the bath becomes too cool, the blower lowers the vessel and allows the blast to impinge with great force over the surface of the metal, resulting in very rapid oxidation which quickly raises the temperature of the bath. When it is considered that the blower is obliged to direct several blows in different vessels simultaneously, the reader can form some conception of the intricacies of his task. Moreover, aside from knowing the estimated chemical composition of the pig iron in the mixer furnished him by the mixer foreman, the blower must depend entirely upon the appearance of the flame.

It was a hobby of mine to study the flame, and I recall one time in particular when I had bragged about my ability to detect the drop of the flame. So Dan McCrory, who was the blower on my shift, had me stand in front of him (he was a foot taller, so I didn't obstruct his view) where I could not observe his movements. Dan allowed the blow to continue for a few seconds after I gave the signal, but later confided to me that I had hit it right, but that he did not want to give me the satisfaction of knowing it.

At the "drop of the flame," the blower signals his assistants, who are poised at the levers in expectancy, and down comes the vessel again to an horizontal position. Let me say right here that a fellow is kept mighty busy watching the vessels and dodging the shower of fire which ensues forthwith when one is lowered; and this in addition to cranes overhead and locomotives all around pushing and hauling ladles of hot metal, which slop over first on one side and then on the other. Hardly a man who has worked many years in the mill but can show the ugly scar of a frightful burn. Once, a ladle of metal tipped over on a laborer. He never uttered a sound,

and in a few seconds all that was visible were a few charred bones.

After lowering the vessel so that the molten metal cannot run down into the tuyere openings, the blower shuts-off the blast. The metal bath in the vessel is now "white hot," and its temperature is at least 400 degrees Centigrade (720 degrees Fahrenheit) higher than it was at the beginning of the blow, as a result of the heat generated by the oxidation of the impurities in the pig iron. Moreover, the metal is now virtually chemically pure iron, only about 0.05 per cent. of the original carbon and small quantities of several other elements remaining in the iron. Therefore, in reality the metal is now very soft (very low carbon) steel.

The next step consists in the recarburization of the bath—that is, the addition of a definite, calculated amount of carbon and manganese which will introduce into the pure molten iron the desired percentages of those elements. Those percentages vary according to the kind of steel which is being made and the purpose for which it is to be used. For example, steel which is to be rolled into billets or light rails is usually medium high in carbon, containing 0.5 or 0.8 per cent. of that element; on the other hand, sheet bar is soft steel, containing about 0.1 per cent. carbon. However, some additional carbon is essential, in order to impart tensile strength and hardness to the finished product. Moreover, manganese performs two essential functions in the steel; first, it reduces to the metallic state any iron which may have been oxidized during the blow, and, in addition, it neutralizes the injurious effect of sulphur in the metal. That is, they make the metal brittle when hot. Consequently, the addition of at least 1. per cent. of manganese to the bath makes the steel much more forgeable, and this, obviously, is very desirable.

For the purpose of recarburizing the metal, it is customary to use either ferro-manganese or spiegeleisen, commonly spoken of as "spiegel." Both of these substances are merely special grades of iron, containing relatively large percentages of manganese and carbon. From what has been said in the above paragraph, it will be evident that, in making soft steel, much less carbon is required than manganese; and, consequently, in such cases it is customary to use ferro-manganese as the recarburizing agent, since this material contains a much greater percentage of manganese than it does of carbon. Only a little is required, and it is simply preheated in a small furnace and shovelled into the vessel by hand, or into the ladle after the metal has been poured out of the vessel. On the other hand, in making medium high carbon steel, spiegel is employed; and as a much larger amount is required, it is first melted in a cupola furnace and then poured into the converter, followed by a brief blow, in order thoroughly to mix it with the metal. As mixer foreman at Lackawanna, it was one of my jobs to calculate the amount of recarburizing agent to add to the bath. Examples of two simple cases will assist the reader to visualize the manner in which these calculations are made.

Example No. 1—"Soft" Steel

Let us assume that it is desired that the finished steel shall contain approximately 0.1 per cent. of carbon, and that the weight of the heat, or blown metal, is 20,000 lbs. In this case, ferro-manganese is the proper recarburizing agent to use, since only a small amount of carbon is needed. As a last assumption, suppose that our supply of ferro-manganese contains 6.5 per cent. carbon and 80 per cent. manganese.

Then 20,000. x .001 = 20 lbs. carbon needed

$$\frac{20. \times 100.}{6.5} = 308. \text{ lbs. of ferro-manganese}$$

are required to yield 20. lbs. of carbon. Moreover, the blown metal undoubtedly contains a slight amount of carbon, and, therefore, 300 lbs. of ferro-manganese will surely be sufficient to furnish the desired percentage of carbon.

Now 300. x .80 = 240. lbs. of manganese in 300. lbs. of ferro-manganese.

And $\frac{240.}{20{,}000} = .012$. That is, 1.2 per cent. of manganese is added to the heat, which will suffice to prevent red shortness in the steel.

Example No. 2—Medium High Carbon Steel

Next, let us suppose that it is desired to make medium high carbon steel (such as billets or very light rails) containing 0.5 per cent. carbon, and that the weight of heat is again 20,000 lbs. Here, spiegel is the logical recarburizing agent. Finally, let us assume that the spiegel contains 5. per cent. carbon and 20. per cent. manganese.

Then 20,000. x .005 = 100 lbs. of carbon needed.

$$\frac{100. \times 100.}{5.} = 2{,}000 \text{ lbs. of spiegel}$$

needed to provide 100 lbs. of carbon.

Now 2,000. x 0.20 = 400. lbs. of manganese in 2,000 lbs. of spiegel.

And $\frac{400}{20{,}000} = 0.02$. That is, 2. per cent. of manganese will be introduced into the bath, which is satisfactory.

Occasionally, when the heats are to be used for making light rails, about 0.15 per cent. of silicon and a small amount of ferrotitanium (about 0.1 per cent.) are added, in order to prevent blow holes, which defects might cause a broken rail and, consequently, a bad wreck. Also, in making bolt steel, a high percentage of sulphur is desired, and this is added by throwing bags of sulphur into the ladle after the heat has been poured from the vessel. This is rather ticklish business for the mixer foreman, since if too much sulphur is added, the steel will be unfit for making bolts, and, furthermore, there is no way of knowing definitely just how much sulphur the iron in the mixer contains. I might add, also, that bolt steel is the only instance of which I know where sulphur is not extremely undesirable.

When it becomes time to pour the heat from the vessel, one of the blower's assistants, by means of an hydraulically operated jib crane, swings a casting ladle under the vessel's mouth, while another assistant revolves the vessel gradually downward until the metal is entirely emptied into the ladle. Moreover, during this procedure, an effort is made to retain in the vessel as much as possible of the slag which, as we have already seen, is a viscous substance consisting of the oxides formed as the result of "burning" the impurities out of the metal. After the metal is entirely poured into the ladle, the vessel is revolved bottom upward, dumping the residue of slag into the pit beneath.

The metal is now steel in every sense of the word, although it is a white hot liquid. The next step consists in what is known as "teeming" the steel from the casting ladle into a series of molds which have been pushed into position by a dinky engine through the pit that extends between the vessel floor and the blower's stage. Each of these molds is mounted on a low truck, or "stool," in the wheel hubs of which ball bearings may be applied to excellent advantage. Moreover, a mold is a cylindrical cast iron or steel shell, open at both ends and tapering upward.

Before the molds are sent into the mill, they are sprayed with some sort of sulphurous compound, and the fumes which arise from them are second only to German poison gas. There is no antidote (peach stones will not help) and a man's only salvation is to keep to windward; or, if caught to leeward, to breath through a handkerchief, which serves to strain the sulphur from the pure air.

There is a spout in the bottom of the ladle, and a man, called a "pourer," teems the steel into one of the molds by prying up a stopper in the bottom of the ladle. When the mold is filled, the pourer lowers the stopper, and the ladle is swung over the next mould and the operation is

repeated. This may seem to the uninitiated like an easy job, whereas, in reality, the pourer must possess both skill and "nerve"; one little spatter may relieve him of a foot or two! The ladle holds an entire heat, which is sufficient to fill four average sized molds, which vary somewhat in size according to the kind of steel which is being made. In fact an "old hand" can usually tell what kind of steel is being "blown" in each vessel, merely by observing the size and sequence of the several sets of molds which extend in a line through the pit. In order to assure success of the teeming, it is imperative that the temperature of the steel be high enough so that it will not freeze in the spout of the ladle. Here again we see that Bessemer Process could not exist if the oxidation of the impurities in the pig iron did not raise the temperature of the metallic bath—especially since the melting point of steel is considerably higher than that of the pig iron. When the steel has been entirely teemed into the molds, a small residue of slag (which escaped from the vessel with the metal) remains in the ladle. Owing to its viscosity and because it is lighter than the steel and floats on the surface, this slag, fortunately, does not begin to trickle through the spout in the bottom of the ladle until all the steel is out, when the pourer applies the stopper. Then the ladle is turned upside down, and the slag dumped into the pit. However, it is difficult to prevent the slag from sticking somewhat to the sides of the ladle, forming a "skull" which accumulates and must occasionally be broken off with crow bars. Furthermore, the ladle is lined with refractory clay, and this lining requires frequent patching and must occasionally be renewed.

After a number of sets of molds containing several heats have been filled in this manner, an engine enters at the opposite end of the building and hauls them out to the "stripper," which is an hydraulically operated mechanism having gigantic steel fingers which grasp each mold and lift it off the ingot. The ingots—which by this time have solidified on their outer surfaces—are left standing on the stools. At night, it is very spectacular when these bright, orange-red, ingots are hauled on to the rolling mill. There they are placed in the "soaking-pits"—a "soaking-pit" is a sort of annealing furnace—where the interior of each ingot gradually solidifies, while its exterior is reheated. Eventually, the ingots are brought to a definite, uniform temperature throughout their masses. They are then in condition to be rolled into all sorts of shapes for commercial uses. The rolling mill industry, alone, is a marvelous instance of Yankee ingenuity in devising means for accomplishing big tasks quickly, and I wish that space would permit me to describe some of the remarkable things accomplished in a modern American rolling mill.

Such is the cycle of operations performed in "blowing a heat" of steel. Every effort is made by the blower and foremen to avoid lost time in charging the vessel with pig iron, supplying the recarburizer, teeming into the molds, and in every other operation either big or small. A few minutes' delay may easily cause a "cold" heat; that is, the steel may become chilled before it is teemed. Thus, the reader can easily imagine the activity and excitement which pervade a big mill in which several vessels are being operated simultaneously.

Canadian Machinery Drafting Course---Part III

In This Second Portion We Go Still Further Into the Use of the Drawing Instruments, and Discuss the Various Type of Lines as Adopted in General Drafting Practice

By J. H. MOORE, Associate Editor Canadian Machinery

BEFORE entering this third portion of the course, let us commence with a good-natured warning to students in general: "Do not yield to the inclination of speed only, but be content to travel the road carefully and at a natural gait." We will try and touch only on the absolute essentials, but in this portion especially, where we intend speaking of lettering and section lining, undue haste would be a very bad mistake. For this reason we ask the reader to study this portion with extreme care, especially the section lining department, for once the principle of the idea is grasped the rest will come easily.

In regards to the lettering. There is a belief in certain circles that lettering is non-essential to a mechanical drawing; in fact the writer of this article, personally, heard a certain chief draftsman give instructions to one of his staff to use a fountain pen for lettering and dimension purposes. When asked his reason for such a command the reply was, "It saves so much valuable time." True, perhaps it saved a little time in the drafting department, but what about the shop end of it, where the workmen had to decipher the lettering and dimensions? A system such as spoken of is carrying the time-saving idea too far, for a neatly executed drawing, with poor lettering will never pass muster, in fact the effort spent in making the drawing neat was time wasted, if at the finish the dimensions are carelessly placed and undecipherable.

Still, there is another danger, just as glaring as the one already spoken of. How often we see a drawing, where all the time seems to have been spent on the lettering, while the drawing portion is left commonplace, and perhaps even shows lack of care, yet the lettering is not only perfect, but of the fanciest design possible to make, sometimes, in fact, work that a show-card writer would be proud of. It is therefore of the double danger that we would warn students. We do not wish to take up our readers' time carrying them through

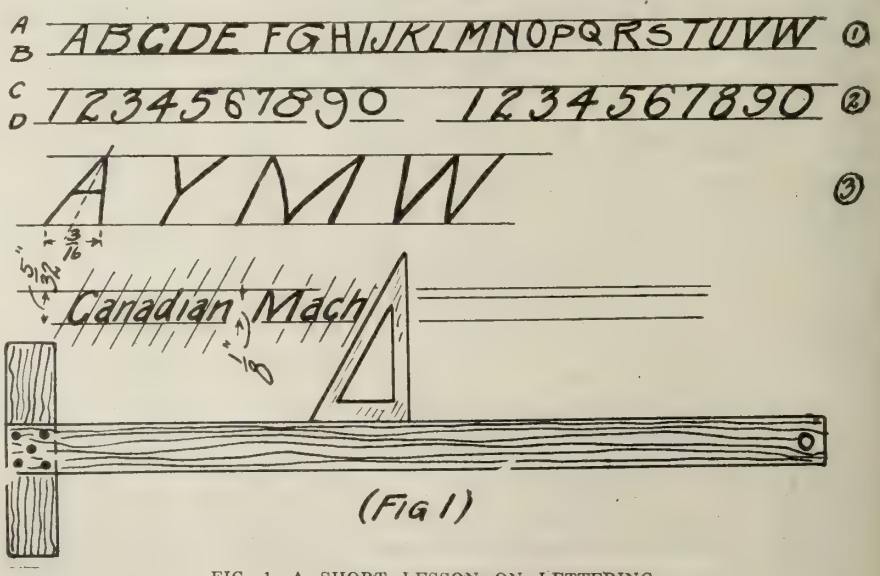


FIG. 1—A SHORT LESSON ON LETTERING.

a long painstaking course in lettering, and yet, because we only intend mentioning two styles of lettering we do not wish them to run away with the idea that lettering is non-essential. If the two styles illustrated further in this portion are practised earnestly, students will be sufficiently equipped in the ground-work at least, and have ample knowledge for average conditions.

In the up-to-date drafting room of to-day, wherever possible rubber stamps are used to take the place of the lettering. This particularly applies to the title block, and as the type used is much better than the hand printing, such a method is not only an improvement, but a decided time-saver. For the purpose of our course, we will, as before stated, keep to two styles, namely the sloping Gothic letters, and the block type.

Fig. 1 illustrates how students may practise the Gothic style with the aid of T-square and triangle. To start with it is important that a good pen be used for the purpose. A Gillott's No. 303 pen is ideal for such work. For the purpose of our course we will set a standard to the height of the lettering. This height is clearly shown on the sketch Fig. 1, namely that capital letters are to be 5-32 in. high, and the smaller, or lower-case letters as they are called, are to be ⅛ in. high. As regards the spacing horizontally, no real definite rule can be given, for it is simply a matter of the general appearance that counts. Students will become more proficient in this spacing the more they go on, and the more they practise the more their eye will discern uneven spacing. What would perhaps help the student more than any thing else is to remember these points, that W is the widest letter, M and T the next widest, then A and B. The narrowest letters are I and J, after which all the rest are about equal. A short space of time memorizing these facts will help the student considerably.

Before beginning to letter, draw horizontal guide lines with your T-square to serve as a guide for the tops and bottoms of letters, see lines A, B, C, etc. on Fig. 1. The letters should be made to extend fully up to the top and down to the bottom. They should not fall short of the guide lines, for if they do the lettering will appear ragged and uneven.

It is also very important that the letters have the same inclination. For example letters A, B, C, D and E are shown at correct inclination, then F, G, H, etc., are alternately put at various angles to illustrate the point of irregular slope, also the importance of keeping to the proper guide lines is illustrated by purposely not reaching the proper lines, to show up the irregular and ragged effect.

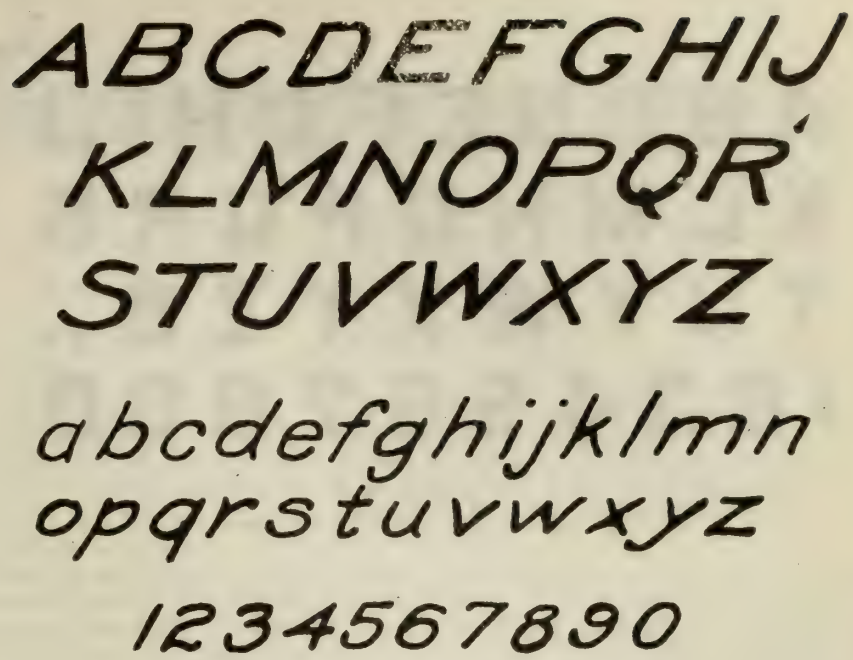


FIG. 2—THE STYLE OF LETTERING TO BE USED.

To secure the regular slope, use T-square and 60 degrees triangle, as shown in the lower portion of Fig. 1. In lettering make the backs and sides of the letters parallel with these sloping guide lines. A few points regarding the construction of a few particular letters. On line 3, Fig. 1, enlarged twice the actual size, are shown letters A, Y, M and W. To print A draw the centre line at the regular slope; from the apex of the letter draw a line almost perpendicular as shown, and make the distance across the bottom of letter about 3-16 in. wide. Regarding the other letters illustrated, students, by studying the same, will easily grasp the style and principle of design involved. Our advice to the student is this: follow the copy closely, keep on practising, for one can learn more about the lettering subject by actual practice than by any written instruction. Fig. 2 illustrates the complete alphabet and numerals. We now leave the Gothic style and pass on to the block design.

Fig. 3 illustrates the block type, and while at first sight it looks a difficult style, it is in reality very simple, for it in a mechanically produced style of lettering, the T square and triangle completing the entire letter. The letters are to be made 5-16 in. high and ¼ in. wide, except M, which is 5-16 in. wide, and W, which is ⅜ in. wide. The thickness of all lines is to be 1-16 in. The distance between any two letters of a word is 1-16 inch, except where A follows P or F; where V, W or Y follows L, where I follows F, P, T, V, W or Y, where T and A are adjacent, or A and V, W or Y are adjacent. In this case the bottom extremity of A, and the top extremity of P, T, V and W are in the same vertical line, etc. In other words, as before stated, practice will allow the eye to discover proper spacing.

Since these letters are composed of straight lines they can be made with T-square and triangle throughout. The

Announcing the Prize Winners on Plate No. I

1st Prize—Hugh Scott, 27 Helena Ave., Toronto, Canada.

2nd Prize—Frank Spry, 17 Francis St., Galt, Ontario.

3rd Prize—E. M. Belinger, 28 Germain St., St. John, N.B.

If you don't happen to see your name here this issue make up your mind that you will, before this course is finished.

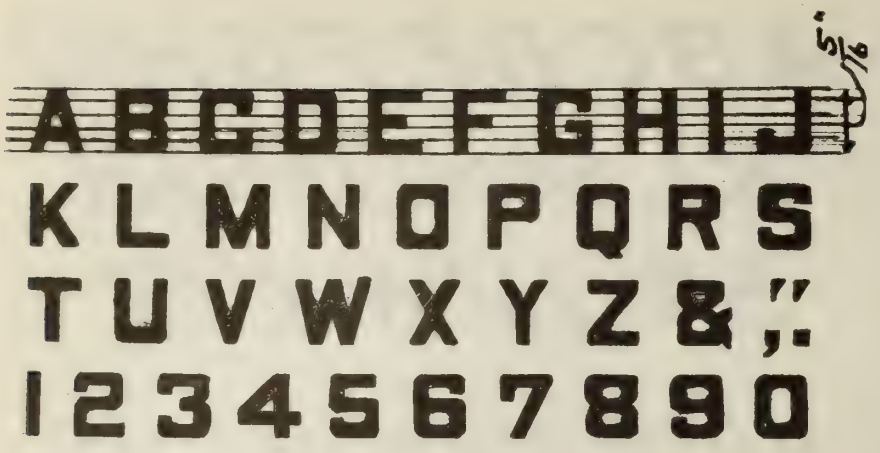
Tear off and send with drawing

Name .....

Address .....

Position .....

Firm's name .....



(FIG 3)

FIG. 3—THE COMPLETE BLOCK ALPHABET.

student should draw six horizontal lines 1-16 in. apart in lead pencil, to represent the thickness of the letters at the top, centre and bottom: then by use of the triangle he should next draw the letters and the spaces between them, also in lead pencil. Having the letters all laid out, he can then easily ink them in. Use the ruling pen for this purpose. Students nad better ink in all vertical lines first, next the horizontal lines and lastly the oblique lines. By such a method he lessens the chances of blots, also follows the building up of the letters in their natural sequence. Once more the importance of practice work is impressed upon the student if he would become proficient in this work. Leaving the student at this point to practise these two styles of lettering at his leisure, we will go on to section lining, its principles and purposes.

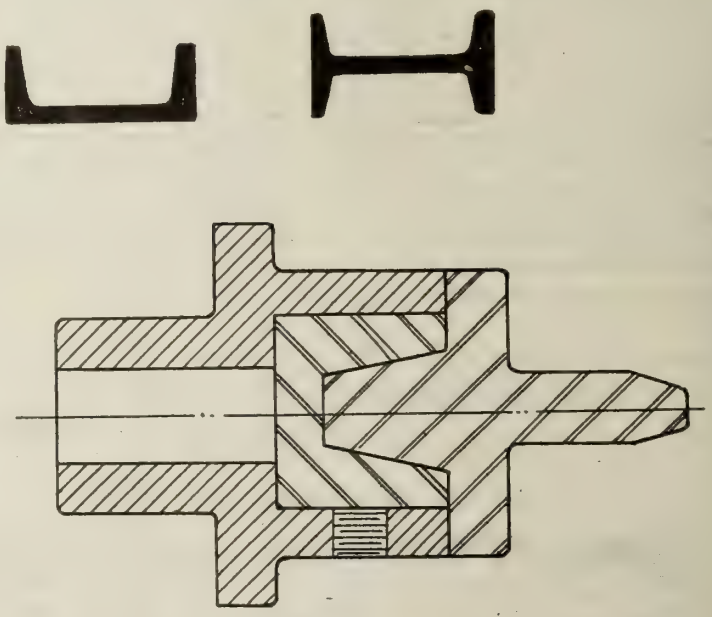
Sections and Section Lining

When we speak of a section through a piece of work, exactly what do we mean? We mean simply this, that to show clearly what otherwise would all be hidden and represented on the drawing by dotted lines, we cut clean through the centre of things, or in fact through any portion of an object, or objects, to show its various details. To make these points even more plain than ever, we section line the various parts by certain lines which represent the material from which they are made. Unfortunately there is no universally adopted standard, thus a certain combination of lines in one drawing office may mean steel, but in another office they might use the same combination of lines to represent some other metal, for instance cast iron. However, in the majority of offices, the combination of lines are alike, and on our plate No. 3, are illustrated these various shadings or section lines, as they are called. Under each space is given a letter of the alphabet, and at the end of this article we have placed in table form the letters, and what each particular section represents. Students should familiarize themselves with these various sections, so that at once they can tell what material a part is made of by its section linings. Where lines are too thin to show section lines they are simply blackened in, as shown on one of the portions of Fig. 4. These blackened sections are most frequently employed for sectional views of structures composed of plates and rolled sections, such as I beams, angle irons, rail bars, etc.

On going further into the drawing question, we will find that section lines do not always run in the same direction, for example refer to Fig. 4. This view shows that there is more than one piece to the section given. It is a general rule among draftsmen that each part of the same piece is section lined in the same direction, irrespective of its continuity of the section, so that by this means, after one has followed up the section method further, they can easily ascertain if at various parts of the section the same piece appears. In a later plate on this course, the student will have to make sectional views from straight sketches, but of course, before we expect him to do this, further information will be given him on this important subject. At the present time the chief idea is to familiarize students with the various lines used in section lining, and their meaning.

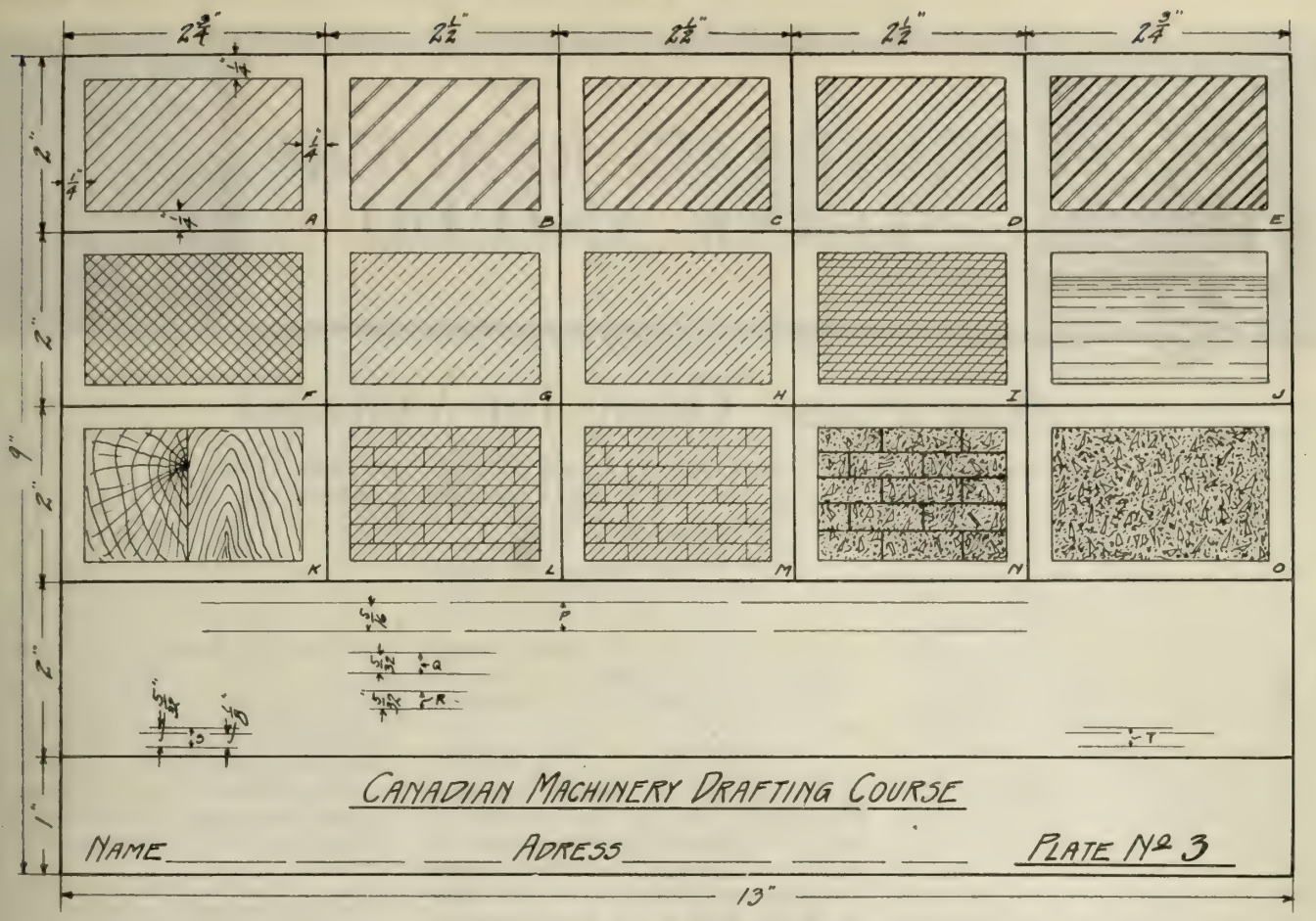
The next plate will go on to practical use of the instruments, as applied to geometrical drawing, and while two or three plates will be taken over in this branch of the subject, it is only because it is absolutely essential that the student get this groundwork before going further into the mechanical drawing question. As stated before, we will not attempt to make this a long, detailed course, but will carry the student along as fast as we possibly can, with the knowledge that he has a chance to follow us. It would be foolishness to proceed faster.

Might we close this portion of the course by asking some questions? Do you like this course? Do you believe it worth while? Is it doing you any good? If so tell us about it by letter. We would like to know that our intentions are being realized, namely to provide an interesting course of use to the shop worker. Are there any points you would care to suggest? We should like to hear them. Last, but not least, keep sending on your work. We are busy receiving replies now, but we want still more. How about it? Dou you want to earn one of the prizes? If so send your stuff along. It may be your plate will land the prize. Referring to plate No. 3: proceed to lay out the border lines as before. Then divide evenly into the sizes given on the plate. Draw up each section as near to the original as possible. The section of this plate devoted to the lettering is left blank for obvious reasons, namely that we wish to see your progress on this subject. To show us this progress proceed as follows: where P is marked make two guide lines 5-16 in. apart, and draw in the words, Canadian Machinery, in block style lettering. Where Q and R is marked print in sloping Gothic capitals 5-32 in. high these



(FIG. 4.)

FIG. 4—THE PRINCIPLE OF SECTIONING ILLUSTRATED.



HERE WE HAVE PLATE NO. 3—SO GET BUSY.

words: Canadian Machinery has a motto well worth while. "To make their paper better this week than last week, advancing all the while." At S and T, make double guide lines, and place these words, in sloping Gothic, with capitals and lower case letters. "The price is $3.00 per year, let us have your subscription now."

Regarding the spacing, that is strictly up to the student. Make it as good as you know how. From your plate we will see how well you have read the instructions. Above all send the plate in.

Table form illustrating what materials the various section lining represents.

A represents cast iron.
B represents cast steel.
C represents malleable iron.
D represents wrought iron.
E represents wrought steel.
F represents copper or zinc.
G represents brass or aluminum.
H represents composition.
I represents insulating material.
J represents water.
K represents wood.
L represents brick.
M represents fire brick.
N represents concrete blocks.
O represents concrete.

BOOK REVIEW

Liquid Steel: By. Col. David Carnegie. Longmans. Green & Co., New York and London. Price $8.50.

In the second edition no changes have been made with the exception of the incorporation of an additional chapter on the "Development of electric steel manufacture in Canada." The author throughout the book has set forth and compared the various items of cost in the different processes of steel manufacture in addition to the descriptive matter pertaining to the various processes themselves.

Information and data of practical use to steel makers generally are given, including:

The analysis and costs of iron ores. pig irons, refractory materials, fluxes, ferro-alloys and fuels, all of which are principally arranged in tabular form for easy reference.

2. The composition of charges for different classes of steel with particulars of the finishing additions required.

3. Details of the construction arrangements and cost of furnaces and plants.

4. Methods of assembling steel works costs and details concerning the value of labor and the costs of living in various countries. These figures are necessarily changed by war conditions.

Materials used in steel manufacture are taken up and dealt with exhaustively and the remaining portions of the work are developed in five parts: the Crucible process, the Bessemer process, the open-hearth process, the electric process and costs and labor.

Over five hundred pages, ten plates and 252 illustrations have been necessary to develop the subjects treated.

WALKERTON.—The town council is considering coming into the market for a motor truck and chemical extinguisher. Their present equipment is in poor shape.

DON'T TAKE IT FOR GRANTED

(Continued from page 433)

of the blower and, when made tight, there was no further trouble with heat regulation. No one had thought that a new valve could be other than right, and so no one had looked there for trouble —it was the old story of the very little thing right at hand.

Our city was justly proud of its new six-storey hotel—the first building with elevators, too. An engineer from the H— elevator Co. had come to go over the proposition, and, their shop being crowded, had put the job out with a local shop to build everything except the machine itself, which they had in stock. The engineer had made inquiry as to the water pressure and been informed by the city engineer that the hydrant in front of the hotel showed 80 lb. at six o'clock in the evening, but that it would be safer to make a test during the day on the hotel service pipe in the cellar.

"That's near enough," said the elevator man, "we need only 60 lbs. for our type of hydraulic elevator." But when the elevator was installed it was found necessary to take off the luggage carrier to permit it to run at all and even then one could ascend the stairs as fast as the elevator would carry at any time during the day. Taking pressure for granted had been a mistake, for it was found by tests made too late that daytime hydrant pressure was only 60 lbs. and by the time allowance for bends and other demands of hotel service had been satisfied, there was not over 40 lbs. left available for the elevator.

WHAT OUR READERS THINK AND DO

Automatic Gong for Vehicles

An Interesting Article on a Safety Gong Which Can Be Attached to Any Moving Vehicle—This Idea Can Be Adapted to All Classes of Work

By L. C. MARTIN

OFTEN it is desirable to have mounted on a vehicle a gong which sounds its alarm whenever the vehicle is in motion. That described in this article and detailed in Figs. 1, 2, and 3 satisfies such requirements. A notable advantage of the arrangement which is to be discussed is that it is extremely simple. Hence it can be made readily and is not liable to get out of order. It is entirely self-contained. Another feature is that the frequency of the sound emitted by it is proportional to the speed of the vehicle on which the gong is mounted. If the vehicle moves slowly the gong sounds infrequently; if it moves rapidly the taps come in rapid succession. Hence, when the vehicle carrying the gong is invisible, the listener can judge easily of the rapidity of its approach. This consideration becomes of considerable importance when the device is used in locations which are dimly but poorly lighted, as for example in mines or in dark, irregular corridors in industrial plants.

Some of the cases in which the automatic alarm may be effectively used are: On trucks in factories, on monorail telephers, on cranes, on mine locomotives and cars and on turntables.

As indicated in Fig. 3, the automatic gong is attached to one of the wheels of the conveyance. Each time the wheel completes a rotation the gong sounds once. At each rotation the steel ball within the tapper cylinder drops against the tapper and thereby makes the tapper strike the gong. A spring is provided which then returns the tapper to normal position where it will be ready to receive the next stroke. In the general assembly of Fig. 1 the relation of the components are shown. The assembled tapper cylinder C may be mounted within any gong, G, which is available. A yoke, Y, of strap iron, holds, by means of two round-head wood screws, the complete device to the back-board, B. The cap screw, S, passing through the hole in the gong and turning into a tapped hole in the yoke, Y, clamps the gong securely in position. A washer, W, is provided between the yoke and the gong so that the gong will be located in the correct location to receive on its rim the blows from the tapper. Spacing blocks, B and B, may, if necessary, be inserted to raise the tapper cylinder away from the surface of the mounting board. The mounting board, with the device assembled on it, may be clamped to the spokes of the vehicle wheel with U bolts, as delineated in Fig. 3.

For very severe service it is better, instead of using wood, to mount the gong on a square of steel plate and then bolt this plate to the wheel. In the accompanying diagrams no attempt has been made to indicate exact dimensions. For each diameter of gong, different proportions are necessary and must therefore be selected in each instance to satisfy the requirements of that specific case.

In Fig. 2 the detailed construction of

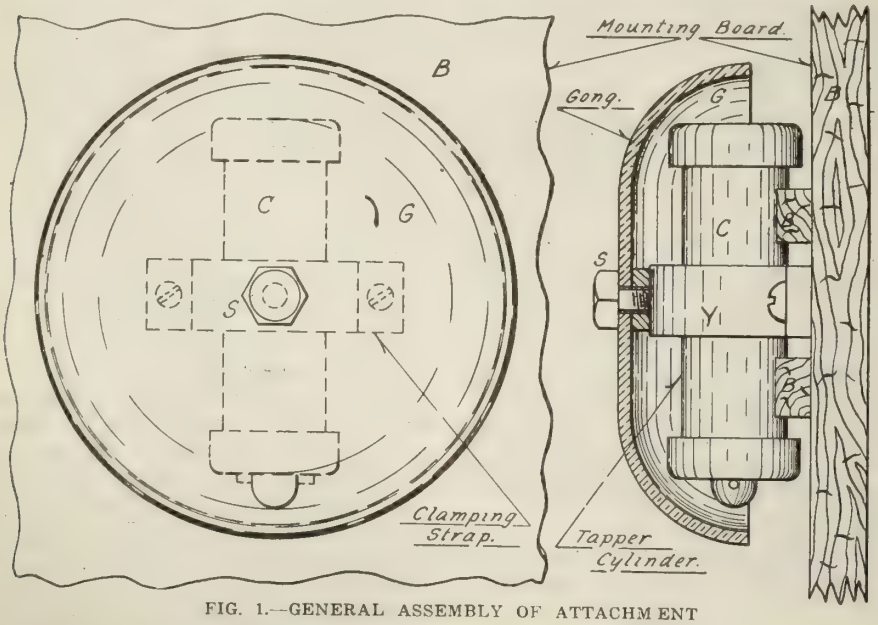


FIG. 1.—GENERAL ASSEMBLY OF ATTACHMENT

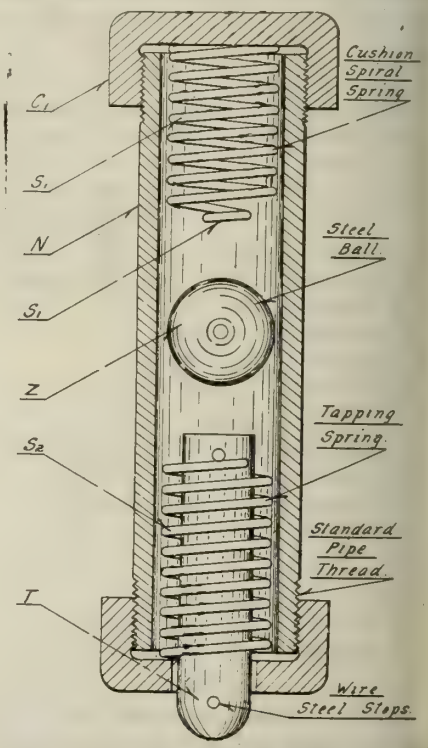


FIG. 2—DETAILED CONSTRUCTION OF THE TAPPER CYLINDER.

the tapper cylinder is diagrammed. A nipple of wrought-iron pipe, N, constitutes the body. Malleable iron pipe caps, C_1 and C_2, are screwed on each end of the nipple. One of the caps, C_2, has a hole drilled through it to accommodate the tapper, T. Two drive-fit pins are forced in holes drilled in the tapper to act as stops. Ball Z should be of steel —such balls are regularly manufactured for ball bearings and may be obtained in any one of many different diameters, from almost any machinery supply house. However, if a steel-bearing ball is not available, a chunk of iron of approximately spherical form will suffice. Spring S_2 should be of brass wire, about No. 14 for the average case. Its function is to return the tapper after the ball has struck it and to hold the tapper in position against the action of centrifugal force. Spring S_1 forms a cushion for the ball when it rebounds and may comprise a few turns of relatively light wire, possibly No. 18.

Some experimentation may be necessary in order to locate the tapper cylinder in the most effective position within the gong and to determine the best proportions for the two springs. As the wheel on which the automatic gong is mounted rotates, centrifugal forces act on the ball and on the tapper. Its effects and the expedients which must be adopted to counteract them can be determined only by trial.

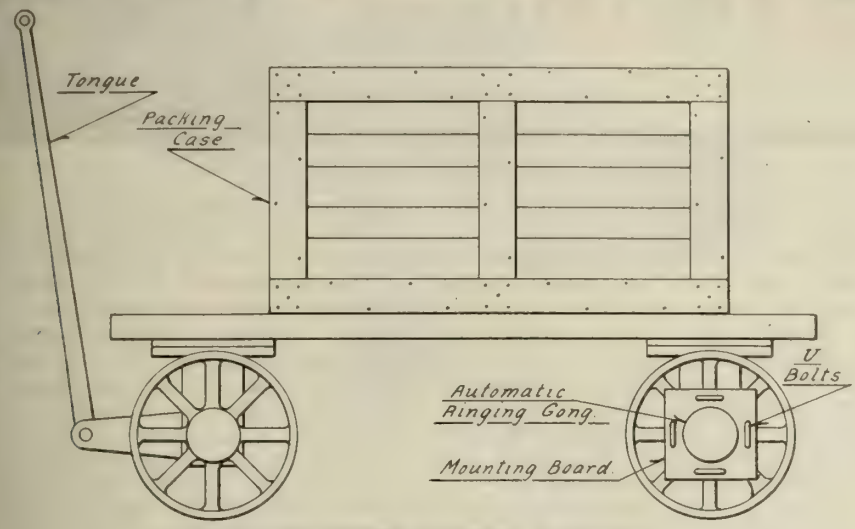


FIG. 3—ATTACHMENT MOUNTED IN PLACE.

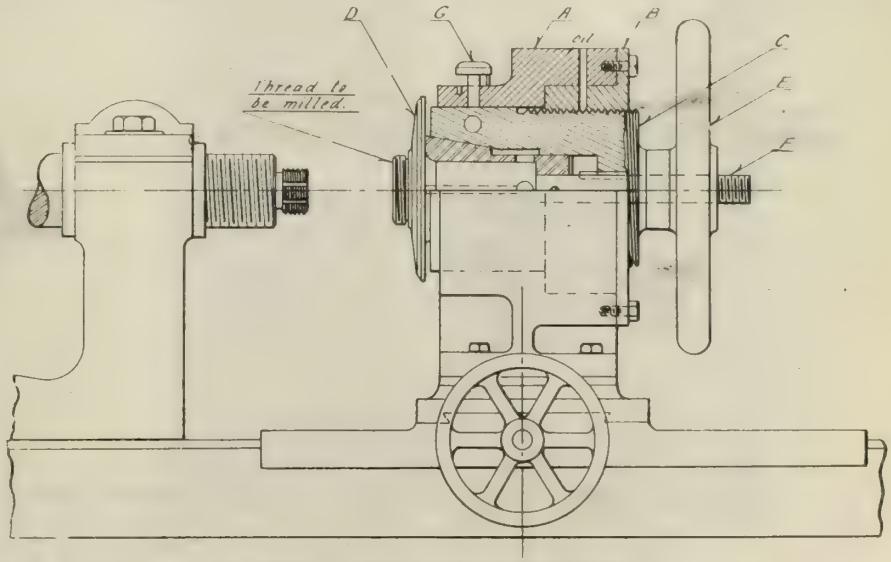
HAND-MILLING FIXTURE FOR AUTOMOBILE HUBS

G. BARRETT

The possibilities of adapting "war machinery" to the needs of domestic manufacture is a problem that has, as yet, received little attention, but careful consideration of the requirements of the situation will frequently enable mechanics and engineers to make such additions or slight alterations that will make the machine an economic asset instead of an expensive liability. Changes that were made to one of these single purpose shell machines, for the purpose of milling the short threads on automobile hubs, is shown in the accompanying cut. These hubs were formerly threaded (14 threads) on a screwing machine, but on account of the short length of the threaded portion it was difficult to obtain a good clean thread, as the first two were always torn and too sharp.

The fixture here shown was designed so that these threads could be milled in one of these discarded lathes. The casting A was made to fit on the cross slide and bored to fit the bronze nut B and the bearing screw C, this latter containing the collet chuck that holds the work. In operating the device, the hub D is held in the chuck, which is drawn in by the hand wheel E, the tightening screw F being secured to the collet by a tapered pin, and held in a relative fixed position to the piece C, by the feathered key shown. The bearing screw C is turned around until the hole shown in the section comes in line with the locking pin G, which prevents the bearing screw from turning while tightening the chuck. When this is accomplished the pin is withdrawn and turned a little to hold it out.

With the milling hob secured in the spindle nose the work is ready to be milled. The depth of the cut is governed by the graduations on the cross feed screw, then the hand wheel E is turned around slowly for a little over a revolution, and the job is finished with a first class thread. As there are many of these old machines available in various shops, this fixture, with the necessary modifications, could very well be adapted to different threading operations and made into a stationary machine.



GENERAL VIEW OF THE ATTACHMENT.

BRITISH LENSES INSTEAD OF GERMAN ONES

The English factory of the famous German firm of Zeiss, which is located near London, has been acquired by two British firms of optical lens makers. The war has proved beyond a doubt that English firms are capable of turning out lenses far surpassing in quality the German ones. Before the war it is estimated that about 95 per cent. of the lenses used in the U. S. were imported.

AMERICAN STEEL FOR BRITISH WORKS

At the annual meeting of the Scottish Tube Company Ltd., in Glasgow, the chairman said that in order to keep the works going they were compelled to seek supplies of material from America, where the works were able to supply suitable steel for tubemaking at a considerably lower price than home makers.

The Bureau of Mines, Department of the Interior, Washington, have issued papers Numbers 207 and 219. Paper 207 deals with combustion experiments with North Dakota lignite and gives an exhaustive summary of the results of numerous tests and trials which have been conducted with this fuel. Technical paper number 219 deals with subject of gas analysis and the necessity for it in the maintaining of proper combustion.

DEVELOPMENTS IN SHOP EQUIPMENT

GREENFIELD RECEDING PIPE THREADER

In working out the design of the new receding pipe threader, which has recently been added to the line of tools manufactured by the Greenfield Tap & Die Corporation, Greenfield, Mass., two special advantages are claimed for it—one, the quick release of the chasers at the end of the cut; the other, the quick resetting to cutting size.

In operation the tool is wound onto the pipe until a thread of the desired length has been cut, after which the threader may be pulled straight off. It is stated that this tool "leads" on easily and that the action of the tool becomes freer as it is advanced onto the work.

No unwinding is necessary to return the threader to its original cutting position. To accomplish this result, it is merely necessary to release the lead screw, lift the head, reset the trigger and begin another cut. It will be apparent that none but the actual cutting teeth of this threader follow around the threads.

The chasers are narrow and they travel along the pipe parallel to the thread they are cutting and not parallel to the axis of the pipe, the claim being made that this condition of operation reduces considerable friction. The chasers are interchangeable and made in such a way that it is possible to replace a single chaser in case of breakage. Under such conditions the replaced chaser will follow or "track" uniformly with the balance of the set, making it unnecessary to buy an entire new set of chasers when one becomes unfit for further use.

At the beginning of the operation, the chasers cut a full depth thread, and as the work progresses the levers which support the chasers gradually change their position, permitting the chasers to recede until they have finally backed completely away from the pipe. Then the threader can be pulled straight off the pipe, avoiding loss of time in unwinding. A single turn of either of three conveniently placed lugs disengages the lead screw, so that the head may be pulled back to the original position and reset at that point.

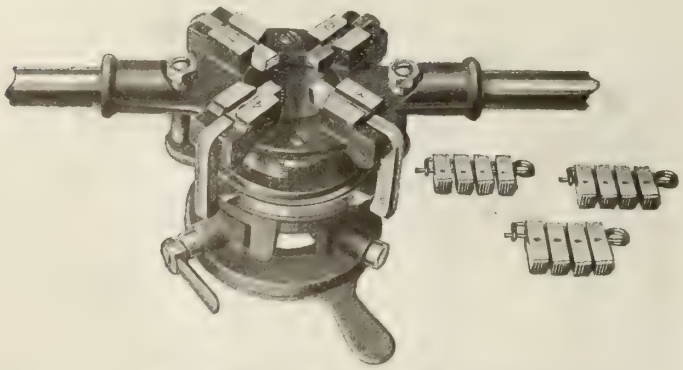
A 3-jawed universal chuck guide is provided on this tool and after the jaws are tightened against the pipe, one turn of a grip screw working inside of the chuck tightens the chuck so that it cannot slip. The jaws open wide enough to take in a coupling of the largest pipe size that comes within the range of this tool. Adjustment may be made for cutting shallow or deep threads, such adjustment being easily made by changing the setting of the lock nut and adjusting rods that project through the head of the threader.

The lead nut is made of three segments, which clean themselves, and no dirt or chips can gather on the lead screw. Both the lead screw and nut are replaceable without requiring the tool to be returned to the factory.

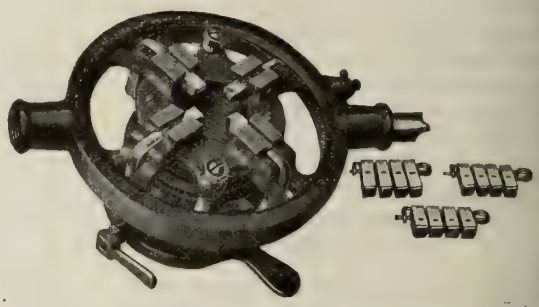
The threader is regularly furnished with one set of narrow chasers for each pipe size, Briggs standard right-hand threads being furnished, unless otherwise specified. Chasers for cutting British (Whitworth) standard threads may be furnished to order.

Ratchet Receder

To provide for the performance of pipe threading operations in trenches or near to walls, and other places where the amount of space is limited, a ratch receding pipe threader has been place upon the market by the Greenfield Ta & Die Corporation. In its general a rangement, this tool is similar to th regular receding threader, which ha just been described. The ratchet m chanism represents the only change ar it is incorporated right into the die stoc instead of being made an attachmen The head is so designed that the pullin strain of the handles comes directl back of and in line with the chaser thus minimizing the pull and preventin danger of trouble caused by twistin strains. The threader is made with tw handle lugs, and two handles are fur ished with the tool. When it is to b used with the ratchet mechanism, or of these handles is taken off and th tool will then swing in a 14-inch circl but it is equally feasible to disengag the ratchet, screw the second handle in place in its lug, and use this tool, ju as the regular receding pipe threader operated.



GREENFIELD RECEDING PIPE THREADER.



RATCHET RECEDING PIPE THREADER.

AN AUXILIARY HOIST FOR TRAV ELING CRANES

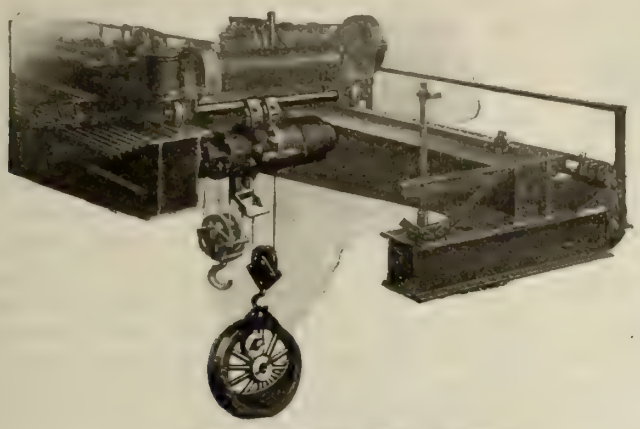
A simple and practical auxiliary hoi for attaching to any standard overhea electric traveling crane, as shown b the illustration, has recently been d veloped by the N. B. Payne & Co., 2 Church street, New York City.

The crane lends itself to quick an easy attachment, as it is claimed by th makers that it can be attached "the da it arrives."

The hoist does not take up any mor room overhead, does not require an ex tra trolley, does not shorten the trav of the trolley on the bridge, nor doe it interfere with the accessibility of th main hoist. It is plain that these ac

vantages involve a considerable money saving.

It is pointed out by the manufacturers that the average traveling crane in a day's work usually handles a far greater number of light loads than heavy loads, and this is an important point worthy of investigation Since cranes for lifting heavy loads are slow-moving, their use results in a serious loss of time if they also handle the light loads. Thus a 20-ton crane, direct-current, with a hoisting speed of 12 feet per minute per load, will handle a three-ton load at but slightly greater speed. But with the auxiliary hoist a light load of, say, three tons, may be handled at the very much higher speed—2 to 10 times as fast as the speed of the main crane.



AUXILIARY HOIST FOR CRANES.

Attachment of this auxiliary also effects an important power saving. Very often the hook and block of the main crane together weigh more than some loads frequently handled. The auxiliary hook and block being much lighter, it is evident that the power saving in a year's time becomes a worth-while item. The labor saving with the auxiliary hoist is another important item, especially when a gang of men must wait for a small piece being slowly moved by a large crane. This is a vexing circumstance with which many foremen are well familiar. The auxiliary eliminates this labor loss.

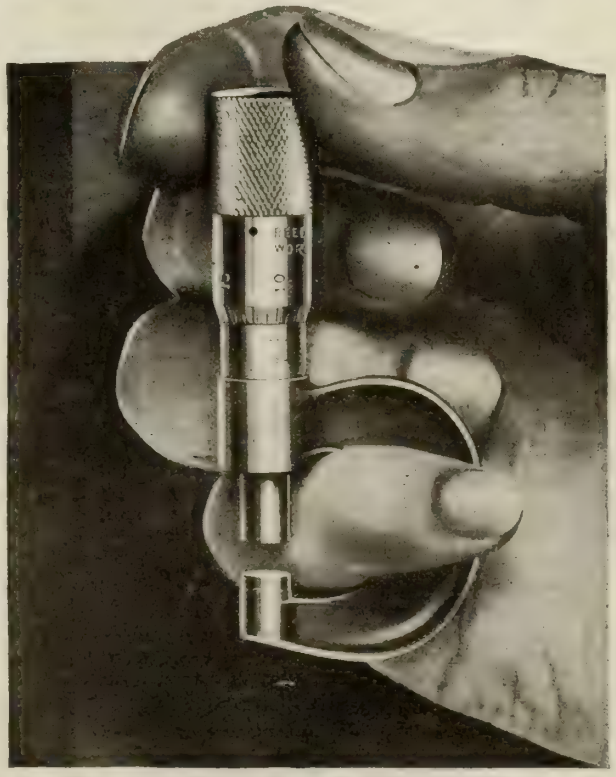
Ordinarily from 1 to 5 tons standard auxiliary hoists are supplied by the makers to meet the usual requirements. Larger special sizes, however, are furnished where specified.

Also, by the application of this auxiliary attachment any standard single hoist electric traveling crane may be equipped with two lines for drop bucket service. The control may be arranged from cage, floor or pulpit to suit the crane to which it is applied. It is stated that this auxiliary can be attached by the purchaser, but to assist the manufacturers such information as this should be given: kind of service; make and type of crane; span; lift, alternating or direct-current motors; voltage; phases; cycles; cage, floor or pulpit control; speed in feet per minute of main hoist at full-load and no-load; approximate weight of average crane load; number of lifts per day; maximum capacity of auxiliary hoist desired; speed in feed per minute desired at full load.

It is evident that this device will prove of much value to present owners of old slow cranes.

THE "REED JUNIOR"—HALF-INCH MICROMETER

Answering the call for a sturdier half-inch micrometer caliper than has been on the market, Reed Small Tool Works, Cherry street, Worcester, Mass., has developed a tool which is claimed to satisfy all requirements.



THE REED JUNIOR HALF-INCH MICROMETER.

In presenting "Reed Junior," the manufacturers state that "Junior" is a chip of the old block—that all the good qualities found in their larger sized micrometers are reproduced in the half inch size.

The simple, but rugged construction, assures long life for everyday use. Equipped with a solid anvil and two-part thimble instantaneous adjustment is afforded, this being a special feature in the Reed micrometer. The diameter of spindle, barrel and thimble remains the same as that of the one-inch to six-inch micrometer, but these parts have been reduced in length. Small enough to slip into the vest pocket, the Reed Junior is still large enough to be easily operated by one hand, the deep throat allowing room through which to pass the little finger in grasping the frame.

A natural thumb and finger grip is furnished by the concaved web of the drop forged steel frame and the possibility of a firm grip, especially when being handled under oil will make the "one-handed half-inch micrometer" an extremely popular tool.

The dull nickel finish of the frame obviates the glare found in the highly polished frames, while the clean-cut graduations and figures of generous size will relieve the eye strain of the accurate workman.

This micrometer will be furnished in both English and Metric systems and with lock nut and ratchet stop, if desired.

To Tunnel St. Lawrence. — The Chambre de Commerce of Montreal, at a recent meeting, gave a unanimous approval to a project for tunneling the St. Lawrence River, and the building of a central union station in Montreal. As outlined at the meetig, the idea was that the tunnel should reach the heart of the business centre of the city.

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The National Railway

MANY of the railway officials of private roads in Canada, including Lord Shaughnessy and President Beatty, of the C. P. R., are quite outspoken in giving their opinions regarding the chances of success or failure attending the efforts by the Dominion Government in operating the C. P. R. and C. N. R. Their big point is that the Government cannot give or get the services that the privately-operated road can.

This country, now that the G. T. R. and C. N. R. have practically been placed on its doorstep, has 25,000 miles of road to care for and operate. It cannot even be claimed that in taking these over the country has come into possession of property that has been financially successful heretofore. Had it been a financial success it would never have passed into the hands of the Government. We have a peculiar way of doing business, in that only the lame ducks are handed over to the Government under the guise of public ownership.

As a matter of fact the Dominion Government has a stiff proposition. It is doubtful if the Ottawa authorities can take the property they now have on their hands and make it a financial success. They are handicapped in the first place because in the past the Government has not conducted its other departments on a business basis. The most recent of these to be hauled to the surface and dangled before the public gaze has been the Printing Bureau. The conditions there were such that, had they been applied to any other business that had to pay its way or sink, the sinking would have now been a matter of rather ancient history.

Have the people, who, after all are the owners of the Government roads, any guarantee that principles more sane and more thorough will be applied to the management of the railroads than have for years been permitted at the Printing Bureau?

There are so many millions at stake that the question of management and control becomes one of colossal importance. If there are the usual number of political tinkers running the affairs of the National Railways, Canada can get ready to face an annual deficit that will be as a millstone hanged to her neck, and expect to pay transportation rates away over and above those that were previously paid to the companies.

The Government of this country does not occupy an enviable position in taking over 25,000 miles of railroad. Governments have not shown themselves adepts at business, and were the reverse to prove the case in regard to the railroads Canada would be in for an agreeable surprise.

The Overhead Expenses

EVER hear a man say that there was nothing in a motor car to justify the price that is charged for them? Perhaps you have said something like that yourself. You have given the car the once-over, and in a hazy sort of way have set down the things, mentally, that go to make up the car.

You have counted the four wheels, the chassis, the engine, and so on. Being of a mechanical turn of mind you have figured out how the engine, the differentials, etc., could be turned out in quantities and rushed through quickly, and you have satisfied yourself that the price charged for the car couldn't be found there from the standpoint of mechanics.

But wait. One Canadian firm has plans out now for making cars. Long before they made any announcement they had their men all over the country asking questions, finding out all they could about the demand, the cost, the marketing conditions, etc. Then comes the period of buying the equipment, and remember the equipment market is still based on war prices. After a long list of tools has been bought and considerable tool-room equipment, the next call is for the fitting up of another department entirely for the making of the differentials to be used in the cars. This is going to call for an outlay of about $140,000 or even more.

And after all this is done there will be the material, the assembling, building, testing, finishing, etc. It will be months yet before the company get one cent of return in the way of purchase money from the buyers of the car. Their car, after being made, must be marketed. This means a selling organization, an advertising campaign, and an expense account of very large proportions.

It means that for months and months the firm undertaking to put the car on the market must continue to be simply a purchasing and a spending organization. To all intents and purposes the office of the receiving teller has been closed. The promoters of the scheme have simply to go ahead and spend.

The buying public sees nothing of this. They see nothing but the finished article, and at once reckon what it is worth on the basis of time and material on actual production.

The same thing is true of many things that people buy for various purposes. They have called for tremendous outlays, long months of lavish spending, and very often the ability of the promotors to stand this period is sorely taxed.

So don't forget that the months of preparation, of costly unproductive effort, help to pile up against every automobile a goodly amount of overhead charges that cannot be dodged, and all of which tend to increase the selling price without improving the car.

DOWN South a broker won a swimming match against all comers. Constant contact from dealing in watered stock keeps him in shape.

HERE'S a new flivver joke. If one flivver passed another on the road, what time would it be? Quite easy. Simply tin past tin.

MANY a brave man who has seen action at the front now fears the action his wife expects in the back yard when she flops the parlor carpet over the line fence.

SOME of the teachers who were in conference in Toronto a few days ago almost fainted when some keen mind unearthed the information that barbers on an average were making more money than teachers. The teachers should not worry. When we all turn Bolshevik the barbers will be so shy of business that the chin-scrapers will occupy a lowly place in the land.

The Graded Certificate

ONE of the bills which was given its third reading by the Ontario Legislature provided for the grading of certificates for engineers and brings this Province into line with other Canadian Provinces with the exception of New Brunswick and Prince Edward Island. With these exceptions graded certificates have practically become a reality from coast to coast, and action in conformity with that of the Ontario Legislature may shortly be expected in New Brunswick.

It is expected that the rating of certificates and the examinations held under the Act will be of such nature as to conform to those in other Provinces, and in this manner make the certificates issued by the various Provinces interchangeable.

Certain plants are exempted and to the operation of these graded certificates are not essential. Power plants having a capacity of less than 50 boiler horsepower, as determined by definition in the Act, are exempt together with heating plants operating at twenty pounds pressure or under. Locomotives and steamships are also exempted and boilers for agricultural purposes; threshing engines, etc., also do not come under the provisions of the Act. Only those hoists which are used at mines or quarries are exempted, all other hoists being subject to the operation of the Act. This portion of the Act has been re-enacted from the former one and no change has been made.

The most important feature of the Act is that portion making provision for the grading of certificates and for the recording of changes made from time to time in the positions held by engineers.

It is probable that four classes of certificates will be issued. The fourth class certificate will embrace all firemen having six months' experience, night watchmen and water tenders. The holders of this grade of certificate will be required to know how to operate a boiler in a safe manner.

The third class certificate will be the lowest engineer's certificate and will be required of those operating steam plants of 50 boiler horsepower or over, up to the lower limit of the next higher class.

The second class certificate will be required of those having the operation of plants of greater capacity in their care.

The first class certificate will be the highest grade and will be obtained only by examination. This examination will necessarily be of a highly technical and practical nature.

Present holders of certificates will be divided into two classes: second and third, the standing to be set by the board and the first class certificate will be obtained only by means of examination.

It will not be necessary for engineers at present operating a plant to obtain the certificate necessary for its operation under the new law, so long as he continues to remain in his present position, but if he changes to a plant having a higher rating the Act will necessitate his having the proper certificate for its operation, time being given for his preparation for examination.

In the furtherance of this legislation all power plants coming under the Act will be registered and the boiler horsepower of all plants in the Province will be obtained. Registration certificates will be issued and these certificates will be permanent unless alterations are made, in which case a re-registration will be necessary. This portion of the Act is of interest to the plant owner as it concerns him alone and does not affect the engineer except in so far as it permits the board to keep track of the plant capacities and thus to determine the grade of certificate necessary for its operation.

Do You Know This Chap?

HE was a pillar in the church, at least he said he was, his Sunday face it was a sight from eyebrows down to jaws. He had the holy look down fine, it was a treat to see him come to kirk on Sabbath day with children one, two, three.

He 'tended all the meetin's with an air of joy and grace, and never lost a single chance to open up his face.

His prayer was always six feet long, 'twas always just the same, and folks that didn't come at all knew just what he was sayin'. At every business session, too, he bobbed up in their midst, and criticized the whole machine with thumpin's of his fist.

He always had a lot to say 'bout the financial end, as though he thought the thing should pay a monthly dividend.

At every social thing they had, our friend was right on deck; of cake and all such things, he must have ate a peck. One might have thought that this here man was just one model saint, an echo of the good old school, so pompous, yet so quaint.

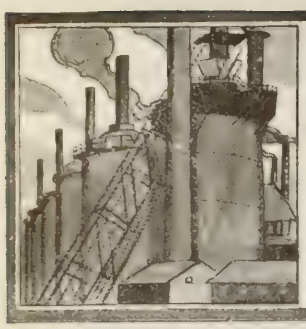
We saw him, though, one Sabbath morn, 'tis sad to contemplate—he sorted out his coin and got a nickel for the plate.—ARK.

IF THE people of this country were not crammed and jammed to the neck with downright grasping selfishness, chances are that there would not be so many increases and jumps in the prices of food and clothing.

THE British Admiralty is advertising in some of the papers that it has a number of German submarines for sale cheap, the only stipulation being that they shall be broken up. There are quite a heap of folks who would with pleasure tackle the breaking-up job.

AN agitation is on in England, and it promises to gain strength, the object of which is that husbands shall pay wages to their wives. But in the case of the well-trained man, who simply comes home and tosses his pay envelope into his wife's apron, what is going to happen? Will some courageous individual arise and suggest that the husbands shall be allowed a certain amount as salary?

Hungerford, in Pittsburgh "Sun."
The Dime Novel



MARKET DEVELOPMENTS

Several of the Old Country Prices Still Too High

Dealers Figure They Are at Least 25 Per Cent. Too Much in Advance of Competitors—Nothing Moving Yet in the Way of Structurals, But Many New Machines Are Sold

THE sale of new machinery increases. Several of the larger dealers have stated that during the last month there has been more new material disposed of than in any period since the signing of the armistice. For some time past the bulk of the trade moving has been in disposing of used machinery, which while making things busy for the warehouses, did nothing for the builders of machinery. Automobile plants and the National as well as C.P.R. are in the market with fairly good lists.

Nothing moves yet in the way of structurals, and that section of the steel business remains very quiet. Until there is evidence of some developments there the chances are that several other lines will remain inactive. For instance, when structurals are brisk and building is booming there is a big demand for steel plate for boilers, safes, and a dozen other things. Warehouses admit that, although they are buying quite a fair tonnage now, they always specify prompt delivery, and they have a pretty fair idea as to where they are going to dispose of their produce. It may be that they have every confidence that present prices are going to remain for some time, but their actions do not point in that direction.

Dealers in scrap metal are simply marking time. In fact, at no time since the ending of hostilities have they had a chance to start a movement that would carry out much of their stock. Dealers are not anxious to sell at present levels, holding that there must be an improvement very shortly. On the other hand few of them want it to be known that they are in the market, as they are pretty well stocked up. Steel mills and foundries are not buying, as most of them have their yards well filled.

Old Country steel and iron materials will have to show substantial reductions before they can again find a place in the Canadian market, as at the present time many of these lines are at least twenty per cent. too high. Some reports have it conditions are only temporary, as Old Country plants are still in many cases on a war basis. However that may be, it is a fact that for present purposes their figures are too high.

THE CARTERS' STRIKE DID NOT HELP THE BUSINESS IN MONTREAL

Special to CANADIAN MACHINERY

MONTREAL, May 1.—During the past week business in this district was somewhat disorganized owing to the carters' strike, but fortunately this has now been settled and merchants and shippers are hopeful of resuming activities on a normal basis. The water-front has again returned to its busy season and prospects look good for the open period of navigation. The return to ordinary industrial activity is still unpronounced, but every report seems to point to increased expansion in the near future. The entire situation is one that is difficult to define with any degree of accuracy as the tendency to do business other than for immediate needs is of a reluctant character. The reason for this is the unsettled state of peace developments and the delays that are experienced in the adjustment of steel conditions. Dealers here are not overcrowded with orders, but the volume is sufficient to maintain the spirit of optimism that has featured the operations of the past four months. Little increase is noticed in machine-tool business, but activity is of a steady character.

The metal situation is still without feature, and general trading is comparatively light with quotations unchanged but continued firm. Old material is still listless and continues to be influenced by the unsettled conditions of the general trade situation.

Buyers Show Waiting Attitude

Despite the fact that actual sales of new machine tools are of a light character the general inquiry would indicate that buying may develop at any time, the present reluctance being due largely to the uncertainty of the times and the negotiations that are still on respecting the method of disposal of those tools now owned or controlled by the American Government. While the bulk of this equipment is tied up in American plants the situation is one that affects the trade here, inasmuch as many of these tools will be absorbed by Canadian manufacturers as soon as their release is possible. Many hundreds of new tools of various standard types are likewise tied up in Canadian plants as a result of the stoppage of American shell contracts.

When a definite ruling has been made as regards their resale, it is anticipated that plenty of buyers will appear in the market. Until the bulk of this "war" machinery is finally disposed of normal operations are out of the question. Dealers' reports indicate a fair volume of supply business with prices showing little tendency to lower levels.

Local Activity Only

Interest in old materials during the week is virtually confined to the possible developments arising out of current negotiations between the steel mills and the American Government regarding an agreeable adjustment of steel prices for domestic operations. The market has, to some extent, been of an open character, but competition has not been such as to create a serious cutting of prices. Scrap sales generally are contingent to general activity and with this of a very uncertain nature, the movement of old material is restricted to actual needs for immediate requirements. Local trading is light but steady. Some declines are noted in the iron list; heavy melting steel, with a drop of 50 cents a ton, is quoted at $9.50 per ton. Machine cast-iron and wrought iron pipe are both lower, the quotations of $17 and $8 representing a decline of $1 per ton.

ARE BUYING MORE NEW MACHINERY NOW

Dealers Find Trade Satisfactory In Amount of New Material That Is Called For

ORONTO.—Explaining why more business is not coming in has grown to be the chief pastime of several firms and individuals. They used to blame the war prices, the coming of peace, the fixed price list of steel and iron. In fact if there is anything that has not been blamed for the apparent holding up of freer buying we would be pleased to hear of it at once, so that it might be trotted out and the thing made unanimous.

Accept Steel Prices

The Canadian trade appears to have accepted it for granted that the prices named in the last schedule for steel are going to stand for some time. A nice volume of business is moving on this supposition. At the same time it cannot be urged that there is the freedom in buying that would be caused were there more confidence that the prices would not be lowered for some time to come. Even the warehouses, although buying fairly heavily, are not going into the market in the way in which they did in pre-war days. They make their orders up and bind the mills down to deliver in a specified time, usually not more than three weeks away. There are none of the big, old-time orders going to the mills which they could fill at their leisure, and which could always be counted upon to keep the plant running close enough to capacity to keep production costs within proper limits.

It is a fact, though, that the bridge and structural end of the steel business is just where it was when the war stopped. Nothing is moving. This is probably due to the fact that the building trade is not brisk. Many lines are tied up with this. For instance the building of safes and boilers for large office and apartment buildings used to call for a large tonnage of steel plate, but there is nothing being ordered in this line at present, and there are no indications of an improvement in the immediate future. Then, again, people talk of peace not being fully established, about the chances for the Western crops, and a hundred and one things. In fact a number of firms are making their chief indoor pastime hunting up reasons for not coming into the market as good sized purchasers, instead of following along with the hand-to-mouth policy.

The Old Country Material

The settling down to peace lines is bringing several things to light, and one of them is that Old Country iron and steel is going to have a stiff fight to win back the market that has been lost during the war by the inability of the Old Country producers to get their material on the market here. Before the war there was certain lines of hand-made iron chain, bars, etc., that were in great demand. They were well-known British lines. In fact some of the railroads used to give three options as to what irons could be used in their work, and all three of them were Old Country lines. Now, however, the price is at least 25 per cent. against the British goods. It may be that the conditions that are causing these high prices in the Old Land are more or less temporary, and that with the return of more normal conditions they will be able to come in here "at a price," but for the present they are too high to get much of the trade.

Buying New Machinery

Although there are not a large number of concerns in the market now for new machinery, those that are buying are taking on large amounts. Dealers report that there has been more new machinery bought during the past months than for any two months since the signing of the armistice. The feeling will not down, though, that prices are too high. Buyers will pay a reasonable advance on pre-war rates, as they can see and understand why the price should be higher, but when it comes to selling a machine now for around $1,000 that used to go on the market for between three and four hundred, they begin to find fault, and the result is that many of them look for used equipment or else stay out of the market entirely. Makers of machine tools fear labor difficulties, it is said, and must maintain a safe margin on which to work.

But prices show little inclination to step down. In fact they refuse to budge, although in a few isolated cases some lines have receded about ten or fifteen per cent., but are still away high to the levels that were maintained before the coming of the war.

A Dull Scrap Market

"Things are no worse or no better than they have been for some weeks past." That is the way the largest dealers in the district size up the situation. Dealers are taking on such material as comes in at the prices which are published elsewhere in this paper, but they are not keen to buy. They have to take on quantities at times just to let the trade see that they are in the market for material, and sometimes in order to protect their name and credit. As a general thing they do not want to buy, even at the comparatively low figures now quoted. Some of the smaller dealers still have in mind the high figures they were receiving for their material during the years of the war, while the ultimate user has in mind the much smaller figure at which he may have to sell the articles for which he would buy scrap material. Between these two points there is a big gap, and it has not been bridged.

The steel mills and the foundries are not buying anything to speak of. In many cases they are pretty well filled up, and added to that the rate at which they are consuming material just now is much smaller than it was during the period of the war.

Prices have not been changed at all during the last two weeks.

POINTS IN WEEK'S MARKETING NOTES

There have been no changes made this week in Toronto prices for steel, iron or scrap metal, and the general opinion is that prices as slated now will remain for some time.

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Dealers report that they have sold more new machinery during the last month than for any similar or longer period since the signing of the armistice.

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Orders that are sent in from this district to the steel mills are usually accompanied by a condition that shipment be made inside of two or three weeks. Although buying is fairly brisk, it is all conducted on the hand-to-mouth order.

—

Old Country steel and iron goods are finding it hard to get re-established in the Canadian market, owing to the fact that their prices have increased more than those of competing countries for the Canadian market. On iron, British goods are still 25 per cent. too high.

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Pittsburgh reports that current bookings are not sufficient to account for anything over thirty per cent. of the capacity of the steel mills, but old orders bring the total up to around 60 per cent.

MAY DISCUSS THE PRICE OF MACHINES

Reductions in Machine Tools Have Not Been General, Nor Would it Help Selling

Special to CANADIAN MACHINERY

NEW YORK, May 1.—Nothing has occurred to change the machine-tool situation, which is largely one of waiting on the part of prospective buyers. Machine-tool sellers are assiduously following up their inquiries, but comparatively little business is being placed. The whole business situation is quiescent, and it is not expected that machine-tool buying will be greatly stimulated until there is a general business improvement. These observations apply more particularly to conditions in the East than in the central West, for there is a moderate amount of new buying being done, principally by automobile and tractor interests, though at Chicago a variety of industries have come into the market, such, for example, as manufacturers of washing machines, wrapping, candy and baking machinery.

There are no developments in the price situation. The recently reported reduction in the prices of engine lathes has not brought forth reductions on any other lines. The opinion of some in the machinery trade is that no trade will be gained by price reductions, and it is predicted that many manufacturers will stand pat on present prices, at least until July 1. There will, however, be a discussion of costs of production at the spring convention of the National Machine Tool Builders' Association at the Hotel Traymore, Atlantic City, N.J., on May 12 and 13, and further reductions may follow that meeting. Many machine-tool builders believe that when prospective buyers actually need the tools they will buy them regardless of price.

Further conferences are to be held between the machine-tool dealers and representatives of the War Department to agree upon a plan for the disposal of Government second-hand machine tools. As reported last week the machine-tool dealers are standing firm for a 15 per cent. commission instead of the 7½ per cent. offered by the Government authorities.

Cable advices have been received from England that the embargo on the importation of machine tools has been lifted. This embargo has not operated seriously against some of the better known makes of American machine tools, which have been admitted quite freely under blanket permits. However, some of the lesser known tools have been excluded almost absolutely.

STEEL MILLS ARE NOT GETTING BUSINESS TO COME NEAR CAPACITY

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., May 1.—The stagnation in the pig iron, unfinished steel and finished steel markets has become more pronounced and at the same time it has become more remarkable, because with the opening of spring and the progress towards the peace settlement one would certainly expect greater activity.

Yet the fact is that merchant furnaces continue to blow out, one after another, and steel mill operations continually decrease, having now dropped to about 60 per cent. of capacity, and with at least half the production depending upon old orders, current bookings representing 30 per cent. or less of capacity.

These are conditions that might easily have been expected to obtain immediately after the cessation of hostilities, when war work must have been suspended very largely, and when time had not been afforded for consumers of iron and steel to get busy on peace work. Yet the showing has been that even three months after the signing of the armistice, in January, the average rate of steel production was 87 per cent. of capacity, production being now about 60 per cent. with prospects that if conditions do not change a rate of less than 50 per cent. will be reached in another 30 days.

The Price Muddle

There is disposition in many quarters to blame the lethargy in the market on the muddle made in Washington of the attempt to set prices. The program as originally announced seemed to call for price deflation in all lines, so that buyers could go ahead, but the Industrial Board shifted its ground and referred to the operation as being one of "price stabilization." Certain reductions, not as large as had been expected in many quarters, were arranged, and then the new prices are announced as being minimum for the remainder of the year.

It is quite unsafe to accept at par explanations American business men give for dullness in business, as has been proved, by subsequent events, upon many occasions. For instance, in say ten years before the war, there were several protracted cases before the Interstate Commerce Commission, the railroads desiring freight rate advances, and if business chanced to be always dull at the time, everybody said the trouble was the Interstate Commerce Commission; if they would only grant that rate advance business would boom. Men even set dates, and said that unless the decision should be reached by such a time it would do no good anyhow. When decisions were made, however, these same men scarcely took time to read the details of them, and business went on just as before. At other times it was the tariff that was holding business back. It is well therefore not to put too much stock in the talk these days that the muddle at Washington is responsible for dull business. The observation will be seen to be the more pertinent when it is noted that all the talk and criticism is levelled against the Railroad Administration, particularly Walker D. Hines, Director-General of Railroads, because he refused to endorse the Industrial Board steel prices and place orders at them. He refused to "co-operate." Practically nothing is said about the Navy Department, which did precisely the same thing, and worse, indeed, for the Navy Department formally threw out the bids for 20,000 tons of steel, stating that they were unacceptable because not competitive. The Director-General had not even asked for bids. Then Chairman Hurley, of the Shipping Board, announced that additional contracts for 2,000,000 tons deadweight of vessels are about to be cancelled because the war is over and the board can't go ahead at "war time prices." If all this talk were fair and sensible there would be equal criticism of all three departments, but the Railroad Administration gets it all. The explanation is not a matter of business at all, but of psychology. The Railroad Administration, the Navy Department and the Shipping Board all helped to win the war, and all are entitled to equal credit because they all tried to do their best. There was a big difference, however, in the psychological effect. The United States Navy, for various reasons, one of which is extremely obvious, stayed out of the United States. The Shipping Board sent its ships out of the United States. The railroads, however, operated all over the ground and everybody came in contact with them, experiencing much dissatisfaction in that contact. So Director-General Hines gets all the blame, and nothing is said about Secretary Daniels or Chairman Hurley.

"Open Market" Discussion

The trade talk is largely of "open market. There has been an "open market," so-called, in pig iron for several weeks, for for merchant furnaces lost little time in renouncing allegiance to the Industrial Board price schedule, being much dissatisfied with it because it reduced steel so much less, proportionately, than pig iron, and also because they held that for real activity business would have to get back to usual principles, which means an open market in pig iron, as always before the war, each district making its own prices under competitive conditions. However, so far as Western Pennsylvania and Ohio are concerned there has been practically no cutting below the regulation prices, which became effective March 21. The explanation is that there has been no inquiry large enough to make it worth while. A large sales office in this town reports its largest sales in the past week to have been in 100-ton lots, two such sales, other sales being of carloads. A large producer of basic and Bessemer pig iron had nothing larger to work on than an inquiry for 200 tons of high silicon Bessemer, which it sold, getting about the pre-war premium for the silicon, above the standard Bessemer price, instead of the fancy silicon differential prevailing during the war.

In steel products it is a matter of defining terms, whether or not there is an "open market." Many observers claim there is one, that many mills would cut the "official" prices if there were a good order to be secured thereby. But if one regards as "open market" one that really operates as such, sales being made at competitive prices, under the official prices, there is no such thing yet, because no such sales are being made. The selling, what little there is, involves the regular official prices, with perhaps here and there a little exception.

The question is how this situation will be resolved. If buyers, and particularly "investment" buyers, those that might engage in large construction projects, were to offer large orders and mention the prices at which they are willing to close, the steel producers would pro-

bably negotiate, but the buyer does not do this. Either he does nothing or he buys from hand to mouth, paying the price asked. If, furthermore, the steel producers were sanguine enough to believe that a large volume of business could be brought out by cutting prices and making a competitive market, they would doubtless do so. Judging by what occurred after the market was thrown open in February, 1919, after the famous "Gary dinner" movement, it requires about three months for the market to go through the racket and, having found its low point, begin an upward movement. The steel producers may like to have it thought that they seriously intend to hold present prices until buyers accept them and fill the mills with orders, but there is probably not a steel producer who really expects anything of the sort. All of them probably favor a break when the time becomes ripe, the question being when they will consider the time ripe. It may be in a week, or it may be in 3 months. Meanwhile there may be a particular advantage in holding steel prices firmly, to make the break the more impressive when it does come.

SCRAP IRON IS IN POOR SHAPE JUST NOW

Decided Tone of Weakness That It Is Almost Impossible to Shake Off

THE scrap iron market has again developed weakness, due to lack of demand. The reports from different United States points are as follows:

CHICAGO.—With the absence of trading prices have declined again. Delivery of the balance of former contracts is being found sufficient for the needs of consumers. What the railroads are offering is being taken up by dealers.

NEW YORK.—Prices generally are at last week's levels, though wrought pipe has declined a little. Outside of borings and turnings there is little demand. Most dealers are holding their stock rather than sell at present prices.

PHILADELPHIA. — The market is weak in practically all grades. Heavy melting steel is quoted at $15 to $16 delivered. Blast furnace turnings are selling at $10 to $11 delivered.

PITTSBURGH.—While there is little business prices are holding fairly steady, It is believed that the mills are using up their stocks, and in view of the fact that prices are at a level that matches the intrinsic value, further drops are unlikely.

CLEVELAND.—With a very slack market, dealers are making no effort to get rid of accumulations, believing that a rise will be evident in the near future. Consumers have enough scrap on hand to carry them on for some time, and are not anxious to buy just now.

BUFFALO.—While there has not been much buying the market shows a good tone. There is a fair demand for borings and turnings, and some enquiry for heavy melting steel. The indications are for a good amount of business in the near future.

CINCINNATI.—There is very little enquiry and all grades of scrap are weak. Dealers do not profess much hope for the future. Steel turnings and cast borings are somewhat stronger.

ST. LOUIS.—The market here is on the decline. Steel dropped $1 a ton during the week. What business there is is confined to dealers.

BIRMINGHAM.—Dealers are hoping for a better market, and in view of this are trying to buy some of the scrap the Government is offering. Pipe makers are enquiring for cast iron scrap.

BUYING PIG IRON IS BEING DONE IN ONLY VERY SMALL QUANTITIES

BUYING in the smallest possible quantities, and a still further decrease in production, are the features of this week's markets. More stacks are being blown out in the eastern districts.

Following are reports from various centres:

PHILADELPHIA.—Judge Gary has stated that the price plan is dead, which statement has roused some interest in the market. There has been some improvement during the week, some thousands of tons having been sold for prompt shipment. Producers are making just enough iron to cover their contracts, piling not being practical at present costs.

NEW YORK.—There has been a little better demand for spot buying during the week, most dealers reporting the sale of a few hundred tons. Several more stacks have been blown out. and others are expected to follow. Some small tonnages have been sold to Brazil, Argentine, Chile and China. Export to other countries is held up through high freights and other causes.

PITTSBURGH.—Production has been cut down to approximately 50 per cent. of normal in this district. Producers do not intend to pile iron. The new prices continue to be quoted, but it is thought that any large enquiry would bring a cut. At present enquiries are very sluggish. Two or three months of the reduced production would about even up the supply situation, as present stocks are high only in comparison with the small demand.

BUFFALO.—The view of furnace men here is pessimistic. Production is still on the downward path, several stacks being shut down. The feeling here is that artificial price fixing should be discontinued, and the market left to the ordinary laws of supply and demand.

CLEVELAND.—There is not much new business moving. Some makers have decided to adjust contracts to the new basis, as far as undelivered parts of the contracts are concerned. In one case a clause has been added that if prices go up in the open market, such addition shall be added to the $26.75 price, up to $31, the price which obtained before the reduction was made.

CHICAGO.—There is no alteration in the situation here since last week. There is little activity in the foundries, and production of pig iron is low. Contracts made with the idea of covering first half demands are likely to be sufficient for last half. The result is a stagnant market.

CINCINNATI. — The prospects of business here are very small pending some decisive action from Washington. Producers cannot see any way to lower prices with wages at their present level. There is a very light enquiry, consumers not being anxious to commit themselves far ahead.

BIRMINGHAM.—With stocks mounting in the furnace yards, further curtailment of production is anticipated. Sales are at a minimum and another stack is expected to go out shortly.

ST. LOUIS.—Lack of confidence in the market is shown by an almost complete cessation of business. Consumers are not getting orders, and in turn are not buying pig iron.

Economic Condition of the Chinese People

One of the Richest and Yet Most Undeveloped Markets and Nations in the World—Peculiar Customs Rulings—What the Canadian Manufacturers Ought to Know About the Business

By TRADE COMMISSIONER J. W. ROSS, Shanghai

WHILE China is a land of vast area and resources, with an enormous population, the consumption of foreign goods does not depend so much upon the desire of the people for many articles, as in their ability to pay for them. The purchasing power of the Chinese people is probbly lower per capita than that of any other civilized nation. It is therefore necessary that their whole economic condition must be improved if the trade of the country is to greatly expand. It is all very well to say that China has vast resources; but resources are of little value if nothing is made of them. The great bulk of the Chinese people live off the soil, and all of their exports to foreign countries are in natural products—tea, silk, beans, seeds, hides, skins and furs—yet agriculture is conducted in

the most primitive manner. New seeds are never introduced, and machinery not at all employed. The cotton seed annually sown has so deteriorated that it only produces about half a crop of cotton, having fibres so short that it has a very limited sale abroad. It is not that the land is overpopulated so much as it is underproductive, due to faulty methods of cultivation. Nevertheless, too many people are trying to live off the soil for the reason that there is no other employment for their labor. Millions of the inhabitants should find employment in working the mines now undeveloped, and other millions should obtain their living through various industrial occupations badly needed throughout the Republic.

Primarily the most pressing needs of China are:—

(1) A great extension of railway lines to enable far distant and now inaccessible provinces to convey their products to the markets of the seaboard.

(2) Government support and instruction in agriculture. This is of prime necessity. In particular the tea, silk and cotton industries all require special attention; and in respect to the former, unless some means are employed to improve the methods of cultivation and curing of tea, the industry is threatened with total extinction.

(3) The extensive mineral wealth of the country needs to be developed, and this cannot be done without the assistance of foreign methods and foreign money.

(4) The establishment of industrial enterprises of every conceivable kind. This is probably the most difficult of all the problems, but without such industries China cannot hope to advance very far, or the conditions of the people to greatly improve.

In order to bring this about encouragement will need to be given to foreign capitalists to induce them to make investments in industrial enterprises in the country. The present existing anomalous and absurd export duty and inland transit tax, as well as duty upon raw material, will need to be removed, and the country generally reorganized on common-sense and business-like lines, instead of the haphazard manner in which it is being run at the present time.

Industrial Enterprises

If China is to advance at all it must be along industrial lines in order that the pressure upon the soil may be relieved. It has frequently been stated that the Chinese are inefficient, but this statement is not literally true. Their mistakes in the management of industrial enterprises are not those of inefficiency so much as want of knowledge. Practically none of the people have ever had any instruction in technical knowledge, and extremely few of those who go abroad to acquire this form of education ever make any practical use of what they have learned upon their return.

Any knowledge which the Chinese have obtained in engineering and in technical methods, excepting railway engineering, has been derived from working in mills and factories conducted under European management, and most of this has been merely picked up and has little or no scientific comprehension at the back of it. The Chinese are admirable in their management of small affairs, but in the conduct of large enterprises they are completely at sea. They have not the genius for organization and leave too much to badly paid assistants. They do not understand how to eliminate waste, or how to utilize by-products. Their industries are nearly always under-capitalized, and so advantage cannot be taken of purchasing raw materials when markets are favorable. The above must only be taken as applying in a general way. There are some occasional apparently successful industries, but they are so few as to be exceptions.

Spread over the central parts of China in almost every large town are to be seen large factories which are either completely closed down, or, when running at all, only work a few months in each year. In one place it will be a cotton mill; in another a silk filature; in another a brick works or glass factory, or a paper mill. The history of nearly all their failures is as follows: A company is formed with either insufficient capital or a building is erected far too large for the requirements of the business. The industry is frequently established in a district where sufficient raw material is not always available. Consequently the works are idle many months of the year. No provision is made in the prosperous years for depreciation of buildings and machinery. Capital is diverted from one industry to maintain some other of a different nature. This is not an exaggerated picture, but is common knowledge of all who have resided in China for any length of time. This state of affairs is entirely due to lack of knowledge of industrial methods and the economies of modern business.

Customs Tariff

The Chinese customs tariff, which has been fixed by treaty with the various powers, is a 5 per cent. ad valorem duty only, which is applied to imports and exports alike. The port of Shanghai is the chief point of entry of all foreign goods imported into China.

In addition to the import and export tariff duties, there is a wharfage dues surcharge of 2 per cent. of the duty paid, the amount thus received being divided between the International French Municipal Councils and the local Chinese officials by an arrangement made in 1899. This is purely a municipal tax, and as a measure of convenience is collected by the customs at the time the duty is paid.

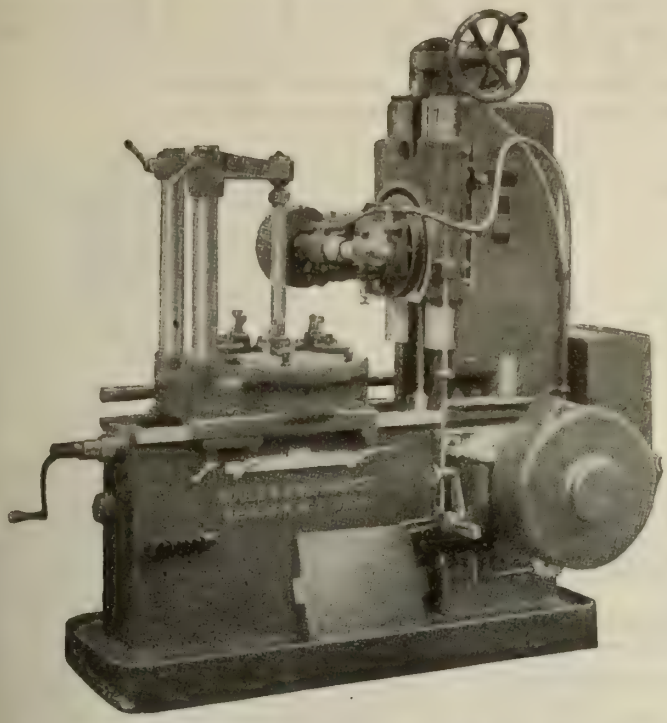
In addition, there is a conservancy tax of 3 per cent. of the duty paid, which is also collected in the same manner—and for the same reason—by the customs and remitted to the conservancy board of river improvement at the port of Shanghai.

The Chinese customs tarif is grotesque inasmuch as it penalizes China's overseas trade to the extent of 5 per cent. ad valorem on all exports. China maintains a most efficient and well-organized customs service of highly-paid foreign officials, whose whole time is spent in collecting a 5 per cent. ad valorem duty. The same organization could collect a duty of 10, 15 or 20 per cent. at the same expense. A large sum of money is urgently needed for harbor improvements at Shanghai, and the question has been asked: Where is the money to come from? What difficulty would there be in increasing the present small duty to 8 or 9 or even 10 per cent. and thus obtain the funds necessary? The increase would never be felt. Another peculiarity of the Chinese customs is a condition that probably does not exist in any other country. It is the tax on their own goods from one port to another within the country. Once a foreign-made article has been entered at a treaty port and the duty paid, it is free to be sent to any other treaty port without the payment of further dues; but a bale of Chinese cotton cloth manufactured in Shanghai, or any other article, if sent to Hankow, another port, must pay just as much duty as was paid by the imported article. In the matter of dues and duties there is no protection whatever or even encouragement given their manufacturers by the Chinese Government.

Trade Opportunities in China

Enough has been said to show the importance of China as a market for foreign manufactured goods. It is not so much the value of the trade to-day as the value that it must attain to with the coming years. If China is not advancing rapidly along new and modern ways, she is certainly not going back. There is evidence on every hand to show that advancement is being made, and the probabilities are that the progress from this time forward will be much more rapid than ever before; the present is therefore a most fitting time for those countries that are interested in the development of an overseas commerce, to make a study of this market and to familiarize themselves intimately with the country itself, its trade, resources, and people. In particular the actual position of China on the map and its relationship to other countries adjoining should be thoroughly understood. The location of the chief towns, as far as they are concerned in foreign trade, and the different rail and river routes, should be studied and made familiar; the products of the country and what China has to sell, as well as what it buys, should be known; for all such matters are of importance. A thorough knowledge of shipping routes, and shipping agents, and steamship lines, freight rates and tonnage, bills of lading, and

Continued on page 92



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SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	**11 00**
Tire steel	**5 50**
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Gueplh	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$19 00	$20 00
Electro copper	18 50	19 00
Castings, copper	17 25	19 00
Tin	60 00	58 00
Spelter	9 00	8 50
Lead	6 75	7 50
Antimony	8 00	8 50
Aluminum	35 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

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4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	17 00	14 00
Pipe wrought	8 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	12 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd. brass	net
Nuts, square blank	add $0 7
Nuts, square, tapped	add 1 0
Nuts, hex., blank	add 1 0
Nuts, hex., tapped	add 1 2
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and
Boiler rivets, base ¾" and larger	$8 5
Structural rivets, as above	8 4
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4
Cold pressed nuts over 1½ in.	add 7

BILLETS

	Per gross
Bessemer billets	$38
Open-hearth billets	38
O.H. sheet bars	42
Forging billets	51
Wire rods	52

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4
Cut nails	4
Miscellaneous wire nails	60
Spikes, ⅜ in. and larger	$7
Spikes, ¼ and 5-16 in.	8

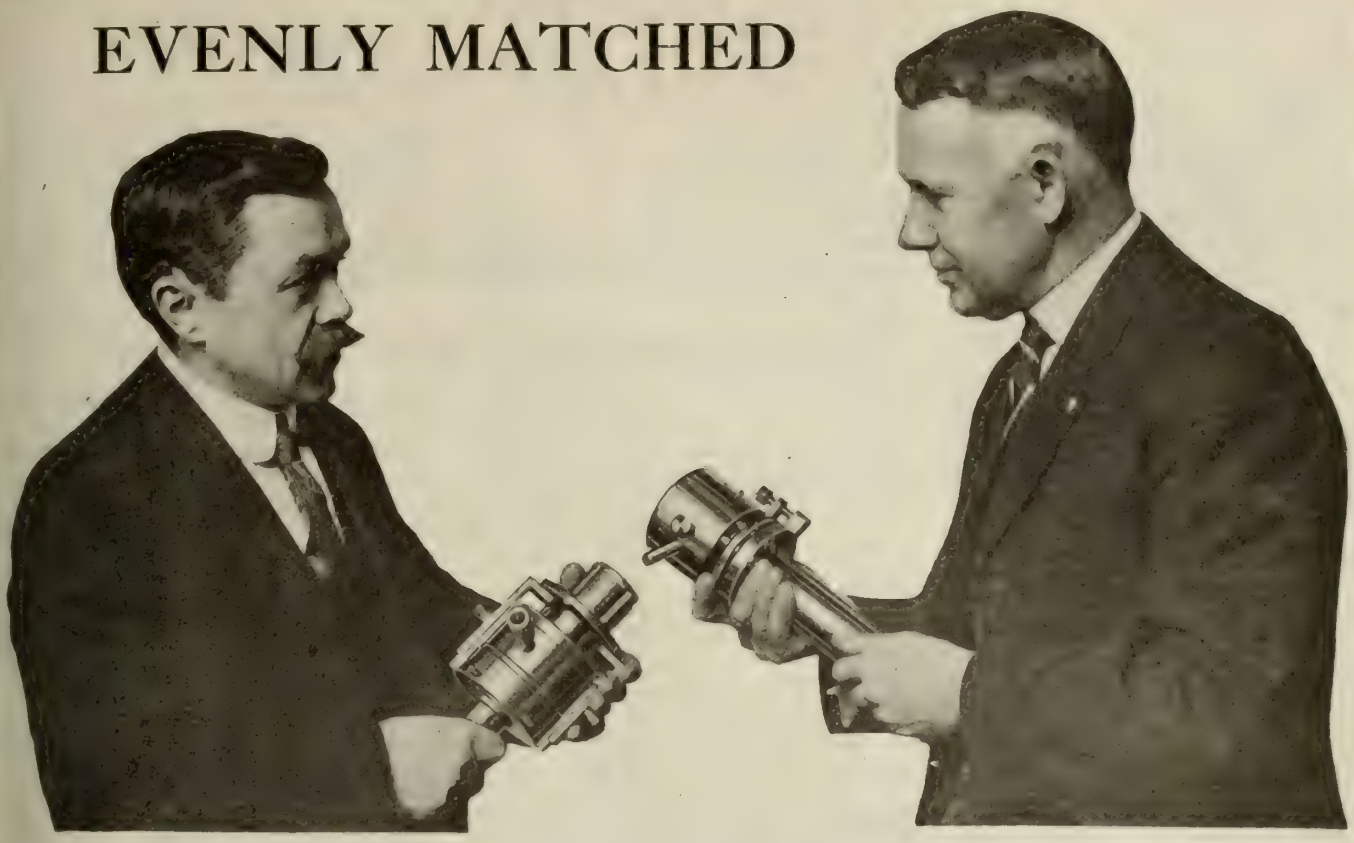
ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 45
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto

EVENLY MATCHED



The man who is tapping internal screw threads with a Geometric Collapsing Tap is evenly matched with the one who is cutting external screw threads with a Geometric Self-opening Die Head.

Commenting on the policy of THREADS, the monthly publication of The Geometric Tool Company, a London supporter of the Geometric method says:

"The policy you advocate as to work is good, yet you are inconsistent in making a tool that avoids it."

Geometric Self-Opening Die Heads and Collapsing Taps

Help You to Avoid Work by Doing It for You

The Geometric Catalogue will tell you how.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents: Williams & Wilson, Limited, Montreal; The A. R. Williams Machinery Co., Limited, Toronto, Winnipeg and St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks..list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 5%
At warehouse ..... list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head.28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Idea!	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

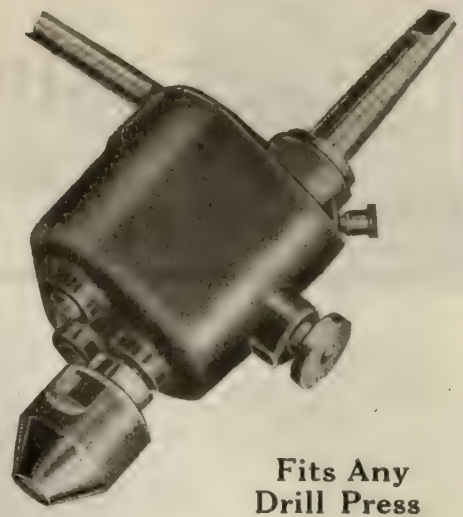
Prices per lb. unless otherwise stated.

TEN Tapping Jobs for Every ONE You Do By Hand

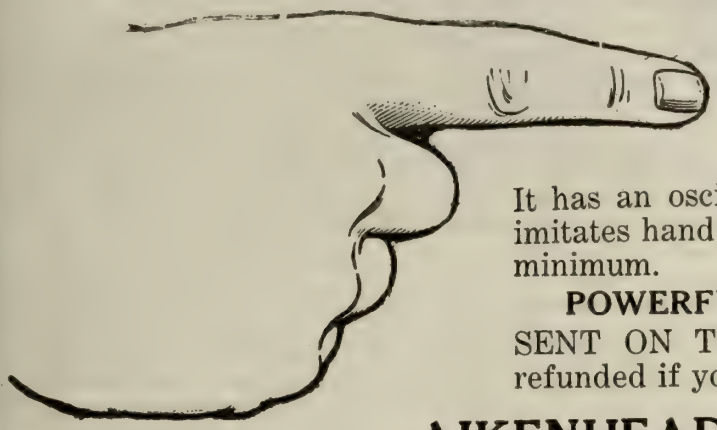
This is the Capacity of

Aikenhead's

Wahlstrom Attachment



Fits Any Drill Press



It has an oscillating movement which mechanically imitates hand tapping, and reduces tap breakage to a minimum.

POWERFUL, DURABLE, TROUBLEPROOF

SENT ON TRIAL. And your money is promptly refunded if you are not satisfied.

AIKENHEAD HARDWARE LIMITED

17, 19, 21 Temperance Street - - Toronto, Canada

Aikenhead's

"Preferred by men who know"

Van Dorn Portable Electric Drills

Van Dorn Electric Drills make neat, clean holes 50% faster than the best pneumatic drills.

Van Dorn Drills are both fool-proof and trouble-proof. ASK THE USER.

May we send catalogue.

Aikenhead Hardware Limited

17 Temperance Street TORONTO

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Halifax.—The congregation of St. Andrew's Presbyterian Church, at a meeting, decided to proceed at once with the erection of a new church building of brick and stone to cost about $130,000. H. G. Bauld, M.P.P., promised the first subscription of $1,000.

Worcester, Mass.—Sleeper & Hartley, Inc., Worcester, Mass. makers of high-speed automatic wire coiling machinery, have been successful in securing, through their French agent, Mr. Edgar Bloxham, an order from the French High Commission, for a very considerable quantity of wire nail machinery, amounting to more than one hundred machines, which, in addition to regular orders will make it necessary to practically double the staff and operate two shifts. This equipment will be used in reconstruction work in France. The project for a new plant, which was dropped last year, on account of the inability to secure building permits, has been revived.

Peterborough.—At a meeting of the board of works committee of the city council, which lasted until 2 o'clock in the morning, it was recommender that the Russell Townsend Co., of Toronto, be awarded the contract to build the new Hunter Street high level bridge, at an estimated cost of $249,000. At the same meeting Ald. Alex. Murray tendered his resignation, and is leaving for Scotland, where he hopes to regain his health. Ald. Murray was one of the four labor candidates elected by a substantial majority at the last municipal elections. He was an officer in the machinists' union of this city, and last summer was a member of the board of arbitration created to deal with the differences of the machinists and others employed by the Canadian General Electric Co., of this city.

Boston.—The management of Nova Scotia Steel and Coal Company is on the eve of important decisions as to policy, involving determination of the question whether the predominant side of the company's operations will be mining or manufacturing. Nova Scotia owns very valuable iron ore lands and submarine areas at Wabana, Newfoundland. It is conceivable that the company, possessing as it does advantages as to location, will in the not distant future be handling a big ore trade with Europe. But this development must await precise information as to the cost of laying ore down in England. With transportation such an important factor, this cost will naturally be more favorable to the company when the ocean tonnage situation has returned to something nearer normal than exists to-day. It is thus improbable that Nova Scotia will sell any considerable tonnage of ore for delivery in 1919, either to Europe or the United Staes. Nevertheless, in order to continue development of the mine, it is proposed to store a considerable quantity of ore at Wabana during the year. Nova Scotia lost by war or marine disasters four of its long-term chartered steamers, leaving it with one steamer of 8,000 tons under charter. The boats built by the company itself are of relatively small tonnage. As soon as ditions warrant it is proposed to charter or purchase ship tonnage required for coal and ore trade.

The Late JOHN H. HALL,
Founder of the well-known Brantford firm, John H. Hall & Sons, who died in the South recently.

TRADE GOSSIP

Will Buy Truck.—The most important item of business transacted by the Dunnville town council at its meeting was the decision to spend $1,200 on the purchase of a motor truck and hose for the Live Oak Hose Co.

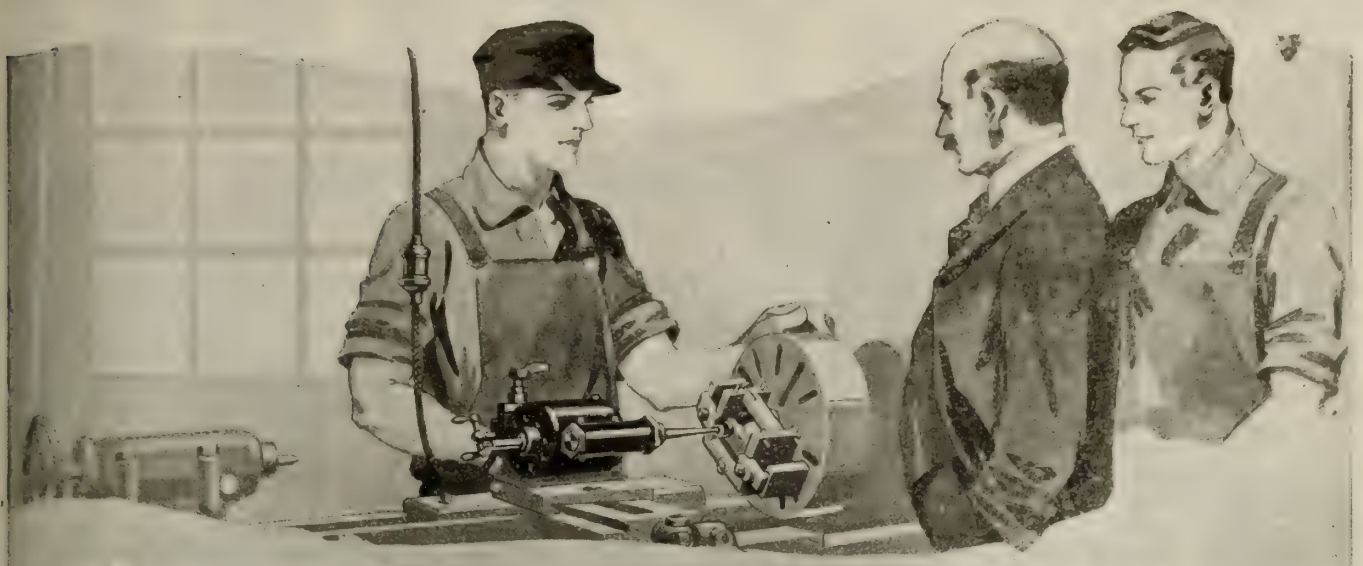
Gas Wells Sold.—The interests of the Canadian Gas Co., Ltd., in the Tilbury East Field, have been purchased by the Union Natural Gas Co., the deal involving about half a million dollars. The Union Co. also get control of certain wells and leases from which they have heretofore been buying gas under contract with the Canadian Co.

Paper Mill Planned.—The Spruce Falls Pulp and Paper Co. have decided on the erection of a large paper mill at Kapuskasing, west of Cochrane, on the line of the Government Transcontinental. After a tour of inspection of officials and engineers of the compay to decide on the location it was decided to start construction in May. A large part of the capital interested is American, while there are some Toronto and Ontario capitalists also holding stock.

Elcetrical Furnaces.— The Electric Furnace Construction Co., Finance Building, Philadelphia, reports a repeat order from the Ford Motor Co., for a "Greaves-Etchells" electric furnace installation. The initial furnace was installed last year and it is reported that it has given extremely good results. In England further orders have been received for furnaces from Woodward, Gatty, Saunt & Co., Ltd., Birmingham, and G. & J. Weir, of Glasgow.

Work for All.—The Chatham branch of the Ontario Labor Bureau are making preparations for finding work for all the returning veterans of that district. Labor conditions in the district are good, and employers have promised that former employees will get their old jobs back, and there are many enquiries from employers for skilled help, one demand from the Dominion Sugar Company being for three hundred men. There is also an ever-increasing demand for farm help.

First Coal Cargo.—The Dominion Coal Company's steamer, "Lingan," with a cargo of 7,000 tons of Nova Scotia coal, has arrived in Montreal, being the first coal boat of the season to reach there. The steamer Hochelaga, of the same service, is also due with a similar cargo. It is the expectation of the company to expedite the shipment of coal this season in order to obviate the heavy exports from the United States which were forced on the country by war conditions. This should operate to a marked extent



"There's only one way under the sun for us to do this job right—that's with a Dumore Grinder"

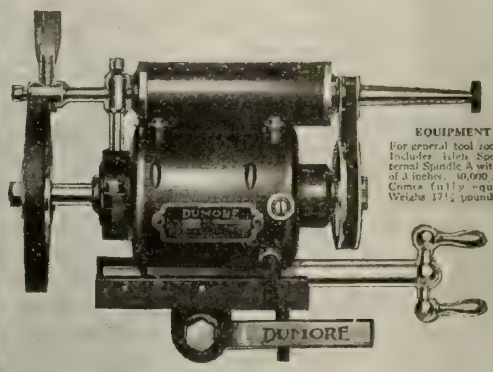
AN appreciation of its construction, plus a knowledge of its past performance, have created this unlimited confidence in the DUMORE grinder.

Accuracy in grinding is possible only with a tool that is mechanically right. The DUMORE, with its dynamically balanced armature and speeds ranging from 10,000 to 50,000 R.P.M. positively insures perfect work, free from chatter-marks, taper or bell mouth. It is light and portable and is the tool for grinding those "hard-to-get-at" jobs.

Vitally affecting the very volume of your production—in fact, back of the reputation of your manufactured products—is the quality of the tools you employ.

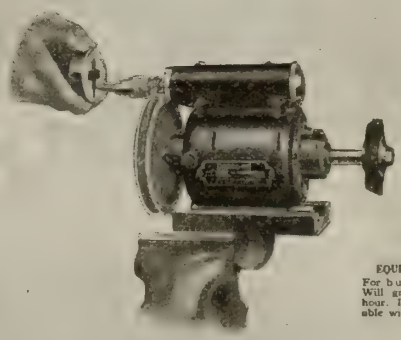
Is your tool-room equal to its task?

WISCONSIN ELECTRIC CO.
2911 16th Street RACINE, WIS.



EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 4 inches. 40,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.

EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS

in correcting the heavy adverse trade balance between the two countries.

Will Employ Many.—That Canada will be able to absorb all the available labor within the near future, was the opinion expressed by E. W. Beatty, K.C., president of the C.P.R. Mr. Beatty came here to meet the government. "I look for a decided improvement in the labor situation," said Mr Beatty. "I think everyone is looking forward optimistically. The present stress is gradually easing off and everyone is contemplated to step forward more briskly when the peace treaty is finally signed." Touching upon the recent announcement that the C.P.R. would make a determined effort to provide as much employment as possible, Mr. Beatty stated that preference would be given to the man who had served overseas. All former employees of the company who left to join the colors and who have applied for their old positions have been reinstated, while about 2,500 additional returned soldiers had been taken on the company's strength.

Export After Trade.—L. Allerton, representing the Nemours Trading Corporation, New York, an organization of manufacturers' agents for export trade, said at the Windsor Hotel, in Montreal, that he was in Canada for the purpose of getting in touch with the big manufacturers in order to arrange for exports of Canadian products, particularly to the British colonies. The firm had agencies abroad for American goods, but they felt that in Canada certain manufactures might better suit the people in the British colonies. Mr. Allerton felt that with agents abroad, constantly on the spot, and studying the needs of th people, there could be a great extension of Canadian business. The firm had agents abroad at advantageous points, and these kept the firm informed in respect to goods desired. In the work of reconstruction, Mr Allerton felt that both American and Canadian firms should do good business Mr. Allerton is calling upon our local manufacturers, but will leave in May for the purpose of opening up branch offices in Africa, especially at Durban and Johannesburg. Mr. Allerton has been handling export trade for years in various foreign countries for British and American firms.

Ball Bearing Manufacturers Combine.—Of interest to all users of bearings is the just announced reorganization, effective May first, whereby the products of The Hess-Bright Manufacturing Company, the SKF Ball Bearing Company, the Atlas Ball Company, and the Hubbard Machine Company will be sold through one central organization. The new company, under the name of SKF Industries, Inc. will thereby be able to offer a comprehensive line of ball bearings, including the Hess-Bright deep-groove type, SKF self-aligning radial and thrust bearings and ball bearing pillow-blocks and shafting hangers. Through the medium of its engineering organization, backed up by a well equipped laboratory, the new company will be able to place at the service of bearing users the knowledge gained in many years of anti-friction bearings of all kinds. On request, manufacturers' problems will be analyzed in detail and that type of bearing recommended which (independent of sales considerations) is best suited to the conditions met. In addition the laboratory staff will carry on research studies affecting anti-friction bearing design and application. The new company—SKF Industries, Inc.—will be under the direction of B. G. Prytz, President, W. L. Batt, Vice-President, J. P. Walsh, Comptroller, and S. B. Taylor, Sales Manager. The principal office will be at 165 Broadway, New York City, with branches at Boston, Philadelphia, Atlanta, Buffalo, Cleveland, Detroit, Cincinnati, Chicago and San Francisco.

PERSONAL

Frank J. Tone has been made president of The Carborundum Company of Niagara Falls, succeeding the late Frank W. Haskell. George R. Rayner has been made vice-president, succeeding R. B. Mellum of Pittsburgh. F. H. Manley retains the office of treasurer.

Lieutenant R. A. Fisher, U.S.N.R.F., for the past eighteen months connected with the Flying Corps, has joined the sales and engineering force of the J. R. Stone Tool & Supply Company, Detroit, Michigan. Lieutenant Fisher, before entering the Service was connected with the Curtis Aircraft Corporation and the Continental Motors Corporation, Detroit and Muskegon.

TENDERS

TORONTO. — The Board of Control adopted a motion by Controller McBride, aimed at contractors who are not Canadians. It was in the following terms and carried unanimously: "That during the reconstruction period, and until further action hereon is taken by the city council, no contract for the construction of any public work undertaken by the city shall be awarded to any person or company that were not bona fide residents or ratepayers in the Dominion of Canada continuously since 1914." After this Controller McBride strongly opposed awarding a contract for the St. Clair avenue storm sewer, at $73,165, to E. L. Reynolds, a former citizen of Cleveland, who has been living with his son here since 1912 "I intend to be a citizen of Toronto and I have made my home here," said Mr. Reynolds.

MARINE

St. John, N.B.—A steamship service, served with three steamers, will soon be operating between St. John and New York. The steamers will carry about three hundred tons each trip, and one will be en route, one loading at New York, and one unloading at St. John through the season.

London.—Five million feet of lumber are being made up into a huge raft which will be fitted with internal combustion engines and have accommodation on the deck for the crew. She will make the voyage to England through the Panama Canal, and when she reaches home will be dismantled and the timber distributed.

Cleveland.—There is quite a heavy demand for tonnage in the grain trade, and Julius Barnes of the United States Food Administration Grain Corporation has notified the Mobilization Committee of the Lakes Carriers' Association that boats to load 10,000,000 bushels will be wanted in the Lake Superior trade this month.

London.—It has been stated by the London Post Office that tests made in 1905 and 1906 proved that British mails landed at Sydney and forwarded by rail reached their Canadian destination a day earlier than by the St. Lawrence route. The Canadian Government is said to be considering the advisability of adopting Sydney as the permanent port for landing mail.

Victoria.—The official list of 23,000 ton full-powered wooden steamers under contract here for the French Government by the Laing Co., was announced. The company already has launched the Strassbourg, Metz and Mulhouse. The remaining ships are as follows: Canada, Montcalm, Wilfrid Laurier,, Ottawa, Winnipeg, Frontenac, Lasalle, Acadie, Montmagny, Alberta and Nouvelle Ecosse.

Montreal.—A company was incorporated last week, to be called the Canada Transatlantic Company, Limited, with a capital of $1,000,000. The company will be a connecting link between the Canada Steamship Lines and the Compagnie General Transatlantique. It will operate six steamships between French and Canadian ports of about 6,000 to 8,000 tons deadweight. The service will be put in operation about June next. This should lead to a large development of trade between Canada and France.

Washington.—The Shipping Board has formally approved of rates for shipment on the Great Lakes of coal, ore and grain. A meeting was held of the Shipping Board, the Food Administration Grain Corporation, and representatives of vessel owners and shippers. The rates agreed upon are as follows: Ore 80c per ton; coal 42½c per ton, and grain from Lake Superior to Lake Erie and from Lake Michigan to Lake Erie, April and May loading, 3½c and 3c respectively; September, October and November grain loading including winter storage of vessel 5c. The grain rates to Georgian Bay and Goderich were fixed at ½c per bushel; Port Huron ½c per bushel, and Collingwood ½c per bushel under the Lake Erie rate. The rate to Detroit was made the same as to Lake Erie ports.

Goderich.—Captain R. F. Pyette, of steamer Sarnian, was presented with a hat by the members of the Town Council of Goderich in honor of being the commander of the first steamer to enter the harbor this season. As his ship was also the first arrivals at Port McNicoll and Port Arthur this is the third hat he has received this season. The Sarnian had a cargo of wheat from Fort William.

Detroit Store 997 Woodward Avenue. Represented by A. C. Towne, Inc., Buffalo. New York Office, 141-145 West 36th St. Louis G. Henes, 75 Tremont St., San Francisco and Title Insurance Building, Los Angeles.

The captain said that the harbor of Goderich had been greatly improved by the outside breakwater, and he had no trouble in making port with a draught of 19 ft. 6 inches. The harbor could be still further improved by the extension of the north breakwater for 300 feet, and by slightly deepening the inner harbor. As it was it was the only safe harbor on Lake Huron for vessels of large draught.

Collingwood.—With the passing of Capt. Samuel Crangel, who died in California recently, a well-known figure in Great Lakes shipping circles has been removed. Deceased was 80 years of age and was one of the oldest masters on the lakes and had spent over 30 years of his life building freighters, among which were the Rosedale, G. R. Crow, W. D. Mathews, James Carruthers, and J. H. G. Hagerty. He was superintendent of the St. Lawrence and Chicago Steam Navigation Co., Vancouver. At a meeting of the Board of Trade held recently shipbuilding conditions were reviewed and a resolution was passed urging upon the Dominion Government the necessity of keeping its promises regarding ship construction on the Pacific coast. Mr. Tiers, secretary of the Wallace Shipbuilding Co., and Mr. J. J. Coughlan, both stated that the Government, when refusing the yards permission to take orders for foreign tonnage, had promised that they would be kept busy for at least three years on Government construction.

Deal Pending.—Sir John Gibson said in Hamilton that there was nothing new to announce in connection with the negotiations which have been in progress some time for the purchase of the National Steel Car Company by the American Car & Foundry Company.

Detroit.—Establishment of a World Peace Exposition in Detroit that will eclipse all World Fairs ever held in this country is planned. Announcement of the project was made by Mayor Couzens. The organization of the Exposition will be under the direction of Charles M. Schwab. Two or three years will be required to put the Exposition in shape, thus setting the date at 1922 or 1923. Millions of dollars will be required. Fred J. V. Skiff, director of Field Museum of Chicago, will draw plans for the Exposition. Mr. Skiff was manager of the Chicago, Buffalo, St. Louis and San Francisco Fairs. Charles M. Schwab has consented to come here, it is understood, and take the organization of the Exposition in hand. His record during the war in whipping the United States Government's shipbuilding program into shape is considered a guarantee of success.

Brantford Gets Interswitching.—After long and painstaking effort on the part of local manufacturers the interchange switching is now in operation between all lines entering the city. A new connection has been made between the Lake Erie and Northern and the Grand Trunk and a shipment of fifteen cars of hemp for the Cordage Company was the first to pass over it. The city now compares favorably with the larger Canadian railway centres.

Contract Awarded.—The contract for the building of the Educational Building at the Royal Military College has been awarded to Pigott and Healy of Hamilton, and work has been already commenced. The contract price for the erection is $323,000 and the building is to be completed and ready for occupation for the opening of the fall term of 1920.

Work to Start Soon.—Work is to be started shortly on the proposed Hydro line from Port Colborne to Bridgeburg, a part of the Toronto-Bridgeburg system. The entire cost of the system will be $11,000,000, but the amount to be spent on the frontier line has not yet been determined. There are rumors that the Buffalo & Goderich division of the Grand Trunk will be electrified from Bridgeburg to Port Colborne when that line is taken over by the Government.

Big Showhouse for Montreal.—A syndicate represented by Richard Wolstan, a hay and grain exporter of this city, has secured a piece of property in Maisonneuve, and contracts will be let at once for a temporary building. The plans are to have eventually an arena that will hold 20,000 people, and Maisonneuve was selected in preference to Westmount on account of the high cost or land in the latter district.

Canadian Credits.—There need be no fear regarding the security of Canadian credits advanced to Rumania, according to authorities in Paris, if there is no further delay. While the people are in great distress, if relief is afforded quickly there is every prospect of a speedy return to normal conditions. The army is well placed to deal with any threatened invasion of Bolshevist troops from Hungary or Russia, while there is no fear of Bolshevism within the nation.

BIG PLANS OF THE OLD COUNTRY FIRMS

Armstrong-Whitworth Have Amalgamated With A. and J. Main, of Glasgow

The firm of Sir W. G. Armstrong-Whitworth & Co., Ltd., has amalgamated with A. and J. Main, of Glasgow. The combination will be known under the title of Armstrong, Main and Co., Ltd.

This is the second big British engineering combination to be announced this month, the first being that of Vickers-Petters, Ltd. The fusion of big concerns having identical interests is becoming an outstanding feature of the reconstructional period.

The achievements of Armstrong-Whitworth's during the war include the turning out of 14,500,000 shells, 18,500,000 fuses, 21,000,000 cartridge cases, 12,500,000 rounds of field-gun ammunition, 6,000,000 projectiles, 1,075 aeroplanes, 47 warships, 600 merchant ships, 100 tanks and 13,000 guns and mountings, and three airships.

Among the firm's enterprises are a new steel and iron works, the enlarging of the company's shipyards on the Tyne for the output of all classes of commercial shipping, and the amalgamation already referred to of which the engine works' department and the manufacture of hydraulic cranes, dockgates, etc., is the subject. The manufacture of hand pneumatic tools is also to be largely increased and new and more efficient types of tools are to be produced, together with the supply of the whole of the necessary compressing plant for operating the tools. The existing machine-tool trade supplied from the Manchester works is being developed, and new shops and increased plant rapidly installed.

Conversion of works and plant is taking place on a large scale. Their projectile and ammunition works are being adapted for the production of all types of locomotives. It is anticipated that an output of from 300 to 400 heavy-type locomotives per year will be attained in addition to a big supply of narrow-gauge and yard locomotives. The first delivery of locomotives are due for the fall of this year.

The heavy naval and land gun mounting shops are being diverted for the manufacture of marine engines and boilers.

Arrangements are stated to be now in progress for the resumption of the construction of automobiles and electrical plant.

GODERICH HARBOR OPEN FOR SEASON

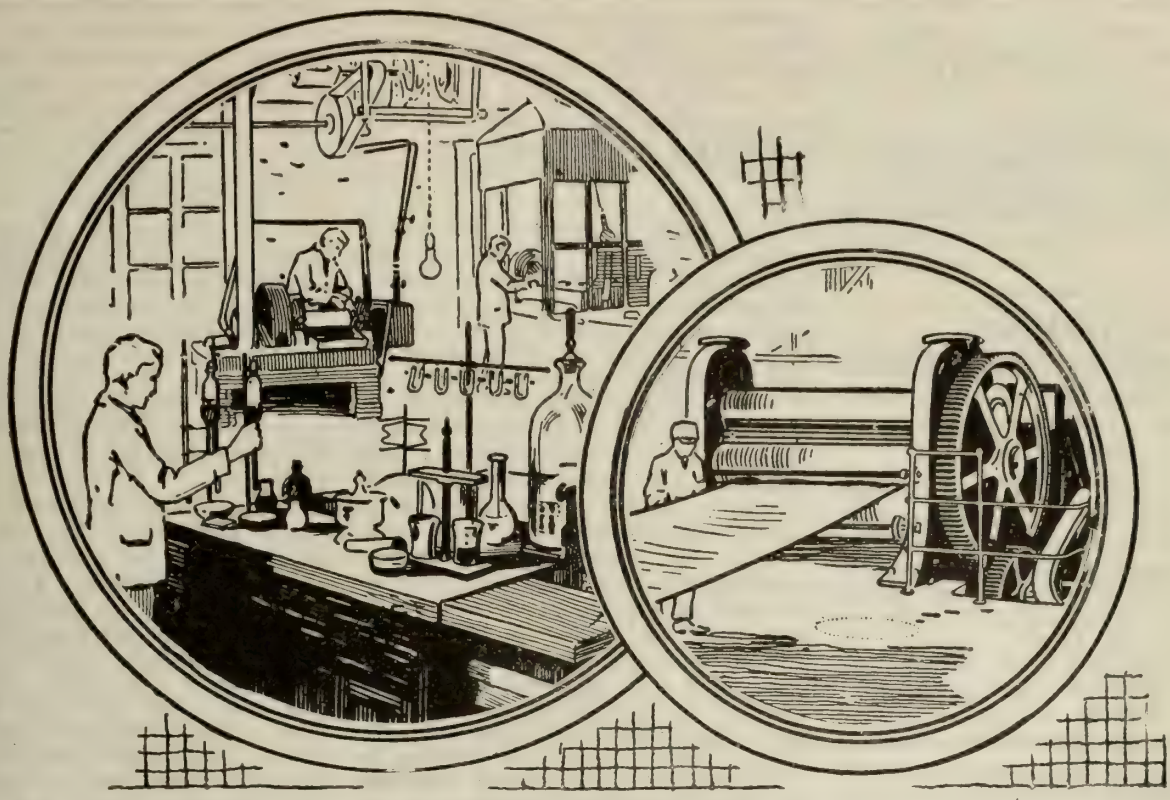
Busy Place Now That Navigation Has Started for the Year

GODERICH.—Navigation so far as Goderich is concerned opened this (Thursday) morning, when the first of the winter fleet cleared. For some time past work has been rushed aboard the four Canada Steamship Line boats, for instructions were to have them ready to proceed as soon as the insurance would become operative on April 15. However, it was noon of the following day when all repairs were completed. By this time the weather was not very favorable, with a strong gale blowing from the east which increased during the afternoon, and by evening a fairly heavy sea was rolling. Early this morning the wind shifted to almost south and at 9.30 the Martian, with Capt. McIntyre on the bridge, cast off her lines and started her first trip for the season. With intervals of a few minutes, the Bickerdike, Capt. Johnson; Midland King, Capt Aikin, and Ionic, Capt. Wing, left their winter berth for the head of the lakes. All these vessels will load grain at Fort William.

Superintendent McLaren, of the Canada Steamship Lines, has been in town for the past few days in connection with the clearance of that company's steamers which have wintered here. Mr. McLaren says that their entire upper lake fleet is now in commission.

To-day at noon when the unloading of the Negaunee was completed the last of the winter cargoes had been taken into the elevators.

There is very little stir on the three



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American vessels, Brietung, Negaunee and Central West. Only on the latter have the engine room crew arrived and they have quite extensive repairs to make. There is no definite information available as to when they intend to open the season, but it will no doubt be quite late.

The Algoma Central boats, the Agawa and Home Smith, have both their forward and after crews busy fitting out. It is expected that they will clear early next week.

TROUBLE COMING OVER BRIDGE ORDER

Injunction Talked of Because the Structure is Likely to Exceed First Figures

Peterboro'.—R. R. Hall, solicitor, served the city with a notice threatening to seek an injunction to restrain the city from entering into a contract with the Russell Townsend Company, of Toronto, for the construction of the Hunter Street overhead bridge, estimated to cost a quarter of a million dollars. In his letter, Mr. Hall states he is acting for Wm. Rudkins, a ratepayer. The grounds for the threatened injunction, according to Mr. Hall's letter, are based on the fact that only $260,000 was voted for the construction of the bridge, and that taking into consideration land damages and engineer's fees, this figure is likely to be exceeded, and that the Board of Works in recommending the acceptance of the Russell Townsend Company's tender on a lump sum fee, plus cost, have discriminated against several other contractors who tendered on the same basis. It is the intention of the parties supporting the injunction suit to make each member of the city council who votes in favor of the proposed agreement with the Toronto firm personally liable for any loss, costs or damages in excess of the amount originally voted for the work.

Mr. Hall also alleges that Mr. Frank Barber, the Toronto engineer in charge of the work, has not sunk any test pits to determine the depth to which the foundations of the several piers are to be sunk, and that the plans showing the depth to which the piers shall be sunk are wholly incorrect and the piers will have to be sunk to a much greater depth, which will very materially add to the cost of the construction of the bridge.

Mr. Hall states that the tenders that have been received by the Council of the construction of this bridge, exclusive of land damages, and engineer's fees, clearly exceed the amount authorized by the ratepayers to be expended in the construction of this bridge and even these twelve tenders that have been received are estimates only and are not in fact bona fide tenders that the contractors are willing to be bound by, as the lump sum cost of the construction of the bridge.

CHINESE PEOPLE

(Continued from page 450.)

insurance, are matters with which every shipper should be familiar, and terms of sale f.o.b. or c.i.f. accurately understood. The more one knows of a country the easier it will be to do business with that country, but this knowledge cannot be obtained without some thought and study

It is generally regarded that China presents the greatest undeveloped overseas market for foreign goods that exists anywhere. No one who has made a study of the question has any doubts upon the subject. It is inconceivable that 400,000,000 people inhabiting one of the most productive portions of the world can forever fail to be influenced by the activities of other countries and peoples. As it is, even during the period of the war, with many factors operating to prevent expansion, the foreign trade of China has yearly increased, reaching a maximum last year of over $1,000,000,000 gold, of which imports amounted to $597,000,000 and exports to $462,000,000. This is no inconsiderable volume of business, yet it only represents a per capita trade of about $2.50 per annum, or an import per capita of less than $1.50. Expansion and increase may perhaps be slower than in many other countries, for many factors are concerned in the problem; and undoubtedly the purchasing power of the mass of the people is lower than in almost any other country, but this must improve with time. The country is not over populated, but its methods of production are primitive and insufficient, and as before stated, transportation facilities are urgently needed, but in a measure this has been provided for, and will eventually be established. In order to carry out this, foreign material will be required, which Canada is in an excellent position to furnish in part.

Some Points Upon Overseas Trade

Overseas trade differs in many respects from home trade, yet in other respects it is much the same.

Very few Canadian wholesale houses attempt to do business at home by correspondence only, therefore why should they expect to do an overseas trade with foreign countries by methods which are found to be unsuccessful at home? It is unfortunate that business houses in China, with few exceptions, make little attempt to push the sales of any of the articles for which they are agents. They take on an agency for almost everything, but make little effort to push trade in the interior. There are some firms that employ travelling salesmen who make periodical visits to other ports, but their number is not great, and consist mostly of the representatives of drugs, soap, chemicals and dyes, biscuits, hardware and sundries. The cigarette establishments and the kerosene oil companies have their own resident managers and salesmen in all parts of the country. Nearly all advertising of special lines and proprietary articles must be done by home manufacturers. Personal representation then in many lines of special manufacture and new products is the means most likely to meet with success in establishing a connection in the China market. All manufacturers of such lines as building hardware, roofing, paints and oils, special machinery, gasoline engines, electrical supplies, enamelled ware and similar products, if desirous of or seriously wishing to develop an overseas trade should, if possible, send their personal representative over the ground at least once. It is quite impossible for any one to judge intelligently of China or the China market without having seen and investigated both for himself. The same also applies to the markets of Japan, the Philippines, the Straits Settlements and India.

The representative should not be too young, and should have an intimate knowledge of the business which he represents. If possible a principal or some member of the firm should be the first to visit the overseas markets. The firm would thus acquire a personal knowledge of the country and its trade conditions; they would also be able to form business connections and to establish agencies, which would be of value for future operations. In the machinery and engineering trades any representative sent abroad should have technical knowledge of the lines which he represents, and be able to talk with a clear understanding of his subject, for he must meet engineers and practical men, and be in a position to answer their inquiries and to meet their criticisms.

A FREE MARKET

All subsidies and control over prices and material with regard to orders for pig iron, manufactured iron and steel and tin plates will be withdrawn April 30, subject to provisions of existing contracts and any export regulations. This means that manufacturers and merchants in the United Kingdom are free to make their own terms with regard to price and delivery from May 1.

Mr. James H. Kelly, late engineer of the Brockville Waterworks, passed away at his home after an illness of four weeks. Deceased, who was 82 years of age, came to Canada as a child, settling with his parents in the little village of Bytown, now Ottawa. His father was a marine engineer, and the son followed in his steps. When still in his 'teens Mr. Kelly came to Brockville and entered the employ of Jones Bros., who conducted a forwarding business on the St. Lawrence and its tributary streams. He later became engineer with Chaffey Bros., whose shipyard was located on Gourlay Street, now occupied by part of the James Smart Mfg. Co. From there he went as engineer on one of the vessels of the Northern Transportation Co. their fine line of boats plying between Ogdensburg and Chicago. Retiring from

marine work he became foreman in the mechanical department of the Smart & Shepherd Foundry, and later the James Smart Foundry. He was appointed engineer of the Brockville Water Works in 1898, which position he occupied until his retirement. The deceased was a widower and leaves two sons and two daughters.

COURT FAVORS CANADIAN CAR CO.

Judgment in Protracted Case Has Been Given Against American Can Co.

Montreal.—Senator Curry, chairman of the board of directors of the Canadian Car and Foundry Company, received the judgment in the case of the Car Company against the American Can Company, which was rendered by the Appellate Court of the State of New York, in favor of the local company.

The amount involved, including interest, was about $750,000, and arose out of the famous Russian shell contract.

It will be recalled that the American Can Company entered into an agreement with the Car Company to make use of the fuse plant at Dayton, Ohio, for the filling of some of its own war contracts with the Russian Government, but when the Russian Imperial Government was overthrown the American Can Company desired to get a judicial opinion on the matter of payments to safeguard its own position. This was obtained in one of the lower courts in favor of the Car Company, but the American Can Company decided to carry the matter still higher, and it is this judgment which has been just received. Senator Curry stated that it was really stronger in favor of their company than the judgment of the lower court.

This disposes of the largest item still outstanding in connection with the Russian shell contract still to be settled. There is still a claim for approximately $200,000 arising out of tariff drawback on unexported shells, which has to be settled in the United States by a special Congressional bill, as there is no clause in the Tariff Act to deal with such a circumstance. The last Congress expired before this bill was completed, so that it will have to come up again at the next session.

These two amounts, with a few smaller ones, brought the total outstanding unsettled claims to slightly over a million dollars.

The University of Illinois, Engineering Experiment Station have issued Bulletin No. 107 dealing with the analysis and test of rigidly connected reinforced concrete frames. This publication is a valuable addition to the literature on the subject of the strength of reinforced concrete and gives the formula and results which have been derived for a number of very interesting conditions hitherto only determined by the means of very wide approximations.

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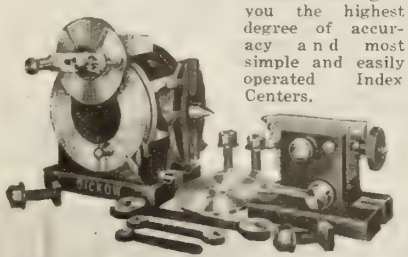

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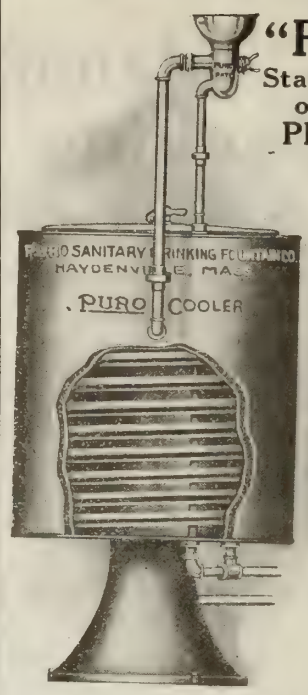

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TRADE WITH RUSSIA

NEW YORK.—Soviet Russia wants to buy great quantities of supplies in the United States, and if trade is opened is prepared to place at once in European and American banks $100,000,000 in gold to cover the cost of initial purchases,

This alluring avowal was made by L. C. A. K. Martens, who from temporary headquarters at 299 Broadway announced that he had received from Foreign Minister George Chicherin the appointment as representative of the Russian Soviet Government in the United States with instructions to negotiate for the opening of trade relations.

"To insure a basis of credits for additional Russian purchases in the United States," he said, "my Government is ready to submit propositions which I believe will be acceptable to Americans interested in Russian trade."

Mr. Martens was formerly a member of the Russian Social Democratic party and now amiably admits that he is a Bolshevist. No shooting irons are visible in his Broadway office. In fact, the first envoy of the new Government seems to be a man of peaceful disposition as well as of business directness. He is blue-eyed and light-haired and speaks English well.

He said that as a first step he had sent his credentials to Washington with a memorandum on Russian conditions and an outline of the desire of his Government to re-establish trade with the United States.

"The purchases I am empowered to arrange," he continued, "will be commensurate with the needs of the 150,000,000 people of Soviet Russia. Russia is now prepared to purchase in the American market great quantities of such commodities as railroad supplies, agricultural implements and machinery, factory machinery, tools, mining machinery and supplies, electrical supplies, printing machinery, textile manufactures, shoes and clothing, fats and canned meats, rubber goods, typewriters and office supplies, automobiles and trucks, chemicals, medical supplies, etc.

"Russia is prepared to sell flax, hemp, hides, bristles, furs, lumber, grain, platinum, meals and minerals."

In a short time, he said, he would appoint a commercial attache and open offices in New York for large scale purchasing headquarters. He was also planning to incorporate a "Board of Trade of Soviet Russia" to organize trade relations and furnish a medium through which American trade could get practical contact with Russian commerce.

Germany Not in It Now

Remarking that Russia before the war got the bulk of her imported manufactures from Germany, Mr. Martens said: "As Germany's production for a considerable time remains subnormal Russia is all the more an open market for other countries. In a trade sense as

well as in a political sense Russia is starting anew. It is quite obvious that the manufacturing nation that first secures a large amount of the Russian foreign trade at this time will be in an advantageous position for the future as well. I may state that large European manufacturers are already well informed as to the possibilities of trade with Soviet Russia and are laying their plans for it as soon as the present impossible blockade conditions are relieved.

FORT WILLIAM.—The Canadian Pacific Railway announces that, weather and ice conditions permitting, their first upper lake steamer for this season will leave Port McNicoll for Fort William Thursday, May 1, followed by five sailings each week thereafter. Freight for Port Arthur, Fort William and northwest points, is now accepted for routing via Port McNicoll.

Caustic Soda

There is only one safe and speedy method of handling caustic soda as received in iron drums. Punch two holes in the lid of an unopened drum, place the drum in a tank, cask or convenient receptacle. Send a steam jet by a pipe into one hole and open the valves. It is possible by this kink to make up 30 per cent. solution speedily and safely. To dilute is a simple matter and to duplicate strength a hydrometer is the easiest method. The weight of caustic being known and the capacity of receptacle the amount of alkali per gallon of solution is easily ascertained. The hydrometer used was graduated 1,000-1,200 and as the purpose in view involved very great dilution (about ½ per cent. being found sufficient) the solution was made up 1.200 in strength; a small measured quantity of the strong liquor being placed in a much larger measured quantity of water. Alkali, like all forms of grease, being now expensive and difficult to procure, it is thought that caustic can be substituted for milder alkali. such as soda ash, if the proper means of handling and using are set forth. As a grease shifter caustic is ideal, but it needs care and proper handling, otherwise injury may result to the experimenter unversed in its nature. A foot with strong boiling caustic liquor spilled over means painful burns and ruined foot-gear, while a spot or two drills holes in any woollen clothing; its action on wool is extraordinary and must be experienced to be credited.

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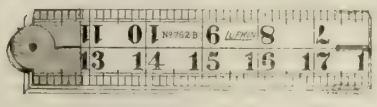

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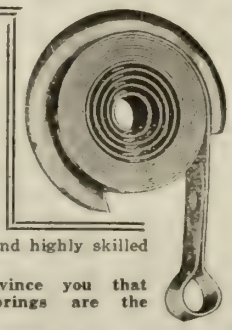

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Established 1857.
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218 South St., Bristol, Ct., U.S.A.
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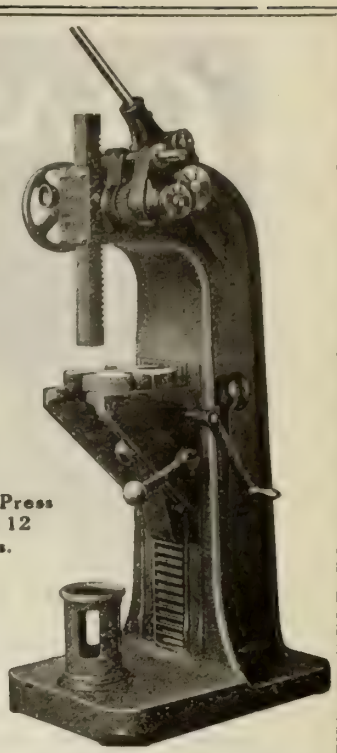
Springs, Screw Machine Products, Cold Rolled Steel and Wire



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10 to 12
tons.

Write for complete information on Atlas Arbor Presses. All sizes for all purposes.

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Kalamazoo, Mich., U.S.A.

Clear
Wired and Frosted
Portlights

ROBERTS GLASS BEVELING CO. INC.
RSG
TRADE
PORTLIGHT
MARK
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PROMPT DELIVERIES

Canadian Representative:

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ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

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WANTED—TWO TRAVELLING CRANES AND runways. Cranes to be from five to ten tons capacity with runways from 70 to 80 feet wide. Reply Box No. 571, Canadian Machinery.

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TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

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Large Quantity of
USED MACHINERY
In excellent condition.

Automatic and Hand Screw Machines
Drill Presses, Grinders
Milling Machines
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Elliott Woodworker
Automatic Screw Slotting Machine
Twist Drills
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P. W. Ellis & Co., Ltd.
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DRAFTSMAN WANTED

EXPERIENCED ON MACHINE TOOL DESIGN. Apply in confidence to Box 570, Canadian Machinery (c18m)

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Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works
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New and Slightly Used Machinery and Tools

1", 1½", 1⅝", 1¾", Turret Screw Machines.
No. 1, and No. 2 B.G. Automatic Tapping Machines.
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Floor and Bench Drill—Presses.
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ST. CATHARINES MACHINERY CO., LIMITED
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Used Machinery and Equipment for Sale

Acme Automatics.
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In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
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1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, Nova Scotia
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"Ask the Man Who Owns One"

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Three Step Cone or Selective Gear Drive

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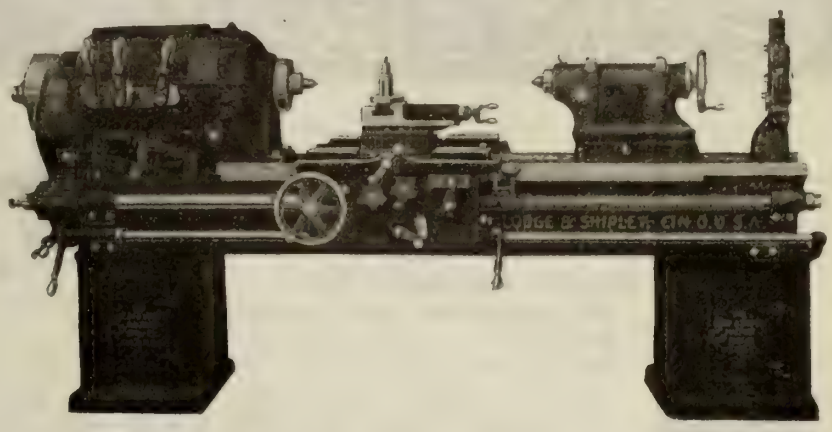

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"EVERYTHING IN METAL AND WOOD WORKING MACHINERY"

Free Tool Grinding Chart

SHOWS AT A GLANCE

Correct Clearance and Rake Angles for Cutting Tools

Grind your cutting tools in exactly the right way to get best results—and you save time. That's obvious. It is precisely that that this Tool Grinding Chart enables you to do.

It has been adopted as standard by many firms that found it a long way better than guess work.

CANADIAN MACHINERY would like to see this Chart in every shop in the Dominion. Mail the coupon below for your copy to-day.

CANADIAN MACHINERY,
153 University Avenue, Toronto.

Please send me/us free, one of your tool grinding charts.

Signed.....
Firm Name.....
St. Address.....
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PARTIAL LIST OF TOOLS

2—60" Bullard Vertical Boring Mills
1—60" Niles Vertical Boring Mill
No. 4—B. & S. Plain Miller
1—36" x 36" x 8' Gray Planer, two heads
No. 3—Cincinnati Universal Miller
5—No. 0 Steptoe Hand Millers
13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
14" x 6' New Carroll-Jamieson Quick-Change Lathe
15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
15" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 17"
17" x 8' New National Quick-Change Lathe
3—17" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 19"
17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 19"
18" x 24" New Rahn Larmon Lathe, D.B.G. Quick-Change
19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 21"
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25" x 14' New Sidney D.B.G. Quick-Change Lathe, swing 27"
33" x 14' Putnam, arranged fo. Motor Drive
6' Western Radial Drill
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100-lb. New Little Giant Hammer
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SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

Elliott & Whitehall Machine & Tool Co.

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MILLING CUTTERS AND SMALL TOOLS

We manufacture the following tools, etc.

Standard and Special Milling Cutters of all descriptions, Gear Cutters, Hand Reamers, Shell Reamers, Chucking Reamers and Taper Pin Reamers, Lathe Mandrels and Arbors, Metal Stamping Dies, Gauges, Jigs and Fixtures, Etc.

All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

ASK FOR OUR NEW CATALOGUE No. 10.

IN STOCK HERE

National High Speed Side Milling Cutters

6	Only	3½	x	⅝	x	1"	4	Only	5	x 1	x 1¼"
6	"	4	x	½	x	1"	2	"	6	x 1	x 1"
2	"	4	x	⅝	x	1"	4	"	6	x 1	x 1¼"
2	"	4	x	¾	x	1¼"					

National High Speed Slitting Saws

9	Only	2½	x	3/64	x	⅞	4	Only	5	x 3/32	x 1
10	"	3	x	1/8	x	1	1	"	6	x 1/8	x 1
20	"	4	x	1/8	x	1	4	"	6	x 3/32	x 1
12	"	4	x	1/16	x	1	12	"	6	x 3/16	x 1
6	"	4	x	3/16	x	1	6	"	6	x 3/16	x 1¼
6	"	4	x	5/32	x	1	2	"	7	x 1/8	x 1
20	"	4	x	3/32	x	1					

J. A. M. Taylor MACHINE SHOP SUPPLIES

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The REGO 100% Efficient Welding Torch

Saves Oxygen Eliminates Flash-Back Better Welding

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Plain Cylindrical Grinders

Built by

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TOOLS, DIES and GAUGES

Manufacturers of UNIVERSAL CYLINDER RE-BORING TOOLS.

Windsor Machine & Tool Works

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This space, small though it is, is capable of producing big results if used continuously and judiciously.

BATH Universal Manufacturing Grinders

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And Machine Work of all Kinds

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When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

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GALT MACHINE SCREW CO., LIMITED
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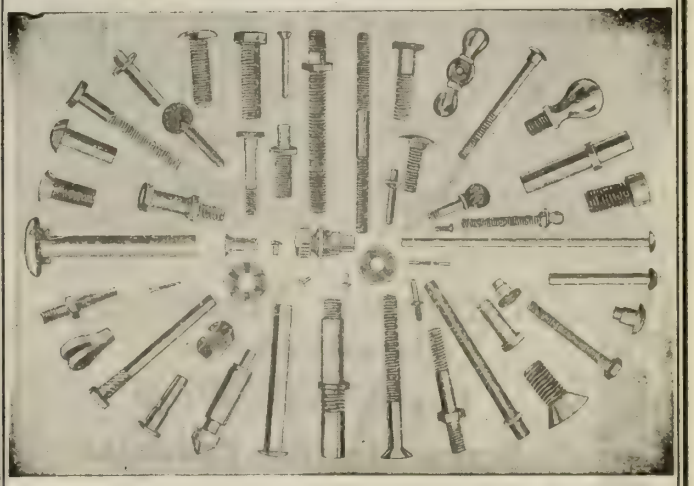

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ACCURACY Products QUALITY

Our Mechanical Engineers are at the service of our Clients.

United Brass & Lead, Limited
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W. L. TOBIAS, *Superintendent*
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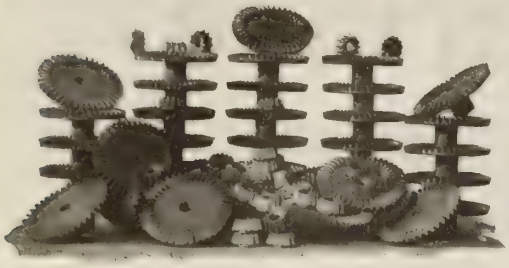
Bevel Gears of Quality

CUT GEARS



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SPECIAL MACHINERY

Built to Order

Also gauges, punches, jigs, dies, small tools, etc.
Prompt Service.
Moderate cost.
Send Blueprints for estimate.

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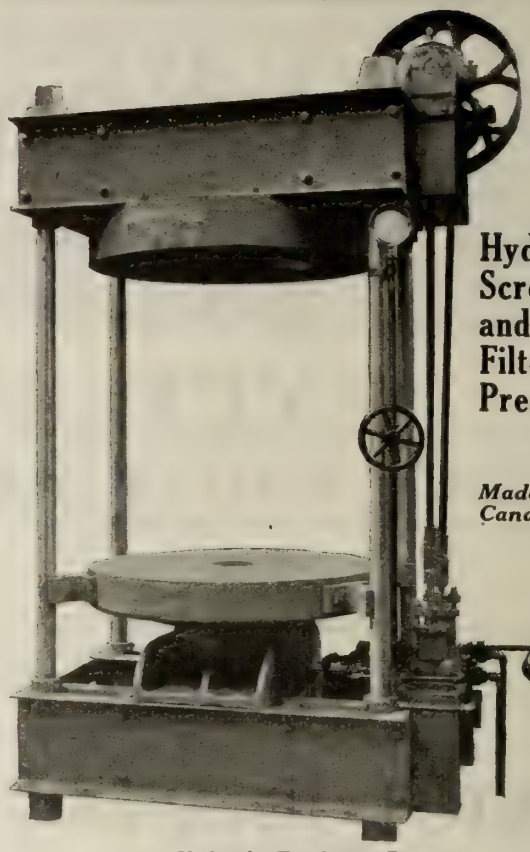

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Made in Canada

Hydraulic Truck Tire Press
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Automatic Machinery
for all purposes

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Consult us on your machine problems

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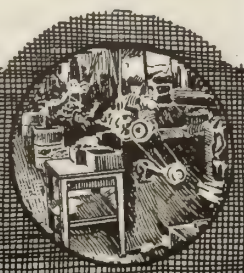

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

THE FINANCIAL POST
OF APRIL 26TH CONTAINS:

DOMINION STEEL'S SHIP PLATE DEAL

Arrangement Promises to Work Out Well for Company and Shareholders

The continuance of work on the Dominion Steel Corporation's rolling mill at Sydney, N.S., brings to mind that this company has a very favorable agreement with the Dominion Government, and one which should be a good thing for the shareholders.

The company agrees to make plates (basic open hearth) to such thickness or size as required for shipbuilding, the Government to purchase 250,000 gross tons, and have the option of increasing the amount to 375,000 tons. Deliveries are to be made at the rate of 50,000 tons per year, the Government retaining the option of increasing this to 75,000 tons per annum.

The price for such plates is $4.15 per 100 lbs., or $83 per ton, and provision is made that this price may be increased to $4.25 or $85 per ton.

You will find further interesting matter on this subject in THE POST of April 26th.

Farmers, Trusts, and Publicity (Editorial) .....

The Five Best Industrials .....

United Hotel Co.'s Deal for Clifton Patronage and the National Forest Menace .....

The Steel Trade Items Here Reproduced Also

A Commission Like Ontario's for Nova Scotia .....

Commission of Utilities in B. C. and New Capital .....

Government Failure in Operation of U. S. Railroads .....

Dominion Steel Strikes Hard at Scotia's Claims .....

Rubber Company Has Record Year —49% on Common .....

Price Bros. & Co. Show Nearly $1,500,000 Profits .....

Sawyer-Massey Adopts a House-Cleaning Policy .....

Production of Mining Corporation of Canada Falls Off .....

Bank Clearings Were Affected by Holiday .....

Higher Savings Balanced by Current Loans .....

Says Banks Are a Handicap to Retail Section .....

How is Germany to Pay Billions of Indemnity? .....

Opportunities for Business in Balkan States .....

How to Float Foreign Bonds is a Problem .....

Conditions Are on Quiet Side in Bond Market .....

S. Vancouver to Consolidate its Tax Arrears .....

THE PRICE FOR STEEL SOON TO BE ADJUSTED

Between the United States Railroad and Industrial Boards

NEW YORK.—From a technical market standpoint, according to Hayden, Stone & Co., the most encouraging event of the week was a new high price on this movement for Steel common. The figure reached is the highest since last November. Undoubtedly this anticipates an agreement between the railroads and industrial boards on the price level for steel. This is one of the acts to which the market has been steadily looking forward. It will be important, not only in the material improvement which it should shortly bring about, but even more for its psychological effect. No doubt it will be shortly followed by an agreement on the price for coal.

You will find further interesting matter on this subject in THE POST of April 26th.

Regina's Tax Rate Boosted by Five Mills .....

Beck's Tactics Give N. Toronto a Bad Setback .....

Saskatchewan Dealers in Farm Lands Organize .....

Steel Confusion Now Increased by Naval Board .....

Business Building News Items Appear Each Week in *The Financial Post*

The above are only a few of the many subjects of real profit-making interest to Canadian men of affairs which have been dealt with by expert writers and editors in THE POST of April 26th. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

The MacLean Publishing Co.,
143-153 University Ave., Toronto.

Send me THE FINANCIAL POST every week till further ordered. I will pay subscription price, $3.00 per year, on receipt of bill, or you may draw on me for this.

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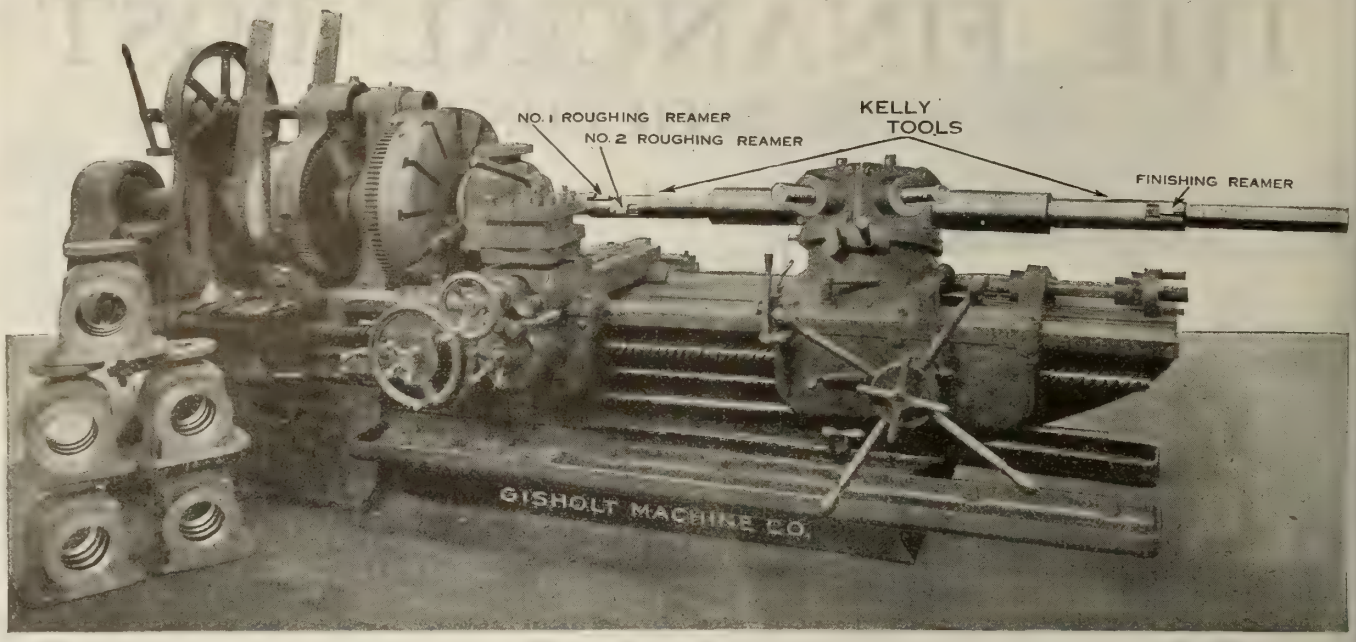


Kelly PRODUCTION Tools

Kelly tools are shown above in operation upon a 24" Gisholt Lathe. The steam engine valve chests, being machined, are of cast iron and are rough bored and semi-finished with two reamers in one bar. They are then reamed with finishing reamer in the other bar. These reamers, being properly piloted, pass over three ports and give a true, smooth hole to close limits.

The hole is approximately 5½" diameter. By inserting a different sized set of reamers IN THE SAME BARS, a much larger sized job of a similar nature is performed.

These reamers are all ADJUSTABLE and have REPLACEABLE HIGH SPEED OR STELLITE blades.

KELLY TOOLS WILL SAVE EXPENSE AND WORRY

DELIVERIES 1-10 DAYS

Send for our Catalog J-4

The Kelly Reamer Company

CLEVELAND, OHIO, U.S.A.

AGENTS:

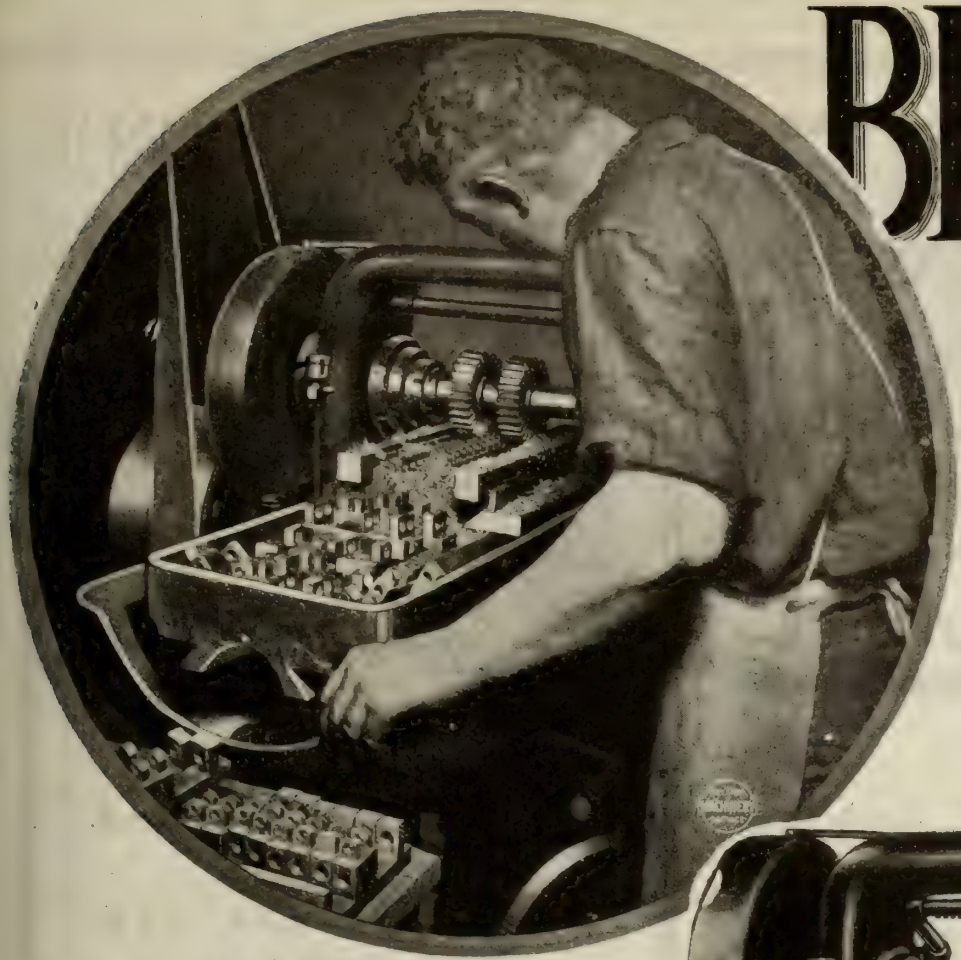
Western Can: Canadian Fairbanks-Morse Co., Winnipeg. London: Burton, Griffiths & Co., Ltd.
Paris: Burton Fils Latin America: Fox Bros. & Co., New York City
Stockholm: G. A. Lindstedt & Co. 40 Domestic Agencies

BRIGGS

MILLER

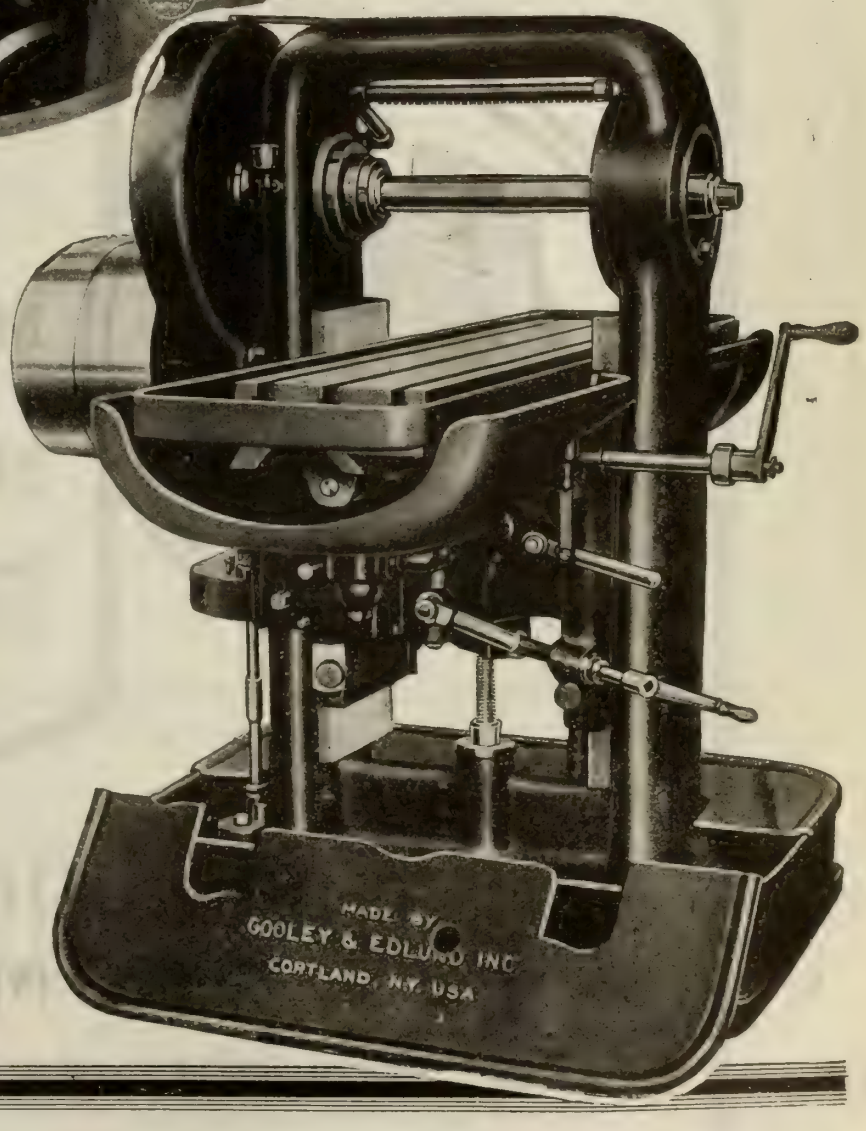
Breaking Production Records

Forcing the feed on the "BRIGGS" to an extent impossible on any other machine.



THE photograph shows twelve belt lacer jaws clamped together on the table of a Briggs Milling Machine, where two straddle-mounted cutters mill the channels at one setting, though the stock is cold rolled steel, one inch thick. 15 minutes completes the operation, this speed being attained by forcing the feed to an extent impossible with any other milling machine. There is no chatter—the surface is "finished" when it comes from the machine.

Rigid, powerful and easy to operate. Takes wide, deep cuts without showing least signs of distress, and will produce accurate work when running at a high rate of speed.



Gooley & Edlund, Inc.

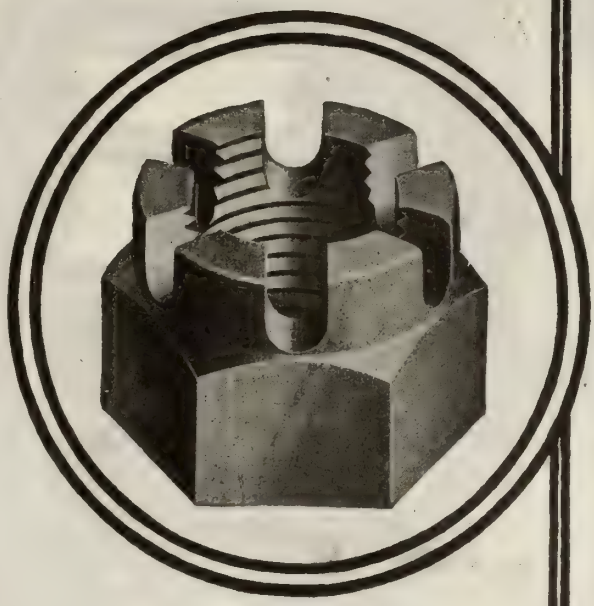
Cortland, N.Y., U.S.A.

Williams & Wilson, Ltd., Montreal

FOREIGN AGENTS:—Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia and Barcelona; C. W. Burton Griffiths & Co., London, Manchester and Glasgow; Andrews & George Co., Tokyo, Japan.

SCREW MACHINE PRODUCTS

STANDARD OR SPECIAL



READY FOR DELIVERY

NUTS—Plain—S.A.E.
Castellated—S.A.E.
Semi-finished—V—U.S.S.

SCREWS—Cap V—U.S.S.—S.A.E.
Set—U.S.S.—V.

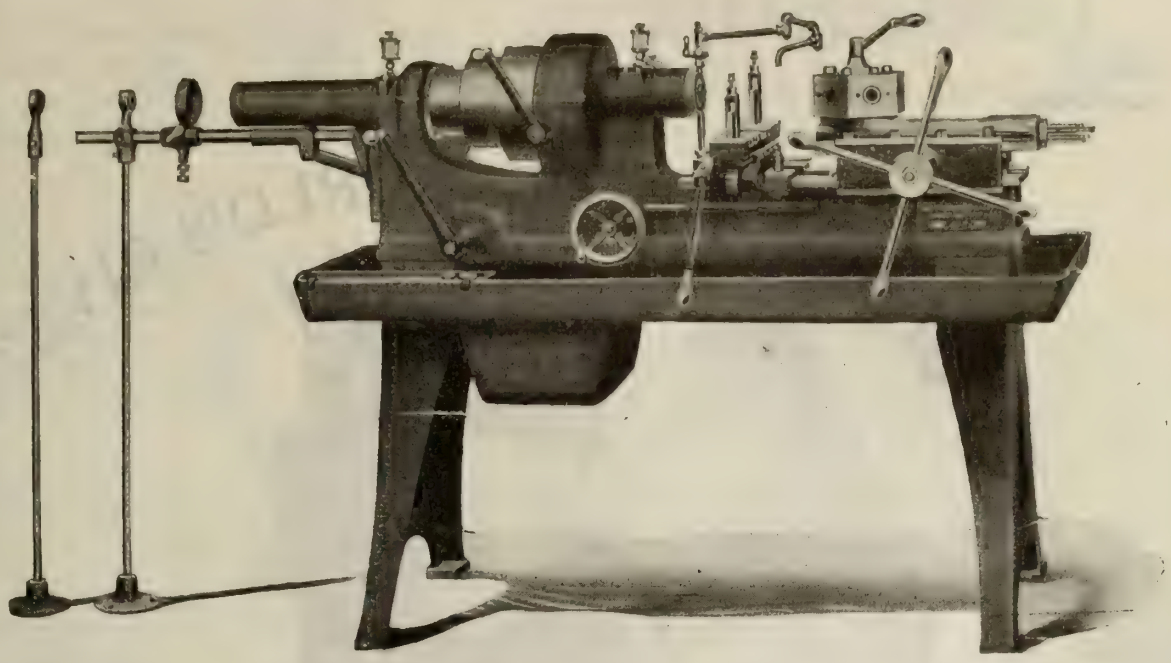
MADE TO SPECIFICATIONS

Special Screw Machine work, sizes up to 2¼" diameter, 10½" long.

NAMCO

THE NATIONAL ACME COMPANY

DE COURCELLES & G.T.R. MONTREAL P.Q.



No. 2 Turret Screw Machine

The No. 2 Turret Screw Machine is particularly fitted to small parts manufacturing. Many fuse parts and adapter contractors have used large batteries with marked success. Now you will find them just as profitable and reliable for your peace work.

The machine is built with both plain head and geared friction head construction. The geared friction head adapts it particularly to threaded work up to the capacity of 1 in. x 6-in. for alloy steels and other tough metals requiring the power obtainable through this construction.

With our increased output we can quickly equip you, and, as with all W. & S. machines your production can be speeded by equipping from our immense stock of standard tools.

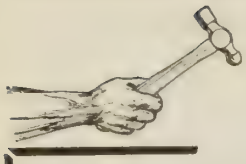
Turret Lathes and Screw Machines from 5/8 in. x 4 in. to 4 1/2 in. x 44 in. bar capacity. Maximum swing 21 1/2 in.

THE WARNER & SWASEY COMPANY

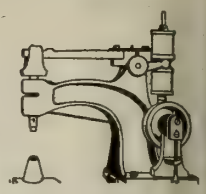
CLEVELAND, OHIO, U.S.A.

New York Office—Singer Building. **Boston Office**—Oliver Building. **Buffalo Office**—Iroquois Building. **Detroit Office**—Ford Building. **Chicago Office and Show Rooms**—618-622 Washington Blvd.

FOREIGN AGENTS: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Allied Machinery Company, Paris and Turin. Van Rietschoten & Houwens, Rotterdam. Yamatake & Co., Tokio. Benson Brothers, Sydney and Melbourne. A. Asher Smith, Sydney. A. R. Williams Machinery Co., Ltd., Toronto, St. John, Winnipeg and Vancouver. Williams & Wilson, Ltd., Montreal.



THE PRINCIPLE IS RIGHT
THE HAMMER WITH THE HUMAN STROKE



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THE HIGH SPEED WAY; DOING THE WORK OF FOUR HAND RIVETERS

THE HIGH SPEED HAMMER COMPANY, Inc.

ROCHESTER, N.Y., U.S.A.

The High Speed Hammers

HEAD RIVETS COLD

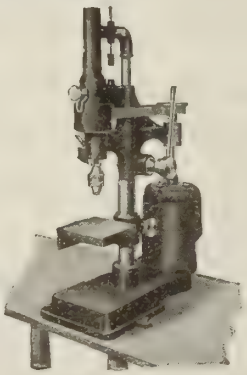
Tight or Loose, Flush or Countersunk or Finishes Heads Any Shape Desired at the rate of:

A Rivet a Second up to 3/16"
A Rivet in 2 seconds, ¼" to ⅜"
A Rivet in 3 Seconds, 7/16" to ⅝"

BUILT IN 8 SIZES

To head rivets cold from the smallest to 1½" in diameter.

Send for High Speed Hammer Book



HIGH SPEED DRILL PRESS

MODEL E-50 HIGH SPEED

MOTOR-DRIVEN
BALL-BEARING

Sensitive Bench Drill Press

SPECIFICATIONS:

Height Over All	24"
Base	7½x18"
Diameter of Spindle	7/16"
Spindle Feed	2¼"
Weight	62 lbs.
Capacity	From Smallest to ¼" Drills

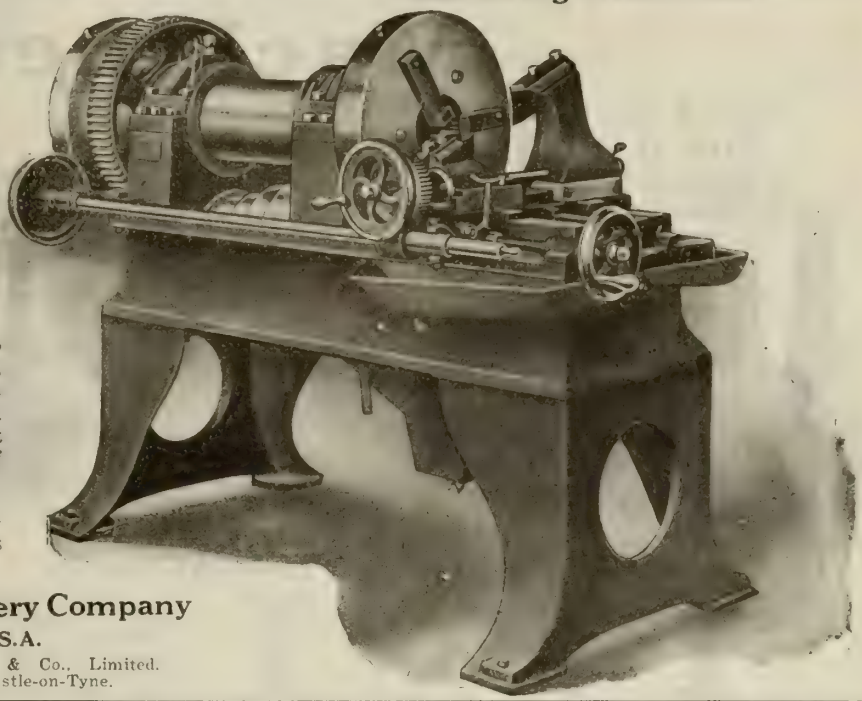
Send for High Speed Hammer Book

Exclusive Arrangements Considered Only With Organizations Prepared to Carry, At All Times, Representative Stocks

Cut Your Cutting-off Costs in HALF

HURLBUT'S

Patent Cutting-off and Centering Machines



TO say that the Hurlbut, Rogers Cutting-Off and Centering Machine will **double your production** and **cut your costs in half** may seem like a broad claim. But this is just what this machine will do compared with any ordinary machine of its kind.

Hurlbut, Rogers speed and efficiency is easily explained. Instead of only one, it is equipped with two cutting-off tools —one cutting up and the other down. In this way they hold the work against each other and finish a job in just half the time and do twice the work.

You can't afford to be without this machine. It saves real money. Let us tell you more about it. Write!

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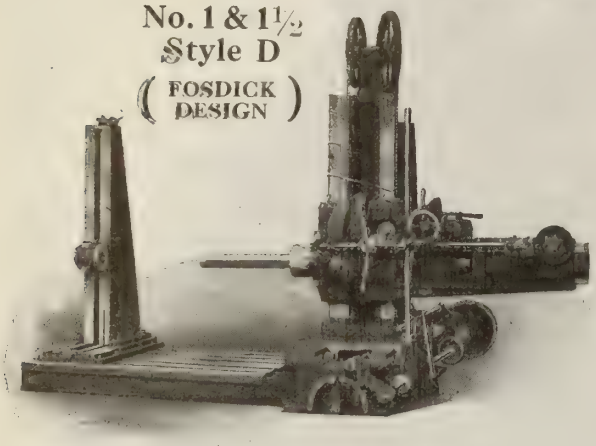
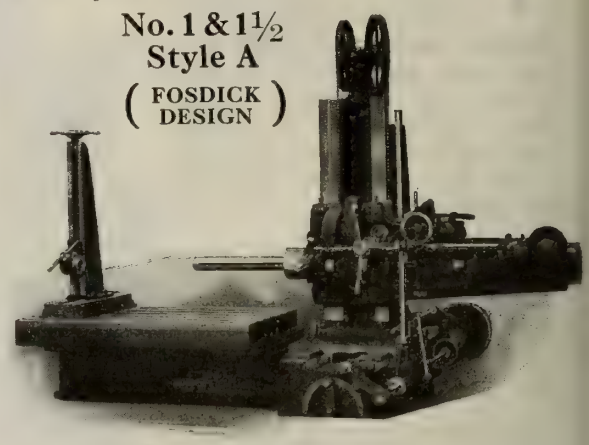
Machine's

No. 1 & 1½ Style D (FOSDICK DESIGN)



No. 1 & 1½ Style A (FOSDICK DESIGN)

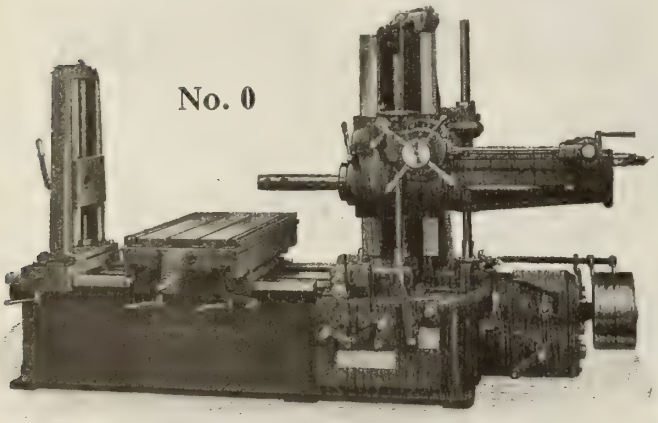


SPECIFICATIONS:

Size of Machine.	No. 1	No. 1½
Diameter of spindle	3½"	4"
Morse Taper No.	5	6
Traverse of spindle	28"	30"
Vertical adjustment of head	36"	54"
Horizontal adjustment of column	36"	62"
Maximum, work bed to centre of spindle (Style A)	44"	62"
Maximum, work bed to centre of spindle (Style D)	58"	76"
Size of work bed	42" x 72"	42" x 120"

Size of Machine.	No. 1	No. 1½
Speeds (4 to 255 R.P.M. geometrical progression)	12	12
Feeds, in all directions (.007 in. to ¼ in. per revolution)	8	8
Motor horse power	7½	10
Floor space	9' x 15'	11' x 19"
Total height of machine	8' 9"	10' 3"
Net weight (Style A machine)	16,000 lbs.	21,000 lbs.
Net weight (Style D machine)	15,000 lbs.	19,500 lbs.

No. 0



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G. & L. Machines are the master of the situation.

Their convenience, simplicity, easy control and great accuracy will prove invaluable to your plant.

Let us put some interesting facts before you. Write for full particulars.

NO. "4" FOR BIG WORK

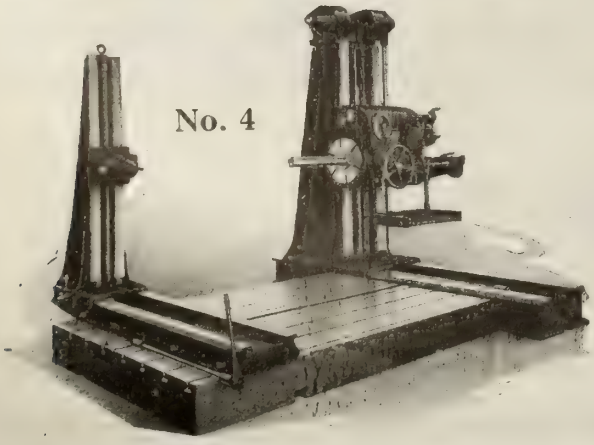
Diameter of spindle	5
Size of hole in spindle	No. 6 Morse
Size of floor plate	8' x 12"
Floor space required	16' x 24' 6"
Weight	50,000 lbs.

No. "0" FOR PRECISION WORK

Diameter of spindle bar	3⅛ in.
Spindle bored to fit Morse Taper No.	5
Longitudinal travel of spindle	26 in.
Vertical adjustment of head on column	25½ in.
Size of table	24 in. x 50 in.
Traverse travel of table	30 in.
Longitudinal travel of table	32 in.
Approximate net weight	9,500 lbs.

Drop us a line for detailed information and catalogue.

No. 4



Giddings & Lewis Manufacturing Company

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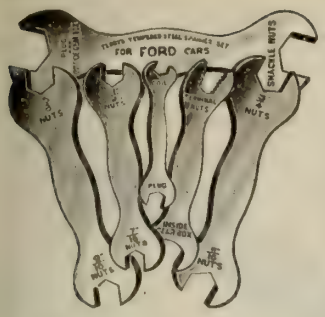

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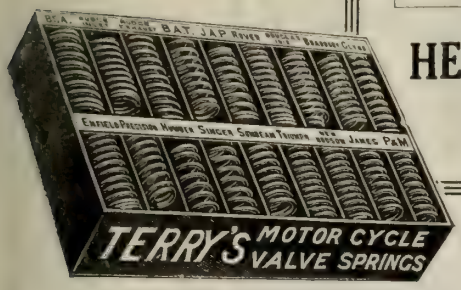

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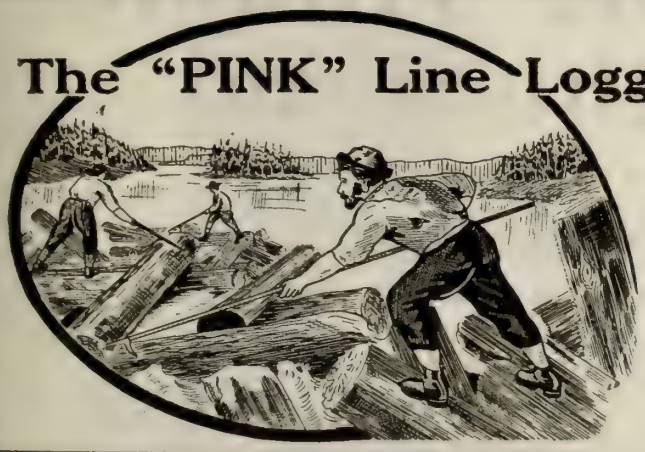

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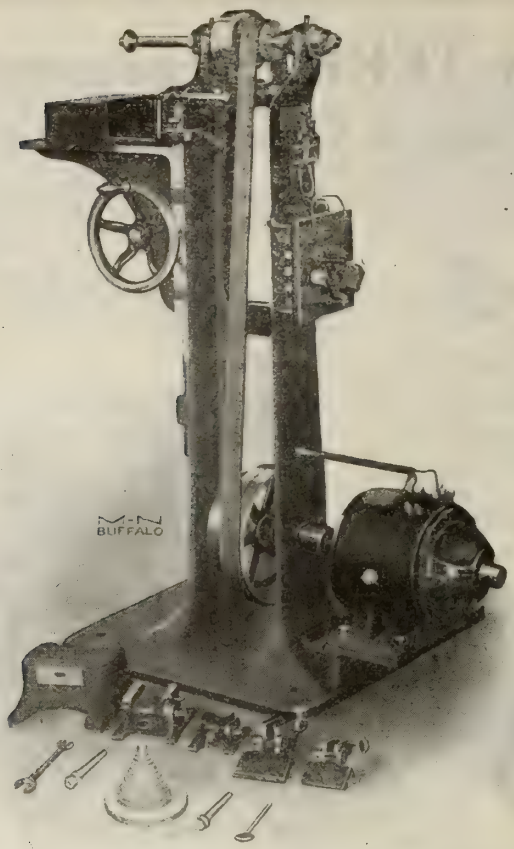

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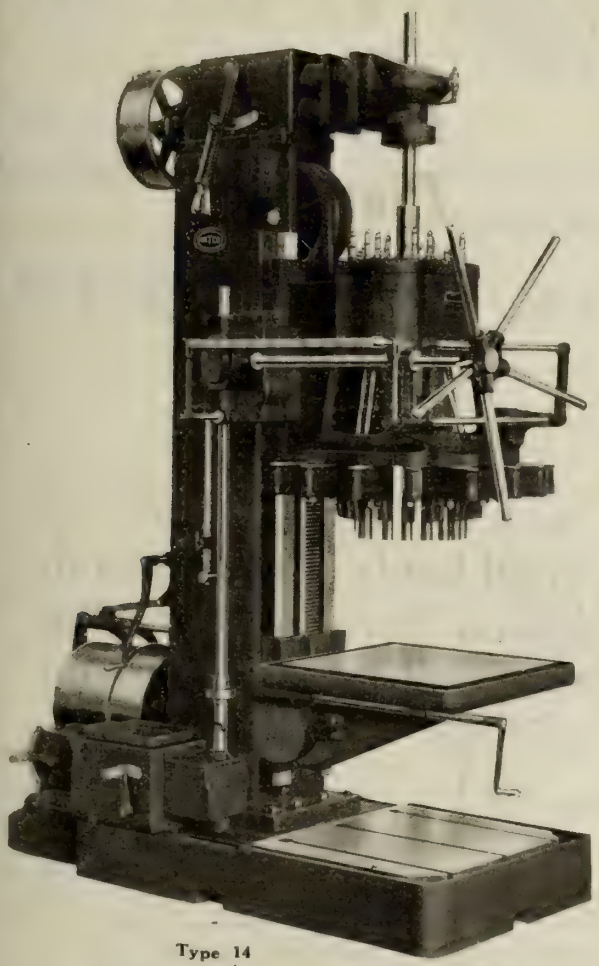

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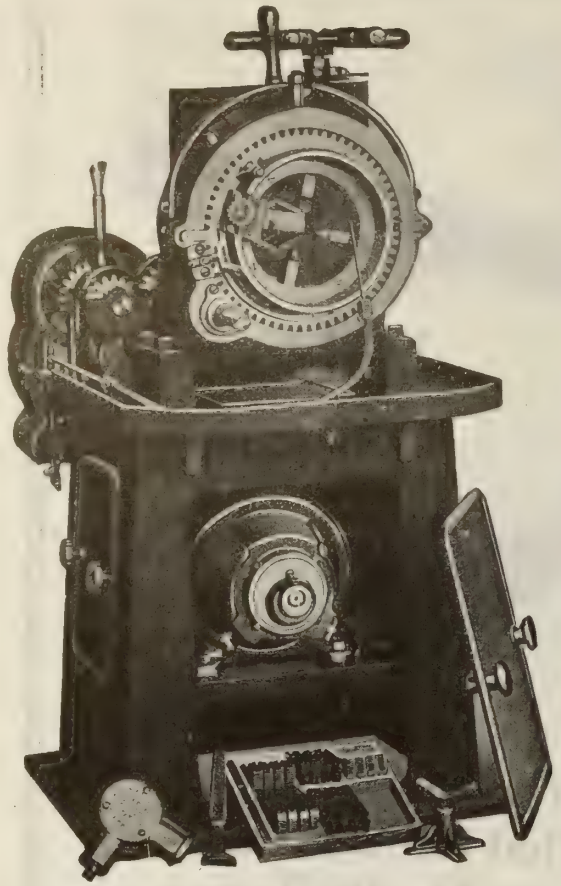

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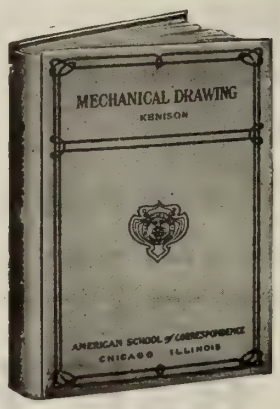

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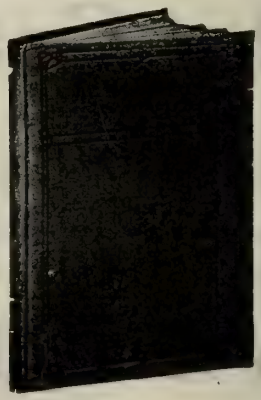

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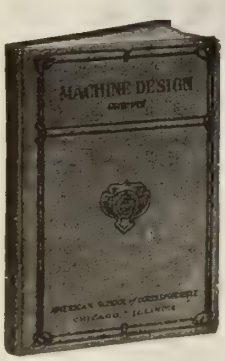

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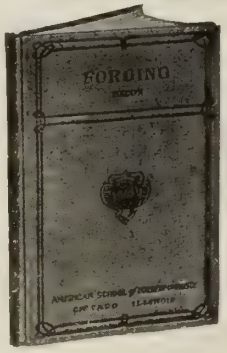

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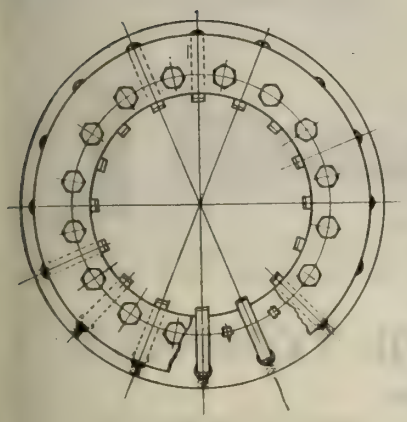

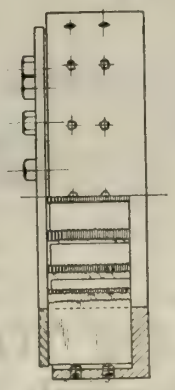

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THREAD—Diameter, 8½″; length, 3⅝″; 8 pitch, Briggs, Ltd.
TIME STUDY—

	Min.	Sec.
Inserting jig in chuck		30
Champfering for leading threads	5	
Milling roughing cut	13	
Finishing cut	8	
Removing jig from chuck		30
TOTAL TIME	27 minutes	

for two sets of chaser or 13½ minutes per set.

MILLING FEED—Roughing cut, 2″ per minute. Finishing cut, 3″ per minute.

MATERIAL—Rex A Tool Steel.

NOTE—Jig was arranged so as to hold two sets of chasers. Chuck was an air collet.

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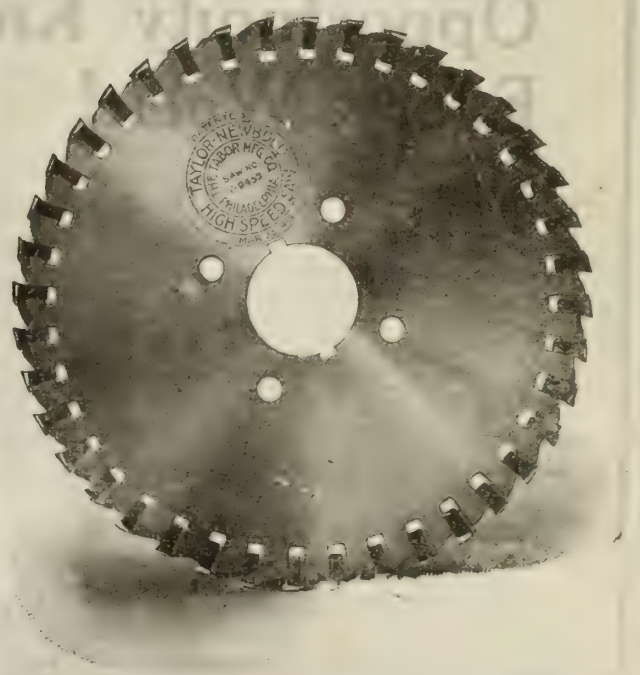

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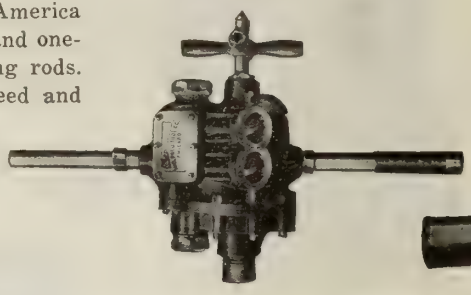

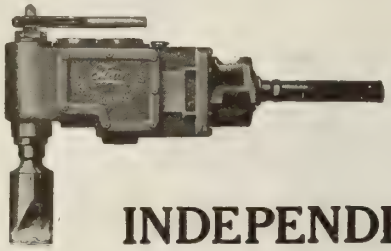

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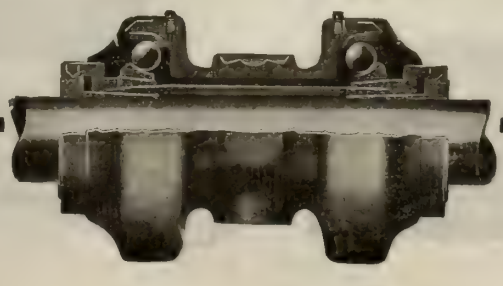

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Your Money's Worth

Never again will the Canadian Nation and People be the same careless improvident spenders of "ante bellum" days. "EFFICIENCY" and "GET YOUR MONEY'S WORTH" will be the popular motto and the successful machine shop manager must be able to see the advantage of making one pound of High Speed Tool Steel do the same work as ten pounds in forged tools; in other words he must and will

USE ARMSTRONG TOOL HOLDERS

No heavy "stub-ends" to throw away. No time lost with men at the grinder while lathes stand idle. No stock of heavy sizes of steel to carry, and the blacksmith as a tool-dresser is eliminated entirely.

Armstrong Tools are great favorites with the men—a good thing to consider from a production standpoint.

Our Catalogue is of handy pocket size and will be mailed to you upon request

ARMSTRONG BROS. TOOL CO.
"THE TOOL HOLDER PEOPLE"
306 N. FRANCISCO AVE. CHICAGO, U.S.A.

Skilled Artisans Prefer Standard Grade Tools

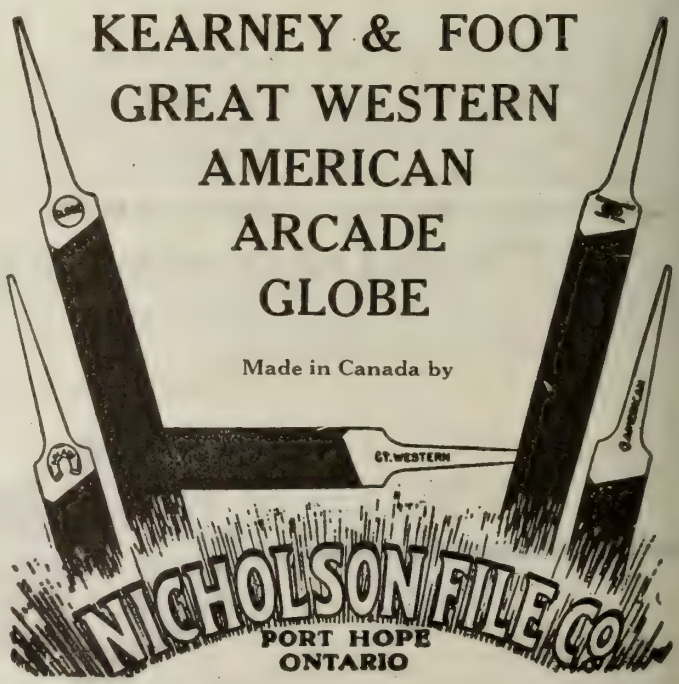
The skilled mechanic MUST have sharp files otherwise he gets no satisfaction out of his work.

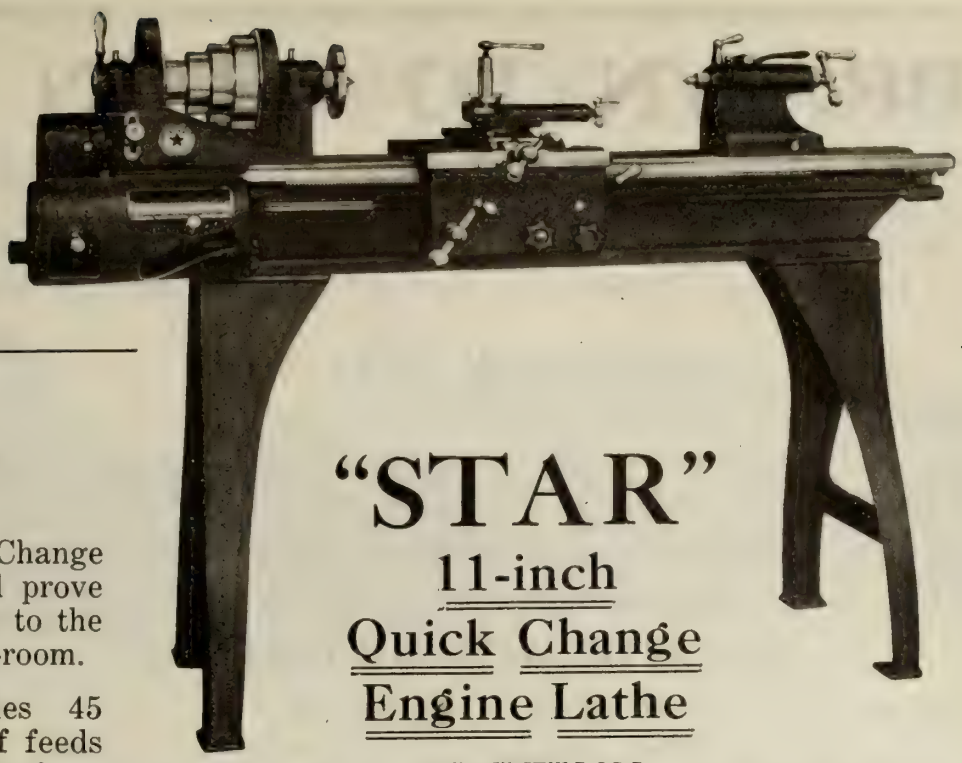
As soon as his file becomes dull tell him to turn it in and get a new one. The result will be better work and greater satisfaction to all concerned.

And it pays. New files cost little, labour costs much.

Good steel, accurate cutting and proper hardening insure long life to "Famous Five" files.

Specify them when ordering. They are:





This new "STAR."

Quick Change Lathe will prove invaluable to the small tool-room.

It provides 45 changes of feeds or threads from 3 to 92 per inch, including 11½.

"STAR"

11-inch Quick Change Engine Lathe

STAR TRADE MARK REGISTERED

11" x 5" STYLE QC-E

Write us for full particulars re this new lathe. Its quality and construction conform to that standard which has made "STAR" Lathes remarkably popular everywhere.

Write to-day

The Seneca Falls Mfg. Co., Inc. 366 W. Falls Street **Seneca Falls, N.Y.**

STEEL TANKS

THE

TORONTO IRON WORKS

LIMITED

HEAD OFFICE: ROYAL BANK BLDG. TORONTO WORKS: CHERRY STREET

Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

POWER -- BENDERS

THREE NEW MODELS

"Wonder" Pipe Bending Machines (pat.)

Electrically operated to bend from ⅛" to 20". Send for printed matter. We also manufacture TEN other sizes, hand operated benders.

American Pipe Bending Machine Company

52 Pearl Street **Boston, Mass., U.S.A.**

BRAWN TO BRAIN

Brawn, undeveloped, uncultured, means little or nothing. Brute strength never wins out.

Brain, without physical development, often withers and accomplishes little. Add power to reasoning, brawn to brain, strength to sagacity and you have

A COMBINATION THAT WINS

So it is with a lathe. It is not only the weight, the mass, the power, but to this must be added uniformity, accuracy, efficiency. In CISCO

The Lathe With the Pull
The Lathe of Simplified Accuracy

brawn and brain are evenly proportioned. The result

A LATHE WITH NO PEER

It will save you *time, money, thought* and *worry.*

Built by

The Cisco Machine Tool Company, Cincinnati, U.S.A.

Built in 14" 16" 18" 24"

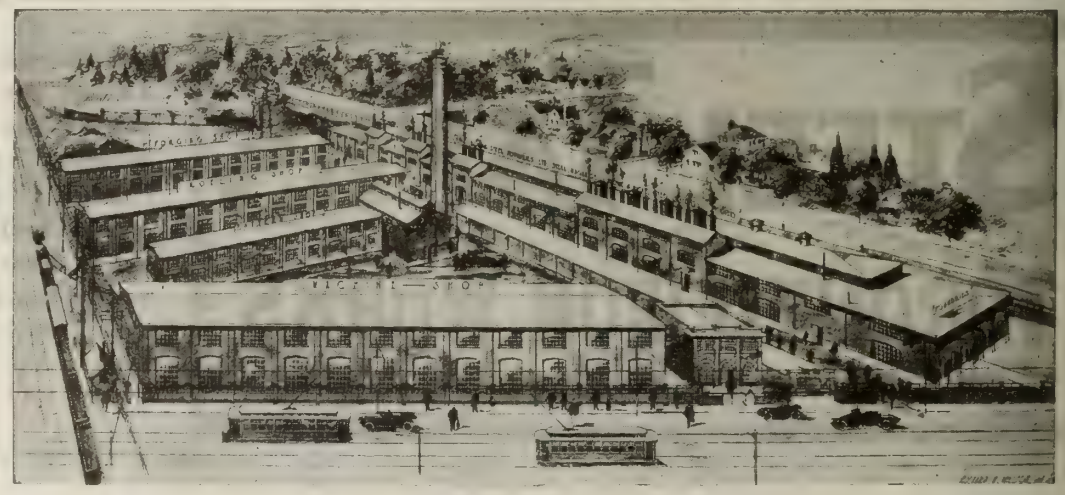
Engine and Tool Room, Belt Driven, Motor, Geared or Motor Geared.

We are Growing

When our plans are completed, "HISCO" will be the largest plant of its kind in Canada.

Two big new electric furnaces are being added to our present large equipment. And cleaning and annealing department measuring 300' x 100' is about to be completed.

This will place us in a position to handle orders big and small with unequalled facility.



Specify "HISCO" Products

Quality and Service Guaranteed

Steel, Chrome, Manganese and Nickel Steel Castings

Annealed and Unannealed

Cement Mill and Mining Machinery Castings, Stamp Mills, Crushing Plants, Excavating Outfits, Steel Car Wheels, Locomotive Driving Wheels and Frames, etc.

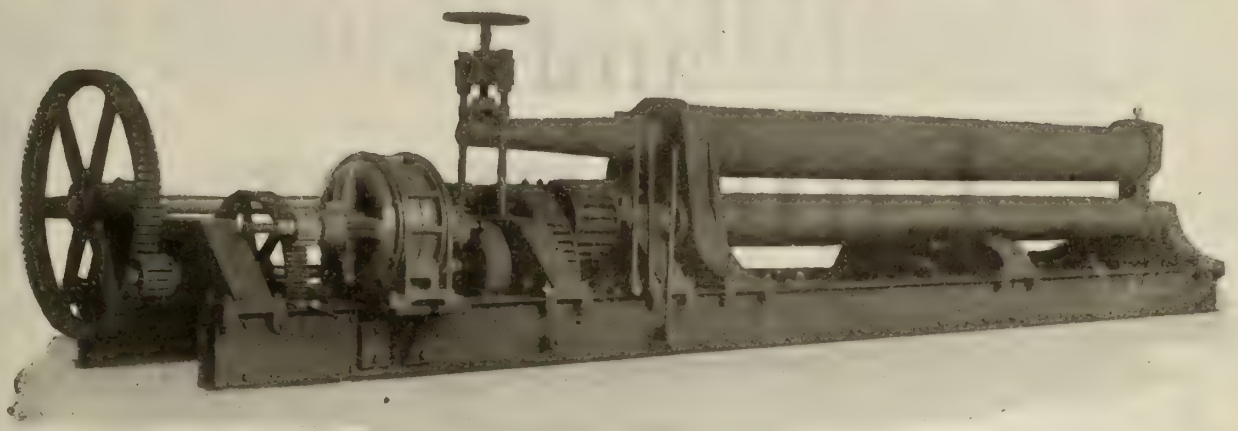
GEARS Machine Moulded, any size up to 18 feet, without Patterns

HULL IRON & STEEL FOUNDRIES, LTD., HULL, QUE.

WICKES

HEAVY DUTY PLATE BENDING ROLLS

Built for Real Service



We also manufacture High Grade Vertical Rolls, Angle Rolls, Punches, Shears, Spruce Cutters, Radial Wall Drills or Countersinking Machines, Flanging Clamps and Heavy Duty Engine Lathes.

Ask for Catalogue.

WICKES BROS., SAGINAW, MICH., U.S.A.

RICKERT-SHAFER TAPPERS

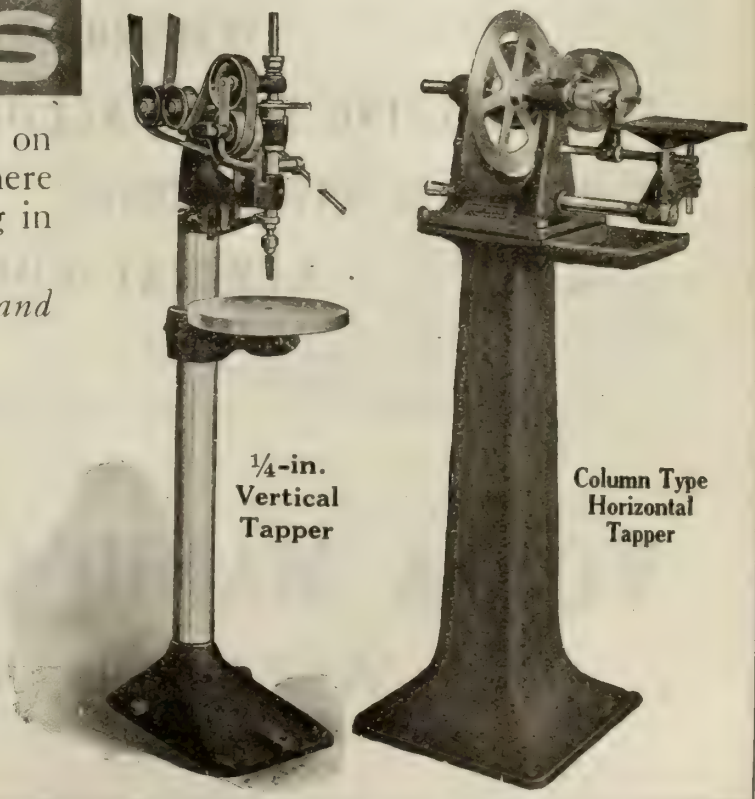
Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on ⅝-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.

Write for specifications



The Rickert-Shafer Co.

ERIE, PA., U.S.A.

FRED HERBERT, Foreign Agent, Coventry, England.

Electric Furnaces and Equipment

THURY REGULATORS, NEW TYPE

ELECTRODE WINCHES
ELECTRODE HOLDERS
MAGNETIC BREAKS
ROOF COOLER RINGS
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ELECTRIC FURNACES
FOR SMELTING FERRO ALLOYS AND REFINING STEEL
PORTABLE ELECTRIC HOISTS, MONO RAIL HOISTS,
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MACHINES, EQUIPMENT APPLIANCES and TOOLS
for
SPECIAL PURPOSES
DESIGNED AND BUILT

We will make what YOU want as you want it.

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Hand and Machine

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THREAD GAUGES
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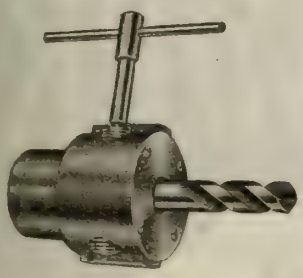
WE ARE GENERAL AND SPECIAL TOOL MAKERS

Let us quote you on your requirements, and have your tools made as you want them made.

WOOD PATTERNS METAL PATTERNS
Hand and Machine

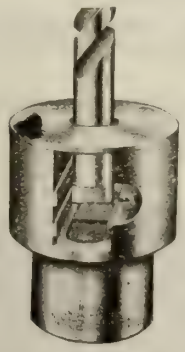
TOOLS



UNION

POSITIVE DRIVE DRILL CHUCKS

The Union Drill Chuck is made in seven sizes (0 to 2 inches) with PATENT TRANSVERSE SLOT—so that drills with tenons can be inserted (see illustration). The shank of drill should be squared on two sides to enter the TRANSVERSE SLOT, giving a positive rotation to the drill independently of the jaws, permitting the jaws to centre and align the drill accurately. The drill is held absolutely true and will not slip under the hardest strain. This type of chuck will be found to give the best of results on all classes of work from HIGH SPEED drilling to the hard BLACKSMITH and GENERAL REPAIR work.



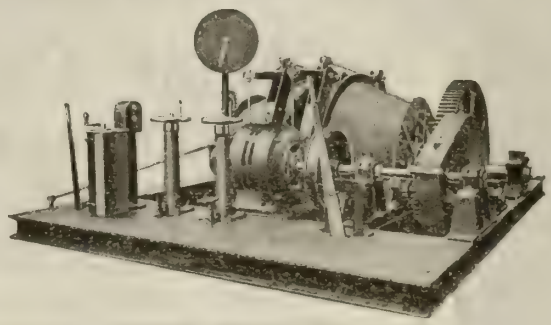
UNION Manufacturing Co.
New Britain, Conn.

New York Office 26 Cortland St.

Makers of a complete line of chucks

LANCASHIRE MOTORS

HAVE WORLD WIDE REPUTATION
FOR
"RELIABILITY"



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Specialists in Motor Manufacture and Application

SEND YOUR ENQUIRIES TO

The Lancashire Dynamo & Motor Co., of Canada, Limited

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Williams' Superior Drop-Forged Clamps

FOR nearly half a century we have been making and finishing *Superior* drop-forgings. The experience gained in producing hundreds of thousands of parts to the most exacting requirements has enabled us to develop several lines of Clamps which are unsurpassed in stiffness and strength. All are made of a strong, tough grade of carefully selected steel and after forging are "heat-treated" to improve their stiffness and strength just as are the more important airplane and automobile parts. Remember, "There's a Williams' Clamp for every purpose."

Ask for Machinists' Tools Booklet showing Machinists' Clamps, "C" Clamps, Strap Clamps.

THE A. G. LOW CO., LTD.
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J. H. WILLIAMS & CO.
"The Drop-Forging People"
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PUNCH PRESS WORK

What Can You Save?

By Using Parts Made in the Punch Press

Look over your standard parts, Mr. Manufacturer, and see what parts can be made (or could be made by slight change in design) by this process.

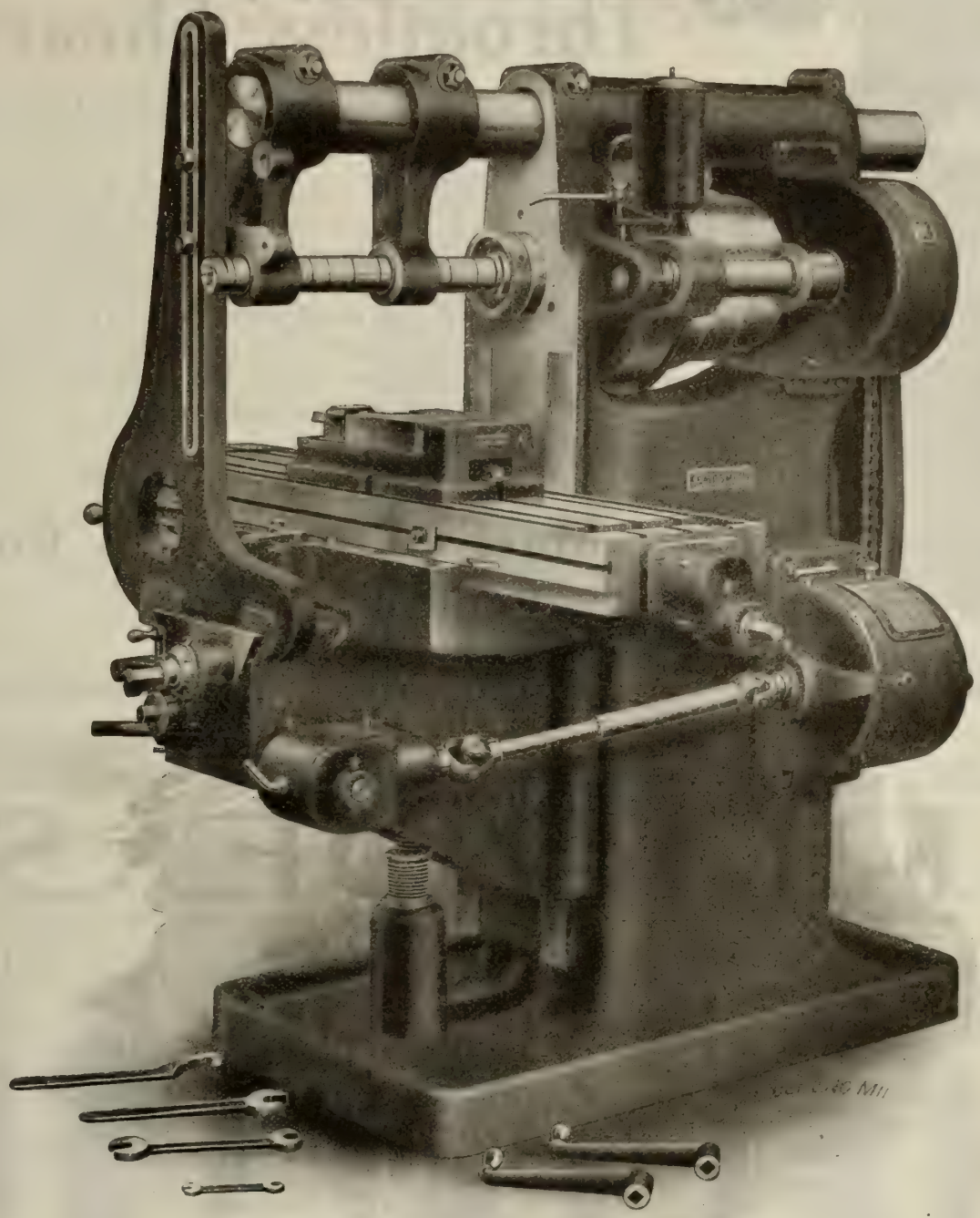
You will be surprised at the saving you can effect.

We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

A Battery of presses is also available at our plant to manufacture parts for you with the understanding that you pay only for good parts made. Our facilities ensure prompt deliveries at right prices.

W. H. BANFIELD & SONS LTD.
370-386 PAPE AVE., TORONTO.

KEMPSMITH



KEMPSMITH No. 3 Plain Milling Machine

Double Back Geared.

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our Catalogue "B" describes and illustrates many notable features of the Kempsmith Miller. Write for a copy to-day.

THE KEMPSMITH MANUFACTURING CO.

MILWAUKEE, WIS., U.S.A.

FOREIGN REPRESENTATIVES:—Barandiaran & Co., 3 Alameda, San Sebastian, Spain. Bevan & Edwards, Pty., Ltd., 117-29 King St., Melbourne, Australia. Edgar Bloxham, 12 Rue du Delta, Paris, France. D. Drury & Co., 1-2 Central House, Main St., Johannesburg, South Africa. Roku-Roku-Shoten, 3 Shinsakanacho, Kyobashiko, Tokyo, Japan. Nielsen & Winthers, Blegdamsveg 60, Copenhagen, Denmark. Parke & Lacy Co., Ltd., 60 Clarence St., Sydney, N.S.W., Australia. Selson Engr. Co., 19 Via Botero, Turin, Italy, and 85 Queen Victoria St., London, E.C., England. Spliethoff, Beeuwkes & Co., Leuvehaven, W.Z. 159, Rotterdam, Holland.

"The Marshalltown Throatless Shears"

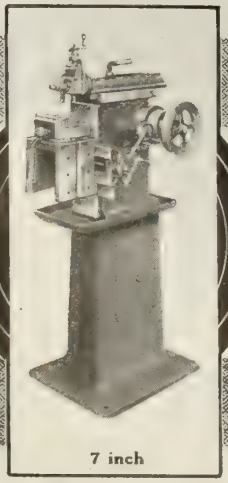
guarantees perfect work at less than half the ordinary expense.

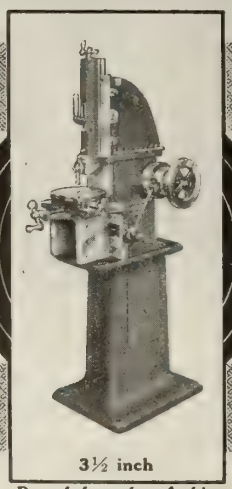
Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

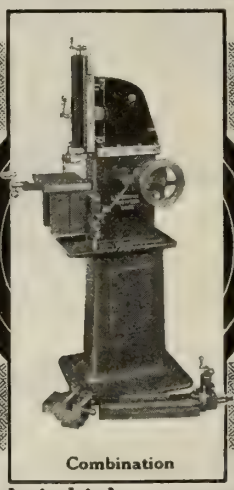
Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

RHODES


7 inch


3½ inch


Combination

Machines of increased efficiency increase the production rate of your men, offsetting an increase in wage rate.

Proof for the Asking

THE RHODES MFG. COMPANY
Owned and operated by the Jacobs Mfg. Co.
HARTFORD, CONN., U.S.A.

By their higher capacity and wider range of service, RHODES, Improved Shaping and Slotting Machines multiply output and correspondingly cut costs.

Photographic Copying The PHOTOSTAT

(Reg. U. S. Pat. Off.)

"The idea of copying by means of a camera at first caused us to raise our hands in astonishment—the complexity of photographing to produce copies and the possible expense of such a method made it seem out of the question.

"How soon our prejudice, which amounted to nothing but ignorance, was overcome when 4 months ago we installed a photographic copying machine—the Photostat, to make photographic copies of typewritten work, drawings (simple and structural), and machinery!

"With this device we can either enlarge or reduce typewritten work, produce copies of drawings which are difficult and sometimes impossible to blue print, and secure photographs of different parts of machinery, a copy of which we may want to send to customers or prospective customers.

"The machine is so simple to operate that a girl with no previous photographic experience handles it—the copies are clearer than any other known means of copying; of course, there is no possibility of error—and, as an example of its remarkable speed, where it would take us a half hour to produce a copy of our 'Suggestion Prize Awards' we did it in 5 minutes with the Photostat."

—Minneapolis Steel & Machinery Co.

This cut shows a PHOTOSTAT on which a large drawing has just been copied in less than a minute.

Never Makes a Mistake

It is simple, practical, easy to handle. Requires no expert knowledge. The machine is loaded with a roll of sensitized paper especially manufactured for the purpose.

The original subject is photographed directly upon this paper producing a facsimile copy which is immediately cut off, developed and fixed right in the PHOTOSTAT itself.

The focusing, exposing and developing are all controlled by simple mechanical devices and no glass plate, film or other intermediate negative has to be made.

After fixing, the copy is removed to a tank of running water and rapidly washed free from chemicals. It is then dried and is ready for use. As many copies as desired may be run off in this manner.

By a simple adjustment of the mechanical focusing device the copy may be made at actual size, reduced, or enlarged, within the size limitations of the machine.

Error in copy is impossible because every copy is an absolute facsimile. The operations are all simple, such as a boy or girl can do.

The PHOTOSTAT Copies

Pencil Drawings, Ink Drawings,
Tracings, Reports,
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Contracts Ledger Pages,
Illustrations for Salesmen, Insurance Records,
Sketches Blue Prints,
Letters, Maps,
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Manufactured by the Eastman Kodak Company exclusively for the

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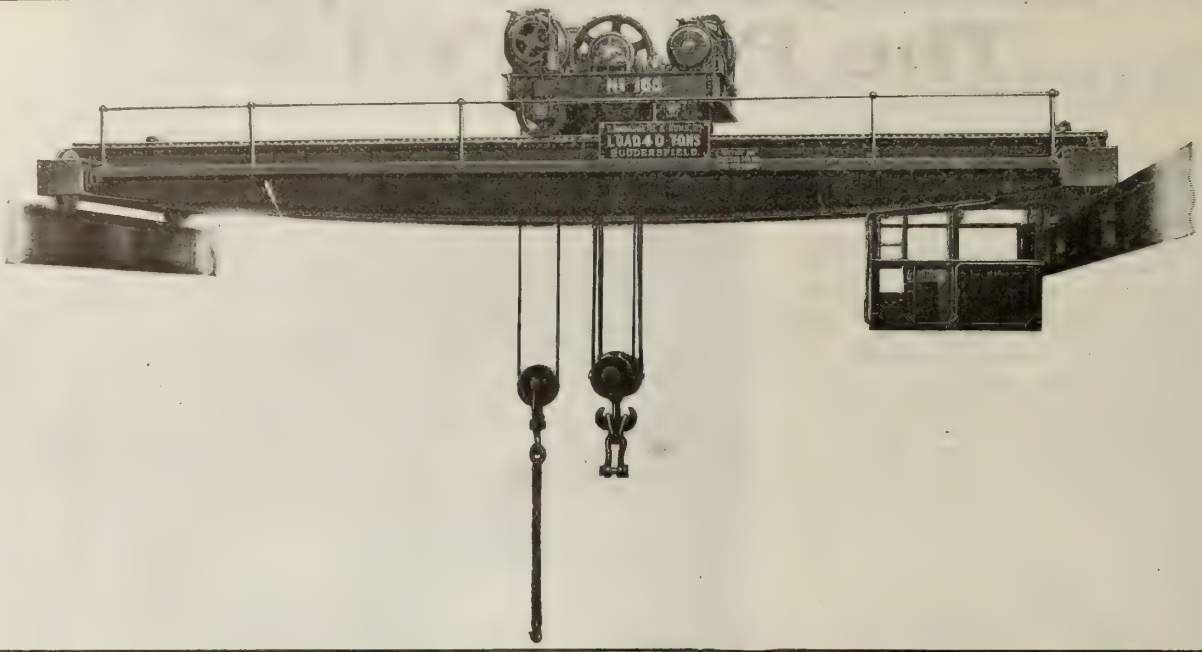
ELECTRIC CRANES & CAPSTANS



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HUDDERSFIELD
ENGLAND

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CODES A. B. C. LIEBER A. 1.

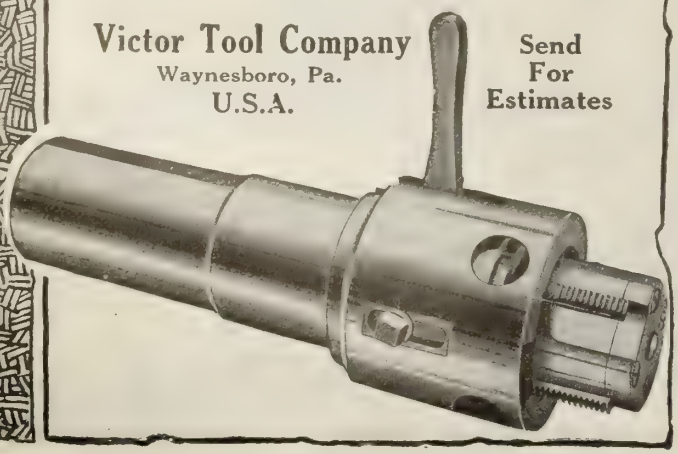
We wanted something original— this is what we got

"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
U.S.A.

Send For Estimates



DIAMOND TOOLS

FOR TRUEING GRINDING WHEELS

QUALITY SERVICE SATISFACTION

INDUSTRIAL GEMS

THE GENERAL SUPPLY COMPANY of CANADA, LIMITED

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VANCOUVER 906 Vancouver Block

Sole Canadian Agents for

THE JOYCE-KOEBEL COMPANY, INC.
Formerly Geo. A. Joyce Co. Ltd.
NEW YORK LONDON

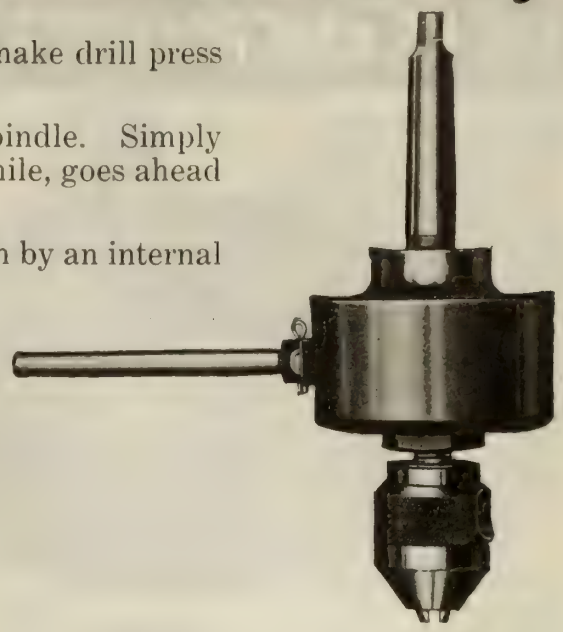
Save Taps, Trouble and Money

The "B-T" Reverse Tapping Attachment fits any make drill press and is equally efficient on **all** of them.

Eliminates necessity of reversing the machine spindle. Simply raising spindle reverses tap—the machine, meanwhile, goes ahead at full forward speed.

A reverse speed twice that of tapping speed is given by an internal gear drive. It is friction driven—automatically adjusted by the amount of pressure the operator puts on the drill spindle.

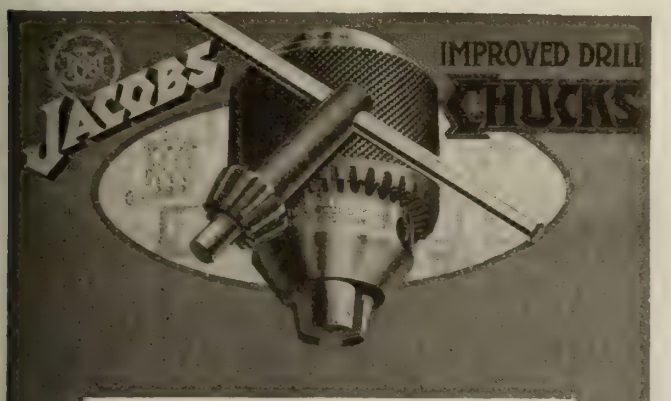
Can also be had with positive drive. Both plain and friction chucks are fitted with jaws to grip round and square end of tap.



Get the details—In our Bulletin.
Write to-day.

Bicknell Thomas Co.
Greenfield, Mass., U. S. A.

"B-T" Reverse Tapping Attachment



Wherever there is the whir of drills—there, too, you find Jacobs Chucks.

Their success, never questioned, has been firmly established by their acknowledged superiority.

THE JACOBS MFG CO HARTFORD CONN U.S.A.

H & G

Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

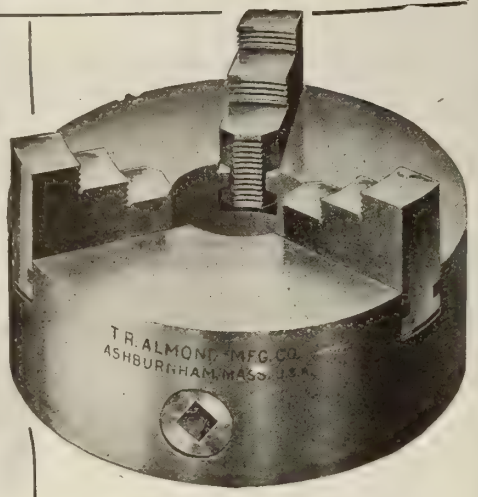
on Nickel Steel

Ask for Catalog

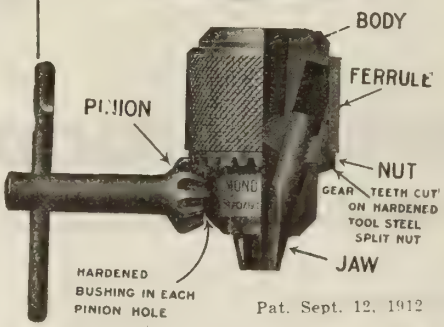
Eastern Machine Screw Corp.
New Haven - Conn.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".

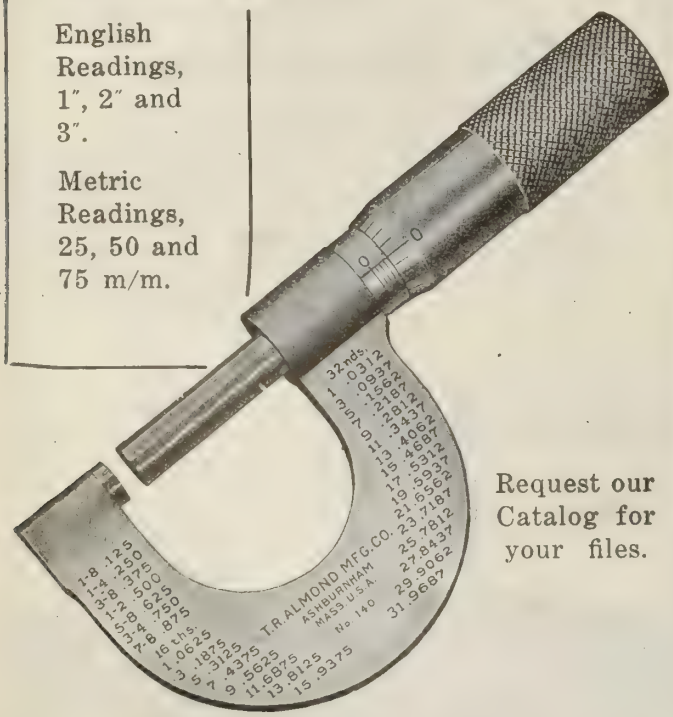


Pat. Sept. 12, 1912

Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.

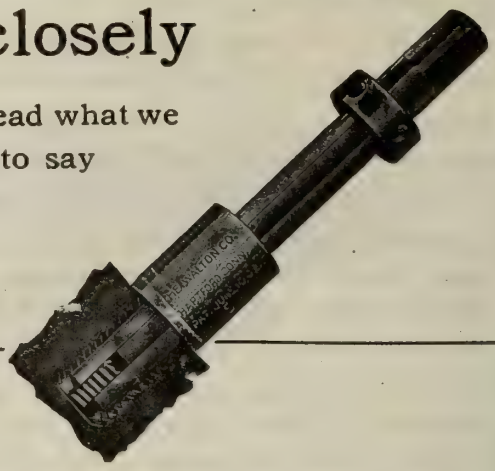


Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.

Look at this again —closely

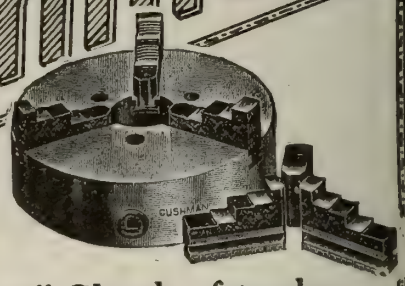
and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

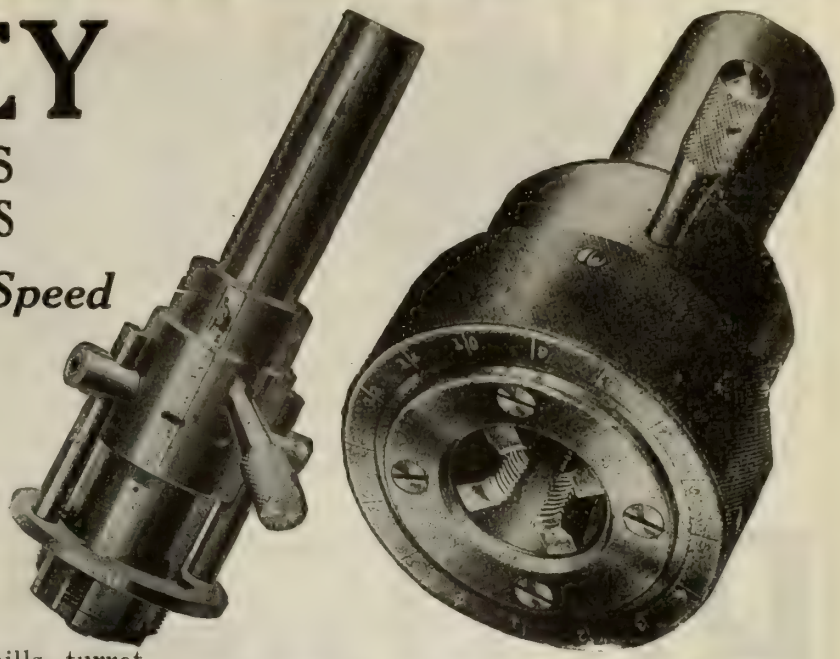
Cushman Chuck Co., Hartford, Conn.

CHUCKS

MURCHEY

COLLAPSING TAPS and SELF-OPENING DIES

Promote Accuracy and Speed



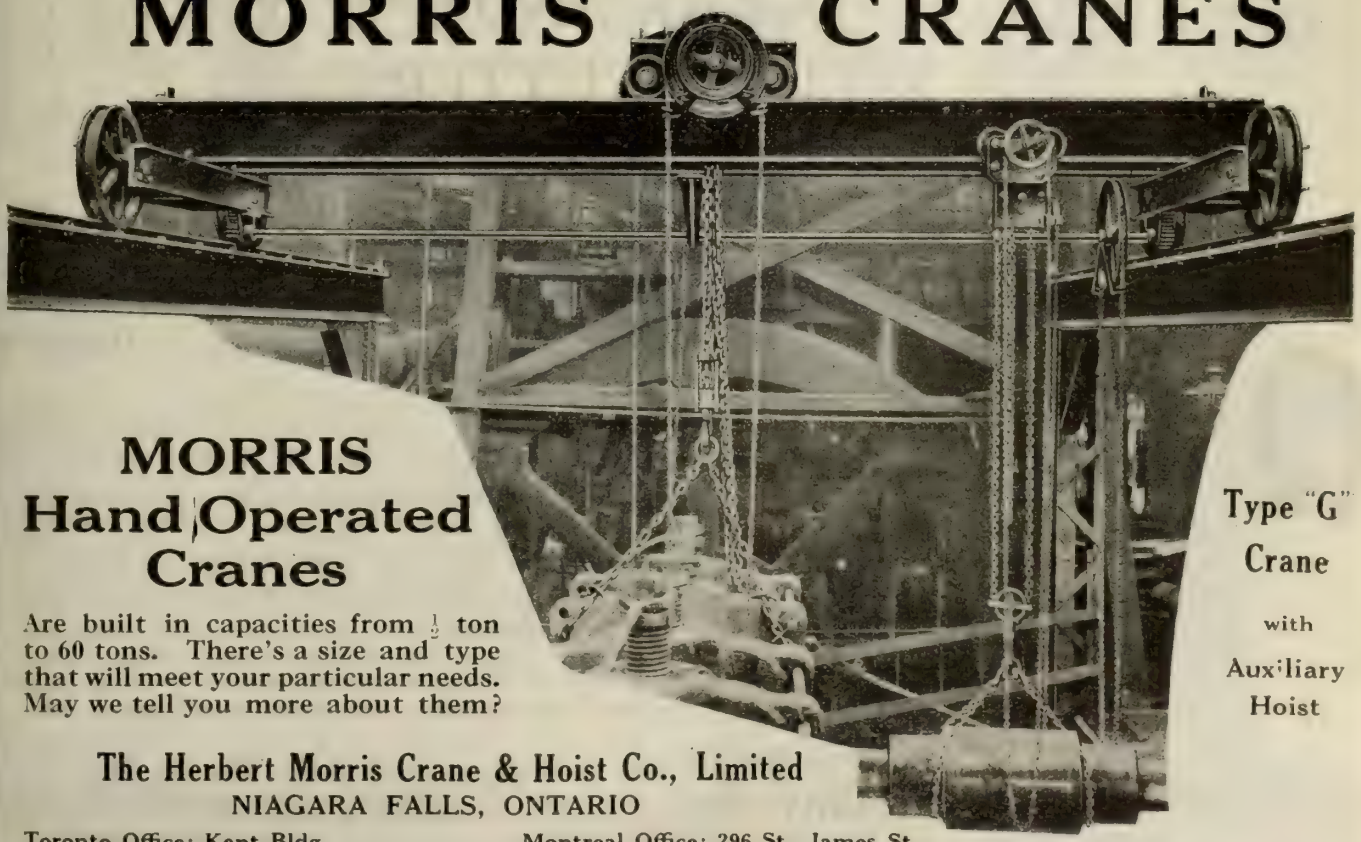
MURCHEY Collapsing Taps and Self-Opening Dies are cleared free from the thread instantly, preventing all danger of stripping, besides cutting time for production in half. **Thus you are sure of greater accuracy and greater production.** Murchey Tools are speeding production in all parts of the country on tapping machines, drill presses, monitor machines, boring mills, turret lathes, and on all other machines to which taps or dies may be attached.

Let us know the class of work you are handling and we will show you how to increase your production 50 per cent. without running up the eost.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.

MORRIS CRANES



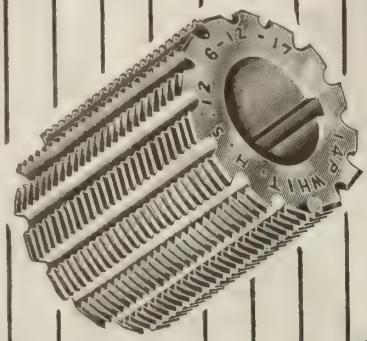
MORRIS Hand Operated Cranes

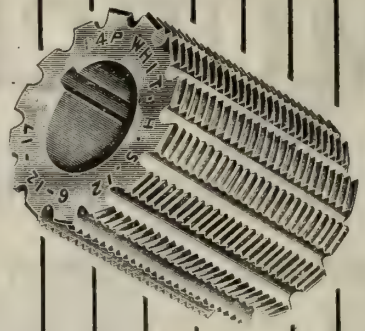
Are built in capacities from ½ ton to 60 tons. There's a size and type that will meet your particular needs. May we tell you more about them?

Type "G" Crane with Auxiliary Hoist

The Herbert Morris Crane & Hoist Co., Limited
NIAGARA FALLS, ONTARIO

Toronto Office: Kent Bldg. Montreal Office: 296 St. James St.





Butterfield

TWIST DRILLS GEAR AND MILLING CUTTERS

(Carbon and High Speed Steel)

Quality

Prompt Delivery

They're the happy result of a great combination of specially trained men and the finest special machinery—these Butterfield carbon and high-speed steel Twist Drills, Gear and Milling Cutters, Side Mills and End Mills, with straight or spiral flutes and plain or nickeled teeth. Their ability to serve accurately and long equals that of Butterfield Taps, Dies and Reamers — the sincere praise of a thousand users wouldn't be a better recommendation.

The Butterfield Catalog, just off the press, fully describes these better tools and how they increase production. Write for your copy.

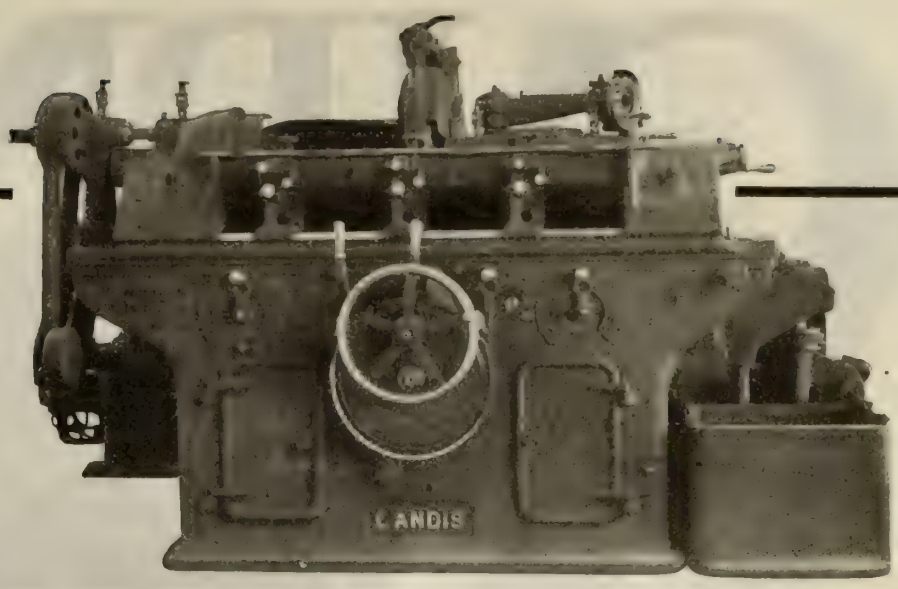
38

Butterfield & Company, Inc. - Rock Island, Quebec

Toronto Office: 220 King Street West

LANDIS

Plain
Self-contained
Grinding
Machine



You Can't Afford to Overlook These LANDIS Features

Work Table Stationary. The Landis principle of having the work table stationary secures it firmly on the bed.

Overhang Eliminated. The Landis Grinding Wheel Head, in its travel, never goes beyond the length of the bed. The Landis Grinding Wheel Head is directly above the carriage and supported between the wide, well set apart, carriage ways.

Downward Belt Pull. The wide, powerful, endless grinding wheel belt pulls directly back and down from the wheel spindle, tending to secure the base with the bed.

Our catalog gives complete data and specifications of various types of Landis Grinding Machines.

LANDIS TOOL CO., **WAYNESBORO, PENN.**
50 Church Street, New York City

ARCTIC METAL

Our long and extensive experience in the manufacture of **Brass, Phosphor Bronze, Copper** and **Aluminum Castings** enables us to supply a casting of a special formula for any purpose.

Tallman Brass & Metal Co.
HAMILTON, ONT.

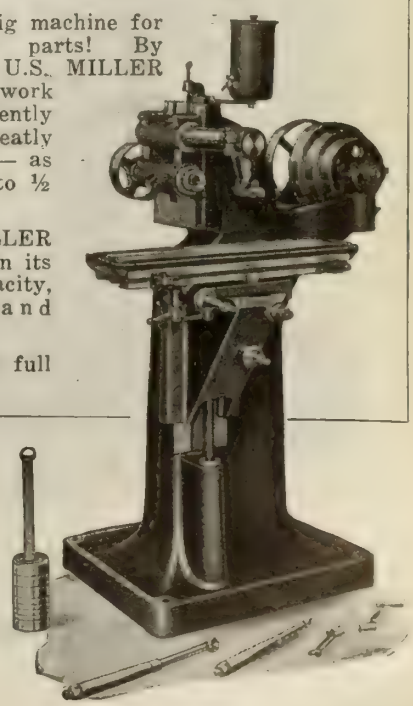
U.S. MILLER

Reduce Your Milling Costs ⅓ to ½

Don't use a big machine for milling small parts! By adopting the U.S. MILLER you can do the work just as efficiently and at a greatly reduced cost — as much as 1/3 to ½ lower.

The U.S. MILLER stands alone in its class for capacity, accuracy and speed.

Write for the full details.

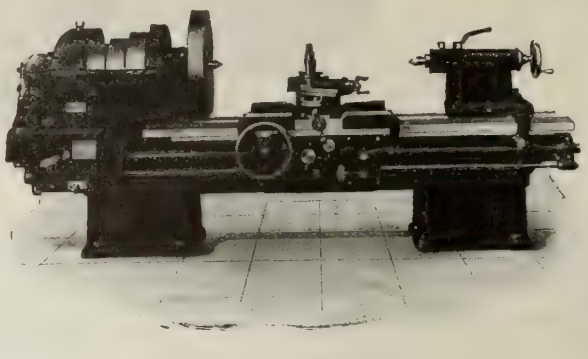


United States Machine Tool Co.
CINCINNATI
Ohio U.S.A.

SIDNEY

Sidney for Service

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3 step cone, double bac gear, semi-quick chang gear lathe, built on 10 f bed. This lathe also fur nished with quick-chang gears. Bed lengths avail able: 10, 12, 14, 16, 18 an 20 feet.

The Sidney Line comprise 15-inch, 17-inch, 19-inc 25-inch, 27-inch, 30-inc and 36-inch lathes, whic are adaptable to the fines tool room work or th heaviest duty shipyard o factory rapid productio work.

Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohic

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

The Greenfield Universal Grinder

For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

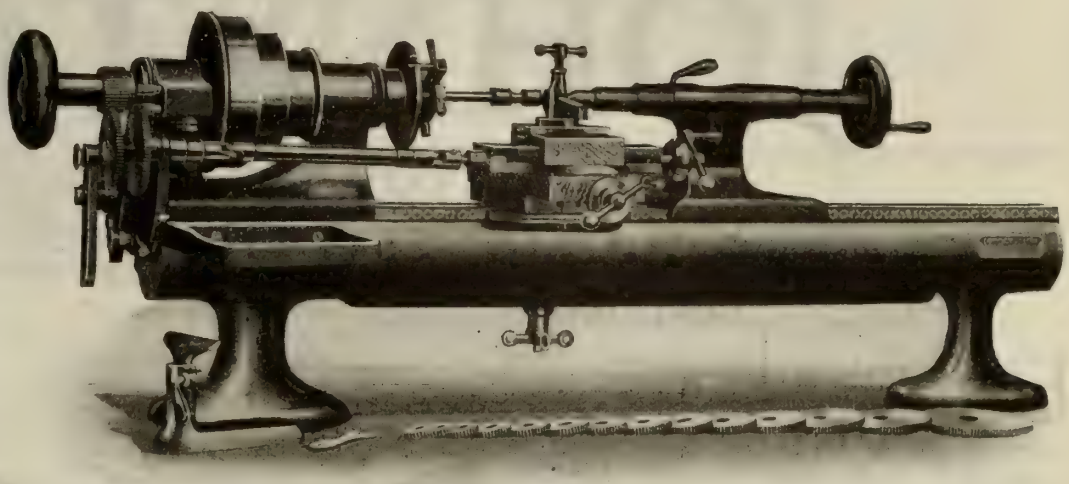
The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

Greenfield Machine Company,

GREENFIELD, MASS., U.S.A.

CATARACT BENCH LATHES AND ATTACHMENTS

Cataract Bench Lathes are finely constructed precision tools, with responsive controls, simple adjustments and numerous convenient attachments adapting them to a wide variety of work. **Study this illustration.** Note the base, the circular bed, the sliding tool post, massive head stock (indicating strength), range of gears, special tailstock, arrangement of gears.



Hardinge Bros., 1770 Bertau Avenue, Chicago, Ill.

ALFRED HERBERT CO., Limited, Coventry, England, are our representatives for United Kingdom, France, Belgium, Russia, Japan, Manchuria, Korea, Formosa, China, Italy.

Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

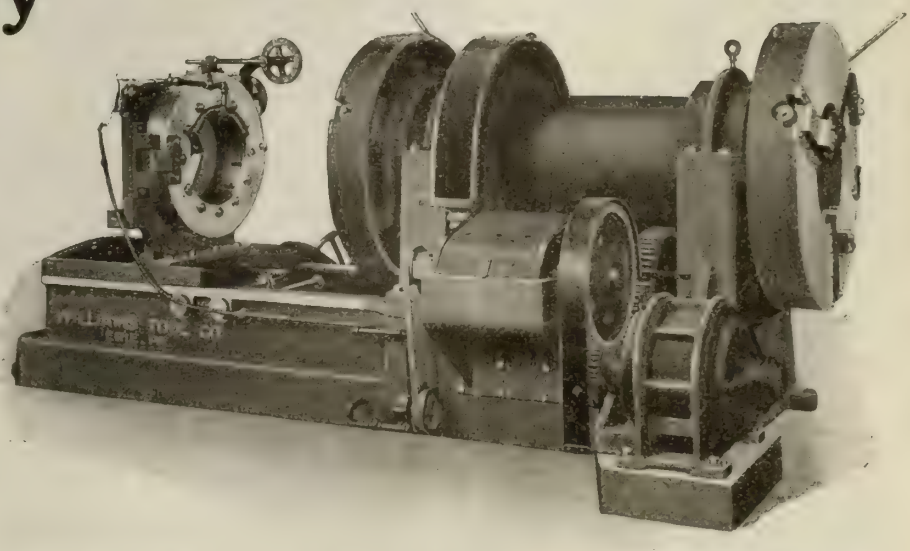
Williams Pipe Machine

that's on the job.

For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.

It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.

The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



Write

Williams Tool Company

Erie - Penn. - U.S.A.

Canadian Agents:
The A. R. Williams Machinery Co., Limited Toronto, Canada

European Agents:
Universal Machinery Corp. London, - England

POTTER & JOHNSTON

AUTOMATIC MILLING MACHINES

HORIZONTAL VERTICAL

EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches. 12 Spindle Feeds, 20 to 180 R.P.M.

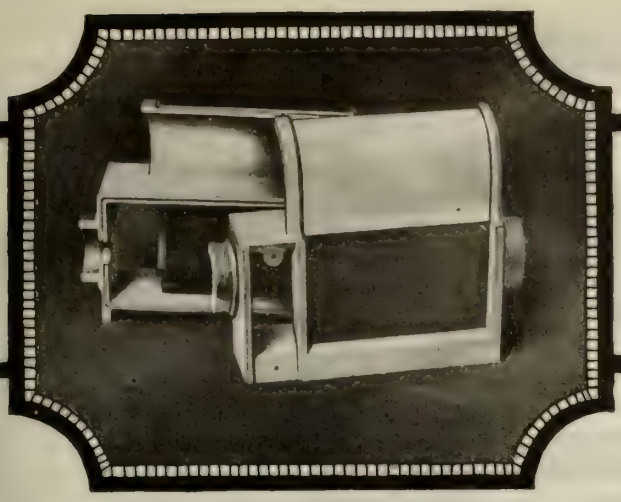
Send us your Blueprints and we'll gladly give you production figures.

Bulletin 36 on application.

Canadian Offices: POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse: Galt, Ont., Canada



FRANKLIN DIE-CASTINGS

Reducing Costs—

To reduce the cost of your product without increasing your investment—use Franklin die-castings instead of machined parts.

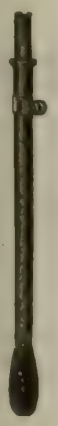
Good die-castings not only are less expensive—they are more uniform, more quickly assembled, and often two or more parts can be cast together at a very decided saving.

Twenty-seven years' intensive experience has taught us how to make the *best* die-castings—how to apply them most satisfactorily to a wide range of purpose.

Send samples or blue prints for recommendation and estimates. And ask for Booklet "C."

Franklin Manufacturing Co., 746 Gifford St., Syracuse, New York

Every Emery Wheel With Its Own Dresser



Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"**—the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO
Alfred Herbert, Limited, Coventry, Agent for Great Britain

Special Equipment
Built to Specification
Steel Plate and Structural Steel Work

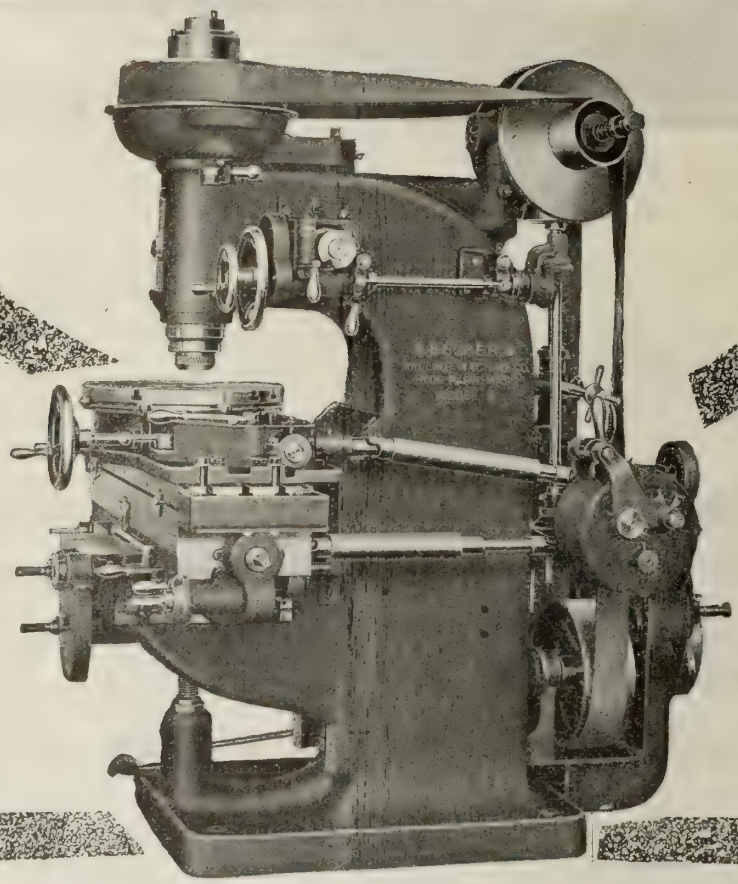
Grey Iron Castings

High Quality and Prompt Service Double-Sure

Write for Full Particulars

WILLIAM HAMILTON CO., Limited
TORONTO - ONTARIO

Becker



"Becker Belt Driven Millers"

The Machine that gives the Smooth Finish

Model B

The machine shown above is a Becker Model B Belt Driven Miller — Like the other machines of this line it is a Production Tool of the first class, embodying all the features that have made Becker Millers the standard.

The strenuous period of war work has introduced Becker Belt Driven Millers into Canadian factories. They were essential then because they greatly increased production without adding to manufacturing costs—and now, they are essential also because they will enable you to reduce your manufacturing costs in order to cope with the keen after-war competition.

You need a Becker Belt Driven Miller.

Write for Circular O-501——*NOW*

BECKER MILLING MACHINE COMPANY

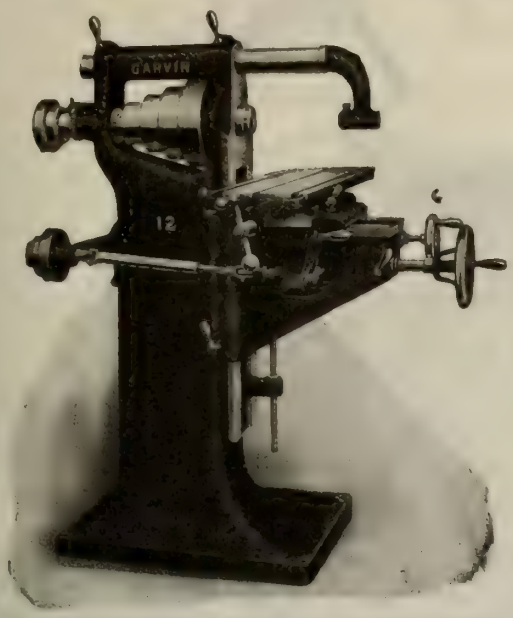
Hyde Park, Boston, Mass.

Canadian Agents:

Rudel-Belnap Machinery Company, Ltd., 137 McGill St., Montreal.

A. R. Williams Machinery Company, Ltd., 64 Front St. West, Toronto.

GARVIN



No. 12 Plain Milling Machine-Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....18 x 6 x 15 in.

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

---

Production of Rare Quality at Lowest Labor Costs

There is unusual strength, accuracy, speed, convenience and range in

AURORA

Drilling Machines

You can use them to great advantage on any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.
Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works

AURORA, INDIANA, U.S.A.

The BARNES DRILLS

Complete line. 8-inch to 50-inch swing

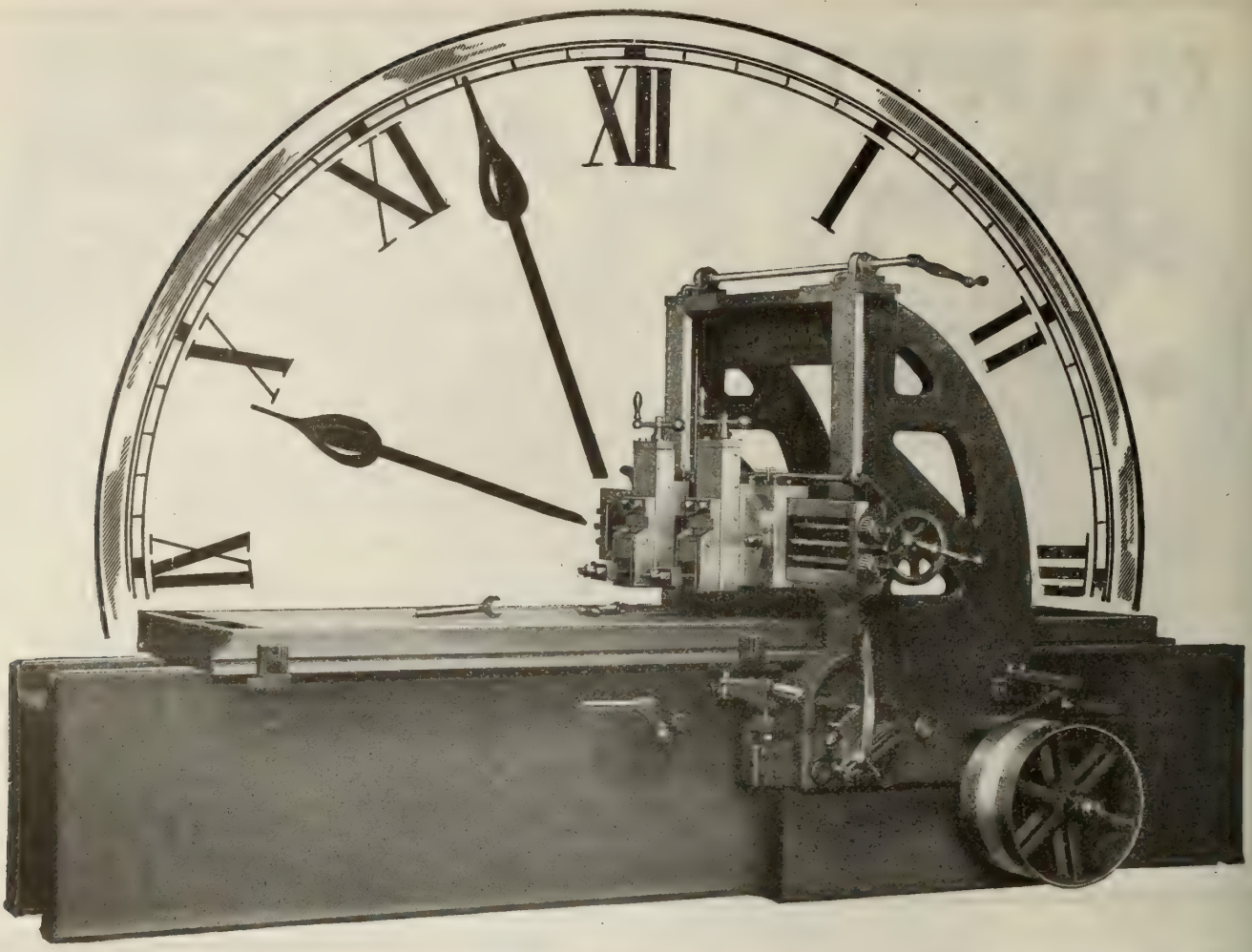
Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.

Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal



The Advantage of the Second-Belt Drive Becomes More Evident as Time Goes on

In the construction of Whitcomb-Blaisdell Planers the usual rapid running train of gears is eliminated. This means the absence of shocks and jars, and not only assists in turning out smooth, finely finished work—work that is free from chatter marks—but actually prolongs the life of the planer.

The substitution of the second belt drive for the usual train of spur gears **reduces noise and friction losses.** More power is delivered to the table, and there is a noticeable lack of "chatter." The "cushioned" reverse of the Second-Belt Drive permits the **exceedingly high table speeds** that would rack to pieces the ordinary full-geared planer.

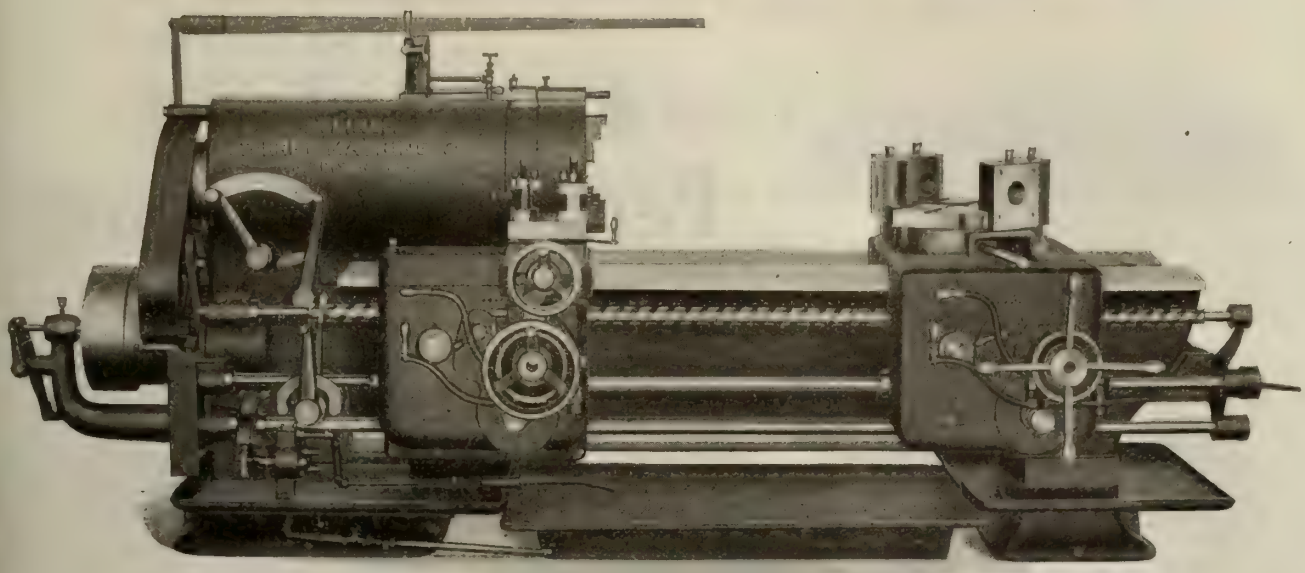
THE IDEA BACK OF THE WHITCOMB-BLAISDELL IS THE BEST RESULTS IN THE SHORTEST TIME.

Why not investigate? May we send catalog?

WHITCOMB-BLAISDELL MACHINE TOOL CO.
WORCESTER, MASS., U.S.A.

Whitcomb-Blaisdell Planers

STEINLE



One of the reasons why the Steinle 24" Full Swing Side Carriage Turret Lathe is ahead of all others in the economical and accurate production of many classes of work.

The Constant Power Single Pulley Drive

This feature insures the same amount of power being delivered to the machine at all times. It does away with power losses due to variation in the amount of belt contact always in evidence when cone pulleys are used.

One belt furnishes power for all functions of the machine. As long as this one belt is kept in proper condition the operator never has trouble with the power traverse of the carriages or pump, as the power for operating these features is derived from the main drive through geared connections and not through belts.

No countershaft to oil or get out of kelter.

Consider the advantages: ONE BELT direct from line shaft or motor, Thirty Reversible Spindle Speeds, Power Traverse for Both Carriages, Independent Feed for Both Carriages, Cutter Lubricant Pump, ONE BELT.

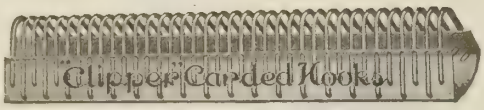
The operator can give all his attention to the cutting tools, feeds and speeds, resulting in more and better work.

There are more good reasons why the Steinle 24" Full Swing Side Carriage Turret Lathe is ahead of all others in the economical and accurate production of many classes of work. We will give these reasons in future advertisements in this Journal. Watch for them. They will be interesting to you.

STEINLE TURRET MACHINE CO.

MADISON - - WISCONSIN, U.S.A.

Clipper
Clipper Belt Lacer Co.



First Aid and Permanent Repair

Clipper Belt Lacing played an important part in the fierce manufacturing energy of the war years. The Clipper is helping in a hundred thousand plants to speed up huge reconstruction programs and magnified trade demands. The breaking of a belt used to be a serious interruption to manufacturing before Clipper Belt Lacing came. It meant a costly delay. It used to take from 15 minutes to half an hour to accomplish even makeshift belt repairs.

The Clipper Belt Lacer
Laces a Belt in Three Minutes

The Clipper not only does the job quickly but does it better. A Clipper laced joint is as strong and lasts as long as the belt itself. It is smooth and flush with the belt on both sides. There is absolutely no friction loss. And the cost of mending a joint with the Clipper is a mere trifle.

In many big plants several Clipper Lacing Tools are kept handy for emergency use. The operation of lacing a belt with the Clipper is so simple that any workman can do it. It is never necessary to call in an expert belt-mender in factories where the Clipper is used.

The Clipper was awarded by the American Museum of Safety the only gold medal ever given for metal lacing. The Clipper is perpetually guaranteed and goes to manufacturers on free trial. Get the Clipper on guard in *your* plant. It will forever end your belt lacing troubles.

There are many mill supply dealers in Canada who handle the Clipper. If you do not know who they are, write us.

London, England: No. 10 Norfolk St.

Clipper Belt Lacer Company
GRAND RAPIDS, MICHIGAN, U. S. A.

Distributors in all parts of the World

Does Your Storage System Save Oil?

If you have never studied the question of storing, distributing and using oils, you will be surprised to know the enormous losses that occur daily wherever oils are handled by inefficient methods. Losses that could easily be prevented by use of

BOWSER OIL STORAGE SYSTEMS

Such Conditions Are Wasteful, Dangerous, Unnecessary

Save All the Oil!

Store oils in leakproof, dirt-proof tanks. There is no loss of oils from any source, no loss of quality. Labor in handling is cut to the absolute minimum.

Write for literature describing equipment for your needs.

S. F. BOWSER CO., LTD.

66-68 Frazer Avenue
TORONTO, ONT.

LONDON 32 Victoria St. S. W. 1
PARIS 5 Rue Denis-Poissons
HAVANA Lonja del Comercio 427
SYDNEY 6 Castlereagh St.

The Bowser Way—Safe, Loss-proof, Convenient, Clean, Systematic

Its strength is surprising. The all-steel working parts mean that you can depend on it, too. It has a safety factor of 3½ to 1 in its weakest part—no greater is found in any hand-chain hoist.

And just because those working parts are steel instead of the ordinary cast iron, a Tribloc is not only stronger and safer, but also wears longer.

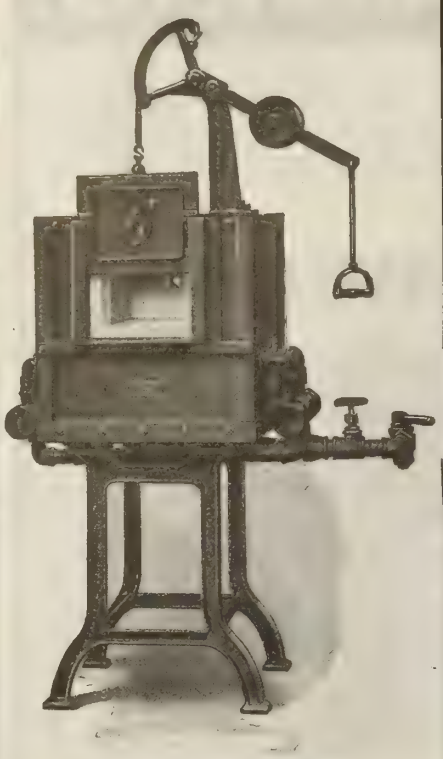
The safety is further increased by our patented loop hand-chain guide—which prevents the "gagging" of the hand-chain at any speed or any angle.

Nothing that could add to the efficiency or safety of a Tribloc has been overlooked. It's so good we guarantee it for five years.

You'll find details and prices in our Catalog No. 3, which comes to you on request.

Ford Chain Block and Mfg. Company

Philadelphia, Pa.



TYPE K HIGH SPEED STEEL FURNACE

The Right Furnace for High Speed Steel

Too much—too little or an uneven heat treatment of High Speed Steel renders it practically worthless for the purpose intended.

This Gilbert & Barker furnace has been designed especially for the correct heat treatment of High Speed Steel. A temperature of 2400°F. is quickly obtained and **easily maintained.** The heat is uniform on all sides of the work and loss by radiation is reduced to the minimum by special insulation.

More than 50 years' experience in designing and building furnaces, especially for the accurate and economical heat treatment of metals is your guarantee of satisfaction.

PROMPT DELIVERY ON G. & B. FURNACES

Recent additions to our plant, already one of the largest in this field, makes it possible to offer immediate shipment of your order.

Tell us your problem and we will tell you the type of furnace you require, but first send for Bulletin 24. To-day is a better day than to-morrow--write.

Gilbert & Barker Mfg. Co.

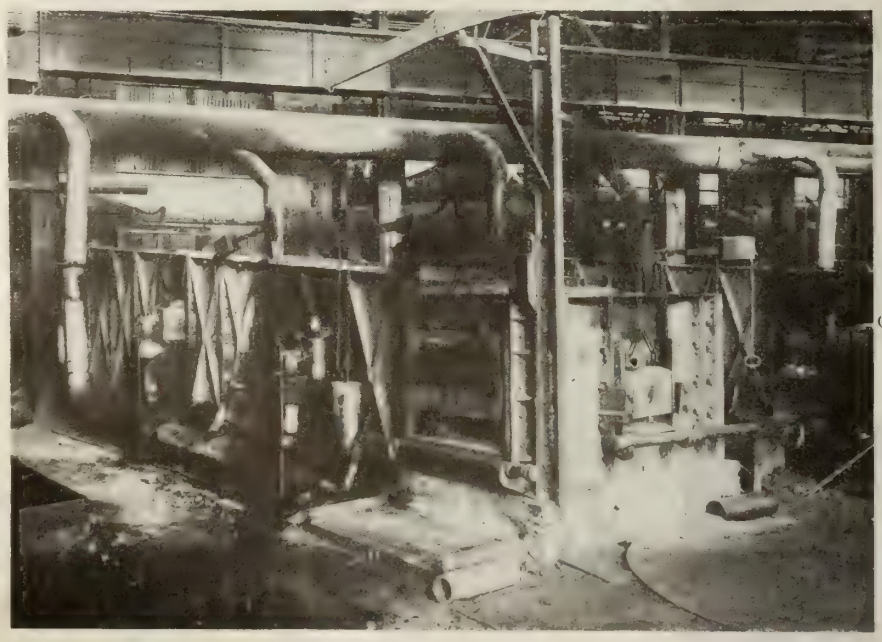
West Springfield, Mass., U.S.A.

Canadian Agents: Williams & Wilson, Montreal, Que. New York Office, 26 Broadway.

GILBERT & BARKER MFG. CO. G&B SPRINGFIELD MASS. U.S.A. EST. 1865

Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering

Company, Limited

Room 308, Bank of Toronto Building, Montreal

Three Rivers, Quebec, Canada

SAVE TONS

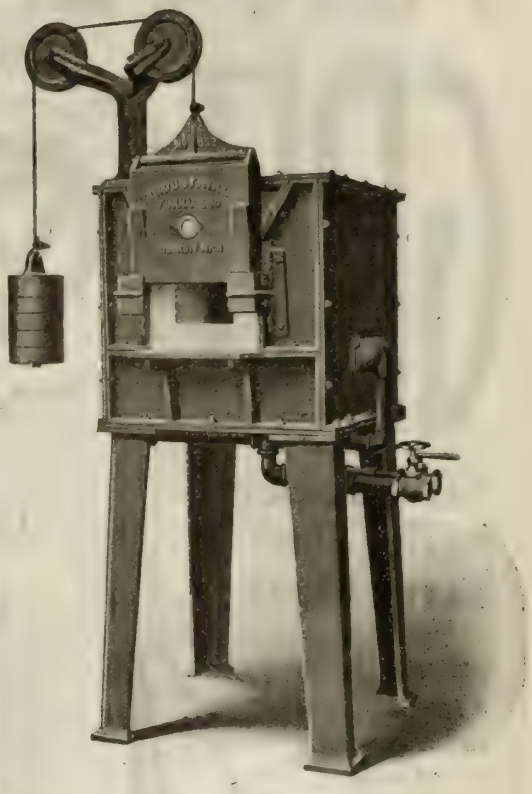
An old, inefficient furnace every working hour is building a monument of clinkers and ash to **profits lost needlessly.**

Bellevue Furnaces

because each designed for a specific purpose, economize fuel and save labor wherever in use.

Bellevue furnaces cover the entire industrial field—79 different styles; 41 extra sizes.

Say that we may send you more particulars.



Bellevue Industrial Furnace Co.
JULIUS HINZ, PRESIDENT
703 Bellevue Ave. - Detroit, Mich.
Representative in Canada:
H. W. Petrie, Limited Toronto, Canada

ECONOMIZER FORGE

It is economical in fuel, air and power; protects workmen from flame and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into forge shop.

Write to-day for catalog 34-T

W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors
50 Church Street New York
(Hudson Terminal Bldg.)
Canadian Representative: R. J. McLean
128 Bleury St., Montreal, Canada.

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types

FORGING FURNACE

For
Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting

Toronto Office:
STANDARD FUEL ENGINEERING CO.
W. H. KIRK, Manager
909 Excelsior Life Building.
Phone, Main 385

STANDARD FUEL ENGINEERING CO. DETROIT, MICH.

ANGULAR GRIT

Saves Labor
Saves Time
Saves Costs

One ton of Angular Grit equal carloads of sand

Quicker and Better

ANGULAR GRIT offers you the most advanced and economical method of cleaning castings, etc. Its angular and irregular cutting points clean raw castings and forgings more thoroughly and with greater speed than either sand or shot.

ANGULAR GRIT dispenses with sand bins and sand dryers, and there is no dust nuisance where it is used.

If you are using sand, think of the labor you can save by adopting ANGULAR GRIT in its place.

Used for all kinds of cleaning operations—best materials for cleaning shells. Prove its superiority by giving it a trial.

Pittsburgh Crushed Steel Co.
Established 1888
Pittsburgh, Pa., U.S.A.

Canadian Representatives:
Williams and Wilson Ltd., Montreal, P.Q.

We make **Machinery Guards** of all kinds.

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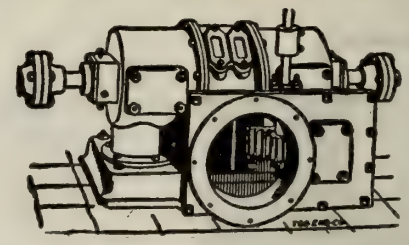

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Can supply complete equipment, including flume, turbine and power transmission.

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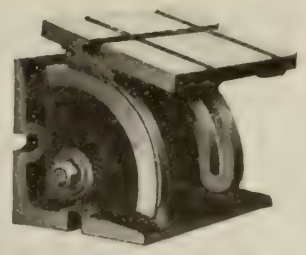
Tool-Room Specialties

External Limit Gage
Style 31

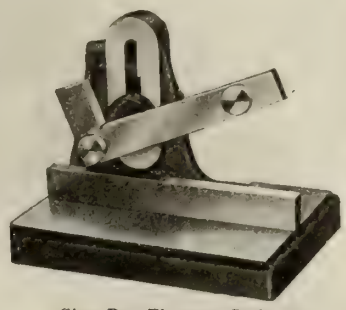


Tool Makers Adjustable Knee
Style 170

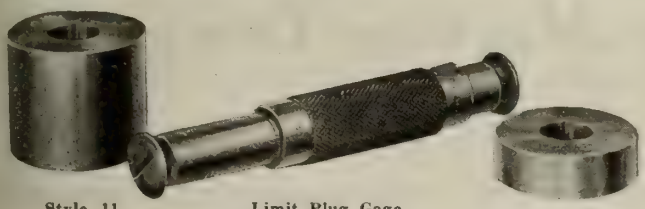
Why use home-made tool room devices which are always expensive, not always satisfactory and often delay work because of the time required to make them?

Why not use Taft-Peirce tool-room specialties—no bother, no delay, and no uncertainty.

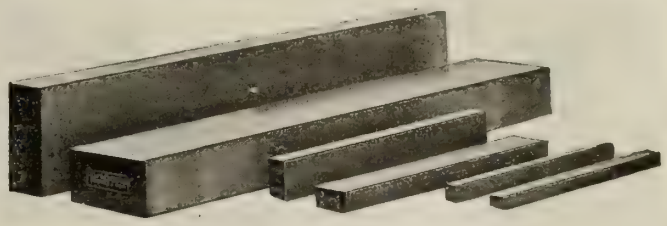
Adjustable External Limit Gage
Style 32



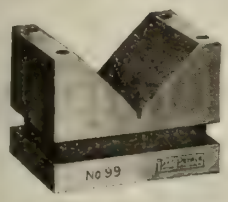
Sine Bar Fixture—Style 120



Style 11 Limit Plug Gage Style 13 Handle Style 12



Steel Parallels—Style 150



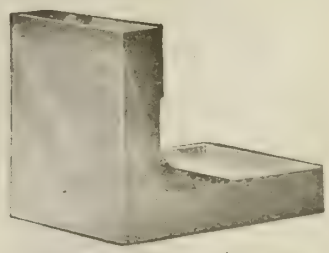
V Block—Style 130

As to character and quality, Taft-Peirce tool-room specialties have been standardized. They are manufactured in quantities, cost less than those made in your own tool-room, and the line is complete enough to meet most requirements.

Equalizing Jaw—Style 140

Ask your dealer or write for catalogue 104 E.

Box Parallels—Style 160



Tool Makers Knee—Style 180

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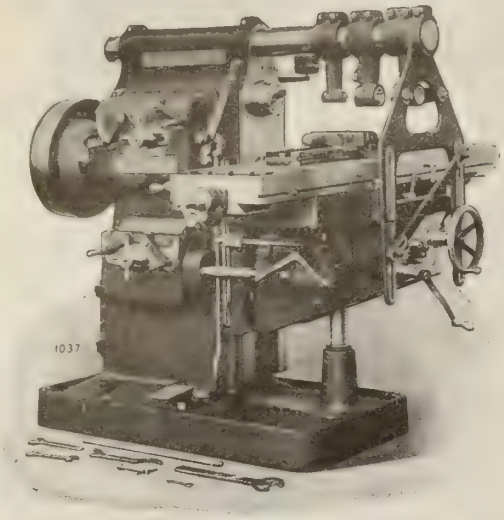
Woonsocket, R.I., U.S.A.

New York, Woolworth Building Detroit, Majestic Building

Williams & Wilson Ltd., Montreal and Quebec.

2059

Cincinnati High Power Millers



One of our 9 High Power Single Pulley Plain Millers. We also make 9 cone driven plain machines, and a full line of Universals.

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Flanged Spindle End

which makes Face Milling Cutters Interchangeable in all sizes of Machines

Handy and Easy to Operate

These are some of the reasons why you should use

Cincinnati High Power Millers

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TRAHERN lubricating pumps are Rotary Geared. This type of construction insures a steady even pumping movement, in either direction, which forces a copious stream of lubricating coolant into the deepest cuts. The stream is forced from the pump in an even flow, absolutely free from pulsation.

This steady flood of coolant increases the efficiency and prolongs the life of your equipment and insures a higher grade of work turned out at lower cost.

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Rockford, Ill.
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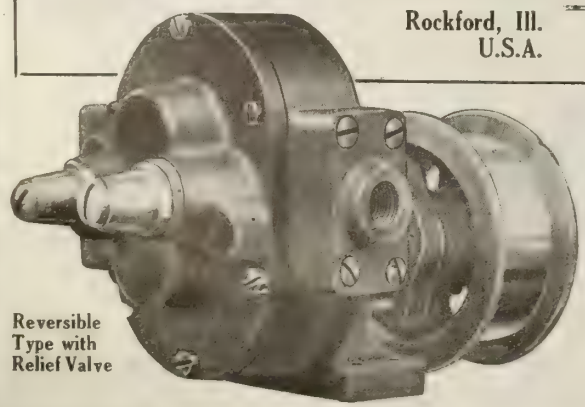

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Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

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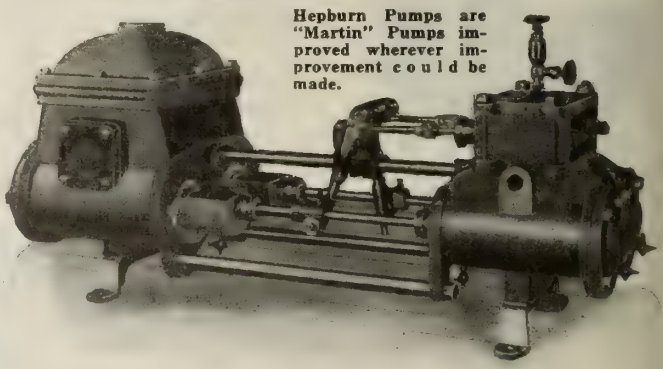

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This waste cost 13 cents a pound

This waste cost ¾ of a cent a pound

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The difference between 3/4 of a cent and what you are paying for waste and wiping cloths represents the saving on each pound you wash in OAKITE.

The oil can be reclaimed, which further reduces the expense. Waste and wiping cloths can be washed in Oakite from 50 to 150 times.

Instead of destroying the fibres of the waste, Oakite makes them softer and more absorbent than when new. Expensive apparatus not necessary.

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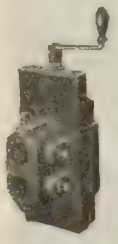
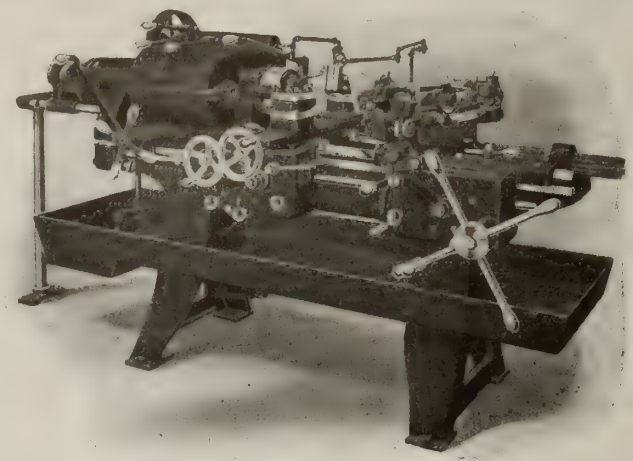
Increased Capacity Draw Back Collet with Bushings

No. 147
Multiple Turning Head

No. 138
Single Cutter Turner

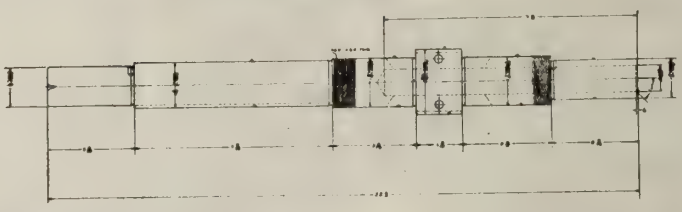

No. 144—
Slide Tool


1-B Universal Turret Lathe

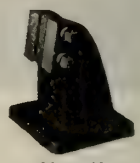
No. 155
Recessing and Boring Tool

Scroll Chuck

No. 140
Pointing Tool



No. 142
Center Drilling Tool


No. 149
Rear Forming Tool Holder

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No. 1-B UNIVERSAL TURRET LATHE
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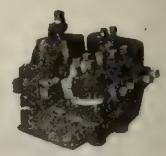
No. 103 B
Split Bushing

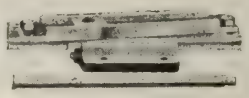
No. 141
Flanged Tool Holder


No. 139
Multiple Cutter Turner

No. 145
Rear Tool Holder

Draw-Back Collet with Bushings

No. 103A
Flat Cutter Bushing


Taper Attachment

No. 102 A
Adapter for Forged Cutters

No. 143
Knurling Tool

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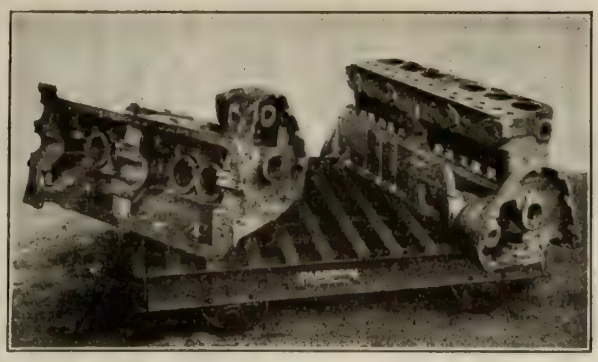

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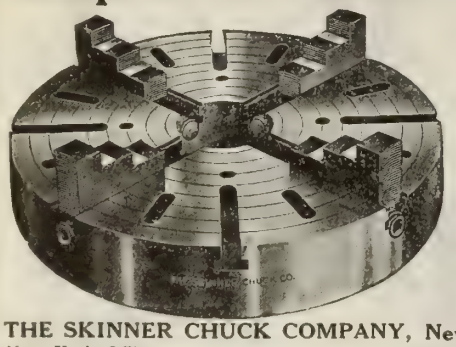

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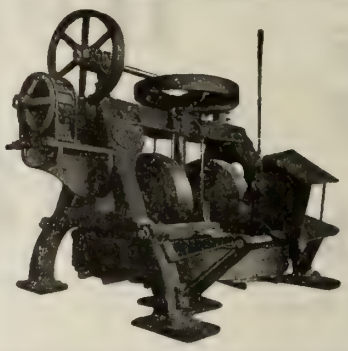

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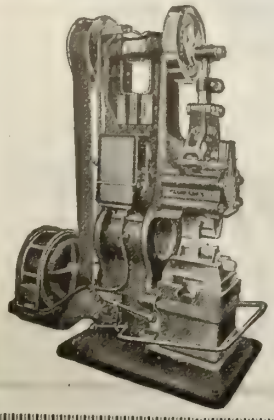

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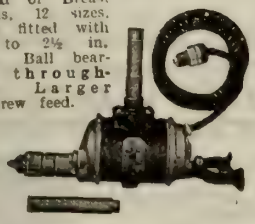

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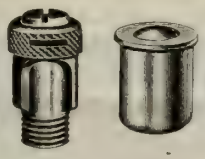

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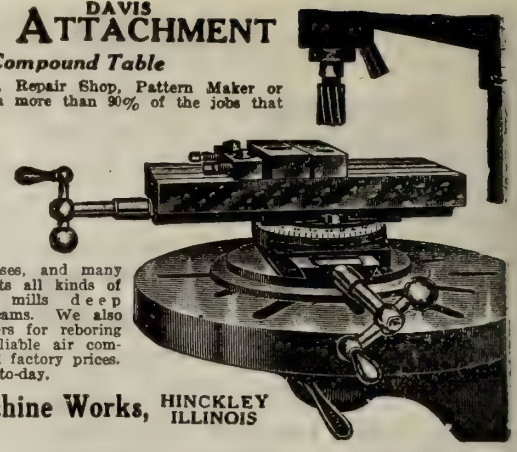

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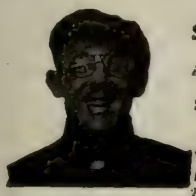

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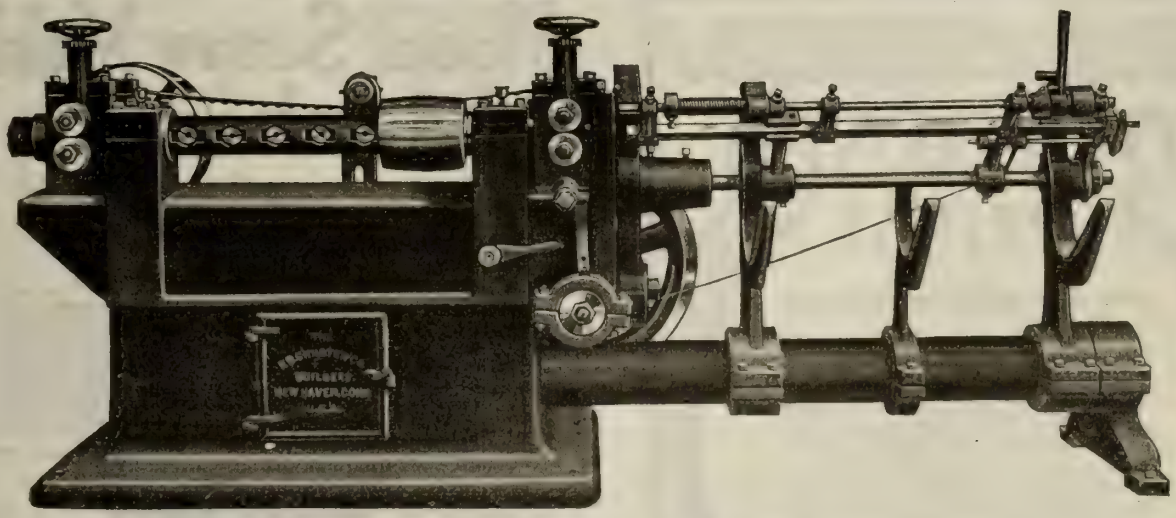

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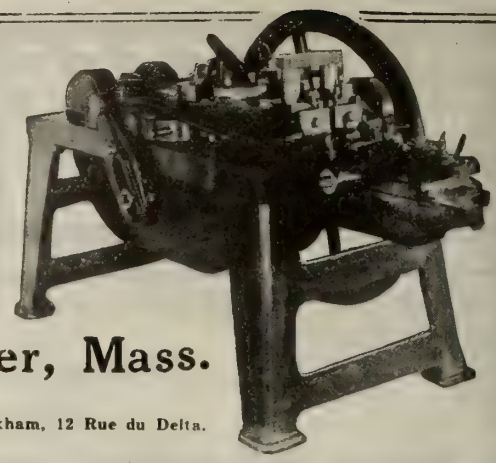

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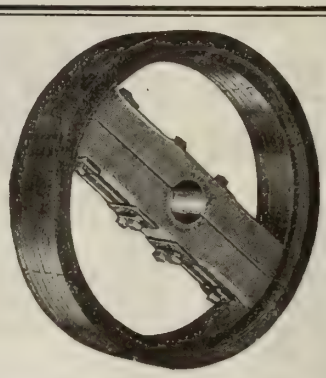

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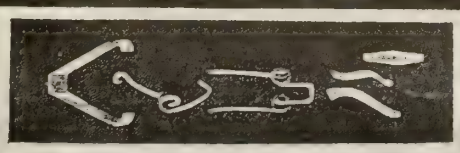

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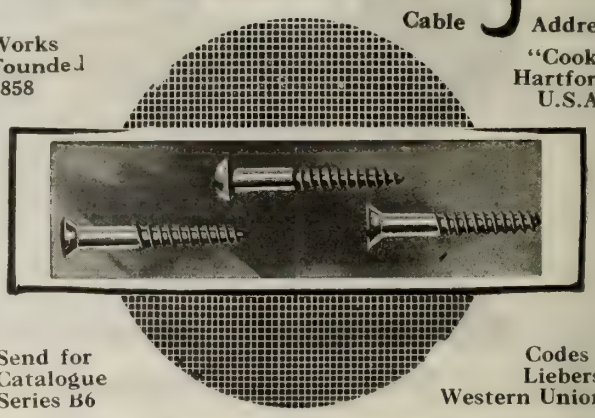

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Kennedy & Sons, Ltd., Owen Sound.

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International Malleable Iron Co. Guelph, Ont.

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Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

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Fittings, Ltd., Oshawa, Ont.

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Morse Chain Co., Ithaca, N.Y.
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Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
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Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont.

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General Steel Co., Milwaukee, Wis.
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Norton, Ralph B., Agent, Montreal.

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Norton, Ralph B., Agent, Montreal.

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CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
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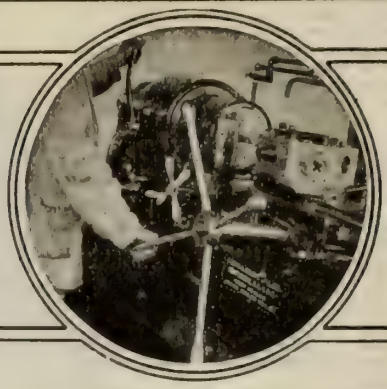

Two Lever Control

On bar stock and work of a similar nature the operator manipulates the turret by means of a lever or pilot wheel with his right hand while with his left he feeds the cross slide tools to the work, and at the end of the operation, when the piece is cut off, pushes the cross slide forward slightly, automatically bringing the next length of stock instantly into position ready for the tools. This largely eliminates making lost motions as the operator remains in the same position at all times.

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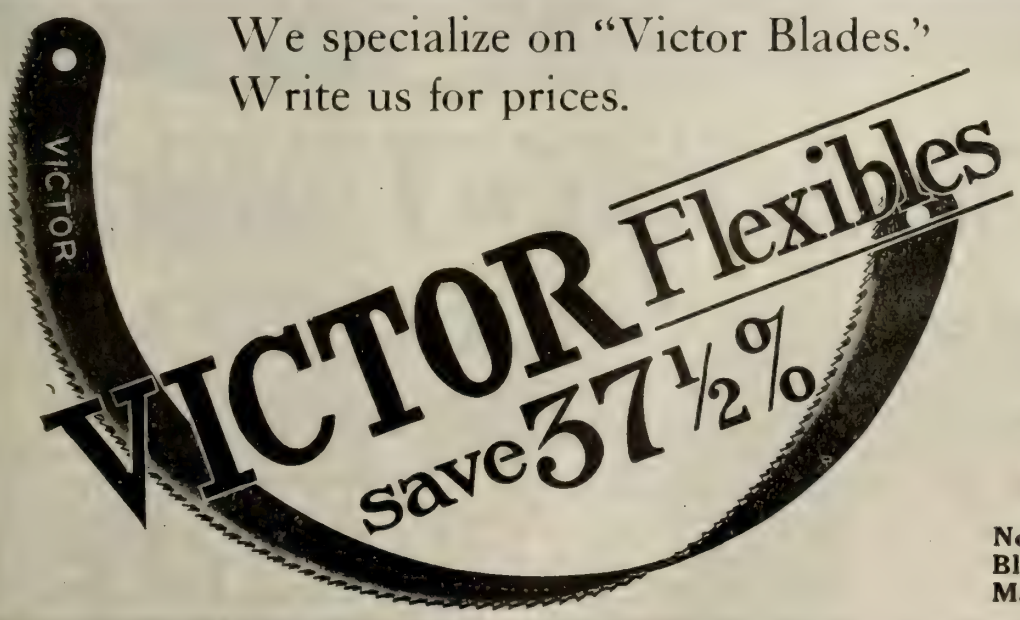

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D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

DRILLING MACHINES, WALL RADIAL
Lund-Farquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EARTH HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

EFFICIENCY ENGINEERING SERVICE
Anderson's Efficiency Service, Toronto, Ont.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRINKING FOUNTAINS, SANITARY
Pure Sanitary Drinking Fountain Co., Haydenville, Mass.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRIVING TOOLS
The Thos. Pink Co., Ltd., Pembroke, Ont.

DRY CLEANING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELEVATOR MACHINERY
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMBOSSING PRESSES
Oliver Machinery Co., Grand Rapids, Mich.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Baxter & Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Trueing Tool Co., Windsor, Ont.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE LATHES
Oliver Machinery Co., Grand Rapids, Mich.

ENGINES, MARINE
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES
Brewster Co. ,Wm., New York, N.Y.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL
J. F. A. Comstedt, New York City, N.Y.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont
United Brass & Lead, Ltd., Toronto.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

FENCE, IRON AND FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

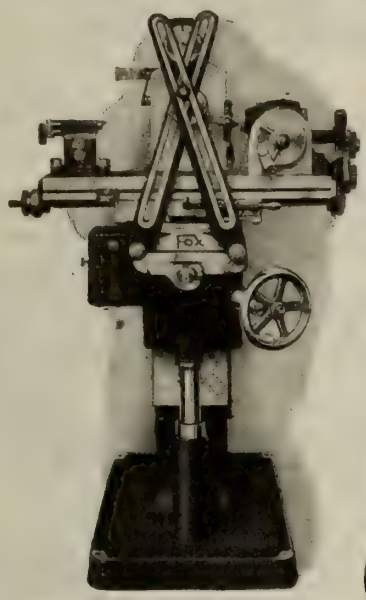
FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.

TRADE **FOX** MARK
REGISTERED

MILLING MACHINES

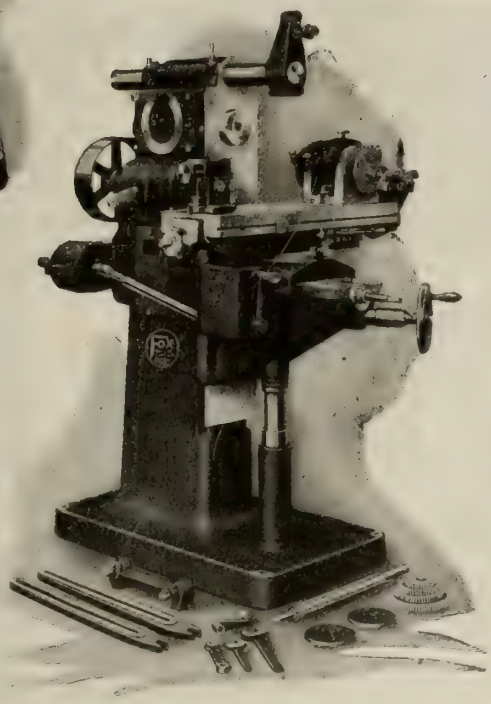
FOR

Rapid Production of Motor Parts



The **demand** for increased production **requires tools** of **great strength** and **durability**; the Fox 2-A Universal Milling Machine illustrated has met this demand, and is being used wherever extreme accuracy and quantity production are required.

The machine has a universal table, spiral cutting attachment, 10″ Dividing Head with 6″ Universal Chuck, making it a machine **especially adapted for Tool Room Work.**



The **United States Government** used this machine in its various **repair shops** for **Aeroplane Motors.**

You should be using this tool to help the production of parts necessary for reconstruction.

Specifications—No. 2-A Miller.

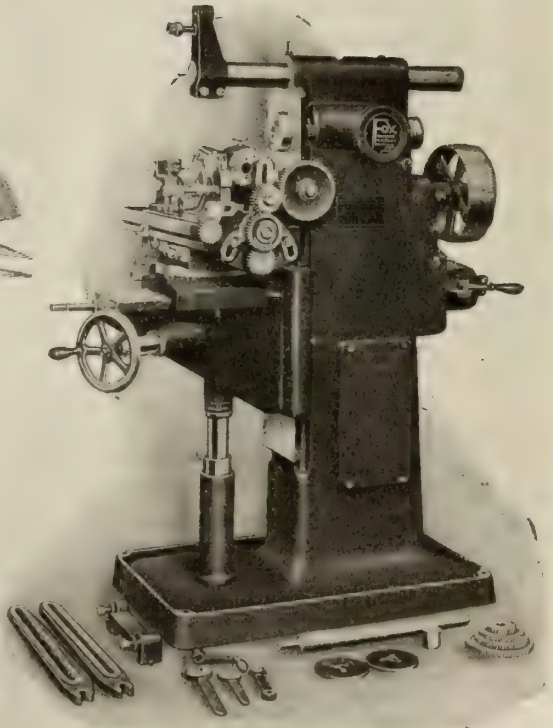
Spindle speeds 12
From 21 to 423 r.p.m.

Table feeds 6
From .317″ to 2.79″ per min.

Table .....8½ x 27″
Long. feed (power) 26″.
Vertical feed (hand) 13″.
Trans. feed (hand) 8½″.

Drive...Single pulley 10 x 3″ running 250 r.p.m.

Gears — Hardened steel.
Weight .....1,500 lbs.



We build this same machine with a plain table, omitting the spiral cutting attachment and Dividing Head.

Our No. 1 type machine has a four-step cone drive, and while being a lighter machine is a "bear" for work. This was proven by **the hundreds** of **them in the largest munitions plants.**

We also build the Fox Multiple Spindle Drilling Machines.

FOX MACHINE COMPANY

1047 W. Ganson St., Jackson, Michigan, U.S.A.

Ingersoll File Co., Ltd., Ingersoll, Ont.
Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

FILLING STATION EQUIPMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

FIRE BRICKS
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

FITTINGS, MALLEABLE AND CAST IRON
Fittings, Ltd., Oshawa, Ont.

FIXTURES
Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

FLAT SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

FORGINGS, STEEL AND IRON
Can. Foundries & Forgings, Ltd., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE

FORGING AND WELDING
Victoria Foundry Co., Ottawa.
Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

FORGINGS, SPECIAL
Armstrong, Whitworth of Canada, Montreal, Que.
Canada Foundries & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FORMING
Henry Hope & Sons of Canada, Ltd., Peterboro.

FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FOUNTAINS, DRINKING
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING
Can. Consolidated Rubber Co., Ltd., Montreal.

FUEL OIL SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Gilbert & Barker Mfg. Co., Springfield, Mass.

FURNACES, ANNEALING, CASE HARDENING AND TEMPERING
Bellevue Furnace Co., Detroit, Mich.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical Engineering Co., Three Rivers, Que.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

FURNACES, BLAST
Belleview Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

FUSE BOXES, STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.

GAUGES, MANUFACTURERS, LIMIT, THREAD
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

GALVANIZING PLANT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE TANKS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GAUGES
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

GAUGES, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Normac Machine Co., St. Catharines, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Swedish Gage Co., Inc., Montreal.
Swedish Gage Co., New York, N.Y.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, VACUUM AND PRESSURE
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GAGES, SNAP, THREAD AND CYLINDRICAL
Swedish Gage Co., New York, N.Y.

GEAR BLANKS
Can. Steel Foundries, Ltd., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

GEARS, CUT, MORTISE, ANGLE, WORM
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

GENERATORS, ELECTRIC
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GENERATORS, MOTOR
MacGovern & Co., Montreal, Que.

GERMAN SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLUE HEATERS
Oliver Machinery Co., Grand Rapids, Mich.

GLASSES, SAFETY
Strong, Kennard & Nutt Co., Cleveland, Ohio.
Wilson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
Aikenhead Hardware, Ltd., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.

GOGGLES
Consolidated Optical Co., Toronto, Ont.
Standard Optical Co., Geneva, N.Y.
Strong, Kenard & Nutt Co., Cleveland, Ohio.
Wilson & Co., Inc., T. A., Reading, Pa.
Welding & Supplies Co., Montreal, Que.

GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS
Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (SEE LUBRICANTS)

GRINDERS, AUTOMATIC KNIFE
W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH
Wisconsin Electric Co., Inc., Racine, Wis.
Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co. Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, DIE AND CHASER
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
United States Electrical Tool Co., Cincinati, O.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, PORTABLE, ELECTRIC, HAND, TOOL POST, FLOOR AND BENCH
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Wisconsin Electric Co., Inc., Racine, Wis.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, ROTARY SURFACE
Bristol Machine Tool Co., Bristol, Conn.

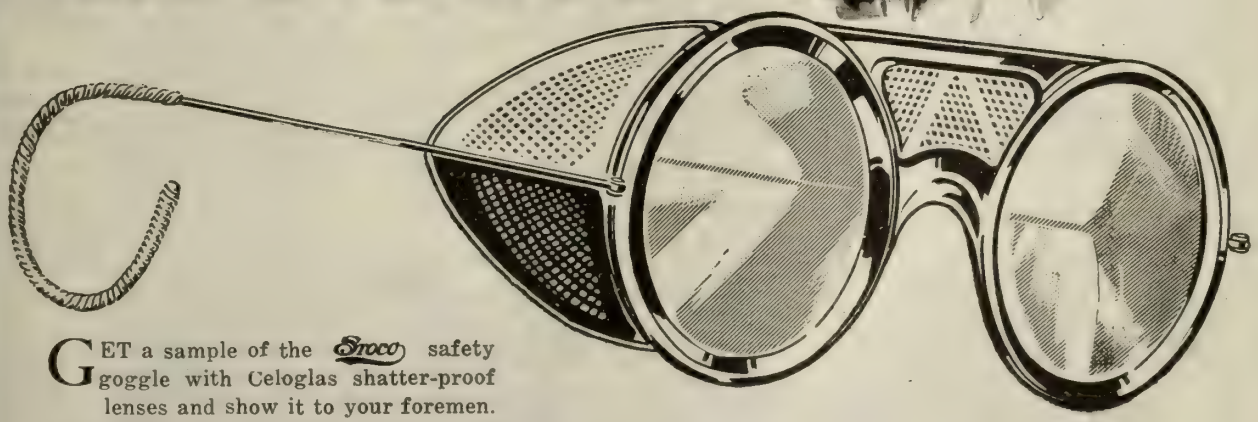
GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Wing & Son, J. E., Hamilton, Ont.

GRINDERS, UNIVERSAL, PLAIN
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Reed-Prentice Co., Worcester, Mass.
Wing & Son, J. E., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
LeBlond Mach. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York, N.Y.
Norton Grinding Co., Worcester, Mass.

These Stoco CELOGLAS SHATTER-PROOF LENS SAFETY GOGGLES will make my men EYE SAFE



GET a sample of the Stoco safety goggle with Celoglas shatter-proof lenses and show it to your foremen. Have them give it a trial under actual working conditions, and it won't take them long to decide that it's the kind of eye protection their men need.

The Stoco safety goggle frame is the strongest ever designed for eye protection purposes. In spite of its sturdy construction it is light in weight and mighty comfortable in use.

Stoco safety goggles are supplied with either easy cable earbows or elastic headbands, and also with regular heavyweight glass lenses or Celoglas shatter-proof lenses. Celoglas lenses have a thin piece of celluloid between two glass lenses. Even though the glass may fracture from a hard blow, the lens will not leave the frame nor will particles of glass fly into the eyes of the wearer.

The price of Stoco safety goggles with Celoglas lenses is $115.00 per hundred pairs; with regular glass lenses, $90.00. Sample free on request to Safety Engineers or Superintendents.

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GENEVA, N.Y.

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Williams & Wilson, Limited, Montreal, Que.

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Brantford Emery Wheel Co., Brantford, Canada.
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Ford-Smith Mahcine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Norton Co., Worcester, Mass.

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Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

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Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.

GUN AND AMMUNITION SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

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Ford-Smith Machine Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
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Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
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Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

HACK SAWS, POWER
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Limited, Montreal, Que.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited Montreal, Que.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh, Pa.

HAMMERS, NAIL MACHINE
Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston Mass.

HAMMERS, STEAM
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
Beaudry & Company, Inc., Boston, Mass.

HAND PLANERS
Oliver Machinery Co., Grand Rapids, Mich.

HAND LEATHERS OR PADS
Graton & Knight Mfg. Co., Montreal.

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Algoma Steel Corp., Sault Ste. Marie, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

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Shore Instrument & Mfg. Co., New York.

HEATING AND VENTILATING ENGINEERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

HEATING AND PLUMBING CONTRACTS
James Ballantyne, Montreal.

HEAT TREATMENT OF STEE L
The Gray Ball Bearing Co., Ltd., Toronto.

HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

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J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

HIGH SPEED TOOL ROOM DRILLS
Albany Hardware Spec. Co., Albany, Wis.

HIGH SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.
J. F. A. Comstedt, New York City, N.Y.

HINGE MACHINERY
Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES
London Bolt & Hinge Works, London, Ont.

HOBS
Greenfield Tap & Die Corp., Greenfield, Mass.
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.

HOBS, MILLING

HOISTS, AIR
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

HOISTING AND CONVEYING MACHINERY AND ENGINES
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, CHAIN AND PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, ELECTRIC
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

HOOKS, BELT LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

HOPPERS
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Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

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Hydraulic Machy. Co., Ltd., Montreal, Que.
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William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.
Williams & Wilson, Limited, Montreal, Que.

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Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

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Brown & Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Athol, Mass.

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Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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INGOT METAL
Brown's Copper & Brass Rolling Mills, N.
Toronto, Ont.
United Brass & Lead Ltd., Toronto.

INGOTS, STEEL
Nova Scotia Steel & Coal Co., New Glasgow, N.

INGOTS, FORGING AND ROLLING
Electric Steel & Metals Co., Welland, Ont.

INSTRUMENTS, ENGINEERING
Consolidated Optical Co., Toronto, Ont.

IRON GREY
Brockville Foundry Co., Brockville, nt.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

IRON SAND
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

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Swedish Steel & Importing Co., Ltd., Montre

IRREGULAR CUTTING SHEARS
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Can. Fairbanks-Morse Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niag
Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

JACKS, PNEUMATIC
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JACKS, PIT AND TRACK
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Northern Crane Works, Walkerville.

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Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.
Normac Machine Co., St. Catharines, Ont.

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KEY SEATERS
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

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LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

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Wood Turret Machine Co., Brazil, Ind.

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Bridgeford Mach. Tool Wks., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Blount, J. G., & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal.
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Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Hardinge Bros., Inc., Chicago, Ill.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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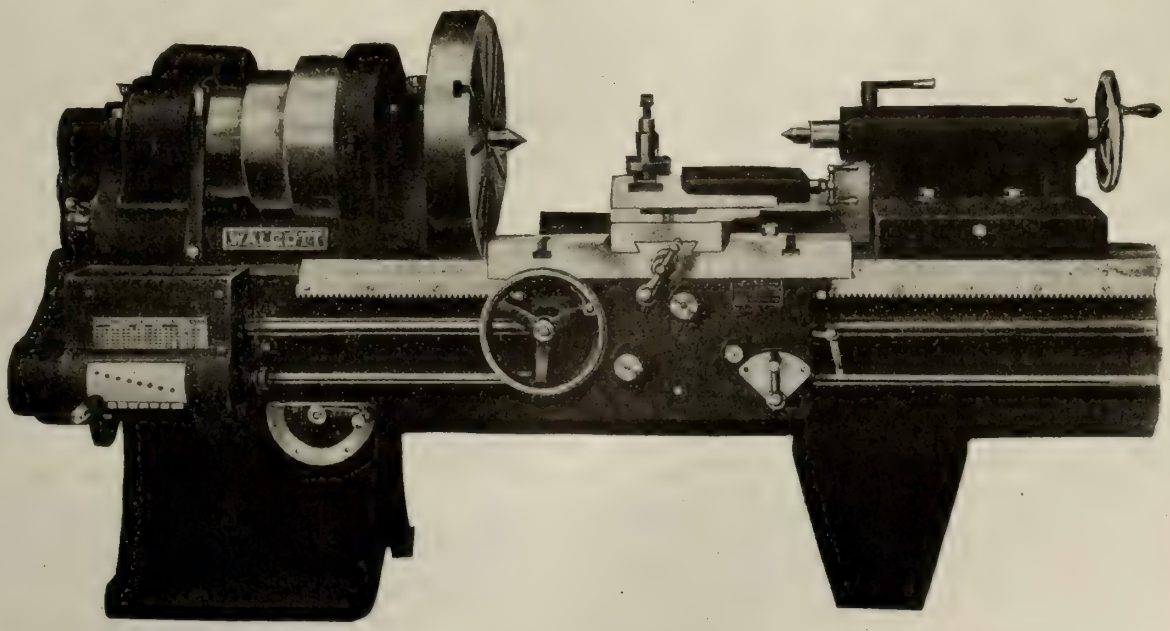

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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
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Whitcomb-Blasdell Mach. Tool Co., Worcester, Mass.
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Fittings, Ltd., Oshawa, Ont.
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Garlock-Walker Machy. Co., Toronto, Ont.
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Roelofson Mach. & Tool Co., Toronto, Ont.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
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Wickes Bros., Saginaw, Mich.
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Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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Williams & Wilson, Limited, Montreal, Que.

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Williams & Wilson, Limited, Montreal, Que.

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Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
H. C. Dodge, Inc., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

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LEATHER STRAPPING
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Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
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LOADERS, WAGON AND TRUCK
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.

LUBRICANTS
Cataract Refining & Mfg. Co., Toronto.
Elm Cutting Oil Co., Toronto, Ont.
Ontario Lubricating Co., Hamilton, Ont.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

LUMBERMEN'S TOOLS
The Thos. Fink Co., Ltd., Pembroke, Ont.

MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal, Que.
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Marten Mach. Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINES, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

MACHINE SHOP WORK
James Ballantyne, Montreal.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H. Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MACHINE TOOLS
Cincinnati Lathe & Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

MACHINE & REPETITION WORK
Katie Foundry, Ltd., Galt, Ont.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co. of Canada, Ottawa, Ont.
Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Toronto Testing Laboratory, Ltd., Toronto.

METAL SAWS
Simonds Mfg. Co., Fitchburg, Mass.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

METAL STAMPINGS, SMALL
Can. Winkley Co., Ltd., Windsor, Ont.

METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

MILLING ATTACHMENTS
Becker Milling Machine Co., Boston, Mass.
Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
The Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.
New Britain Mach. Co., New Britain, Conn.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

What Two Leading Authorities Say About
ARMCO Iron Welding Rods

THE uniform satisfaction of ARMCO Welding Rods for both oxy-acetylene and electric welding is typically evidenced by the following comments of two prominent users.

From the standpoint of oxy-acetylene work President B. K. Smith of the American Welders Association is perhaps the best qualified man in the country to pass judgment. He states:—

"I have tested ARMCO (American Ingot) Welding Rods, and they proved exceptionally good. There is so little difference between your rods and genuine Norway iron that it cannot be noticed even after most severe tests as to quality and ultimate strength. I congratulate you for the success of replacing the foreign with the American product.

"The flow of the metal is very clean and plastic, without a trace of sulphur or any other defective elements found in many special rods.

"In testing two pieces of mild steel plates welded with your rods they broke at 60,000 pounds, which is a very good elongation showing. The acid test on the welding line showed pure, clean metal with no oxide and a uniform color with the boiler plate.

I certainly recommend ARMCO RODS to brother welders as ideal for tank, boiler, sheet metal or any other work where best grade rods are required, and the best is none too good for any work."

And with those interested in *electric* welding, the opinion of the Welding Department of the Newport News Shipbuilding and Dry Dock Co. should carry weight. They too are enthusiastic about ARMCO IRON Welding Rods, as may be inferred from the following comment:

"We are using ARMCO IRON for all our welding to our entire satisfaction and we find ARMCO works out more satisfactorily for our numerous kinds of welding than any other wire.

"We attribute the steady arc and even flow of ARMCO to the uniformity of the product."

Men and firms of this type do not express opinions hastily, so you may be sure that ARMCO WELDING RODS have real merit.

Making a trial costs practically nothing, so why not at least ask for our booklet "ARMCO Welding Rods."

Carried in stock at convenient points throughout the United States and Canada.

AMERICAN ARMCO IRON

The trade mark ARMCO carries the assurance that iron bearing that mark is manufactured by the American Rolling Mill Company with the skill, intelligence and fidelity associated with its products, and hence can be depended upon to possess in the highest degree the merit claimed for it.

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PAGE STEEL & WIRE CO.

Established 1883 as Page Woven Wire Fence Co.

STEEL AND WIRE PAGE QUALITY PRODUCTS

Makers of "Copperweld" Copper Clad Steel Wire; ARMCO IRON Welding Rods and Electrical Wire; Wire Mill Products, Plain and Galvanized; Wire of Special Analysis; Wire Fencing for all Purposes; Factory Gates; Ornamental Iron Fence; Machine Guards; Tool and Stockroom Partitions; Architectural Iron.

PLANTS: Monessen, Pa. and Adrian, Mich.

SALES OFFICES: 30 Church Street, New York

WESTERN REPRESENTATIVES: Steel Sales Corporation, Chicago

Our Monessen, Pa. Plant

MOTOR SPRINGS
The Dunbar Brothers Co., Bristol, Conn.
MOTORCYCLE FRAME AND FORK
The Dunbar Brothers Co., Bristol, Conn.
MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.
MOULDS, RUBBER
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.
MUNTZ METAL
Brown Copper & Brass Roller Mills, New Toronto, Ont.
NAILS
Page Steel & Wire Co., Adrian, Mich.
NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.
NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.
NICHROME CASTINGS
Can. Driver-Harris Co., Ltd., Walkerville, Ont.
NICKEL
Boker & Co., Inc., H., Montreal, Que.
NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.
NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.
NITROGEN
Carter Welding Co., Toronto, Ont.
NUTS
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can
Williams & Co., J. H., Brooklyn, N.Y.
NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
NUT BURRING MACHINES
National Machy. Co., Tiffin, Ohio.
NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.
NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Ti..n, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.
NUT TAPPERS
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.
OILS, MOTOR
Elm Cutting Oil Co., Toronto, Ont.
OILS, DRAWING
Elm Cutting Oil Co., Toronto, Ont.
OIL SEPARATORS
Can. Fairbanks-Morse, Co., Montreal.
Sheldon's, Ltd., Galt, Ont.
OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.
OIL STONE GRINDERS
Oliver Machinery Co., Grand Rapids, Mich.
OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.
OPENING DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.
OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto.
OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford, Ont.
OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
OXYGEN, ELECTROLYTIC CELLS
Welding & Supplies Co., Montreal, Que.
Brantford Oven & Rack Co., Brantford, Ont.
OXY-ACETYLENE WELDING AND CUTTING
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.
OXY-ACETYLENE WELDING AND CUTTING PLANT
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Oxyweld Co., Ltd., Toronto, Ont.

PACKINGS, ASBESTOS
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.
PACKINGS, LEATHER, HYDRAULICS, ETC.
Baxter & Co., Ltd., J. R., Montreal, Que.
Graton & Knight Mfg. Co., Worcester, Mass.
Gutta Percha & Rubber, Ltd., Toronto, Can.
William R. Perrin, Ltd., Toronto.
PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.
PAPER MILL CONVEYORS AND DRIVES
Can. Link-Belt Co., Toronto, Ont.
Bertrams, Ltd., Edinburgh, Scotland.
MacKinnon Steel Co., Sherbrooke, Que.
PAPER MILL MACHINERY
Garlock-Walker Machinery Co., Toronto, Ont.
PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
PATTERN MARKERS' LATHES
Oliver Machinery Co., Grand Rapids, Mich.
PATTERN MAWERS' VISES
Oliver Machinery Co., Grand Rapids, Mich.
PATTERN SHOP SUPPLIES
Oliver Machinery Co., Grand Rapids, Mich.
PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.
PEDESTALS WITH DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.
PECK CARRIERS FOR POWER PLANTS
Can. Link-Belt Co., Toronto, Ont.
PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.
PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.
PINS, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.
PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph, Ont.
PIPE CUTTING AND THREADING MACHINES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.
PHOTOSTATS
Commercial Camera Co., Providence, R.I.
PIPE RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.
PIERCING
Oliver Machinery Co., Grand Rapids, Mich.
PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE REAMERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE STOCKS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE THREADERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PISTON RODS, ROUGH TURNED
General Steel Co., Milwaukee, Wis.
PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.
PLANER JACKS
Armstrong Bros. Tool Co., Chicago.
PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Oliver Machinery Co., Grand Rapids, Mich.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.

Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.
PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.
PLANER-SHAPER, COMBINED OPEN SIDE
Lynd-Farquhar Co., Boston.
Williams & Wilson, Limited, Montreal, Que.
POWER HAMMERS
Quickwork Co., St. Marys, Ohio.
POWER TRANSMISSION MACHINERY
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Williams & Wilson, Limited, Montreal, Que.
PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
POLE SAW FRAMES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
PLIERS
Aikenhead Hardware Co., Toronto.
Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.
POLE LINE HARDWARE
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Quebec.
PLATE AND TANK CONSTRUCTION
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
POLISHING MACHINES
Ford-Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.
POLISHING PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.
POWER HOUSE CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
PRESSED STEEL PARTS
The Gray Ball Bearing Co., Ltd., Toronto.
PRESSERS, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.
PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.
PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.
PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
PRESSES, FILTER
William R. Perrin, Ltd., Toronto.
Smalley-General Co., Inc., Bay City, Mich.
PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.
PRESSES, HYDRAULIC
John Bertram & Sons Co., Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
PRESSES, BALING
William R. Perrin, Ltd., Toronto.
PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N.J.

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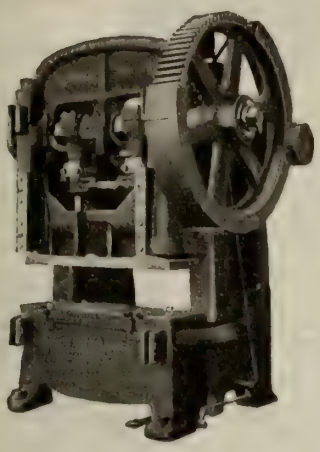

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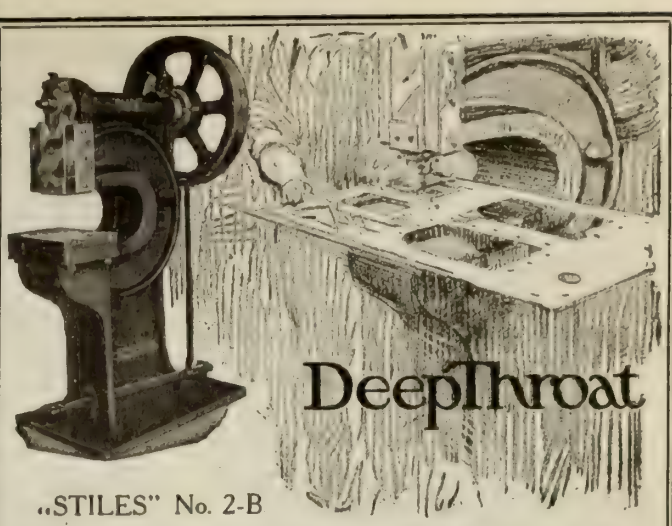

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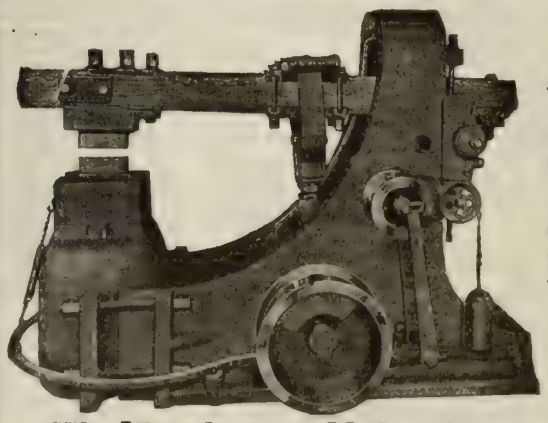

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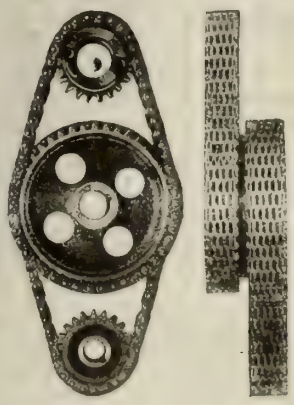

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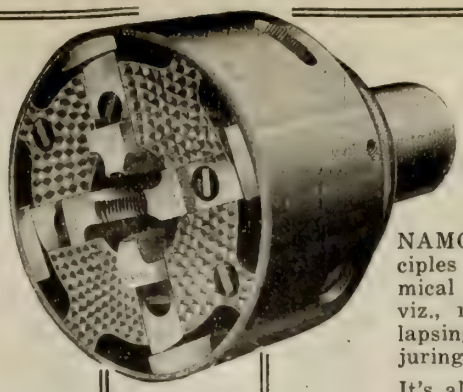

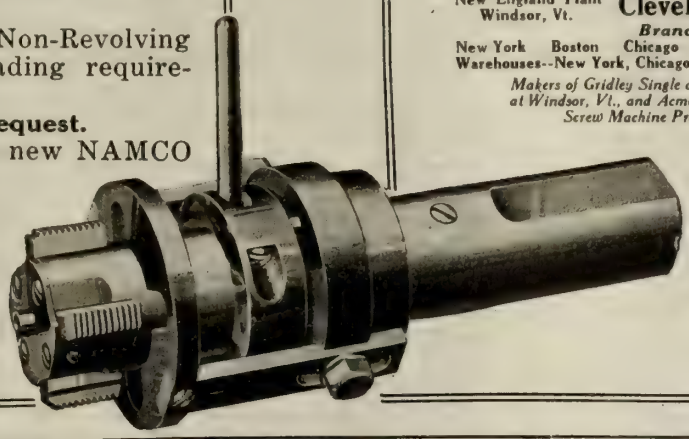

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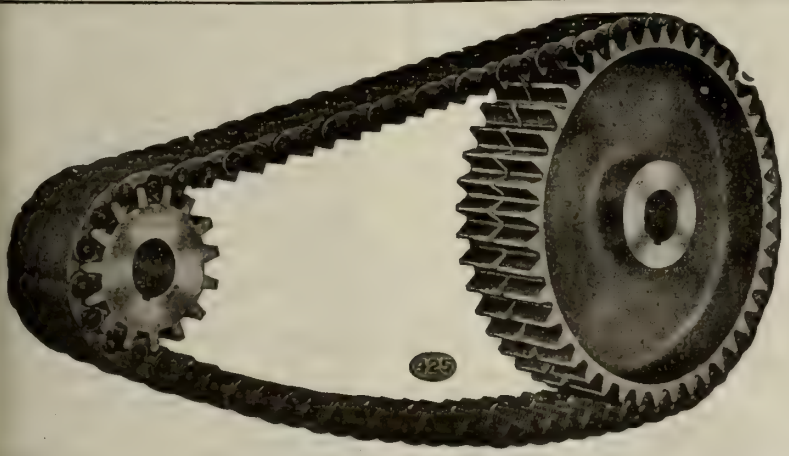

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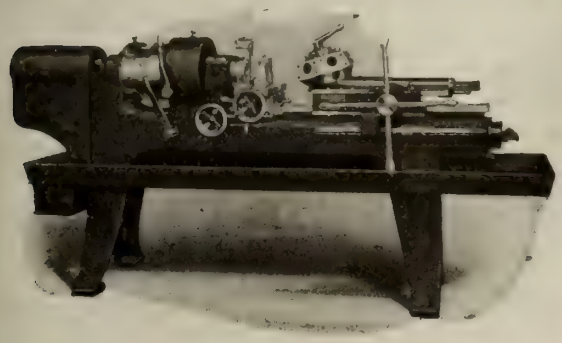

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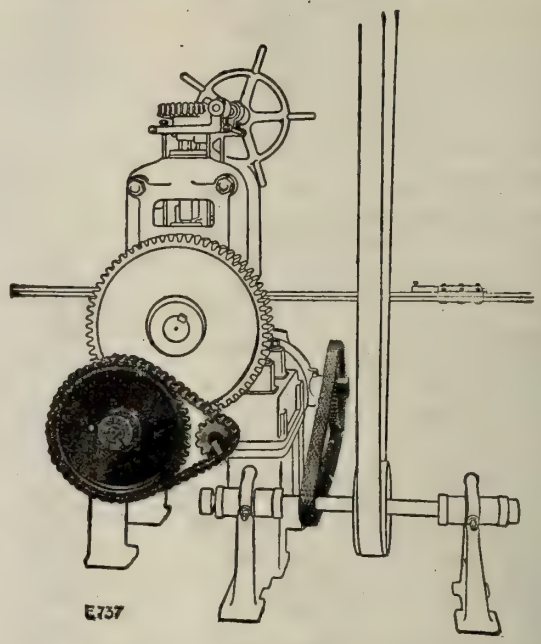

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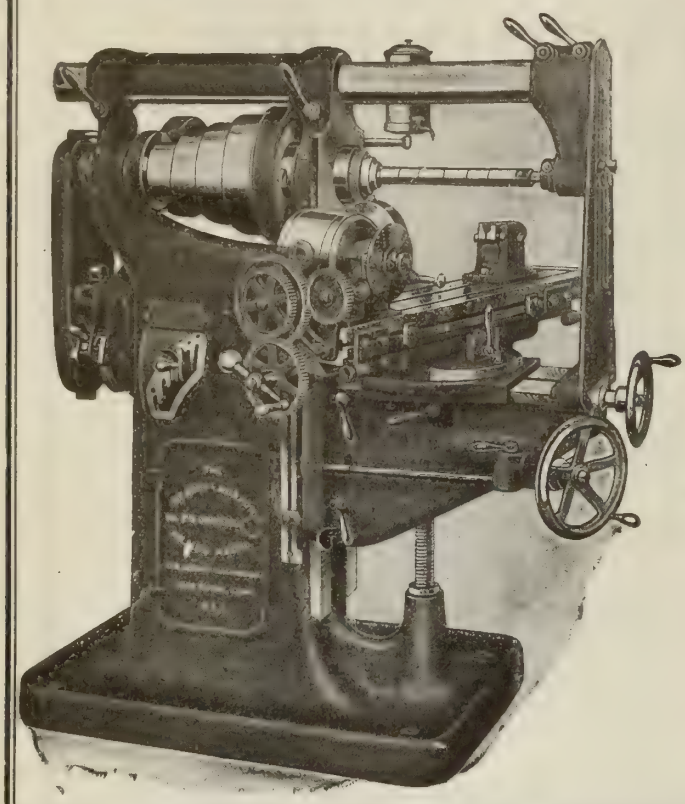

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QUALITY *Foss* SERVICE

The Distinctive Rigidity

of the "Mueller" Radials, one-piece, patented column, reinforced with four internal webs; and the long bearing of the arm of this column assures accuracy at the extreme traverse of the spindle even when the arm is at the top of the column. Combination positive, and friction feed, low or high speed friction reverse, unusual operating convenience and other advantages, combine to make it both popular and profitable on a wide range of operations.

One "Mueller" in a plant brings us repeat orders as fast as the expansion of business warrants. The record of each "Mueller" ordered makes the user want more.

Order your MUELLER from *Foss*

You'll get a remarkable combination of quality and service and our own guarantee of absolute satisfaction or money refunded.

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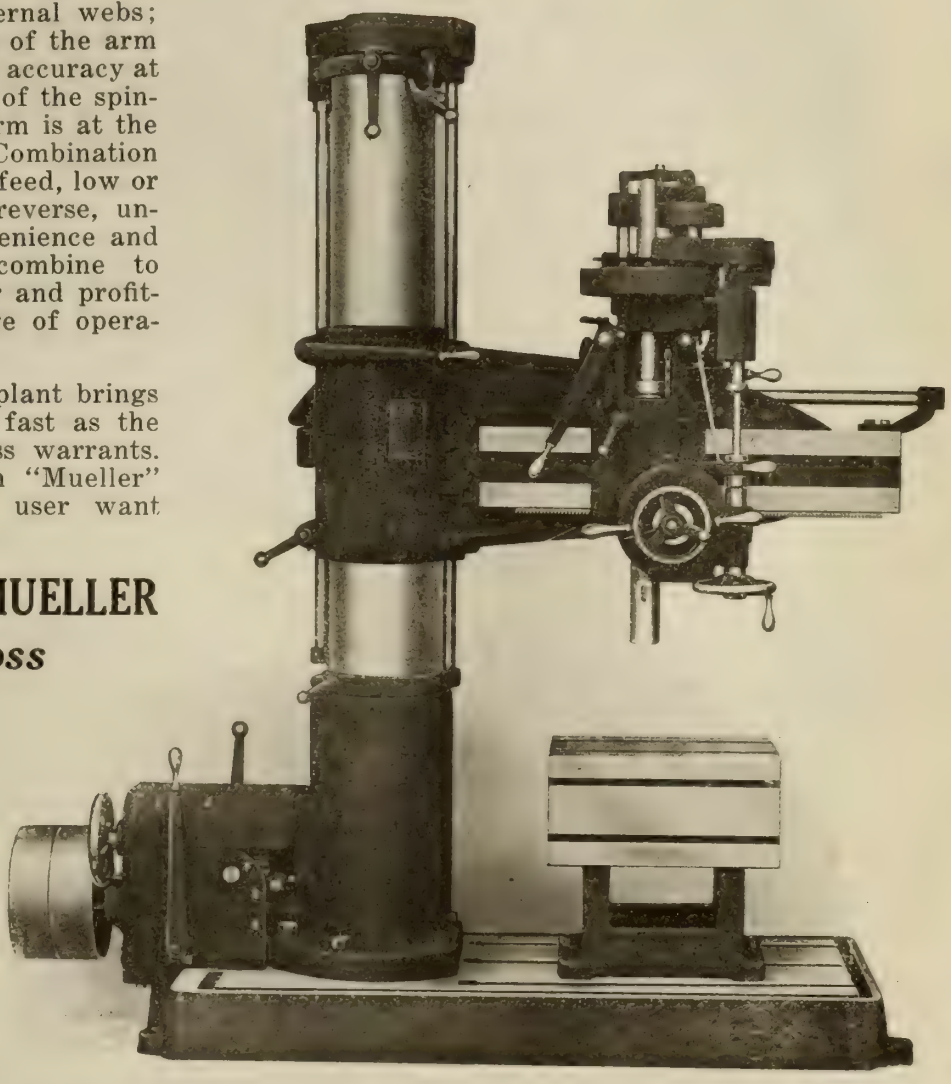

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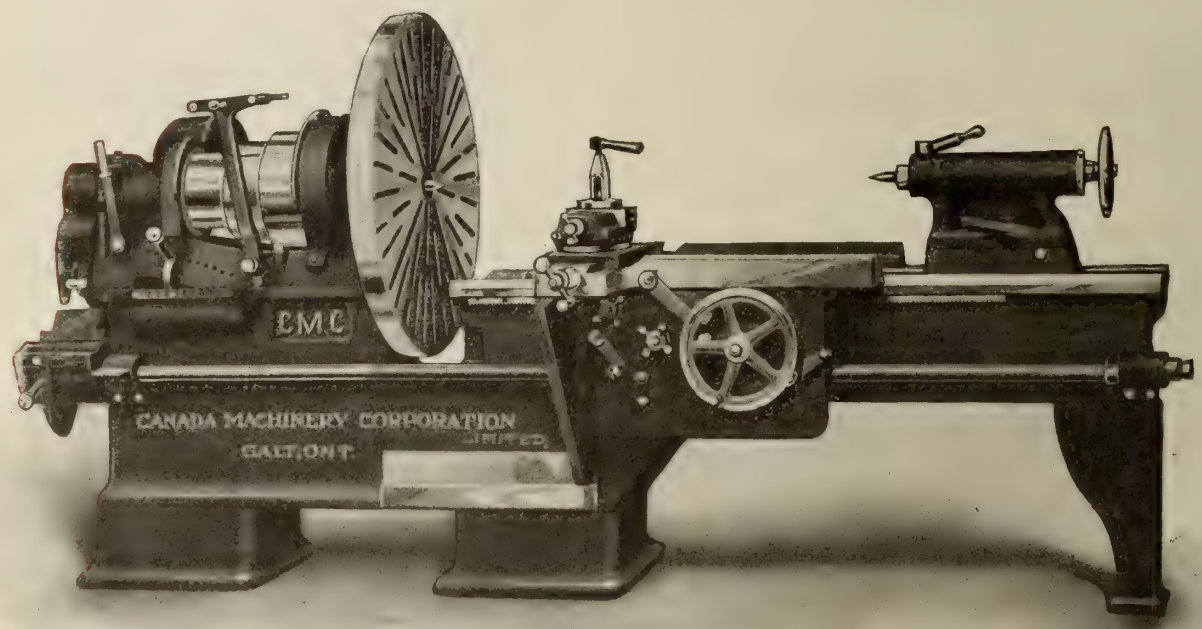
C.M.C. **GAP LATHE** C.M.C.

with quick change gears



Sizes 18″, 20″ and 24″

This Gap Lathe is a modern high speed tool of great strength and extreme accuracy. The design of the gap and gap plate is a decided improvement, our construction permitting the large face plate and thin work to swing without the removal of the plate.

The Bed, especially below the gap, is of unusual weight and strength to insure the maximum stiffness under the heaviest cuts.

The Headstock is of the three step cone, double back geared type, permitting the use of wide drive belts and giving ample range and number of spindle speeds.

Write for special descriptive bulletin.

We can effect early deliveries.

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Toronto Office and Warerooms: BROCK AVE. SUBWAY

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 19 Publication Office: Toronto, May 8, 1919 Subscription Price $3.00 per Year

Friction Practically Eliminated

Lubrication Costs of No Account

Chapman Double Ball Bearings

Chapman Double Ball Bearings are purposely designed to overcome two causes of great expense experienced in the use of plain bearings.

First—reduction of friction load, an evil which wastes countless units of power in the course of a year.

Second—reduction of a large amount of oil and attention required to make the bearings give proper service.

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Users save 75% of friction loss in transmitting power, and as they require oiling not more than twice a year much time and oil expense is saved.

That's the kind of economy you want in your plant! Decide to adopt Chapman Bearings without delay.

Fit all standard hanger frames and are interchangeable with self-oiling box of same size.

We also manufacture Annular and Thrust Bearings for automobiles and machinery.

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SMALL TOOLS

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

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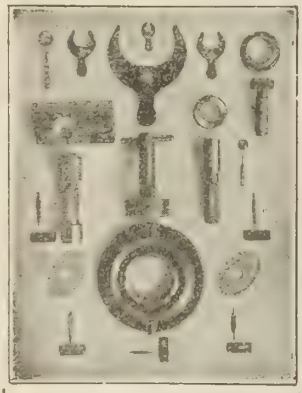
These dies are practically solid when in use and can be adjusted 1-32 in. larger or smaller. The chasers can be quickly removed for the purpose of renewal or sharpening. Standard sizes furnished include U. S. Standard, Whitworth Standard, S. A. E. Standard and "V" form, all right hand; also special right-hand Briggs Standard taper pipe thread.

The Pratt & Whitney policy of highest quality materials, together with the necessary refinement and accuracy, is maintained.



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Accuracy Unequalled

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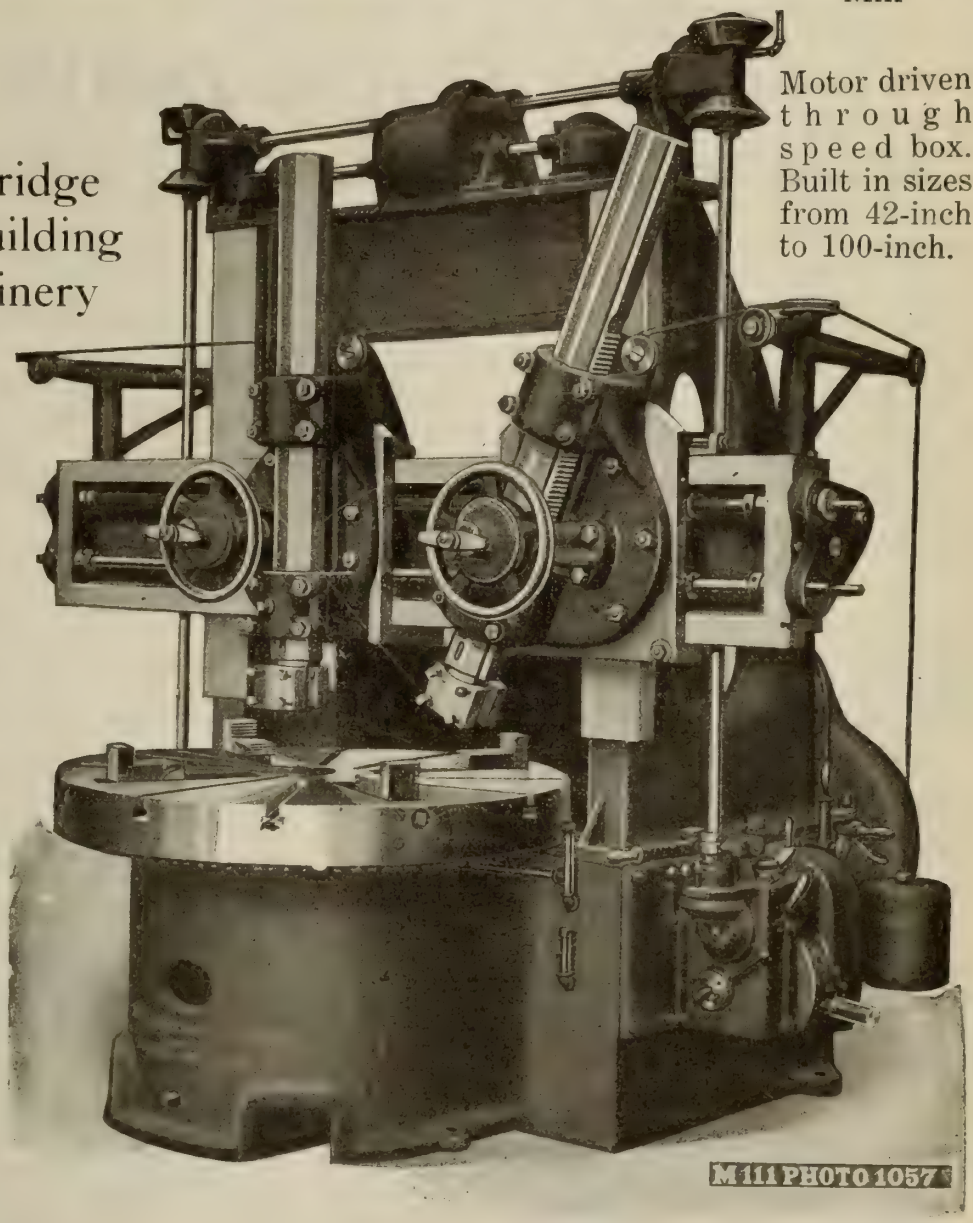
Motor driven through speed box. Built in sizes from 42-inch to 100-inch.



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The Publisher's Page

TORONTO APRIL 8, 1919

BIG FOUR DRIVE

$1,500,000 in Four Days in the City of Toronto Alone

THINK what this means, men. Judged by the old standard of things, it is a huge undertaking, but in the light of recent achievements it seems perhaps quite ordinary. It will be done in four days, and no one will marvel.

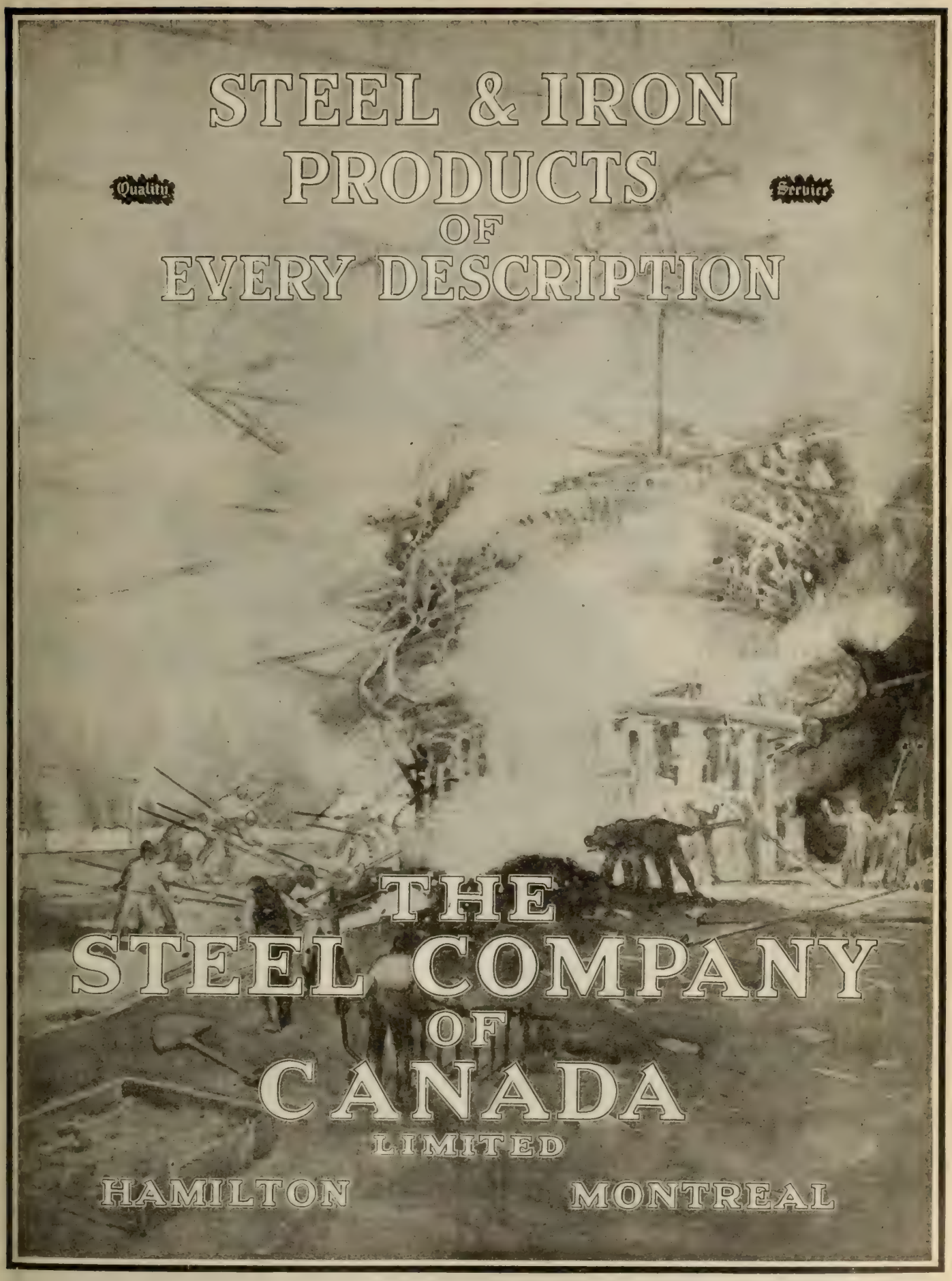
And yet it is a big thing to put across. A very big thing. Some of the best brains in the city have been working for weeks planning and organizing. Nothing has been left undone, nothing forgotten. The raising of $1,500,000 is a simple matter in itself but the perfecting of the necessary organization is a wonderful thing.

It is significant that the big men back of the campaign rely on advertising to help them. They appreciate the value of advertising and recognize its power, but they know that there must be organization back of it.

There is a lesson to be learned from the manner in which these big campaigns are conducted. They last but a few days and much has to be accomplished in a short space of time. There must be careful planning, wise leadership, complete organization, enthusiasm and *PUBLICITY*. All these things are necessary if a big success is to be won in a few days. How much more necessary is it, then, that there be careful, aggressive, enthusiastic organization back of the publicity of a commercial proposition which is being established, not by whirlwind methods in a few days, but by a slower process extending over a period of many years.

Some manufacturers lean too heavily upon their advertising, neglecting the supporting factors which make for success.

Canadian Machinery and Manufacturing News, May 8th, 1919. Vol. 21, No. 19. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Deparment, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.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PRODUCTS
OF
EVERY DESCRIPTION
Quality
Service
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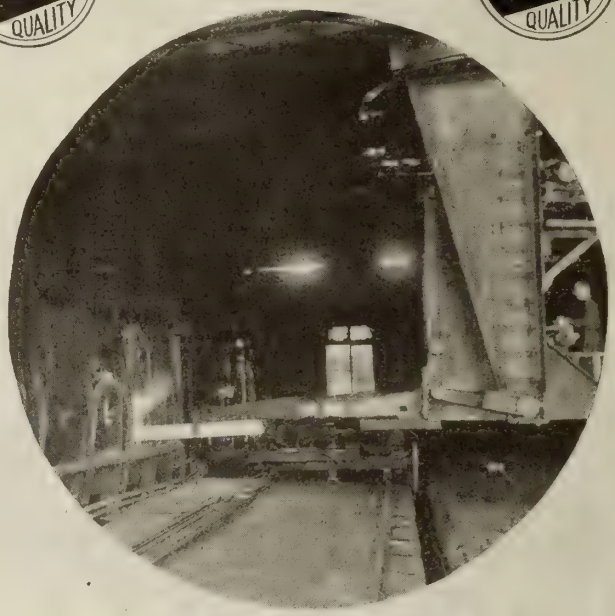
MONTREAL

ALGOMA STEEL CORPORATION, LTD.

SAULT STE. MARIE, ONTARIO

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

MARK OF ALGOMA O.H. QUALITY



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Sulphuric Acid. *Nitre Cake*

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Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

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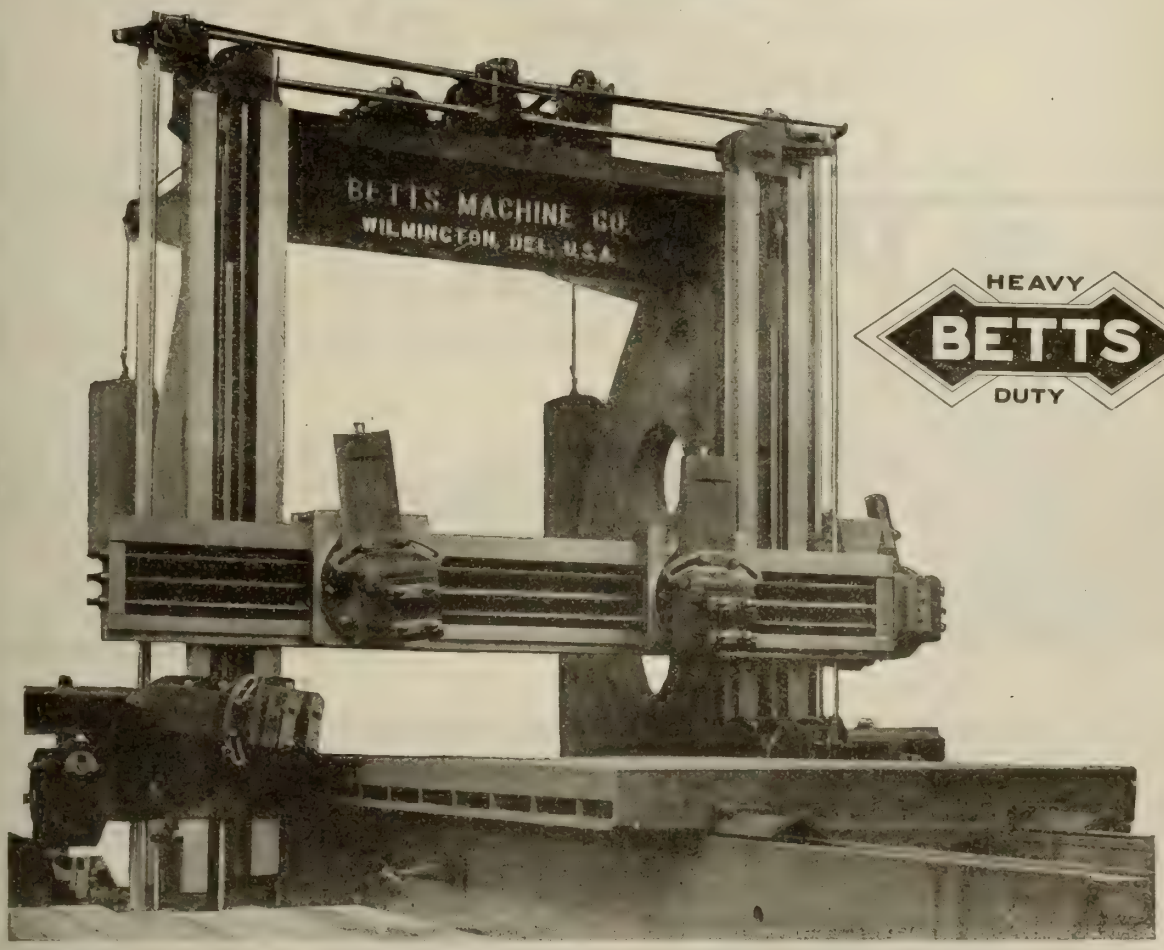
Betts Leadership in Heavy Duty Machine Tools

In every commercial field there is a leader—a trail blazer—a pace setter. In the heavy duty machine tool field, Betts has earned the leadership. For 58 years Betts' tools have set the pace and blazed the trail to greater production and machine tool efficiency.

The number of tools in operation in the world's largest locomotive works, railroad shops, steel mills, shipyards, forge shops, electrical shops, etc., is convincing evidence of Betts' leadership in the heavy duty machine tool field.

Let us tell you more about Betts tools.



HEAVY BETTS DUTY

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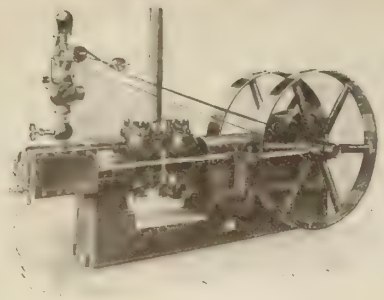
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON. DEL.



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Why not use your existing boiler capacity?

The steam-driven compressor illustrated is compact; you can easily put it into a corner of your power-house. Steam and air ends are built to the latest designs; the steam consumption is low, the efficiency high. The construction is such that supervision is reduced to a minimum—and there is a size to suit your plant.

K-302 is the bulletin

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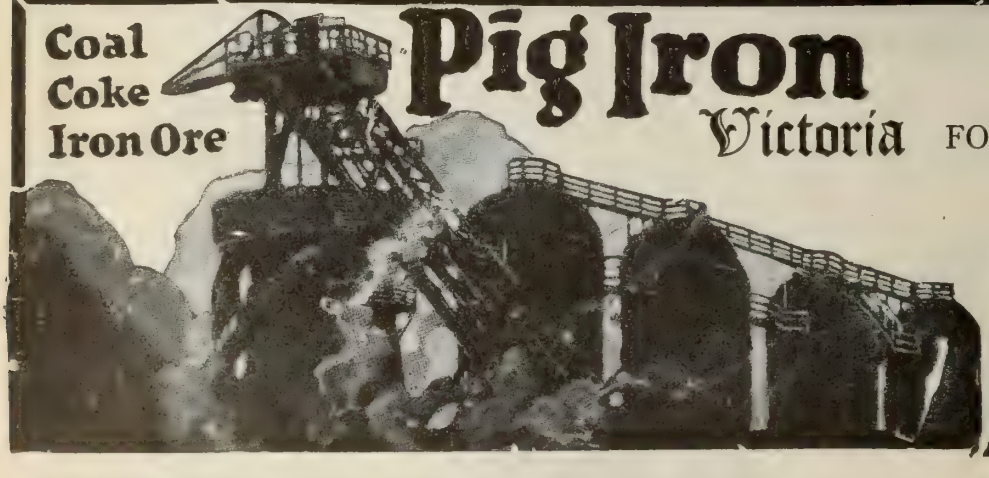

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FIRTH'S CARBON TOOL STEELS
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HIGH SPEED AND CARBON TWIST DRILLS

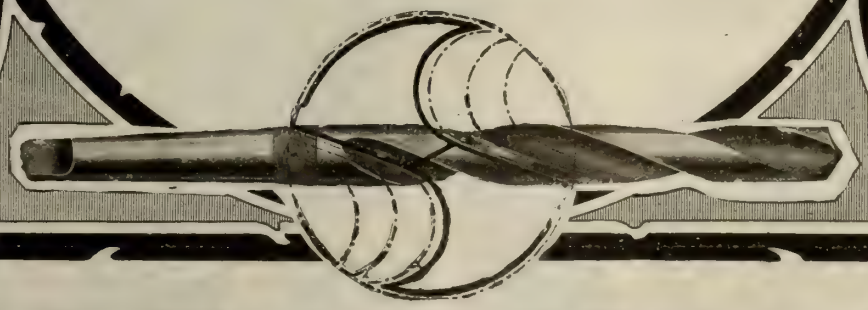
Unusual Drills Backed by Unusual Policies

Every superintendent should investigate the unusual qualities of

WILT TWIST DRILLS

The "WILT" has stood the test of all conditions—it is here to stay—its popularity among the mechanics makes that a certainty.

Investigate "WILT DRILLS" and you'll buy no others



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OF CANADA LIMITED

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In the "Snyder" and a Host of Other Drill Presses

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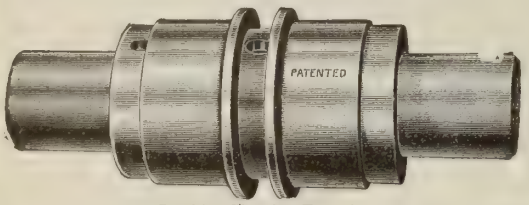
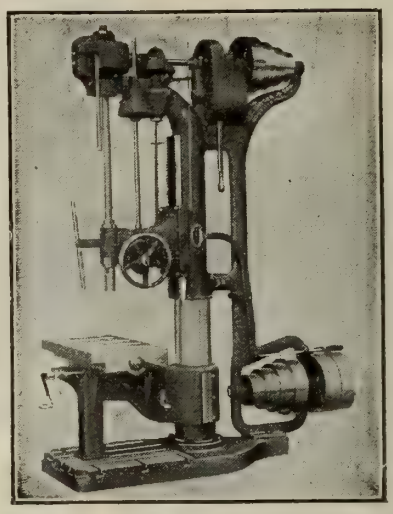


Double Clutch—Exterior.

Write us for our Yellow Data Sheets



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PROMPT SHIPMENTS from large stock

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MADE IN THE U.S.A.

HIGH SPEED STEEL

TRADE MARK

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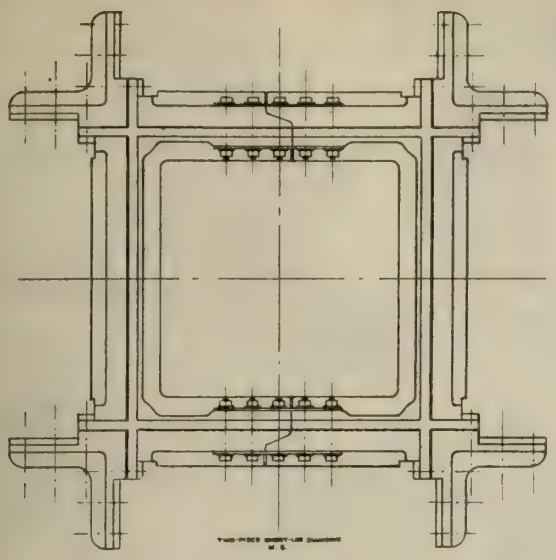
Represented in Canada by Messrs Norton Callard & Company MONTREAL Que.



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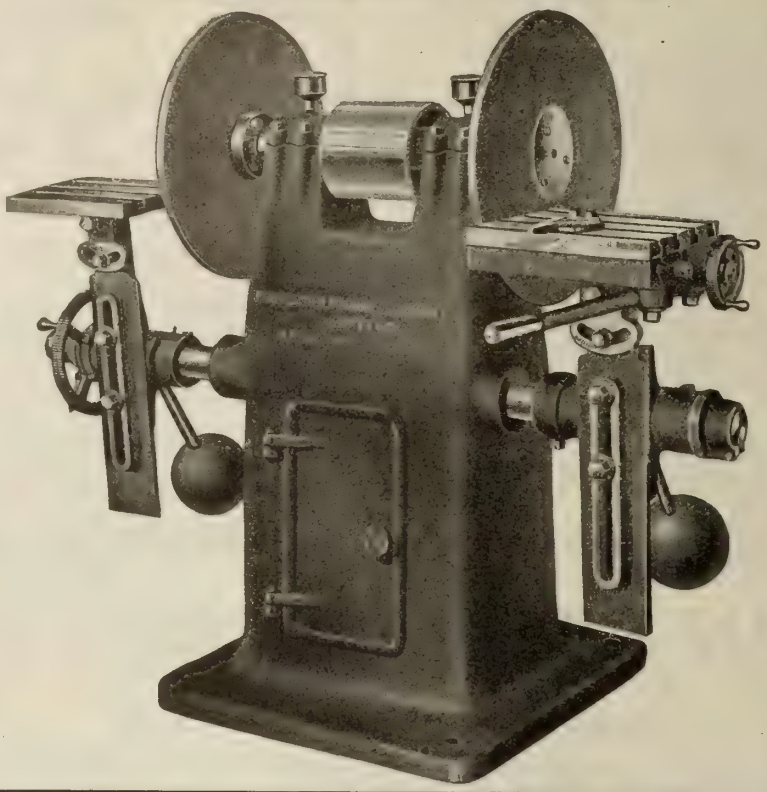

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Special Machinery

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FORD-SMITH MACHINE CO.
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HAMILTON, CANADA

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The High Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
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"Trojan"
"Nickle Genuine"
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Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.
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Bristol 12-inch Rotary Precision Surface Grinder

Built for rapid production on grinding work.

It handles work either singly or in multiples within the capacity of the chuck and not thicker than 6-in., and grinds within quarter thousand in. of manufacturing accuracy.

And it is built to last.

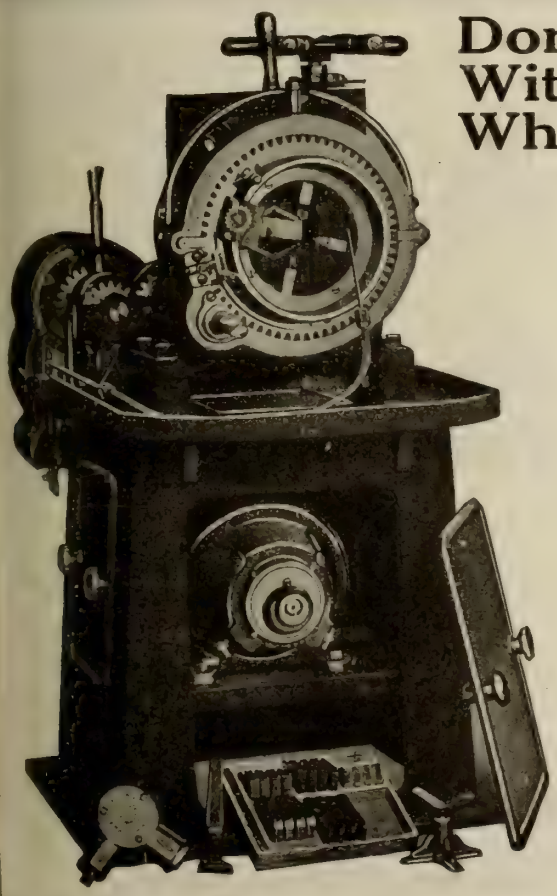
It is provided with exceptionally long bearings throughout, especially in the back column. This prevents the wear, which is very slight, from affecting the accuracy of the grinder. The Back Column is made to swivel four degrees, which allows concave or convex grinding.

Bristol Rotary Surface Grinders are made in several types and sizes and are regularly equipped with 8-in., 12-in., and 16-in. magnetic chucks, either belt or motor driven and for dry or wet grinding.

Our Bulletin describes the many good points fully. Send us your name and address and we'll gladly mail you one.

Grinds within .0004 in. of absolute Accuracy

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
BRISTOL, CONN.



Don't Talk Man Shortage With Six Men on Pipe Work Where There Should be One

Don't let urgent work lag for the want of men while you employ a gang of men instead of one man and a

Forbes Pipe Cutting and Threading Machine

on your pipe work.

The old-style stock and die method of cutting off 15-in. pipe required six men. It can now be done with one man and a Forbes Machine.

The motor-driven type follows the pipe-fitting work wherever an electric wire can be run. No hauling of heavy pipe to and from a stationary machine.

In the Forbes Machine the dies revolve. The pipe remains fixed in the self-centering vise. And the threads cut! They're the kind that make tight joints, because they're clean, accurate.

Write to-day for our catalog.

The Curtis & Curtis Co.
115 Garden Street **Bridgeport, Conn**

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The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally Known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

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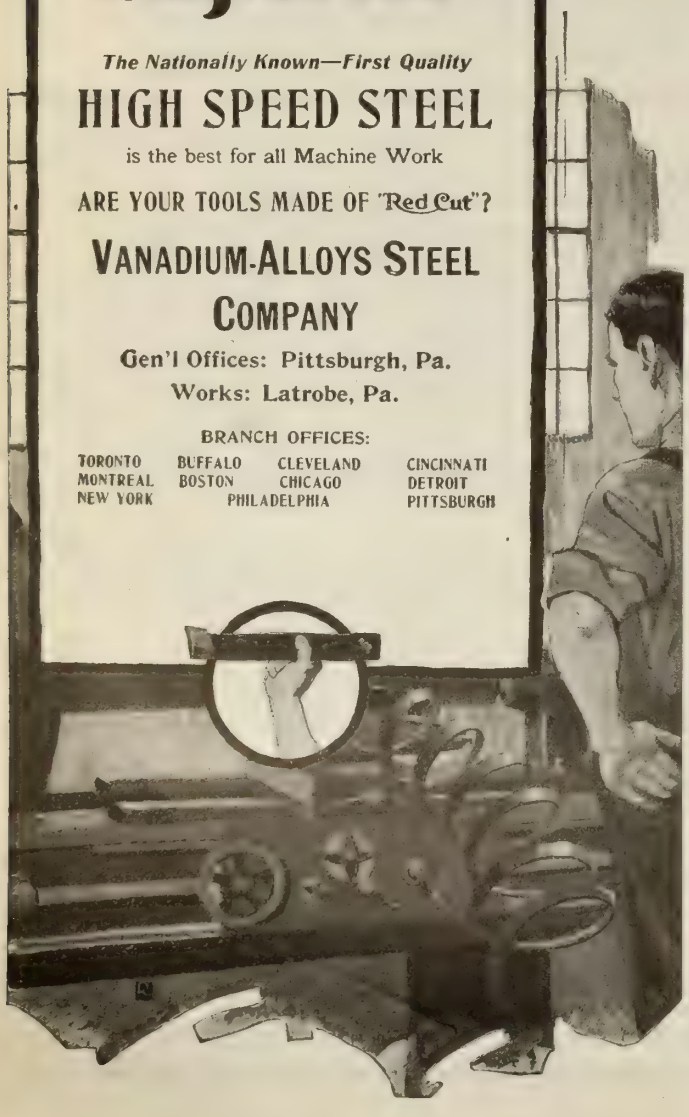

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Toronto Office: 510 Lumsden Building

CANADA
FOUNDRIES & FORGINGS
LIMITED

A SOLEMN WARNING

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Canada Foundries & Forgings, Limited
WELLAND, ONT.

LOCOMOTIVE AND CAR WHEEL TYRES

HIGH-SPEED AND CARBON
TOOL STEEL

MISCELLANEOUS SHOP TOOLS

MADE IN CANADA

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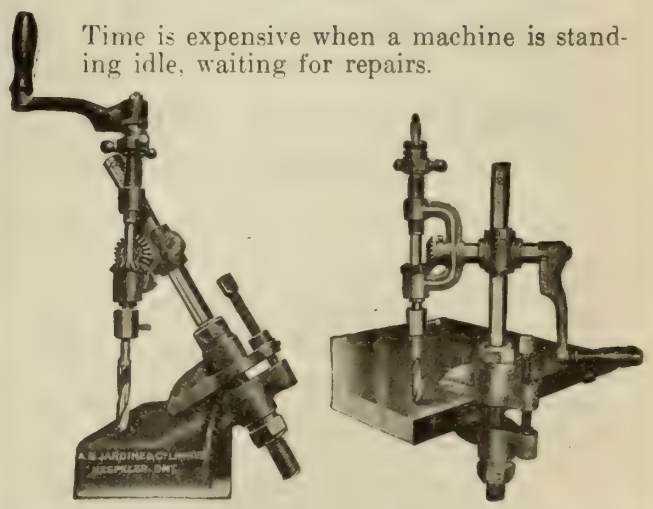
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
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STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

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Steel Ingots
by the
HARMET
Liquid Process

GENUINE EMERY

Sizes 180, 160, 140, 120, 110, 100, 90, 80, 70, 60, 54, 46
40, 36, 30, 24, 20, 18, 16, 14, 12, 10, 9, 8. hole.

EMERY FLOUR AND WASHED FLOUR

EMERY
GLASS
FLINT
GARNET
CORUNDUM
CARBORUNDUM

PAPER AND CLOTH

IN SHEETS, ROLLS, DISCS, BANDS, STRIPS and TAPES, &c.

John Oakey & Sons

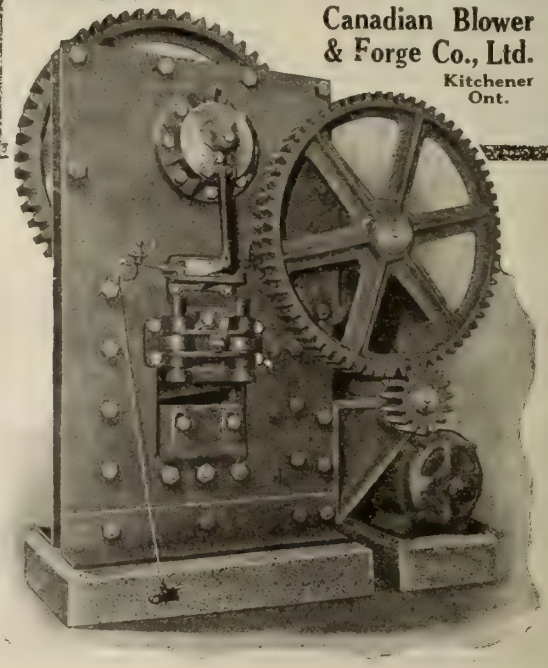
LIMITED
WELLINGTON MILLS
LONDON, S. E. 1., ENGLAND

CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

Canadian Blower & Forge Co., Ltd.
Kitchener
Ont.



Trade Mark

He knows "W & B" Twist Drill and Reamer Quality

"W & B" Cuts Hole Cost

DRILL-CHEAPNESS means hole-expense. The Drill isn't the only thing. There's labor, and time. Poor Drills make few holes, have to be sharpened often or break easily. Every delay means expense—increased overhead, lost production, more Twist Drills.

Cheap holes lead to profits and progress, and the best Drills and Reamers make the cheapest holes. The employer gets more production and the drill press operator gets more pay.

Whitman & Barnes is a sixty-five year old corporation. "W & B" Drills and Reamers have helped to build the Panama Canal, the Grand Central Station, the New York Elevated Railroads, Ships, Trucks, Tractors, Bridges, Engines, Farm Machinery, Automobiles, Locomotives, Steel Cars and all kinds of manufactured products, everywhere.

For a lifetime "W & B" Drills and Reamers have been unsurpassed in hole-making quickness, accuracy and economy. The careful, intelligent, thrifty shops know "W & B" tools by performance. From the small manufacturer to the United States Government, the demand for "W & B" Drills and Reamers has filled our factories with high-grade orders.

"W & B" means experience, research, achievement, capacity, fair dealing, promptness, technical accuracy and reasonable prices. Use our experience and reputation by specifying "W & B" Carbon or High Speed Twist Drills and Reamers. Right for all industries.

The Whitman & Barnes Manufacturing Co.,
Office and Factory: St. Catharines, Ont.
London Office: 139 Queen Victoria St., E.C.

Established 65 Years

Whitman & Barnes

TWIST DRILLS — REAMERS — WRENCHES — HAMMERS

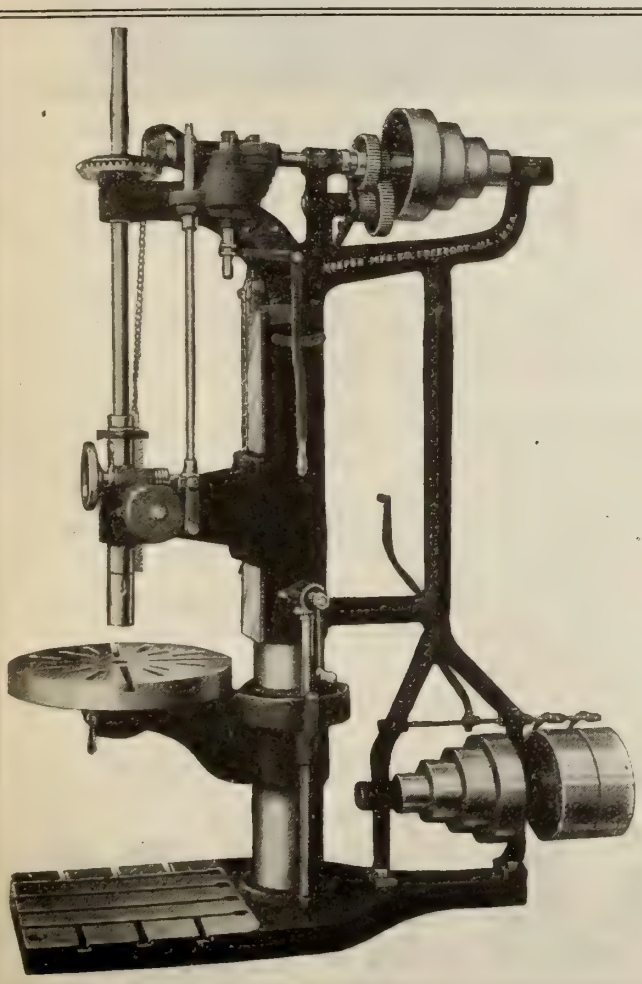
"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.



HOEFER

for PRECISION DRILLING

For over 25 years the name Hoefer has been associated with drilling equipment. Drillers have been our specialty.

Hence it is only natural that Hoefer Drillers should embody the latest word in design, efficiency and accuracy.

And they do. Regardless of the size of press, drilling to a fine degree of precision is always possible.

Hoefer Drillers are looked upon as a recognized standard—the standard by which satisfactory service can be measured.

Catalog showing complete line on request.

HOEFER MFG. CO.
FREEPORT - ILL.

DRILLERS

Whitcomb-Blaisdell Planers

WHITCOMB-BLAISDELL LATHES AND PLANERS PLAY SOME PART IN THE MOST OF THE HIGH-GRADE MACHINE TOOLS MADE ON THE CONTINENT.

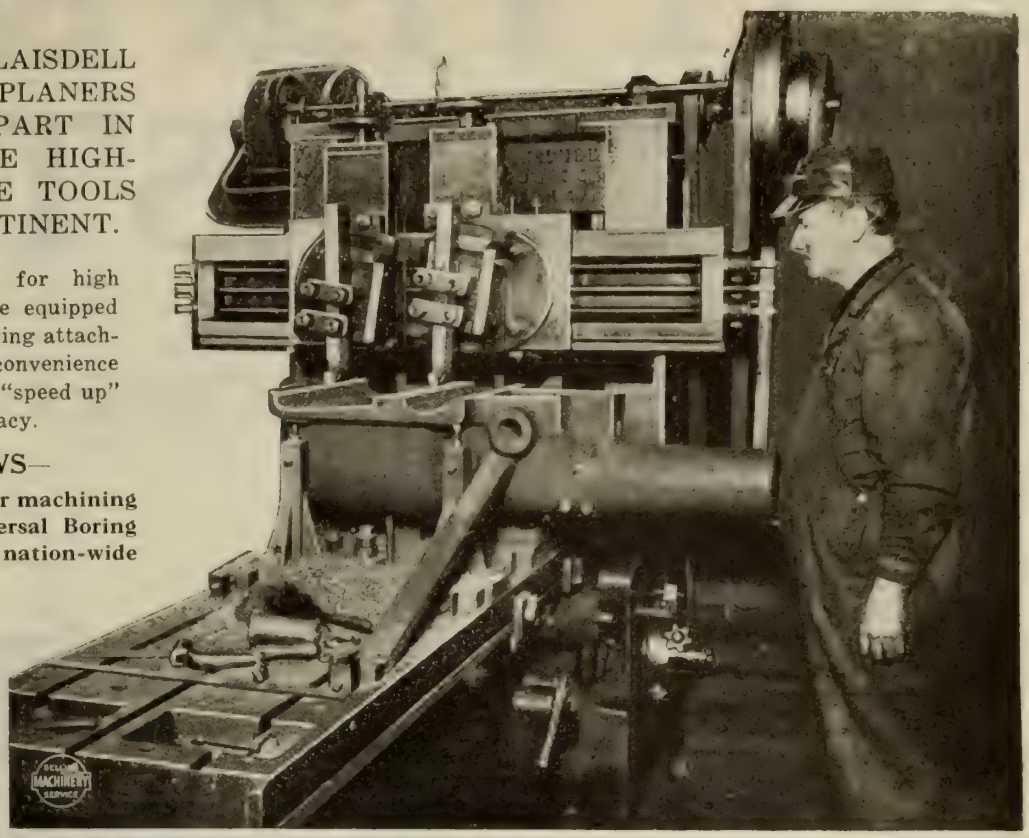
ALL-round machines for high grade work, they are equipped with special labor-saving attachments that add to their convenience and enable the operator to "speed up" without endangering accuracy.

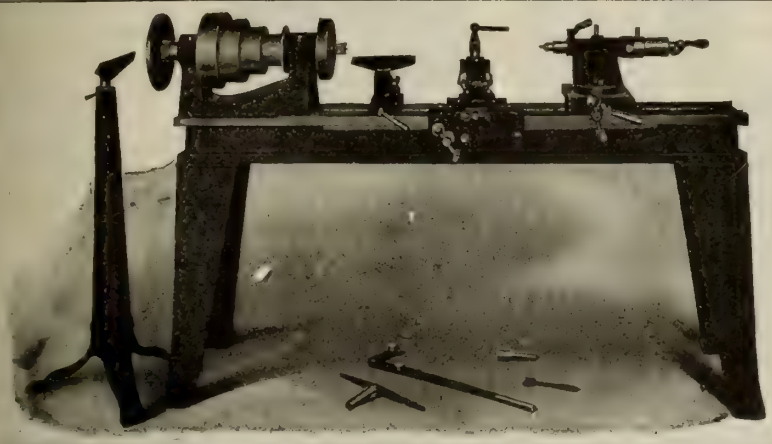
ILLUSTRATION SHOWS—

a Whitcomb-Blaisdell Planer machining the head post of a Universal Boring Machine—a machine with a nation-wide reputation for accuracy.

May we send you our catalogue giving full particulars?

Whitcomb-Blaisdell Machine Tool Co.,
WORCESTER, MASS.
U. S. A.





A Favorite—

Blount Pattern-makers' Lathe

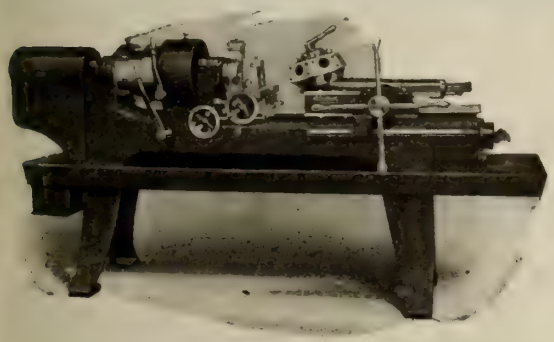
FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catolog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY
EVERETT, MASS., U.S.A.

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



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SEND FOR
CATALOG "C"
OR
ASK THE USER

WOOD TURRET MACHINE CO
BRAZIL INDIANA U.S.A

POTTER & JOHNSTON

AUTOMATIC MILLING MACHINES

HORIZONTAL VERTICAL

EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches. 12 Spindle Feeds, 20 to 180 R.P.M.

Send us your Blueprints and we'll gladly give you production figures.

Bulletin 36 on application.

Canadian Offices: POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse: Galt, Ont., Canada

A WALL RADIAL DRILL

That Puts Dollars In Your Pockets

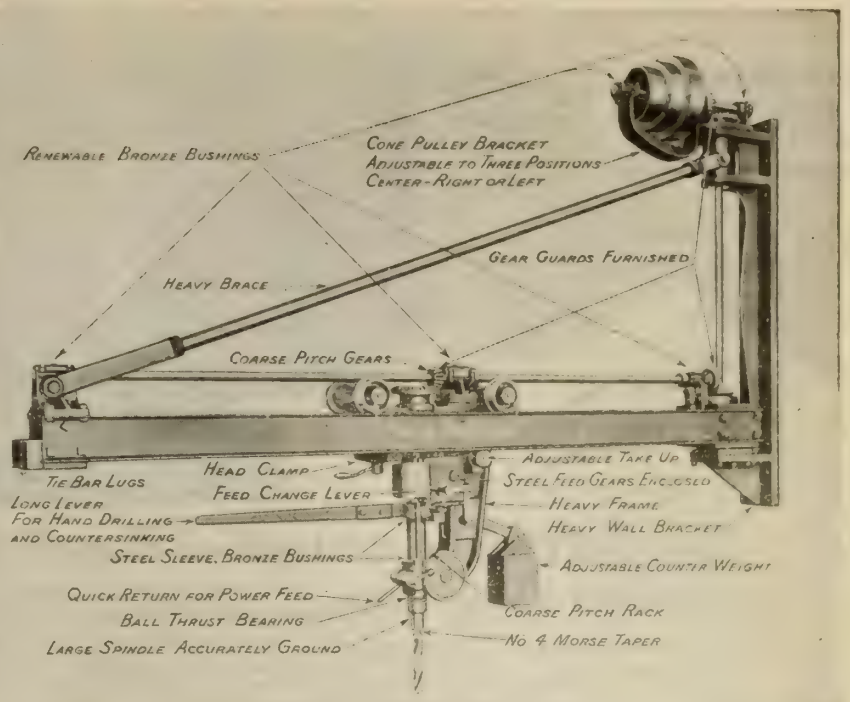
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the machine is made of high grade materials throughout and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling proposition in your pocket, by the installation of this machine.

Send for detailed bulletin.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



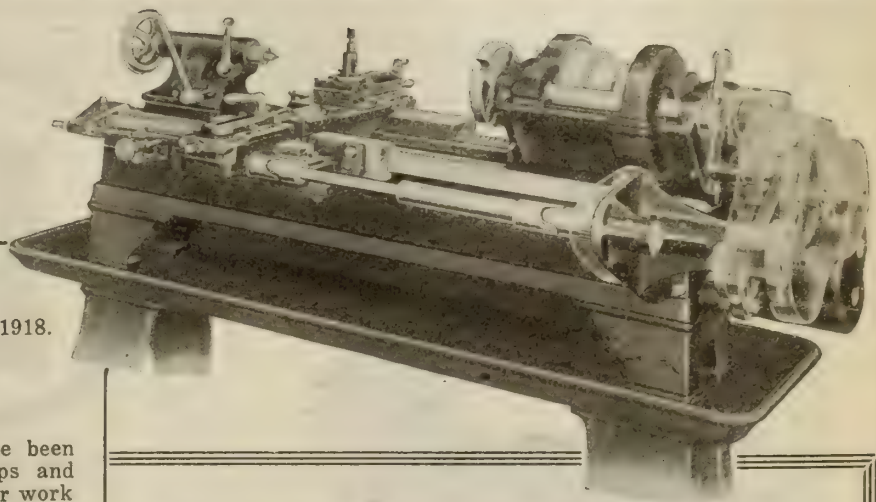
LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS**

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

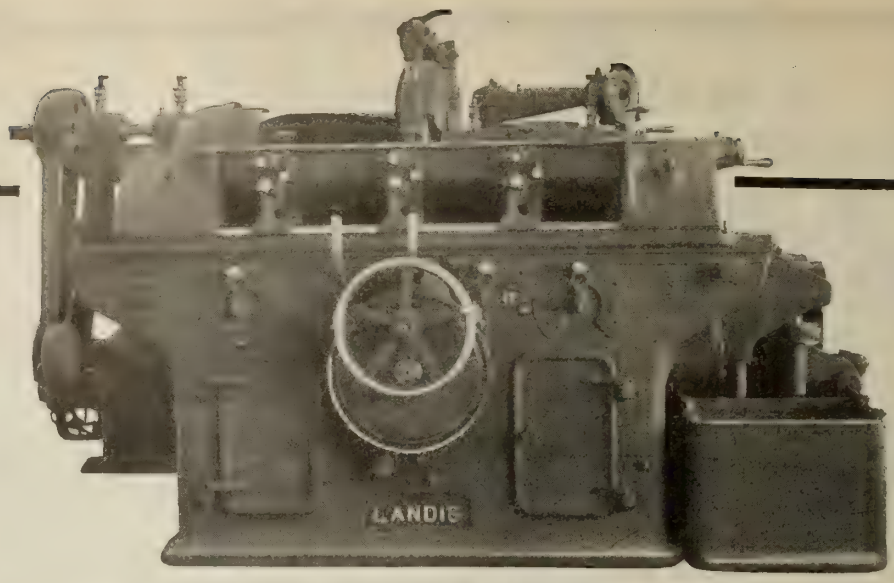
MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

LANDIS

Plain
Self-contained
Grinding
Machine



You Can't Afford to Overlook These LANDIS Features

Work Table Stationary. The Landis principle of having the work table stationary secures it firmly on the bed.

Overhang Eliminated. The Landis Grinding Wheel Head, in its travel, never goes beyond the length of the bed. The Landis Grinding Wheel Head is directly above the carriage and supported between the wide, well set apart, carriage ways.

Downward Belt Pull. The wide, powerful, endless grinding wheel belt pulls directly back and down from the wheel spindle, tending to secure the base with the bed.

Our catalog gives complete data and specifications of various types of Landis Grinding Machines.

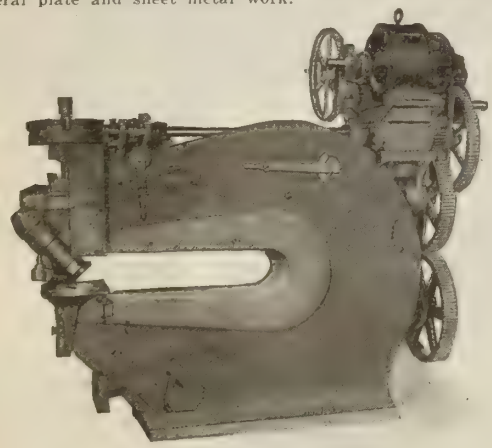
LANDIS TOOL CO., WAYNESBORO, PENN.
50 Church Street, New York City

H. COLLIER SMITH
"QUICKWORK"
Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

Write for Catalogue

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

The GRANT

Spins a Polished Rivet Head Every Second Without Noise

A dozen of these GRANT ROTARY RIVET SPINNING MACHINES going at full speed would not awake a light sleeper in the same room.

The GRANT is fast. In one second it will quietly spin a polished rivet head without breaking or in any way marring the casting. It will rivet tight or loose, as required. The GRANT boosts the output, cuts the cost, and turns out perfectly accurate work.

Pleased to tell you more about it. Write.

Grant Noiseless Rotary Rivet Spinning Machine

The Grant Mfg. & Machine Co.
Holland Ave., Bridgeport, Conn.

Tycos

TEMPERATURE INSTRUMENTS

Indicating Recording Controlling

This General Trade Mark

REG'D. TRADE MARK Tycos ROCHESTER, N.Y.

covers all indicating, recording and controlling instruments made by this company and is a synonym for standard apparatus—precision, reliability and permanence.

We invite, from all interested industrial managers, correspondence relating to our instruments and their uses.

Our stock models cover every usual industrial requirement, with very moderate outlay.

Taylor Instrument Companies

Rochester, N. Y.

There's a Tycos or Taylor Thermometer for Every Purpose

201 Royal Bank Bldg., Toronto

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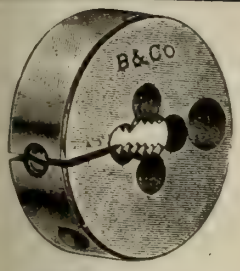


Butterfield

Taps, Dies, Reamers, Drills, Milling Cutters

Butterfield quality gives the Maximum returns on your investment.

BECAUSE

It ensures **clean and accurate cuts** and will duplicate the work over a long period of use.

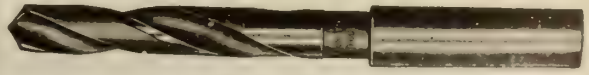
Butterfield Quality is the result of 35 years' continuous effort to keep our product distinctly in the lead from the standpoint of efficiency and economy.

SEND FOR OUR CATALOGUES. Catalogue Seventeen covers Taps, Dies and Reamers. Catalogue "A" covers our line of Twist Drills, Gear and Milling Cutters.

Butterfield & Co.

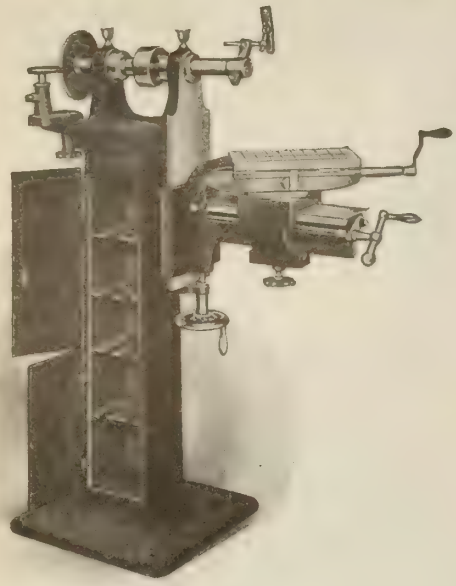
Inc., Rock Island, P.Q.

Toronto Office: 220 King Street West



14

OBTAIN THE BEST RESULTS



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL
CUTTER AND SURFACE GRINDERS

Simple **Light Running** **Accurate**

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

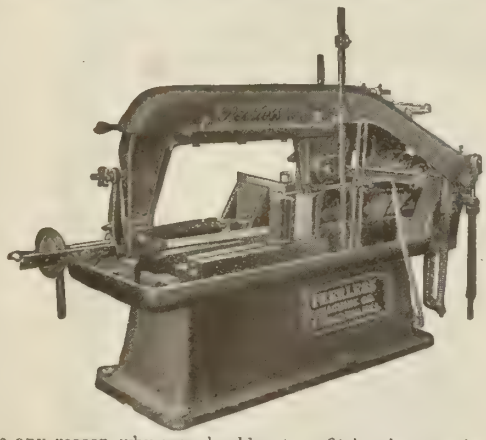
THE GARVIN MACHINE COMPANY

Spring and Varick Streets *(Visitors Welcome)* 50 Years New York City

Peerless HIGH SPEED

The New Standard of Production

Why Not Cut Off Stock From 50 to 100% Faster?



Is there any reason why you should not profit by the superior speed, accuracy and capacity of the Peerless, as well as others? Why you should not do more work with the same number of machines, or the same work with fewer machines? Why you, also, should not save in room, in operating expense and in costly material?

We will prove to you what the Peerless is doing in some of the largest plants in the country, or will let you prove its superiority in your own plant. A machine is ready for you to try, and if after 30 days' use you want to let it go, you may ship it back at our cost for freight both ways.

Write us about it—now.

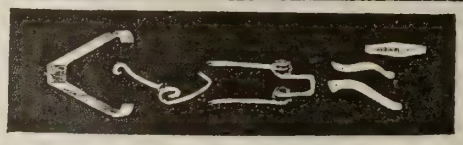
PEERLESS MACHINE CO.

1607 RACINE STREET **RACINE, WISCONSIN**

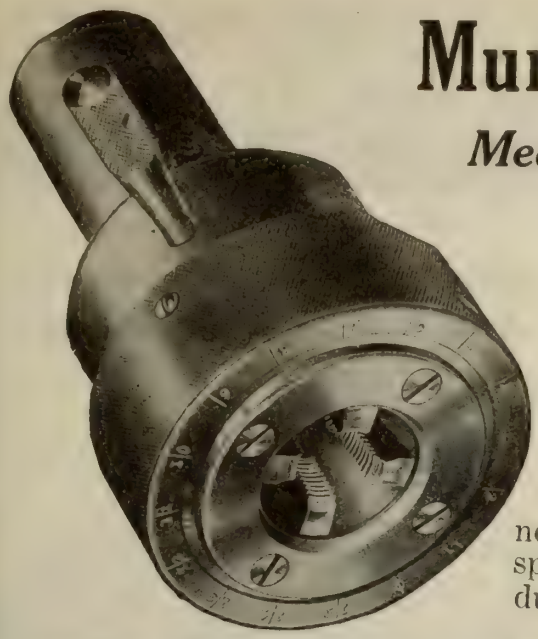
DUNBAR SPRINGS

are dependable springs

We've been making springs since 1845. We've evidently made good. The demand for Dunbar Springs has forced us to put up a big new plant. With better equipment than ever before, we are ready to handle your orders. You might be interested in spiral or flat Vanadium Steel Springs—we've done some good work in this line. If there's anything in small springs or oil tempered Steel Springs of any sizes that you need, it might be well to get in touch with us.

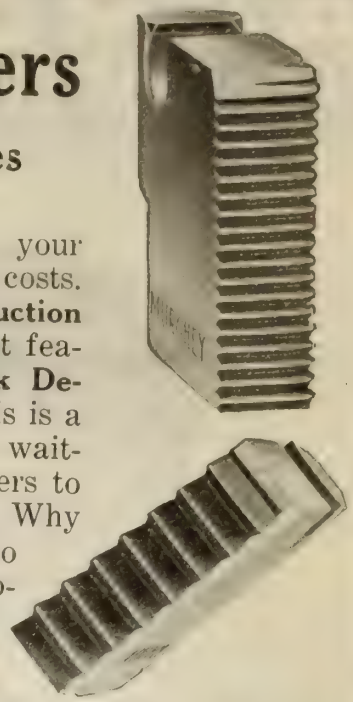


The Dunbar Brothers Co. BRISTOL CONN.



Murchey Chasers

Mean Quick Deliveries



Murchey Tools will cut your tapping and threading costs. **They will boost production 50%.** Another important feature is Murchey's **Quick Deliveries on Chasers.** This is a Murchey specialty. No waiting! We get your chasers to you when you want them. Why not use Murchey Tools to speed up your threading production?

Send for a Murchey Tap or Die on approval and give it a trial. You will then secure actual proof of its value to you.

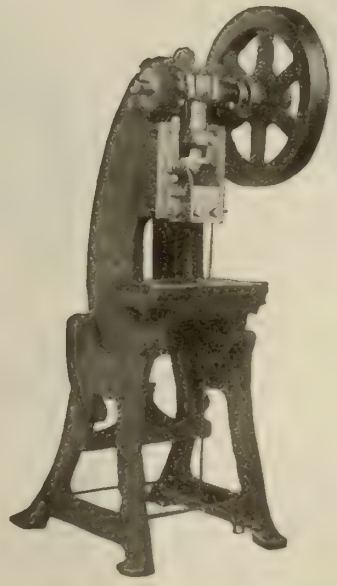
Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.

CONSOLIDATED

All the energy of America's most modern machine shop and foundry is concentrated upon one product.

CONSOLIDATED POWER PRESSES



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HASTINGS - MICHIGAN
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CONSOLIDATED

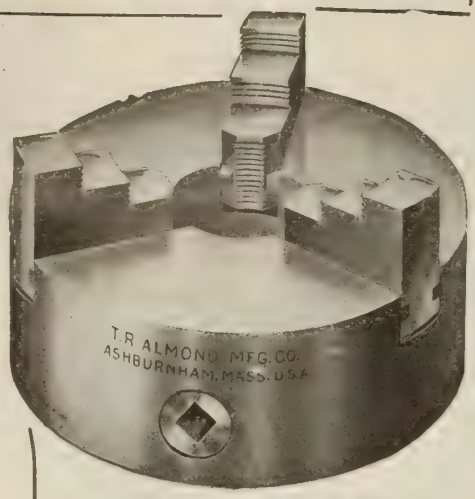
For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

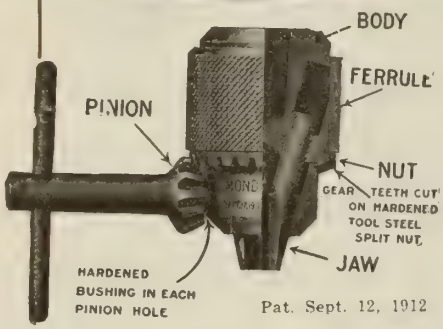
CONSOLIDATED POWER PRESSES

ALMOND CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



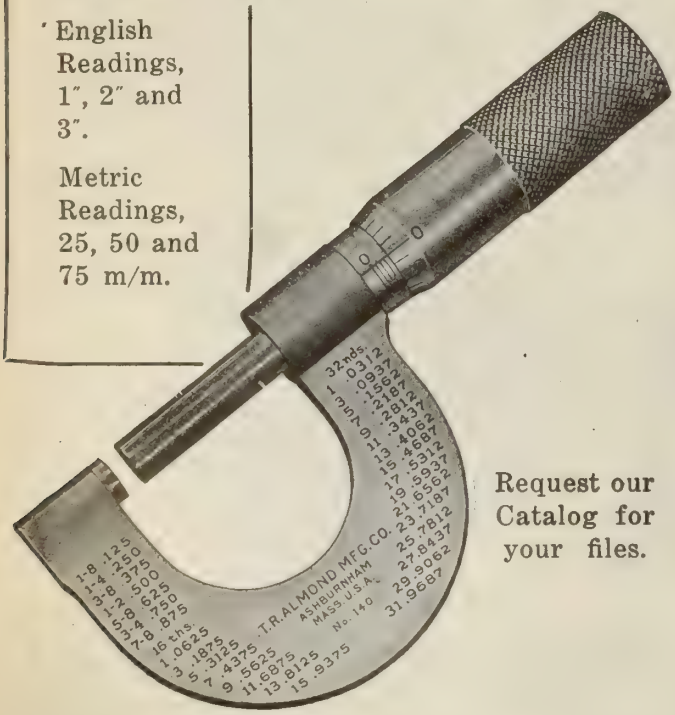
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



Request our Catalog for your files.

T. R. ALMOND MFG. CO.

6 Maple Avenue, Ashburnham, Mass.

CUSHMAN

We've been Manufacturing

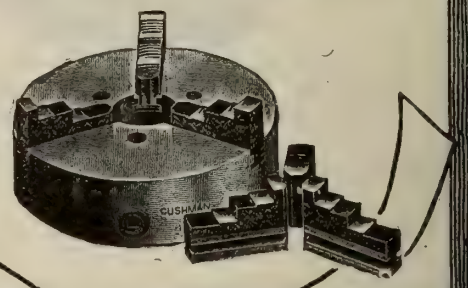
Nothing but Chucks and Their Accessories

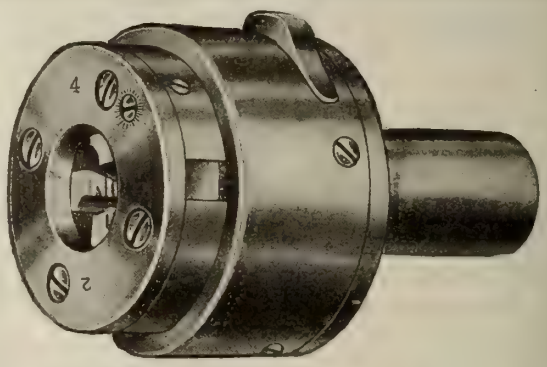
FOR NEARLY 60 YEARS

AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.
Cushman Chuck Co., Hartford, Conn., U.S.A.





H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.

New Haven, Conn., U.S.A.

B-T THREAD LEAD INDICATOR

Be Sure You're *Right*--Then Go Ahead

Getting the right thread lead instantly, and maintaining a constant check upon it, minimizes the possibilities of delays in assembling and reduces the number of parts scrapped through incorrect measurements.
B-T Thread Indicators detect errors of one thousandth of an inch from correct lead. They are easily read—absolutely accurate—and can be used for testing odd pitches, as well as external and internal threads.

BICKNELL-THOMAS CO.
GREENFIELD, MASS.

Have you a copy of our booklet ?

Williams' "Agrippa" Boring Tool takes any size or shape of bar, within its range, and requires no bushings. Its sleeve bar cap admits a straight or angular cutter; either can be quickly inserted at the business end of the bar without removing the cap or disturbing the setting of either the bar or the holder.

Williams' "Agrippa" Tool Holders

"THE HOLDERS THAT HOLD"

YOU wouldn't use the best automobile produced in the *Nineteenth* Century if you could get it for nothing. You wisely prefer to buy a modern car because of its cheaper maintenance, improved performance and increased convenience.

In the shop you can obtain these same advantages through the *Twentieth* Century improvements of Williams' "Agrippa" Tool Holders.

Remember, too, that while improved roads have made automobile performance easier, tougher steel, heavier machines and higher speeds have rendered tool holder accomplishment more difficult.

Machinists' Tools Booklet on request

J. H. Williams & Co.

"The Drop-Forging People"

45 Richards Street Brooklyn, N.Y.

The A. G. Low Co., Ltd.,
45 Pacific Ave., Saskatoon, Sask.

Agents for Manitoba, Saskatchewan, British Columbia and Alberta

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Designed expressly for light, general shop use, the Becker Belt Driven Miller shown here fills a recognized need.

Its strength, as characterized by the solidly built stand, heavy "gooseneck" and the massive knee, is apparent.

Your next machine should be a Becker Belt Driven Miller—circular O-502 tells why.

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DRILLS FILLS

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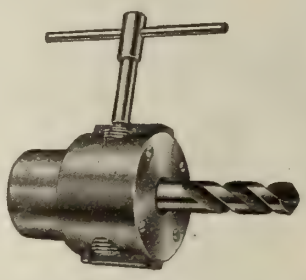

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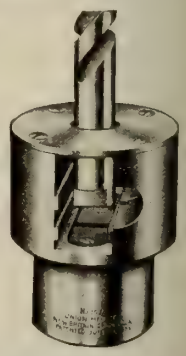
The Union Drill Chuck is made in seven sizes (0 to 2 inches) with PATENT TRANSVERSE SLOT—so that drills with tenons can be inserted (see illustration). The shank of drill should be squared on two sides to enter the TRANSVERSE SLOT, giving a positive rotation to the drill independently of the jaws, permitting the jaws to centre and align the drill accurately. The drill is held absolutely true and will not slip under the hardest strain. This type of chuck will be found to give the best of results on all classes of work from HIGH SPEED drilling to the hard BLACKSMITH and GENERAL REPAIR work.



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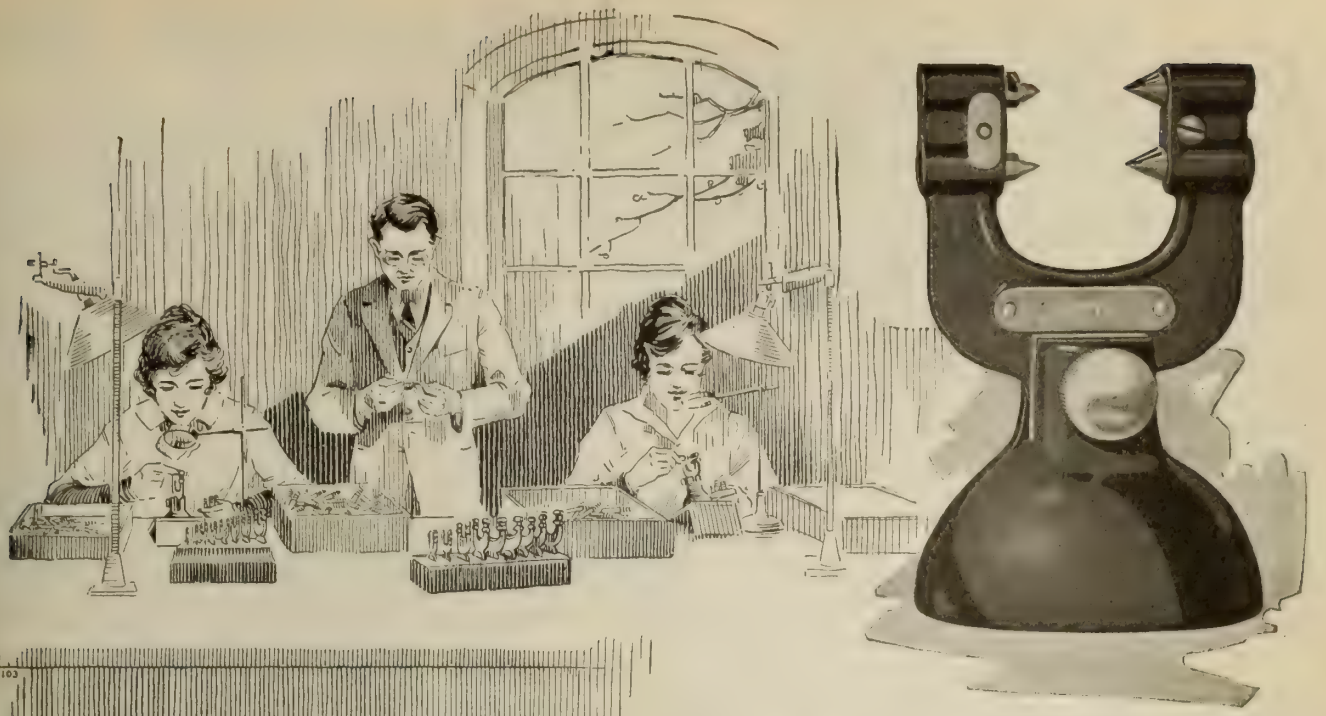
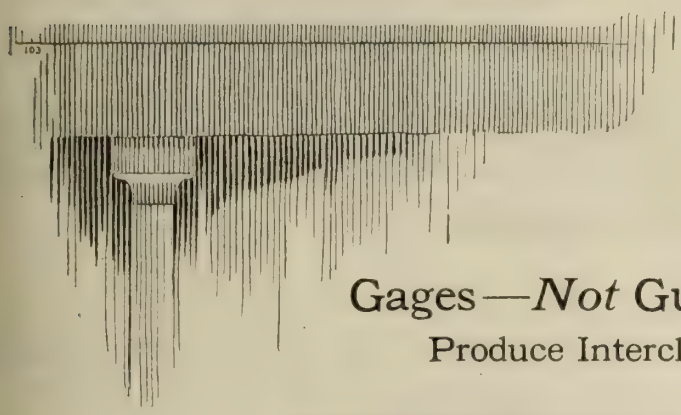
New York Office 26 Cortland St.

Makers of a complete line of chucks





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Through the employment of a GTD Limit Gaging System, during the process of manufacture, the percentage of off-size parts reaching the final inspection stage is reduced to a minimum.

By gaging the parts as they are made it is possible to keep the production steady, and the product to size, with a very small amount of scrap.

The use of Limit Gages is the *one* factor absolutely essential to the quantity production of interchangeable parts.

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"GAGE IT"
and we'll help you!

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GALT - ONTARIO
CANADIAN PLANT OF GREENFIELD TAP AND DIE CORPORATION

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 44A

Semi-Precision Grinding

Railroad frogs, switches, crossovers, safes, large pinions and gears, dredge buckets and similar castings are made of a manganese steel containing 12 to 14% manganese. This material is so tough and hard that it cannot be machined economically with tools made of any steel now known. It is therefore necessary to use grinding wheels mounted on auxiliary spindles in place of the steel tools on lathes, boring mills, planers and shapers.

These castings made of manganese steel have to be finished to as close limits as ordinary steel parts which can be machined in the usual way. Some of the limits are very close and others give considerable tolerance. All of these operations come under the general classification of "semi-precision" grinding.

Owing to the fact that the shrinkage of manganese steel cannot be controlled very accurately, considerable material is left for grinding. The wheels are forced very hard and must cut free and fast or they break down very rapidly. The wheels must also be cool cutting, as considerable heat is developed at best and a slow cutting wheel will add to this and may at time cause wheel breakage. Tapered wheels are generally used as an added precaution against breakage.

Norton wheels grain 14 and 16, grades O and P are very successfully used on these semi-precision operations. Local conditions, such as speed of wheels, finish desired (although this is not usually important) and condition of castings all affect the choice of wheels and may make necessary a slight change from these grains and grades.

Constant touch with work of this nature has given us experience that will be of help to anyone having problems of this nature.

NORTON COMPANY

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

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It costs less to buy new files than to pay men for time wasted with dull files.

"Famous Five" Files stay sharp for a long time because they are accurately cut and properly hardened.

When ordering new files specify "Famous Five."

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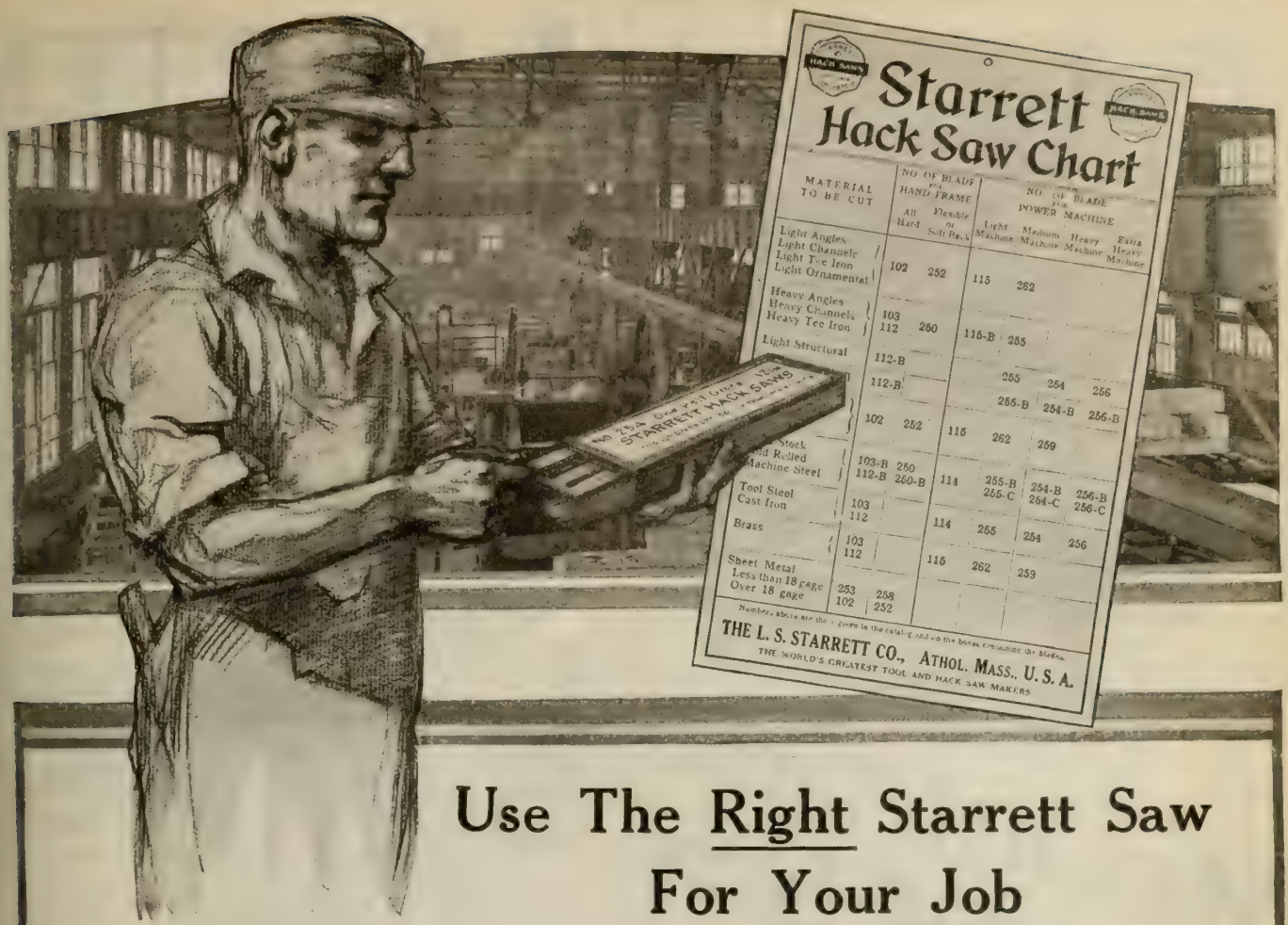

Use The Right Starrett Saw For Your Job

The same Hack Saw cannot be used with equal efficiency for cutting-off heavy angles, brass pipe and cold rolled.

Neither will the same gage and tooth-pitch work with equal economy on different powered machines. The shape, texture and hardness of the material and the power available all enter into the selection of the blade that will give the best results.

Our Hack Saw Chart 3 was produced after careful tests to determine the **proper** Starrett saws to use for various cutting requirements. Send for a copy.

Our Service Department can show you how to increase the efficiency of your cutting-off department.

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ATHOL MASS.

The Worlds' Greatest Tool Makers.

Manufacturers of Hack Saws Unexcelled

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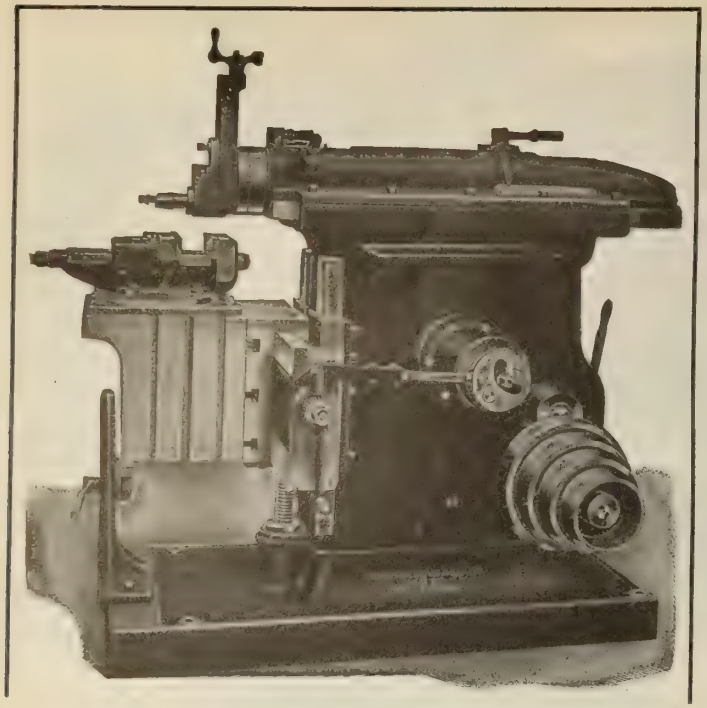
STARRETT HACK SAWS CUT QUICKER LAST LONGER



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Combine the best features of all machines which have hitherto been placed upon the market, and nothing has been included, except those points which experience has shown to be essential.

An examination of the construction will reveal features that make for increased production, ease of operation and accuracy.

Write for descriptive literature.

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ACCURACY--RELIABILITY

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WE ARE GENERAL AND SPECIAL TOOL MAKERS

Let us quote you on your requirements, and have your tools made as you want them made.

WOOD PATTERNS **METAL PATTERNS** Hand and Machine

P X H

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P.H. & Imperial Files

"They Cut Faster and Wear Longer"

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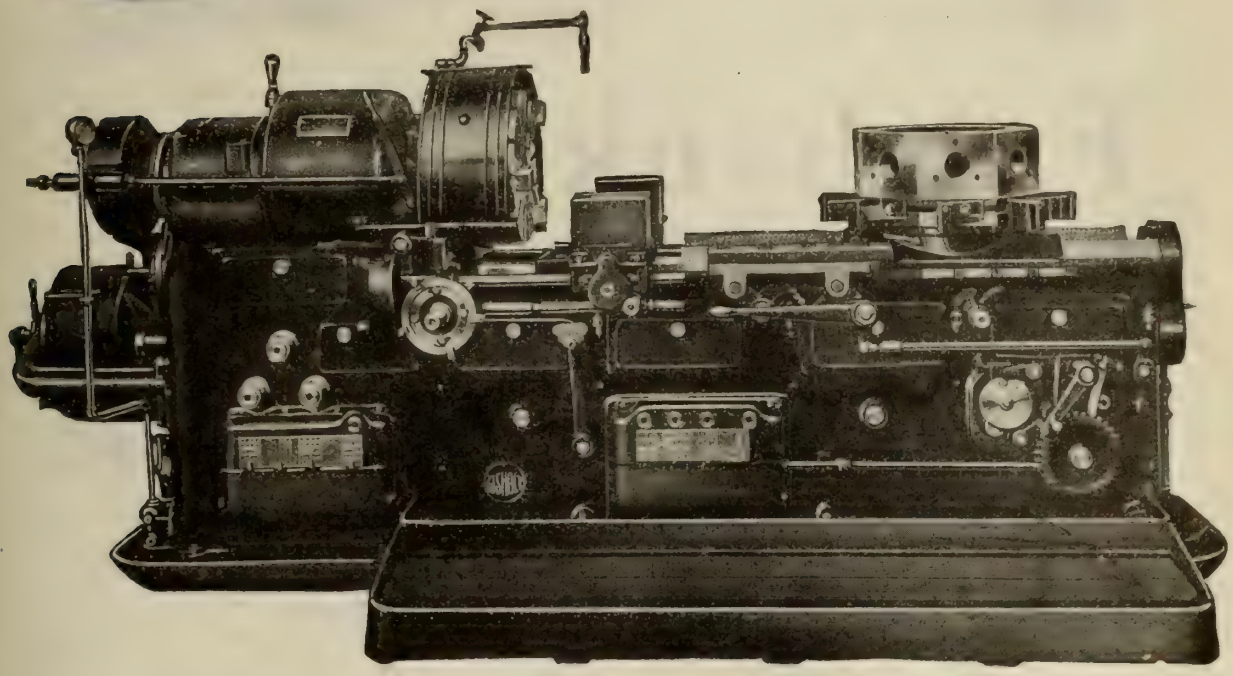
GISHOLT



"GISHOLT" placed before "AUTOMATIC" gives the word a new meaning

The name Gisholt, linked to Automatic Turret Lathes, adds to this type of tool the entire weight and success of the Gisholt organization.

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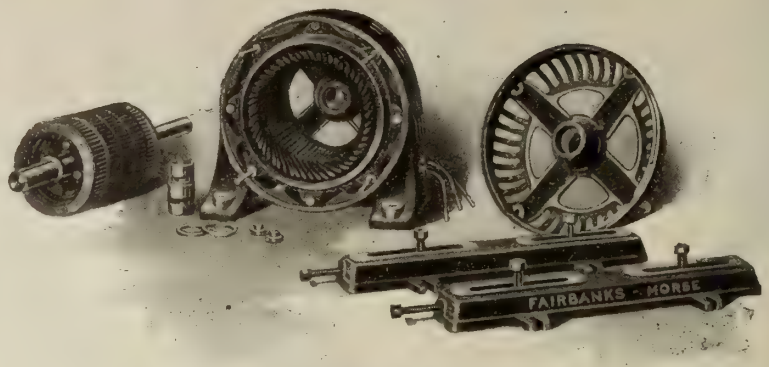

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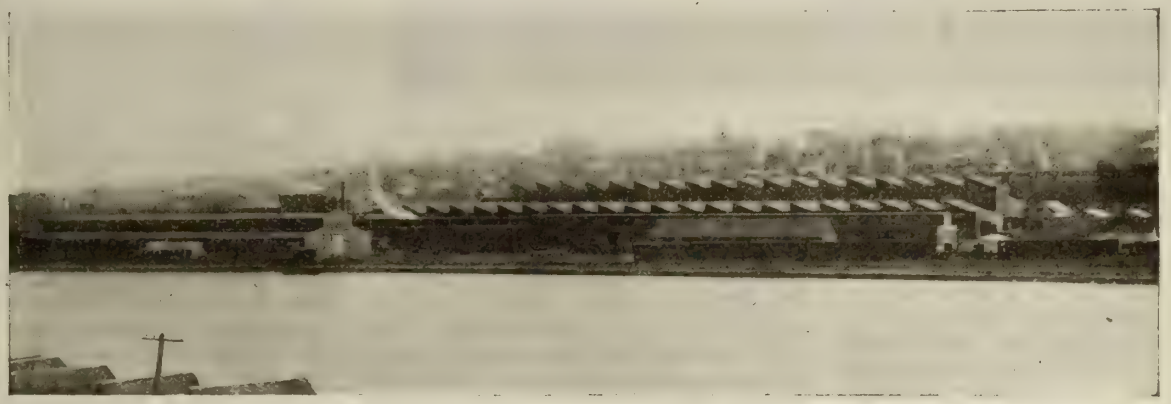
CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 19. May 8, 1919

Home of The Canadian Ingersoll-Rand Co.



Dealing With the History of This Plant, Together With its Various Departments, Including the Productive and Apprenticeship Systems Employed

THE Canadian Ingersoll-Rand Company, Limited, is the descendent of the Canadian Rand Drill Company, which started in Sherbrooke in 1890 with a total staff of some twenty men, using small rented premises. The expansion was rapid, and after one move had been made, the company finally moved to its present site in the upper town, and built its own plant.

Site and Layout

The present site of the plant is on slightly sloping ground, separated from the Magog River by the station and yards of the Canadian Pacific Railway, from which five parallel sidings enter the yards and buildings. Iron, coke, and heavy foundry supplies are received in the upper yard at the cupola level, and the finished product is shipped from the lower levels. Sherbrooke has the advantage of being served by four railways, being on the main line of the Canadian Pacific Railway from Montreal to St. John, the Montreal-Portland main line of the Grand Trunk, in addition to being the northern terminus of the Boston and Maine, and the headquarters of the Quebec Central Railway. Interswitching facilities are good, and good relations between the company and the railways make possible much more prompt railway service than can be obtained in large centres. Electric power is cheap and abundant, there being both the city supply from hydro-electric stations on the Magog and St. Francis Rivers, and also Shawinigan power; all of these are connected to the power station of the Canadian Ingersoll-Rand Company.

Pattern Shop and Pattern Storage

The pattern shop of any plant is in close connection with the foundry, and in the case of the plant of the Canadian Ingersoll-Rand Company the pattern shop is placed between the foundry and main office, so that it is easy of access both to the engineering department and foundry foreman. The building itself is of brick construction, single-storey, well lighted all round, the natural lighting being helped by the fact that none of the neighboring buildings are close enough to obstruct the windows. The equipment is complete, including swing cut-off saw, bandsaw, rip saw, buzz planer, sanders, emery disc, cylinder sanders, wood-turning lathes, etc. A special feature of the layout is that the benches are arranged crosswise to the windows: this arrangement has advantages both for lighting and for general convenience. Iron tables, with surface planed flat and edges straight and square, are in use for lay-out work, and have proved of very great value.

There are four pattern storage buildings. All patterns are stored on shelves, and are easily located by means of a simple numbering system. Both patterns and shelves are numbered.

Foundry

As explained above, the sloping character of the site of the plant has been used to advantage in the placing of the buildings. Thus the foundry is on the higher level, and all materials used in the cupola are received in the upper foundry yard on the cupola level, so that no hoisting of materials is necessary. Sand for cores and moulds is mixed on an upper floor, and supplied to the core department and moulding floor by means of chutes. The upper floor extends the whole length of the building, and is used for storage of all kinds of lighter foundry supplies and equipment.

The foundry has two cupolas, and is equipped with a Mumford jolt ramming machine, which, when installed, was the largest in Canada. The equipment of special flasks is particularly thorough, which permits of making all moulds for regular lines on a manufacturing basis.

FOUNDRY.

There are also smaller jolt ramming machines for core work; Tabor roll-over machine for side floor work, and a full equipment of pneumatic sand-rammers.

The ovens for baking dry sand moulds and core work are a special feature, there being three large ovens, twenty-five feet square, and two small ovens. The foundry is served by two cranes of fifteen and ten tons capacity, and there are also jib cranes with pneumatic motor hoists in the bays, and in the cleaning department. The sand-blast room is one of the best equipped in the country, using a combination of Pangborn, Sly, and Ingersoll-Rand systems. In addition to the sand-blast equipment, the cleaning department makes use of pneumatic chippers and grinders.

Foundry Yard

Between the foundry and the compressor shop lies the foundry yard, in which are stored flasks and castings. The principal feature of this yard is that it is spanned by a 10-ton traveling crane, which is, of course, very much more convenient than a series of jib cranes.

Compressor Shop

"No. 2" building is not likely to be a favorite with the Germans, as from under this roof came the largest production in Canada of 8-in. shells, the second largest of 18 pr. shrapnel, in addition to thousands of 6-in. and 75 m.m. shells. Following the armistice the shell machines have been cleared out and stored, and the compressor department has been moved up from the original building on the company's present site. No. 1, which is now used as a finished products warehouse.

The building is of one-storey construction, with basement extending under the northern half, the latter used as a general store room. The type of construction is of the heaviest, to support 250 lbs. to the square foot. With a view to supplying an abundance of light the roof is of the "saw-tooth monitor" type, the clear height under the monitor being 40 ft. with 25 ft. clear height under the side bays. The side windows are of the modern wide type, so that there is no lack of daylight in all parts of the shop.

The Canadian Ingersoll-Rand Company manufactures two main types of air compressor, the straight-line and the duplex, both in several classes and sizes. With the increased facilities for cheap electric power the demand for power driven compressor is steadily increasing, and with the short-belt drive supplied for small and medium sized compressors, and direct motor drive for the larger machines, electric drive is as compact as steam drive and usually more economical. The shop is arranged with the machine-tool section under one side bay, the tool-room under the other side bay, leaving the centre for erection, testing, and shipment. The layout of the machine tools is arranged with a view to having a continuous flow of material. Castings are brought in by a truck on rails, either from the foundry yard, which lies between the compressor shop and foundry, or direct from the foundry. Machine tools are served with pneumatic motor hoists, either on jib cranes or runways, and the material is thus passed from machine to machine and handled on the machines with next to no manual labor. The centre of the shop is served by a ten-ton traveling crane.

The equipment of the shop resembles that of an engine building plant; vertical and horizontal boring mills, lathes, drill presses, and milling machines. Compressed air is used to a large extent; pneumatic drills in erection work, chippers and grinding for finishing up frames, flywheels, etc., compressed air jets for cleaning out deep holes in drill-press work.

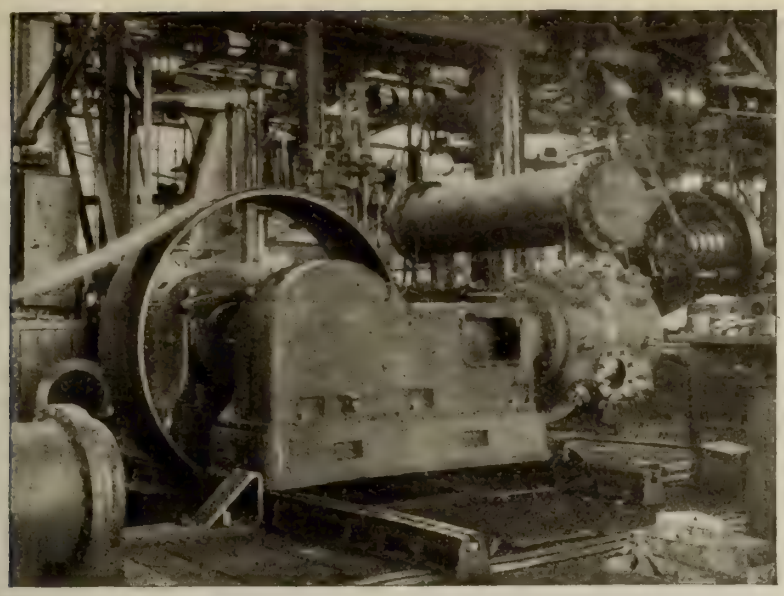
An important feature of the work is testing; all compressors are tested before shipment; the illustration shows a "PLB-2" compressor under test.

Drill Shop

Among the principal products of the Canadian Ingersoll-Rand Company are rock drills. These are manufactured in "No. 3" building, situated between the compressor department and the northern boundary of the plant. This building was extended 200 feet in 1917, and at the time of the extension advantage of the change was taken to remodel the grouping of the machine tools and to instal a central circulating system for cooling compound. The shop is equipped with sprinkler system, as are all the other buildings of the company, and heated by hot water. The lighting in general use throughout the plant is by 200 watt Mazdas, supplemented where necessary by low-power drop lights at the machines.

The modern rock-drill is subjected to very hard usage, has a very high drilling speed, and is expected to have good wearing qualities. All of these require-

GROUP OF COMPRESSORS BEING ERECTED.



COMPRESSOR ON TEST FLOOR.

ments demand great care in manufacture, with rigid inspection. The equipment of the drill shop is therefore absolutely up-to-date; the lathe department includes besides engine lathes, Gisholt turret lathes, Jones and Lamson turret lathes, in addition to Potter and Johnston, and Cleveland automatics. Among the special equipment of the shop may be mentioned a Pratt and Whitney splince miller, and five automatic threading machines, which are found of great value in the accurate threading necessary on feed screws and feed nuts. The heavier lathes and drill-presses are all served by direct-lift hoists; the power consumption of these hoists is in the neighborhood of ten cents a day, and they are found of great service in lifting the heavier castings, etc.

Drill Testing Department

All rock drills are tested before leaving the plant; the photograph shows one of the drills just about to start work drilling the test block of granite. In the same department are two Leyner sharpeners and furnaces used for sharpening drill steel; these machines double the speed of the ordinary mine blacksmith; this particular installation is used to supply sharpened steel to customers and to the drill testing department.

Pneumatic Tool Department

The accuracy necessary in the manufacture of pneumatic tools is not realized by the general public; close fits are absolutely necessary and yet the tools must not be delicate, and must stand up to very severe service without frequent stoppage for adjustment and repairs. For these reasons the equipment in this department is among the most modern in the plant, and inspection is exceedingly rigid. The bulk of the work passing through the department is steel, which is used instead of cast iron on account of its much greater strength. The lathe work is done as far as possible on the automatics, or on the turret lathes, both of which are well adapted for high speed and accuracy. The main factor governing which type of machine is to be used is generally the size of the lot being manufactured, as, of course, the 's'et-ups" time is an important item of the cost when using the automatic lathe. Milling is handled by a group of modern milling machines corresponding in size to the No. 2 and No. 3 Cincinnati.

Finally comes the grinding. As the limits on parts for pneumatic tools are extremely close, the equipment of grinders is not only extensive, but thoroughly modern and kept in perfect condition. It can be understood that with manufacturing demands to limits of a thousandth, the matter of alignment of a grinder spindle is of some importance. The inspection department is furnished with a master set of Johannsen gauges, scleroscope, etc. A little point of interest is that all barrels and handles of the pneumatic tools are sand-blasted, smoother finish, but because the sand-blasting immediately shows up even the tiniest flaw in the forging, and is hence of great assistance to the inspector.

Apprenticeship System

One of the principal questions of the day is that of apprenticeship; it is significant to note that the Whitley reports, which have been adopted as the best solution of labor difficulties in England and are being studied on this side of the water, lay considerable stress on this point. The Canadian Ingersoll-Rand apprenticeship system has as its central idea the provision of future foremen. With increasing specialization, the old-time all-round machinist is being displaced by the specialist, but the machine-shop foreman must be more than a specialist, and an apprenticeship scheme for training future foremen must give an all-round training.

The first point in the Canadian Ingersoll-Rand scheme is that the boy must be sixteen years old and must have completed an ordinary public-school education. In order to make sure of the latter point, the application form now includes an elementary examination.

Apprenticeship is for four years, divided into eight periods, the apprentice being given an increase in pay at the end of each period. All apprentices are under one supervisor, whose business it is to see that the boys become familiar with all classes of work, lathe, milling-machine, fitting, etc. It has not been found practical to move the apprentices from one class of work to another at stated intervals, the ruling principle being that the apprentice must be really proficient before he is transferred.

In addition to the machine-shop instruction classes in elementary shop mathematics are given twice a week (in the company's time, at which attendance is compulsory. A provision in the

LEYNER OUTFIT SHARPENER

TESTING 78" DRILL.

agreement for apprentices reads as follows: "Apprentices will be allowed one day of their time on any period for each evening they attend a class of the Industrial Drawing Schools, or of any approved technical classes of the Y. M. C. A., or other approved institution."

The working conditions are similar to that of the ordinary machine operator; the apprentice can earn premium above his current day rate, and he can purchase tools from the company at cost. At the end of four years a bonus of $50.00 is given with a certificate of proficiency, and the boy is well on the road to become a foreman.

Forge Shop and Hardening Department

The Forge and Hardening Department ranks as one of the most important in the whole plant. Proper heat treatment will give almost any result required in the way of toughness, hardness, etc., and the majority of the parts that go to make up the rock hammer-drill, and pneumatic tool require quite a complex heat-treatment.

The Forge Shop proper is equipped with two steam hammers and fuel oil furnaces, forge fires, etc., but the bulk of the work of the department is in the hardening and heat treatment section. For this part of the work there are two large carbonizing furnaces, oil-treating furnace, hardening furnaces, lead and cyanide baths. Temperature is the chief factor in heat treatment, a matter of a few degrees around the "critical" points making a very great difference in the resulting steel. For this reason, the pyrometer equipment is usually complete, and to secure uniform results the pyrometer indicators are enclosed in insulating boxes having double walls packed with sawdust. All pyrometers are frequently compared with the master pyrometer and corrected when necessary.

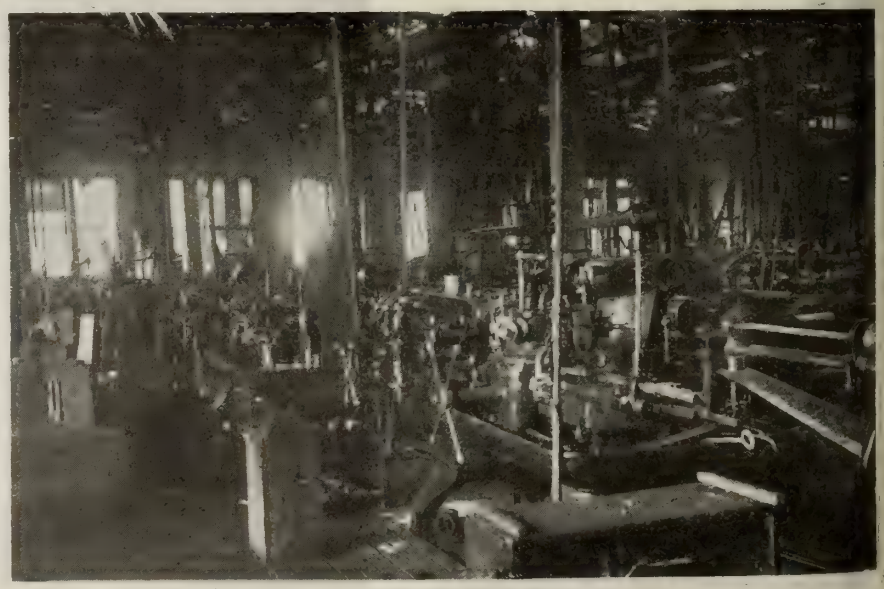
Production System

More and more it is realized that whatever the faults of the modern systems of shop management, they are relentlessly pushing out the older "trial and error" methods. Scientific management has drawn bitter criticism, largely through being applied so often by theory-engineers, but where there is less theory and more practice, there is less criticism and more praise.

The Canadian Ingersoll-Rand Company has been associated with the modern movement in shop management for a number of years, since the days when Mr. F. A. Halsey applied his premium system of payment. However, until 1917, the system was considered mainly on the basis of premium, that is, rather from the standpoint of labor than from possibilities in improved routing of week, etc. The present system is, in the main, that of H. L. Gantt, with modifications due to local conditions. The Halsey premium system has proved to be satisfactory, and is that used at present in the plant, though with the change that the workman has half his gains in time instead of one-third as in the original plan. A standard time is set for all operations, based on careful time-study, and the operator is paid for half all time saved at this standard daily rate.

Many systems of scientific management have been wrecked through too little reliance on the shop foreman. After all, the shop foreman is generally a mine of information, and this should be used by making the foreman realize that with the modern system he has as much responsibility as ever, and has lost no power or importance. This principle is at the bottom of the system of production management now in practice at the plant of the Canadian Ingersoll-Rand Company, and the foremen have an important part in the working out of the new system.

Time-study, standard time for operations, and premium pay, while very important, are not the whole of modern production management. The first essential in the shop is to see that the various machining operations are essential, that they are done in the right way, and, as far as possible, done in the same order for every lot that goes through the shop. With the right operations done in the best way, the next thing is to determine the correct standard time. Time-study, if carried out honsetly, is of great value both to the company and the machinist; the latter soon realizes that he really is making more money, and the company gains by the extra speed. With all this information at hand, it becomes easy to lay out the work to the best advantage, where the foreman's experience is of great value, and all schedules are laid out in consultation with the shop superintendent and foremen. With defini



PNEUMATIC TOOL DEPARTMENT.

INTERIOR OF DRILL SHOP.
(Note) Direct lift air hoists serving engine lathes and turret lathes.

schedules for the work, machines are kept busy continuously, and the "machine-idle" item is kept down to a minimum.

An important item of shop management is that of tools; few shops know whether their expensive tools and fixtures pay their way, and the tool storeroom is apt to become a museum of "dead" tools. The system now being put into practice by the Canadian Ingersoll-Rand Company includes a simplified system of tool-storage, centralized tool store-room, and no "dead" tools in the tool store-room. At the same time, the cost of tools and jigs is being followed up to determine whether they pay their way.

It is of course impossible to describe a modern shop system in a few hundred words, but the above gives a rough idea of the system in force at the plant of the C-I-R-Co. It will be noticed that it deals more in practice than in theory.

AN OBJECT LESSON IN MACHINE DESIGN

The connecting rod shown in the accompanying photograph was taken from a high speed air compressor on medium duty work, which had been in service for only a year, and which, at the time of failure, was working under normal conditions. The breakage of an important part like this is usually a serious proposition, and, in this case, practically the total destruction of the machine, as well as entailing a great expense and delay. As several similar machines, but of different sizes, have recently failed in the same way, it would tend to show that it must be due to defective designing.

This connecting rod was made of a steel casting, and on examination of the photograph it will be noticed that the fracture at "C" is of a very crystalline nature, indicating fatigue, while that of the cap at "B" shows large blow holes, which unfortunately occur at the weakest point, where the metal is cut away for the large capscrew "A." It will be noticed also that at the opposite side of this hole at "D," there is an indication of a shrinkage crack, and it is probable that the cap failed here first, thereby causing the rod to break.

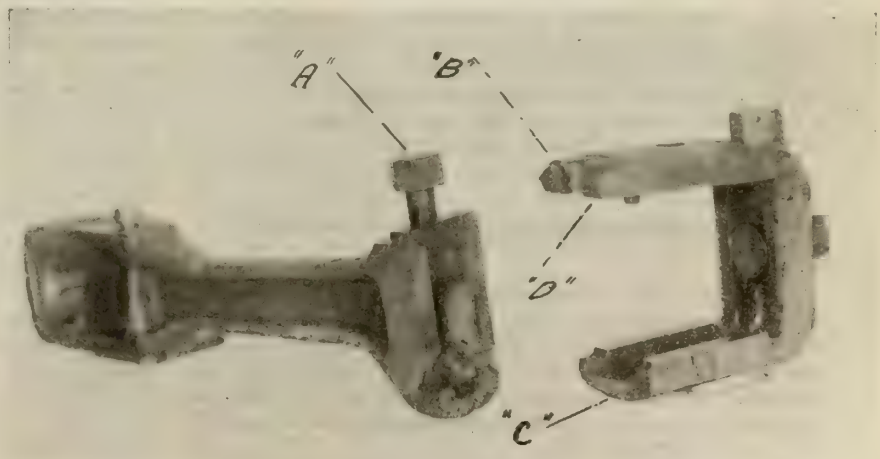
Machine parts which are subject to repeated shocks or to continual stresses in different planes can not be designed satisfactorily from the knowledge of such materials under ordinary stresses, such as tension and compression. It is only by the study of cases like this, and by the testing of the materials under consideration, under conditions as near the actual as possible, that we can be reasonably sure of the correctness of our design.

Had this connecting rod been made of vanadium steel this failure would not likely have happened, as this special steel is not susceptible to fatigue, and has an unusual capacity of resisting repeated stresses. These facts have been proven by numerous tests under conditions of this kind, and consequently it would have been more satisfactory to have used vanadium steel, as any increase in cost would be more than offset by the extra service and reliability to be gained. Unfortunately at the present time there is a great tendency on the part of some manufacturers to cut down costs by using the least expensive steel, detrimentally to themselves and to the customer.

BUSINESS REORGANIZED

The business which has been successfully carried on by G. A. Marshall & Co. has been reorganized and enlarged, and will henceforth be known under the name of Marshall, Son & Bunney. The head office will be at 39 Richmond St. East, Toronto. Arrangements have been made for the firm to represent some of the most reputable Old Country concerns. It is their intention to stock tool steel, alloy steels, files, drills, saws, tools, vises, axles, springs, automobile accessories, wickless stoves, brazier lamps, etc. The new firm will represent and be sole Canadian agents for Wm. Atkins & Co., Ltd., Sheffield; C. & J. Hampton, Ltd., Sheffield; Jos. Evans & Sons, Ltd., Sheffield; J. Brockhouse & Co., Ltd., West Bromwich; Howie & Burley, Birmingham, and W. Gilbertson & Co., Ltd., Swansea.

Mr. G. A. Marshall was for some time established at 70 Lombard St., where he carried on a flourishing business in high speed steel, cutlery, etc. He has had over 30 years' experience in the cutlery and steel business. G. R. Marshall has been overseas for three years, with the rank of Captain in the R.A.F. Previous to his joining the Air Force he was connected with the business of his father on Lombard St. Walter G. Bunney, the other member of the firm, has for 21 years been associated with Jonas & Colvert, Sheffield, latterly in the capacity of general manager of their branch firm, W. T. Beesley & Co., manufacturers of cold rolled steel and wire of all descriptions. All the members of the new firm of Marshall & Son & Bunney are practical men, thoroughly conversant with their lines and with the requirements of the trade to which they will cater.



VIEW OF BROKEN ROD.

I. M. Curious Receives Oil for His Lamp

Being a Reply to the Article Published in the April 24th Issue on the Search of a Standard System of Dimensioning Drawings. This Reply is by

DONALD A. HAMPSON

COMMENTING on that article in the April 24th issue deploring the lack of uniformity in dimensioning drawings, there is "much that might be said on both sides." In reality it is not so much the lack of uniformity that hurts, it is the lack of workability: aside from the record they keep, the end and aim of all dimensions is to convey certain sizes as determined by one person to others who have occasion to need those sizes in the performance of some sort of work.

Now if the dimensions are given in terms which are readily workable, the measurements can be made with speed—if the dimensions are given in terms that are inconvenient, the work will be delayed and mistakes may be looked for. It is a matter of adapting the dimension to the class of work done by the shop and, if the drafting room persists in using terms that are awkward for machinists to follow, then it shows a decided lack of co-operation that should be relieved by a few first-class dismissals.

In the ordinary run of small and medium sized work, the calculations which have to be made by the draftsmen are more frequently in inches than in any other unit of length—the inch is the standard unit for pressures and strength and surfaces—and in putting the measurements from these calculations upon drawing, there is seldom any good reason for translating inches into feed and inches. Machinists have or have access to all lengths of "scales" from an inch up to 24 in. in most shops and the most accurate dimensions fall within this larger extreme, so that the quality of the jobs turned out is based on the eyesight of the workman rather than on the fact that nineteen and five thirty-seconds was expressed as all-inches or feet-and-inches or that one twenty-four inch rule was used or two twelve-inch ones. (The machinist who can't make such a change mentally while he is looking up the rules or while his cut is running had better brush up and spend his evenings on the arithmetic course now offered in CANADIAN MACHINERY.)

The work itself determines what kind of rules a machinist has to have. As has been said, the work in each shop follows the same line quite closely and as a consequence the oldtimers have the most convenient sizes of tools and the newcomers do (or should) fall right in line. Any designing and drafting that deserves the name will very quickly see what is the best for efficient shop work.

Some shops will run to rough work of large sizes—work that has to do with structurals and outside layouts—and here we find the foot the most convenient unit, with fractional parts of a foot expressed in inches. Work that is laid out by surveyors for shop men is generally in feet and inches, (though often in feet and tenths of a foot, because surveyors are dealing with such large dimensions that to state them in inches would be worse than the metric system (and such a habit of dimensioning is carried out without thought of inconvenience to the men in the machine shop.

When the run of shop work is finer, the inch system of dimensions has everything in its favor up to and over the 48 in. mark. If the folding rules carried by machinists or the steel tapes, are not accurate enough for the particular purpose, gauges are supplied by the shop, but in general, when long lengths are encountered, they don't have to be extremely close.

The automobile shops, starting as they did, new and untrammeled and free to make standards of their own, very wisely decided to discard the use of feet and to use inches almost exclusively. No one is bothered to measure a 144″ wheelbase or a 30″ frame or a crankcase 26⅞ over all or a 34″ tire. One cannot fail to see the ease of speech, the ease of writing, and the lessened chance of error in noting the tread as 56″ against the 4′ 8½″ as persisted in by the railroads. The various manufacturing operations are carried forward without conflict on an inch-only basis.

The selection of the dimension system depends upon the average class of work, but as drawings do have to be sent into other shops and as drawings from other places are sent in to us, it is unreasonable to expect the easiest system to always prevail—in fact it would be impossible. Also, if dimensions never appeared except in the approved form, there would be a sameness to work that would breed mental laziness just as we would tire of looking at new automobiles if they were all Cadillacs.

There is no trouble for modern machinists to get along with any terms in plain English. The writer knows of one shop that is large enough to have a world-wide reputation, but small enough so that when work is slack in the manufacturing departments they shift the men around or parcel them around to the machinists on repair and special work as helpers. That shop does quite a little tap and die work for pipe fittings, it makes automobile parts in a small way, it makes supplies for printers, it exports to France and South America, it does the average run of general machine shop work. If there was ever a need for uniformity in dimensions, it would seem as if it was there.

But no. Sizes are given to the particular job and the standards in that field. Printers have an inch that is but .996″ with the commonest fractions, thereof, as "points," and "picas" (1-72 and 1-6 of the .996″ respectively). Pipe threads include the 11½ and others differing from the U.S.S. and the S.A.E. and include the standard pipe taper of 3″ to the foot. The export stuff goes in English and metric. There is as nice an array of non-uniformity as could be found but there is no confusion, on drawings or verbally. If parts are wanted in printers' sizes, the drawing give them so because it is easier to comprehend and quicker and stock sizes of steel are kept that way; if metric parts are wanted, the drawings are dimensioned as so many MM.; "Std. pipe taper" is marked where required; and when exact measurements must prevail, they are stated in thousandths. Confusion and mistakes and kicking are alomst unknown because the drawings are made up in workable style regardless of uniformity—the drawings give them so, because it is easier to comprehend it helps outside as well, for if a customer needs a drawing, it is sent to him and it is in the language he understands.

So far as the two-foot rule is concerned, the writer has never seen a machinist that had one in his kit. Sometimes when men were hired that had been mechanics in the field of carpentry or building or wagon work, they appeared with two-foot rules, but they soon discovered that the materials of a machine shop do not let you make a dig in them with the end of the rule, this dig or scratch being the line of measurement which varied an eighth or so according to the slack in the joints and the rounded condition of the ends. The modern folding rule is so much more accurate and lastingly so, it has a much greater range, and takes up very little more pocket space withal.

Commenting also on the subject of "Machine Design

and Horse Sense," the same initial statement might be made. There are so many sides to the question and the big designers occasionally make such mistakes amid their greater successes, just as the workmen unaccountably spoil a nice job once in a while amid a monthly average of 100%, that no one can really call the other black. Co-operation between shops and planning department and an exchange of ideas followed by a sifting in which jealousy has no part will produce the best machine in the end.

But the designer is not so free to act as the shop men sometimes think. There is a commercial side to machine design: the time may not be ripe for radical changes, the expense of re-designing and bringing out of a line of machines of several sizes is often so great that it has to be dropped; prevailing demands in one decade may be quite different from those of another and it is only in a few cases that manufacturers can go to the expense of creating or changing a demand.

Improvements are often made years before their time. There were quick change devices for thread cutting on lathes and beltless feeds for machine tools forty and fifty years ago, but they did not find favor until recent years. Ford alone stood out for light weight automobiles for a long time, but now all makers work to that end—the self-starter and electric lights were doing business ten years before the demand for them became a command.

The technical graduate without experience and the inventor have their place—they should not be broadly condemned without even a hearing; that actual practical experience we hold so highly often rubs the bloom off and changes them from men of vision and ideas to followers and standpatters. The worst of the men in the business is that their minds unconsciously follow a certain track, that of standard practice, while the inventor is not so restricted. Neither the professional nor the visionary has a monopoly of ideas.

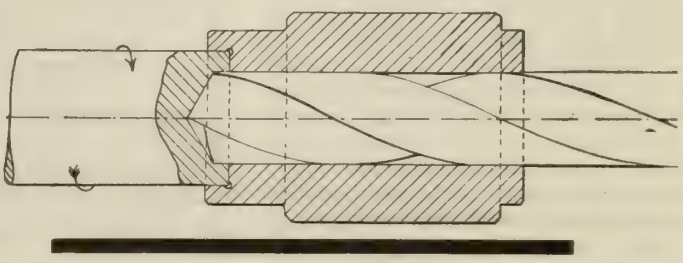
Probably the most important improvement ever made in fast newspaper presses was that of running the strip of paper over that triangular-shaped plate (I've forgotten its name at this moment) curling the edges down over the sides as it nears the apex and thus folding it on the run. Previous to this separate sheets only had to be fed or the endless strip stopped, cut off and drawn between rollers to secure a fold; but the invention named turned the strip into the live member which forced itself into shape as it ran, making possible the modern high speed press, which was only possible when the paper ran continuously and from a roll or web. Designers had worked on the problem of **pulling** the paper through, but without success; but a humble workman conceived the idea of its **forcing** itself through in the manner stated. "It made old man Hoe sit up and scratch his head," as his secretary told me.

An inventor wanted some castings with chilled surfaces and took the job, along with the rest of the work, to a small shop. The superintendent admitted that his experience with chilled work was confined to reading only, but he was willing to do his best and to co-operate with the foundry. The foundry had only done small chilled work, but they were willing to try, so the two places worked together on the job and turned out six good No. 1000 castings out of the first six tried. Some busybody got the inventor's ear to tell him that those people can't make you good chilled castings and the inventor refused to pay for the pieces even after they had been in use and proved quite satisfactory. Then he took the job to the A—— Iron Casting Co., who laughed at the other's work and proceeded to turn out the castings in the "right way"—the accepted way. Well, after a month had gone by, they began to hedge and ask to have the design changed because of too great manufacturing cost, but the real reason was that these specialists had made a dozen castings and had saved only one and that one was doubtful. In the end, they asked the "experimenters" for their method.

A saw manufacturer wanted to make a lumberman's saw with clearance back of the teeth, which were cut on an arc of a thirty-foot circle. Designers and shop men told him that it couldn't be worked, but the manufacturer found a correspondence school graduate who laid out a design and the machine was made in the saw factory's own small machine shop. It worked, and that manufacturer had the satisfaction of producing commercially the first crescent ground saws, an improvement that was widely copied.

All of which goes to show that the ethics of the business should include a serious, unbiased consideration of the ideas of all men with sufficient push to submit them. Then, when the manufacturing problems have been solved (and they always can be), the financial and commercial sides of the question can be carefully weighed and a design evolved which will be a success. Nothing is altogether perfect and it takes a combination of horse sense and experience and education and vision to get by with a public that is cold blooded in its demands.

GUIDE BUSH FOR STARTING DRILLS ON ROD



THE drawing represents a device that was successfully applied on a turret lathe to start drills accurately in the centre of bright bar. The latter was not perfectly straight, and the effect of its bent state was to make the ends liable to "run out," so that the ordinary device of starting with a centre or starting-drill was inapplicable. A bush was turned up similar to that given in the section, fitting the drill body nicely, recessed out at the nose to just slide over the stock, and knurled on the enlarged body. After case-hardening the bush was brought into use by sliding it along as illustrated to force the drill point to start centrally, after which service the bush could be slid back to the tail end of the drill, leaving it free for rapid cutting. This device gave the best average of hole through each piece, holding up safely within the limits for subsequent grinding.—FRED. HORNER.

Means of Ignition and Principles of Magnetos

Principles of Magnetism and the Generation of an Electric Current—Construction of the Magneto, Dual Ignition Coil and Engine Starter—Care and Maintenance—Duplex Starting

By H. POLLARD, Lieut. R.A.F.

In our January 16th issue, we ran an article by the above author on aero engines. In this article we omitted to give due credit to the Macmillan Co. for certain matter taken from a book published by them on the subject. We now mention this point, at the same time stating that in the following article there are also cullings from the books as published by this firm on above subject.

IT is with no small amount of temerity that I have named this article as above, for I think it would be more correct to call it "Means of Ignition." I shall endeavor to give in a brief fashion a description which will, I hope, convey to my readers a rough idea of their particular type of ignition. It would be impossible to describe in this short article all the forms of ignition which are to be found in use to-day. There is the cyclist with his single and twin cylinder machine, the automobile with its high tension magneto, its self starter, in some cases its low tension magneto, and in other cases the auxiliary starting magneto. In many other cases we find ignition accomplished by means of a battery and coil. I shall endeavor to give a short, pithy, practical description to enable the amateur to come into closer touch with that most delicate part of his machine, the magneto. It is impossible to enter into a description of the magneto without first of all explaining in rather more detail than the average person gives credit for, the principles of magnetism which are, of course, the primary source of power in the magneto. Just in closing this introduction I would like to say a few words regarding early magneto systems. The ones I refer to are the original low tension magneto, and the special low tension magneto sparking plug systems, which are now of only little more than historical interest. The low tension magneto was of very simple construction, but the special sparking plugs used with this system were of a very complicated nature, and involved the use of tappets, springs, cams, and many other mechanical parts. The special magnetic plug system never was extensively used, although in many ways it was an improvement on the type already mentioned.

Production of An Electric Current

To generate electricity it is necessary to have the assistance of magnetism. Magnetism can be produced in iron or steel to almost any desired strength. The act of magnetizing a piece of steel is to cause each particle of metal to become a magnet. All these small magnets become laid out in one certain specific order, the whole arrangement on completion being a magnet with a North and South pole. From any magnetized piece of metal we have lines of force radiating

FIG. 1

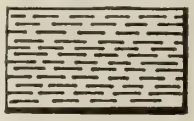


FIG. 2

in a certain manner. The space through which these lines pass is known as a field of magnetic force. It is from such a field that we derive our initial energy in the magneto. Examples of various fields of force are shown in Figs. 3, 4, and 5.

The magnets as used on a magneto are simply plain bar magnets bent over in the form of a horseshoe. They are fitted with soft iron pole pieces as shown. The reason for this is as follows: The permeability of iron is higher than that of steel. In simple language this means that you can pass more lines of force per square inch of section through iron,

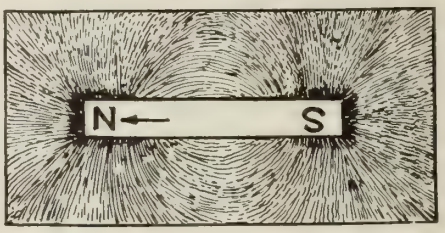


FIG. 3—DIAGRAM SHOWING FIELD OF FORCE AROUND A BAR MAGNET

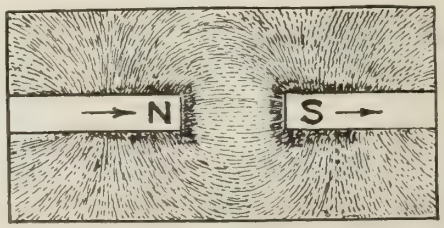


FIG. 4—FIELD OF FORCE AROUND TWO UNLIKE POLES.

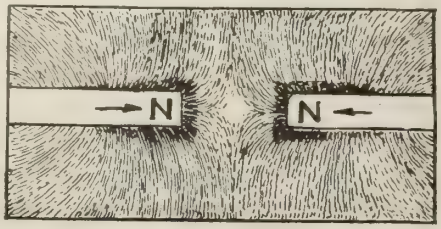


FIG. 5—FIELD OF FORCE AROUND TWO LIKE POLES.

than you can through steel. Therefore the object in fitting soft iron pole pieces is simply to increase the strength of the field in between the poles of the magnets, so that we shall have a higher magnetic field and consequently a higher primary current in the magneto. Electricity is produced by cutting lines of magnetic force with a coil of wire.

Studying Fig. 7, we see a coil of wire whose ends are connected to a galvanometer or voltmeter. A bar magnet is shown, so that the lines of force pass across the coil. In moving the magnet from A to B we cause the lines of force

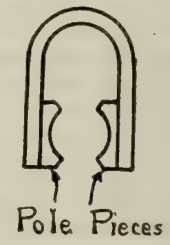


FIG. 6.

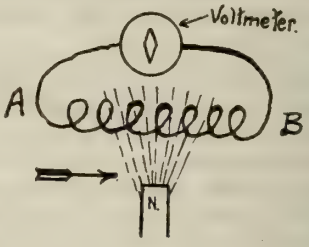


FIG. 7.

to be cut by the coil, thus giving a current in the coil which is registered by a deflection on the galvanometer. This is the principle which governs the working of the primary.

Taking a look at Fig. 8, we see that the magnet in the previous sketch is replaced by a coil which is connected to a switch and battery. When the switch is closed a current passes through the coil A and lines of force radiate across and cut the coil B, causing a current to be induced in the coil B. This is the principle underlying the working of the secondary.

Construction of the Magneto

Almost all the magnetos of to-day are built with H section armatures. The primary winding, which consists of a very few turns of moderately thick wire is wound around this first. One end of the wire is connected rigidly to the armature and the other is led out to the contact breaker. Attached to this winding is the condenser and the switch

The secondary winding, which consists of a very large number of turns of exceedingly fine wire, is first of all attached to the primary and then wound

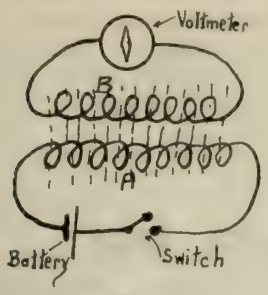


FIG. 8

around and above it, the other end being led off to the distributor. From here, of course, the current is distributed to the various cylinders in the correct order of firing. This will be more clearly

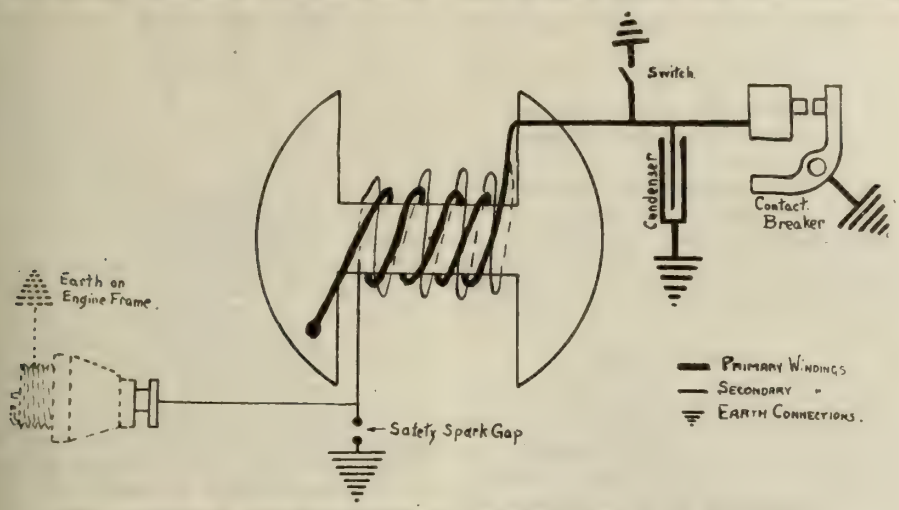


FIG. 9—DIAGRAM SHOWING INTERNAL CONNECTIONS OF A MAGNETO.

understood from an inspection of the accompanying diagram, Fig. 9. Before explaining the functions of the various parts, I would like to say a word or two regarding the build of the armature core. The armature core is built up or "laminated" of a large number of very thin stampings of soft cast iron, each one being insulated from its neighbor by means of a very thin coating of shellac varnish. The reason for this is to reduce the internal resistance of the magneto so as to produce a higher efficiency Before proceeding with the different types of magnetos, I will explain the functions of the various parts. A contact breaker is a mechanical device fitted to the primary circuit of a magneto to cause a sudden interruption to the flow of current in that circuit, simultaneously giving rise to a high tension current in the secondary. When the contact breaker points are together, a current of electricity flows permanently through the primary windings, and lines of force from the primary windings are passing constantly across the secondary coils, but there is no cutting effect. At the point of break, the field of force, which has been passing across the secondary, is caused to collapse, and in so doing cuts the secondary winding, producing a high tension current, which is expended as a spark at the sparking plug.

A condenser is fitted to the primary circuit of a magneto to absorb the reverse or back current at the point of break, and also to increase the efficiency of the spark. The manner in which this operates is as follows: When the platinum points are together there is a closed circuit and electricity flows continuously along this path. At the point of break there is a certain amount of electricity left in the circuit, which, if left there, would produce a certain amount of heat, which would probably detrimentally affect the insulation of the windings. This electricity is absorbed by the condenser and when the points come together again this energy is given back to the primary winding, thus increasing the strength of the current in that circuit, and also increasing the strength of the spark. The condenser is composed of sheets of tin, interleaved with sheets of mica, and can be said to function as a storage battery for the primary circuit, and not as the mixing chamber of the carburetor, an indignity which it has suffered by more than one aspirant to magneto fame. The switch is fitted purely to short-circuit primary circuit, or,in other words,to provide a direct and permanent path for the current to flow to earth, thus preventing a possibility of a spark occurring at the plug.

The safety spark gap, which is found on the secondary circuit, is, as its name implies, a safety device fitted so that in the event of any unforeseen obstruction to the flow of current arising in the secondary, a spark can occur at the gap and thus prevent the windings of the secondary from being burnt out.

By an obstruction is meant such an event as a plug becoming sooted up or oiled up, or a high tension lead dropping off. The above description is only a rough explanation, but it will, I hope, serve as a foundation for the reader to make a more detailed study of this work at a later date.

Combined Magneto and Coil

This type of ignition is to be found chiefly on American cars. A low tension current is generated in the armature and a similar form of make and break is fitted as in most magnetos. This low tension current passes into an induction coil, which differs very little from the type of coil used with an accumulator. In a self-contained type of machine it is usual to find the coil under the arched portion of the magnets. This is done to conserve space. The advantages of this are plainly seen, because we can get more wire on a coil than on an armature, and the high tension circuit being kept apart from the armature, breakdowns are largely eliminated.

Dual Ignition Coil, and Engine Starter

By means of pressing a button which is situated on the dash, the engine is started. One set of plugs is required and a switch on the coil enables the magneto to be brought into circuit after the engine has been started on the coil and battery. The high tension distributor and the contact breaker on the magneto are used in either system and should the magneto fail, it is possible to run the engine continuously on the coil. A trembler is fitted to the coil which can be brought into action to give continuous sparks by turning the starting button round; starting is thus accomplished if the sparks from the coil are not effective.

As an alternative to the above we find in some cases an auxiliary magneto fitted for starting. This is simply a small high tension magneto, but it is not fitted with a distributor. In the centre of the distributor of the main magneto is a special carbon brush with a terminal connection on the outside of the distributor. From this terminal a connection is made to the armature of the starting magneto. The starting magneto is, of course, operated by hand. This is a form of starting device that is very prevalent in aeronautical circles.

In passing, it would perhaps be of interest to say a word or two regarding the principle of automatic advance magneto. This is quite distinct from the ordinary magneto with a fixed timing point, or the usual variable timing arrangement controlled by the driver. In some machines it is done by combining a centrifugal force device or governor with the armature, which ensures that at all speeds the contact breaker will operate at the point of maximum efficiency as well as at the correct time with regard to the piston position. This design, of course, ensures automatic timing of the spark as well as a maximum intensity for any given speed.

The Two-Cylinder Magneto

Two-cylinder engines are made with different crank systems, one being at 180 degrees and one at 360 degrees. In the former case the two explosions occur in succession, with a long interval till the next two explosions. In the latter (i.e. 360° type) the explosions occur at equal intervals. The same type of mag-

neto is used in both cases, but it is run at different speeds. In the 180° engine it runs at crankshaft speed, and in the 360° engine it runs at half the crankshaft speed. In place of the usual slip-ring we find the distributor, which consists of a half-circle sector of metal, mounted on the armature shaft of the magneto. This distributor makes contact alternately with each carbon brush, these brushes being diametrically opposed to each other. From here the current is led to the two plugs. It is important to note that two non-effective sparks are produced immediately after the effective sparks, in the case of the 180° engine, these occurring at the beginning of one exhaust stroke and the end of another. In the case of the 360° engine a non-effective spark occurs in between the effective sparks.

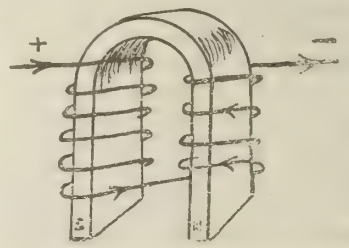
Care and Maintenance

To those who have only a little or perhaps no knowledge of the magneto it is best that they should leave it entirely alone. If attention is given to it about every 150 hours of running it will be found to be quite adequate. The magnets themselves will, under normal circumstances, retain their magnetum for a period of three to six years, when they can easily be remagnetized. The make and break must be kept clean, points adjusted and perfectly flat. The ball bearings require periodical lubrication, and the maker's note as regards this point should be strictly adhered to It is often a great mistake on the part of amateurs to overlubricate, thus causing such troubles as oily distributors, collector rings, carbon brushes, etc. The high tension leads may become worn, and, in consequence, a short-circuit may arise which may either be intermittent or permanent; sparking plug troubles, such as broken insulation, sooty plugs, or oily plugs caused by excessive lubrication of the engine.

The gap on the sparking plug should be very carefully noted, and made to be about .020 inches, or half a millimetre. The reason for this is because of the comparatively low voltage when starting and also to ensure a spark passing under the resistance offered by the highly compressed charge. A large gap would tend to strain the insulation of the armature, and so allow a spark to pierce the insulation and pass to the frame. This is, of course, very highly improbable nowadays, as it is only with unfair treatment that such a case of affairs would exist.

Duplex Sparking

The object of using two sparking plugs in one cylinder is, of course, with a view to increasing the power. It does quicken the rate of combustion and increases the force of explosion, thus increasing the power of the engine. To think that by placing an extra plug in the cylinder in a haphazard fashion will give an increase of power is to make a very serious mistake. Great discretion is necessary in the placing of the two plugs. They must be situated in parts of the cylinder where the gas surrounding the points is as nearly as possible of the same strength and proportion. The two plugs must also be perfectly synchronized so that the plugs spark simultaneously. Unless these points are very closely observed, no good can accrue from the use of two plugs.



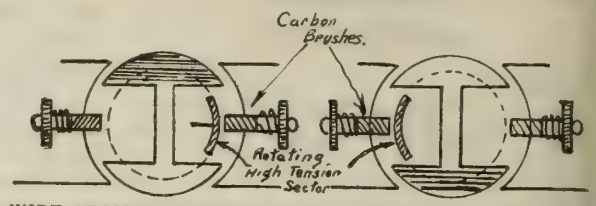


FIG. 11—METHOD OF WINDING WIRE AROUND MAGNETS TO REMAGNETISE SAME

Coil and Battery Ignition Systems

This system of ignition is now only met with at very rare intervals. It consisted first of a single coil and contact breaker. It consisted later of a trembler coil which made starting much easier. The universal adoption of the magneto, though, has necessitated the abolition of this rather cumbersome and troublesome mode of ignition. Before passing on to accumulators, I would like to add just a few words on ignition coils.

Ignition Coils

The fundamental purpose of a coil is to intensify or increase the voltage from an accumulator or dry battery. You may only have 4 volts from an accumulator, but by passing it through a coil it will become increased to, say 25,000 volts, according, of course, to the size and design of the coil. It is, of course, understood that it is necessary to have a very high voltage to enable a spark to jump the gap under the pressure of the gases in the cylinder. The accompanying sketch will give a rough idea of the construction of the coil. It consists of a soft iron core, over which is wound two layers of moderately thick wire; over this is wound from 15 to 20 layers of very fine wire. Each layer is carefully insulated from the next by a layer of waxed paper. The secondary is not connected to the primary, its two ends being connected to the spark plug; the circuit has to be completed across the gap of the two points. The primary winding is connected through a contact breaker and a trembler to the accumulator or battery. The object of the contact breaker is to time the spark so that it will occur at the correct moment. The trembler is attached to the coil itself and is operated by the magnetism of the core, and its object is to produce a very rapid and intermittent interruption of the currents as it flows through the coil. We find then that the electro magnetic induction from the primary generates a high tension current in the secondary just as long as the contact breaker and trembler are in action. This, however, only lasts for an infinitesimal fraction of a second. The above is only a brief explanation, but it will serve the reader as a foundation for further study.

Charging Accumulators

I would strongly recommend that charging of accumulators be done at any charging station, because it is so very easy and cheap, but it would perhaps be of interest to point out how it can be done, so that the amateur can assuage his thirst for this particular detail. It is invariably done from a direct current circuit, but it can be done from an alternating circuit if one has the necessary apparatus which is of a rather more complicated nature. In charging from an ordinary domestic lighting supply it is necessary to first of all find the negative and positive pole. If these are not marked, connect two pieces of wire (one to each terminal), put the switch in the off position, now dip both ends in a glass of salt water and you will observe bubbles of gas rise from one wire. This is the negative pole. Connect this wire to the negative pole of the accumulator and the other wire to the positive pole, and your battery is now being charged. During charging gas will be given off freely, and when fully charged the acid will become milky in color. The accumulator can be tested for a full charge, either by testing the specific gravity of the acid in each cell or by a voltmeter. There are, of course, other methods, an illustration of one of which is shown, but it is quite a simple matter for the reader to exercise his ingenuity to make a home-made arrangement to suit his particular case.

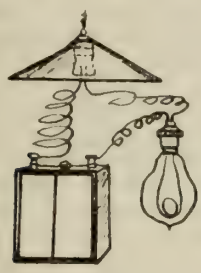
Storing Accumulators

In storing accumulators, if the following points are observed, very little trouble will be experienced. If it is an accumulator of standard design and it has never been charged, it will be sufficient if it is stored in a dark dry place. If it is an accumulator that is charged and you require to store it for an indefinite period, discharge it through a lamp, then empty out the acid, and store as previously mentioned. If you desire to store an accumulator partially charged, say for about six months, first of all charge the accumulator fully, dry the case thoroughly and grease the terminals, and store in a dark dry place It will then be found at the end of the time to have lost very little of its strength. There is sometimes a slight film of sulphate formed on the plates when drying, but this will disappear when the accumulator is charged again.

In closing this article, I would just like to enumerate a few of the most

common magneto troubles and their remedies. If you could make an analysis of all the magneto troubles you would be surprised to find what a large percentage of them are to be found at the contact breaker. We have first what is known as sticking of the rocker arm. That is due to moisture swelling the fibre brush on which this arm oscillates causing the arm to stick fast and thus putting the magneto out of action. Oil must on no account be used to remedy this trouble, but the hole in the

FIG. 13 — CHARGING AN ACCUMULATOR THROUGH A LAMP SOCKET.



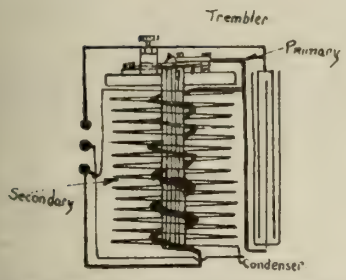


FIG. 14—ARRANGEMENT OF WINDINGS OF A TREMBLER COIL, THE THREE TERMINALS ON THE LEFT CONNECT UP—TOP TO BATTERY, CENTRE TO SPARK PLUG, LOWER TO CONTACT BREAKER.

bush must be enlarged a very small amount with a reamer. Sparking at the platinum points is another common trouble, and this is due to either condenser failure or pittedness of the points. By pittedness, I mean that the points of the contact breaker have become rough or broken. These must at all times be kept perfectly smooth and flat. Another trouble which I have already mentioned is that of overlubrication, and I here again trespass on the reader's time to lay still further emphasis on this point. It is impossible to enumerate all the numerous troubles that may occur through this trouble. In closing I would commend all my readers to leave the magneto and its attendant worries in the hands of a competent mechanic, because in endeavoring to repair the trouble you may, as the saying goes, go further and fare worse.

BRITISH POTASH INDUSTRY

By M. E.

THE trade in potash, which has become one of world-wide importance, was at the outbreak of the war almost entirely in German hands; and so confident was Germany that England would eventually have to come back to her for this commodity that it has often been stated by the experts in that country, and it was a favorable saying of the Kaiser, that England and the Allies would be compelled to sue for German potash after the war was over. In fact this was considered to be one of the powerful economic levers by means of which Germany might secure from enemy countries the necessary supply of other raw materials for her various industries.

Potash is widely distributed in Nature and forms an important constituent of large portions of the earth's crust. It is found in the form of soluble salts in nearly every fertile soil, and great stores of it are contained in sea water. It is an essential part of the food plants and passes from them directly into the bodies of animals. Formerly indeed one of the best known sources of potash was the suint, the grease from the wool of the sheep, and it was also obtained from the ashes of plants and from calcined seaweed. Associated with sodium nitrate, it occurs in large arid tracts in South America as an efflorescence on the soil.

About sixty years ago the rock salt beds of Stassfurt in Germany began to attract attention, and valuable deposits of potassium minerals were found at depths of about 850 feet below the surface. Other still more prolific beds were reached at a depth of some 1,100 feet, but the rock itself and the brine or deliquescent salts of this district also proved to be a rich source of potash; and so cheap and so abundant were the products of Stassfurt that all other potash manufactures had to be abandoned. While the rock-salt works are mainly Government property, the chief chemical factories are in private hands, and the output of potash in recent years, or shortly before the war, became so large as to need some regulation in order to avoid a glut in the market. It was asserted in 1910 that the daily flow into the Elbe of magnesium chloride and common salt, which were the waste liquors from this industry, represented a weight of chlorine alone estimated at 975 tons, and rendered the water of that river distinctly saline to the taste. In view of the flourishing state of the industry at Stassfurt, Germany naturally saw no need to encourage development in Alsace.

In 1904 extensive deposits, resembling in all respects those of Stassfurt, were discovered in Alsace over an area of about 7 square miles, north-west of Mulhouse. The estimated available quantity in this locality is 300 million tons, and some fifteen shafts have already been sunk, though production has hitherto been much hampered by various legal and other restrictions consequent upon German ownership of the land.

Notwithstanding the large stocks of potash in the hands of the trade, when the supplies from Germany were cut off by the war, Great Britain, and indeed the world, was faced with a famine of a substance that is needed by agriculturist and for many military purposes as also for the manufacture of matches. It thus became necessary to consider the possibility of new sources of supply.

In speaking of the imports of potash, this word is used in several different senses, and it is not an easy matter to arrive at definite figures. It is alleged that in 1913 Germany exported 1,800,000 tons of potash, of which 865,000 tons went to the United States, 150,000 tons to Great Britain, 95,000 tons to France, and smaller amounts to other continental countries. It seems likely that much of this potash was in the form of "kainit," an impure sulphate containing also common salt and magnesia salts. The custom of the trade was to sell kainit on the basis of its contents of soluble potash, with a guaranteed percentage of not less than 12 per cent. soluble. Worked out on the unit value, potash fetched a retail price of 4s. 6d. to 4s. 9d. per unit (£22 10s. to £23 15s. per ton), while potash sulphate was 2s. 6d. per unit (£12 10s. per ton) and on this basis kainit, with about 12 units of potash, cost 54s. to 57s. per ton. Since August 1914, potash has gradually risen in price, until in October 1918 it fetched 26s. per unit (£130 per ton). This would place kainit, if procurable, at £15 12s. per ton.

As already mentioned, potash has been extracted in considerable quantities from greasy fleeces, and in February reference was made to the attempts being made at Bradford to deal with this source of supply.

Another source of potash is the flue-dust from cement works, blast furnaces, and coking plants. Considerable progress has been made in America in treating the dust deposited from rotary cement kilns for the recovery of this substance and it has been suggested that an increased yield might be obtained by adding feldspar to the cement constituents. In Great Britain the Government has taken steps to deal with blast-furnace flue dust, and the Board of Agriculture and Fisheries has issued a "leaflet" on the subject setting forth the prices to be charged from June 1918 to May 1919. The charges would appear to contemplate a range of potash contents from 2 to 14 per cent., and the price is estimated at from 7s. 6d. to 8s. 6d. per unit. Flue-dust containing 12½ per cent. of potash is valued at 117s. per ton. This would be equivalent to 9s. 5d. for the unit of potash and 5s. 6d. per unit of potash sulphate.

Much attention has been directed in America to the utilization of feldspar as a source of potash and more than 100 patents have been secured for various modes of working. Other American sources of potash are found in the Lakes of Lincoln, Nebraska, where a thick coat of cream, floating on the surface, said to yield potash in abundance. The Consolidated Gold Fields of South Africa claim to be producing 43 tons of potash per diem from their workings under the Trona Corporation, at Searles Lake, California.

Wanted—Rational Systems

A Plea for the Adoption of Real Rational Systems, Not the Cut and Dried Form Method as Usually Adopted. We Invite Readers to Give Us Their Ideas on This Subject

By ROBERT MAWSON

THERE has been more bunk written about system and systematizing plants, large and small, than any other innovation that the engineering profession has seen or heard about during the past decade.

It reminds me very much of the coal saving compound that has been the means of providing a lot of easy money for a few and a lesson in how people can be fooled.

When we speak of chemicals to most people, especially if the names be long and almost unpronounceable, it acts like a bait to the sucker. There are many who nibble, and unfortunately some who bite.

The same with systems: describe it in abstract terms and describe it in such a way that few people understand it, and there are many plant owners willing to give it a trial. Let me say here, however, at the start, I am not averse to a system when installed in a rational manner, for when used in that way, the best operated and managed plants are benefited from them.

It is those systems which are of the unbending, cast-iron, one-for-every case, that have proved a failure.

For example a factory manager reads an article illustrating a system which has proved beneficial to a certain plant, and he decides to use it carte-blanche in his shop, and invariably he finds it does not come up to the rosy hue painted in the article. He is disgusted and says: "Well, now I know these systems are no good."

If on the other hand the manager had taken the system described and changed or modified it to suit his particular needs or peculiar shop conditions he would have found a benefit from using it. The first trouble I have found with many systems is that they are irrational, or made so by the way they are used.

To illustrate the point, I was at one time in an office connected with a plant where system was the one thing in greatest evidence, in fact it stuck out like the nose on your face. The office was about twenty feet square, and in it were located the desks of the general manager and also factory manager.

Each of these executives had a private secretary with separate typewriter: one example of the highly developed system in vogue in this office is worth reciting.

An Example of Irrational System

To illustrate by an example. If the general manager wished to convey an order or matter of importance to the factory manager he would call over his (general manager's) private secretary and dictate a letter containing this information.

The letter was then produced on the typewriter, being duly signed by the general manager and placed in the outgoing basket, which occupied a position on his desk.

At certain prearranged times during the day the letters were gathered from the various baskets on the executives' desks and carried by a boy to what might be called a clearing room. This letter being amongst them it was carried there to be finally placed in the incoming basket on the desk of the factory manager. It was taken from there by the factory manager's secretary, who opened it and laid it on the desk of his superior.

The factory manager now went through a similar procedure with his reply, which finally arrived after the cycle of systematic motions had been carried out before the general manager for his attention and information.

Now, no reader can dispute the fact that here was a most perfect system, but will also agree that it was a most unprofitable one.

We have only to assume a case where instant decision was necessary and this circle of system followed, the result would be not only disastrous but abject folly.

Such a case of irrational system is far worse than none at all, as it proves both expensive and finally defeats its own ends.

Stereotype Systems

Systems of the cut and dried book form or what I have here called stereotype, are, in most cases useless, and should not be followed without being modified to suit the conditions of the shop adopting them.

A certain friend of mine has been general superintendent of a plant employing about 300 employees for the past 20 years.

It must be agreed that this man during these years must have gathered some knowledge of this particular shop's conditions, more so because of the fact that he has been largely the means in building the business up from a country jobbing shop of three or four men. As I know something of this man's ability I might also add that he has increased very materially the efficiency of the plant.

One morning a gentleman presented his card to the office boy and asked to see the superintendent. He was invited into the executive's office and asked to state his business, and the reply was that he was a system expert.

The superintendent is a wide-awake man, and told the expert to take a walk through the shop and come back with a report how he found things there.

The expert took a stroll as invited and returned in about thirty minutes.

Greeting my friend, the superintendent, he said: "Well, I can do it."

"You can do what?" he was asked.

"Oh, I can instal my system," remarked the expert.

He was then asked what the system consisted of and what it would do.

Pulling out a number of forms and blanks from his pocket he said: "We would use blank No. 264 and form No. 986," etc., etc., showing samples of various shapes and of almost as many colors as we find in the spectrum.

The superintendent thought a minute and then asked: "But supposing we should instal this system what will be the saving to our company?"

"Oh," replied the expert, "I cannot guarantee any saving, but I will assure you of a good, perfect, efficiency system."

Needless to say my friend did not adopt the system.

Now let us find the trouble with the expert and his system, and this will apply to many others.

First I would say that he assumed that he possessed a perfect system, which could be applied to every case.

Very much like a doctor if he attempted to cure every bodily disease with one kind of medicine.

And second—any man who takes a lightning trip through a plant, spending about as many minutes as the superintendent has been years, and endeavors to show that executive how to run the plant, not only insults the intelligence of the man, but conveys the impression that the man doing so is a fake.

Again, a system which consists of only signing and countersigning various colored forms, giving orders and the like, without either decreasing the cost of manufacture or in increasing the production of the plant, may look well in a book, but is not the type either needed or desired in plants to-day.

To summarize the question, the only way in which systems can be used to advantage, call them either scientific, efficient or by any name you will, is to take the best we can find and change or modify them to suit the plant conditions, with the specific object in view of either increasing production or decreasing the cost of manufacture.

And if after adopting a system, it is found that it is not performing this function, let the system go or change it until the desired results are obtained.

Systems are intended to help, not hinder, and if used rationally will do so, and the firm adopting them will profit accordingly.

WELDING AND CUTTING

A Review of Some Modern Methods of Arc Welding

The Author in a Paper Read Before the Institute of Mechanical Engineers, London, Makes Interesting Comparisons of Various Systems

By THOMAS H. HEATON

IN February, 1914, the author read before this institution a paper on Some Modern Methods of Welding." The exigiences of the war have led to a great development in the various systems of welding, both electric and otherwise. It may, therefore, be of interests to return to the subject, giving some further particulars. In some respects electric welding has proved under present circumstances more advantageous than gas welding, because of the difficulty of procuring oxygen, carbide of calcium, etc., necessary in gas-welding processes, therefore, the author deals with electric systems only in this paper, chiefly applied to the welding of mild steel.

The author holds no brief for any given system of welding, and in confining this paper to electric welding he does not intend to imply that gas welding produces inferior welds. Indeed, he is of the opinion that each known system of welding has its proper sphere, and that probably any given method may be the best in its respectively most suitable application. The author uses oxy-acetylene welding, and has done so for many years before the war, with most satisfactory results.

Arc Welding

BENARDOS.—This system was patented in Great Britain in 1885 by Nicholas de Benardos and Stanislaus Olzewski, both of Petrograd. It includes: (1) the union of metals; (2) their disunion or separations; (3) the formation of apertures in metals; and (4) the union of metals in layers. The process is thus shown to be of very general utility. That is to say, it can be used for welding, for cutting, and for perforating. It is interesting to note that the Benardos specification mentions metallic electrodes, surrounded with carbon. It also mentions an apparatus called an electric solderer, with two carbons side by side, and a magnet to deflect the flame to the object under operation. The author has manufactured steel barrels, drums and tanks, etc., by this system for twenty-five years with success.

The work is positive to a carbon electrode. Therefore no deposit can take place from the carbon to the work, which is of open-hearth mild steel of good quality. The weld remains soft and is purer iron than the original metal. The current is direct, the voltage being about 90 volts, and the amperes 250 to 500, according to the thickness of metal. There are hammered welds and fused welds, and the results are very good, seeing that the work is designed to suit the process, and the process the work. The arc may be 1½ or 2 inches in length, and the heat may be well spread over a fairly large surface, which is, in the work in question, an advantage, because it avoids extreme local stresses in the weld, and tends to prevent deterioration of the metal surrounding the wood.

The speed of welding is considerable. Welds in mild steel 3.5 mm. thick can be made, including the heating and hammering, sound and petroleum tight, at the rate of 2.76 minutes per foot long; mild-steel bosses fused and not hammered at 1.73 minutes per foot of weld; and other fused welds 1.22 minutes per foot of actual welding. Eight inches of 15 mm. diameter carbon of good quality are consumed in welding 50 feet of mild steel ⅛-inch thick.

Cutting Mild-Steel Plates

Length.	Thickness.	Width of Gap.	Time.		Electricity.		Cost of Current and Electrodes.
Ft.	In.	In.	min.	sec.	Units	Amps.	d
1	1	½	3	0	1.75	415	2¾
1	½	½	2	10	1.25	420	2¼
1	⅜	½	1	25	0.75	420	1¾
1	¼	7-16	0	45	0.40	375	1½
shaft 8(dia.)		1½	50	0	31.75	425	39¾

The carbon, 15 mm. diameter, is consumed as follows: about 3 inches in the plates in each case, and 24 inches in the 8-inch shaft.

The gap is wider and the cost less than with oxy-acetylene, allowing for carbide and oxygen at fairly normal prices, respectively at 4d. per lb., and 4s. 6d. per 100 cubic feet, but in cutting the 8-inch diameter shaft the time is more than 3 times that with oxy-acetylene, and generally the oxygen cutter compares favorably in time, as oxygen, at high pressure, blows away the melted metal quickly. The carbons are taken at 4d. per foot long, and the current 1d. per unit.

In the hammered welds the edges are butted, and pieces of scrap steel of the same quality as in the parts to be welded are laid on to thicken the weld. These are fused in before hammering, and they protect the abutting edges from burning. It is therefore a natural sequence to think of a metallic electrode in place of the carbon, and with such metallic electrode other substances than iron or steel may be associated, and the Benardos specification mentions this fact.

Slavianoff, also a Russian, introduced about 1895, a metallic electrode in places of carbon. In 1893 the author suggested a mild steel electrode to the late Mr. Dickinson, of the Bowling Iron Co., and it was tried unsuccessfully. The experiment was not persevered with, or possibly a better result might have been attained. The author is not aware of any user of the Slavianoff system in this country, but understands it is in use in America, where the General Electric Co. have developed it to a considerable extent.

KJELBERG. — Oscar Kjelberg, of Gothenburg, introduced into England in 1907 a metallic electrode to replace carbon. He made the work negative to the electrode, so that the natural tendency would be to deposit the metal of the positive electrode on to the work. This system is largely and successfully used. The metal of the electrode is melted into the joint and then hammered. The metallic electrode is coated with a fusible silica flux, the object of which is to prevent oxidation and to insulate the electrode. The arc dissipates this flux, leaving no slag. The current is direct and varies according to circumstances

from 45 to 90 volts. The electrodes vary in size, but generally may be taken as 3-16 of an inch diameter soft iron wire. The current may be about 145 amperes on work ¼-inch to ½-inch thick in mild steel.

It is not found to be really satisfactory to apply this system to work in mild steel to thicknesses of plate below ¼-inch. The author has tested welds in thinner material, but would consider them less satisfactory than hammered welds made with a carbon electrode. The heating is more local and cannot be spread as with the freer carbon electrode. Nevertheless some remarkably good results are obtained by well-trained welders in boiler repairs, ship repairs, etc. The speed of welding is not so rapid as with the Benardos arc. The coating of the metallic electrode may be varied to suit the nature of the material to be welded, and the Kjelberg patent covers this in its specification. The metallic electrode melts away quickly and has to be changed. This is one of the details in which skill is required in the workman, because the weld is cooling while new electrode is being inserted, so that at the point of junction of the old and new portions of the weld, there may be a possibility of a defect. A skilled and careful operator can overcome this difficulty.

The Quasi-Arc

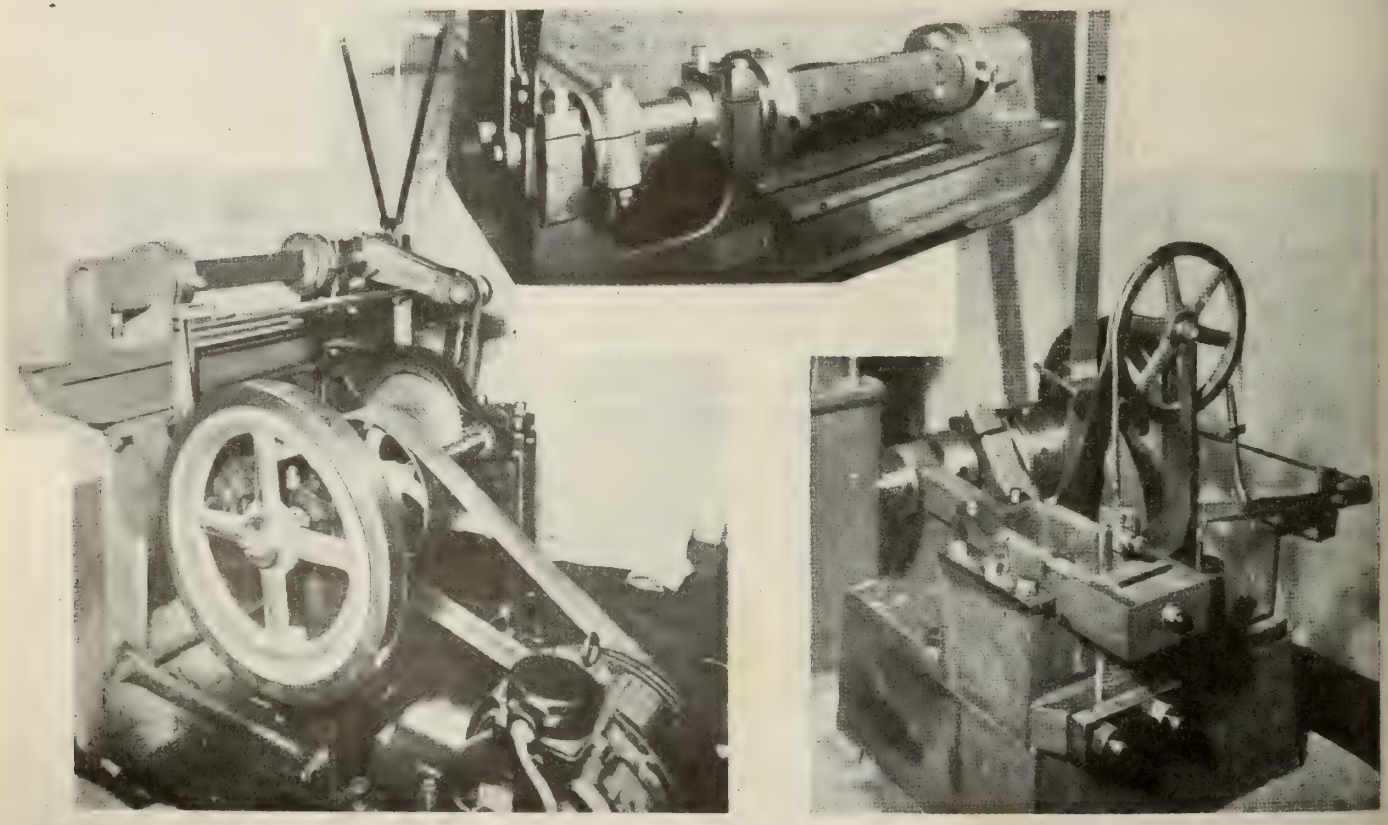
This is a process in which a metallic electrode is used as in the Kjelberg process. It is the invention of Mr. Arthur Strohmenger, of London, and some excellent results are attained by it. Mr. Strohmenger has brought out various methods of covering metallic electrodes with fusible insulating coatings. The coating may be of such a nature as to supply constituents that are burnt out of the metal in welding, and so compensate for their loss. With some electrodes aluminum wire is incorporated under the coating. Blue asbestos yarn is especially preferred as a coating for the electrode for welding iron or mild steel, as it forms a reducing flux, and it may be smeared with a composition such as sodium silicate, etc., or aluminum silicate, etc., to vary the fusing temperature of the yarn. Extreme care is used in the preparation of the electrodes and much stress is laid upon the good and regular quality of the metal of which they are composed, and upon the exactness and evenness of the coating.

The metallic electrode is positive to the work, and, in fusing, is deposited upon it. The coating, in melting, forms a vitreous slag which covers the weld and flakes off more or less in cooling. The slag must be carefully removed if successive layers of weld are required. Its object is to protect the weld from absorbing oxygen, and so avoid deterioration of the quality of the metal at the weld. The metallic electrode fuses into a joint prepared by bevelling the edges of the pieces to be welded. It is in almost direct contact with the metal to be welded, so that there is not properly an arc. The operation is otherwise very similar to that in the Kjelberg system, but there is no hammering. The electrodes vary from about 14 S.W.G. to 4 S.W.G. in diameter for ordinary work up to ¾-inch thick.

This system appears to be best suited for thicknesses above 3-16-inch thick, though as in the Kjelberg process thinner metal can be welded. The speed of welding is relatively greater for the greater thicknesses in comparison with that of oxy-acetylene welds, but is much less than with the carbon electrode up to ¼-inch. The heat is, of course, very local, and as with the Kjelberg system it cannot be spread over a large area. The current is direct, and the voltage recommended is about 100 volts, and much lower in amperes than with the Benardos system, varying from 20 to 175 amperes according to the thicknesses operated upon.

Cutting is possible with a metallic electrode by keeping the electrode from contact and maintaining an arc. The electrode melts away in the operation. If it touches the work it sticks to it. Occasional cooling by dipping the electrode in water is necessary. A carbon electrode is more easily manipulated for this purpose. With the metallic electrode positive to the work and deposited as it melts on the negative electrode, which is the work, welds can be made upward. That is to say the welder can work underneath the work and weld its under surface. This requires a particularly good workman. It can be done with other systems, but not so well, owing to the fact of the positive electrode depositing on the negative being a natural feature in an electric arc.

Many tests have been made both in the laboratory and in practical service with the systems described in the foregoing, and their utility has been fully demonstrated. The work, however, must be designed to suit the process, and the process must be regulated to suit the work, in order to be successful. Distortion due to the heat or the effect of contraction must be allowed for, especially on flat surfaces, and anyone requiring welded joints would do well to consult



LEFT—MACHINE FOR TESTING FLAT BARS BY ALTERNATING STRESSES. TOP—HEADSTOCK FOR ABOVE MACHINE. RIGHT—MACHINE FOR COMBINED IMPACT AND BENDING TESTS.

the welding expert before definitely deciding upon the details of his design.

Other Inventors

There have been many inventors at work on electric welding. Dr. Hugo Zerener, of Berlin, in 1890, introduced into Great Britain a system with two carbons and a magnetic deflector, apparently a variation of the invention of Benardos already described in this paper. It is not greatly used so far as the author is aware. Charles L. Coffin, of Detroit, was a prolific patentee of inventions connected with arc welding, as was also Henry Howard, of Halesowen.

C. H. A. Hoho and A. C. Lagrange, of Belgium, devised in 1892 an apparatus for heating metals to be welded. The metals to be heated are fixed to the negative pole and immersed in an electrolytic bath. The current passes from the positive pole through the solution, such as carbonate of potash, and returns through the metal piece attached to the negative poe. The solution decomposes, depositing hydrogen on the metal pieces in a thin layer. The metal pieces heat and the film of hydrogen protects them from the solution. The metal is withdrawn from the bath as soon as the proper temperature is attained and welded on an anvil. The metal pieces are perfectly clean and the hydrogen protects them to an extent from oxidation, but only until they are upset under the hammer. The process is interesting, but not in general use. The systems, in which welding is done by means of the electric arc, that are most generally used are the Benardos, The Kjelberg and the Quasi-Arc system.

All the systems so far described are operated by hand. The work is fixed either on an anvil, a suitable support, or as in the repairs of boilers, or other objects, by being heavy enough to remain stationary, and is connected to the electric circuit by an attached conductor. There are, however, and have been in the past in special cases, machines arranged to hold the work and to operate the electrode. These have not been found generally to produce better work or to weld more rapidly than can be done by a skilled welder by hand. Where they are successful is in special cases in which the work is of a straightforward nature, and the position and travel of the work or the electrode, the one in relation to the other can be maintained.

Electric Resistance or Contact Welding

This is the invention of Professor Elihu Thomson, of America. The author would like to correct a misstatement in his previous paper in which he referred to the resistance welding as the "Thomson-Houston" system. A letter was received from Professor Thomson too late to be published in the report of our proceedings, pointing out that Professor Houston was not associated with the invention. The author is not the only writer to fall into this error of nomenclature, and takes the first opportunity to publicly correct it. The earliest application of the Thomson resistance welding introduced into this country was that of causing currents of electricity to pass through the abutting ends of pieces of metal to be welded, thereby generating heat at the point of contact, which also becomes the point of greatest resistance, while at the same time mechanical pressure is applied to force the parts together.

Bars, angle, tee and other irregular sections are welded by this process, as are tubes, circular tires for cart-wheels, rims for the wheels of motor-cars, frames, wire-netting, chain, and mild steel wire down to very small dimensions. Copper wire is also welded. In welding the heavier sections it is customary in some cases to hammer them while they are in the jaws of the machine, as it is found in practice that some sections are thus more thoroughly brought together. If the heat shows indications of irregular distribution, the head of the hammer is sometimes used as an auxiliary conductor to bring more current from the jaw of the machine to the cooler portion of the metal under operation. The jaws are hollow and are cooled with water.

The parts or pieces to be welded are held in jaws as in a vice. One jaw is fixed and one adjustable, so that by moving the adjustable jaw the pieces may be brought into contact, and then after the current commences to heat and soften the metal at the point of contact of the pieces being welded, to press them together until the weld is complete throughout their mass. The adjustment of the movable jaw is in the simpler machine made by hand, in others it is automatic, and for heavy sections is done by hydraulic power. In some machines there is an automatic cut-out to switch off the current when the weld is complete. It is desirable to see that the pieces to be welded, if of equal section, project each to an equal extent beyond its respective jaw. In some cases gauges are provided to ensure accuracy.

In many cases the weld is finished off by hammering on an anvil or by mechanical means so as to remove the fin caused by the extrusion at the weld, and to toughen the joint and improve the quality of the metal in it. The current is single-phase alternating, and of very low voltage, being transformed down to about one to four volts at the electrodes, depending on the method of welding adopted.

There are two methods of electric resistance or contact welding, namely, slow and fast:

1. Slow welding, with a small electrical input and considerable time for application. By this method the metal is heated slowly, drawing it where required by tapping with a hammer to close contact and when welding heat is obtained, set up rapidly and finished on anvil. By this method the metal is not burnt and no rotten metal is hammered back into the weld. The current is one to two volts.

2. Fast welding. Heavy electrical input is used for a short period and the metal burned at the joint. The weld is closed up continually while burning occurs and after the circuit is broken, until all soft and rotten metal is squeezed out from between the faces. This rotten metal is removed when cold by grinding. No hammering on the anvil is done at all, so that only clean metal is left between the welded faces. The actual voltage applied to the jaws of the welder depends on the nature of the contact of the jaws and may be anything between two and four volts.

Tube Welding

The following examples may be of interest as showing the power required and cost of same per weld:

Slow Method.—Tube welded 1⅞-inch diameter by 3-16-inch thick. Maximum input 30 kva. This tube was welded very slowly so as to do away with any thickening of the metal at the weld. These tubes are cut off quite square—originally they were cut off bevelled so as to avoid any contraction of the tube interior, but this was found to be unnecessary. On compaction of the weld and while hot, the outside diameter is reduced by tongs closing on to and worked around the tube, gaps being cut in these tongs to allow the scale to come away freely. No hammering is done and no lump is left on the inside of the tube. These tubes stand a hydraulic test of 3,000 lb. square inch, and failures are less than 1 in 500.

Fast Method.—Where thickening at the weld is not detrimental, solid drawn steel tubes were welded in twenty-five seconds, with a maximum input of 34 kva., the diameter of the tube being 1⅞-inch outside by 3-16 inch thick.

Tire Welding

Slow Method.—Steel tire 2½-inch. Hard springy steel for gun-carriage wheels took 0.7 B.t.u. applied for fifty-eight seconds, maximum load 56 kva.

Fast Method.—Steel tire 3½-inch by ½-inch. Hard springy steel for gun-carriage wheels took approximately 0.9 B.t.u. applied for thirty seconds, maximum load 120 kva. There is no question that the welds are good, provided the conditions are right and proper care and skill employed.

To be continued

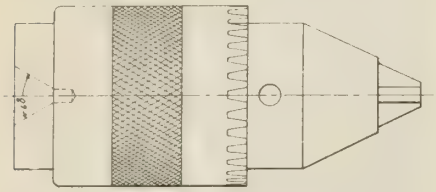
The Shipbuilding Outlook.—The shipbuilding question was up for discussion before the Union Government caucus in Ottawa recently. The members from districts where shipbuilding has become a thriving industry, pushed their claims for a continuation of building very hard. They say that Canada should have her own fleet carry her wheat to market, and that the number now being built will not be near enough for Canada's growing trade. The Government will be under a big handicap, owing to the contract made with the Dominion Steel Co. for plates at $81 a ton from the new mill, which will be in operation this fall. The Government realizes that this will make the cost prohibitive, but enthusiasts point to the mounting cost of construction in Great Britain as an incentive to keep on building here.

WHAT OUR READERS THINK AND DO

A QUICK METHOD FOR CENTERING CHUCK WORK

By J. J. McINTYRE

As no doubt readers of CANADIAN MACHINERY are always looking for something new, the writer illustrates by



SKETCH OF THE CHUCK

photograph and sketch what he believes a brand new stunt.

It is away from the usual method of centering work, which necessitates the removal of the tailstock centre, and is much faster and easier to operate.

Referring first to the sketch, readers will notice that the scheme is very simple, namely, to take an ordinary small drill chuck and provide a hole in the back of same with an included angle of 60 degrees, which is, of course, equal to the angle on the tailstock centre.

The rest of the operation is self-apparent, but for readers' benefit we show the photograph of the chuck in place on the lathe, and actual operation.

(Editor's Note.—We would like to hear from readers as to their opinion on this style of chuck.

CURVED HACK SAW BLADE

According to the "Machine and Tool Review," published by Albert Herbert Ltd., of Coventry, England, a new patent has been secured for a curved saw blade for use in the hack saw. It is claimed by the inventor that only a few teeth are cutting on alternate parts of the surface at one time, and an increased output of 25 per cent. is expected by the use of such a style of blade.

HOW TO TIE A GRIP-HITCH

By L. A. Latuou

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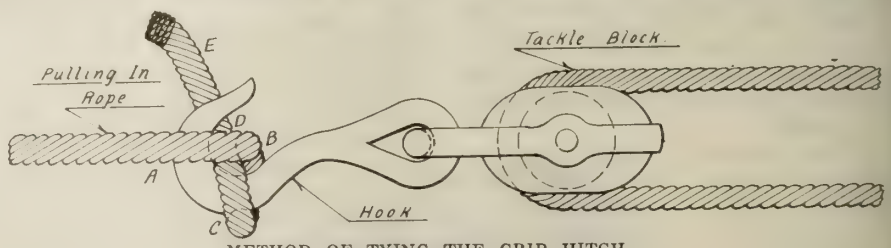
When drawing on a pulling-in line with a set of tackle blocks it is often necessary, as the pulling proceeds, to catch the pulling line with the hook on the tackle block at various locations along its length. This may be readily and quickly effected by forming the hitch shown in Fig. 1 in the tackle-block hook. To make this hitch, the pulling-in rope is passed through the hook at B, under it at C, and the free end E is passed through the loop at D. When a stress is imposed on A the loop B grips against D. Obviously, the greater the stress the tighter will be the grip. The use of this hitch renders unnecessary the use of knots for permanent fastenings.



METHOD OF TYING THE GRIP HITCH.

PROVIDING OIL GROOVES IN BABBITT BEARING*

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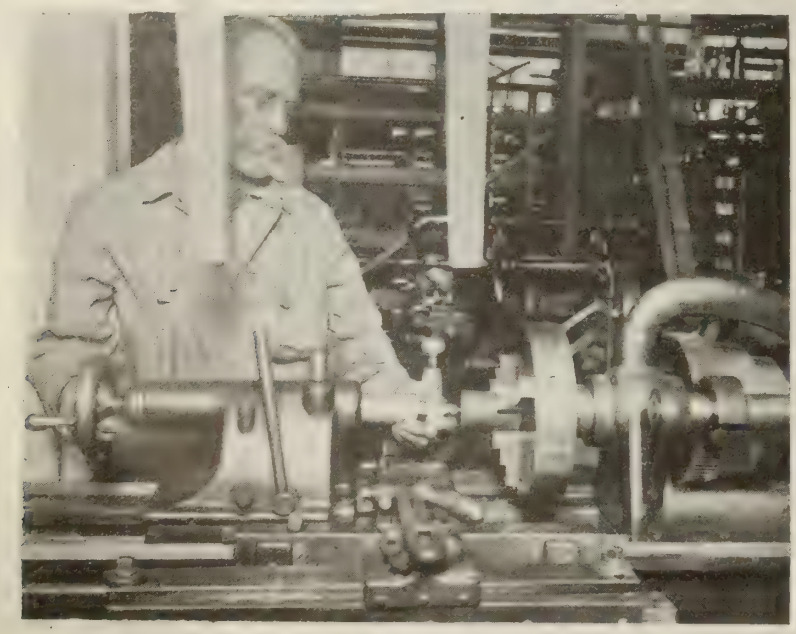
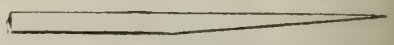
If a piece of shafting around which babbitt bearings are being poured is wrapped with a cord as shown in the attached picture before the bearing is cast, oil grooves are provided. The cord should be wrapped spirally in two sections from the centre of the bearing toward the ends, so that the oil will be



GENERAL VIEW OF THE MACHINE.

SURFACE-GAUGE NEEDLE WITH ECCENTRIC POINT



A SIMPLE dodge for securing a fine adjustment to the needle of a surface-gauge, when the latter is unprovided with a fine height adjustment, is to grind the point to one side (see the sketch), so that when the needle is turned a portion of a revolution in its clamp, the point is raised or lowered, as the case may be. This is preferable to tapping the needle to drive it up or down.—FRED HORNER.

carried in each direction from the oil hole along the shaft as it revolves.

TURRET LATHE STUNT
By C. E. HALL.

In the production of small brass parts on a "Cataract" No. 3 bench turret lathe with automatic chuck closer, much inconvenience was caused and valuable time

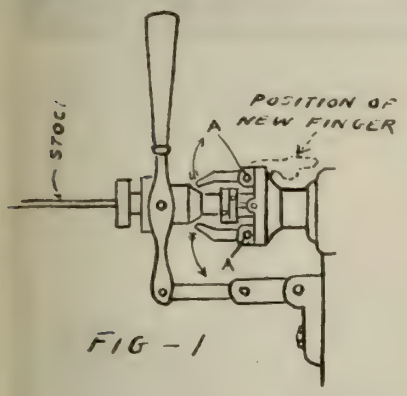


FIG-1

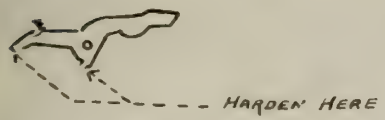


FIG.-2

lost, by the chuck failing to open when the clutch was released.

The angle of the draw in chucks on a No. 3 "Cataract" is 12 degrees, and while it is undoubtedly a better angle than most others as far as holding and easy closing are concerned, still it will not release as readily as one having a greater angle, which in most standard makes is 15 or 20 degrees.

The trouble was caused by the clutch fingers.

As will be seen in Fig. 1 they are both pivoted at A.A. and as the whole clutch revolves, the centrifugal force causes the outer ends to travel in the direction of the arrows Fig. 1, consequently closing the chuck enough to prevent the stock, which is fed automatically, from feeding freely.

The difficulty was overcome by making a pair of tool-steel fingers, hardened on their working faces, of the design shown in Fig. 2, which put the preponderance of weight on the opposite end of the pivotal point and so tended to open the chuck. The irregular outline was merely to conform to the shape of the clutch body, and give a maximum weight of metal on this end of finger.

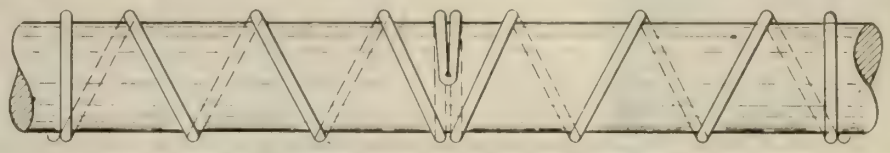


FIG. 1—USING A SPIRAL CORD TO CAST OIL GROOVES IN BEARING.

U. S. PIG IRON FINDING IT HARD TO GET INTO THE BRITISH MARKET

ALTHOUGH prices have advanced abroad, high freight rates are against American material. Trading is very dull, and some concessions are being made in spots.

Following are reports from various centres:

New York.—Sales during the past week have been confined to small lots for prompt shipment. These have all been of the foundry grade, and the total is not more than 3,000 tons. The new prices announced in Great Britain have placed American iron at a great disadvantage, not only on account of actual lower prices, but the difference between the freight rates over and above the cost at shipping points. With further cuts expected in the British prices, a still greater handicap will be placed on American material.

Philadelphia.—There has not been much business done during the past week, but enquiry has been brisk. The situation seems to be that large consumers are waiting to make sure that the bottom has been reached before placing their orders. An export enquiry for 2,000 tons was lost to an English maker by a margin of over $9.

Pittsburgh.—The lowering of production that has taken place during the past weeks is beginning to show some effect in the pig iron market. Some producers have stopped production entirely, and are supplying what demand there is from stock. Sale of 500 ton Bessemer to Pittsburgh at $27.95 is noted.

Buffalo.—There is no sign of normal buying being renewed. Both inquiry and sales are at a minimum. Producers are operating at only 40% to 60% of capacity. The largest sale reported is 250 tons malleable.

Cleveland.—With iron still accumulating on banks, blowing out of furnaces at an early date is considered likely. Most of the producers in this district have revised their old contracts to the $26.75 furnace for No. 2 foundry iron. Sales have been confined to carload lots.

Chicago.—With production still at a low level, more stacks will likely be blown out before long. There is a fair amount of inquiry for small lots for immediate delivery, and a number of small sales have produced a fair aggregate. A good buying movement cannot be long delayed.

Cincinnati.—Small lots for delivery before July 1st constitute the total business. There have been reports of medium sized sales for third quarter, but no information as to the prices quoted are available.

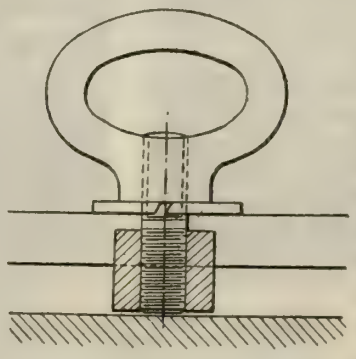
St. Louis.—The condition here is one of absolute deadness. No orders are being placed, and more stacks are being blown out. A return of open markets and competition is ardently wished for.

Birmingham.—The largest orders that are being placed are an occasional 300 tons to 500 tons. Stocks have been accumulating, and production has been less, but there is no report of any further cutting out of stacks.

Special Cable From Birmingham, Eng.

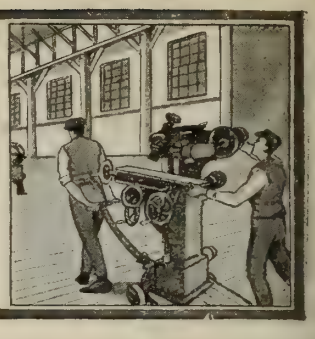
Prominent representatives of American mills are visiting England and France, promoting an international agreement in the export steel trade. Other leading American producers are expected to arrive here for a conference in June. A pooling and international price agreement on rails is being consummated. English import restrictions on machine tools, woodworking machinery and agricultural implements were removed April 24.

LIFTING-EYE FOR SLOTTED TABLES.



THE illustration shows a loop nut, fitted with a screwed stud, entering into a shouldered nut that fits the tee-slot of a machine table. A pair of these eyes, spread sufficiently apart along the slot, form a convenient means of lifting the table by hand, or rope to the crane, when doing fitting, or repairs. A split spring washer under the boss of the eye forms a sort of friction lock to prevent the stud sliding along should the eye be turned inadvertently.—FRED. HORNER.

DEVELOPMENTS IN SHOP EQUIPMENT



CINCINNATI TURRET ATTACHMENT

The three illustrations as shown give readers a good idea of the new attachment that has just been placed on the market by the Cincinnati Lathe and Tool Co., Cincinnati, Ohio, for use in connection with its regular line of engine lathes. This hectagonal turret is designed for various types of work, and is shown in the photographs on various types of work. The lathe shown is supplied with a pan, a pump, a turret toolholder in compound rest, double back gears, and hexagonal turret on the bed, together with power feed.

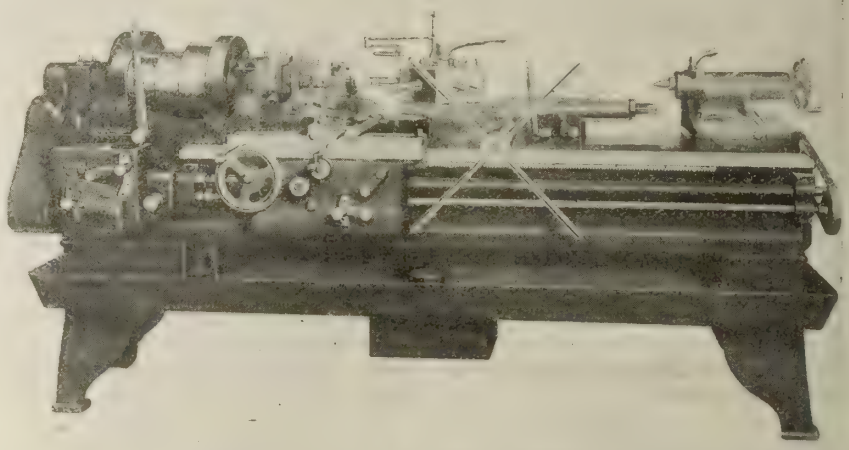
NEW 11-IN. SWING "STAR" QUICK CHANGE ENGINE LATHE

The Seneca Falls Manufacturing Company, Inc., has just brought out an addition to the well-known line of "Star" lathes, an 11-in. swing quick change gear engine lathe.

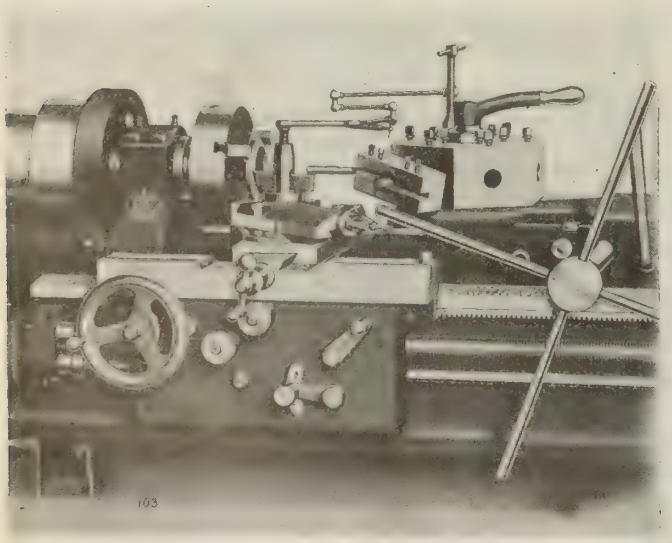
This lathe has a quick change gear equipment, consisting of a train of nine gears in the form of a cone mounted on the lead screw, the whole being enclosed in the main gear box and controlled by one tumbler handle. By means of another tumbler carrying a set of compounding gears, the train of gears is given different speeds, thus providing 45 different changes of feeds and threads, from 3 to 96, including 11½, none being duplicates. Any desired thread not given on index plate may be obtained by using necessary change gears on feed stud. The construction is very simple and the drive is direct through a minimum number of gears from head spindle to lead screw, absorbing practically no more power than a plain engine lathe.

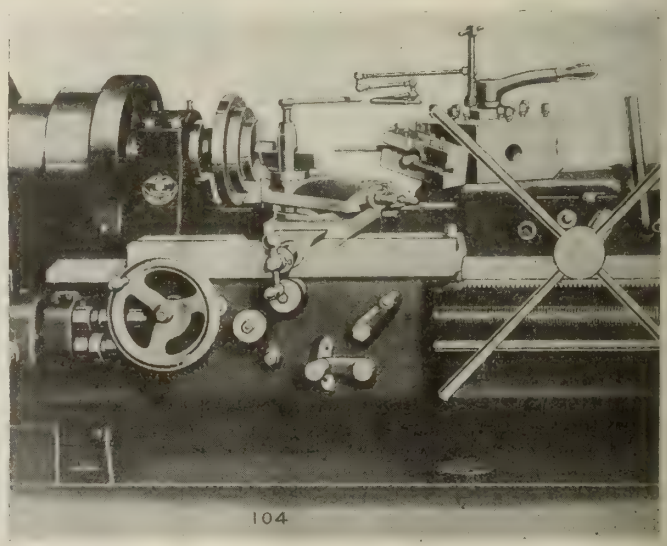
The headstock is web pattern, hollow spindle with 1-in. hole made from 60-65 carbon crucible steel carefully fitted to bearings. The carriage has substantial bearings on ways, is gibbed front and rear, and has power cross feed. The apron has a safety device so that opposing feeds, the long feed and split nut cannot be engaged at the same time.

This lathe may be used with any of the large line of extra attachments, including motor drive, taper attachment, draw-in chuck, oil pan and pump, turret carriage stops, milling and gear cutting attachments, etc.

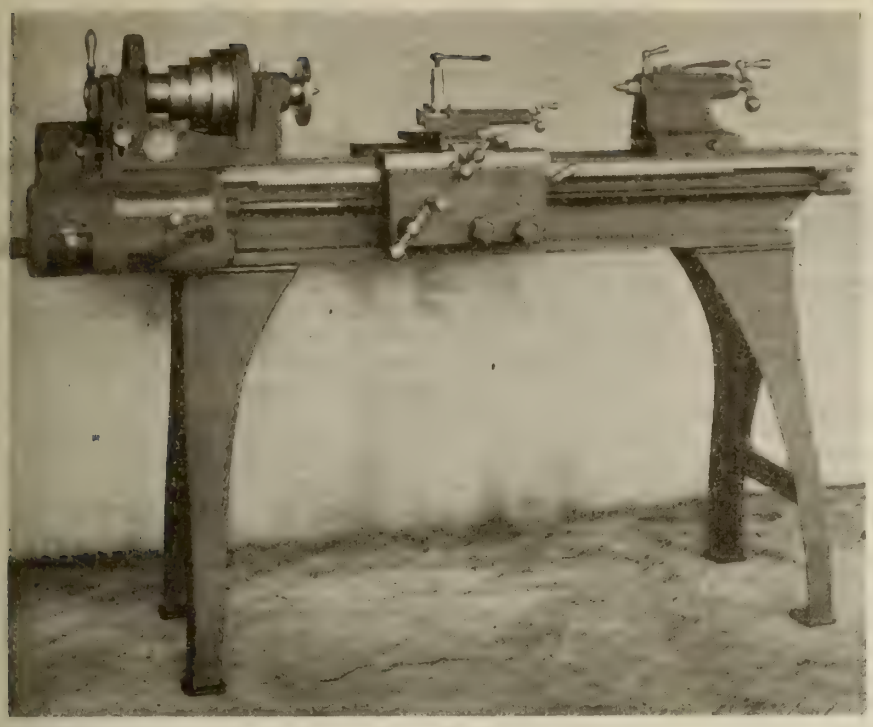


GENERAL VIEW OF MACHINE.





CLOSE UP VIEWS OF THE TURRET



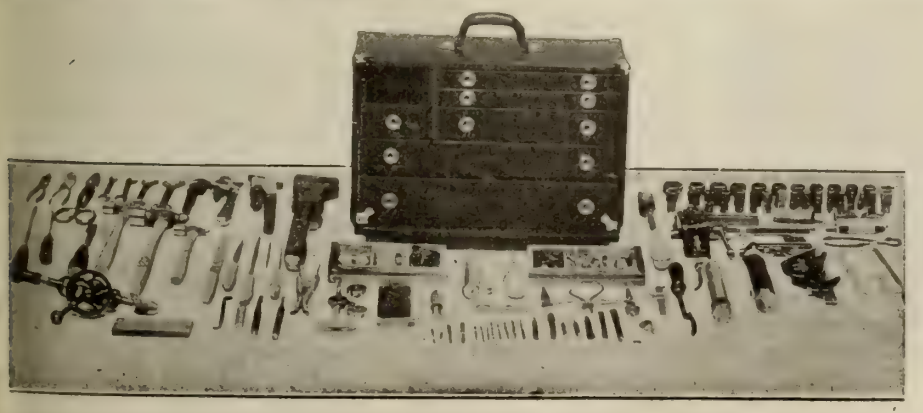
NEW TOOL CHEST

The Union Tool Chest Company, Rochester, New York, have recently developed a new tool chest for the use of the auto mechanic, auto and truck owner. It is strictly a garage chest. The material of which these chests are made is selected, thoroughly kiln-dried oak throughout. The corners have lock and glued joints. This is the construction specified by the Government for all its machine gun cartridge belt boxes and chests, which are subjected to extremely rough handling. The outside finish is obtained by means of an ebony stain, black filler, black first coats, and two coats of black varnish. This produces a high-grade, semi-gloss black finish which is oil and water proof. It will not show finger prints and can be easily and quickly cleaned. The inside of the frame and the inside of all drawers and trays is finished black with a special oil and waterproof preparation. The drawer pulls are of a special flush ring type, which are as convenient and give 10 per cent. more drawer space than knob pulls. The rings are flush with the drawer fronts and cannot pull off.

A Sargent and Greenleaf brass lock is provided. The handle is covered with heavy genuine leather and has heavy steel wire through the centre. Loops secured by rivets, not screws, carry the weight and cover the end of the handles which are attached to the chest.

The drawers run in hardwood slides inset into the ends of the frame. These will carry any weight which can be put into the drawers.

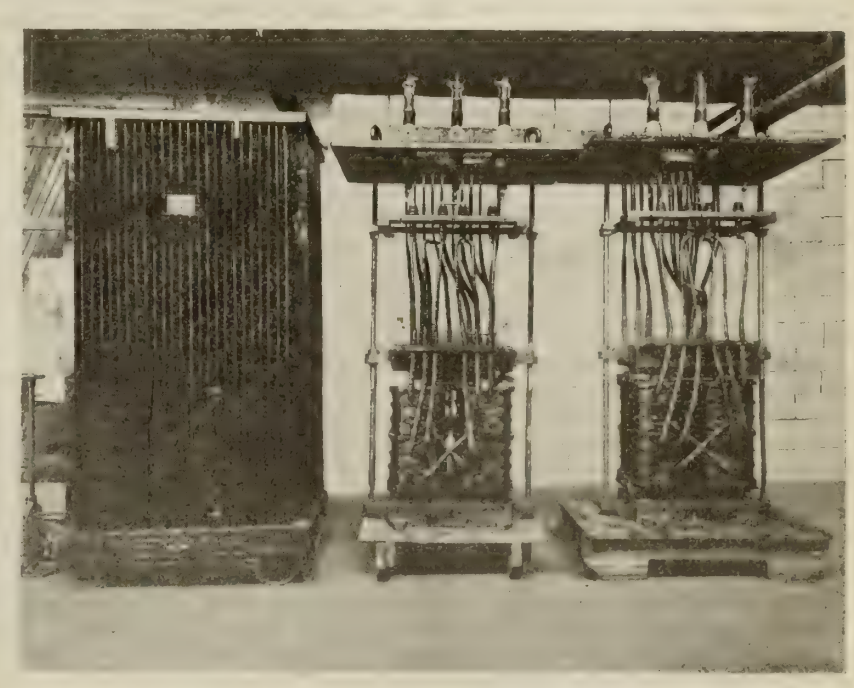
In addition to its ample capacity this tool chest is conveniently arranged as the two small top drawers are fitted with movable partitions for small parts and for delicate instruments, such as battery gauges, etc. The third drawer from the top is designed to hold a complete set of socket wrenches.



ELECTRIC FURNACE TRANSFORMERS

The electric furnace owes its growing acceptance as a desirable medium, both for heat treating steel and melting non-ferrous metals, chiefly to the more exacting control that is offers over furnace conditions. To supply an important link in the control equipment of its Baily electric furnaces, the Electric Furnace Company, Alliance, Ohio, is building special transformers of the type illustrated.

These core type transformers are of 400 K.V.A. capacity and the high tension side fitted with the usual voltage taps, is wound for 22,000 volts. The low tension side is fitted with the special voltage taps to meet the particular voltage requirements of the furnace. Each transformer is single phase, and for small furnaces, requiring 100 K.W. or less, one transformer is sufficient. Three phase current is taken care of by two transformers fitted with a Scott connection. By means of the special low tension voltage taps, any desired current input may be delivered to the furnace through the selective oil break switches that are a part of each installation. With furnace current under control, any furnace temperatures may be steadily maintained.



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The Unsettled Conditions

THE authorities of our cities, of our provinces, and of our Dominion, should take heed to draw a straight line between legitimate trade unionism and the continental Bolshevism that certain agitators are seeking to foist on the world to-day.

Trade unionists themselves have got to make it their business to use every bit of influence they possess to see to it that they are not made a party to a lot of baneful influences being turned loose here that will make it well nigh impossible for the shops to operate at all.

There is no room in Canada for Bolshevism. There is not the disease here to call for such a poisonous remedy. Conditions that drove crowds to mob rule in Russia are not here, and when men call out in this fair land and urge others to rise up and use the torch and the gun, it is high time for our organized law to do a fair share of the rising up and put an end to this stuff.

There is another duty facing the Government. It is safe to say that most of the unrest right now is due to the fact that men's wages, though they have increased, have not kept pace with the rate at which the purchasing power of their dollars has decreased. There is a gap between income and outlay that they are not able to meet.

We have little patience with the talk that people have money to go to the moving pictures, therefore, they are not in bad shape. Surely no person has a desire to see income and expenses so closely balanced that there must be nothing left over for recreation or pleasure.

What the people want to feel is that every dollar they spend for the things they must have in order to live decently shall represent **real value.**

What they do **not** want to feel is that 67 or 70 cents a pound for butter represents not only its first cost in labor, but a certain amount of rake-off for every man who has been able to crowd himself into the line between the producer and the consumer.

Butter is only one of a long list of staple articles.

The cold storage business should be investigated thoroughly and fearlessly, and the public should know if it is true that tons of food are destroyed at intervals rather than that they should be allowed to go on the market at a reduced price.

The business of grappling with this problem is big enough to take up the best efforts and attention of any Government. There is a real task there, and in its solution rests much of the future conditions in this country.

We can never have a contented and a happy people until it is possible for them, out of their earnings, to buy from the markets of the world those things which they must have to provide decently for themselves and their families. As things stand at present, those who are unduly profiting in **handling, making or holding** the things people must buy in order to live are making it almost impossible for manufacturing business to go ahead and do business on a profitable basis.

Plain, Ordinary Thrift

ONLY a week or so ago the United States Steel Corporation announced that it would, for the present at least, suspend payment of the extra dividend that has been handed out to the shareholders recently in addition to the regular payments.

As far as we have noticed it has not been suggested that the action of the Steel Corporation was prompted by the fact that they could not meet the extra dividend. As a matter of fact the Steel Corporation could meet the payment, and do it handily. They have made money. They have very large assets, and nothing would be thrown out of kilter were the "extra" to be paid as usual.

The corporation's president says that he looks for better business on ahead. During the present period he intimates that unrest and slack orders are to be expected. And for that reason he seeks to set his house in order. In other words there is room for ordinary thrift and precaution in a concern the size of the United States Steel Corporation.

As a general thing thrift and precaution are supposed to be part and parcel of the existence of the man with a fairly small salary. He, of necessity, has to be tolerably thrifty, else some fine day he will find himself in jail or in the hands of the creditors.

But the man who is making money is he who finds that even with his big ideas and fool habits he is able to make ends meet. He is more mightily concerned about thrift in some other chap's case than he is in his own.

It's easy to let a dollar slide now, isn't it? A few years ago the expenditure of a five dollar bill would have meant that you and the wife would have had to sit up for a couple of evenings and talk the matter over. But now? Well, it goes and there is nothing more said about it.

Cost of living has increased. Granted. Wages have gone up? Yes. But along with it all, our ability to spend has kept ahead of the whole thing.

A glance at the stock markets generally and at the offerings of debentures leads to the belief that we are moving out of the era of the high earning power of money. We are passing out of the unreal atmosphere of war industry, and it is hard to realize it. Business that is placed now or orders that are given are for normal, not abnormal purposes, and sooner or later we will have to realize this. The element of urgency has been removed, and people are more inclined to stay out of the market with their business if the price of materials does not suit them.

The wise man is going to govern himself accordingly. He is not going to put the lid on all expenditures, but he is going to buy ESSENTIALS and let the trash slide. He is going to take a leaf from the book of the Steel Corporation, and thrift and common sense are going to have a chance to assert themselves.

OPPORCHUNITY

"As the pote says,
Opporchunity knocks at ivry man's dure wanst.
On some men's dures it hammers
Till it breaks down the dure
An' thin it goes in and wakes him up
If he's asleep,
An' every afterward it wurruks f'r him
As a nightwatchman.
On other men's dures it knocks
An' runs away,
An' on the dures iv some men it knocks
An' whin they come out
It hits thim over the head with an axe.
But ivrywan has an opporchunity.

Well This Sounds Like Real Easy Money

Written by One Who Had It Tossed at Him

LOOKING over CANADIAN MACHINERY a couple of weeks ago, I saw an article headed "Is There Such a Thing As Easy Money?" That is, in the nature of things, a highly controversial subject, and complicated by the fact that the ones who get their money in the easiest manner, think it is obtained only with difficulty.

Personally, the pursuit of the elusive dollar has always been fraught with hard labor and indifferent success. Only one occasion comes to my mind wherein I was the hunted, and the prettily engraved paper, the pursuer. Even at that, the manner of its coming was attended with so much mystery and anxiety of mind, that I doubt if it could be strictly labelled as "easy money."

The means by which I was, at that time, endeavoring to lay the foundations of a fortune, was by taking charge of the steam plant of a manufacturing concern. The salary was in inverse proportions to the duties. This particular plant had started in a modest way some years before, the motive power at the beginning consisting of a vertical firebox boiler, and a 15 h.p. horizontal engine. The original engineer had been a bricklayer, who having developed a partiality for hanging around the boiler, during the construction period, in order to warm himself, was struck by the comparatively easy and sheltered life the fireman seemed to lead. It looked so much more comfortable than laying bricks in the invigorating winter climate, that he determined to change his profession. Fortune favored him, inasmuch as the incumbent of the position developed an attack of the demon rum, and was summarily discharged. The erstwhile follower of the ancient rites applied for the position, and obtained it.

The product of the factory was a household need. With the growing population of the country the demand for the company's goods increased. The plant grew, more power was necessary, and a horizontal boiler took the place of the vertical, a new boiler room being built to house it. More buildings came along, more pipings, more boilers, more power. With the help of the handy man who had become the chief steamfitter, pipes were run here and there and everywhere. With the introduction of motors instead of the old line shaft drive, an electrician became necessary. Old Bill, the one-time bricklayer, kept strictly aloof from this phase of the proceedings. He was already in the position of the Irish Fusilier crossing the Tugela River in the Boer War. The commanding officer, during the fording of the stream, gave the order "Fall in two deep." One of his followers replied in anguished tones, "Begorra, I'm in two deep already."

Things were getting so complicated for Bill, that he decided to find an easier job. Before long he got in touch with a nice little factory that used one boiler for heating only, and transferred his patiently won engineering abilities to this haven of rest. This was where I stepped in.

I was at that time in a big plant out in the country, but yearned for a city life. Some friends of mine in the supply business were looking out for a job for me, and one day I got a letter from them, advising me that some clients of theirs had a nice little plant they wanted a man for, who could do a little re-organizing. After a little correspondence. I accepted the position, and moved in to the city.

I found a plant, consisting of four 150 h.p. horizontal return tube boilers, a pair of compound engines, horizontal, air compressor, belt-driven generators, hydraulic pump, and the old original engine, which was used occasionally at nights.

In the boiler room was the most astounding collection of pipes it has ever been my misfortune to run up against. They ran overhead, under the floor, were mounted row upon row on the walls. The main steam pipe was a fearful and wonderful layout, and a graceful wreath of steam surrounded every joint. While I was standing on the boiler top, trying to visualize this Chinese puzzle, a wildly excited old fellow rushed up the ladder, and started shutting down the main stop valves on all four boilers. Naturally all the safety valves started to blow, and the boiler tops become a most uncomfortable location. The boilers were in the basement, and there was a door leading from the tops to the yard, so I strolled gracefully out to wait for the excitement to stop. I hadn't yet taken charge, and my enthusiasm was beginning to cool a little.

While I was trying to decide on whether I should go home or not, the superintendent came along. He had left me just a few minutes before, to allow me to look around a little. He looked worried. "I thought you were in the boiler room," he barked when he saw me. "Well, I was," I replied, "but there seems to be a holiday proclaimed, and I didn't want to interfere. Does this sort of thing occur very frequently, or is it just emergency practice?"

"Well, this is what we want to stop. All this trouble is over a burst pipe in the galvanizing department. There's so many pipes and valves leading there that no one knows what to shut off, and the quickest way is to shut everything off, plug the pipe, and trace it after."

That was my introduction. However, I liked the super, and was promised very many inducements if I would stay and straighten things out. I stayed, and in a few months had things improved a lot. Incidentally, I had a lot of trouble with some of the oldtimers, especially a night fireman, an Italian. It ended up with my firing him, and he departed, vowing vengeance.

Christmas was approaching, and I was getting over the worst of my troubles. I didn't have to work more than an average of fourteen hours a day, and sometimes even got a Sunday at home. I had been married a short time, and was getting quite well acquainted with my wife, in the intervals between supper and bed.

One day, I was called to the 'phone. A strange voice came over the wire. "Is that Mr.——?" it demanded. I pleaded guilty. "You are chief engineer there?" Again I admitted the soft impeachment. "That's alright. Now what is your private address?"

I immediately became dignified. "I don't know you, sir, and I don't give my address to strangers. Who are you, and what do you want." Mystery pervaded the voice. "You'll find out who I am in good time. I can't tell you over the 'phone." "Very well then," I replied, "it's no use prolonging the conversation."

I hung up the receiver, and tried to forget all about it, but I kept on wondering. It seemed peculiar.

Foolishly, I told my wife about it after supper that night. To my surprise, she immediately dissolved into tears. "Oh dear, oh dear, I knew something awful would happen. Why did you do it?" Not knowing what I had done, I couldn't explain, so said nothing. "Don't you see," she went on, "it's that dreadful Italian. The papers are full of dynamite outrages. We'll be blown up in our sleep, I know we will."

This angle hadn't occurred to me. It seemed funny to me, and I was foolish enough to laugh. I got the blowing up right there, and incidentally, determined to keep business affairs to myself in future. However, peace settled down after a while, and nothing more was said, though she was plainly worried.

Two days after came the call again. This time I had a new idea. "Look here, old chap," I said to the unknown. "I have all the life insurance I can carry, so it's no use your bothering." The owner of the voice laughed. "I am

not selling life insurance, but I'm glad to know you carry it." There was something about this I didn't like. I tried a new tack. "Why don't you come down here and see me?" I demanded. "Oh, that wouldn't do. It's better for my own sake to see you at your house." "Well, you can jolly well find out," I yelled. "I'll never tell you." He laughed again. "I just called you up to let you know I've found out. You'll see me on Christmas Eve," and the receiver was hung up at his end.

Christmas Eve was only two days off. I did a lot of powerful thinking during that time, though I didn't say any more to my wife. I could think of no solution. I didn't owe any money to anyone, and had no enemies, with the possible exception of my late fireman. There seemed nothing to do but wait.

We were going out that night, and though I was not to be scared, I was sort of hurrying my wife up while she dressed. She seemed to be longer than usual, but the last time I looked in she had said she couldn't be any quicker, and I was making her nervous. I thought to myself, that was quite fair, as I was nervous myself.

A short, sharp ring at the door bell. I jumped about a foot, and then, pulling myself together, boldly opened the door. A mild looking stranger stood there. "You are Mr. ——" he asked, and immediately I recognized the mysterious voice of the telephone. I nodded without answering.

"You have given me a lot of trouble to find you," he went on. "Can I speak to you a minute." I sized him up, and concluded I could handle him alright. "Very well, come in," I answered, and led him in to my modest sitting room.

"My name is Brown," he said as he took a chair. "I represent the —— Oil Co. I have been months trying to sell your firm, and shortly after you took charge, I got an order. Here is a little Christmas present," and he laid a ten dollar bill on the table.

I tried to protest. "Not a word," he broke in. "This is entirely between you and me. I wish you a very merry Christmas." Before I could frame the words I wanted to speak to him, he had reached the door, and was half way down the steps. I concluded to let him go, and returned to the room, to enjoy the heartiest laugh I had enjoyed for some days.

My wife came out to enquire into the cause of my mirth. I told her I was laughing at a man for giving me ten dollars. "Of course," she said, "ten dollars is only a joke to you. What was it for?" "Well, my dear, it was supposed to be for value received." I explained what my visitor had said to me. "The whole point is this. I had no more to do with purchasing oil or any other supplies than you have. Our firm divides its orders among the people who buy from them, and no matter what the quality, they each get a turn. Anything I say for or against carries no weight. As a matter of fact, this chap has the worst brand of oil on the market, and he knows it. That's why he feels so grateful to me, for what he thinks is my good influence. It would be a shame to undeceive him. The reason he got an order is because his people bought some stuff from our firm, and as long as they continue to buy from us, he will get more orders, and we will get a visit from Santa Claus."

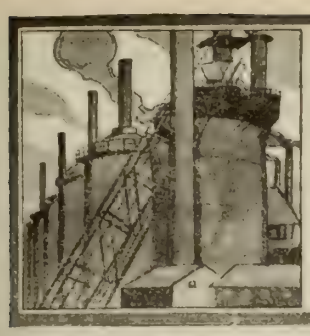
Well, the following Christmas, I received two ten dollar bills, and the one after that, on the last occasion I showed my friend a case of cutlery the boys had given me that day on the occasion of my leaving the firm.

"Well," he said, "I am sorry you are leaving. I hope you will put in a good word for me with your successor."

I promised.

Current Events in Photograph

One of the chief ambitions in life of the Bolsheviki seems to be to wreck and murder. This junk pile shows how costly locomotives were deliberately wrecked. The men on guard are British bluejackets and the scene is at Soroka, on the Murmansk-Archangel Railway. This wreckage is a very mild sample of what usually happens when the Bolsheviki are in charge of things.



MARKET DEVELOPMENTS

Much War Material to be Disposed of Yet

And Tool Dealers Want to Know What is Going to be Done With It—Rate of Production at the Steel Mills Does Not Improve—Scrap Market as Dull as Ever

DEALERS in Canada who are selling lines of American-made machine tools find that the rate of exchange on Canadian payments is having some effect on the sales. It amounts to around 2¾ per cent., and when the dealers are not able to fasten this on the purchaser it cuts seriously into his margin on the sale. The exchange serves also to give the Canadian maker an advantage of that amount over his American competitor.

The large amount of used machine tools in United States war shops is also an unsettling element in the market. The surface has hardly been scratched as far as the other side of the line is concerned when it comes to disposing of this material, as there are immense plants from which hardly anything has been taken. Builders of new machinery would like to know for certain just what is going to be done with this.

Production at the steel mills does not improve, although some of the dealers state that there has been some signs of an improvement in the movement of structurals. Anything, large or small, that turns up in this line, could well be called an improvement, as there has been a standstill of the most pronounced sort for a great many months.

Pittsburgh places the rate of production at the steel mills in that district at 60 per cent., with a tendency to fall below this mark. It is also noted that the railroads, which were spoken of at one time as likely to be large buyers of rails, are well up with their orders. In fact, it is claimed that they have already had rolled for them their normal tonnage, and so the much-talked-of controversy between the Department of Commerce of U.S. and the director-general of the railroads amounts to nothing at all. In the last resort the railroads could turn around and say that they had no business to place, anyhow.

The scrap metal market continues dull—as dull as it has been at any time since the signing of the armistice. In fact, it is quite proper to refer to it as dull, listless or stagnant, depending on your preference for words.

No changes have been made during the week, either in steel or iron or the scrap metals. The only notable tendency is that dealers who are now making inquiries for fourth quarter copper find that the feeling is for a higher level at that time.

MONTREAL RECOVERING FROM THE STRIKES THAT WERE ON THERE

Special to CANADIAN MACHINERY

MONTREAL, Que., May 8.—Business has again steadied down after a brief period of disorganization, due to strikes, and while other disturbances are pending, there is hope that the worst is over. Montreal will take on additional activity in the near future, when the improvements to the harbor are well under way. Little has been done in this way during the war, and the programme for the present year is of considerable importance. Traffic in and out of the port is taking on midsummer activity with ocean vessels arriving daily. General business is improving slowly, with reports steadily becoming more optimistic. Steel trade is better; machine tools are not active but dealers report a fair volume of business, new equipment demand steadily growing. Metals are quiet and dull with little interest displayed. Scrap is still dull with little movement.

Business Gradually Improving

Current business in the steel industry is not what might be termed exceptionally active but the volume is sufficient to taboo the possibility of calling the market stagnant. Considerable delay is experienced in getting down to operations on a peace basis, and many reasons are advanced for this apparent hedging, but the one most generally heard is the uncertainty of the future. Three years ago it was the same uncertainty of the future that maintained every industry at the apex of activity, but the want of confidence is a feature of present conditions.

Canadian manufacturers are beginning to realize that time will be required to normalize the industrial situation, and that pre-war prices cannot be attained by simply waiting for them.

The steel business here has been somewhat stimulated by the opening of navigation and considerable movement of material is reported. Dealers are reporting better warehouse supplies but are still reluctant to carry the stock that was generally shown in pre-war days. No change has been made in prices here, and quotations are invariably firm in character.

Metals Very Quiet

With the absence of any marked activity the market continues to remain in its state of listless unconcern, and apart from buying for present needs, which are relatively light, the situation is devoid of interest. With the exception of aluminum, all the metals are inclined to weakness, but apparently nothing can be done to stimulate a buying movement in face of the uncertainty that appears to permeate most every branch of industry. The presence of labor troubles and the possibility of others is likewise an influencing factor and one that has an unknown relation to the existing state of dormant enterprise. Business here, in metals, is very quiet, but what is passing is of a steady character. Dealers are quoting easier prices on coppers,

18½c for lake, 17½c for electro, and 17c for castings; these quotations representing declines of from ¼c to 1c per pound. Tin, at 54c shows a drop of 6c over that previously quoted, but business is quite dull. Spelter is virtually dead and has dropped from 9c to 8c per pound. The demand for lead is exceptionally light and the quotation of 6½c is a decline of ¼c per pound. Aluminum is holding firm and ton lots may be purchased at 35c per pound but the price of 38c holds for small quantities.

No Export Trade in Scrap

Trading in old material is far from active and the market is quite listless with dealers apparently taking little interest in the situation. Buying is of a transient character as consumers are invariably content to purchase just enough material to satisfy their immediate requirements, leaving the future to look out for itself. Dealers are not anxious to take on any more stock as their yards are now well filled, as the price is little inducement for the accumulation of available material. The general unsettled conditions are a factor in the quiet trading. The recent war has altered trade routes for many commodities, including old material. Prior to the war the opening of navigation meant increased activity in this respect, but this year the reverse is the rule. "Before the war," stated one local dealer, "we shipped large quantities of scrap to the Old Country, but it would appear that the market there is amply supplied, and in consequence the demand from that source is entirely eliminated for the time being." Some local business is being carried on but prices are relatively unchanged but of a nominal character.

ARE SATISFIED TO LEAVE LISTS ALONE

Toronto Dealers Report That Market Is Rather Dull During the Week—Exchange Rate Hurts

TORONTO.—For the second week in succession dealers in all lines covered by the markets are satisfied to let prices stand as they are, and no changes are noted this week. There is a general attitude of waiting developing, and until the trade gets over it there is not likely to be a great volume of business moving. The strike, if it lasts for any length of time, is bound to have the effect of putting the brakes on trade locally, and already the buying of basic materials in some of the plants affected has been very noticeably decreased.

Prices are Holding

Dealers in steel claim that there are going to be no drops for some time. They do not take much stock in the rumors from U.S. points that prices are going to tumble in June. There are signs of a movement in structurals, the first for some time. The inquiries are coming in from various sources and some business is being placed in small lots. The trade does not care very much whether this is small or great, so long as the movement gets a start. There is a feeling that a movement in structurals will give greater confidence in other lines, which have been holding back in the meantime.

Some of the warehouses have been doing a good business right through this year. In fact one of the firms stated to CANADIAN MACHINERY that the trade during that period in their lines was all they could desire, but they were not so hopeful for the present month.

There is some buying going on by a local concern on account of business that is being done for the Halifax shipyards, which are still working on Government boats. Although there are some good orders like this coming in this firm contended that general business was duller than it had been for some weeks.

One good-sized shipment of iron lap-welded tubes is coming in from an Old Country firm for a Great Lakes shipbuilding concern. English furnaces are also being put in. Some of the importers look for a lower price in many of the British lines as soon as the actual signing of peace has taken place, and the business of dismantling the war shops has been proceeded with. The claim of these firms is that the advantage that American firms have now in the way of price in competing for business in the Canadian market is but a temporary condition, and it will be squared away as soon as the Old Country firms get back to their old lines.

Don't Like the Discount

Some of the firms that are selling American machinery in Canada find that the discount that is against Canadian currency just now is rather a serious affair. In some cases, now that competition is pretty keen, it is necessary that the price of the machine be brought down to a point where there is just enough profit to keep the things moving. The discount amounts to about 2¾ per cent. Many of the sales are made on a flat ten per cent. to the agents here, and when it is found that the consumer will not pay the exchange, if he has to foot for the discount, finds himself out on the deal. Some of the Government purchasing departments, such as the National Railways, are also showing a strong preference to staying on this side of the line with their buying, as a matter of national policy, as they do not feel that the Government should, with the exchange so pronounced against this country, make purchases that will tend to increase it. In fact there are some who actually look to see a three per cent. exchange, which will mean just that much protection to the material that is manufactured in the Dominion.

Dealers differ as to the amount of business that is being done just now. In some of the offices the statement is made that the month of May will be a poor one, while in others they state positively that they are well pleased with the amount of business they are doing.

Scrap Market Dead

One can use the word dead, stagnant or dull in referring to the condition of the scrap metal market, according to the way he feels. In all three cases the chances are that he will be well within the mark. Dealers state that there has not been a good week's business done since the signing of the armistice. There is nothing, they claim, on the horizon to stimulate speculative buying, and neither foundries nor steel mills want anything now. "Business is as poor right now as it has been at any time since the ending of the war," was the way in which one of the largest dealers sized up the situation to CANADIAN MACHINERY, and he was not particularly hopeful of anything better in the immediate future. The drops in the price of pig iron made no difference at all in the demand for scrap for a mixture.

It is known, though, that some of the dealers in the metal markets are trying

POINTS IN WEEK'S MARKETING NOTES

It can be said that there is an open market in pig iron now, and active bargaining takes place whenever there is a sufficient tonnage to warrant it.

—

Scrap metal market in Toronto is in the same stagnant position that has existed since the signing of the armistice. Sales made are few and of little consequence.

—

The U. S. Department of Justice, contrary to the general belief, did not sanction the price fixing movement which culminated in the schedule of March 21.

—

U. S. railroads are not making enough money to buy in a supply of rails in advance. They got a little over their normal supply in the year 1918.

—

Some of the dealers who are trying to get a line on supplies of fourth quarter copper, claim that the price is going to be higher than at present.

—

Once British industries get on a peace basis, it is claimed they will soon put their material on the markets here at a price that will sell under the American figures.

—

The rate of discount on Canadian payments for U. S. machines, which now amounts to something like 2¾ per cent., is interfering with the sale of U. S. machine tools in the Canadian market.

—

Production at U. S. steel mills are now placed at 60 per cent. of capacity, and the rate is still declining.

now to secure deliveries of fourth quarter copper, and they are not finding it an easy matter to do this. They seem to be certain that for the months of October, November and December, copper will be expensive. This view is hard to explain, as there is a great deal of copper scrap in the country, but the dealer was quite firm in his opinion regarding the higher price for the last three months of the year.

NEW YORK FLOODED WITH MORE QUERIES BUT NOT WITH BUSINESS

Special to CANADIAN MACHINERY

NEW YORK, May 8.—The situation in the machine-tool trade grows more and more confusing. The volume of inquiry keeps up at an amazing rate, but the volume of buying is very small in proportion. In fact, so little business has come in during the past month that a few machine-tool plants are curtailing hours of work, and cutting down the number of workmen. If it were not for the large quantity of Government tools soon to be placed on the market the trade would feel confident that machine-tool orders would be fairly plentiful when a more settled feeling becomes prevalent among buyers. These Government tools constitute a factor, however, with which the trade does not know how to reckon. More than 300 plants in the United States and Canada contain equipment which must be sold, and to what extent the disposal of this equipment will interfere with business of the machine-tool manufacturers is a question that can be determined only by experience. There is about an equal amount of optimism and pessimism on the subject.

Meanwhile, machine-tool builders continue to reduce prices even in the face of recent assertions that they would not do so. Radial and upright drills, milling machines and cutter and tool grinders have been reduced from 10 to 30 per cent. With few exceptions all machine tools have been reduced from 0 to 30 per cent. since the first of the year, but many of them are still 100 per cent. above pre-war prices.

The difficulties confronting the Government in the sale of its tools are illustrated by the action taken by the Bureau of Aircraft Production, War Department, in rejecting all bids on 630 used tools from the plant of the Union Switch and Signal Co., Swissvale, Pa., which during the war was engaged in making Lerhone airplane motors. The Bureau of Aircraft Production found the bids were below the appraisal valuations of the tools. Evidently the prospective buyers were looking for "bargains," and bid on that basis.

Much to Come Out Yet

A considerable number of the used tools from war plants which have already been put upon the market have been absorbed, but the surface has barely been scratched as yet. About 1,200 or more tools from the Wright-Martin Aircraft Corporation plant at Long Island City, N.Y., which was engaged in making Hispano-Suiza motors, will soon be offered for sale. The equipment of the Eddystone Munitions Co., Eddystone, Pa., consisting of several hundred tools used for shell work, is on the market.

The machine-tool trade has noted with interest the great automobile development which is going on in Canada. In addition to the $6,000,000 plant which the General Motors Corporation will build at Walkerville, Ont., it is announced that several million dollars more will be expended by Detroit, Toledo and Michigan companies for Canadian branch factories. The Maxwell-Chalmers Co. will spend at least $1,000,000 for new units at its present Canadian plants; the Champion Spark Plug Co., Toledo, Ohio, proposes a $300,000 factory at Windsor, Ont.; the Auto Specialty Co., St. Joseph, Mich., expects to put up a $250,000 factory; the Kelsey Wheel Co., Detroit, contemplates extensions which will double its present Canadian output; the Motor Products Corporation, Detroit, will shortly start work on a big plant to care for Canadian trade, and the Republic Motor Truck Co., Alma., Mich., will locate its new Canadian plant at London, Ont., and work is to be begun immediately.

A Slump in Tractors

The tractor industry in the United States, as was recently predicted in this column, might be the case, appears to have been overdone. Many of the plants were built and equipped on expectations of business which has not materialized. Farmers are not buying tractors as rapidly as it was expected they would and consequently the tractor business has taken a slump. Much prospective buying of machine tools has therefore been postponed, perhaps indefinitely. For example, the General Motors Corporation had intended to buy a large list of equipment for its tractor works at Janesville, Wis., but under present conditions no such action will be taken and the plant will be used merely for assembling. The Allis-Chalmers Mfg. Co. had plans for a tractor plant at Milwaukee, Wis., and these plans are now held in abeyance until business develops. Farmers are buying automobiles but they are not taking hold of the tractor proposition as it was hoped they would.

The only buying of importance in this market in the past week has been done by the Dubied Machinery Co., New York, a Swiss concern, which closed for about 100 tools for its Swiss and English plants. The Standard Oil Co. of New Jersey is expected to buy this week for a repair shop at Bayway, N.J., and has issued a list of tools for shipment to Rumania, this being an addition to a similar list issued several weeks ago, on which no purchases have yet been made. The E. W. Bliss Co., Brooklyn, has come into the market for about thirty large tools and the American International Shipbuilding Corporation, Philadelphia, wants 400 small lathes, shapers, drills and grinders and 100 motors for repair shops on merchant ships. The Federal Shipbuilding Co., Kearney, N.J., is expected to buy a large amount of equipment soon for a dry dock and ship repair plant adjoining its shipbuilding plant.

U. S. JUSTICE DEPARTMENT NEVER SANCTIONED FIXING OF PRICES

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., May 8.—The whole of the iron and steel market may be described as being in a waiting attitude, as the market is much duller than would be expected, on an average, even in ordinarily dull times, but the question is what the trade is waiting for. As noted in last report, the trade does not always assign real reason for its waiting attitude, and the reference in some quarters to buyers waiting for a settlement of the so-called "price-muddle" at Washington is not entitled to much confidence. It is probable the buyers have forgotten all about the matter, except that some may feel that if the Railroad Administration would begin an active buying campaign it would stimulate them to take hold also. Inasmuch as the Railroad Administration would not buy much steel, no matter how satisfactory the prices quoted might be, this feature may be dismissed.

That the steel people, on the other hand, are waiting for further action at Washington, or a declaration by the Industrial Board that it is done with its effort, is very greatly to be doubted. In the past few weeks there has been much talk of an "open market" in steel products, as being at hand or near at hand. It might be thought, therefore, that the steel producers have simply been waiting for the Industrial Board to publish its obituary, in order to throw the steel market open to competition. Observation of the past ten days indicates that the attitude is quite the contrary. The steel producers evince no disposition to have an open market either now or at any other time in the future, unless there is a great change in fundamental conditions.

Railroad Buying

After receipt of cablegrams from the President, the Industrial Board made a very graceful switch, and while at first it insisted to the Railroad Administration that the atter had to buy steel at the prices the Industrial Board set, the board has since issued a statement in which it blandly disclaims any desire to dictate prices, explaining that it is constituted merely to be an "inermediary,"

as, for instance, between the steel producers and the Railroad Administration. That is what everybody understood from the original announcement, and one of the criticisms of the board, in these reports and elsewhere, was that it departed from that platform when it insisteed on the Railroad Administration buying at the prices named. The Industrial Board now goes still further, indeed, and while calling itself an intermediary, arranged a meeting between the steel committee and the Railroad Administration, at which the Industrial Board would not be present at all.

In these negotiations it seems reasonably certain the steel producers will refuse the Railroad Administration any further price concessions. It has very little to gain by offering concessions, and much to gain by refusing. Owing to the failure of the Department of Justice to approve the Industrial Board price fixing, which was really the most important respect in which the carrying out of the original program disappointed the steel producers, the producers are not well organized for price maintenance, except through their general and more or less tacit understanding. To make a decided stand against concessions to the Railroad Administration would tend to stiffen the backbone of all producers, whereas to make concessions might be suggestive that producers could make concessions to other consumers at later times.

As to railroad buying, the curious thing is that so few people realize that at best the Railroad Administration would buy very little. Rails have been mentioned as the chief item, but the statistics of rail production in 1918, recently made public, indicate that in that year the steam roads received about 1,400,000 gross tons of rails for replacement purposes, and all analysis shows that such a tonnage was a trifle above, rather than below, a year's normal requirements. Then it is now well known that this year was entered with about 1,200,000 tons on rail mill books, due the railroads at the much advertised average price of $36 a ton, the Industrial Board prices being $45 for Bessemer and $47 for open-hearth. Deliveries have been going forward right along and will be completed about next July. The supply should approximately take care of the most necessary replacement work of this year. Of course if the railroads had plenty of money they might replace rails on a more liberal scale, but that is not their position. In the four months after the signing of the armistice the railroads earned $114,000-000 while the Government guarantee for the period is $259,000,000. The deficit must be made up out of the public funds, and how much money will the roads have when they are returned to their owners and the guarantee ceases? As to the cars, there is probably a surplus to-day of 350,000 cars or more, and there are also surplus locomotives. No doubt in the long run the roads will be in need of making great improvements, but now is not the time when the Railroad Administration would be disposed to embark on such a program. Congress failed to pass the $750,000,000 appropriation for the "revolving fund" out of which deficits, below the Government earning guarantee, are made, and at the first of each month the Railroad Administration has to issue to the roads, to meet their most pressing obligations, "certificates of indebtedness" which the railroads use as collateral for loans.

Thus the outcome of the present negotiations between the steel committee and the Railroad Administration is likely to be just as follows: (1) The steel producers will refuse to make further price concessions; (2) The Railroad Administration will point out that it has no orders to place anyhow.

Pig Iron

Pig iron presents a refreshing contrast to steel, marketwise, even though it is very dull. There is more than the ordinary pre-war "open market" in pig iron. The normal open market means that there is at any date a recognized price, with an advancing or declining tendency. One producer advances his price and, usually within a few days, others follow, or there is a cut in prices, with corresponding following. Now the market is even more open than that, as there is actual bargaining whenever there is any tonnage of importance to be placed. One interest, buying Alabama iron, has been bargaining, making bids that are refused while the sellers make offers which are refused. In the local market no inquiry large enough to warrant bargaining has appeared.

Mill Operations

Steel mill operations are now averaging not more than 60 per cent. of capacity and the rate continues to decline. In some branches of the finished steel trade a slight increase has been observed in current bookings, but old orders are becoming exhausted more rapidly than new buying appears.

SCRAP IRON

THE market is dull at most points, with some grades in demand. At one centre the British Government has sold a large quantity of tractor steel.

Following are reports from various points:

Philadelphia.—There is but little demand for scrap in this district. Wrought pipe is selling at $17.25 to $17.50 delivered, and machine shop turnings at $11.25, with blast furnace turnings at $9.75 to $10.25. The scrap in Government hands amounting to 453,000 tons will be sold by sealed tender.

New York.—The weaker tone prevailing throughout the market is making yardmen less anxious to hold their stocks. The demand which was in evidence last week has subsided. The only change in prices is in wrought long stock, now quoted at $16 to $17, f.o.b. New York.

Pittsburgh.—There is a firm tone to the market there, even in the face of the lack of activity. The rumor that the Carnegie Company is in the market for heavy melting steel, and is willing to pay $16, has some effect on the market. The Pennsylvania Railroad is offering a heavy quantity of scrap, amounting to 4,000 tons.

Cleveland.—There is no indication of consumers showing any interest in the efforts or dealers to interest them. Heavy melting steel has gone back to $14.75. Turnings are quoted at $8 to $8.50.

Detroit.—The principal event in the past week has been the sale of 30,000 tons of tractor steel by the British Government to Joseph Joseph & Co., of New York. The price is understood to be under $20 a ton. The material was made in the U.S. and shipped to various automobile plants.

Chicago.—Most grades have dropped from 50 cents to $1, in the absence of trading. Dealers evidently expect prices to go still lower, as they are no longer buying stock to lay down. Railways are offering about 6,000 tons, including 650 tons short rails.

St. Louis.—There is no change in the market during the past week. What business is moving is entirely between dealers. Prices generally are headed for lower levels. Any offering of a considerable quantity would induce large declines.

Cincinnati.—The only business transacted lately has been some purchases of cast iron borings by a Pennsylvania buyer. Cast borings are quoted at a minimum of $8 per ton, to dealers' yards.

TENDERS

The Inspector of Penitentiaries, Ottawa, is calling for tenders for the purchase of a binder twine plant. Tenders must be sealed and endorsed "Tender for Binder Twine Plant," and will be received up till June 2nd. Machinery is at Kingston Penitentiary, where it may be viewed. Terms of sale, cash.

The Town of Ford City are calling for tenders for the construction of concrete pavements on Drouillard Road from Charles Street to the Essex Terminal Railway in the Town of Ford City. Plans and specifications may be seen at the office of Mr. Owen McKay, C.E., Walkerville. Tenders must be accompanied by a marked cheque, payable to the town treasurer for 2½ per cent. of the amount of the tender, and tenders addressed to J. F. Foster, town clerk.

The City of St. John, N.B., is calling for tenders for driving piles at the approaches to the Ferry Floats, east side according to plans to be seen in the office of the City Engineer. Cash or certified check to the amount of 5 per cent of the amount of the tender must accompany each tender, and tenders must be sent to H. E. Wardroper, Esq., Common Clerk on Forms, to be furnished by the city, and endorsed "Tender for driving piles at ferry approaches, St. John East Side."

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$18 50	$18 50
Electro copper	17 50	17 50
Castings, copper	17 00	17 00
Tin	54 00	55 00
Spelter	8 00	8 25
Lead	6 50	7 50
Antimony	8 00	8 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	17 00	14 00
Pipe wrought	8 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	12 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd. brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks..list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B. ⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

Tenders will be received for the construction of substructure "Bowmanville Brook Bridge" until noon, May 28th, for the construction of concrete abutments, concrete pedestals, floor construction, grading, and other work necessary in the building of a bridge on the Provincial highway over Bowmanville Brook in the Town of Bowmanville. Plans and specifications can be seen at the office of the Town Clerk, Bowmanville, and at the office of the Deputy Minister of Highways, Parliament Buildings, Toronto.

Sarnia. — A popular appointment is announced by the Northern Navigation Co., that of Captain A. W Wright to the command of the "Noronic." The captain, who has been in the employ of the company for thirty years, is one of the most capable mariners on the lakes. He has grown up with boats since he was a boy, and has filled every position from boy to master. In the great storm of November, 1913, when seventeen vessels and an enormous number of lives were lost, Captain Wright brought his then command, the "Saronic," through in safety, which was recognized as a notable achievement. Captain Wright was born in Collingwood in 1871, and has lived in Sarnia since 1907.

BOOK REVIEW

The Whitman & Barnes Manufacturing Company, Akron, Ohio, have issued Number 91, descriptive of twist drills, reamers, special drop forgings, and other manufactured products.

The Fellows Gear Shaper Company, Springfield, Vt., have issued a new publication on commercial gear cutting. This publication is of value from the standpoint of production, and clearly describes the Fellows gear shaper.

The Smart-Turner Machine Company, Hamilton, Canada, have issued Catalogue No. II, descriptive of steel bells manufactured by this firm. The publication deals with the manufacture of the bells and the various sizes and dimensions in which they are sold.

The Oliver Machinery Company, Grand Rapids, Michigan have issued a bulletin descriptive of their new universal motor drive for shapers. This bulletin is descriptive of a great improvement in shaper designs brought out by this firm.

The Link-Belt Company, Chicago, Ill., have issued a bulletin number 220, descriptive of the Peck Over-lapping Pivoted Pocket Carrier for the economical and efficient carrying of coal, coke, ashes, cement, sand, ore, stone, and other materials.

The Hart Roller Bearing Company, Orange, New Jersey, have issued a small pamphlet on the use of their ball bearing universal casters for the plate shop. This caster is a great improvement over the ordinary caster found in the plate shops of shipyards.

The Frank G. Payson Company, Chicago, Ill., have issued a publication on the Logan Air-Operated Labor-Saving Devices. The use of air for the operation of machine tools has rendered possible very material increase in the production of repetition work. The use of this particular device is fully explained in this recent publication.

The American Steam Conveyor Corporation, New York, have issued Modern Methods of Ash Disposal. This publication is an unusually complete and carefully compiled treatise on the disposal of ashes in the power plant. It takes up the various methods which are in common use, and specializes on steam jet conveyance.

The Simonds Manufacturing Company, Pittsburgh, Mass., have issued a publication on Simonds' products in the war. This is a very attractive and interesting publication dealing with the part the Simonds Company played in the winning of the war. The development of the American Steel Helmet was in large measure due to the activities of this firm and the manufacturing of armor plate for machine guns and other purposes. The steel used by this firm was found to be of extremely high quality.

Engberg's Electric and Mechanical Works, St. Joseph, Mich., have issued a catalogue descriptive of the Engberg direct current generating set, which is made in capacities of from one to fifty kw. This publication is an excellent example of commercial printing and furnishes an unusually complete description of the generating set manufactured by this firm.

The American Metal Market and Daily Iron and Steel Report, New York, have issued the 1919 edition of Metal Statistics. This publication is an unusually complete and carefully compiled statistical review of not only the iron and steel markets, but also of the non-ferrous trade. It will be of considerable interest to those interested in market conditions.

MONTREAL NOTES OF THE WEEK

Last week the newly-organized Canadian Government Merchant Marine Ltd. commenced active operations in connection with their ocean service. They have taken over Shed No. 24 on the harbor front and have opened offices there. This company will employ only those boats that have been constructed for the Canadian Government. The "Canadian Voyager" and the "Canadian Pioneer" will be the first vessels in the service. It is anticipated that before the middle of the summer about twenty boats will be operating under this new service. It is the intention of the company to develop new trade centres, and some of the first trips made will be to West India and South America ports. Tropical and semi-tropical food products will form the major part of the cargoes which these ships will bring back to Montreal.

The steel vessel "Labrador," built for the Gulf of St. Lawrence Shipping and Trading Company, was launched last week from the yards of the Davie Shipbuilding Company. Mr. Bernier, the Arctic explorer, is one of the directors of the operating company.

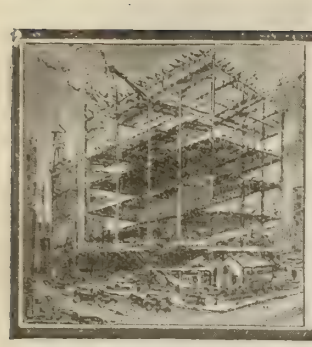
H. E. Whittenberger, formerly general superintendent of the Grand Trunk Railway at Montreal, has been made the Federal manager of the Grand Trunk Western lines, under the United States administration. Mr. Whittenberger, who has been in the services of the G. T. R. for the past twenty-five years, was transferred about five years ago to be general superintendent of the Ontario division.

The Metagama, the first trans-Atlantic passenger vessel to reach Montreal, came up the river last Friday night and docked here on Saturday morning. A large number of the passengers were soldiers and their dependents, but many other civilians were on the list. Although this vessel has not been to port for a couple of years there was little trouble in bringing her up the river. This was largely due to the efficient arrangement of the lights and buoys along the route. The pilot on the trip was Wilbrod Gauthier.

Lieut.-Col. W. J. Sadler, of Sadler and Haworth, belting manufacturers, will be the new chairman of the Montreal division of the Canadian Manufacturers' Association.

The Canadian National Railways are placing into service a new type of steel sleeper that has been especially developed for the use of returning soldiers; these will provide the maximum of comfort and will be a distinct improvement over the old type of tourist sleeping car. Several of these are already in commission, and in all, 50 will be delivered. The Canadian Car and Foundry Co. of Montreal are building 100 of these cars and the Pullman Co. are constructing the remaining fifty. The all-steel construction provides the maximum of safety, and special attention has been paid to the end of the cars to prevent telescoping in the event of an accident. The full complement is expected to be in operation before the middle of the summer. The cars will eventually become the standard tourist car for immigration service.

Improvements to the Port of Montreal, which have been necessarily postponed owing to the war, will shortly be proceeded with. These were part of a programme that was mapped out early in 1914, but were laid aside for more pressing war requirements. The extensions, alterations and additions which are to be made will comprise three main features —namely, better railway facilities, including the electrification of the harbor railway tracks, more ample wharf accommodation, new transit sheds and cold storage accommodation. About $150,000 will be spent on the construction of new sidings. The cost of the new three-storey cold-storage plant and public warehouse, to be built in connection with the harbor will be approximately one and a half million dollars. Additional pier accommodation will be made so that the largest vessels plying the St. Lawrence will be able to dock with the greatest ease.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

TRADE GOSSIP

I. M B .Plant Bought.—It is stated that the Trenton plant of the Imperial Munitions Board, which was being sold in small parcels, has been purchased outright by Messrs. Briggs & Turviss, representing Chicago interests. The deal is said to cover the whole of the 255 acres.

More Lumber Credits. — Further credits for the purchase of lumber in Canada for Great Britain will be urged by Sir Joseph Ball, head of the British lumber purchasing commission. A credit of $40,000,000 has already been extended and taken up, but there are, it is stated, still very heavy demands for Canadian lumber in Europe.

Electrify Montreal Harbor Rys.—The Harbor Commissioners are contemplating the complete electrification of the railway system of the harbor, and the erection of a $1,000,000 cold storage plant. Plans for lengthening of piers and construction of transit sheds are also included. Work on the harbor railway and cold storage plant will be started immediately.

To Settle Dispute.—The Nova Scotia Legislature is about to introduce a bill to force the Dominion Coal Co. and the Nova Scotia Steel and Coal Co. to settle their differences. This will be done by compelling the companies to submit to a re-arrangement of their leases, which will allocate all the areas north of Sydney Harbor to the Scotia, and all those south of Sydney Harbor to the Dominion Co.

The Booth-Hall Company, designers and builders of electric furnaces, announce the removal of their executive and sales offices to rooms 1007-8 Hearst Building, 326 West Madison Street, Chicago. This change was necessitated by new arrangements in connection with the manufacturing of their electric furnace equipment. Increased facilities for turning out standardized furnace equipment has been provided with a large manufacturing company located in Chicago.

Trade With India.—The outlook for exports to India, according to a prominent trade authority lately returned from Bombay, is particularly good just now. There is a good market for all kinds of dry goods, as well as milling machinery and mill supplies. There has been dissatisfaction with goods imported by Indian firms in the past, and there is a good chance for well-made merchandise from this country to get a footing. Negotiations should be made with the native firms direct, it is advised, by sending representatives to India.

Grant for Smelter.—A delegation waited on Premier Oliver of British Columbia with a request for a loan of $300,000 for the purpose of establishing a Rotherd electric smelting plant in the province. The deputation was headed by Mayor Vance, of North Vancouver, and Reeve Fletcher, of Point Grey. Samples of steel were shown to the Ministers, and they were informed that the high grade exhibits had been made from the ore in the space of four hours. The delegation were promised that a full investigation would be made into the project by the Minister of Mines.

Cannot Use Name.—The Canadian Government has refused permission to register the name of the "Returned Soldiers' Co-operative Lumber Co" The Government takes the ground that as this is a private company, not assisted by the Government in any way, it cannot allow the use of the name. The men interested in the project say that the name would be one of their big assets, but they will allow the question to be in abeyance until all the men have returned, when they will try and induce the Government to look more favorably on the matter.

St. Thomas Backs New Industry.—The Board of Trade of this city gathered to hear the proposition of the Provincial Machine Co. to establish a plant for the manufacture of talking machine parts, and talking machines. Mr. Anderson, representing the company, showed that there was a great demand for these parts, which could not be supplied even from the States at present. By manufacturing in Canada they would have a 40 per cent. advantage over firms in the States. A resolution was passed endorsing the project, and embodying the opinion of the board that it would be a safe investment for their citizens.

The Water Tariff Bill.—The bill introduced by Joseph E. Armstrong, M.P. for East Lambton, for the control of rates on water-borne freight by the Canadian Railway Commission, will be strenuously opposed by shipping men. They contend that this bill has been a consuming passion with Mr. Armstrong for years, and if it is passed will operate to put the small owner, who sails his own vessel, completely out of business. The small owner serves a certain class of shippers, who are willing to take a certain amount of risk for a low freight rate, and the small owner has a legitimate place in the country's business.

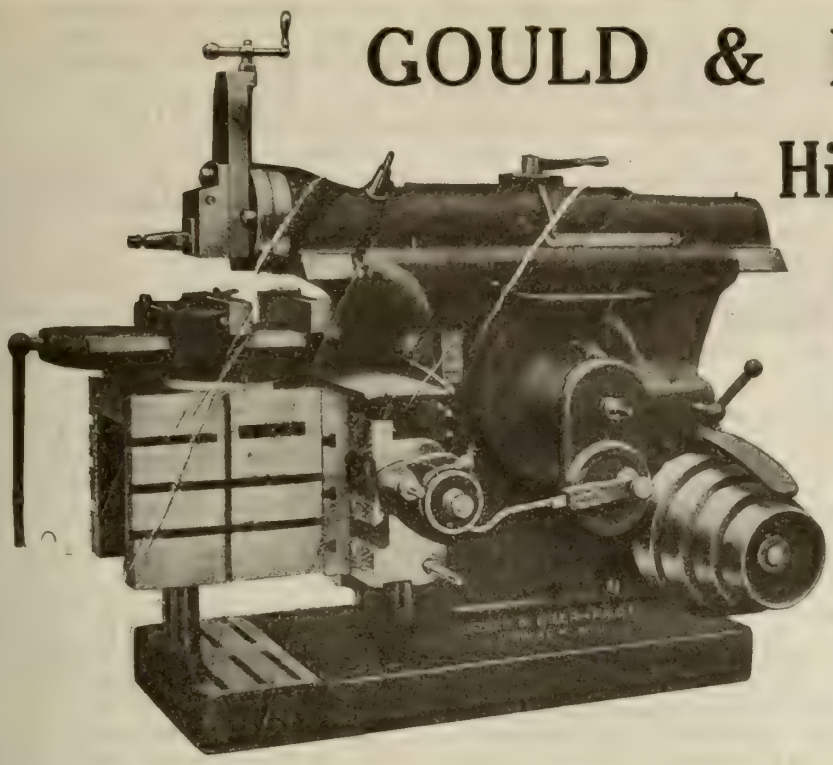
Build at Walkerville. — General Motors, Ltd., who contemplate spending several million dollars in a Walkerville plant, under date of April 28, write CANADIAN MACHINERY to say: 'The initial Walkerville plans call for 200 x 600 single storey saw tooth manufacturing plant. This will be used for manufacturing motors and axles. Other plants to follow this one will possibly include passenger car and truck units. The Canadian plant will not only be Canadian in name, but in fact, and it is the desire of "General Motors" to co-operate to the fullest extent with Canadian labor and Canadian material."

Orillia Adopts Nine-Hour Day.—The manufacturers of Orillia have now adopted the nine-hour day as a standard, and the change will not be accompanied by any reduction in wages. The hours adopted are 7 a.m. to 12 a.m. and 1 p.m. to 5 p.m. The change is the outcome of a suggestion made by the Council of the Board of Trade, that in order to forestall any unrest such as has been evidenced in other communities, the manufacturers should make as generous conditions as possible for their employees, and the employers took the suggestion in good spirit and acted on it. Their action was all the more to be commended, as business is none too brisk just now in the various industries.

Business Growing.—It is expected that before the end of May an adjustment of the shell contracts which the McAvity Co., of St. John, N.B., were engaged in at their Marsh Road plant will be reached, so that the firm will be free to develop the plans which they have in view for these immense works. In the meantime the new steel foundry in the rear of the munition factory is being completed and made ready for work. The firm is also carrying on the general foundry manufacturing business in their Broad Street and Water Street plants, turning out brass material of various kinds, and material for ships, railway and mining purposes. It is intended that before long all the city plants of this enterprising firm will be assembled in their Marsh Road buildings.

To Buy Canadian Goods. — Conditions in China were explained to a number of business men, members of the Canadian Manufacturers' Association by J. W. Ross, Canadian Trade Commissioner to

GOULD & EBERHARDT



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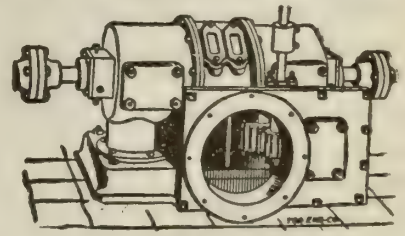

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Banks Indicate Business Growth

"NEW YORK agencies of Canadian banks have, within the past few weeks, received quite a number of inquiries from American manufacturers looking toward the establishment of branches in Canada in the event of the Canadian tariff wall standing and Imperial preference becoming a fact.

"And not only would factories be established, but a great volume of trade, which, under present conditions, flows from the United States to different parts of the British Empire, would be diverted so as to pass through Canada."

Above is a sentence from the regular weekly letter of THE FINANCIAL POST'S resident New York correspondent. For further important information along this line see

The Financial Post

of May 3rd with special section featuring Banking and showing how efficiently business and national needs have been served during the war, while at the same time the interests of depositors and shareholders have been fully safeguarded. Contents of this special issue include:

Europe's Needs Are Cutting Into Wheat Supply.

British Paper Trade Anxious to Deal With Us.

Bolshevism Encouraged by Ottawa's Laxity.

Market Demand for Structural Steel Reviving.

Merger Rumor Accompanies Rise of Maple Leaf.

Heavy Losses for Shareholders of "Safe-on-Sea."

Bright Outlook Predicted for the Dome Mines.

Meeting Criticism of Branch Bank System.

Profits Necessary to Health of Industry (Editorial).

Sky-scraper as Security for $450,000 Bonds.

Winnipeg Water District's Cost Near $15.000,000.

Aviation Risks Being Insured by English Companies.

Effect of Wage Rate on Building.

SPEICAL SECTION.

How Canada's Banking System Served the Nation During the War.

The Banks Have Guarded Great Public Deposits.

General Prosperity Reflected in Bank Profits.

Canadian and American Banking Interests More Closely Drawn Together.

England Making Effort to Return to Gold Standard.

Relations of the Banks and Stock Exchange.

Sir Thos. White Defends Policy of Government Re Bank Mortgages.

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C.M.

China, at the office of the association. He pointed out that the Chinese were a great nation of traders, and had developed their grain growing and stock raising very extensively. There was a big market for foreign goods, and he mentioned the fact that several thousand commercial travelers from the United States were booked for China this year. Shanghai is the principal port and 40 per cent. of the entire trade passes through there. A number of Canadian firms have been conferring with Mr. Ross on the advisability of placing their goods on the Chinese market.

Canadian Exhibits.—Canadian manufacturers were very well represented at the International Exhibition which was held in Lyons, France, March 1 to 15. Mr. W. E. Clarke, representing the Pedlar People, Oshawa, who has just returned, states that Canadian exhibits ranging from textiles to concrete machinery were displayed to particular advantage, having been confined to one locality and not distributed promiscuously, as was the case with some displays. Canadian military bands assisted in making the exhibit from this country a centre of attraction, and the general opinion of manufacturers represented was that their presence was well worth while, from the viewpoint of prospective business. Enquiries were encouraging, and when affairs work back to their normal trend results may be looked for. Following the fair, Canadian representatives enjoyed the privilege of a trip through a part of the devastated area. The general feeling in France seems to be one of optimism in a degree remarkabl for a people who have suffered so severely and now must work out the problems of reconstruction before they can enjoy to the full the benefits of international business.

May Open Up Trade.—A large industrial exhibition in which Canadian manufacturers are being invited to cooperate is being arranged in Athens, the Greek Capital, in September and October, by the "Federation of British Industries," a metropolitan combine designed to regain trade lost during the war. A communication to the International Trade Industries points out the timeliness of the exhibition and the favorable opportunities it will offer to bring before Greek, Balkan and Levant merchants Canadian products and manufactures. It is believed that participation at the commencement of trade relations between the two countries will lead to permanent trade. The friendliness of the Greek Government is assured, and the communication hints that there would be good justification for making the Canadian exhibit one of the most prominent. The Greeks are the chief merchants and traders throughout the eastern Mediterranean coast, Asia Minor and Balkans, and it is figured that there is in Greece at present an accumulation of cash to the extent of $300,000,000 above normal, secured in war orders, and that merchants are impatient to receive machinery and raw materials to carry on national industries and international trade.

MARINE

Buffalo, N.Y.—The grounding of the steamer Sonoma, loaded with grain and having a draught of 19 feet 6 inches, was caused by the moving of the buoys marking the channel.

Port Colborne.—The "Canadian Warrior," built for the Imperial Munition Board, made her initial trip through the Welland Canal on her way to Montreal, where she will load for Europe.

Collingwood.—The Collingwood Shipbuilding Co. successfully launched the steamer "Canadian Recruit." She was built to the order of the Canadian Government for their new fleet of carriers.

Midland.—The big fleet of American freighters that have been wintering in Midland have all sailed. They numbered sixty, and the place looks deserted, now that they have gone. The fleet was the largest in number that has ever wintered in the Georgian Bay.

Quebec.—The second launch to take place in two days was staged at the yards of the Davey Shipbuilding Company at Lauzon recently. This was one of the trawlers built there for the Department of Naval Service.

Vancouver.—The War Column was launched from the yards of the Coughlan Ship Yards, being the ninth of the 8,800-ton steel vessels built by these builders. The keel of an 8,100-ton Dominion Government steamer was laid on the vacated ways a few hours after.

Victoria. — The contract for the breechings and smokestacks for ten of the wooden steamships building by the Foundation Co. for the French Government have been awarded to the National Steel Construction Co., of Duwanish Waterway, Seattle. The work is under way.

Quebec. — News has been received from Cap St. Michel that the "War Toronto," built by the Toronto Shipbuilding Co. last fall, had gone aground while on her voyage to Quebec. The "War Toronto" was on her way to Quebec to load lumber for England. She was one of the wooden steamers built for the Imperial Munitions Board.

London.—While en route from Windsor to Ottawa the Hon. F. B. Carvell stopped off here to hear the claims of London, St Thomas, Middlesex, and Elgin for harbor improvements. He went down to Port Stanley on a special train of the L. & P. S. R., accompanied by a delegation led by Sir Adam Beck, chairman of the London Railway Commission.

Victoria.—The contract for rigging the twenty wooden steamers being built by the Foundation Company has been awarded to Haviside, Withers & Davis, ship riggers, of San Francisco, and Frank W. Haviside will be in charge of the work. The labor employed will all be local, through the Foundation Company's organization.

45,000 SHOWERS

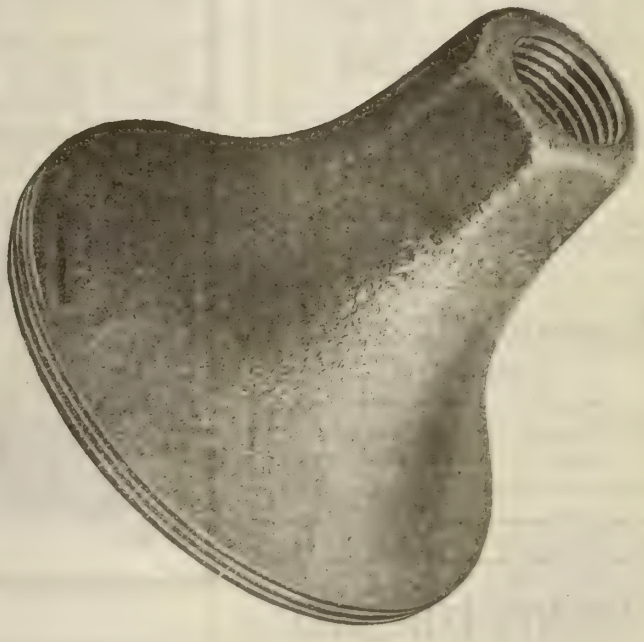
A Manufacturer Gives the Details of Filling a U. S. Government Order for 45,000 Shower Heads, Using Geometric Die Head and Collapsing Taps.

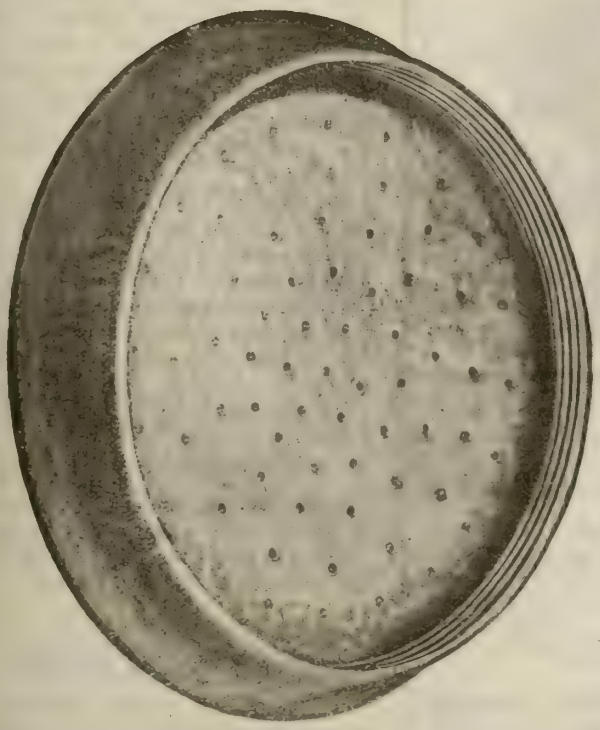
"On the main thread of the shank 3⅜"-16, we average 230 per hour, with a surface speed of about 400 feet per minute. On the pig iron end we averaged 220 per hour, with a surface speed of about 200 feet per minute. This speed may seem a little low, but we cut this down in order to get a quicker handling of the work. We handled these in air chuck, and in releasing air chuck the work automatically dropped to a box below.

"On the face, tapped 3⅜"-16, we averaged 210 per hour, with a surface speed of about 400 feet per minute.

"We were very much pleased with the Geometric tools on this work, especially with the chasers, as we completed 30,000 showers, male thread, with one set of these chasers."

Try a Geometric Thread-Cutting Die Head or Collapsing Tap on your work, and be equally pleased.





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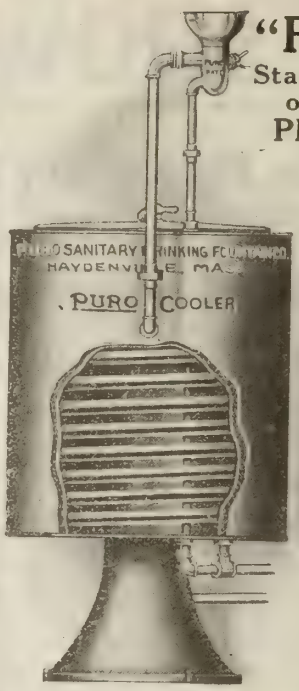

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Welland. — The "Cherokee" of the Canada Steamship Lines, Montreal, coming down loaded with coal, collided with the M.C.R. bridge, and had about 12 feet of her bows stove in. A long train was on the bridge, preventing it from being swung, and the current was too strong to stop the "Cherokee" quickly enough. The "Cherokee" will be towed to Port Colborne stern first, and navigation re-opened immediately.

Victoria. — The Foundation Company have launched the fourth of their wooden steamers for the French Government, the "Winnipeg" being the latest to take the water. She is a 3,000 ton, full powered, wooden steamship, and is the fourth vessel to be launched in the past two months. The "Strasbourg," "Metz" and "Mulhouse" are the names of the other three. The Foundation Company's band lent gaiety to the occasion.

Victoria, B.C.—The first ship to be launched from the Cholberg Yards was the schooner "Gunn," built to the order of Porsgrund, Damp & Seil Co., of Porsgrund, Norway, a vessel of 1,500 tons. She has been already chartered through the Universal Shipping & Trading Co. to load 1,200,000 feet of lumber for Europe, and will be ready for loading very shortly. The masts will be stepped under the shear legs of the Victoria Machinery Depot.

Montreal.—The Canadian Government Merchant Marine will be inaugurated here very shortly. The Government has taken over shed 24 on the harbor front, and H. Milbourne, marine superintendent of the Government line, has opened an office there. The "Canadian Ranger" and the "Canadian Pioneer" will be the first vessels on the service. They are 8,100 ton vessels. It is hoped by the middle of the season to have 20 vessels in service. The first cargoes will be Canadian produce for West Indian ports. The return cargo of the first vessel will be sugar from Havana.

Midland. — The "War Magic," the second boat to be constructed by the Midland Shipbuilding Co., was successfully launched, under conditions closely resembling those of the 24th October last, when the "War Fiend" was dropped into the bay. A cold wind was blowing and rain falling on both occasions. The "War Magic" is of the usual canal sized freighter type, and was built for the Imperial Munitions Board. She is for transatlantic service, her sister ship, the "War Fiend," has already made one trip to Sicily with a cargo of grain. The "War Magic's" machinery was built by the John Inglis Co., of Toronto.

CONTRACTS

Toronto.—The Board of Control gave the contract for the steel work for rebuilding the damaged section of the Exhibition grand stand to McGregor and McIntyre, of Toronto.

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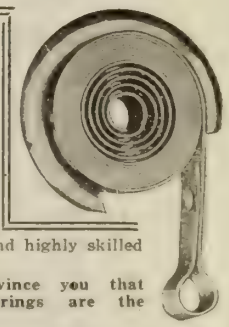

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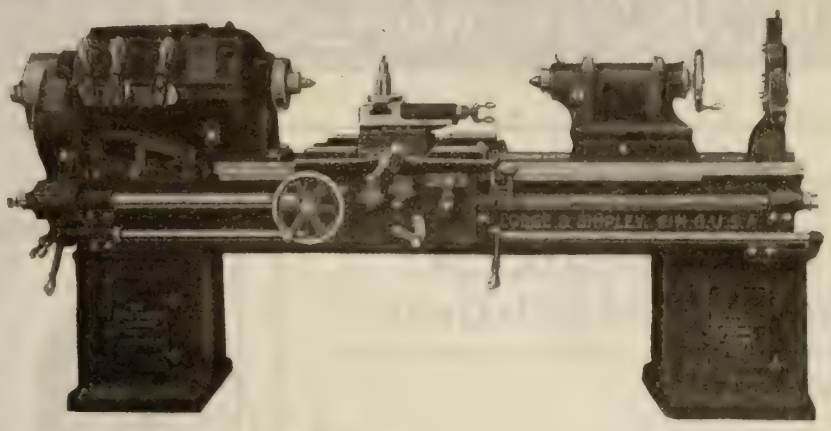

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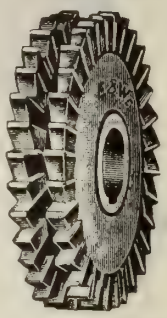

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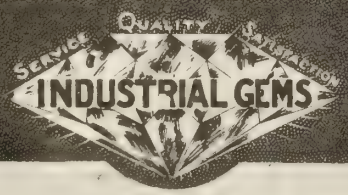

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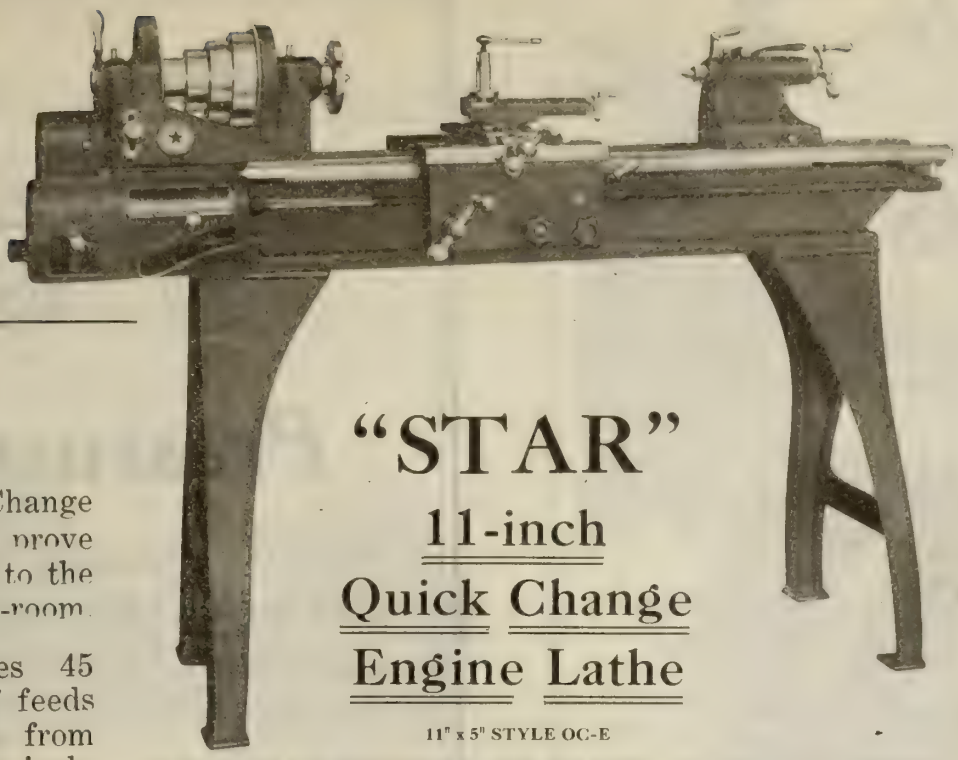

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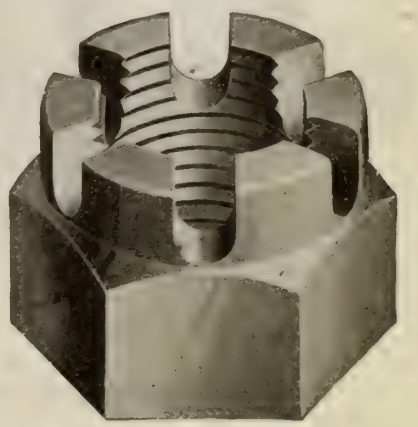

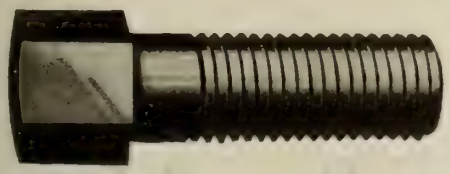

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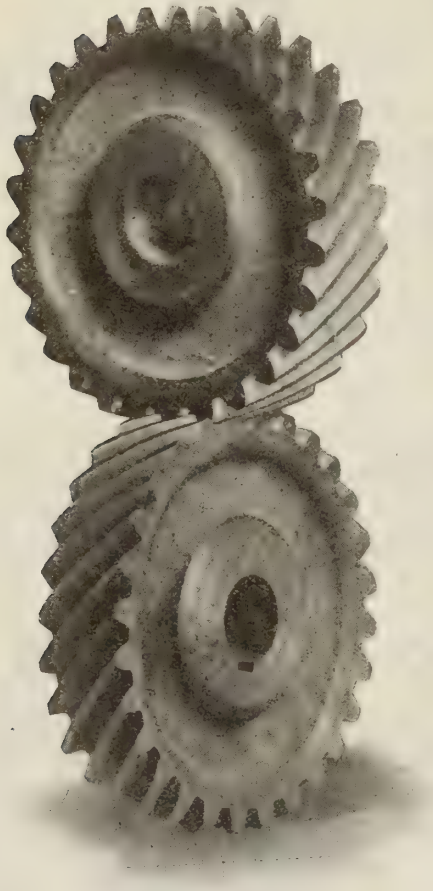

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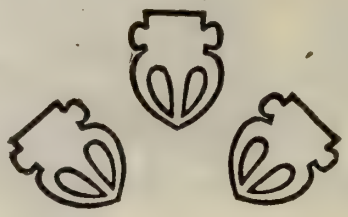

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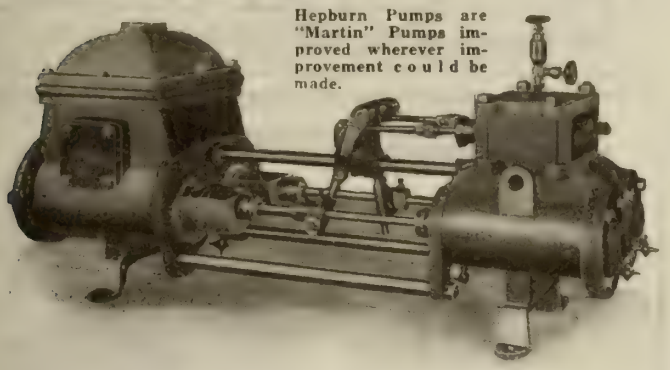

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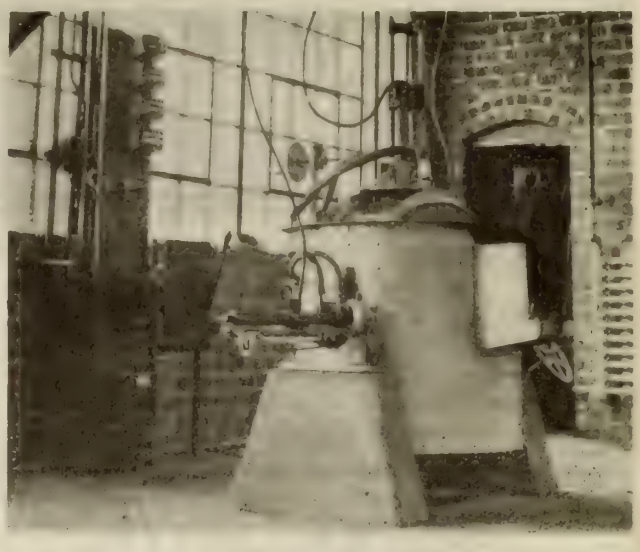

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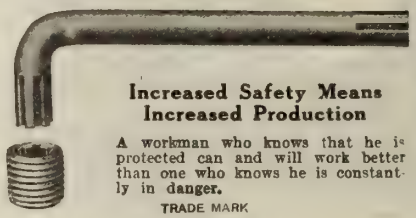

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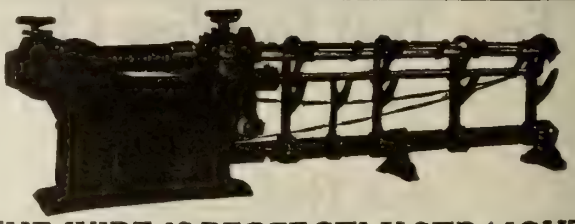

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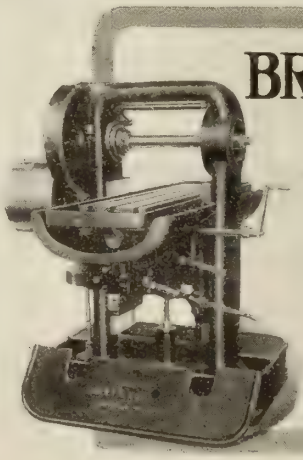

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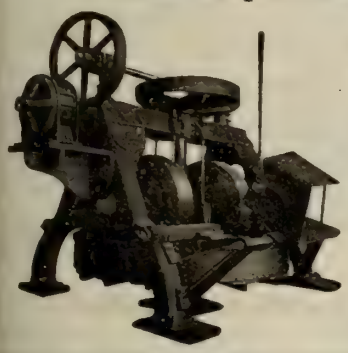

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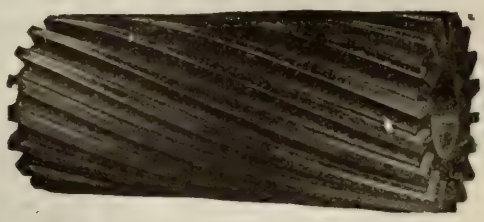

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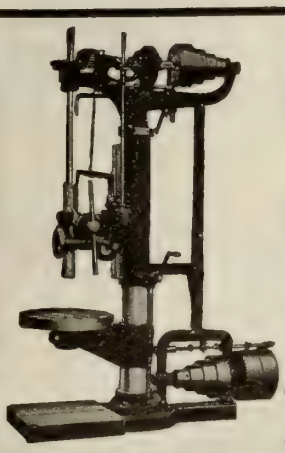

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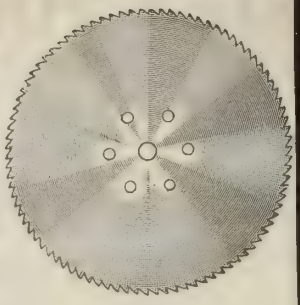

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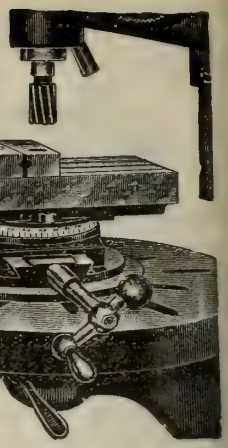

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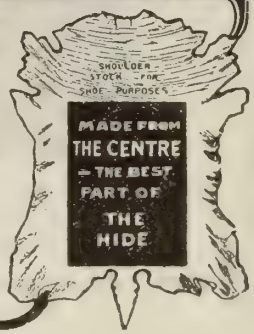

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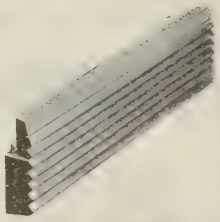

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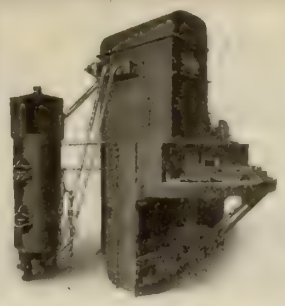

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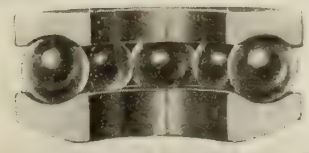

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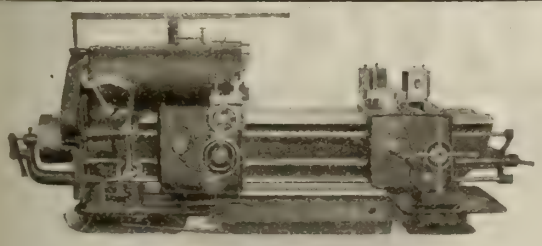

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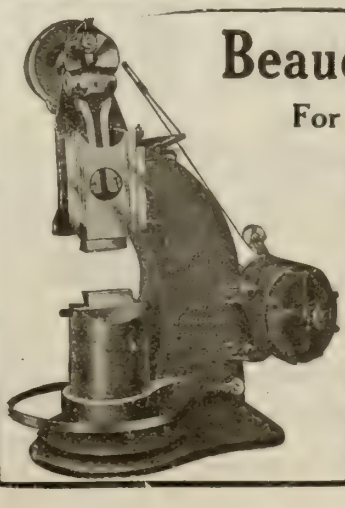

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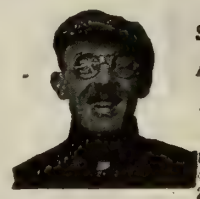

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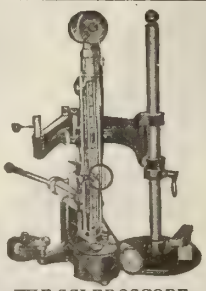

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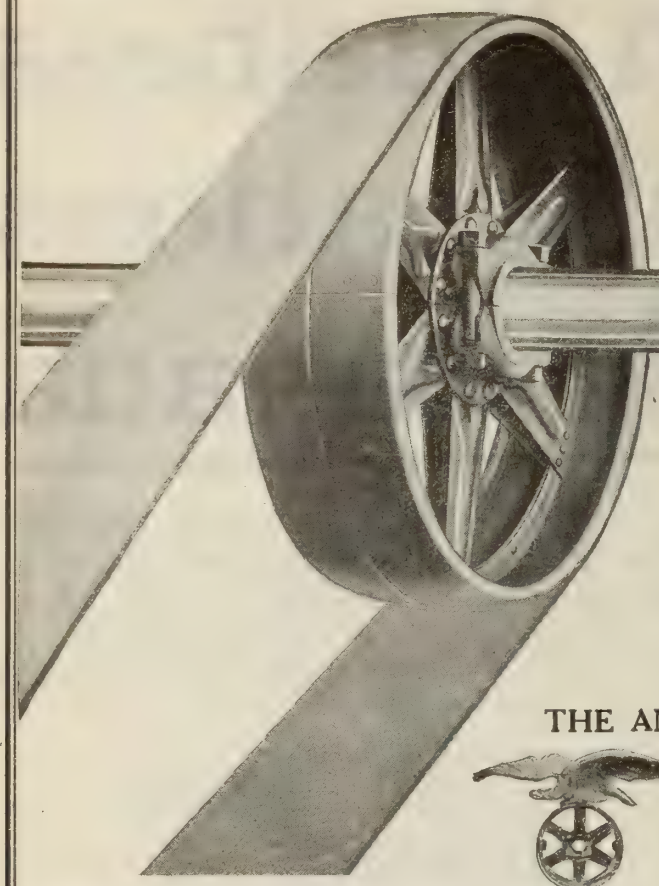

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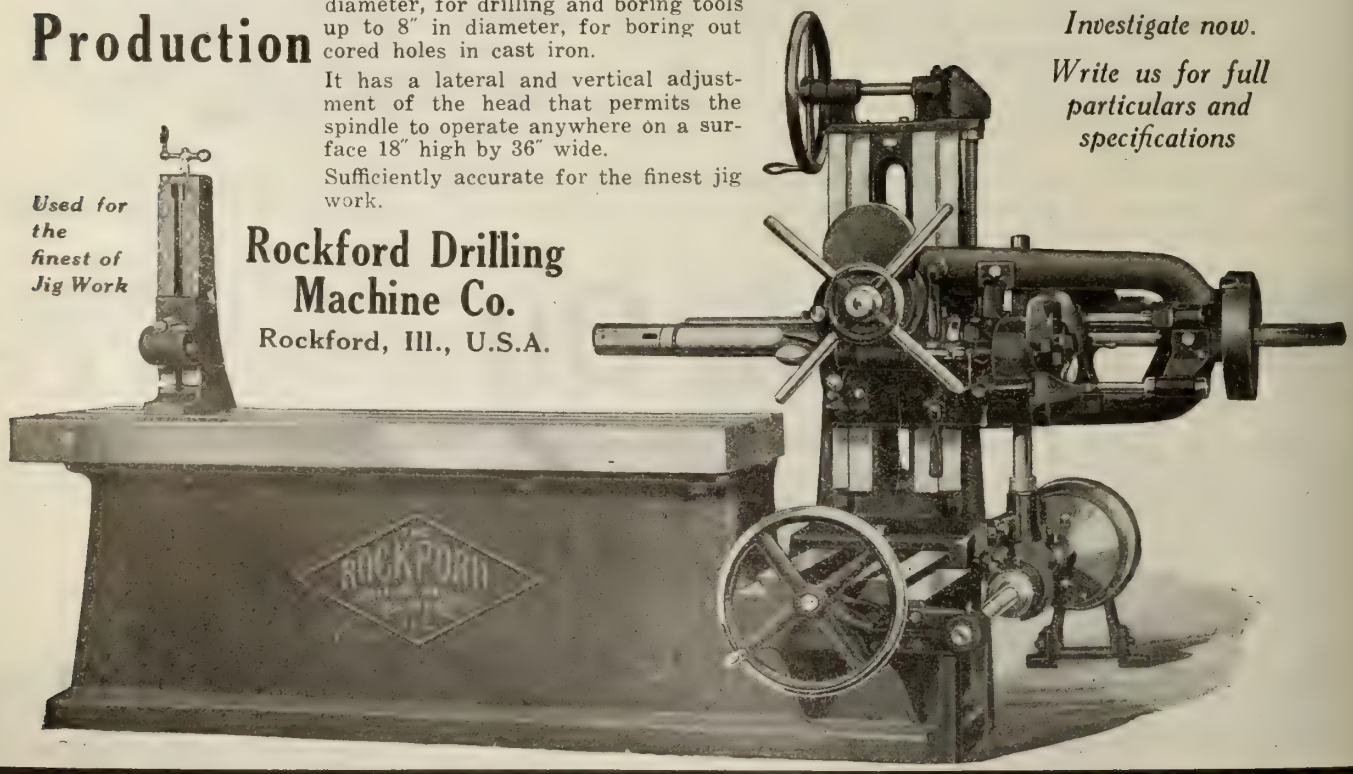

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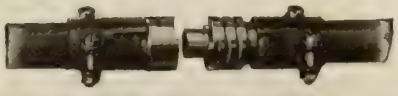

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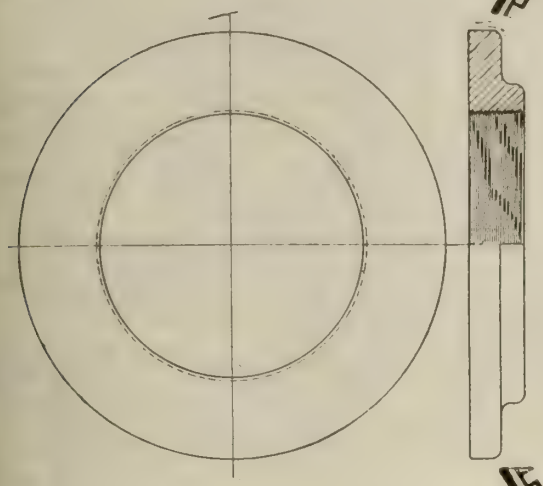

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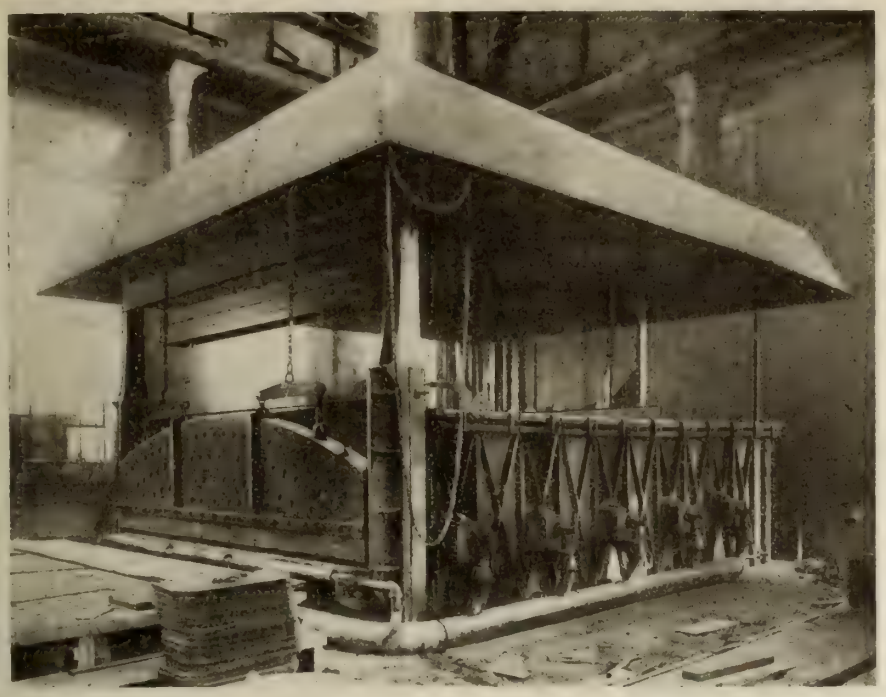

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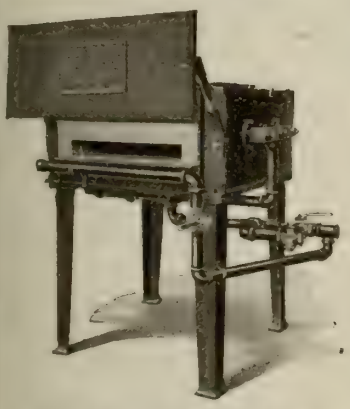

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Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
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FRICTION SURFACE BELTING
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Gilbert & Barker Mfg. Co., Springfield, Mass.

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Wells Bros. of Can., Galt, Ont.

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Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

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GASOLINE TANKS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind

GAUGES
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GAUGES, CALIPERS
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GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
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Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
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Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

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Williams & Wilson, Ltd., Montreal, Que.

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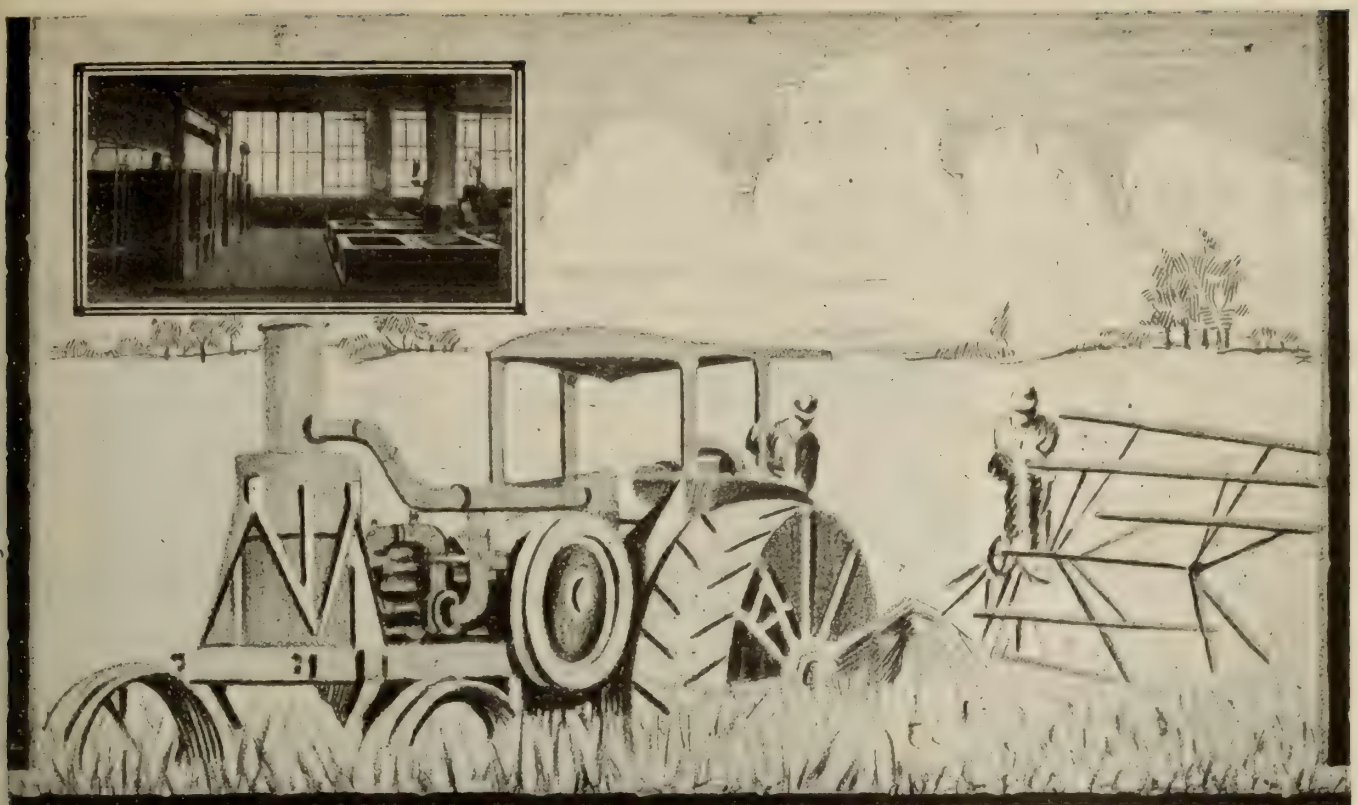

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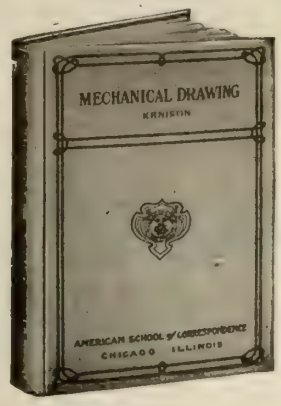

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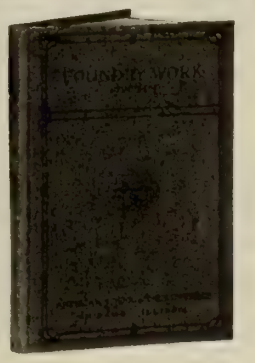

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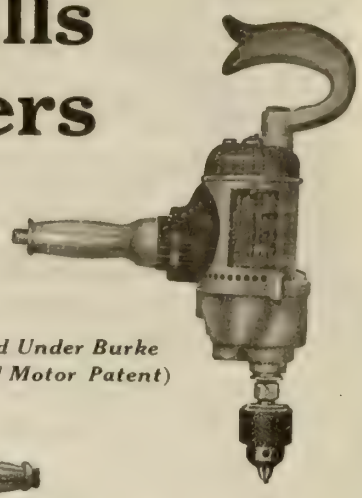

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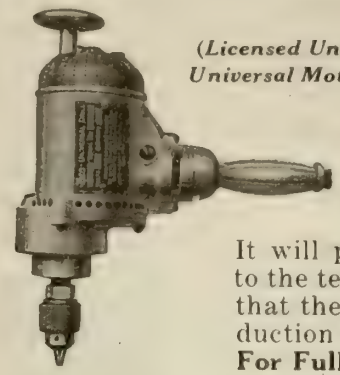

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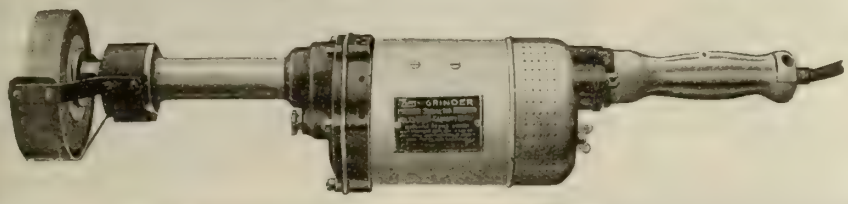

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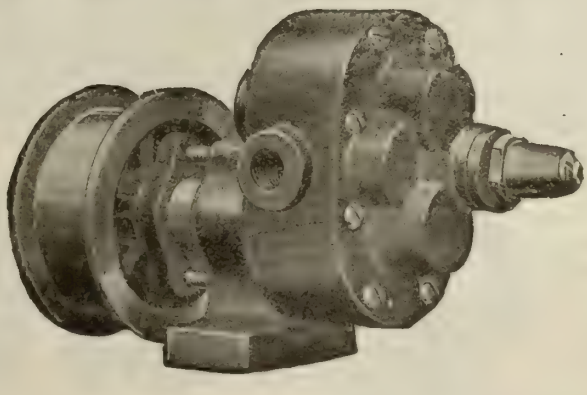

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Oliver Machinery Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
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PATTERN MAWERS' VISES
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Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
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Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
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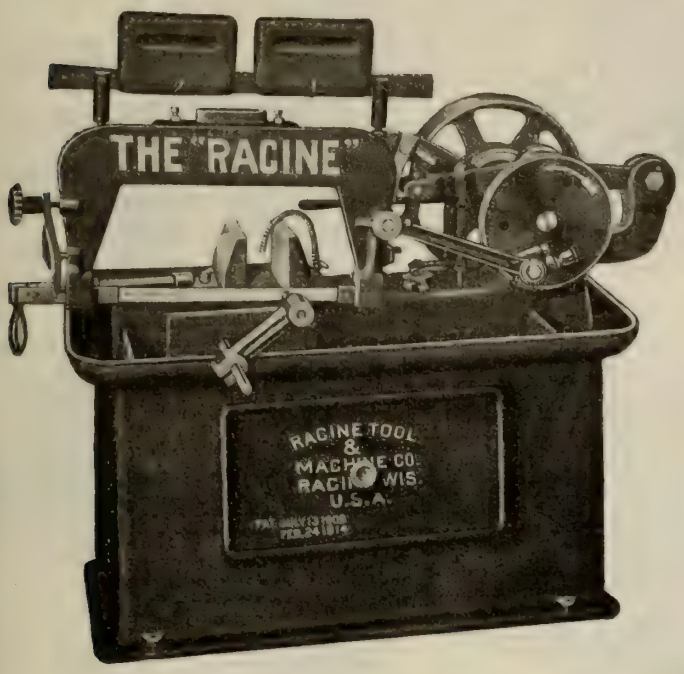

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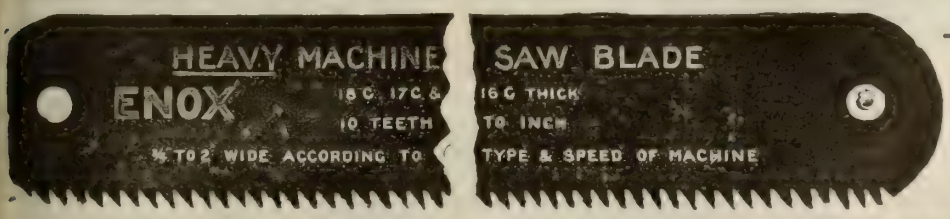

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Greenfield Tap & Die Corp., Greenfield, Mass.
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Here's Pinion Shaft Grinding On a Norton

This photograph was made in one of the well-known automobile factories, and shows just how Pinion Shafts for a well-known truck are being produced. In the rough these shafts have a diameter of about 1¼ in.; from .018 in. to .020 in. of stock is removed, the operator being allowed a tolerance of .0015 in. and the output is approximately 200 daily. The machine shown here has been in constant use over 8 years, has required hardly any repairs, and has always given splendid satisfaction.

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WILSON FEARED THE BRITISH

THE American President crossed the Atlantic in the first place with the idea in his mind that his ideals would be thoroughly in accord with those of the French statesmen; but he was rather afraid of a conflict with the British delegates. He found in reality that his plan for peace terms was as far removed from the French plan as the two poles. Then he crossed to London and was surprised to find that the ideas of the two Anglo-Saxon powers were identical.

This situation, according to J. W. Dafoe in the May issue of MACLEAN'S MAGAZINE, explains much that has developed at Versailles. Further, it contains the promise of a close *rapprochement* between the two great English-speaking democracies for all time to come.

Mr. Dafoe has contributed a remarkably interesting article to this number of MACLEAN'S, lifting the curtain on many of the puzzling situations that have arisen overseas. As the editor of the Manitoba *Free Press*, he is the dean of Canadian newspapermen; as the representative of the department of Public Information on the Canadian Mission to the Peace Conference, he was in a special position to learn what was transpiring. He tells of the really big part that Canada has played in the Proceedings and points out that Canada's status as a nation was firmly established in the eyes of the world when she was allowed separate representation.

A Dozen Other Features---Nationally Important

This May issue is full of articles of unusual significance for Canadian readers.

"SOLVING THE PROBLEM OF THE ARCTIC"
—By Vilhjalmur Stefansson

The second instalment of his remarkable story of the four years of exploration that he undertook for the Canadian Government in the region of the "Pole of Inaccessibility"—a harder place to reach than the North Pole.

"ORGANIZING FOR PEACE"
—By George Pearson

An article of the Great War Veterans' Association by a well-known author-soldier.

"THE CANADIANS IN SIBERIA"
—By Capt. W. E. Dunham

A graphic story of what our forces did in combatting the Bolsheviki, by an officer who has just returned.

"SAFE IN THE SADDLE"
—By J. K. Munro

A review of affairs at Ottawa in which the opinion is expressed that Union Government for the time being is safely entrenched.

The National Idea

The articles in this issue of MACLEAN'S reflect the national idea—Canada's part in the Peace Conference, the political situation at Ottawa, the exclusive report of Stefansson's national explorations, the national organization of our returned men, the work of our forces in Siberia. The reader of MACLEAN'S gets a broad idea of what Canada as a whole is doing. The value of this issue— and of all issues —is very great, therefore, from an educational standpoint.
MACLEAN'S is the one magazine that should be selected for young Canadians to read.

Four capital stories by famous authors—W. A. Fraser, Lloyd Osborne, Frederic S. Isham and C. W. Stephens.

The Review of Reviews

An unusually fine array of articles is given in this department, selected from the best in magazines and periodicals the world over. Some of the titles are:

Planned to Destroy British Fleet.
How Mackensen Was Caught.
Events of War Foretold by Stars.
What is Life Like Beyond the Grave?
A High-born Bolshevik.
The New Life in Dry America.
Germans Were Ready to Capitulate.
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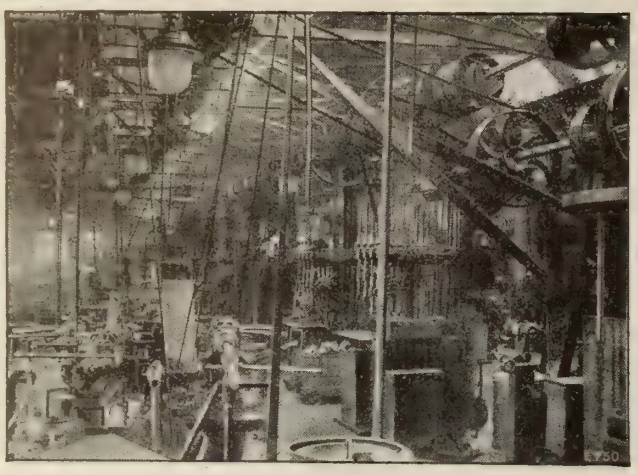

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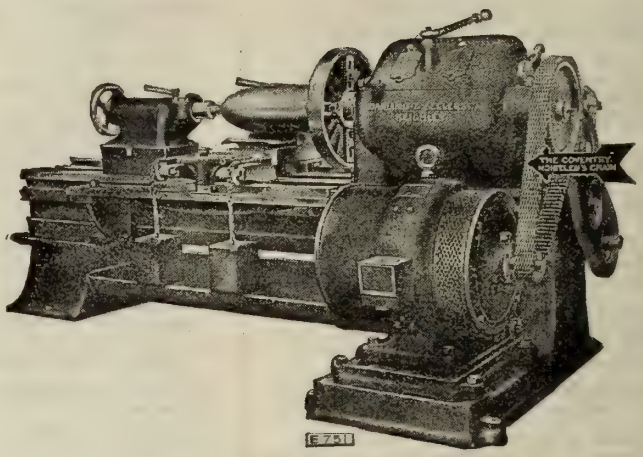

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AND MANUFACTURING NEWS

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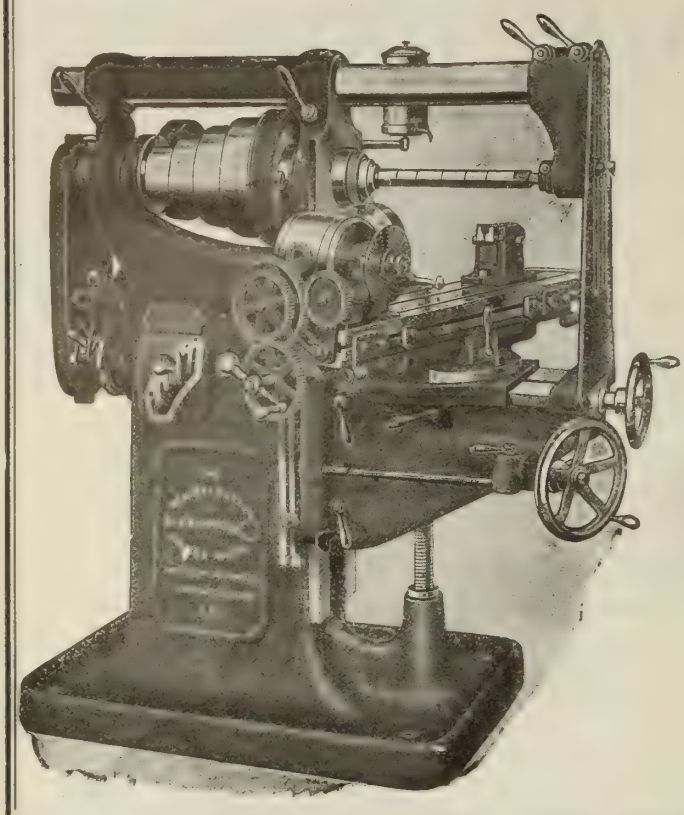

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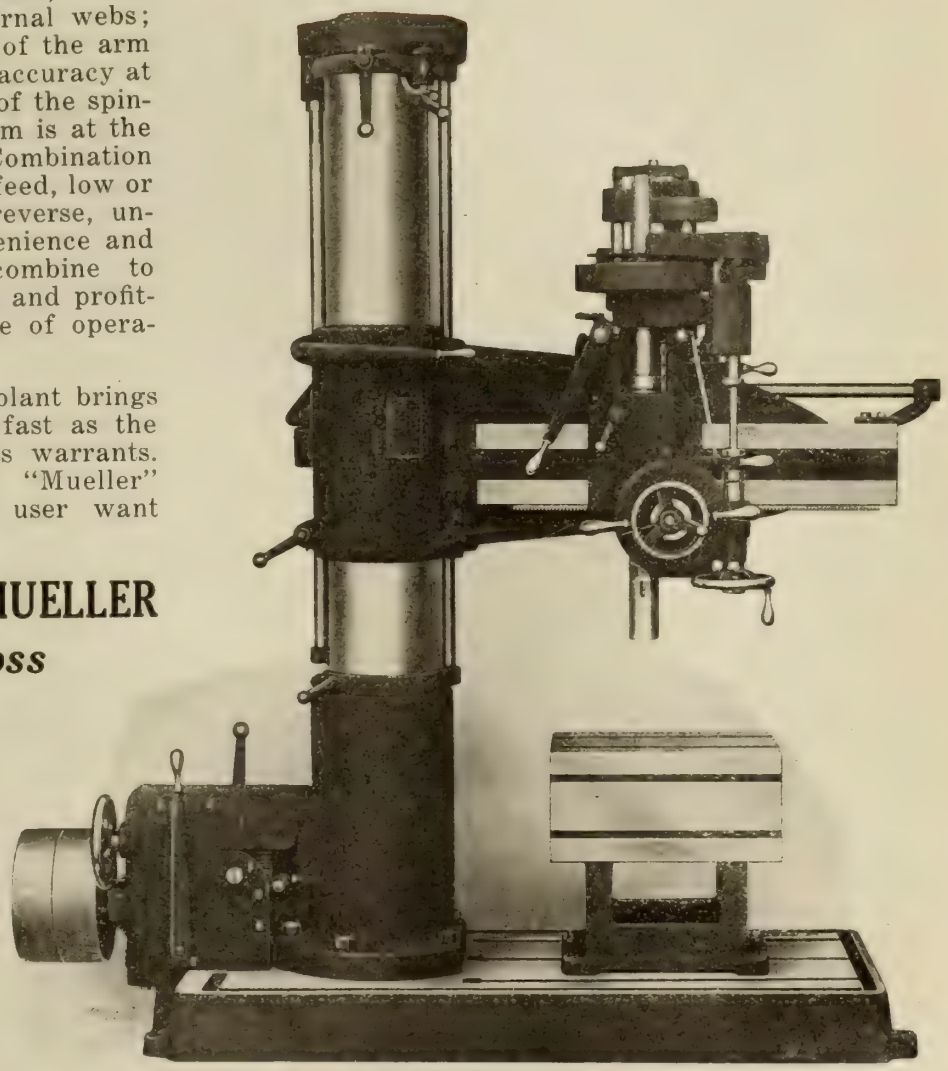

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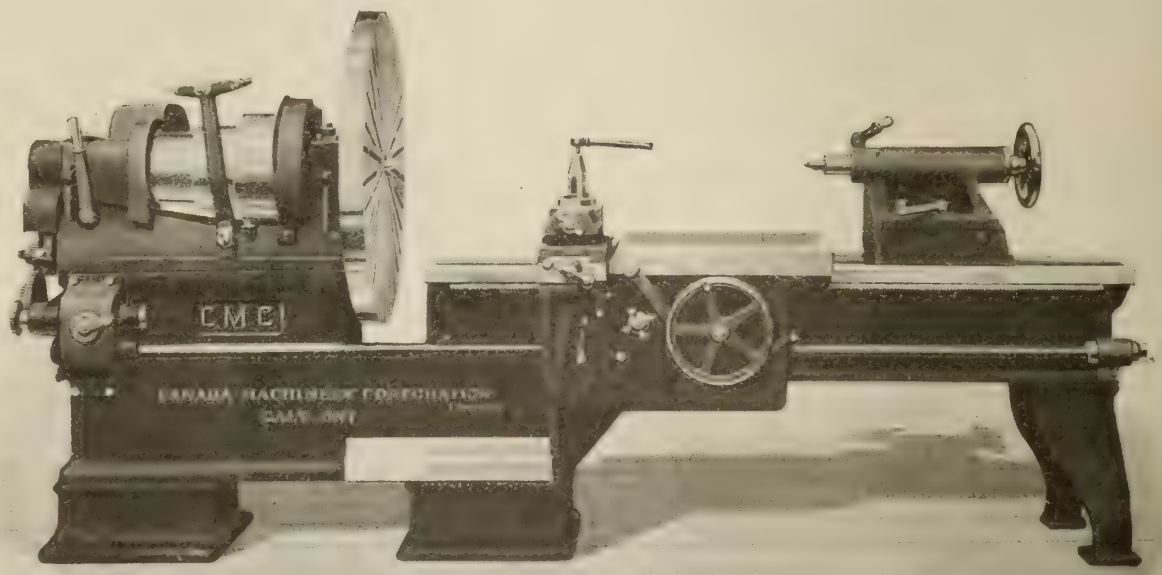

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 20. Publication Office: Toronto, May 15, 1919 Subscription Price $3.00 per Year

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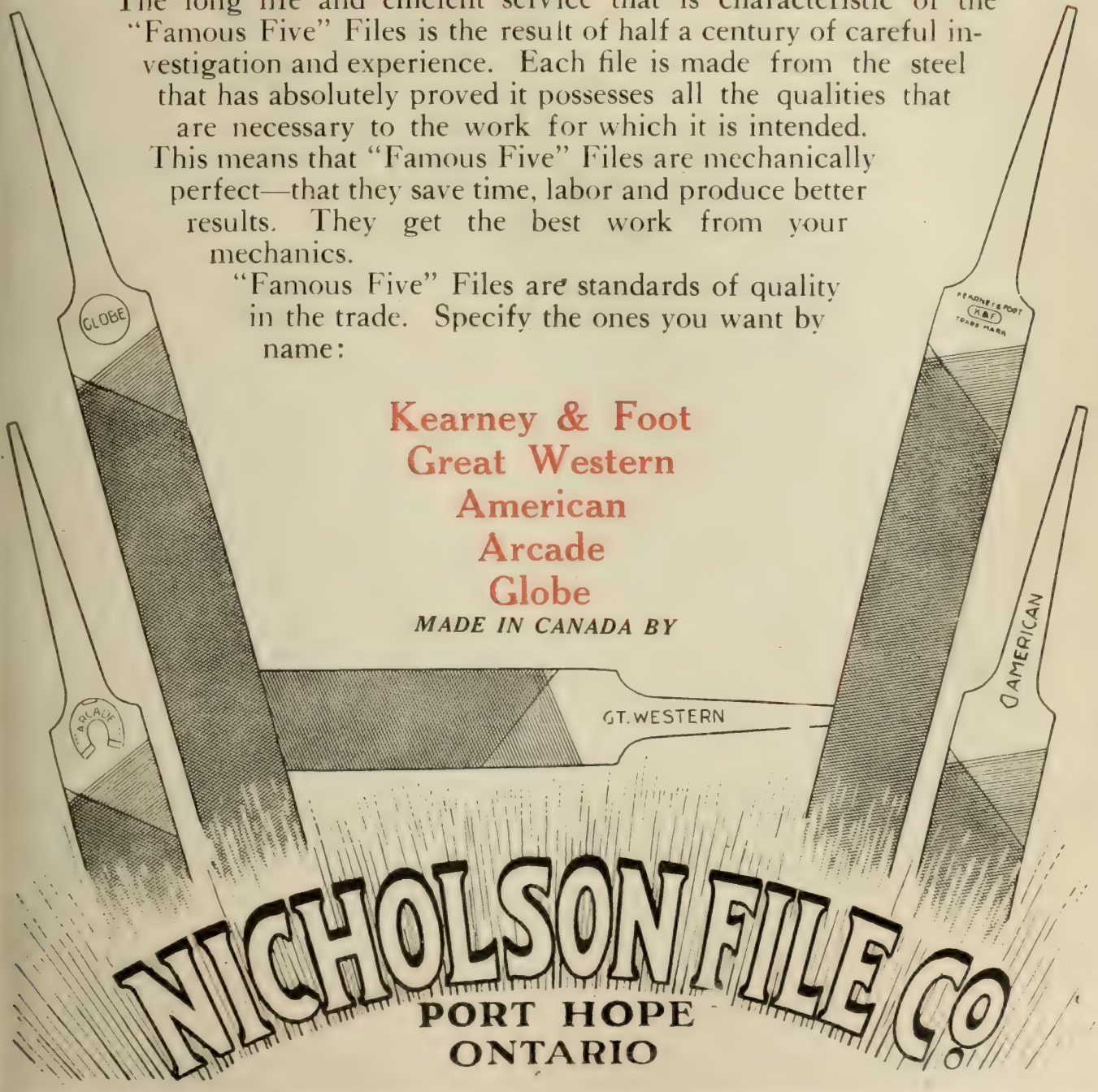

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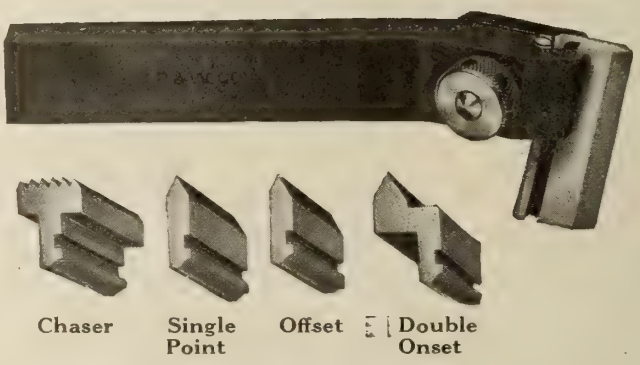

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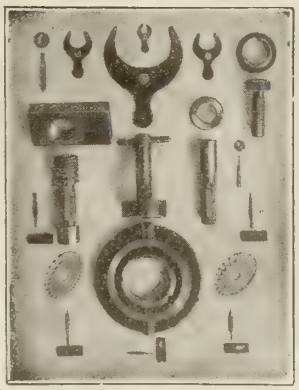

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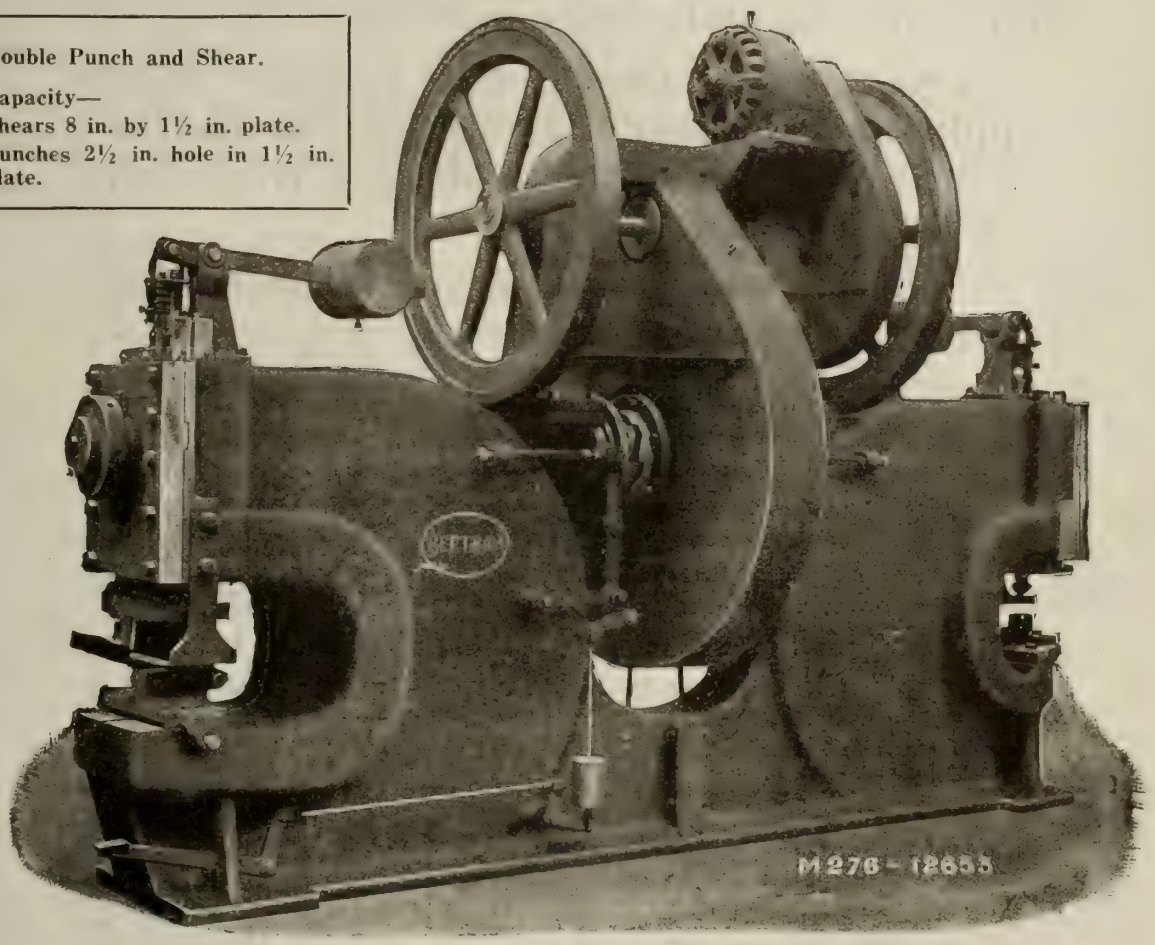

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The Publisher's Page

TORONTO MAY 15, 1919

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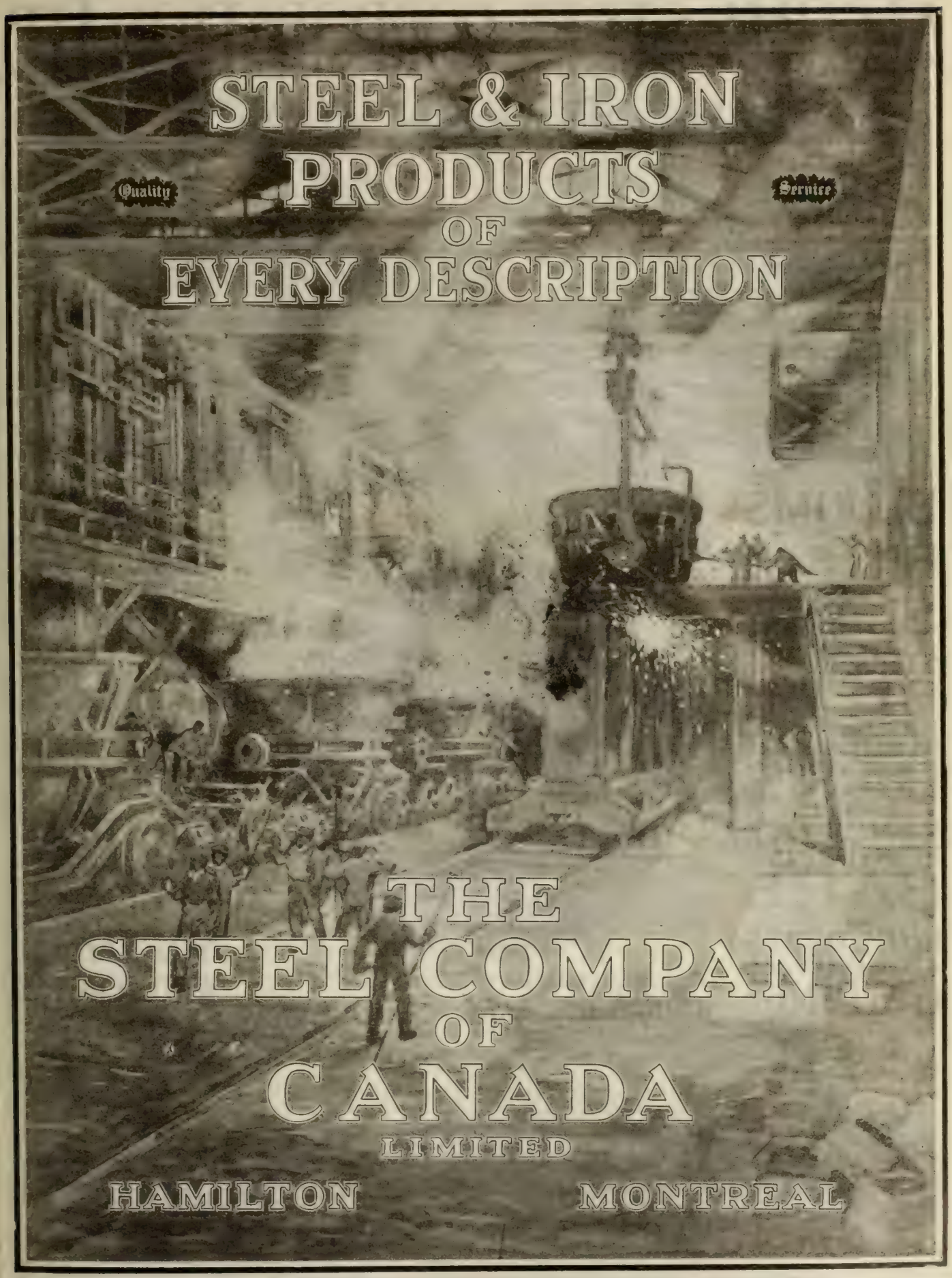
Canadian Machinery and Manufacturing News, May 15th, 1919. Vol. 21, No. 20. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Deparment, Ottawa, Canada. Entered as nd-class matter at the Post Office Deparment, Ottawa, Canada. Entered asAct of March 3rd, 1879.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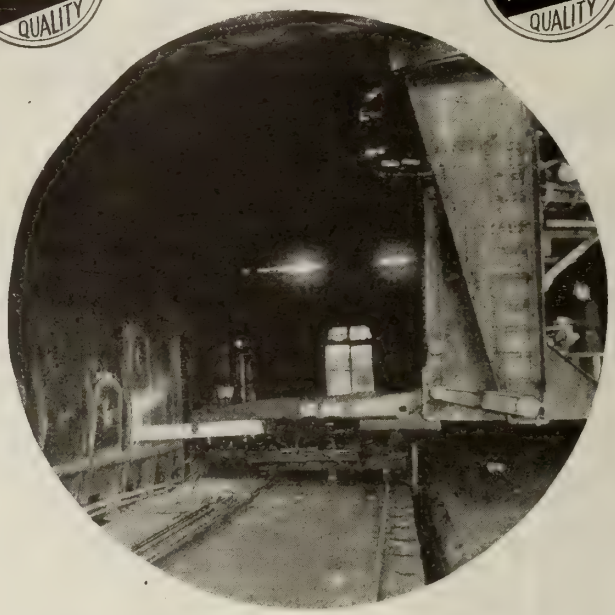

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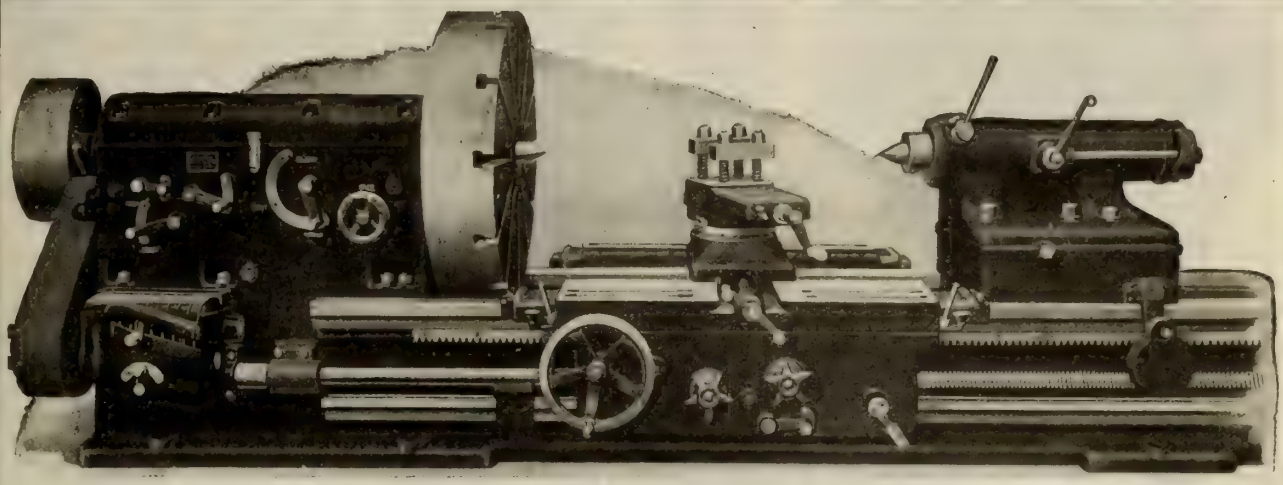

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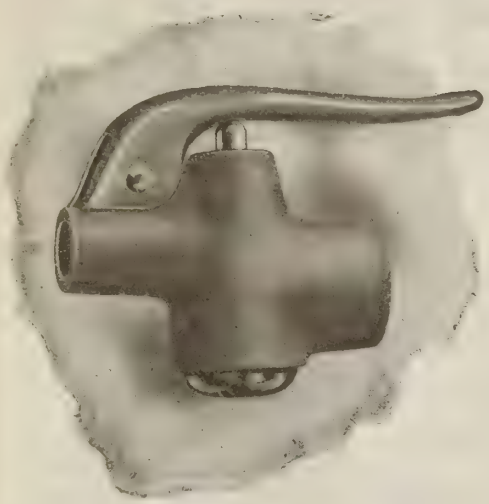

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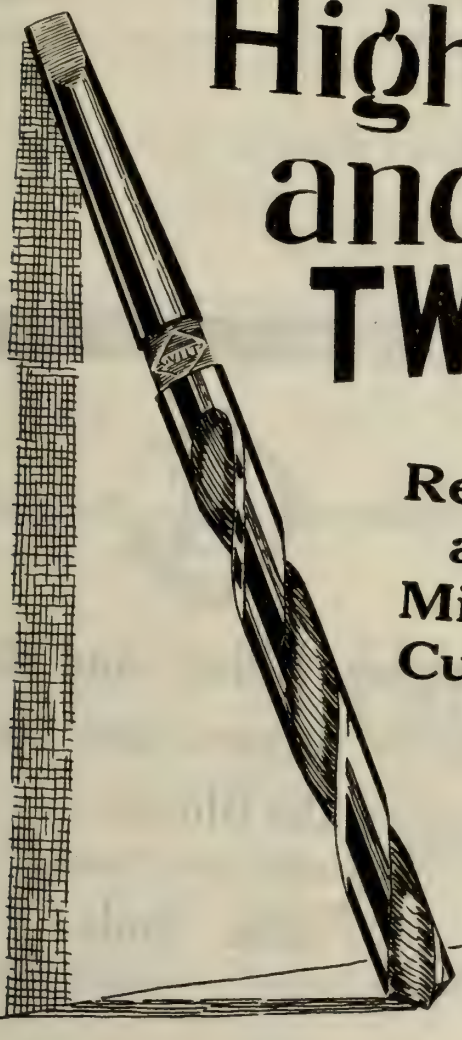

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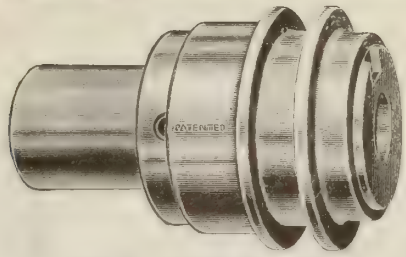

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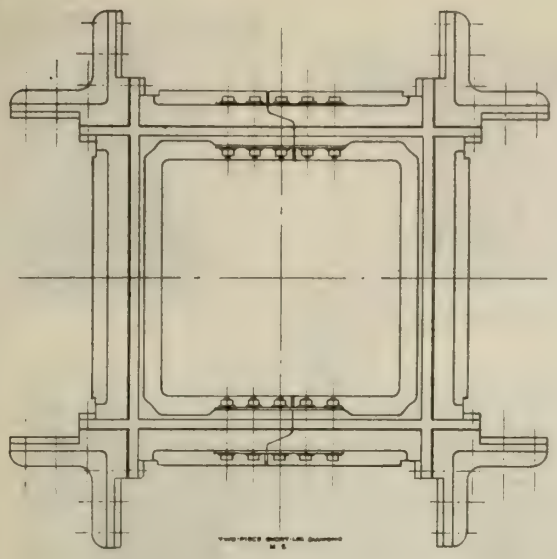

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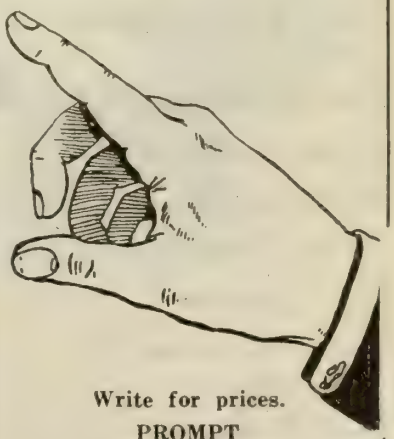

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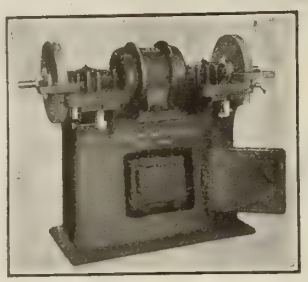
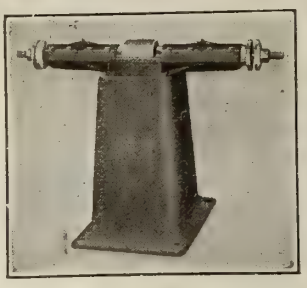
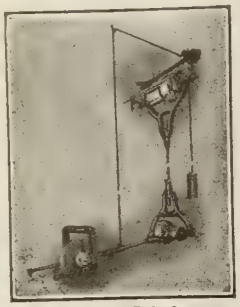

Motor-Driven Grinder


Heavy Type Polisher

Water Tool Grinder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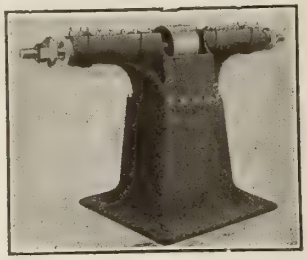
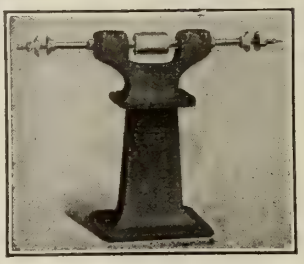

Plow Grinder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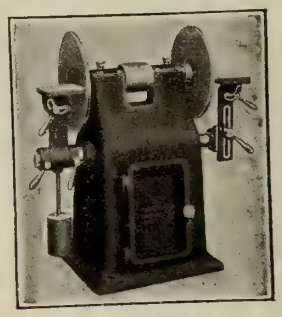
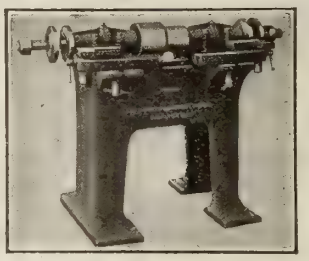

Disc Grinder

Ford-Smith Grinders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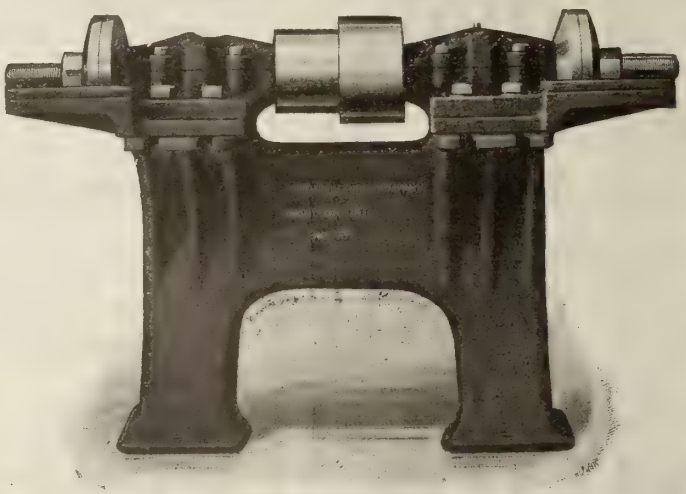
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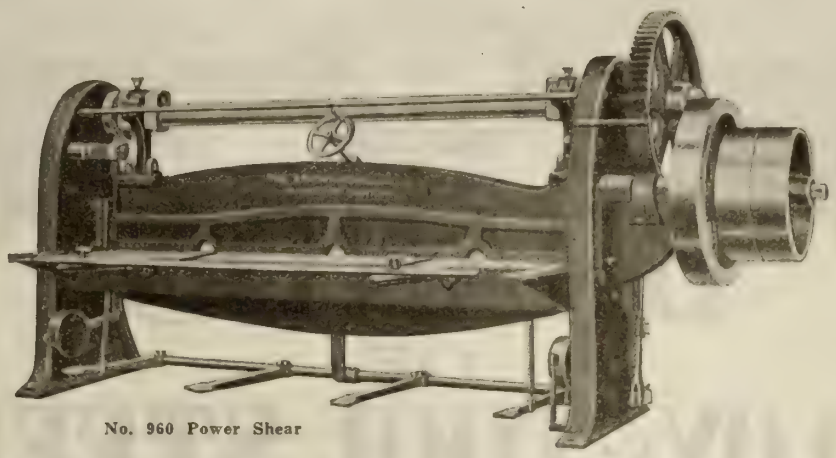
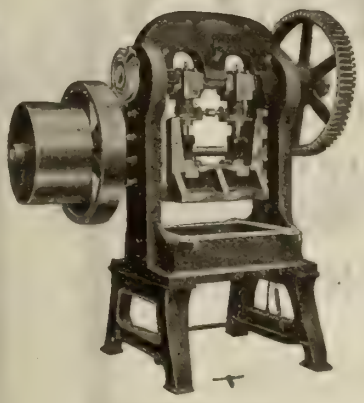


No. 960 Power Shear



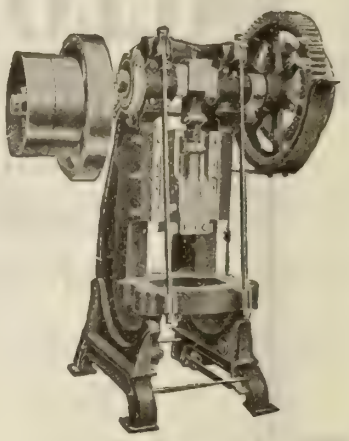
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

Inexperienced help and 24 hours' daily service will test the best machines.

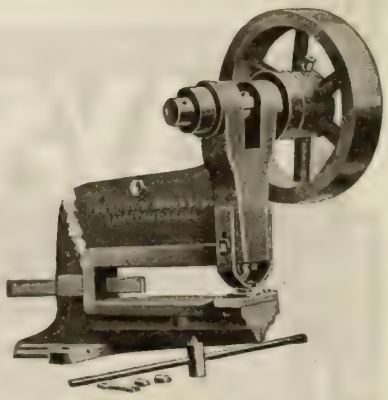
Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press

No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

BRITAIN'S BEST

KE

BRANDS OF ALLOY & TOOL STEELS

In Billets, Bars, Sheets, Hot and Cold Rolled Strips, Cold Drawn Cast Steel, Wire and Drill Rods

HIGH GRADE STEEL FOR ALL PURPOSES

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LIMITED

A SOLEMN WARNING

A flood of business will overwhelm this country inside of two months. Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hesitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, "Don't blame us because you didn't see this vision."

Canada Foundries & Forgings, Limited
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Crucible
AND
Open Hearth Steel
Tool Steel
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856

Frankford, Phila.
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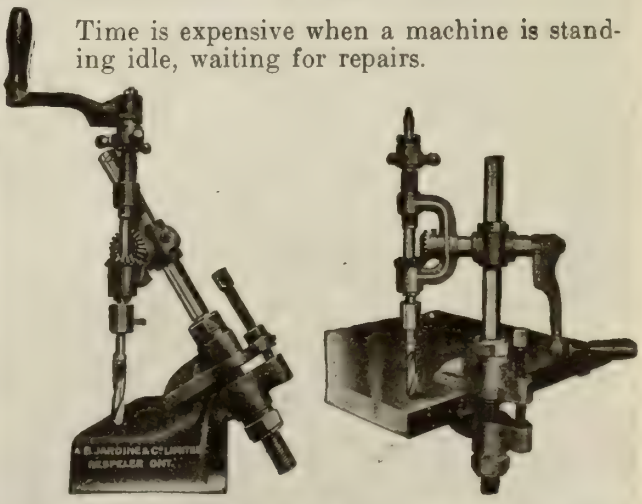
RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
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MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

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HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times.

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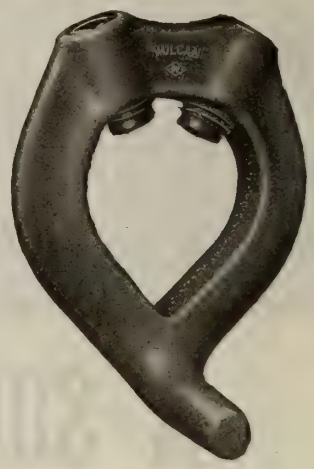

Williams' "Vulcan" Drop-Forged Safety Lathe Dogs

DESIGNED to insure the maximum of safety, care was taken to provide a form as close to a circle as possible—no bunching or extension of the head portion, no "sleeve-catchers" to cause injury to the unwary operator.

They provide safety complete and automatic and, with this assured safety, better balance on the lathe and every whit of utility obtainable in this class of tool.

The price is the same as for the dangerous kind.

Bent and Straight Tail, 1 or 2 Screws, 16 Sizes, 3/8 to 6-inch Capacities.

Ask for Machinists' Tools Booklet

J. H. Williams & Co.

"The Drop-Forging People"

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Agents for Manitoba, Saskatchewan, Alberta and British Columbia

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LINK-BELT Locomotive Cranes are rendering highly efficient service in leading industries throughout America.
They are handling ore at foundries. Handling steel at fabricating plants. Handling small parts with electric magnets at factories. Handling coal and ashes at power plants. Handling steel in ship yards—in fact wherever heavy parts or assembled products are to be handled economically and with dispatch, there you'll find Link-Belt Locomotive Cranes on the job.
And in each case you'll find them rendering a highly satisfactory service. For back of Link-Belt Cranes is one of America's leading engineering organizations. Each crane is of the highest standard throughout—the same high standard which has long characterized Link-Belt products and made the name Link-Belt a guarantee of quality and efficiency.
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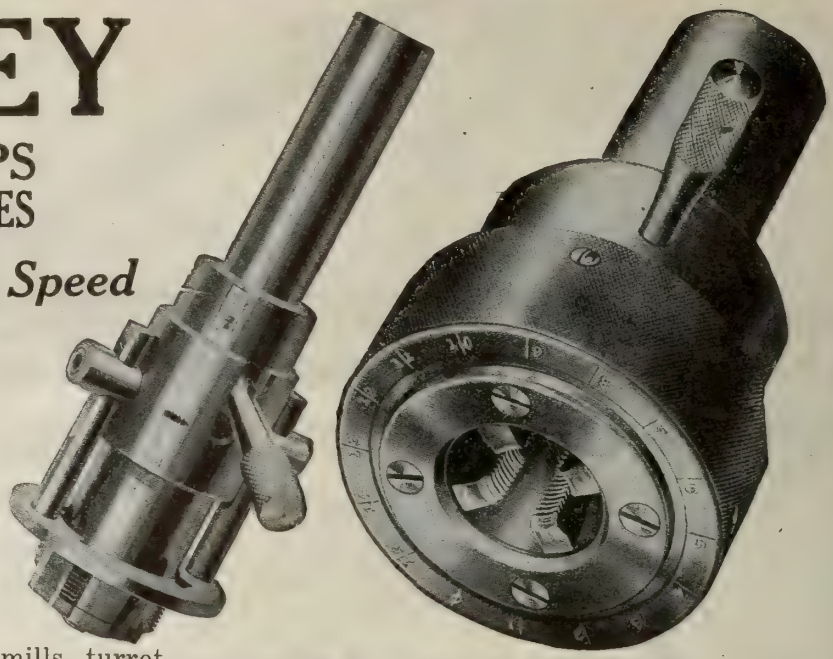
MURCHEY

COLLAPSING TAPS and SELF-OPENING DIES

Promote Accuracy and Speed

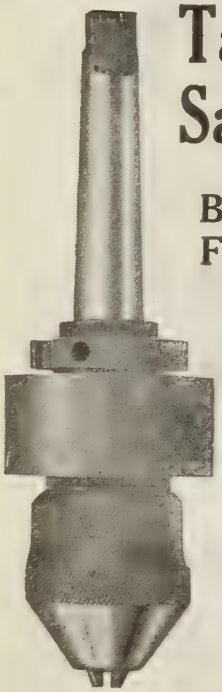


MURCHEY Collapsing Taps and Self-Opening Dies are cleared free from the thread instantly, preventing all danger of stripping, besides cutting time for production in half. **Thus you are sure of greater accuracy and greater production.** Murchey Tools are speeding production in all parts of the country on tapping machines, drill presses, monitor machines, boring mills, turret lathes, and on all other machines to which taps or dies may be attached.

Let us know the class of work you are handling and we will show you how to increase your production 50 per cent. without running up the cost.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.



Tap Chucks that Save Tap Costs

BICKNELL-THOMAS FRICTION CHUCKS

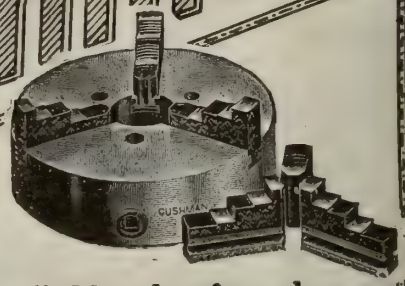
reduce tap breakage to the vanishing point. These chucks will hold the tap to the limit of its endurance, but a sudden strain sufficient to break the tap wil cause the grip to loosen instantly. They are particularly adapted for tapping to the bottom of blind holes, for special work and—owing to their compact design — for use on multiple spindle machines.

Made in four sizes—one-eighth to one inch. Straight or Morse taper shanks.

BICKNELL-THOMAS CO.

GREENFIELD, MASS, U. S. A.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

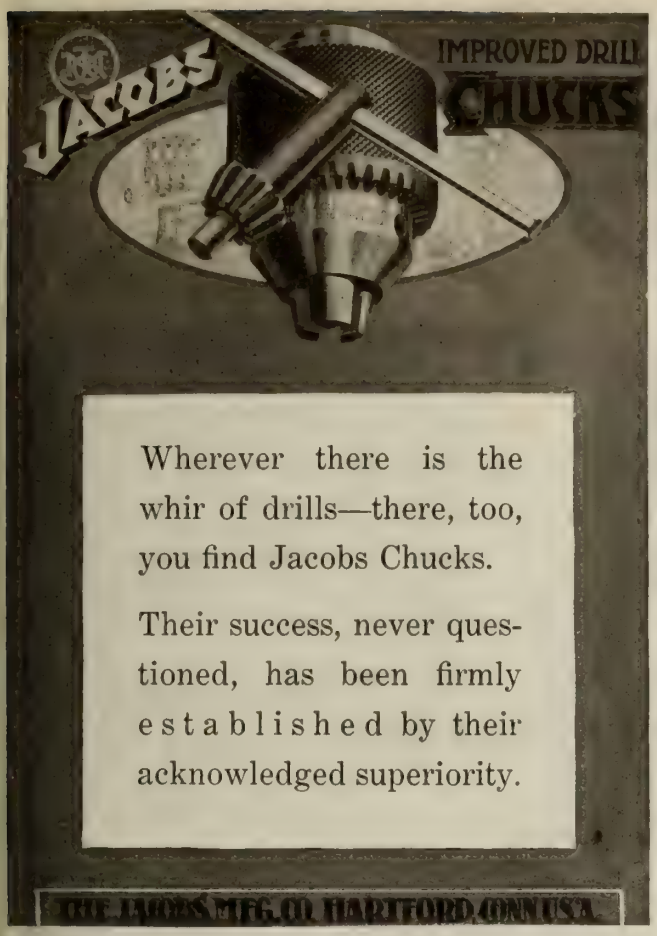
And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

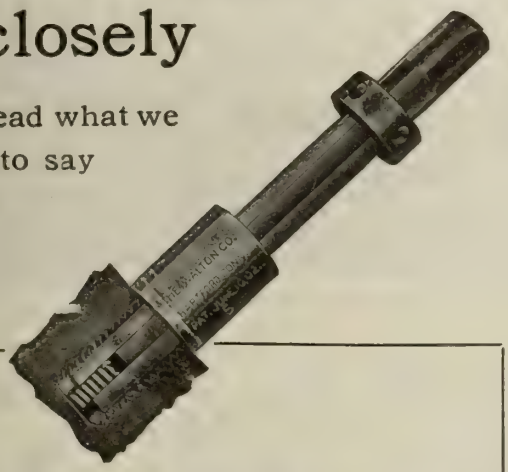
Cushman Chuck Co., Hartford, Conn.

CHUCKS



Look at this again —closely

and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

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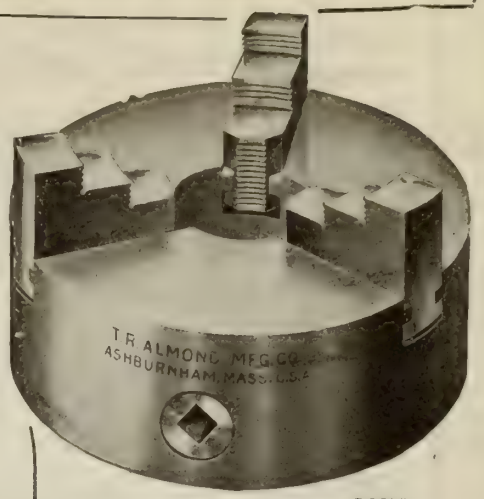
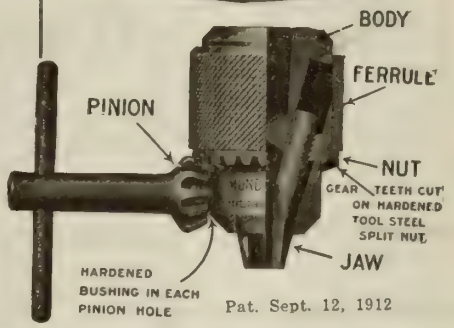
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



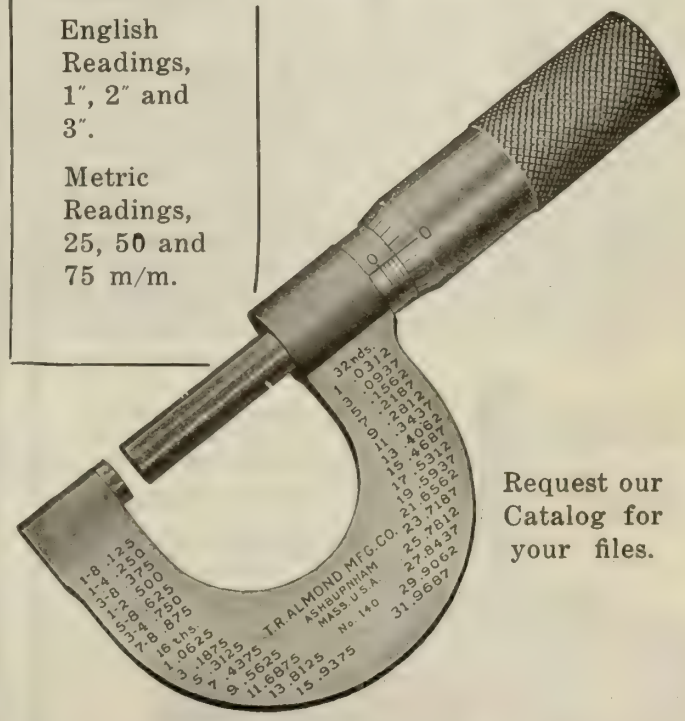
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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Die Head Cuts

Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

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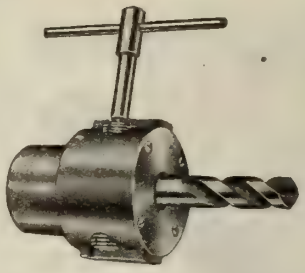
New Haven - Conn.



UNION

POSITIVE DRIVE DRILL CHUCKS

The Union Drill Chuck is made in seven sizes (0 to 2 inches) with PATENT TRANSVERSE SLOT—so that drills with tenons can be inserted (see illustration). The shank of drill should be squared on two sides to enter the TRANSVERSE SLOT, giving a positive rotation to the drill independently of the jaws, permitting the jaws to centre and align the drill accurately. The drill is held absolutely true and will not slip under the hardest strain. This type of chuck will be found to give the best of results on all classes of work from HIGH SPEED drilling to the hard BLACKSMITH and GENERAL REPAIR work.

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New Britain, Conn.

New York Office 26 Cortland St.

Makers of a complete line of chucks

Nova Scotia Steel & Coal Company

Limited

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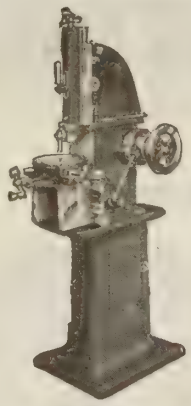
THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

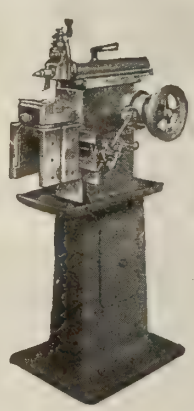
The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.



3½-inch



7-inch

Combination

Three of the machines that by their cost-reducing features have established themselves "solid" with the home users and by these same merits are reaching out in foreign countries. A silent, but powerful message of the Rhodes efficiency.

Their capacity is greatly promoted by the adjustments which may easily and quickly be attached. For shaping, slotting, die making, tool making, etc., these machines stand paramount. An inquiry on your stationery will receive prompt attention.

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Owned and Operated by the Jacobs Mfg. Co.

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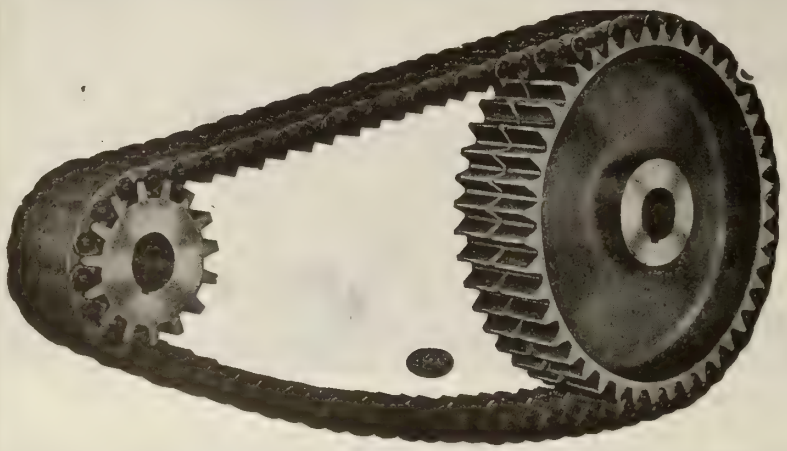

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MORSE DRIVES

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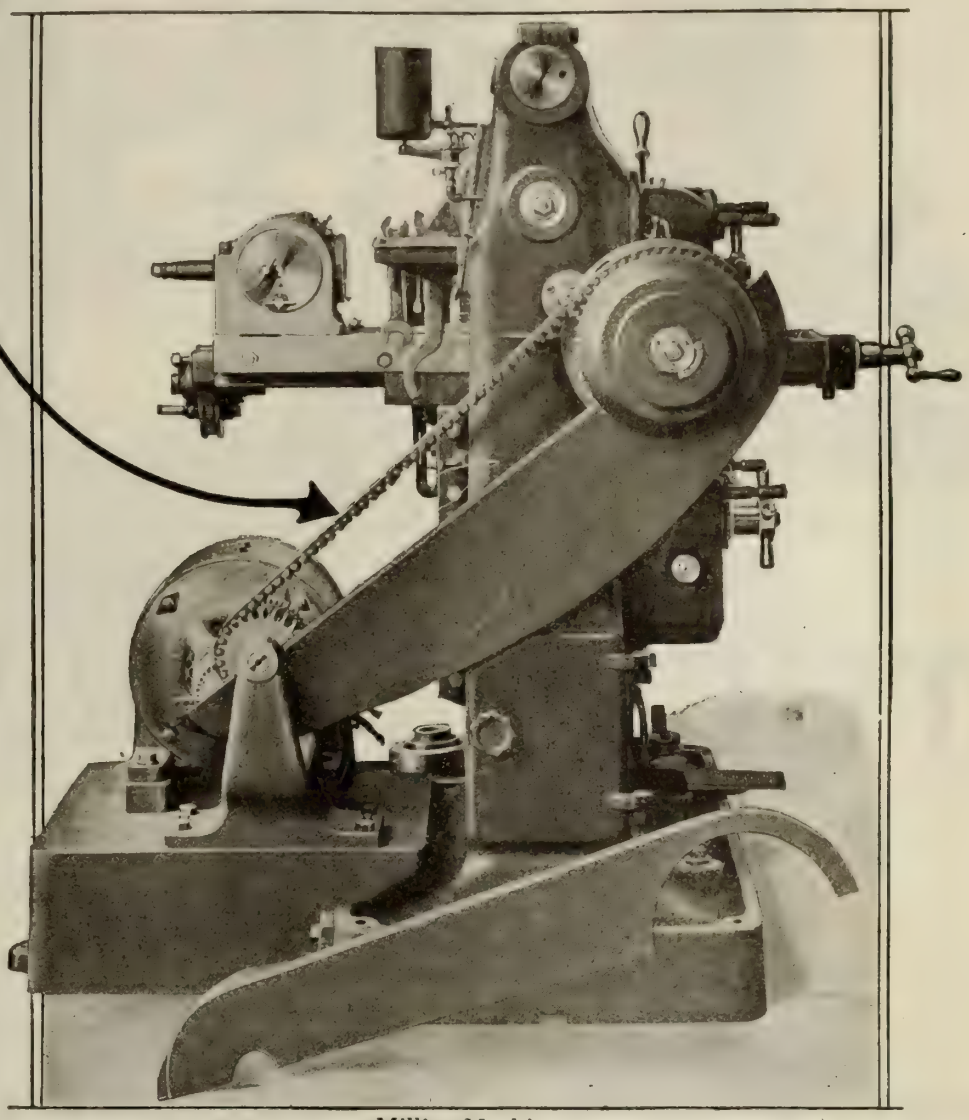

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Positive as Gears.

Oil Bath not Required.

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The drive that will do the most work, the steadiest work, the best work. Made for every purpose from ¼ H.P. to 5,000 H.P. Adopted by engineers as durable, simple, unaffected by heat, cold, oil or moisture. Let us have your general layout and design your drives to suit your special conditions.

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LINCENSEES FOR EUROPE AND EASTERN HEMISPHERE
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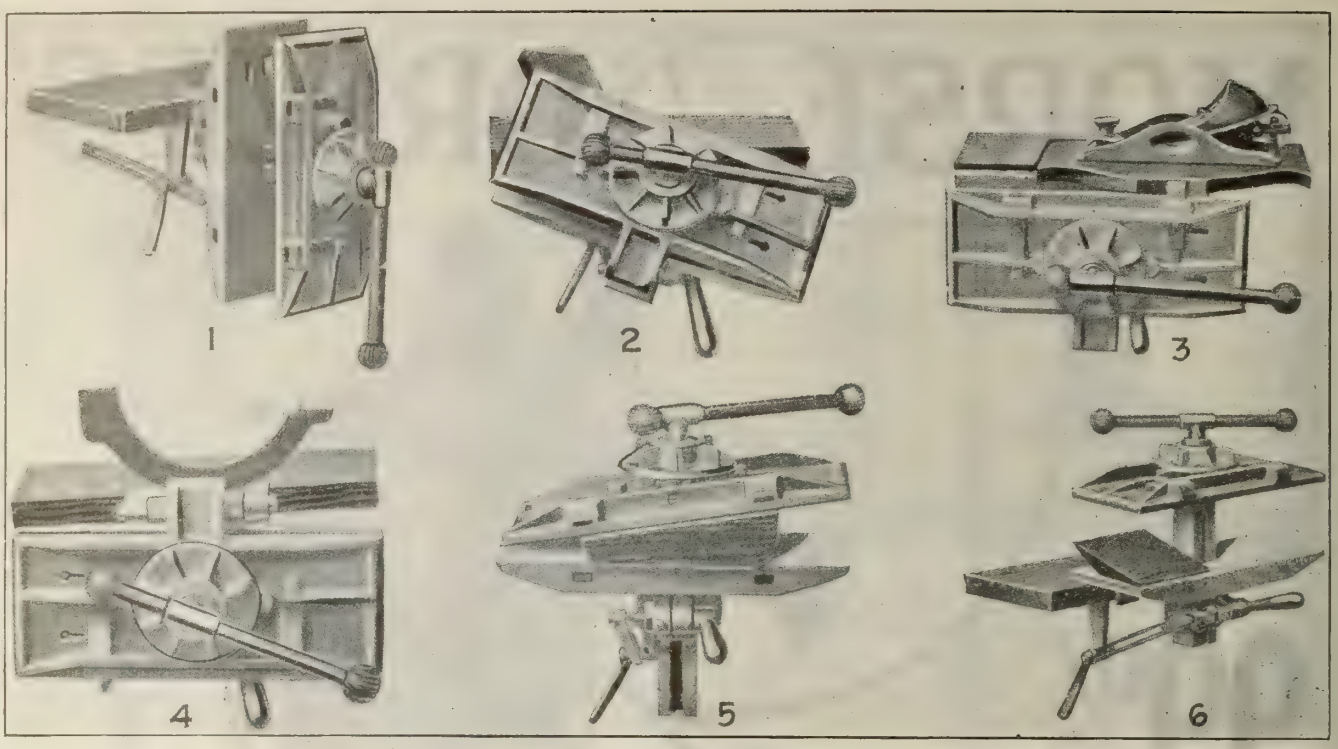

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THE VICTOR VISE

A GLANCE at the illustrations above gives some idea of the versatility of the New Victor Universal Wood Workers' Vise. No position is impossible for this handy tool. Has all the features of a standard vise.

All parts are interchangeable and it is sturdy and strong, yet only weighs 75 lbs. Can be set at any point within the arc of a circle without loosening work in jaws.

Holds any irregular or wedge shape, and will positively hold it securely. **Every pattern-making and woodworking shop can save time and money with the Victor.**

LET US SEND YOU ONE ON APPROVAL

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Put them to the test and you'll soon see a difference in your babbitt cost.
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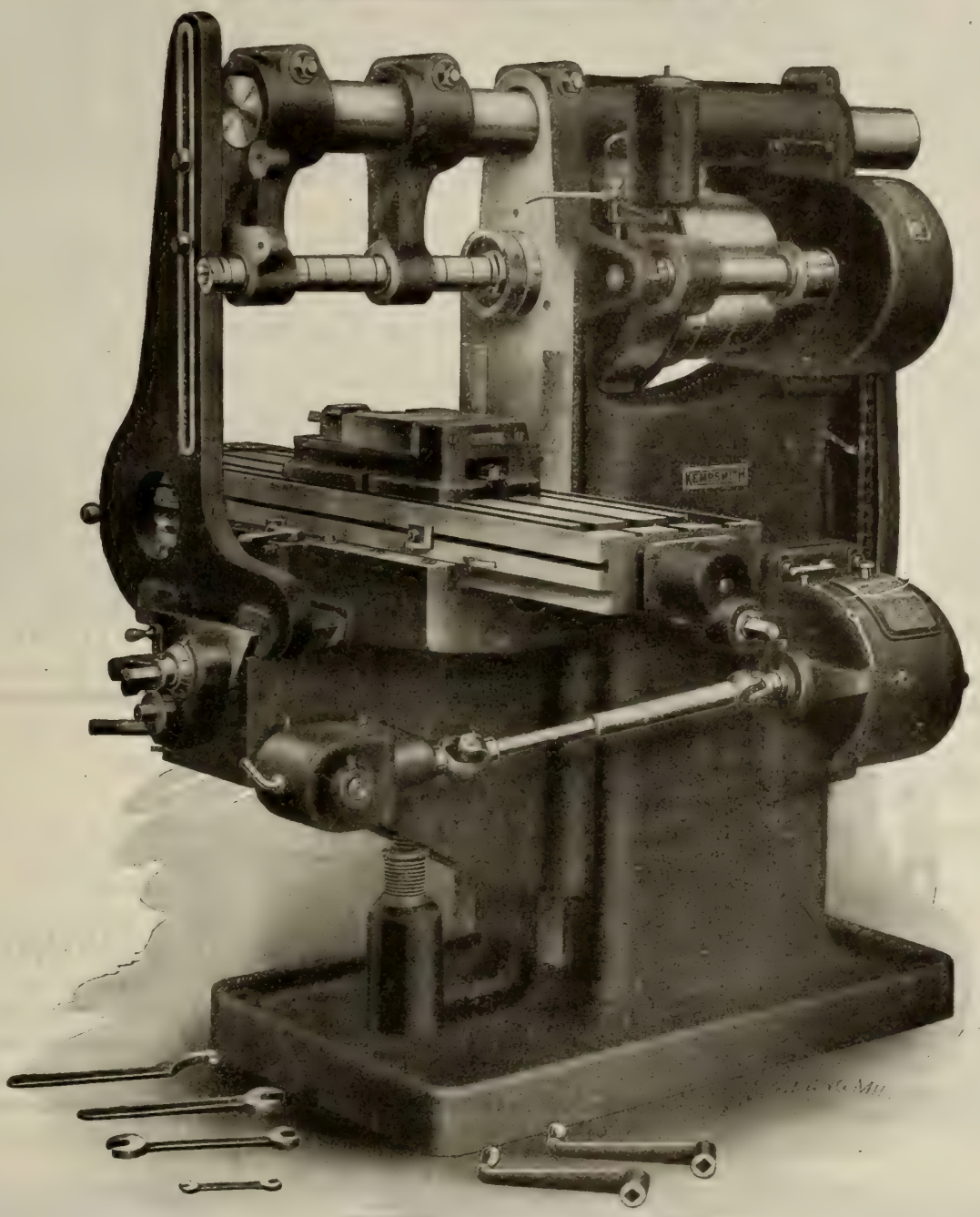

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Double Back Geared.

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our Catalogue "B" describes and illustrates many notable features of the Kempsmith Miller. Write for a copy to-day.

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MILWAUKEE, WIS., U.S.A.

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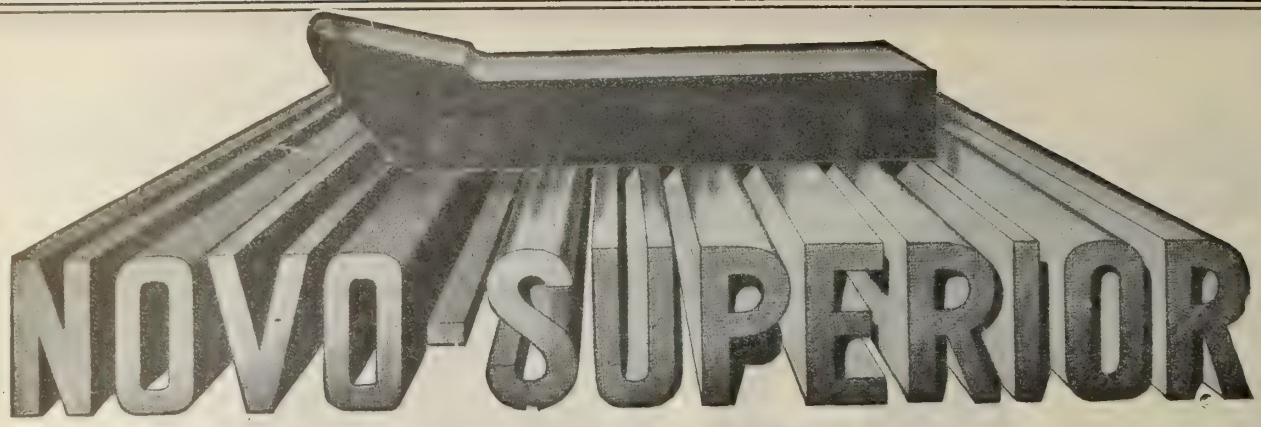

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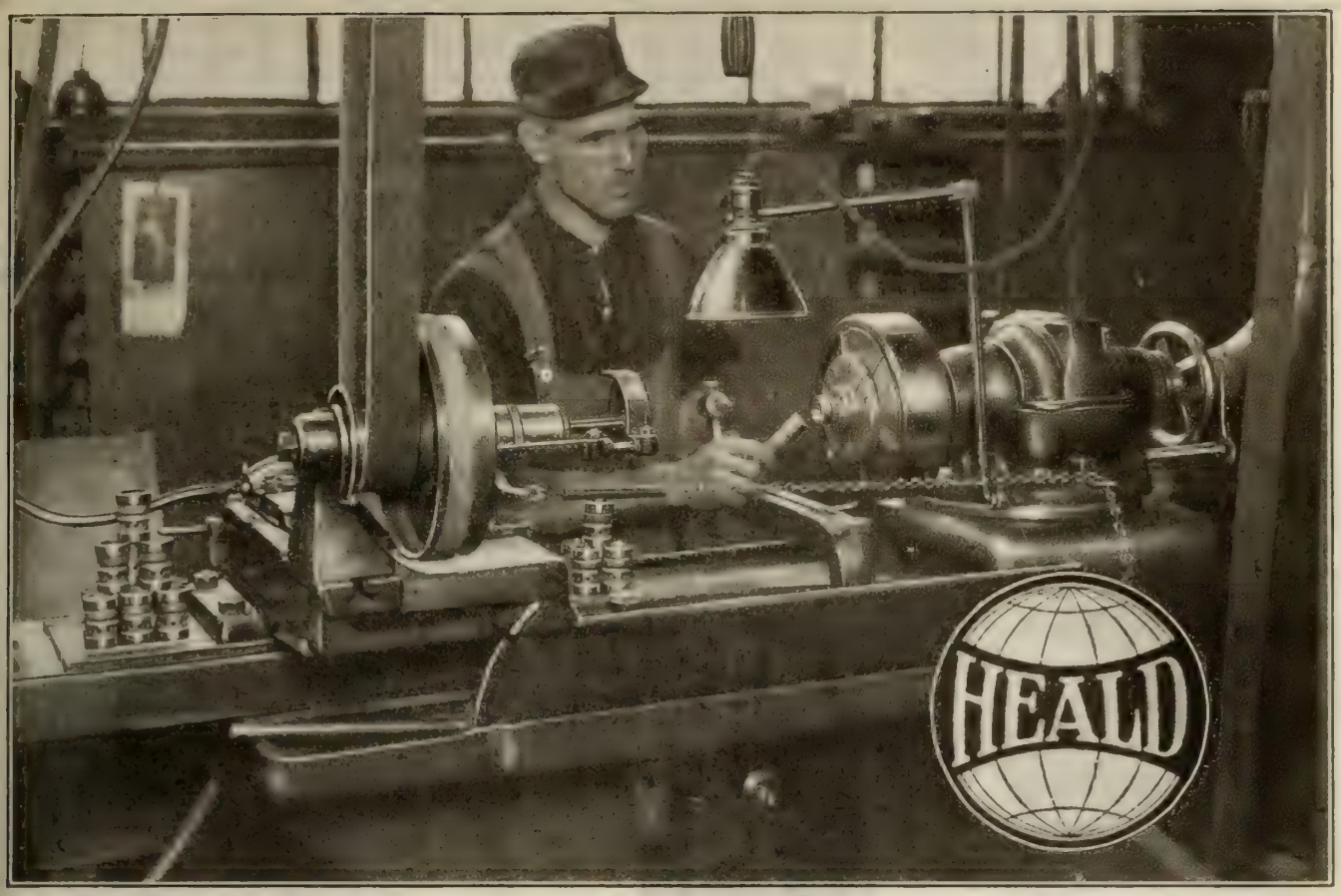

INTERNAL GRINDING

These photographs were taken at the plant of The Ingersoll-Rand Company, Athens, Pa.

The upper one shows a Heald No. 70 Internal Grinder grinding a blind hole in bushing. At the left of the picture can be seen a supply pipe for air cooling and on the right an air suction for taking out the dust. Notice how carefully the operator's hand is protected from injury while plugging the work by the Heald automatic wheel guard.

The lower photo gives an idea of the variety of work that can be ground on a Heald No. 70 at one plant. This machine can be equipped with different style wheel heads, instantly interchangeable, giving the widest range in diameter and length. The work head swiveling to 45° or 4-in. taper per foot makes angular work simple. A radius truing device which can be furnished will form the wheels as desired and makes ball bearing races and all work requiring curved surfaces ideal work for this machine.

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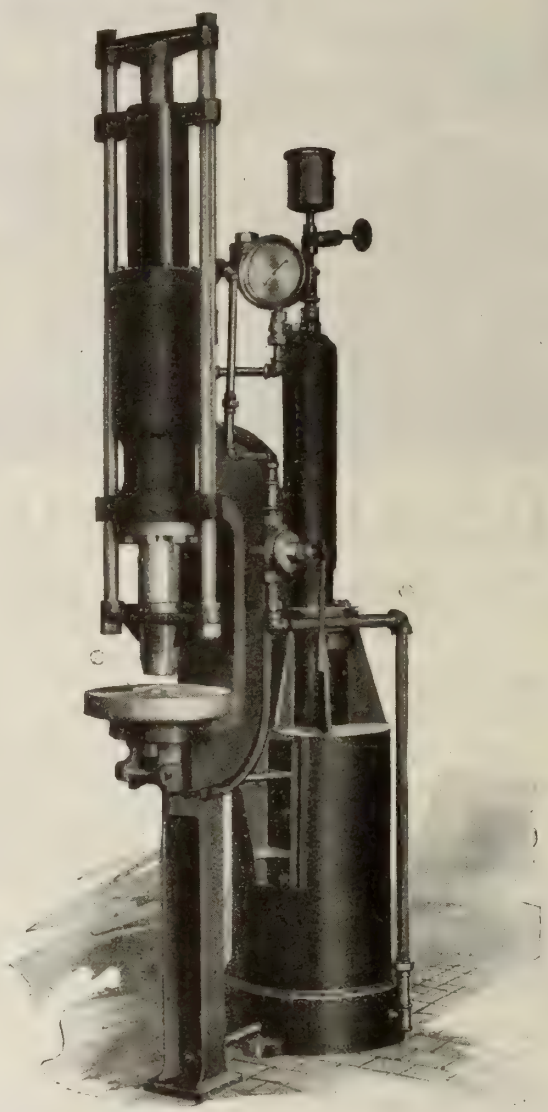

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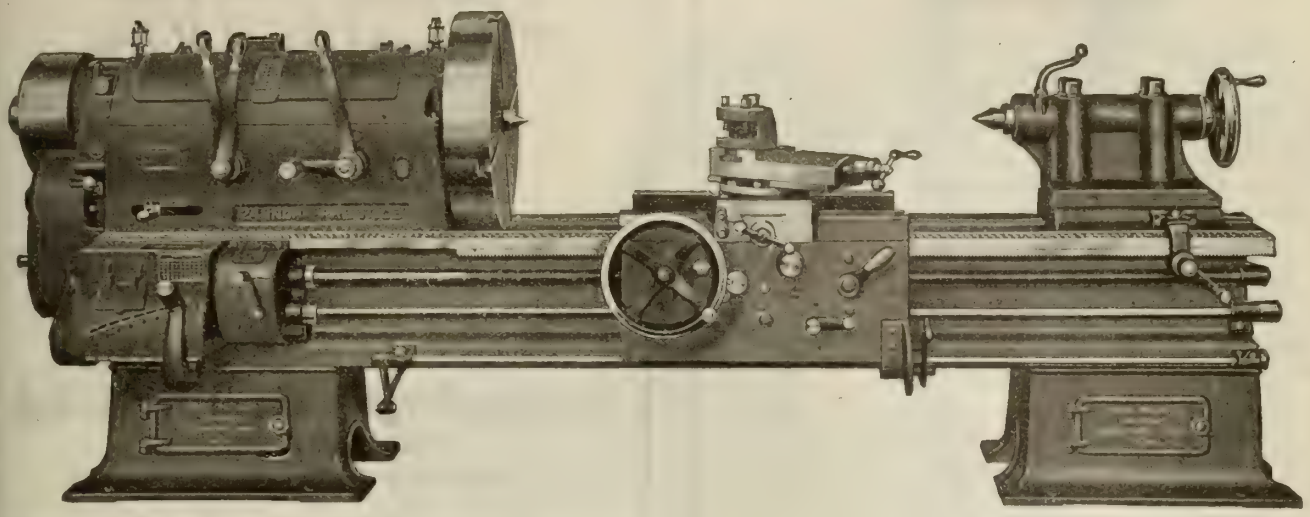

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Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 43A

Wheel Speeds In Saw Sharpening

When saws begin to show cracks, when they begin to case-harden, and when other things go wrong in the filing room, even though a wheel may be satisfactory until the trouble starts, it is usually the grinding wheel which receives the blame, because no other reason for the trouble can be found.

However, the average filer must be given credit for becoming more educated every day with regard to grinding wheels. He is learning to look upon his wheel as one of his tools and is beginning to treat it as such.

Wheel speeds cannot be depended upon in a filing room where the machinery is run by individual steam engines. The steam line as a rule is connected with the same line as that which furnishes steam for the carriage gun. The number of machines used controls the steam supply and power delivered. A change of 200 to 300 r.p.m. of the wheel may result from a change of only one or two revolutions of the steam engine. When it is realized that a change of 500 surface feet will show an appreciative effect in grinding action, it can be seen that this change is a vital one. Generally speaking, a wheel will act considerably harder as the speed increases.

The generally accepted correct speeds for wheels, the sizes of which are usually used in saw gumming work are listed below. These speeds will give approximately 5000 s.f.p.m.

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Diameter	R.P.M. for 5,000 S.F.P.M.
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8	2,400
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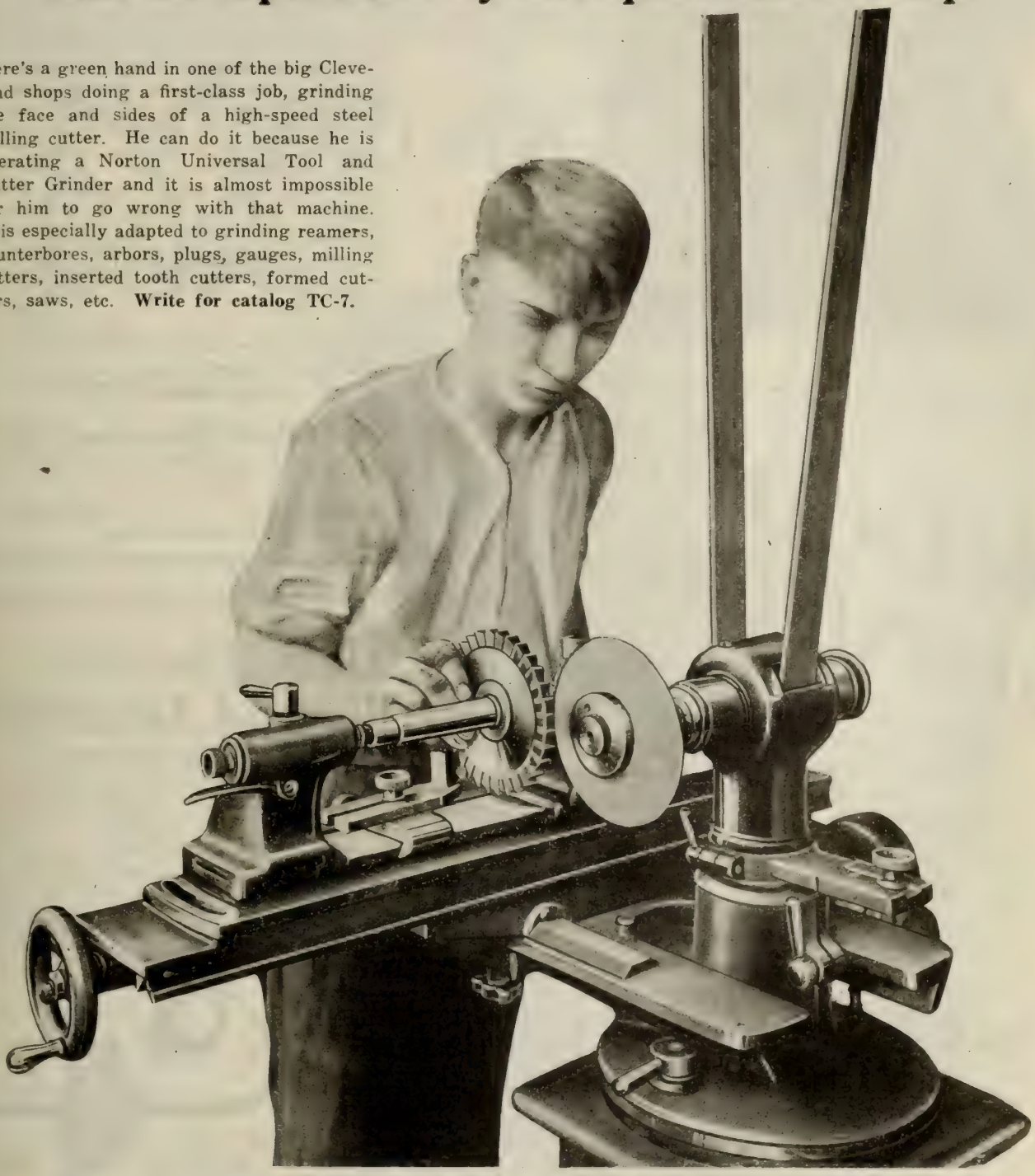

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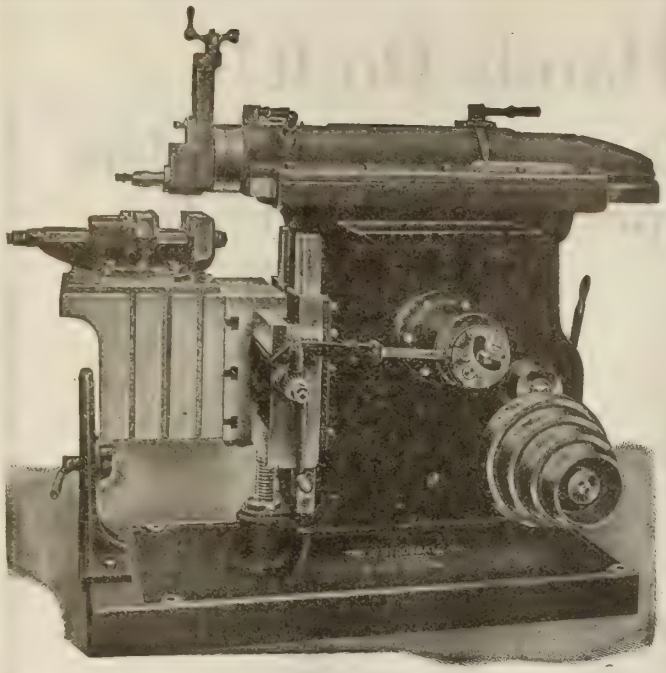

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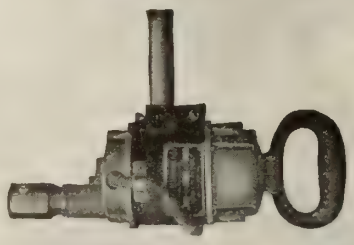

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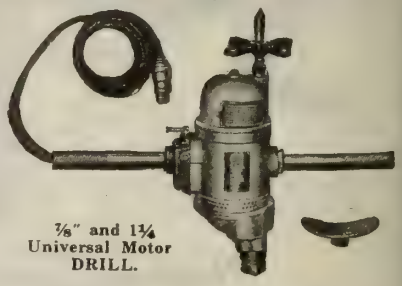

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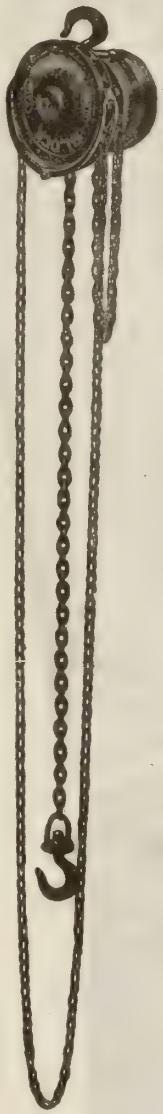

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 20. May 15, 1919

Manufacturing Banner Hosiery Machine--Part IV

A Continuation of the Preceding Parts on the Manufacture of This Interesting Machine

By ROBERT MAWSON

THE frame is the largest element used on the hosiery machine, and in order to obtain intensive and duplicate manufacture, many interesting operations are involved.

It might be well to cite a very interesting procedure which the Hemphill Co. have adopted and which could be followed to advantage by many manufacturers of small machines and tools. This practice is to dip all the castings for machine in enamel, which is afterwards baked in ovens before any machinery operations are performed on them.

The advantage of this method is obvious, as the enamel covers every part of the casting, thus acting as a preservative and also avoids the covering of machined portions, as these occur in operations which follow.

When the usual way of enameling after the machinery is done is resorted to, a longer time is required and often many portions are left uncovered, as the man must be careful to avoid placing enamel on the portions which have been machined.

The half-tone, Fig. 1, shows two Whitcomb planers machining the two sides of the frame. The casting for each operation is placed on the machine table, stops being set into holes of the table to resist the cutting strains exerted during the machining of the frame.

Clamps are also tightened on the pieces to hold them rigidly during the time they are being planed.

The rest of the set-up and work performed is obvious from the illustration.

In Fig. 2 is shown a Kelly shaper machining the top surface of the frame.

The fixture used is in the form of a stand, on which the frame casting rests.

The wooden clamp shown is used to hold the casting against the vertical face of the shaper table.

Fastened to the horizontal face of the table is a strap which extends out and its free end is curved. This curved portion is used as a brace to resist the machining stresses exerted by the shaper tool during the facing operation.

Boring Main Shaft Bearing

The half-tone, Fig. 13, shows the fixture and method used when boring the main shaft bearing. This hole must be in a certain relation as regards height from the top of the frame, and the method used to insure this condition will be shown in our next illustration, Fig. 4.

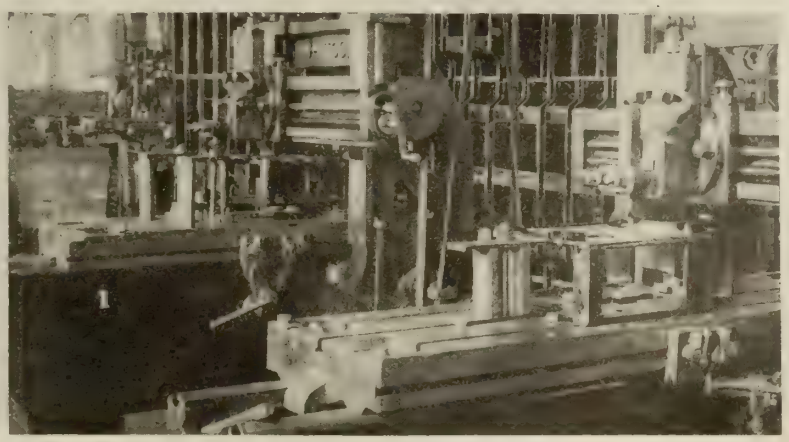


FIG. 1—MACHINING THE TWO SIDES OF THE FRAME.

The arbor A is made with a similar taper to that of the machine and is placed in the spindle of the milling machine.

The gauge body B is then placed on the top surface of the fixture plate on which the frame rests.

The milling machine table is then adjusted for height until the arbor will slide through the hole C, with the gauge body resting on the fixture.

The operator then knows positively that the hole bored will be at the correct height in relation with the top surface of the frame.

The gauge and arbor are then removed from the milling machine and the frame fastened on the fixture by means of the straps, as illustrated in Fig. 3.

The operator then places the boring bar shown in position into the spindle of the machine.

He next moves the table longitudinally until the bar is central in that direction with the cored hole of the frame casting.

The table is then locked, so that it cannot travel in a longitudinal direction, and the two holes bored, using one point cutters for both holes.

One of the plug gauges used to test the correctness of the holes is shown in Fig. 4 at D, this one being for the rear bore. A similar plug gauge is also employed for the front hole.

The rear hole is 2⅜ in. in diameter, and the front bore is 1⅜ in. in diameter.

Milling the Frame

The illustration, Fig. 5, shows a horizontal milling machine milling the 1¼ in. slot for the upright bar.

This operation is very important, as upon its accuracy depends much of the success of the hosiery machine when in operation.

The frame is located on the milling machine table by means of a plug, which is fastened to the machine and fits into the 2⅜ in. bored hole. This method of locating determines that the slot will be central with this bored hole. It must also be at right angles with both bored holes, so as to ensure this condition. The frame is fastened rigidly on the milling machine table. There is yet a third function it must possess, namely, the slot must be absolutely square and at right angles with the top of the frame. To meet this requirement the angular brace shown in front of the milling machine table is used.

This brace is made with a long tongue,

which fits perfectly in the slots of the milling machine table.

This brace is then slid along until the vertical edge comes against the top of the table, which, in the position it occupies during the machining operation, is vertical.

The table casting is, therefore, swivelled on the locating plug until the faces of brace and table are in contact on their entire surfaces.

The brace is then fastened down by means of the bolt seen under the casting.

The table casting is also fastened down by means of clamps on the table of the milling machine, as noted.

The piece is then in condition for milling the slot, the operator being sure that the three conditions demanded will be met with. The gang set-up of cutters used may be observed by referring to the half-tone.

It will be seen that the 1¾ in. slot is machined; also the two surfaces on each side of the slot in the one operation.

The operator raised the table until the correct depth of slot is obtained, testing the same by means of a depth gauge.

Testing the Frame

The half-tone, Fig. 6, shows the gauge used to test the accuracy of the machining on the frame.

The gauge consists of a shaft made with two diameters, which fit accurately the two bored holes.

The element B is a rectangular bar 1¼ in. wide, which is made so that it will have a good sliding fit in the two slots at the top and bottom of the frame.

This rectangular bar also fits in a 1¼ in. slot in the yoke part C of the gauge.

It will be noticed that arm of the yoke has a reamed hole at the upper, into which the main shaft arbor is placed.

To pass inspection the gauge must be in the position shown, the arbor through both bored holes, the arbor in the hole of the yoke member and the rectangular bar fitting in both the slot in the casting and also slot in yoke.

The rectangular bar is then slid up and down to see that it works freely in the slot and the arbor is revolved, and it must also have a similar freedom of action.

If the test gauge will perform this dual function, it proves that the operator has used the fixtures properly and that the work has been correctly done.

A similar fixture gauge is used in a subsequent operation for the final test, great care being taken on this part of the machine, so that accuracy is obtained, both during the machining of it and also inspection for acceptance.

We now come to the drilling operations on the frame, and it will be seen that simple plate jigs are used for these operations.

This is somewhat contrary to what is the common practice in many plants.

Many shops follow the method of making one large jig to take care of all the holes in a casting of this nature.

There are arguments for and against each type of jig and their resultant method.

Where one jig is used there is this argument for the practice: That chances of errors are minimized, providing that the casting is placed correctly in the jig.

On the other hand, the tool is far more expensive to make for first cost, and repairs to the same are also higher, and usually more skilled help is necessary for the proper using of the same.

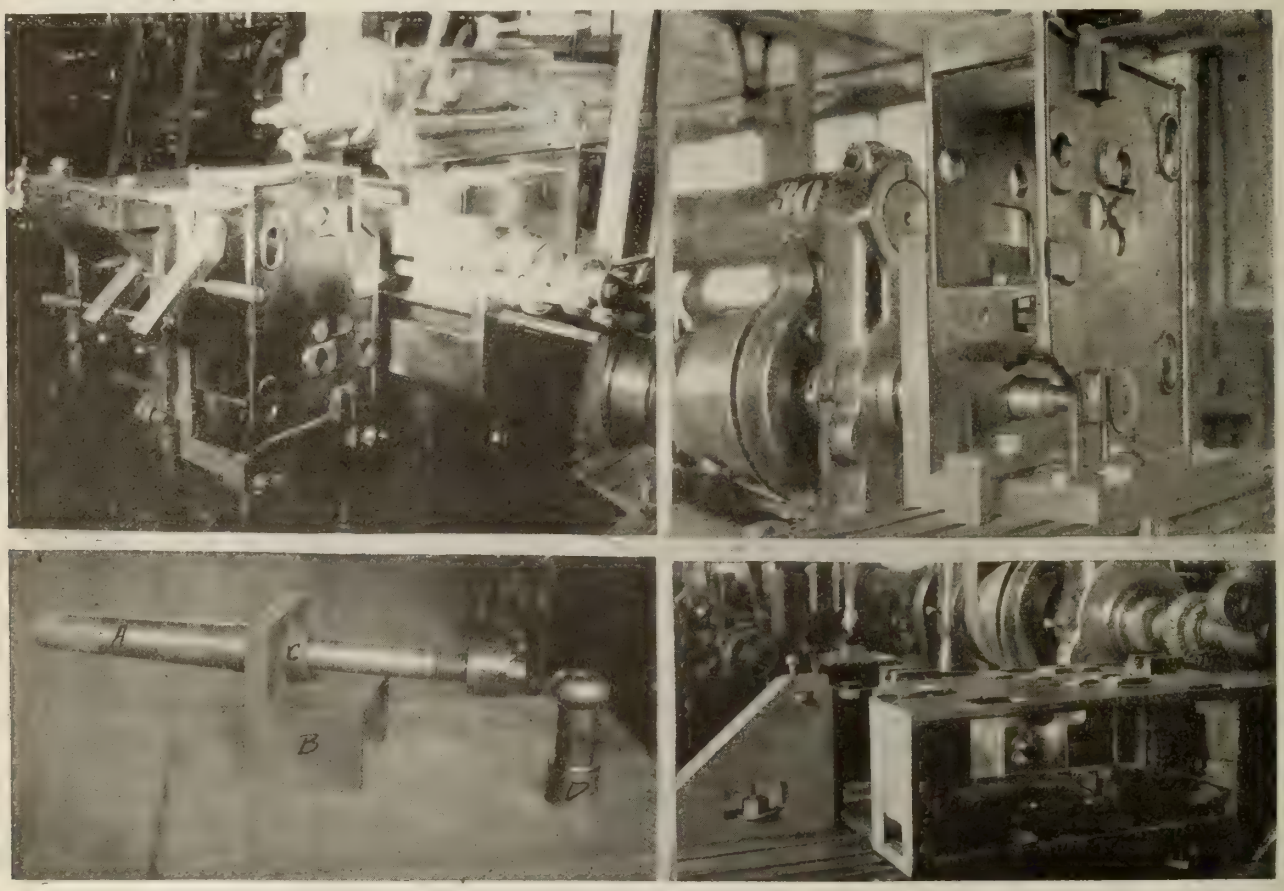
Again, should the jig require any repairs performing on it the entire production on that certain part is at a standstill until these repairs are made.

With a simple plate jig the first cost is low, and if the tools be well designed, using a good locating point, the parts drilled by it are fully as good from an interchangeable viewpoint as the one jig method.

There is also the advantage that a cheaper operator can be used, lower cost for repairs when necessary; but the most important advantage is that should one tool be out of service, the other drilling operations can be carried along, pending the repairs to this particular jig in question.

Drilling the Frame

The illustration, Fig. 7, shows the jig



UPPER LEFT—MACHINING THE TOP SURFACE OF FRAME. LOWER LEFT.—GAUGE AS USED ON BEARING HOLE.
UPPER RIGHT—BORING THE MAIN SHAFT BEARING. LOWER RIGHT—MILLING SLOT FOR UPRIGHT BAR.

in position for drilling the top of the frame.

The jig is located by a plug, A, which fits into the 2⅜ in. bored hole.

This plug is made integral with the jig proper and the tool is pushed on top of the frame from the rear side.

The jig plate is then pushed over until the sides of the jig and frame casting are in line, as shown by the illustration. Seven No. 5 holes are then drilled in the frame, the drill being guided through the bushings shown in the jig.

The next tool shown in Fig. 8 is used to drill the holes in the bottom of the frame. The jig is located by four plates as A, two on each side.

The wing nuts, B, which are attached to hook bolts, which fit under the flange of the frame casting, are then tightened.

This action forces down the jig against the frame, thus holding it in position.

Four 5-16 in. holes are then drilled in the bottom of the frame, the drill being guided through bushings in the usual manner. The half-tone, Fig. 9, shows the jig in position, ready for drilling the left-hand side of the frame.

The jig is located by means of a plug, A, which fits into the 1⅜ in. bored holes.

The tool is also provided with two rectangular tongues, which fit into the two 1¼ inch sliding bar grooves, the milling of which was described in a previous operation.

The holes on the two sides must be in a certain relation with the bored holes and bar slots, hence the somewhat accurate manner used to locate this jig and the one described next. When the jig has been located as described, it is tapped down until its face rests against the surface of the frame.

The following holes are then machined, the various drills being guided through bushings in the jig to ensure accuracy—six 5-16 in. and 12 No. 19 holes.

The jig used to drill the opposite or right-hand side is shown in our next picture, Fig. 10.

This tool is located by the plug A, which fits into the 2⅜ in. bored hole, and also by a long pin, B, which fits into one of the 5-16 in. holes drilled in the previous operation. Attention might be called to the locating plugs in this and the previous jig.

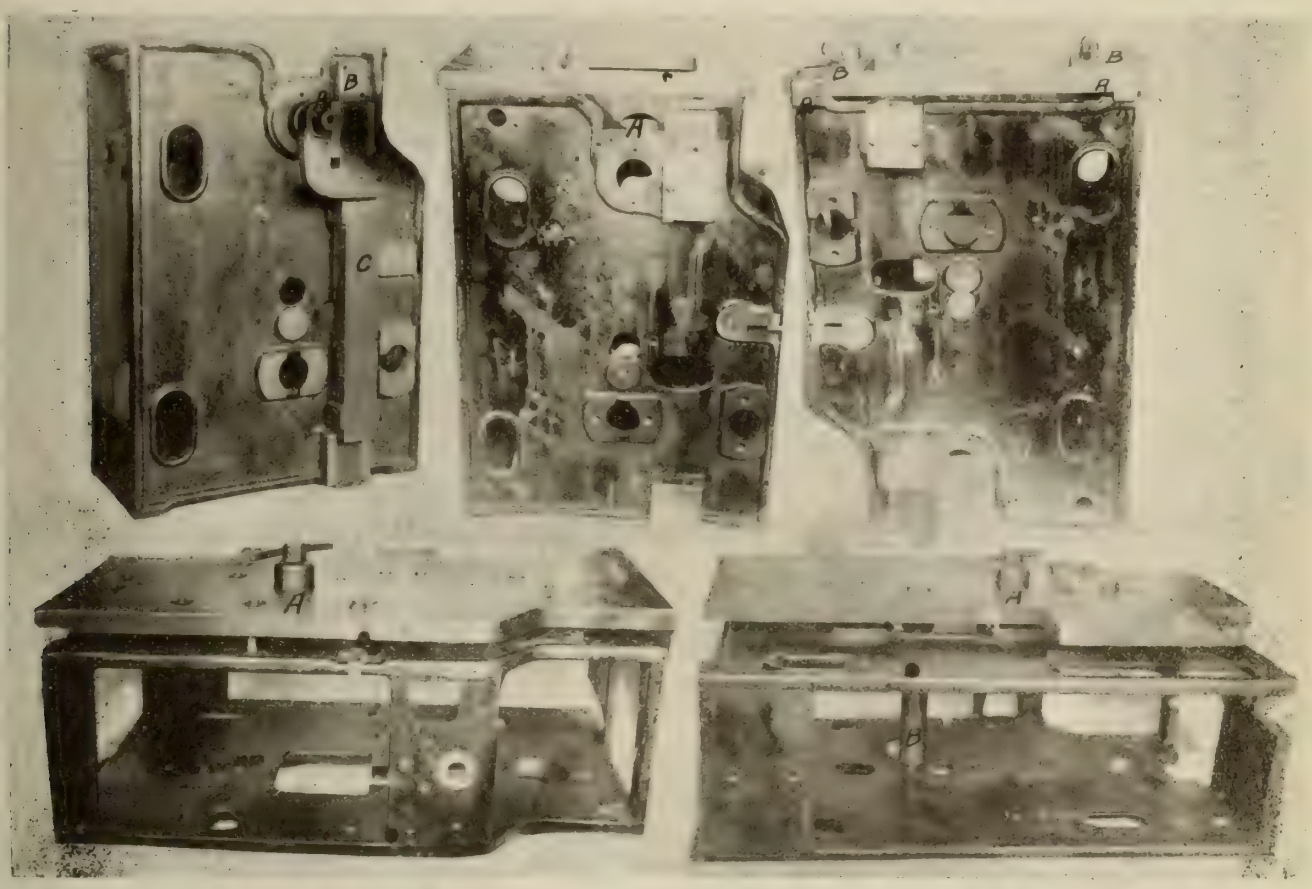
It will be observed that handle is provided on the outer end of these plugs.

This is useful as the locating part of the plug is made a very accurate fit in the bored hole and the operator, by turning the plug by means of the handle, is enabled to assemble or remove the jig, as desired, with greater ease.

When the jig has been tapped down into position onto the surface of the frame, the following holes are machined: Eight 5-16 in., one 31-64 in., eight No. 19, and three ¼ in. holes. Bushings in the jig guide the various drills to ensure the required accuracy.

It will be seen that by using the bored hole and sliding bar slots on the previous jig for a locating medium and on this latter tool the bored hole and one of the already drilled holes, the various holes on the two sides are machined in the correct location with each other. Various holes are then tapped in the frame, no jig being used, the frame being held on the table of a tapping machine.

The frame is afterwards put through a rigid test to see that all holes are in the proper location, the bored holes correct, and also the sliding bar slots in perfect alignment with the bored holes and machined faces. After passing this test the frame is ready for assembling in the hosiery machine and placing into service.



UPPER LEFT—TEST GAUGE FOR FRAME
UPPER CENTRE—DRILL JIG OR TOP OF FRAME.
UPPER RIGHT—ANOTHER DRILL JIG ON FRAME.
LOWER LEFT—DRILL JIG FOR LEFT HAND SIDE OF FRAME.
LOWER RIGHT—DRILL JIG FOR RIGHT HAND SIDE OF FRAME.

PAINTING ON BRASS

Shellac or paint will not harden or dry well on brass, and when ordinarily applied usually remain soft and can be rubbed off. Many claim that it is almost impossible to paint on brass in a satisfactory manner, but the following methods have been used: Apply a little varnish and then wash this with a solution of benzine. Another is to apply varnish and then benzol in double the quantity of the varnish, afterward apply the paint, and a week or two later another coat of paint if necessary.

IMPORTANT ANNOUNCEMENT

CANADIAN MACHINERY is pleased to announce that readers have responded splendidly to the challenge of this drawing course. In fact we have received plates from all over the Dominion for entry to the contest, which speaks well for the wide field covered. These drawings submitted have been surprisingly good, and to show readers that we appreciate their efforts, and intend to do all in our power to help them, we make the following announcement:

That every third issue of this series we will return to all contestants their plates, marked and criticized by our editors, who are practical draftsmen as well as designers. Such a procedure cannot do otherwise than help the students, for the criticism will be constructive rather than destructive. Starting with plate No. 4, we will commence returning all plates so far received.

We would like to hear from readers or students as to their opinion of this latest move on the part of our organization to help the reader.

There seems an erroneous impression among some readers that this course is limited to machine tool apprentices only. This is not the case, the only persons barred being graduate draftsmen. Of course the reason for this being obvious. Machinists, apprentices of all kinds, or in fact any readers other than a graduate draftsman, are eligible.

Another point is this, that simply because you did not happen to start in on Plate 1, is no reason why you cannot commence NOW. We wish to have every reader interested in any way, to be a student, sending in their work regularly. Remember, there are three prizes given every issue, and you may be one of the lucky three, so finally let us say that if you have not as yet sent in your work, do so now, for there is no time like the present.

If you have been sending your work along, then keep the good work up, for the very fact that you are working on this course will help you to increase your earning power.

Canadian Machinery Drafting Course—Part IV

In This, the Fourth Portion, We Start in on Six Problems on Geometrical Drawing. This Branch Will Not be Touched on More Than is Absolutely Necessary

By J. H. MOORE, Associate Editor Canadian Machinery

BEFORE going into this subject of geometrical drawing let us say that a groundwork on this subject is absolutely necessary, otherwise we would not take it up. We shall, however, confine the work to three plates, so that only the most important geometrical problems will be taken up. By this means the student will not tire of the subject, for the writer of this series knows from personal experience that the average machine shop apprentice hates the very name or look of this subject. Still in due justice to the course these points should be at least touched upon, so students in general must not forget the necessity of getting in this groundwork of three plates, after which a more interesting section will follow though not more important than this the first of the geometrical series. Above all keep up the good work. We are receiving replies galore so keep sending in your work and secure one of the three prizes given each part of this course.

Geometrical Drawing

Geometrical drawing is the art of becoming acquainted with the various lines and figures, what particular properties these figures have, and what bearing they have on mechanical drawing. A working knowledge of the problem to be presented in this course are absolutely necessary to a good draftsman, and are of course supplementary to the main idea, namely, mechanical drawing. As the main idea of geometrical drawing is accuracy, students must be sure to have all their drawings neat and accurate, otherwise the purpose of this section is lost.

In geometrical drawings we speak of definitions, which of course means an explanation of the various lines and figures involved in the study.

Geometrical Definitions

Let us see what these definitions are:

A point is used to mark a position and has neither length, breadth, nor thickness.

A line has length only. It is produced by the motion of a point.

A straight line is one that has the same direction throughout. In other words it is the shortest distance between any two points.

A curved line is one that constantly changes its direction. Sometimes it is termed a curve.

A broken line is one made up of several straight lines.

A horizontal line is one that has the direction of a line drawn upon the surface of water which is at rest. In other words a line parallel to the horizon.

Parallel lines are lines which lie in the same plane, and are equally distant from each other at all points.

A vertical line is one that lies in the direction of a cord suspended from its upper end, having a weight at its lower end. It is a line which is perpendicular to the horizon.

An oblique line is one that neither conforms to the vertical nor horizontal.

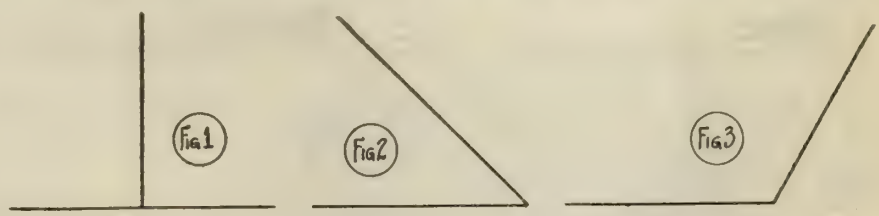
Examples of lines already spoken of are as follows:

Lines drawn with the T-square are all parallel to each other. A line drawn by means of the triangle on its straight side, together with the aid of T-square is a vertical line. A line drawn with the sloped side of triangle with same conditions as above will be an oblique line.

If two lines cut each other they are called intersecting lines, and the point where they cut is called the point of intersection.

An angle is the measure of the difference in direction of two lines. The lines are called sides and the point of meeting the vortex. The size of an angle is independent of the length of the lines.

If one straight line meets another, as in Fig. 1 so that the two angles thus formed are equal, the lines are termed perpendicular to each other, and the angles formed are known as right angles.



Should the angle be less than a right angle it looks like Fig. 2, and is termed an acute angle.

Should the angle be greater than a right angle it is termed an obtuse angle and appears as shown at Fig. 3.

Before going further into the other various definitions let us consider these already given as sufficient for this first portion on geometrical drawing. In this way the student will not have to carry in his head too many definitions at once, but will be able to concentrate on the particular ones he requires, so now to Fig. No. 4, and the instructions for the completion of the same.

Instructions

As usual commence by making the border lines 9 in. by 13 in., and the trimming lines 9½ in. by 13½ in. Divide this space into the seven parts as shown in the plate. As per usual, place the title, etc., in the lower space, then place problems 1 to 3 consecutively as illustrated. We will explain the working out of each problem as we go along.

Problem No. 1 (To Bisect a Straight Line)

To construct: First draw a straight line AB 3¾ inches long. With A as a centre, and a radius greater than one-half of the length of the line, describe an arc of a circle on each side of this line AB. With B as a centre and the same radius, describe arcs as before, intersecting the first two at the points C and D. Join C and D by the line CD, when the point E, when it intersects AB will be the required point. In other words, AE=EB, as E is the middle point of AB.

This problem could also be termed erecting a perpendicular line to a straight line from its middle point, for the line CD is in the middle of AB and is perpendcular to it.

The next problems Nos. 2 and 3 can be classed under the one heading, namely to erect a perpendicular to a given line from a point in that line. We will take up two cases. First in Problem 2 we will take up the problem when the point is near the centre of the line.

Draw AB 3¾ inches long. Let C be the given point on the line. With C as a centre and any radius, such as CD, describe two short arcs cutting AB at the point D and E. With D and E as centres, and any convenient radius greater than CD, describe two arcs intersecting at F. Draw CF and that line will be perpendicular to AB at the point C.

In Problem 3 we take up a case where the point is near the end of the line.

Draw AB 3¾ inches long. Suppose C about ½ inch from the end of the line as shown. With any point D as a centre and a radius DC, describe an arc cutting AB at C and E. Draw ED and produce it until it intersects the arc at the point F. A line drawn through F and C will be perpendicular to AB at the point C.

Problem 4 (Through a Given Point, to Draw a Straight Line Parallel to a Given Straight Line)

First let AB be the given line 3¾ inches long. Let C be the given point.

With C as a centre and any convenient radius, describe an arc DE intersecting AB at E. With E as a centre, and the same radius, describe the arc CF intersecting AB at F. With E as a centre and a radius equal to the chord of the arc CF, describe an arc intersecting DE at D. A straight line drawn through D and C will be parallel to AB.

Problem 5 (To Bisect a Given Angle Where the Sides Intersect Within the Limits of the Drawing)

To construct. Let ABC be the angle to be bisected.

Draw the sides AB and BC 3¾ inches long. With B as a centre and any convenient radius describe the arc DE intersecting AB at D and BC at E. With D and E as centres, and a radius greater than the chord of half the arc DE, describe two arcs intersecting at F. A line drawn through F and B will bisect the angle. In other words ABF will equal FBC.

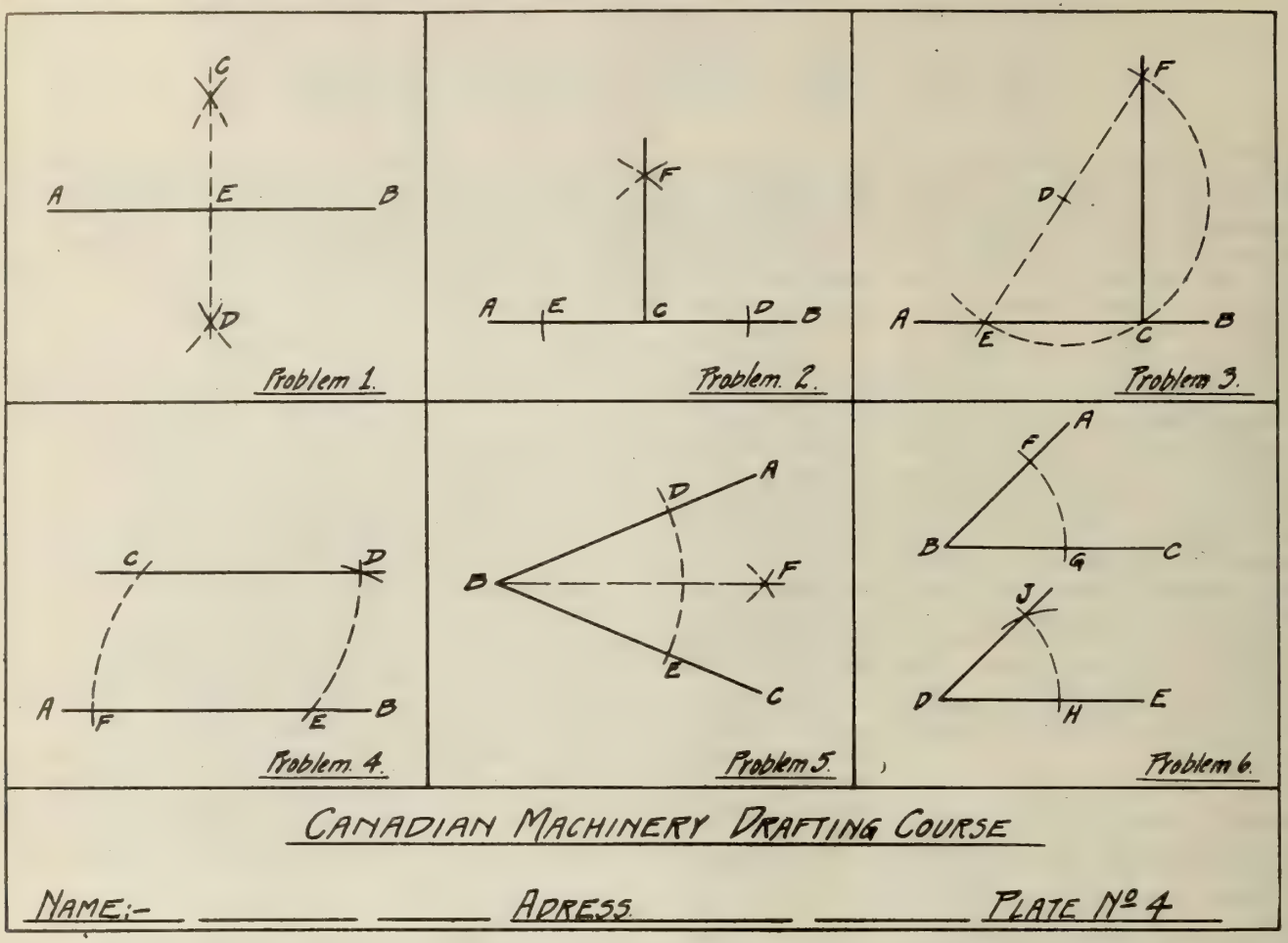
Problem 6 (To Construct an Angle Equal to a Given Angle)

Draw AB 2½ inches long, and the line BC 2½ inches long. The angle formed by these lines may be any convenient size; in this case we will call for 45 degrees. This angle ABC is the given angle.

Now draw DE a horizontal line 2½ inches long, and let D, the left-hand extremity, be the vortex of the angle to be constructed. With B as a centre and any convenient radius, say about 1½ inches, describe the arc FG, cutting both AB and BC. With D as a centre, and the same radius, draw the indefinite arc HJ. Now set the compass so that the distance equals the chord FG. With H as a centre and a radius equal to FG, draw an arc, cutting HJ at J. Through D and J draw a straight line. The angle JDE will now be equal to the angle ABC.

This completes the plate. Draw all these problems very carefully with a 4 or 6H pencil, making sure that the pencil is good and sharp. Draw your lines lightly, then, after completion, ink them in as shown on the plate. Students will do well to study and memorize these problems if possible. Above all get busy with this plate and send us along your work for inspection. Have you landed one of those scales yet? If not, this may be your lucky plate.

NOTE: Owing to some of our students not receiving their copies promptly we have postponed the judging of plate No. 2 for a short time in order to give these parties a fair chance of competing on this plate.



TORONTO.—Mr. W. L. Myers, British Government timber purchaser, accompanied by Sir James Ball, met the Ontario lumbermen at lunch at the National Club recently. That the British Government would be a big purchaser of lumber from Canada for some time to come, was the news received by the lumbermen. They also heard that Britain had purchased lumber to the amount of $30,000,000 already, and that the commissioners would open an office in Montreal to handle all the buying business of their Government. The reasons are

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Arranging Trays, Wrench Holders and Pans on Machine Tools

An Article Describing in Detail the Various Type of Pans as Used on Machine Tools, Together With Their Advantages

By F. SCRIBER

THE extensive use of pans, trays, etc., on machine tools calls for consideration of what is best or most adaptable to the particular machine or job in hand. They should be located so as to be most convenient to the operator when he stands in his operative position. They should, of course, not interfere with the manipulation of levers or other operative parts which he has to use. Another thing which should be taken into consideration is keeping them clean, particularly in the case of tool trays. It is certainly bad practice to have a tool tray located where it is apt to become filled with oil or where dirt will accumulate on the tools from other causes.

On milling machines, turret lathes, and such machines it is customary to have one or more pans conveniently located on the machine and it is also quite common to supply floor benches or trays arranged conveniently to the operator. In the case of a lathe, a tool tray is often mounted on the ways of the machine while on the other types of machines the tool pan is combined with travelling parts of the machine such as on tool slides or tables.

In Fig. 1 we have two examples of common types of tool trays and wrench holders. The upper one in this illustration is simply a tray having suitable provisions for holding it on to a machine and a pan effect for holding work or other articles. In the lower illustration provision is made for bolting this wrench holder to the machine and a number of elongated holes are cast in the upper side of it to hold various sizes of wrenches.

Holders similar to these are often found on milling machines, screw machines, etc., and an example of a tray conveniently located at the right hand side of the operator on a turret lathe is illustrated in Fig. 2. This shows a section at the turret end of the machine and the pan or tray is indicated, it being held in position by two screws. A drawing of this pan would show it as being similar to that shown in the upper view of Fig. 1, except that the flange for holding it to the machine is above the pan instead of below. For convenience in mounting these pans on the machine, filing strips are cast on them as shown and indicated in the upper illustration of Fig. 1.

The common type of wooden tray, such as is often used on the ways of a lathe is illustrated in Fig. 3. This tray is free to slide along the ways of the machine and is prevented from slipping sideways by suitable blocks of wood A which fit in the ways. As the tailstock of the machine is moved up to take short work the tray is likewise slid along and thus is always within convenient reach of the operator. Many of these trays are built with shelves above them and some are made with a cabinet effect and drawers.

In at least one instance the writer has noticed that rough cast iron trays have been used for this purpose, which practice is obviously wrong as the rough casting, being slid along the ways of the machine, is sure to scratch it and destroy the accuracy of the ways of the lathe. When cast iron trays are used they should have leather strips, or other soft material should be used where the tray comes in contact with the lathe.

In order to have an oil can always in convenient reach and before the eyes of a machine operator some manufacturers supply their machines with a holder suitable for an oil can. Such a holder is illustrated in Fig. 4, it being located on the base of the machine, and it is believed this illustration is self-explanatory, the bottom of the holder being cast out so oil or dirt will not accumulate therein.

A rather common and convenient arrangement of placing a wrench holder on a small lathe or other small machine is illustrated in Fig. 5. This shows the chip pan of a machine. This pan of course being mounted on suitable legs, the small lathe itself or similar machine stands inside of this pan and at the back as indicated is located a wrench and centre

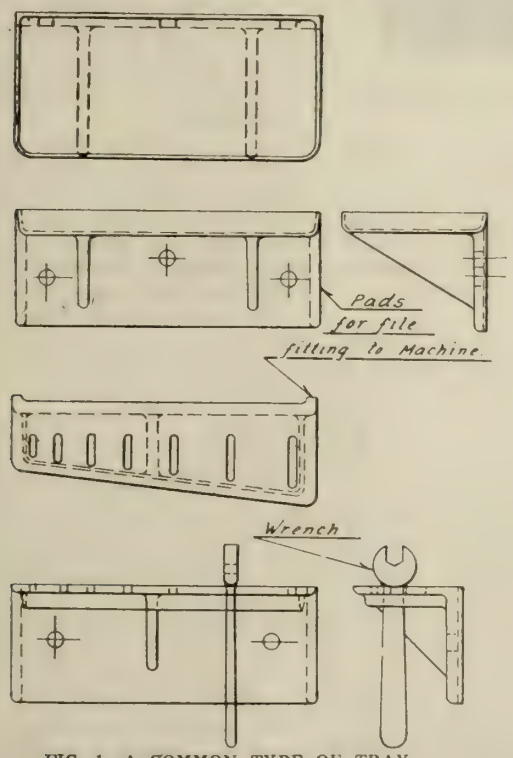


FIG. 1—A COMMON TYPE OF TRAY.

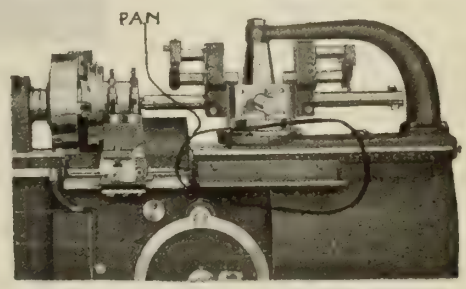


FIG. 2—VIEW OF TURRET LATHE SHOWING PAN IN RELIEF.

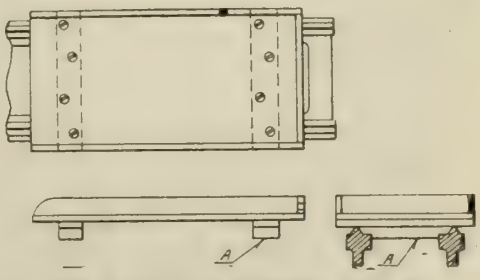


FIG. 3—TYPE OF WOODEN TRAY AS USUALLY USED.

holder, the elongated slots of course being for the wrenches and the round holes being for the centres. Fig. 6 shows a stand of the pedestal type on top of which it is customary to mount a small grinder or machine of similar type. Stands of this type can be conveniently flanged to act as tool trays or pans, this flanging being clearly brought out

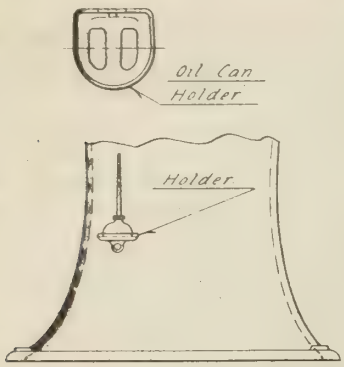


FIG. 4—HANDY TYPE OF OIL CAN HOLDER

by the sectional view AA. Most everyone is familiar with the cupboard for keeping gears, which is provided in many types of machines, and one important feature which one is apt to overlook is indicated at A, Fig. 7, that is to illustrate that the floor inside of the cupboard should slope back so as to hold the box which contains the gears on a

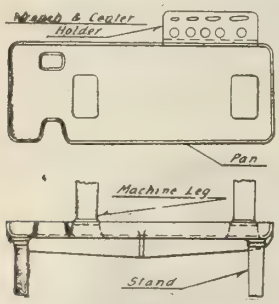


FIG. 5—WRENCH HOLDER FOR SMALL LATHE.

slight angle so they will roll back and will not fall out of the cupboard when the door is opened. In the upper right-hand part of this illustration a wooden box is shown, while the large view at

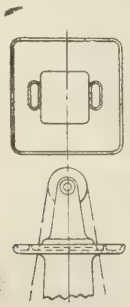


FIG. 6—PEDESTAL TYPE OF STAND.

the left shows how a cupboard appears when arranged in the base of a large lathe. Fig. 8 shows a lathe having six tool holders mounted on the carriage. On this lathe it will be noticed that a flange has been cast around the carriage making it in fact act as a pan. As a convenient means of keeping a milling machine vise or index centres where one will know where they are the shelf shown in Fig. 9 is a good example. This is simply mounted near the base of the milling machine out of the way so that

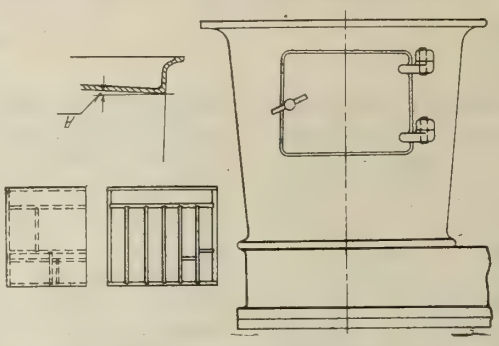


FIG. 7—ILLUSTRATING DIFFERENT STYLES OF CUPBOARDS.

the index centres which go with the machine may be kept thereon when not in use.

An arrangement of a tool tray supported on a pan which is in use on a chucking machine is shown by Fig. 10. In the upper right hand corner of this illustration an end view of this pan is

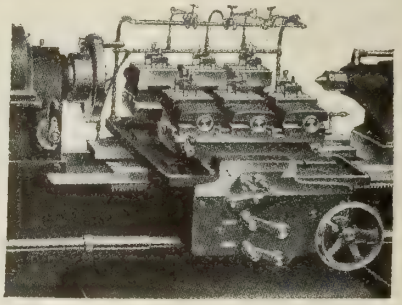


FIG. 8—THE APRON OF A LATHE AS A PAN.

shown; this pan simply has two legs on it notched to go over the edge of the pan, and one bolt is used in the centre to hold it against the top of the machine and to keep it from sliding endwise. This makes a neat and clean arrangement for keeping tools handy on a machine of this type.

In a good many instances it is possible to make the table which holds a small machine a convenient place for keeping parts in process of being machined and the tools for the same convenient. Such an instance is shown in the speed lathe Fig. 11, where it will be noted that the machine (a Brown and Sharpe) is mounted on a stand which is planed on top and has a flange cast around it for catching such dirt as accumulates in handling work suitable for this machine. On the shaper the pan is usually convenient to the operator when he is sitting down, and in the example shown in Fig. 12 the pan is cast with the guard which covers the gears of the machine. This guard of course bolts to the side of the machine and a section through it would appear as shown at the right of this illustration.

It is the little things that show the distinctiveness in machine design, particularly when these things make a more convenient machine for a man to run, and oftentimes prejudice against one type of machine is due to such things as an inconveniently placed handle or other unit of the machine which helps the operator to produce. These little things are items which the operator is familiar with, and if one machine is not as convenient for him as another he will frequently knock it to the disadvantage of the maker.

Fig. 13 shows a small furnace, and a particular feature of this furnace which is apt to appeal to a user is the support A for the soldering iron. This support holds the iron at the most convenient angle where it comes in contact with a good heat and locates it so it will not be floating around where there is no flame.

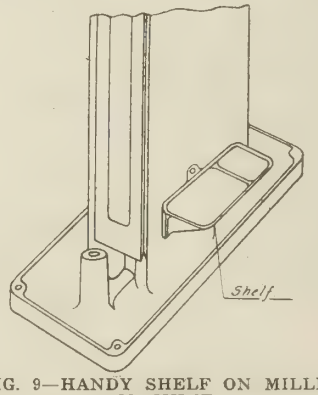


FIG. 9—HANDY SHELF ON MILLING MACHINE.

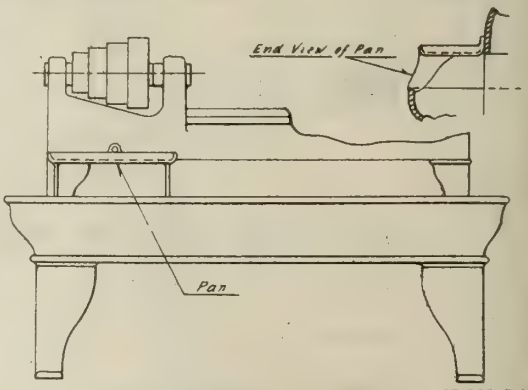


FIG. 10—TOOL TRAY SUPPORTED FROM PAN

By referring to Fig. 14 it will be noticed that two methods of holding wrenches are illustrated, one of which is the plain hook A, which goes through

FIG. 11—HAND LATHE WITH CONVENIENT PLACE FOR TOOLS.

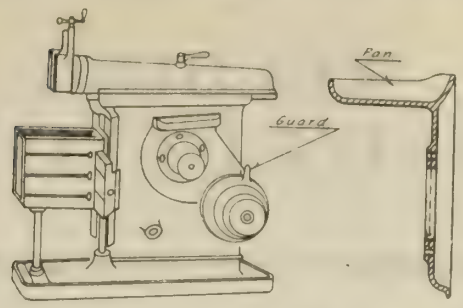


FIG. 12—STYLE OF SHAPER PAN.

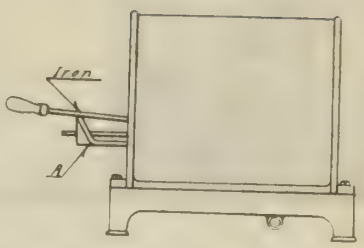


FIG. 13—SMALL FURNACE SUPPORT TRAY

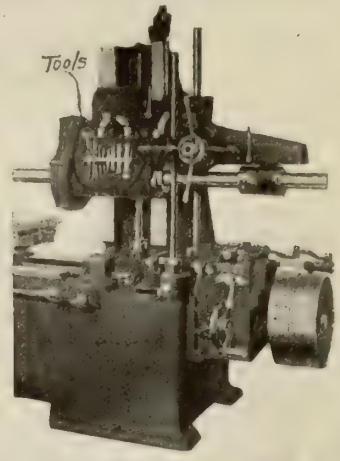


FIG. 17—BORING MILL SHOWING SOCKET HOLDER.

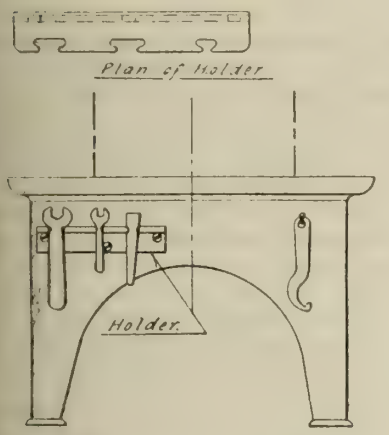


FIG. 14—TWO METHODS OF HOLDING WRENCHES.

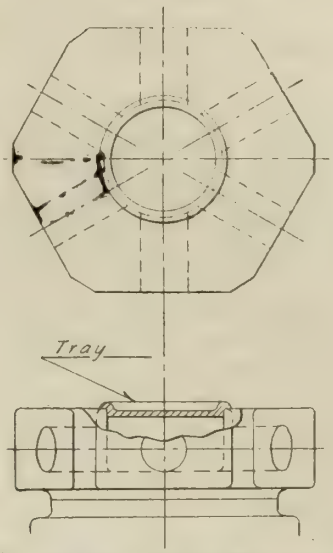


FIG. 15—TRAY CONTAINED IN THE CENTRE OF TURRET.

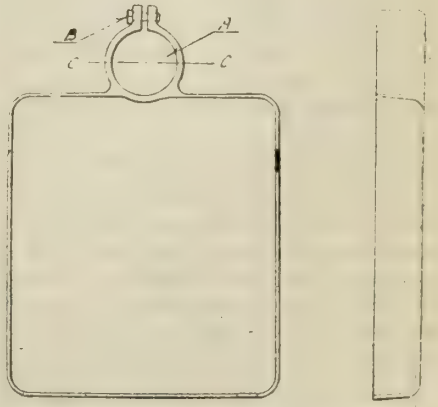
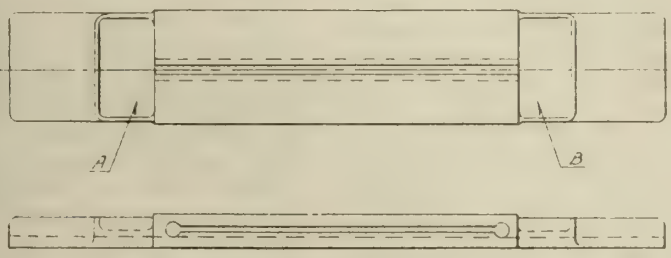


FIG. 18—LARGE PAN FOR GRINDER.



PAN FOR GRINDER TABLE.

the end of a spanner wrench in this instance. The other means of holding consists of a bracket or holder with slots as shown for holding wrenches or drifts.

Another feature closely allied to the hook for holding a wrench is a chain to prevent the wrench from being taken away from the machine, this being attached to a hole in the wrench. Another feature found on some lathes is a recess in the tailstock which forms a good place to keep a few odds and ends handy.

A tray contained in the centre of a turret is illustrated by Fig. 15, and this also acts as a guard to keep chips out of this hole. This pan is made quite shallow and is flanged to fit the hole and is particularly suitable for holding an extra supply of cutters for the boring bars generally used on a turret lathe or chucking machine.

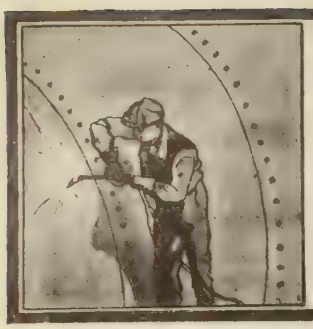
Whether the table of a grinding machine had pockets designed to be cast into it for the purpose of catching dust, water or to act as a convenient place to lay a bolt or wrench, it is hard to say, but whenever the table of a grinder has pockets such as shown at A and M, Fig. 16, these are quite generally used for keeping tools handy.

Fig. 17 illustrates the head end of a horizontal boring machine and shows how tools are kept handy by holding them in a bracket on the sliding head, such tools as wrenches, drifts and taper sockets being held thereon.

(To be continued)

SURFACE - HARDENING COPPER AND BRONZE

The hardest cupro-tin alloy is composed of 73 per cent. copper and 27 per cent. tin, and where this is obtained on a copper soldering bolt which has been "burnt" it takes a good file and much labor to remove the hard metal. By purposely adopting the same method of surface alloying, a similar hardness can be secured, and the surface of copper and bronze made practically proof against filing. The copper or tin alloy is kept at a full red heat under a coating of tin for some time, the surface forming an alloy of the maximum hardness, although care is necessary not to overdo the matter.



WELDING AND CUTTING

A Review of Some Modern Methods of Arc Welding

The Author in a Paper Read Before the Institute of Mechanical Engineers, London, Makes Interesting Comparisons of Various Systems

By THOMAS H. HEATON

A MORE recent development of the Thomson system of resistance or contact welding is made by machines adapted to more or less special purposes. There are two varieties of operation, spot welding and roller welding. The principle is the same in both. The work is placed between electrodes of pure copper and current is passed through it causing heat at the point of contact while pressure is applied to the work closing the joint and completing the weld. The current is supplied to the primary winding of a transformer placed within the machine. The secondary portion of the transformer consists of that portion of the machine that does the work and terminates in the electrodes. The current varies according to the speed and the thickness of the work. In thin work of, say, 20 B.G. the voltage at the electrodes may be ½ to 1 volt, and the current, say, 80 amperes. The current is again alternating and of single phase.

The current, the pressure of the electrodes upon the work, and the speed of operation must be carefully adjusted each in relation to the others. With mild steel 20 B.G. thick perfect welds may be made at a speed of about eight seconds to the lineal foot between rollers. Where rollers cannot be applied the welds are made by a series of spots. If the spots overlap tight joints are made. Where tightness is not essential the spots may be applied at intervals. The welds are very strong and sound, and probably the metal is left in a better condition with this than with any other system of electric welding.

The best work is produced when the machines are regulated automatically. That is to say, where the time during which the electrodes are impressed upon the work does not depend upon the workman but upon the machine. The author is referring here more particularly to spot-welding. In roller welding the feed must be automatic.

Some spot welding machines are so arranged that the workman regulates the time during which the current passes by means of a treadle. He may allow the electrodes to be in operation too short a time, and so fail to heat the metal sufficiently to make a weld, or he may keep them in operation too long and burn or melt the metal. An automatic release regulating the time is obviously preferable. Machines used by the author are for welding thin sheet metal from 24 B.G. to, say, 14 B.G. Machines have, however, been made for dealing with far greater thickness, such as ½-inch to ¾-inch where welded spots take the place of rivets, saving time and labor. It is conceivable, however, that this system has its limits, especially where rollers are used, owing to the disintegrating effect upon them of the heat due to large currents; although the electrodes are in all cases hollow and cooled with water. So far as the author is aware, this system is chiefly applied at present to thin metal.

To weld successfully and to produce the best results so far as the metal at the weld is concerned, the metal to be welded must be suitable. The author refers more particularly to mild steel. It should be made by the open-hearth process, sound, of regular thickness, and low in carbon, sulphur and phosphorus. Otherwise it may be difficult to weld or the weld when made may be brittle. More especially in resistance welding of thin steel the metal must be clean and free from scale. Too much phosphorus tends to make the steel brittle when cold, too much sulphur tends to prevent welding and to hot shortness. Too much carbon prevents welding.

The author has found that for welding it is best to keep the carbon content below 0.1 per cent. and sulphur not above 0.05 per cent. Recently the author found that open-hearth sheet steel of the following analysis in thin sheets would not weld by the resistance method:

	Per cent.		Per cent
Carbon	0.19	Sulphur	0.097
Silicon	0.05	Phosphorus	0.075
Manganese	0.44		

Whereas the following welded satisfactorily:

	Per cent		Per cent
Carbon	0.09	Sulphur	0.07
Silicon	0.05	Phosphorus	0.15
Manganese	0 38		

It is to be noted that the sulphur content is high, especially in the former. Both these steels worked and flanged well, although in the latter the phosphorus is high. With the arc system the need for extreme cleanliness is not so great, as they are not so sensitive, but

Results of Experiments to Ascertain the Tensile Strength, etc., of one piece of Iron Bar, Electrically Welded in the presence of Mr. W. G. Kirkaldy, at Messrs. J. W. & T. Connolly's Works, King's Cross.

Test No	Description	Original Size.	Original Area.	Ultimate Stress—Total.	Ultimate Stress—Per sq. in. of Original Area.	Ratio of Weld to Solid.	Contraction of Area at Fracture.	Extension—In 2 ins.	Extension—In 3 ins.	Extension—In 4 ins.	Appearance of Fracture.
		in.	sq. in.	lb.	lb. tons.	%	%	%	%	%	
4498	(Bar 1⅝-in.) (× ½-in.)	(1.22) (×) (0.485)	0.592	34,128	57,649 = 25.7	—	36.7	31.0	24.0	21.5	Fibrous
4499	(Bar 1⅝-in. ×) (½-in. Weld) (midlength)	(1.22) (×) (0.445)	0.543	27,520	50,681 = 22.6	87.9	12.3	8.0	7.0	6.2	Broke at weld Fibrous

to a certain extent the same conditions apply.

In heavier material welded by the Benardos arc, mild steel of the following analysis welded well:

A

	Per cent		Per cent
Carbon	0.10	Sulphur	0.044
Manganese	0.46	Phosphorus	0.054

whereas mild steel of the two following analyses would not weld satisfactorily:

	B	C
	Per cent.	Per cent.
Carbon	0.15	0.10
Manganese	0.52	0.40
Sulphur	0.093	0.086
Phosphorus	0.141	0.073

(The silicon content was not given in these analyses.)

On the other hand good welds were made of mild steel constituted as follows:

D

	Per cent.		Per cent.
Carbon	0.15	Sulphur	0.025
Silicon	0.009	Phosphorus	0.068
Manganese	0.64		

Thus, although the carbon is high, it does not account for the fact that sample B would not weld well. The failure therefore must be due to other constituents. Probably the chief cause was the high percentage of sulphur. Where sulphur is high it seems to cause boiling of the metal, which after cooling is full of the craters of burst blisters. The great heat of the arc and the freedom of fusing enable this phenomenon to manifest itself.

The author particularly desires to draw attention to this question of quality, which has not hitherto received the general attention it deserves. He is of opinion that careful scientific investigation of the effect of each of the constituents of ordinary mild steel would be of considerable value.

There are special hard steels made, however, which will weld, and mild steel can be welded to them. For example, certain tool-steels can be welded to mild steel shanks. In some cases these welds can be made by a blacksmith, but resistance welding-machines are made for effecting these welds electrically. They require very careful regulation of current and steel of suitable quality. The author has seen most effective welds of high-speed tool-steel to mild steel made in such a way that only the cutting edges of the tools are of the high-speed quality.

Different kinds of high-speed steel require various methods of treatment, and to make successful welds requires some experience of the steel in order to regulate the welding temperature. The temperature appears to be a matter of the greatest importance to enable such welds to be effectively made. In some cases it is found that the high-speed steel heats much more quickly than the mild steel to which it is being welded, and some high-speed steel heats much more quickly than others. In welding this steel the current is applied until the high-speed steel reaches a red heat, and is then cut off to enable the heat to be communicated to the mild steel. The switch for turning the current on and off is manipulated accordingly, the current being continually started and stopped as the operator watches the heating effect. As the steels become softened by the heat, pressure is gradually increased squeezing the two steels together.

There is of necessity a good deal of sparking at the switch during the operation, but the economy effected by using a small quantity of the comparatively clear high-speed steel for the cutting portion of the tool as compared with the larger quantity of mild steel in the shank is very considerable. It is scarcely possible to obtain analyses of the various high-speed steels, but among others the high-speed steel known as Stellite is effectively welded in this way.

Testing

It is the author's opinion that an efficient system of testing should be applied as far as possible to all welds. Nothing goes out of the author's works that is not tested. The tests should be designed in relation to the welds made and the purpose they are required to fulfil, and should be as thorough as possible without over-straining the material. A good test for metal not subjected to pressure is to hammer the welds when cold to break superficial skin welds, and then to apply petroleum to the weld. Petroleum is very penetrating and will come through a defect quickly as a rule. It also has the advantage of showing clearly by a black spot or stain exactly where the defect is.

For vessels subject to internal pressures, it is best to apply either a test with compressed air for low pressures, say, up to 20 lb. per square inch, or a hydraulic pressure test for higher pressures. A high-pressure test with compressed air is dangerous and should not be used, or if used should be applied only by skilled operators under strict conditions. A slight air-pressure may indicate defects either by dipping in water, in which case bubbles appear, or by applying a soap solution to the surface so that defects are indicated by soap bubbles.

There are certain welds, however, that cannot be very easily tested. For example, the hull of a ship is a very modern application of electric welding. Pressure cannot be applied. The petroleum test cannot be applied unless the joints are so made as to be suitable for such a test. The author is inclined to think that in such a case V joints should be carefully prepared, and the welds made by the Quasi-Arc process if electric welds are desired. Petroleum could then be dabbed on to the inside of the plates at the welds and defects would be indicated and could be remedied. Before applying the petroleum the welds should be smartly hammered to break superficial skin welds, more especially for thicker plates. With lapped joints it would not be possible to apply such a test effectively. It is probable that this kind of weld would be better than a hammered weld. It would be difficult to hammer properly such a weld, and as hammering tends to draw the metal somewhat an attempt at hammering might lead to distortion and irregularity of the surfaces at and near the joints.

The stresses upon the hull of a ship, however, are so varied and so incalculable that a petroleum test alone would, in the author's opinion, not be adequate. To make dependable welds in such a case demands the highest skill in the welders, whose reliability should be proved by tests upon selected welds of a similar nature. The welding of ships has been discussed within recent months, and it is an open secret that experiments have been and are being made. It is claimed and appears clear that there would be a considerable saving in labor and a consequent increase in the speed of ship production. It should not be overlooked that, provided really good welds can be ensured, they are stronger than the best riveted joints and are tight. The question of welding the hulls of ships is a very serious one, and while the author would encourage experiment and research with confidence, he would at the same time advise caution in such a matter.

In testing welds there are, of course, the well-known methods of testing for tensile strength, for elongation, for hardness, etc. A good electric weld should have fully 90 per cent. of the strength of the original metal. These tests, however, do not fulfil all needs in such cases as, for example, the hull of a ship subjected to complicated stresses.

In considering ordinary tensile and elongation tests as applied to welds, it is clear that their results may be misleading. First, the Benardos arc is the only electrical arc system that produces a true weld. The systems using a metallic electrode are more in the nature of soldering, inasmuch as they unite the parts to be welded by means of a substance differing very often from those parts. As a criterion of the relative strength of the original metal and the weld, it is obvious that the comparison is scarcely a true one.

Secondly, elongation is again scarcely to be considered a true test, because at the actual point of union the nature of the added metal is not the same very often as that of the original.

Mr. Strohmenger has designed apparatus to test in other ways. In one case he has made a machine to test by alternating torsional stresses. A test-piece is inserted in the machine and gripped at each end in a vice. One vice is stationary and the other movable. The movable vice has a rocking motion so that the test-piece is subjected to torsional stresses of 20° (10° on each side of the centre line) and is turned backward and forward until it fractures. The weld would in such a test-piece be in the centre lengthwise. It is found that in good mild steel a piece about 18 inches between the jaws and without a weld in it will withstand about 250,000 twists be-

fore fracture. A good weld should approach 90 per cent. of this figure in material suitable for welding.

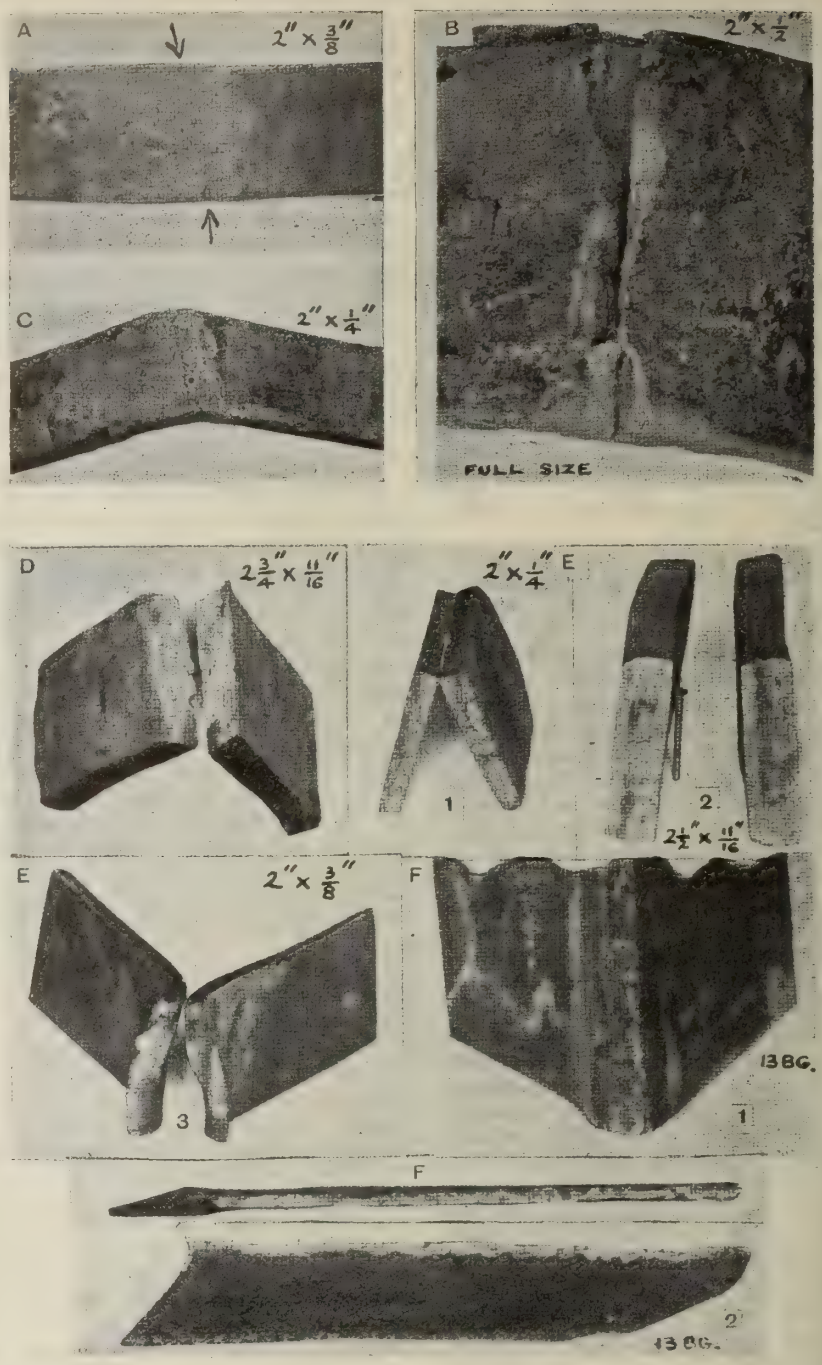
Mr. Strohmenger has made another testing machine for combining an impact with a bending test in rapid alternations. It appears to the author that these methods of testing are worthy of consideration. Adequate tests of reliability and good quality seem to be especially necessary in view of the recent development of welding. All kinds of people have been called upon to make welds. Very few are capable of making reliable welds of varied character. Often the best looking welds are the worst welds through being superficial. The old adage, "beauty is but skin deep," is very applicable to welds.

A very remarkable test of the metal composing the welds has recently been made, involving a disturbance of the structure to an extent which the author would have expected the welds would not resist. A number of mild steel cylinders, each about 1 foot long by 10 inches outside diameter of open-hearth mild steel of 26 tons per square inch ultimate tensile strength ⅜ inch thick, were welded longitudinally. These were reduced by means of dies in a hydraulic press at one end to about 4½ inches outside diameter. The cylinders were reduced in three heats, the first reduction being 4 inches in diameter, the most severe of the three. These were welded by means of the Benardos electric arc with carbon electrode, and so long as the welds were properly made they withstood the operations successfully. Welds made with a metallic electrode did not stand, they broke early in the first pressing and overlapped in the dies.

Welds made by oxy-acetylene gas did not break, but the soft iron joint squeezed out so that the dies would not quite close, and the length of the finished article did not come out so great as was desired. The length had to be increased by building up with oxy-acetylene.

In addition to the varieties of work referred to, electricity is being used for cast-iron, for aluminium and other metals. Even pure nickel has been spot-welded. There is not room within the limits of such a paper as this to do more than mention them. Where electricity is used for welding cast-iron it is in most cases employed with a metallic electrode. Both the Kjellberg and the Quasi-Arc processes are used in this connection. The author understands that in America the Slavianoff process has been used with considerable success, notably in the repairs to the cylinders, etc., of the engines of the German ships "Vaterland" and others that were requisitioned by the United States Government.

Where electric welds were made, mild steel was first deposited on the cast-iron surfaces, and the final joint made by welding the mild steel parts together. In this case there was no pre-heating. It is interesting to recall that, as far back as 1891, metallic electrodes were



used of ordinary grey cast-iron by Messrs. Lloyd and Lloyd, at Halesowen. A number of repairs were effected, notably a fly-wheel which had broken in the arms and which was welded in situ. Fires were lit round the wheel to heat it before welding, and it was welded while at a red heat.

The author would like to acknowledge with thanks information about systems of electric welding in which they are interested supplied by the following gentlemen and firms, who have kindly furnished illustrations, samples of welded articles, or have allowed the author to see their works in operation, namely, Mr. Longley, of Messrs. Smith, Parfrey and Co., Ltd.; Mr. T. F. Tate, of the Electric Welding Co., Ltd.; Mr. Rokes, of the Telegraph Construction and Maintenance Co., Ltd.; Mr. Strohmenger, of The Quasi-Arc Co., Ltd.; Mr. H. S. Marquand and Mr. Kennedy, of The British Arc Welding Co., Ltd.; Mr. Devey and Mr. Millinger of The British Insulated and Helsby Cables, Ltd.; Mr. Burfitt of The Associated Equipment Co., Ltd.; Walthamstow; The Haslam Foundry and Engineering Co., Ltd., Derby; Mr. Green of Eliza Tinsley & Sons, Old Hill; Mr. Meacher of the Westminster Engineering Co., Ltd.

The Vapor Car Heating Company of Canada has been formed, with a capital of $120,000, divided into 2,400 shares of no nominal or par value and 1,100 shares of preferred stock of one hundred dollars each. The chief place of business is Montreal, and the company will manufacture heating and ventilating apparatus for railway cars, steamships, buildings, etc.

The Adaptability of Oil Fuel to Industrial Purposes

In 1917 the largest quantity of oil fuel used for furnace purposes was for heating billets in connection with the manufacture of shells, while in pre-war times the principal consumers were glass bottle manufacturers and makers of rivets, bolts and nuts. For forging or drop stamping wrought-iron materials the metal must be heated up to about 2,500 deg. F. This temperature was formerly obtained by placing iron bars in a coke furnace of the type used by the wayside smith, though of improved construction and larger dimensions. Till gas and oil fuel were introduced the process was rather a slow one, but since oil has been used in an intelligent manner the output of each new or converted furnace has been trebled. Further the size of the furnace is reduced by 30 per cent. The working area occupied by a furnace and its adjacent machines is only about 50 per cent., more area has to be occupied by a stack of coal and behind it by the resultant ashes. With oil fuel these spaces can be used as furnace pitches.

In recent years many metal-melting manufacturers have either scrapped their coke-fired furnaces or converted them to gas or oil. Of these two gas is probably to be preferred, except that its calorific value in any town may vary hourly while that of oil is constant. The principal metals melted at present are aluminium and 70/30 brass. The former is usually melted in "lift out" crucibles, the melted metal being carried to the moulds, whereas brass is melted in tilting furnaces, to which the moulds are brought. For liftout furnaces melting low fusion metals the average oil-fuel consumption is about 15 per cent., and for tilting furnaces about 10 per cent. of the metal melted; that is, for every 100 pounds of metal melted the former would consume about 1½ gallons and the latter 1 gallon.

In the early years of this century a French engineer took up the case of oil as an auxiliary to coal. Several evaporative trials were made with the boiler of a French Navy ship burning coal alone at the rate of 18.8 lb. per sq. ft. of grate per hour and burning coal and oil in different proportions at the rate of 21.3 and 21.7 lb. of mixed fuel per sq. ft. When a mixture containing 5 per cent. of petroleum was burned the evaporation showed an increase of 5 per cent. over that with coal only, and when the proportion of petroleum was 64 per cent. there was an evaporative increase of 56 per cent.

About four years ago power-station engineers began to take an interest in the subject, on the theory that in connection with oil fuel a poorer class of coal could be used than could be burnt satisfactorily under the boilers. Poor coals tend to cake on the links of the chain grate stokers, preventing the quantity of the air necessary for complete combustion from being drawn in; hence a smouldering mass travels along the bars and is dumped into the ashpit only partly consumed. But with oil fuel the argument was that, owing to the almost perfect combustion obtained, the combustible gases rising from the coal fuel bed would be quickly ignited and would cause the mass to become much more incandescent, thereby tending to aerate the bottom mass, which would then allow sufficient air to be drawn through to complete the combustion of the rest of the poor coal. Tests were carried out under a coal-fired Stirling water-tube boiler. One burner was placed on each side, about 25 per cent. from the back of the grate, and oil gravitated from an overhead tank to the burners, which were of the Kermode steam-jet type, working with steam at 25 lb. pressure. In the first test a nutty slack having a calorific value of 10,400 B.T.U. was employed, and a boiler efficiency of 69.25 per cent. was obtained; the temperature of the combustion chamber was 2,648 deg. F., and of the uptake 660 deg. The last of the tests was carried out with a nutty slack of 10,300 B.T.U., and Mexican fuel oil of 18,750 B.T.U., the proportion of oil to coal being 8 per cent. on a B.T.U. basis and 4.96 per cent. on a weight basis. A boiler efficiency of 74 per cent. was obtained, and the temperature of the combustion chamber was 2,850 deg., and of the uptake 628. With coal at 20s. 10d. a ton and oil at 50s. a ton, the cost of a ton of water evaporated with coal only was 2.8s. as against 2.62s. with coal and oil, the money saving with the latter thus being 6 per cent.

CASITNG STRESSES IN IRON CASTINGS AND THEIR RELEASE

An iron casting, when left unmachined, will move somewhat in the course of a few months, but will then remain steady until the skin is removed, when again the whole or partial removal of the outer parts will again cause the metal to move and a period of usually some months will be necessary to again secure steadiness. All cast metals in the state in which they leave the moulds are in a state of internal stress until this has been removed by annealing, or some other method of treatment, but it is iron which is now being dealt with in the form of ordinary grey castings—not what are termed amalleable cast iron, which is a special production—and in the ordinary course, as these castings leave the moulds, they are subject to internal alterations of the stresses set upon casting, which causes the casting to move, or "warp," as it is more usually termed.

In the ordinary way, if you plane off or otherwise remove the outer skin of an iron casting, and store it away on edge for from six to three months, according to its shape and size, afterwards finishing the mechanical work and giving a further short period of rest, you secure that the release of the stresses is such that future movement is practically non-existent; but this takes time, and unless time is an unimportant matter, this form of treatment becomes commercially impossible, and must either be used in combination with heat treatment, or the heat treatment must alone be relied upon.

In what is called "annealing" grey iron castings, considerable heat has to be gradually applied and held for an hour or so, and then gradual cooling must take place, the castings being cold at the start. No great change takes place in the hardness of the castings, the annealing not having the same effect as on a steel casting, which, with careful packing, can be softened very considerably, but certain small changes take place in the iron, and probably a little carbon is absorbed by the skin at certain temperatures. Probable the best method of working is to pack small castings in open flasks with chips, such as are produced by a mortising machine, mixed with a little sawdust, and to place these in a muffle or furnace, the heat being gradually raised to about 900 deg. Cent., and held there for a time, and then gradually cool off, the whole process being completed in under twelve hours. Larger castings could be placed on a bed of chips in the muffle or furnace and have chips well packed amongst them, being careful not to pack too closely, and the heat applied, the heavier articles taking possibly double the time as the small ones. The muffle may be a rough-and-ready one, a piece of a 3 ft. boiler smokestack doing very well, if the ends are roughly blocked up with dry bricks, as the smoke and gases must escape to prevent the pressure bursting some part of the oven or muffle.

After cooling, the castings should be brushed off clean and machined, if necessary; a second heating, perhaps, then being given to ensure that any unequal stress caused by the machine is set free.

Castings made from wrought iron or mild steel should be packed in ore and heated to nearly 1,200 deg. Cent., for some hours to cause the change of structure necessary to secure amalleability, the length of time depending largely on the bulk of the articles. The treatment of these castings must vary with the content of the metal, and no hard-and-fast lines of working can be laid down. For instance, it is possible to make wrought iron castings which can be bent cold to an angle of more than 90 deg. in the state in which they leave the moulds, and in such cases annealing is scarcely ever wanted, but low grade castings would have to be annealed to get the same malleability. This work, unlike the heat treatment of the grey iron castings, is really annealing, and requires the supervision of skilled workers, quite different to that given to the heating and cooling of the grey iron.

WHAT OUR READERS THINK AND DO

Removing and Replacing Ceiling Motor Armatures

A Handy Rigging Which Enabled Heavy Armatures to be Handled With a Minimum of Labor and Time—Two Pair of Chain Blocks and Small Buggy the Means

By T. H. FENNER, Associate Editor

IN manufacturing plants where the motors are suspended from the ceilings it is often necessary to remove an armature for repair and replace it by a spare one. The ease with which this work can be done depends on the familiarity of the millwright's crew with the job, and the gear available.

Direct-current motors of medium speeds and power have armatures weighing up to twelve hundred pounds, and require careful handling if they are to be moved without damage to men or property. This is especially the case where they are suspended from ten to fifteen feet in the air.

In one plant the writer has in mind a very good system had been evolved for doing this kind of work speedily and safely. The ceiling motors were about forty-five in number, running all the way from 1½ h.p. to 75 h.p., but the majority were 35 and 75 h.p.

Spare armatures were kept, and the rule was to remove an armature whenever it gave signs of becoming troublesome and replacing it with a spare. Sometimes of course an armature would burn out through various causes durin the working hours. This would mean certain number of machines being stoj ped, and in this case speedy replacemen was a necessity.

The motors were fastened to chann irons, which were in turn fastened t the I beams of the concrete floor abov These beams were made heavier tha the ordinary floor beams in view of tl extra weight. The line shaft was dire coupled to the motor shaft in most case and in some instances, where one mot drove two adjacent departments, ea end of the motor shaft drove a li shaft. This of course made more wo when an armature was to be removed

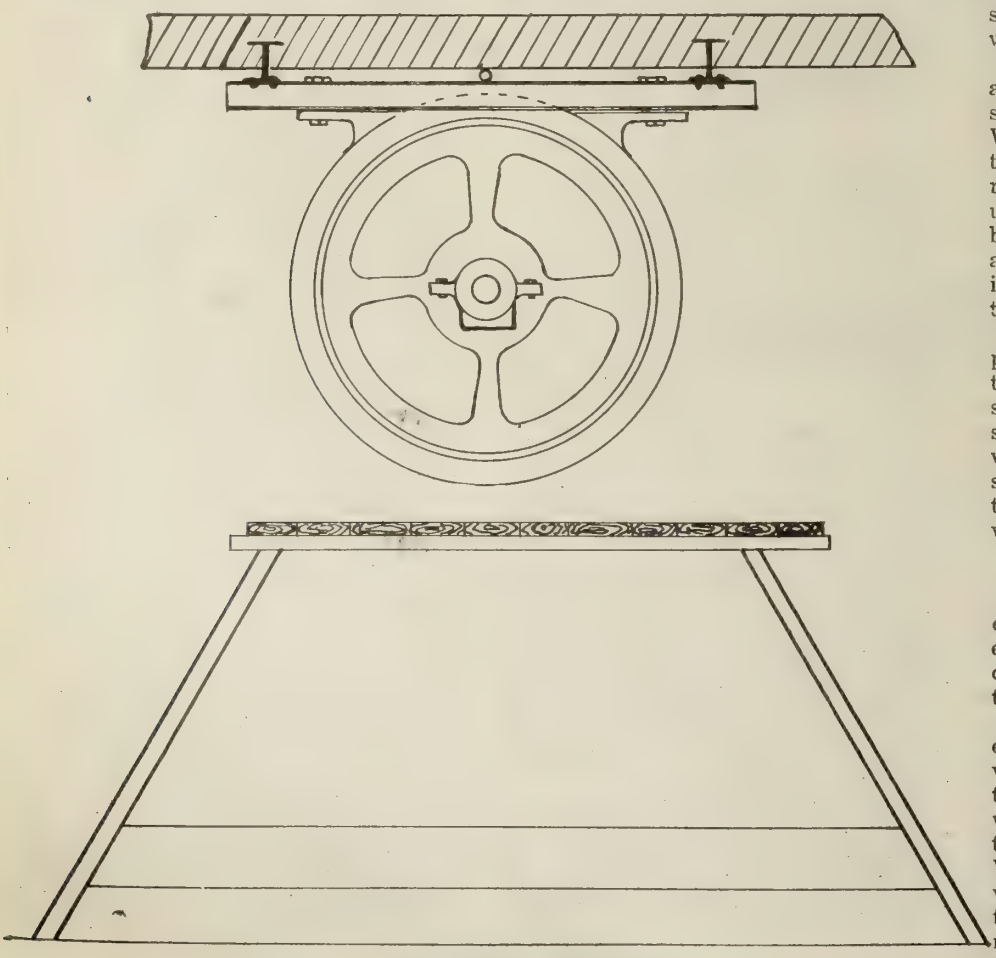
The hangers for the line shafts we about fifteen feet apart, the length shafting being about seventeen fe Where a heavy pulley was installed b tween the motor coupling and the fir regular hanger, extra hangers would used to take the weight of pulley a belt pull. The hangers were of the se aligning type, and were bolted to thre inch wooden stringers, which were turn fastened to the floor I beams.

In the millwright's store was kept pair of strong, high trestles and enou two and three-inch planking to make strong working platform. A supply square blocking was also on hand a was kept for this particular work. strong four-wheeled truck for movi the armatures from and to their pl was also kept here.

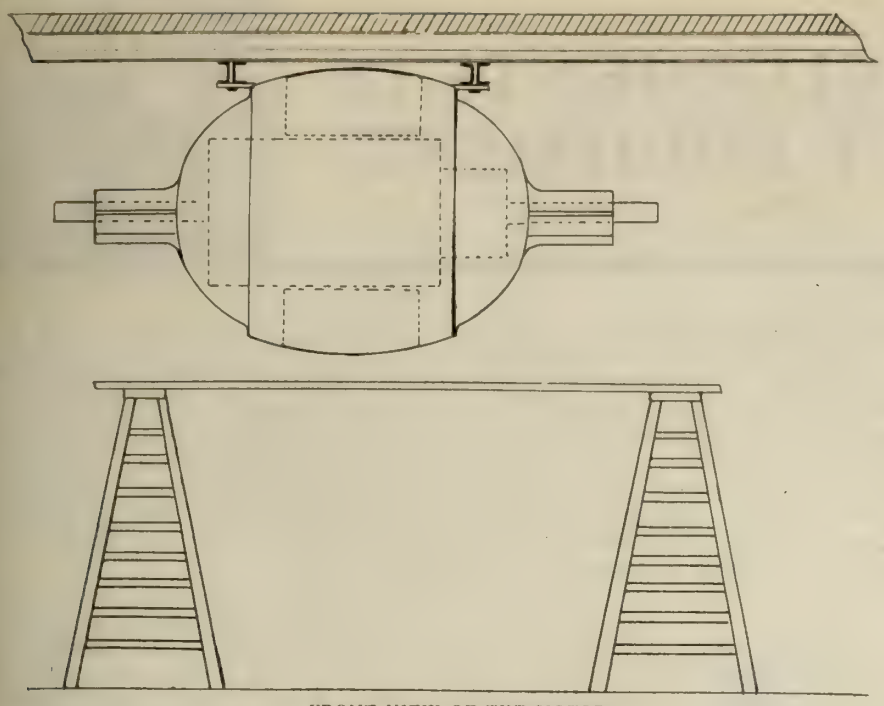
The Method of Procedure

The best way to describe the meth employed is to follow the course events from the time of receiving w of a burn-out till the repair is made a the motor running again.

The first step would of course be examination by the electrician, and would decide whether he could eff temporary repairs, or if the armat would have to be removed. If this the case work would start immediat While the electrician and his hel would disconnect the leads and rem the brushes from the commutator, millwright's gang would hustle o their trestles, chain blocks, slings, e



SIDE VIEW OF THE MOTOR.



FRONT VIEW OF THE MOTOR.

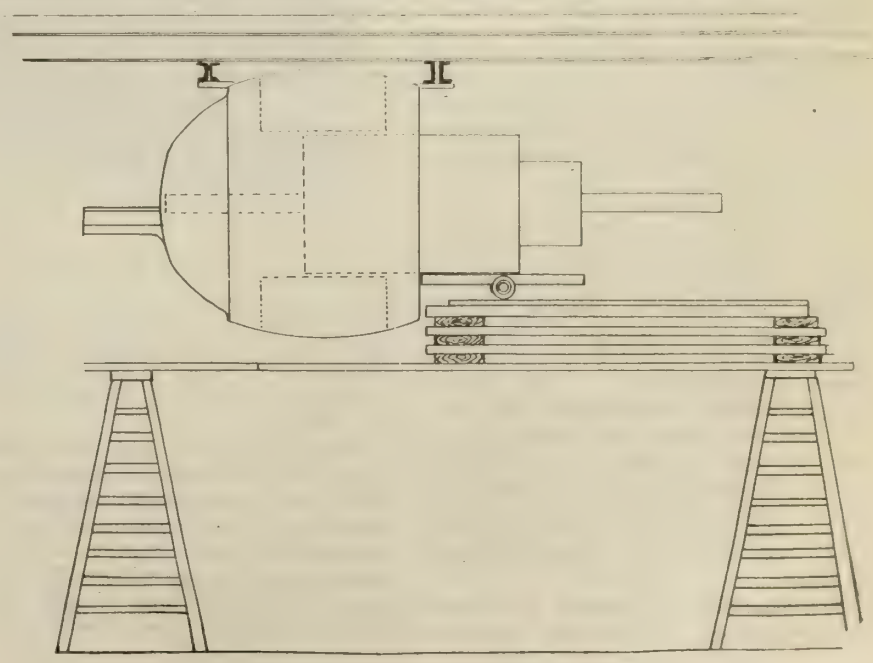
The first actual dismantling would be the removal of the length of shaft immediately adjoining the motor shaft. If there were no pulleys on this length the caps of the bearings would be removed and the length slid back over the hangers far enough to leave room for the armature to come back. If fitted with pulleys these would have to be removed first, though in some cases it would be feasible to lower the whole length of shaft, with hangers and pulleys intact. The shaft out of the way, the next step would be to remove the end housing. This was done by hitching the ½-ton chain blocks to a stringer placed on the ceiling and before slacking the cap bolts holding the housing, taking the weight of the armature on the chain block. The bolts are then taken out and the housing pulled back, the blocks being slacked out till the weight of the armature comes on the field magnets. The blocks are then hitched to the housing and the platform is opened up by removing two or three planks, and the housing lowered to the ground.

On the channel iron to which the motor is fastened, a length of shafting has been left for the purpose of holding the chain blocks. Two pairs of blocks are used, one at each end of the armature. The hook of the chain block at the end opposite to the commutator is passed down through the openings in the housing but is not used till the shaft is just leaving the bearing. It may not be needed at all, but it saves time to hang it up ready before moving the armature. The armature is moved out by the block at the commutator end by leading the block out of the perpendicular so that when tightened up it tends to straighten out, pulling the armature out with it.

By the time that the other end of the armature shaft is ready to leave the bearing another very useful little arrangement is brought into play. This is a small bogey mounted on two wheels at the centre and made with its platform curved to a radius approximately close to that of an armature. Blocking is made up on the working platform till the bogey can be set in just underneath the armature. If the armature is far enough out of the frame to rest on the bogey without tipping, the back pair of blocks will not be needed. Usually, however, the back chain block is tightened up sufficiently to prevent the armature dropping when the shaft comes out of the back bearing. Holding the weight on the two pair of blocks, the armature is worked out until it is fairly over the bogey, and then lowered. This done, the bogey is pulled back on the blocking till the armature is clear of the motor frame altogether. The use of this little carriage saves a great deal of time which would be otherwise used in making flutes and changing blocks. The next step is to lower the armature on to the working platform, which is done by taking a turn on each end of the shaft with the chain blocks and then removing the blocking. This gives more head room and the yoke for lifting can be put on. This is made up of a piece of 3-in. I beam with an eye in the centre for hooking on the blocks. Two pieces of ¾-in. round iron are screwed at each end and bent to a V shape, with the lower end widened out. These fit over the shaft of the armature, the screwed ends passing through the lower flange of the I beam and fastened with nuts. The 1-ton blocks can now be used for lowering. The weight is taken on the blocks, the platform opened up and the armature is lowered on to a truck moved in ready to receive it. This truck is then moved out and the spare armature moved in on its truck. The yoke is taken from the old armature and placed on the new, and it is heaved up. The platform is then replaced and the armature lowered on to it while the yoke is removed. The chain blocks are once more hitched at each end of the shaft, the armature raised up and the blocking put in again with the carriage on top. Working the armature into the frame is probably the most awkward part of the job as the shaft has to be entered fairly into the far end bearing and the oil rings held up carefully till the shaft has passed. The two pair of blocks are used when the carriage has reached its limit.

The armature replaced, the remaining parts of the work do not take long. If all goes well with connecting up the shafting, and couplings can be trued up reasonably quickly, three hours will see the completion of the whole job. This, to remove an armature weighing perhaps 1,000 pounds, and replace it with another, move and replace shafting, and rig platform and gear, is good work.

The number of men engaged on this work was usually five for the heavier motors. Of course handling the smaller ones was only a light job, and two to three men were sufficient.



VIEW SHOWING ARMATURE ON BOGIE.

DEVELOPMENTS IN SHOP EQUIPMENT

HEAVY SERVICE DRILLING MACHINE

THE heavy service drilling machine, as illustrated and described herewith, has been designed by the Defiance Machine Works, Defiance, Ohio, to give constant service, without the constant care usually given drilling machines, having embodied in it several features which make it a very rigid and efficient tool. It has capacity, with a large factor of safety, for driving 3 in. high speed drills in solid steel.

The machine is entirely enclosed, which allows a gravity oiling system to be operated with a continuous flow of oil. The oil reservoir is in the bottom of the housing, from which oil is pumped to the top of the spindle, flowing to all parts of the machine and back to the reservoir. This eliminates the human factor in the care of this machine, which insures endurance and long service.

No countershaft is required with this machine, as it is a single pulley drive. The spindle speeds are obtained by means of two cones of hardened gears, running idle except when one set is meshed by a roll-in hardened gear operated by a lever at the side of the machine within easy reach of the operator. This feature is of our own design and eliminates the constant trouble with change gear devices.

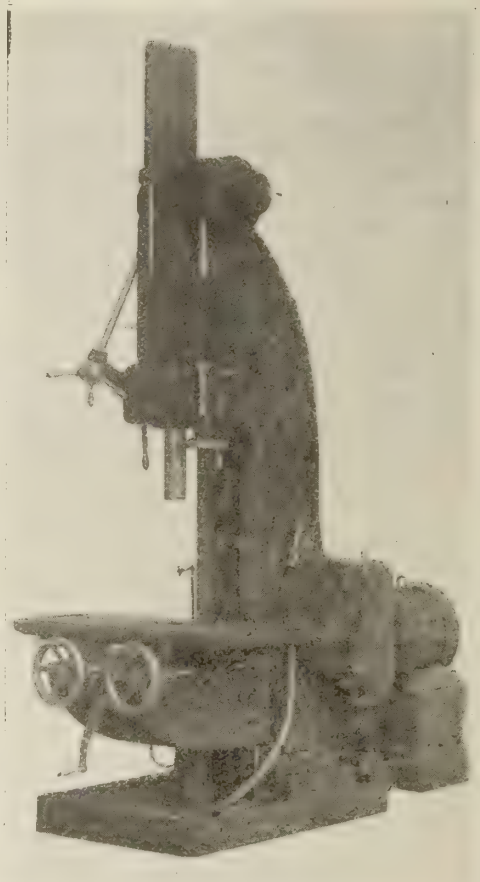
Helical gears are used to drive the spindle; they have two keys through the driving sleeve into the spindle, near the nose, eliminating all torsion to the spindle. The thrust of keys and helical gears is taken by a large thrust bearing. This combination insures smooth motion to the spindle and constant pressure on the drive and feed mechanism, thus insuring long service.

The thrust of the feed pinion on the rack in the spindle sleeve is taken by roller bearings on a centre on the opposite side of the sleeve, eliminating all friction of sleeve in bearing. Hyatt roller bearings are used on all drive bearings, while all slow-feed bearings are bronze bushed.

The spindle is of forged high carbon steel, 3½ inches in diameter at the nose, and our unique drive enables us to drive the spindle at this diameter. The thrust of the spindle is taken by an S. K. F. thrust bearing, which they guarantee to eliminate thrust bearing trouble.

The drive is a unit located in the back of the housing. In this unit there are two cones of four gears each, running idle except when one set is meshed by a roll-in gear. These cones of gears are driven by back gears operated by a high-grade friction clutch located on the pulley drive shaft.

The table is of box type with liberal bearing which is gibbed to the column. It has a vertical adjustment of 15 inches by means of large telescopic screw operated by lever in front of the machine. The screw is located from the centre of the spindle towards the column sufficient to allow boring bars to pass through the table.



GENERAL VIEW OF MACHINE.

Four changes of feed are obtained by means of two cones of gears operated by a lever conveniently located. The power feed stop is obtained by a lever connected to clutch on the worm shaft. It is operated by an adjustable stop rod connected to the top of the spindle, which eliminates the constant trouble with automatic stop devices. The feed is transmitted to the spindle by a large worm gear, the enclosed feature of the machine enabling this mechanism to run in oil together with the fixed centres of the worm and worm gear, gives a powerful worm feed drive. Quick traverse of spindle is obtained by means of a pilot handle within easy reach of the operator.

The tank for the cutting compound is located in the base and is part of the regular equipment. The lubricant is controlled by a single valve near the outlet, the pump having a relief valve.

The compound table is not an attachment to the regular table, but consists of a special box-type bracket to support the intermediate slide and the table, which has a working surface of 17½ in. x 35 in. This table has an adjustment of 18 in. longitudinally and a crosswise adjustment of 9 in. It has three tee slots, running lengthwise, and a liberal oil groove. The screw for elevating is the same as used on the plain table. When the compound table is furnished it is necessary to use a higher column, in order to give the same maximum distance from nose of spindle to table as on the plain machine.

The tapping attachment is extra also, and is an all geared fixture located directly behind the main spindle drive gear. It is operated by a lever to jaw clutch between the forward and reverse train of gears. The feature of the drive near the nose, with two keys through the drive sleeve, with the thrust of the two keys taken on a large thrust bearing eliminates the friction and makes it possible to tap holes without tearing the threads

Capacity with high speed drills in solid steel	3"
Length of power feed	16"
Diameter of spindle nose	3½"
Diameter of spindle drive	3½"
Morse taper in spindle	No. 5
Diameter of spindle sleeve	3½"
Width of steel rack on sleeve	2"
Pitch of steel rack in sleeve	6
Diameter of feed pinion shaft	3"
Pitch of feed pinion	6
Width of helical drive spindle gear	2½'
Centre of spindle to face of column	12"
Maximum distance nose of spindle to top of plain table	32"
Maximum distance nose of spindle to top of compound table	32"
Working surface of plain table	20" x 22'
Working surface of compound table	17½" x 35'
Vertical adjustment to table	15"
Four feed changes	.007, .012, .018, .04
Eight spindle speeds	51, 81, 102, 128, 162, 204, 253, 40
Diameter and face of driving pulley	22" x 5¼
Speed of driving pulley	425 R.P.M
Height of machine with plain table	9' 3½
Height of machine with compound table	9' 8¾

LIBERTY 48 in. OPEN SIDE PLANER

THE Liberty Machine Tool Co., Hamilton, Ohio, have developed the open side planer shown in the accompanying illustration. The design embodies all of the advantages and features of the double housing planer in addition to handling work of unusual width. A notable feature is the rigid construction of the cross rail and column, making it possible to take any cut which the tool will stand, and adapting it to all classes of work required of a modern planer.

The cross rail is triangular shaped with a long and narrow guide extending upward on the front of the column. It is bolted and doweled to the triangular brace or knee. The triangular brace or knee extending to the rear of column, with tongue in rear tee slot, supports the cross rail, and is rigidly clamped with tee slot bolts in the side of the column, in addition to the rail clamp on the front of the column. This construction affords excellent clamping facilities, and the rail remains square with the table when bolts are loosened for raising or lowering the cross rail.

The column is of two post box type construction, extending to the floor. It is bolted and doweled to the side of the bed, and the wide base is arranged for bolting to the foundation.

The bed extending to the floor affords a solid foundation for the machine. The top is closed between the tracks except through the gearing section, which is reinforced by heavy girths. The tracks are wide and "V" shaped with an ample spread to eliminate any unnecessary overhang of the table, and are fitted with automatic oil rollers insuring proper librication. A place is also provided for the operator's tools.

The table is extra deep and heavily ribbed. "T" slots planed from the solid and reamed holes throughout the entire length of table, afford ample facilities for clamping work.

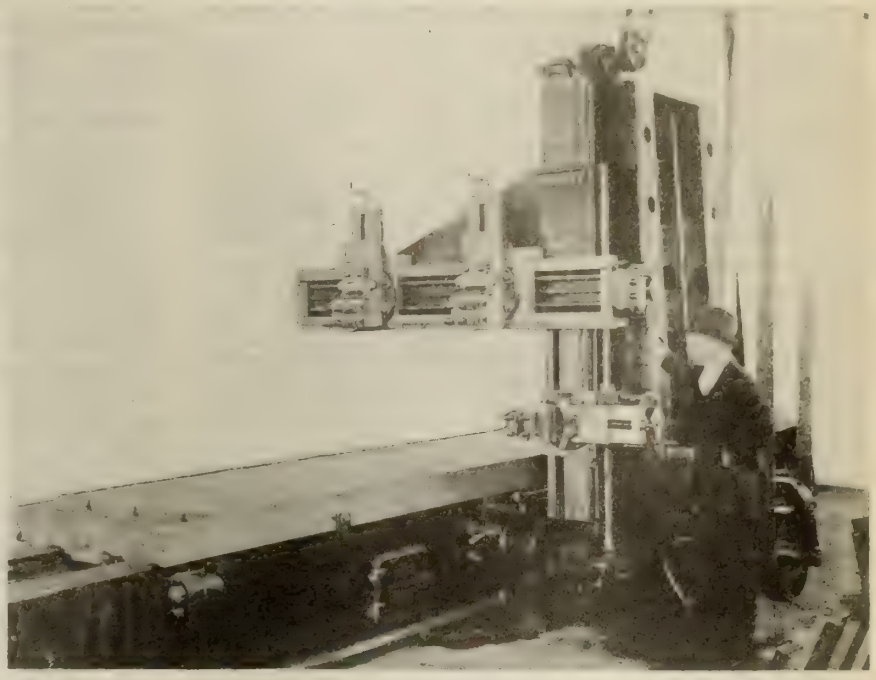
The running gear is placed inside the bed and is easily accessible from the top. The gears are pressed onto the hubs of the pinions relieving the shafts of all torsonial strains. Heavy shafts support the gearing and journal in wick oiled bronze bearings. The pulley or driving shaft has an additional support outside of the pulleys.

The driving pulleys are made of aluminum with cast iron centres, increasing their strength and reducing their weight and consequent inertia at high speeds to a minimum which prevents excessive noise caused by the belts. The loose pulleys have wick oiled bronze bushings and solid web instead of arms to insure safety of operator.

Wide belts insure ample driving power. The shifting mechanism shifts the belts quickly and quietly. The entire mechanism is enclosed, avoiding the accumulation of dirt on the cam and other moving parts. The belt arms are adjustable to keep the belts in the proper position at all times and they have an additional support on the pulley bracket, relieving the fulcrum stud of a bending strain. By means of shifting levers on both front and rear sides of the machine the operator can control the motion of the table without walking around the planer. A safety lock secures the shifting mechanism and prevents accidental starting of planer table.

The patented feed is a decided improvement over the old style arrangements, and has the following advantages:

1. The operator can control or change the feed on cross heads at any time without stopping the machine or disturbing the feeds on either right or left side heads or vice versa.
2. All parts are well protected, yet easily accessible.
3. Convenient location of all operating handles and knobs.



OPENSIDE PLANER

4. The amount of feed is indicated by a dial conveniently located, enabling the operator to set the feed to the proper amount to suit requirements.

The rail heads have long and wide bearing surfaces on the cross rail and are made right and left for close range. They are graduated for swiveling up to 90 degrees in either direction, and have automatic feeds in all directions, operative from either end of the cross rail. The down feed screws under strain, are in tension instead of the usual method of construction. The slides are hung on ball bearings. Binder screws are provided on both saddles and slides. Micrometer adjustments are provided on all vertical and horizontal feed screws.

The power elevating device is located on the top of the column. A long handle on the rear side of the column operates a saw tooth clutch for raising or lowering the cross rail. The handle must be held in position while operating and any obstruction will instantly disengage the clutch, thus avoiding any breakages. All gears are idle when not in use.

The side head is mounted on the front of the column, the same as our standard planer, avoiding unnecessary overhang, of the tool, which is brought up close to the point of support. It is properly counterbalanced and can be moved below the top of the table when not in use. The patented feed, micrometer collars, and control handles, are all conveniently located on the heads and move up and down with same. They are graduated for swiveling up to 90 degrees in either direction. Binder screws are provided on both saddle and slide. The tool block is fitted with a self-releasing spring plunger.

The countershaft is equipped with Hyatt Roller Bearings throughout, and all pulleys are properly balanced, insuring continuous operation and delivering the maximum power to the machine. The only attention they require, is lubrication three or four times a year.

When it is desired to use this machine as a double housing for head planer, the left-hand housing and head can be attached at any time, as the machine is arranged for same. The machine can be arranged for either belt or motor drive. All parts are made to jigs and are absolutely interchangeable. The unit system of parts, make it possible to attach any additional unit, such as heads, or various motor or belt drives, at any time, after the planer is installed.

WELLAND.—The Imperial Oil Company are about to build a plant for handling their product, at a cost of about $40,000. From Port Colborne comes the news that the potash plant that has been under consideration by the Canada Cement for the last three years will be proceeded with. The cost will be about $500,000.

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Shipbuilding and Steel Plate

THE shipbuilding campaign in Canada will be gone on with. That much is certain from statements made in the House at Ottawa. Recently Hon. C. C. Ballantyne, the Minister of Marine, announced that the Government proposed to place with yards requiring business enough additional orders for ships to keep them employed for the balance of this year and probably into 1920. The boats are to be operated on both oceans and on the Great Lakes and St. Lawrence route in connection with the national railways. Some members were inclined to suggest that the cost of the ships, $180 to $215 a ton deadweight, was excessive. The Minister, however, pointed out that Canadian prices were lower than those in United States by approximately $25 a ton, and that prices in Britain had trebled during the war. Mr. Ballantyne also announced that the contract for the purchase of steel plates from the Dominion Iron and Steel Company, which has been subjected to some criticism, would be modified in conformity with the present price of steel in the United States or cancelled, the company not having proceeded very far in the erection of its plant at Sydney, C.B.

The reference to the cancelling or changing of the contract for the rolling of ship plate by the Dominion Steel Corporation brings to mind a contract that was made during the war, in fact, it was sanctioned about the end of March, 1918. At that time four companies submitted propositions, some of them on short notice. The firms were the Dominion Steel Corporation, Nova Scotia Steel and Coal, Canadian Steel Corporation, and the Dominion Foundries & Steel, Hamilton.

The contract went to the Steel Corporation on the understanding that the Government was to purchase 250,000 tons of steel plate at 4.15c per pound, spread over a period of five years, with the option of increasing this amount if desirable. The cost of 4.15 is based on the ingot cost, and if that is not below $25 per ton then the company could claim 4.25c per pound for its plate. It is a safe guess right now that the Steel Corporation could never produce ingots at $25 per ton, as billets, which are quite closely related to ingots, are marketed at Pittsburgh now at $38.50 per ton, and it is safe to say that a new mill could not clear out that much difference in price.

The agreement also provided that rolling plate should begin 18 months from the date of the contract, which would mean that the plate mill should be in operation by the 26th of September of this year. The admission of the Minister of Marine that "the company had not proceeded very far in the erection of the plant" is equivalent to saying that it would be a year yet before there would be any plate rolled, or even longer. So if there is to be work carried on at once in the building of a marine fleet it is certain that the great portion of the plate, with the exception of what the Nova Scotia Steel and Coal Co. can roll, will have to come from U. S. mills.

It is urgent that this country should have tonnage at its disposal for carrying its exports and imports, and it is not well that construction should be delayed or held up until plates can be rolled here in sufficient quantities to meet the demand.

U.S. Capital in Canada

ACCORDING to a report just issued, the amount of capital from the United States which is invested in Canadian manufacturing plants has almost doubled since 1914, though the number of concerns involved has grown less.

The number of plants to-day is given as 388, with an investment of about $265,000,000 in paid-up capital. This estimate is stated to be approximately correct, for, although the companies included in the list may have many Canadian shareholders, on the other hand, many apparently Canadian companies have a large proportion of their stock owned in the United States, so that the capital sum mentioned is probably conservative.

The increase of $130,000,000 in American investments in Canadian manufacturers is an indication of the growing importance of Canadian industry in the eyes of outside investors. It also shows that our neighbor to the south is still available as a field from which to secure capital for the development of our resources.

Many companies which were purely American in 1914, have since had their stock acquired by Canadians, and are now rated as purely Canadian investments.

PERHAPS IRELAND WANTS TO BE RECOGNIZED BEFORE IT'S TOO LATE.—Darling.

Cutting Out Useless Lines

THE Canadian Reconstruction Association has issued an interesting book on "standardization and specialization," with the object of impressing on the Canadian people the need for paying attention to standardizing, and doing away with a lot of needless and costly design for purposes of talking points and competition.

The experience of Canadian shops in the turning out of shells gives the committee a good talking point. Canada had never before made a cartridge case or a fuse, nor a 4.5, 6-inch, 8-inch, or a 9.2, or an 18-pounder. And yet how well the country succeeded. Each plant put its best efforts toward some certain, well-defined standardized part.

In the United States the thing has been carried farther during the war than at any other time, and it now remains to be seen to what extent the industries there will follow up the lessons of the war.

In the automobile industry standardization has played a most important part in the rapid development of the industry, not only in parts, but in tires.

Baby carriages show big reductions in designs. Reed carriages were cut down from 160 patterns to about 30, and the chances are that the rising generation get wheeled and trucked and fresh-aired to just as good advantage in the 30 varieties as in the 160.

Biscuits and crackers were lines in which it was a mighty poor day that did not see a new sort chased out on the market looking for public favor. The cracker bakers have cut down their lines more than 50 per cent. Before the movement for standardization got a start there were over 1,000 different lines made by the cracker bakers. Nor has it been heard yet that any harm has been done by ditching the making of 500 designs of crackers.

Paving brick have been brought to a standard size, 3 ins. x 4 ins. x 8½ ins., and apparently it will be only a matter of time before all the makers come to this size.

In the manufacture of carriages, especially in the essential parts, there has been a big movement. One manufacturer says: "We believe there is not an industry in which there has been more radical changes made than in this. For instance, axle spindles from unlimited styles and shapes, applicable to each individual's ideas, necessitating the axle manufacturers producing hundreds of different styles of buggy axles, together with bushings for each individual style, all have been reduced to one type axle spindle, which will be used by all manufacturers of light horse-drawn spring vehicles."

Perhaps there is no greater change to be noticed than in the manufacture of pocket knives. C. W. Silcox, secretary of U. S. pocket knife industry, states: "Prior to the war many manufacturers in this industry were making as high as 650 basic patterns of pocket knives and from these 650 basic patterns were evolving in some instances as high as 6,000 and 7,000 distinct numbers. Under Government regulations the basic patterns were cut down to 85 basic patterns with only 250 knives to be evolved from same, which very materially reduced the manufacturing costs. Our lines were standardized and each factory made out of the 85 basic patterns 58 basic patterns that were all of the same general character.....We found that we were all paying for a lot of things that were absolutely unnecessary, that made the ultimate consumer pay a fictitious price for this class of merchandise."

There is a great big field here for Canadians to work in. If U. S. manufacturers find it a good thing, it ought to be worth considering here.

A GOOD method has been discovered to make money out of mining and oil stocks. Stay out.

The Joys of Camping Out

HE thought he'd take some holidays and so he got a tent, to camp beside the babbling brook and save a month of rent. He got some pickles and some ham, some salmon and some tea, and every kind of fodder that his cooking eye could see.

And then he got a tiny bed, a blanket and a sheet, to keep the spiders and the bugs from rompin' on his feet.

He also bought a fryin' pan and took a spoon and knife, and told his friends that he was off to lead the simple life. The boarding house he would forget and all his troubles there, and just commune with nature and devour the clover air.

The day had been so beastly hot, it added to his zest to reach the shady wooded spot and chuck his coat and vest.

The camper ate his humble meal and lined up his interior, and swore, by gum, that campin' was a system most superior. He lit his pipe and in the dusk he puffed great clouds of smoke, and dreamed he wuz an Injun brave 'way down at Shogyhoke.

And then he tumbled into bed to dream of joys in store, and the woods re-echoed for a mile with a most gigantic snore.

And the sun came peepin' in at him and he chuckled out with glee, "By all the jumpin' hottenots, this is the life for me." He made a rush to get a meal just like a hungry horse, for this tentin' in the woods had roused his appetite, of course.

But the ants were in the butter dish, and flies camped on the ham, and fourteen different crawlin' things were in the fryin' pan.

The bugs were swimmin' in the milk, though some of them were dead, and the worms had set up keepin' house inside his loaf of bread. He said a lot of sizzlin' words, they just ran out like strings—he's boardin' by the week again on hash and prunes and things.—Ark.

ONCE the Allies finish up the peace terms the next thing is to polish off the man who started the whole thing. At present he's hiding behind a Dutch bedstead.

* * *

WE are now approaching that peculiar season of the year which is punctuated at painfully regular intervals by rhubarb sauce, rhubarb pie, rhubarb pudding, rhubarb, etc., etc., etc.

* * *

CITIES shove up taxes on vacant land to make the holders sell. Very good. But in so doing they simply put the price of vacant land where the real honest-to-goodness builder can't touch it.

* * *

ON May 7, 1915, the Germans sank the Lusitania, and on May 7, 1919, the peace terms were handed to them. It took four years, but the wind was sown and the whirlwind was the harvest.

* * *

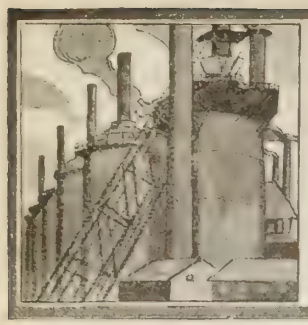
THE box car is the greatest industrial loafer that we have heard of for some time. In fact, some railroad man with a mania for figures has it figured out that if the box car came to work at 10 in the morning the whistle would blow at 12 minutes past 11 for it to quit work. The rest of its time it is hanging around on sidings and waiting to be loaded or unloaded. As there are some 2,500,000 freight cars in United States alone, the amount of loafing this collection does must be staggering in the aggregate.

* * *

THE scrap metal market, like the scrap market in Europe, is quiet this week.

* * *

OUR idea of a steady job is being janitor of that airdrome in Newfoundland where those trans-Atlantic flyers are going to start from.



MARKET DEVELOPMENTS

Is an Open Market Coming in Steel Trade Now?

Things Are Moving Rapidly in United States—Woodworking Machinery is Selling Well Just Now—Some Adjustments Have Been Made in Regard to the Shell Contracts

DEALERS selling woodworking machinery are having a good season. This holds good, from inquiry made from several of the leading Canadian houses. In fact, this line of business is having a better time of it just now than the metal working end. Some of the concerns that have been in the process of tooling up with the purpose of turning to new lines, have been tied up for some days now in these operations, and are simply waiting a turn in events before they can proceed.

The work of making adjustments for the cancellation of war contracts is proceeding more rapidly now, and some claims have been settled, although there are a number of others to be dealt with yet.

Canadian dealers in steel, including plates, structurals, etc., have been watching with considerable interest the developments that have been taking place in United States in regard to returning to an open market. The resignation of the Industrial Board, and the announcement that the fixing of prices has not the approval of the Department of Justice, leaves the steel makers with no medium for the establishment of lower prices. Hence about all that is left is to maintain present values or face the alternative of bringing in an open market.

Canadian orders that are going across the line to the U. S. steel mills are, in many cases, accompanied by a stipulation that should there be a change in prices by the time the order is filled, the buyer here shall get the benefit of the change. This especially refers to any orders that will not be filled for three or four months yet.

Scrap yards have had a poor season of it. In fact, since the signing of the armistice there has been nothing worth while in the business, and some of the dealers with large overhead expenses have probably lost money.

MONTREAL DEALERS LOOK FOR BETTER SALES OF MACHINE TOOLS

Special to CANADIAN MACHINERY.

MONTREAL, Que., May 15.—Business activity is still of a character where immediate needs are the pivot of operations, and trading in futures is still held in abeyance, although the general prospects are more encouraging. Work on the harbor extensions and improvements is rapidly taking shape, and this will act as a stimulant to other enterprises. Steel trading during the week has not been heavy, but prospects are better. Metals are in the same quiet state with the situation unchanged. The inquiry for machine tools has been picking up, but the business passing is not heavy. Scrap is dull and without feature.

Steel Shows No Change

Dealers here do not look for any marked changes in the steel situation as a result of the recent developments in the States, when the market virtually became free from all restraint through the resignation of the Industrial Board officials.

It is not likely that any material change will become effective in steel prices, as it is generally recognized that the present scale is of a satisfactory character when all circumstances are taken into consideration. It is believed in steel circles here that the producers will adhere to present prices as they contend that lower prices would mean operating at a loss, and sooner than do this the mills would close. Labor conditions, not only in the steel trade, but in all the primary industries, are not conducive to lower production costs, and if trade activity is to become stabilized, manufacturers and the country generally have got to recognize the situation as it really is, and embark on a constructive programme irrespective of the seemingly high cost of labor and material. Operative industry is the only guarantee of progress, and hesitation and delay will only make the situation more complex and dangerous. Some doubt has been expressed as to the permanency of the shipbuilding industry here in Canada, but it is more than likely that operations will be continued, even if some curtailment is considered advisable. Steel warehouses are gradually taking on a more pre-war appearance and stocks carried are of a more general character. The week's activity in steel has been exceedingly quiet, and consumers have been holding off, apparently anticipating further price adjustments to a lower level. The coming week will probably show the actual condition of steel, as open competition will demonstrate any weak points in the armor of the producers. Price quotations here are firm and show little indication of early revision.

Machine Tool Inquiry Improves

Summing up the various reports that are gathered from different sources in the machine tool centres, it would appear that a gradual return to more normal activity is noted, although some dealers state that things are still quiet. The general opinion appears to be that good business will eventually be realized should all inquiries result in business. As stated by one dealer: "The better inquiry that has come to hand during the past two weeks would seem to indicate that feelers are going out for the purchase of new equipment, but as yet these inquiries have not resulted in many sales. There is, apparently, a waiting attitude being assumed by many, with the expectation that lower quotations will prevail, and with this tendency developing as it is doing in some lines, the possibility of actual business is more encouraging." It is reported that a certain well-known lathe manufacturer has recently reduced prices on standard tools

25 per cent. Labor conditions and material costs are seemingly detrimental to any serious cutting of prices, but on the other hand, a courageous attitude in this connection may tend to establish a better working basis and a renewal of demand that cannot but aid in the ultimate readjustment. Some dealers here have been doing some little business in connection with the fitting out of the St. Malo shops at Quebec. General sales are light, but far from discouraging. The supply business has shown slight improvement and sales are of fair volume.

Depression in Scrap

"Continued depression is the dominating factor of present business and the actual movement of material is exceedingly light. There is just sufficient doing to demand our presence at the office and yard, but apart from that the interest in scrap is almost wiped out, small local demand being steady but light in character." This statement from a dealer here outlines the present situation, but the development in the steel trade in the States may be the forerunner of better conditions, although optimism for the immediate future is not pronounced.

Circumstances are against a sudden readjustment of working conditions to a pre-war basis, and with this factor influencing the market as it does, trading of an expansive character is not anticipated until the European atmosphere has become more clear. The old material situation maintains its quiet and disinterested position, with dealers patiently awaiting trade developments. A slight advance in red brass turnings is the only change this week, the quotation being 9 cents per pound, an advance on the week of 1 cent per pound.

GO AFTER EVERY BIT OF BUSINESS

Keen Competition for Anything That Shows Up in the Steel Situation

TORONTO.—Dealers who sell steel in any form are after business at present. It is a long cry from the condition of affairs a year ago for instance. During the war the man who had steel for sale, or who knew any person who could find any for sale, was a favorite individual. Every person in sight wanted to see and know him. Now the man who has steel for sale wants to make the acquaintance of any person who has any notion of making a purchase. There is keen bidding now for every order of any size that gets out into the market.

There is a lot of small business coming along, but not in the quantities that the dealers and the mills want in order to run the plants up to something approaching capacity. Some of the warehouses here are having their own little financial funeral too in getting cleared out of the remnants of their war stock. For instance one firm sold a lot of 1,000 bars of iron to a big Canadian industry during the week, the price being 3.50c per lb. This material had cost them a little better than 4c per lb. to put in during the war period, but their best policy is to clear out as soon as possible, and get their money working again. It is peculiar how things work in a circle. This material was placed there from the Pittsburgh mills in the first place. Now the price of 3.50 was placed to meet the Hamilton price of 3.20 on this stock, and the Hamilton price was placed to meet the Pittsburgh price of 2.35, so in the end the Pittsburgh price is chasing out Pittsburgh material that was sold here some months ago.

About Prices

Dealers are not promising their customers anything in regard to prices. In fact they do not seem anxious to mention the chances of any more reductions in price, for they do not believe that a cut would make any great difference in the volume of business passing. If it did not do this it would simply make it harder to make steel at the price. It is interesting to note, too, the great difference there is in the way in which dealers view the matter of the fixed price. Here are two views, both secured by CANADIAN MACHINERY within an hour:

No. 1.—"Nothing but an open market will meet the present situation. Suppose we have another cut in steel, it will leave things in the same position as they are now with a fixed price, and that is the objectionable feature. Throwing the market open now would not mean that the market would run wild, for the very good reason that the plants could not stand it. It would not mean a price-cutting time, but it would restore competitive selling, and I believe that industry in general would favor that very much."

No. 2.—"The fixed price idea is right. The buyer who goes out to secure his raw material knows that his competitor is not buying to better advantage than he is. It gives a better deal to the small buyer who can go out and get goods at the same price as his more powerful competitor. I find that nine out of ten of the larger buyers prefer the fixed price, where they know that the same price that they buy is being charged to all others in the same line of business, with whom they have to compete."

Demand for Motors

There is a good demand for motors right now, and it looks as though it were a fairly good time to buy. There has been a recent drop in price of about ten per cent., but some of the dealers seem quite certain that this will be put back owing to labor and other costs. It might not be out of place here to pass on a word of advice to the prospective purchaser of a motor, especially a person who is not expert in these lines, and who might be fooled on a used machine. The best way to get a used motor, if you decide on this, is to go to some recognized, reliable dealer, and do business through him. In this way you can get his guarantee with the motor. Otherwise, unless you are expert in the matter of motors, you are taking more or less of a chance, which is poor business in connection with your source of power.

The Machinery Market

Several dealers who handle woodworking machinery stated to-day that affairs with them were most satisfactory, and that business was developing nicely.

The strike of the machinists is having the effect of holding up the work of going ahead and tooling up several plants which have turned from war lines to peace work. This seems to be more pronounced in Toronto and immediate district than in the other centres of the Dominion.

BRIDGEBURG.—The placing of additional trains on the Toronto, Hamilton and Buffalo Railway, and the Michigan Central, has resulted in much better business along the frontier. Additional engines have been put to work on the International bridge, hauling freight into Canada at this port. The new yard of the T. H. & B. will be used for all westbound repairing, and will likely employ more men before long.

POINTS IN WEEK'S MARKETING NOTES

The scrap metal market in Toronto remains inactive. Dealers are making few sales of only small amounts.

Opinion in Canada seems well divided as to the advisability of having an open market for steel or the fixed price.

Machine tool dealers report the sale of woodworking machinery as being quite satisfactory. In fact in some cases the demand can be called brisk.

Some of the shops in this district have had adjustments made on their war contracts with U. S. Government. Russell Motor have finished on their fuse and adaptors, but not on the shell work.

Some of the shops that were tooling up for new lines are tied up on the work owing to the strike.

The rate of production at the U. S. Steel Mills continues to decrease, and is not now over the 60 per cent. mark.

Montreal dealers report better business with the opening of navigation.

Warehouses are not buying as heavily as usual as there is not the demand for this as yet.

Some orders for steel are being accepted at the U. S. mills on the understanding that prices shall be adjusted to time of delivery, if any change has taken place by then. This refers to orders that will not be filled for two or three months.

STEEL CONTROVERSY HAS TIED UP THE SELLING OF MACHINE TOOLS

Special to CANADIAN MACHINERY.

NEW YORK, May 15.—The amount of actual buying of machine tools and allied equipment in Eastern markets forms only a small percentage of the volume of inquiry. This has been the situation for many weeks past, and no change has yet taken place, though some hope is expressed that the ending of the controversy over steel prices may cause some buying to go ahead.

The last chapter of the steel price controversy took place in New York last Thursday when representatives of the Railroad Administration and the general committee of the American Iron and Steel Institute met to reach an agreement, if possible, on purchases of steel by the Railroad Administration. The steel manufacturers refused to make any further reduction in prices, so the railroad representatives announced that the meeting was unsuccessful. A day or so later the Industrial Board of the Department of Commerce, which had instituted the price stabilization plan under authority of President Wilson, resigned, and the whole program has therefore been abandoned. The last straw is the statement of Attorney-General Palmer, made public after the resignation of the Industrial Board had been accepted, that the price stabilization program had no legal standing. This may be intended as a warning to the steel trade not to maintain by any agreement the prices which were adopted by virtue of the price stabilization plan. There is, therefore, an open market in theory, though it is very doubtful whether there will be any important reductions in prices.

If there is a resumption of buying in steel products, it would naturally affect other industries which are allied to the steel industry, one of which is the machine-tool industry. There is every indication of a potentially large demand for machine tools, and it needs only the starting of a general buying movement to bring about action on the many inquiries for tools which are now pending.

There has been no important domestic buying during the past week, but a fair number of orders for single tools has been received. The only export buying which is going ahead is for a Belgian automobile plant, whose representative, now in this country, has begun placing orders for about 100 tools needed for the rehabilitation of that factory, which was destroyed in the war by the Germans.

The spring meeting of the National Machine Tool Builders' Association takes place on Monday and Tuesday of this week at the Hotel Traymore, Atlantic City, N.J., and some definite action may be taken relative to disposal of the new machine tools owned by the Government. These tools the Government authorities wish to turn back to the manufacturers, the latter in turn to dispose of them on a 7½ per cent. commission basis, which many of them assert is not sufficient. While the number of new tools is small in comparison with the number of second-hand tools which must be sold, nevertheless they form quite an item, and are a source of worry to the machine-tool builders.

PITTSBURGH MILLS HANDLY GET PAST 55 PER CENT. OF CAPACITY NOW

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., May 15.—The resignation of the Industrial Board at Washington, announced last Friday evening, causes the steel market, technically, to enter a new chapter in its history, but practically there is no material change. The Industrial Board had practically been dead since the very publicly-announced refusal of the Railroad Administration, about April 1, to take part in the programme the board sought to force upon the various purchasing agencies of the Government as well as upon the public.

The program announced for the board before it was actually appointed received general approval and was an excellent one. The trouble of the Industrial Board arose from its departing from the program. This departure was caused by the board being hypnotized, or deceived, as some have expressed it, by the representatives of the steel industry. The object the board was expected to attain was the immediate deflation of prices, that is the development at once of the prices in which buyers would have confidence, and at which they would be willing to take hold. Otherwise, left to themselves, the markets for the various building commodities, including steel, would decline but slowly, as prospective buyers waited, and the return of activity would be correspondingly delayed. This program the board did not carry out, as the reductions it secured for steel products, announced as effective March 21, were not sufficient to create confidence in the minds of buyers. The basic idea was to make prices so low that buyers would expect advances rather than declines, but the Industrial Board endorsed prices that did not create any such expectations.

Columns of newspaper space have been used up in the discussion of the "controversy" over steel prices without the simple and fundamental difficuly being explained. That difficulty was simply this, that the prices the steel producers proposed were based on costs which were inflated by heavy overhead, caused by light operation. The steel producers desired that the heavy overhead per ton (they are now operating at about 55 per cent. of capacity) be represented in the prices. If they had full operation they admitted, privately, that they could be content with lower prices. Buyers, take the opposite view. When the law of supply and demand has full play, the lighter the demand the lower the price. Light operation was made an excuse for high prices, while buyers feel it ought to be a reason for low prices. That is the reason the Industrial Board failed. Furthermore, seeing that the reductions of March 21 were relatively small buyers, including the Railroad Administration, felt that what was in force was an agreement to maintain prices. It was well known that the approval of the Department of Justice was sought by both the Industrial Board and by the steel producers, and was refused. That such approval was applied for was interpreted as meaning that the parties to the arrangement felt that the approval was needed.

With the Industrial Board out of existence, by reason of the acceptance last Friday, by Secretary Redfield, of the resignations that had been tendered two or three weeks earlier, the steel producers have no means whereby they can establish the market on a lower level, hence their alternatives are only to maintain existing prices or to throw the market open to competition, allowing prices to settle where they will. As the producers are much afraid of competition, more afraid than they need be, in the judgment of many observers who are not steel producers, they choose the former alternative, and will maintain the March 21 prices as best they can until something fresh turns up. While as a rule the steel producers are unwilling to admit it, they know that it is altogether improbable that buyers of steel will take hold in liberal fashion until the market is thrown open. It is not that buyers have certain definitely formed ideas as to the prices at which they should be able to buy, their feeling rather being that there should be an open market, whereby whatever prices were developed would be such as would command confidence. The producers feel that it is too early for liberal buying to develop, at any prices, hence they wish to defer abandonment of the present price maintenance understanding. There are many observers who do not agree with this judgment, believing on the contrary that if the market were thrown open liberal buying would develop within a short time, perhaps in less than three months, and that thereupon prices would show an advancing tendency.

Production Decreasing

The monthly report of the American Iron and Steel Institute shows that in

April there was produced 2,239,711 gross tons of ingots, by 30 companies which in 1918 made 84.03 per cent. of the total output. This means that the industry produced ingots in April at the rate of about 31,900,000 gross tons a year, which is 65 per cent. of the capacity, estimated at 49,000,000 tons. For preceding months the proportions were: March, 77 per cent.; February, 85 per cent.; represents a large tonnage, considerably greater than the output in 1906, when existing capacity was pushed to the utmost and mills were nevertheless falling behind in deliveries. To the producers, however, the idle capacity of 22,000,000 tons a year is much more impressive than the operating capacity of 27,000,000 tons, the fear being that nothing could be done, by way of making attractive prices, to engage the 22,000,000 tons, so it is better to make as much profit as possible out of the 27,000,000 tons. According to the present market trend, however, production is in line for further decreases, as new bookings are relatively light and old orders are being completed, with not enough new business to take their place.

The Steel Corporation's unfilled obligations decreased during April by 629,887 tons, leaving 4,800,685 tons on books at the end of the month. This is a slightly larger decrease than was shown for March, but is a smaller decrease than shown for any of the three months preceding March. What makes the showing particularly unfavorable, however, is the fast that shipments during April were much smaller than shipments in March, probably at 70 per cent. of capacity against more than 80 per cent. in March, and the April bookings, therefore, must have been much lighter than the March bookings. The April loss in unfilled tonnage was equal to about 48 per cent. of the capacity, and deducing this from the 70 per cent. shipments indicates that bookings were only 22 per cent. of capacity, this comparing with estimates averaging in the neighborhood of 35 per cent. for each of the four months preceding.

There has been an "open market" in pig iron since about April 1, but prices have been declining very slowly, partly because there has been little inquiry to tempt furnacemen to cut prices, and partly because costs are so high that there is not much room for cutting, it being preferable to go out of blast. In the past ten days various sales have been made in the local market, involving lots of 200 to 500 tons of foundry iron, and cuts averaging in the neighborhood of a dollar a ton. Southern iron, for May delivery, has sold at $24.50. Birmingham, for silicon 1.75 to 2.25 per cent., and at $25 for silicon 2.25 to 2.75 per cent., these being cuts of $2.25 and $3 respectively from the prices that became effective March 21.

SCRAP IRON MARKET IS DULL AND NO SIGN OF ITS BETTERING

Continued dullness is reported from practically every point. Prices decline as the result. Following are reports from leading U.S. points:

NEW YORK. — Heavy melting steel remains steady, but stove plate, grate bars and wrought pipe have declined from 50c to $1. The railroads are putting scrap on the market regularly, and stocks are believed to be accumulating in dealers' yards. The Pennsylvania sold 35,000 tons miscellaneous scrap last week.

PHILADELPHIA. — Nothing has transpired to test the capacity of the market during the week. Some heavy melting steel has been sold at $15, and wrought pipe at $17 to $17.50. Machine shop turnings from $10.50 to $11, and cast borings from $12.50 to $13.50.

PITTSBURGH. — Some grades are holding firm, but others, such as machine shop turnings, are showing weakness. Offers are from $10 to $10.50, with most at the lower figure. There is practically no demand for phosphorous steel scrap but heavy melting steel remains about $15.50 to $16.

BUFFALO.—The tendency of dealers is to wait till the market opens up. There is a good local demand for cast scrap, and from outside comes enquiry for borings and turnings.

CLEVELAND.—There is little tendency on the part of consumers to buy scrap. The dullness in the iron and steel market is affecting the scrap market, and dealers anticipate no change till after the price fixing controversy is settled. No. 1 cast has dropped $1.50, while heavy cast is off $2.

CHICAGO.—Current needs of consumers being pretty well covered by reserves in stock, there is practically no business being done in iron and steel scrap. The offerings of the railroads are being taken up without any trouble. These amounted to about 10,000 during the past week.

CINCINNATI. — There is little call for foundry scrap, sales being in lots of between 50 and 100 tons. Prices are unchanged.

ST. LOUIS. — Dealers are absorbing railroad offerings at rock bottom prices. This is about the only business that is being done. Although prices have been marked down from 50c to $1, actual transactions are so rare the decline is nominal.

BIRMINGHAM.—Dealers' yards are pretty well stocked up, but they are not anxious to sell at present prices. No. 1 cast and heavy melting steel are the only grades showing any demand.

Tenders will be received up to 12 o'clock noon, Tuesday, May 27th, by the chairman, Board of Control, Toronto, for the following supplies: Machine shop equipment; basic sulphate of alumina; belt conveyor and appurtenances. T. L. Church, mayor.

MONTREAL NOTES

The Kirkwood Steamship Co. are inaugurating a freight line to run between Montreal and Chicoutimi. This line will commence operating about the 15th of May, with the steamer Glen Allen. This vessel has been employed in the Lake Service, but is at present being fitted out by Messrs. Forest, Jackson and Forest, of 222 Craig St., Montreal, for ocean service.

At a recent meeting of the executive of the Quebec division of the Navy League, held at the Montreal headquarters, 156 Metcalfe St., it was decided to pursue with greater effort the training of boys for sea careers, and likewise to urge the Dominion Council of the League, at Toronto, to purchase the premises now occupied by the Montreal branch, so that the same could be remodelled to meet the special requirements and objects of the League. Chief Petty Officer F. K. Green has been added to the Montreal staff to supervise the work of training the boys.

A satisfactory settlement has been arranged between the Canadian Car and Foundry Co. and the striking employees and the men have returned to work, after a few days' idleness. The adjustment is based on a 9-hour day for 5 days a week, this to be effective at the expiration of sixty days, as the men have signified their willingness to work on Saturday mornings for such a period, owing to important Government contracts now under way. Substantial increases have been granted, more particularly to those previously receiving a low rate of wages. In addition to the better wage scale and working hours, an industrial council has been formed whereby better co-ordination between the men and the firm will result. The committee appointed by the men will not act as a grievance committee, but rather in the nature of an advisory body. Meetings will be arranged weekly or bi-weekly to discuss the matters affecting current operations and working conditions, and each side will be open to make suggestions for greater plant efficiency and closer relations between the worker and employer.

Forest, Jackson and Forest, 222 Craig St. West, Montreal, have taken over the Canadian agency of the Canton Foundry and Machine Co., of Canton, Ohio, manufacturers of the Canton portable cranes.

Another successful launching took place last week from the yard of the Canadian Vickers, Ltd., when the steel cargo steamer "Canadian Seigneur," 8,400 tons deadweight, was placed in the water, without the usual official ceremony. This is the fourth vessel of the Canadian Government's cargo ship program to be turned out at these yards. It was interesting to note that the S. S. "Canadian Ranger," which was launched about three weeks ago, was lying in the fitting-out basin, completed. A few days later she steamed up the harbor to take on her initial cargo. The 7,500 ton

cargo steamer "Sammanger" recently arrived in port, after completing four trips to Australia, was also constructed at Vickers' yard, having been built last year for Norwegian interests, but handed over to Messrs. Furness, Withy and Co., which firm is still operating her.

The first official banquet of the Council for the Development and Direction of Technical Education was held last week in the Montreal Technical School, and was presided over by Sir Lomer Gouin, Premier of the Province of Quebec. This council has been formed for the purpose of increasing the scope of the work of the school, enlarging the membership, and generally bringing to the aid of technical education all that could be obtained for the purpose from all sources. The general council will be composed of four committees, one to seek out new ideas, another of teachers, another of former pupils, and a fourth of manufacturers, these four committees to send delegates to a central board of directors, which would decide on all suggestions.

If expectations are realized the St. Malo Railway shops at Quebec will be ready for operation about the end of June. The laying of the track necessary to connect the shops with the main line is now under way, and as soon as these are completed, the machinery will commence to arrive. It is stated that Mr. Enright, at present connected with the I.C.R. at Moncton, will be given the position of mechanical superintendent of the Quebec shops, and will shortly take up his new duties and supervise the employment of competent mechanics.

The early opening of navigation has enabled Montreal to get a good start in export business, which, so far this season, has exceeded to a large extent the exports for the corresponding period of last year.

A convention of Canadian chemists from all parts of the Dominion will be held on the 16th and 17th of this month, at the Windsor Hotel in Montreal, for the purpose of organizing an association embracing chemical engineers, industrial chemists, research chemists, and chemists engaged in educational institutions. Owing to the remarkable achievements that have been accomplished during recent years, respecting the greater efficiency of industrial plants, by chemical laboratories and scientific investigation and development, this convention is considered one of the most important steps in the forward movement of this industry. Convention proceedings will be conducted by Prof. W. L. Goodwin, of Queen's University. Robert Job will be chairman in charge of the convention, and G. D. McIntyre will act as secretary.

The Maple Leaf Manufacturing Co., Ltd., has recently been incorporated to carry on the manufacture of commercial motor trucks. The personnel of the directorate is identical with that of the Machinery and Munitions, Ltd., which for four years carried on extensive operations in the making of munitions, at plants in Lachine and Sorel. The former plant has been taken over by the new company, and the Windsor plant and general interests of the Menard Motor Truck Co., which has been engaged in motor truck manufacture since 1908, has also been acquired. The Maple Leaf Company will manufacture standard motor trucks and all truck parts, for both domestic and export trade. It is expected that a big business will be built up with the group of countries with which Canada enjoys favored agreements. The officers of the new company are: Kenneth Molson, president; W. B. McLean, vice-president; F. E. Mahon, secretary-treasurer; Louis Livingstone, sales manager.

Chas. Wheeler has resigned his position as superintendent of the Spartan Machine Company in Montreal, and will take an extended trip to Australia. Before associating himself with the Spartan Machine Co., Mr. Wheeler was general superintendent of the St. Lawrence Machinery Company.

W. J. Espey, who for the past two years has been connected with the Canuck Supply Co., Montreal, has accepted a position with the Herald Press, in the sales and service department.

At the annual meeting of Armstrong-Whitworth of Canada, Limited, held last week in Montreal, H. H. Vaughan and Lawrencé Russell were appointed to the Board of Directors. Mr. Vaughan will become actively associated with the operation of the company's plant at Longueuil, P. Q.

Tenders are being called for additions to the roundhouses at Hanna and Edmonton, Alta.; Humboldt, Sask.; Port Arthur, Ont.; Kamsack, Sask.; North Battleford, Sask.

Current Events in Photographs

SIR DAVID BEATTY IS NOW OUT OF WORK

It must seem rather strange for Admiral Beatty, after nearly five years of ceaseless night and day patrolling of the Atlantic to find himself out of a job. In the photo he is shown entering St. George's Hall at Liverpool with the Lord Mayor who presented him with the freedom of the city. The trim, natty uniform of the great leader of the Navy makes rather a striking contrast with that of the Lord Mayor.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$18 50	$18 50
Electro copper	17 50	17 50
Castings, copper	17 00	17 00
Tin	54 00	55 00
Spelter	8 00	8 25
Lead	6 50	7 50
Antimony	8 00	8 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	17 00	14 00
Pipe wrought	8 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	12 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per [illegible]
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks..list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	**.08½**
Grits, 80 and finer	**.06**

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	$0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Ottawa.—Canada's new Parliament Buildings will cost at least eight million dollars, and may cost ten millions, announced Hon. Frank Carvell, Minister of Public Works, in the House of Commons. The original estimate of the cost of replacing the handsome pile that fell a prey to the flames three years ago was five million dollars. The Government has already expended five millions, and is asking for another two millions to be spent this year, "and then it won't be anywhere near completed," said Mr. Carvell. "I have no hesitation in saying," he added, "that when the building is completed it will have cost eight million dollars." The Minister explained that the excess cost over the estimate was due to the sensational advance in the prices of building material. He frankly told the House "what I have already told the builders: that we have not got value for the money expended. The workmen seem to think it is good, easy Government money and that they should not be in a hurry about finishing the job."

TRADE GOSSIP

Montreal. — Plans are being prepared by a firm of New York architects, for the construction of a factory in this city, at an estimated cost of $250,000. The plant will be used by the Republic Motor Co., Ltd., of Detroit, Mich.

Walkerville. — The ground for the new buildings of the General Motors Corporation has been broken. The entire plant will cost $26,000,000, and the company plans the erection of two buildings this year.

The Cooper-Hewitt Electric Company, Hoboken, N.J., have issued an attractive calendar well illustrated with half-tone engravings showing installations of their lighting systems. This calendar shows installations in various classes of manufacturing establishments from machine shops to textile mills.

Guelph. — The students and staff, old boys and friends of the Ontario Agricultural College, have decided to erect an assembly hall in memory of the boys who fell in action during the great war. A committee has been formed, of which Dr. Creelman has been appointed chairman. The estimated cost will be $100,000.

Montreal. — The requirement of a bond covering all credit accounts for shippers and consignees of freight has been cancelled. The new credit rules call for the settling of charges accumulating from the 1st to 7th of the month by the 14th; from the 8th to the 14th must be paid by the 21st; from the 15th to the 21st must be paid by the 28th and so on. The bonding feature was cancelled because the majority of shippers objected to it.

Montreal. — The directors of Armstrong Whitworth Ltd., as elected at the annual general meeting held here recently are as follows: president, Sir E. P. C. Girouard, K.C., MG.; vice-president, M. J. Butler, C.M.G; directors: Right Hon. Sir Geo. H. Murray, G.C.B.; Hon. Geo. G. Foster, K.C.; F. B. T. Trevelyan; H. B. Walker; H. H. Vaughan, Lawrence Russell The executive committee in charge of the company's works in Canada will be M. J. Butler, H. H. Vaughan and Lawrence Russell.

New Companies.—Joint stock companies have been incorporated this week as follows: The Dixon Co., Peterboro, capital $1,000,000; Dupuis Freres, Montreal, $2,500,000; France and Canadian Steamship Co., Ltd., Montreal, $10,000,000; The Ottawa Iron and Metal Co., Ltd., Ottawa, $50,000; Four Wheeled Drive Auto Co., Ltd., Kitchener, $200,000; Dominion Towing and Wrecking Co., Ltd., Midland, $250,000; W. A. White Co., Ltd., Montreal, $30,000; Central Canada Industries, Ltd., $50,000; The Spedolene Refining and Mfg. Co., Ltd., Montreal, $50,000; Maple Leaf Mfg. Co., Ltd., Montreal, $500,000; Ledoux-Jennings, Ltd., Montreal, $250,000; H. & A. Saunders, Ltd., Toronto, $100,000; Canadian Western Steel Corporation, Ltd., Calgary, $2,000,000; Regent Metal Goods, Ltd., Montreal, $75,000; Vapor Car Heating Co., of Canada, Ltd., Montreal, $122,000; Corundum, Ltd. Ottawa, $250,000; Mutual Finance Corporation, Ltd., Windsor, $300,000

New Industry.—One of the latest industries to locate in Sarnia, Ont., is the H. H. Robertson Co., Limited, manufacturers of asbestos-protected metal. Their product is used as roofing and siding in industrial plants of all kinds. Its body or core is a special annealed solid sheet of steel, immersed in a bath of asphaltic compound to protect against corrosion, and this is insulated with pure asbestos felt forced into the asphalt under pressure. The final covering is an original process of waterproofing which gives a tough, smooth, repellent surface. Asbestos-protected metal has been marketed for some time in the United States by the Aspromet Co. of Pittsburgh. It has been widely used as roofing and siding in foundries, forge shops, mill buildings, storage houses, acid chambers, chemical plants, pumping stations, protection for expensive electric equipment and for a wide range of other purposes. It answers the problems of maintenance and depreciation which are so great a factor in expensive construction. The Sarnia Company will also manufacture troughing, spouting, ventilators, etc., for complete building construction.

Locate in Hamilton.—The Hoover Suction Sweeper Company of North Canton, Ohio, has decided to establish its Canadian headquarters in Hamilton, and will erect a large plant there. Negotiations have been in progress for the past few months, and Mr. Kirkpatrick, the industrial commissioner, landed the industrial prize after stiff competition with London, Windsor and other cities. Heretofore the Hoover Company has had a small manufacturing plant at Windsor, from which point its Canadian business has been handled, but this will at once be moved to Hamilton, and as the company now plans to go after Canadian and export business aggressively, it is the intention to erect a big modern plant at once. In fact, the Canadian general and sales offices have already been moved to Hamilton, temporary quarters having been secured at 20 Macnab street south, to be used while their permanent manufacturing plant and offices are being erected in the east end of the city. A site with a street frontage of about 600 feet, at the corner of Gage and First avenues, has been purchased, and within a few days work will be started on a series of model factory buildings, which will be the last word in industrial construction and an ornament to the district in which they are located.

TENDERS

John Labatt, Ltd., London, Ont., are calling for tenders for the purchase, including wrecking and removal, of water tower motor tank 90 feet steel supports, containing 10,000 wine gallons.

The Canadian National Railways are calling for tenders, up till May 26th, for an addition to the freight car shops. Plans and specifications can be seen at the office of the architect, J. Schofield, Winnipeg.

Tenders for fire apparatus for the Toronto Fire Brigade will be received up till noon, May 27, for the following: 55 foot city service gasoline combination ladder truck with tiller; 75 foot aerial

ladder truck, front chain drive, with tiller, gasoline driven; automobile triple combination pumping engine hose and chemical wagons, pumping capacity 80 Imperial gallons. T. L. Church, mayor.

INCORPORATIONS

The Measuregraph Company of Canada, Ltd., has been incorporated with a capital of $2,500, divided into 25 shares of $100 each, to manufacture and sell instruments for measuring fabrics, textiles, etc.

The Central Canada Industries, Ltd., has been incorporated with a capital of $350,000, divided into shares of one hundred dollars each, to develop lands, industries, banking business, etc. The head office is in Toronto.

The Four Wheel Drive Auto Company, Ltd., has been incorporated with a capital of $200,000, divided into 2,000 shares of $100 each, with head office at Kitchener. The company's charter covers all ends of the automobile business.

A company has been organized at Calgary, with a capital stock of $2,000,000, to be known as the Western Canada Steel Corporation. The shares will be divided into 20,000 of $100 each, to carry on the business of steel manufacturers.

The Dominion Towing and Wrecking Company, of Midland, has been incorporated with a capital stock of $250,000, divided into 2,500 shares of $100 each, to carry on a general wrecking and towing business.

The Welland Utility Manufacturing Company, Ltd., has been incorporated with a capital stock of $250,000, divided into 2,500 shares of $100 each, with the chief place of business in Welland. The company is authorized to manufacture, import, sell, etc., electrical appliances, machinery and instruments of all kinds pertaining to electrical work.

William Arthur White, Joseph Armitage Ewing, K.C., and George Samuel McFadden, K.C., and John Travers Smith, clerk, of Montreal, and Wilfred Clare White, Westmount, have been incorporated under the title of W. A. White Company, Limited, with a capital stock of $30,000, in 300 shares of $100 each, as manufacturers of rubber goods.

MARINE

Quebec.—The steamer "War Toronto," which went ashore on her passage to Quebec, has been refloated, after a few days on the ground. After being pulled off she proceeded to Quebec under her own steam.

Watertown, N. Y. — The excursion fleet on the St. Lawrence and among the Thousand Islands, will be limited again this year, despite the end of the war. The Canada Steamship Lines have announced that the service will be the same as that of last year. Connections between Clayton and Alexandria Bay will be maintained by the Island Belle and Riverside, passing through the famous American channel between Clayton and the Bay.

St. John, N. B.—The winter season just ended has been a record one. The amount of wheat shipped during the winter was 19,956,000 bushels. The season was opened on November 23 last, by R.M.S. Tunisian, which loaded in St. John, after bringing over troop dependents and civilian passengers. She was the first of a total of 222 ocean going freight steamers. Nearly 25,000 returning troops have been welcomed at the port, and as the Board of Trade Journal proudly states, "The port of St. John was never closed an hour during the war."

Montreal. — The coming visit of Col. Grant Morden, the organizer of the present combination of steamships, has given rise to talk of a gigantic merger of British and Canadian steamship interests. The Canadian steamers would be of use as feeders on the inland waterways. Col. Morden is a member of the Canada Steamships London executive, and is understood to represent the London interests who advocated a higher dividend on the common stock than the four per cent. recently inaugurated .

Toronto.—The "Cayuga" will open the Toronto-Niagara season when she makes her first trip to Niagara on the 17th of this month. The Canada Steamship Lines announce that the regular two-boat service will not start until June 14, when the "Chippewa" will also be placed on the run. The "Kingston" and "Toronto" will open the Thousand Islands run on June 14, running on Mondays, Tuesdays and Saturdays to the end of the month, when the daily service will start. During the war the tourist traffic on this route was poor, but is expected to pick up this summer.

Sydney, N.S.—The prospects for the St. Lawrence coal trade are not bright, according to officials of the Dominion Steel Corporation. Three vessels having a tonnage of 45,000 which are owned by the Dominion Coal Company, are now employed by the British Government in transporting grain from Australia to England, while, according to report, Canadian grain elevators are filled to overflowing. One vessel is used as a transport between the United States and England and England and Italy, while another vessel has been carrying cargoes from South America to Holland for the Dutch Government. The latter vessel will now be most of the summer undergoing repairs.

Ottawa. — The Dominion Government will continue its shipbuilding programme through 1919 and 1920, according to a statement in the House by Mr. C. C. Ballantyne, Minister of Marine and Fisheries. The occasion was the bringing forward of an estimate for $30,000,000 to complete the program already announced. The Minister emphasized the fact that the number of ships that the country could use was limited, and that they were very near the limit now. He said that the number of men now employed in the shipbuilding trades was 46,000, and it would be a dangerous thing for any Government to throw that number of men out of employment. This consideration would influence the Government in placing further orders.

Vancouver. — Speaking before the Mathers Commission in Vancouver recently, J. J. Coughlan, of the Coughlan Ship Yards, gave his opinions of the present troubles and the future outlook of his industry. A heavy handicap against shipbuilding, he said, was the heavy freight rates, and the high cost of labor. The unrest in labor circles he attributed to the fact that many of the Union officials were Socialists, and in some cases violent Socialists. A hopeful feature of this condition, however, was that the Reds were losing prestige in the eyes of the men, because they were going too far in their demands. The presence of a man like Gompers or Peter Wright for a couple of months, would be of great help in improving conditions, in the opinion of Mr. Coughlan.

Ottawa.—Representatives of shipbuilding companies located at various points in Canada from Port Arthur eastwards and of the Shipbuilding and Marine Federation, the shipyards employees' organization, who have been in conference here for several days have, it is understood, reached a basis of understanding on questions at present the subject of negotiation. They have divided into committees which will visit the yards of the various districts to consult employers and employees. One committee will go to Collingwood, Midland and Port Arthur, for instance, and another to Toronto and other points in Central Ontario, where shipyards are operating. The Shipbuilding and Marine Federation, on behalf of the employees, is asking for wage increases and for a forty-four hour week.

Ottawa. — By an order-in-council the Government has made traffic on the canals possible. This does not apply to all canals, and to only a portion of the day to those mentioned. Employees will not be compelled to work on Sunday, but those willing to do so will receive an extra twenty cents per hour. Following are the waterways and hours between which they will be available for Sunday traffic:

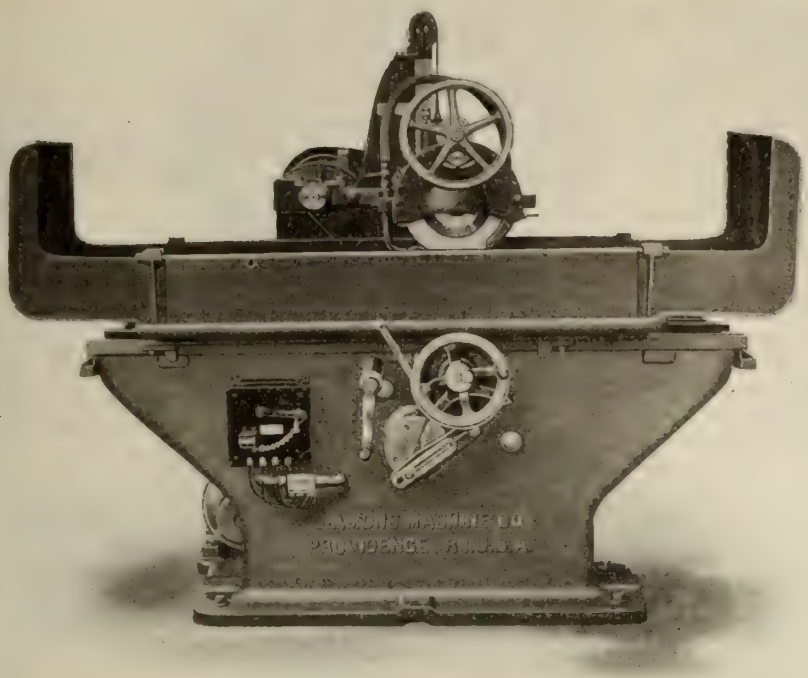
The Ottawa River canals and the Rideau canal, except from Pretoria Ave. bridge, Ottawa, to Manotick, between 6 a.m. and 9 p.m. on Sundays, and between Pretoria Avenue bridge and Manotick, the route to the Rideau lakes, from 5 o'clock to 10 each Sunday morning, and from 2 p.m. on.

On the Trent canal, locks No. 7 at Glen Ross, No. 18 at Hastings, No. 19 at Peterboro, No. 27 at Young's Point, No. 32 at Bobcaygeon, No. 35 at Rosedale, Lindsay lock, Port Severn lock, and the Marine Railways at Big Chute and Swift Rapids, together with the associated bridges, from 7 o'clock to 11 on Sunday mornings, and from 5 to 9 o'clock in the evenings.

BOOK REVIEWS

The Electric Furnace Co., Alliance, Ohio, have issued booklet 5-B, dealing with the use of the Baily Electric Fur-

FOR IMMEDIATE DELIVERY



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No. 1 Automatic Wet Surface Grinder

SPECIFICATIONS:

Table Surface.....24" x 12"
Takes wheels to..12" x 1½"
Speed constant..1633 RPM
Table speeds...18, 30½, 43
Auto cross feed (variable) .005" to 3/32"
Net weight.....3800 lbs.

Investigate the Production Possibilites of this Grinder —Now.

The A. R. Williams Machinery Co., Limited

64 FRONT STREET - - TORONTO, ONTARIO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

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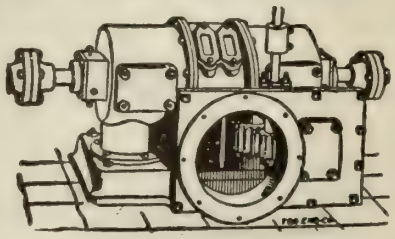
WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

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nace for melting non-ferrous metals. These furnaces are all of the resistance type and through the use of the carbon resistor very advantageous results are obtained, resulting in minimum loss of volatile metals, such as zinc. Results are obtained which are superior to those given by the oil-fired furnaces, and at a cheaper cost.

The Woodturner's Handy Book, by P. M. Havlock. Crosby, Lockwood & Sons, publishers, London. Price, 1s. 6d. This publication has been written for the imparting of knowledge on the tools, appliances, and processes used in wood turning. The various tools used in this craft are well described, the methods in use for sending out work and the actual operations in connection with the woodturning all clearly set forth. Typical examples of various classes of work, embracing practically all those commonly encountered, are given.

The General Industrial Catalogue of TYCOS Instruments containing 422 pages of useful and interesting temperature information is now ready for distribution. This new publictaion describes the whole line of TYCOS instruments for the indicating, recording and control of temperature. Many special applications are illustrated, showing the manner in which TYCOS instruments can be adapted to diverse temperature needs. Practically every instrument manufactured by the Taylor Instrument Companies for industrial purposes is illustrated and much explanatory matter descriptive of their construction and principles of operation is given. The list includes thermometers of every description, index and recording thermometers, hydrometers, pyrometers, temperature and pressure regulators, barometers, absolute pressure and draft gauges. A handsome publication, well bound, printed on paper of excellent quality and illustrated throughout with line drawings and half-tone cuts.

FURNACES STILL BEING BLOWN OUT

Dullness still characterizes the pig iron market. While enquiries for the most part are still very light, prices are holding fairly well, and in one case have advanced. The result of official negotiations is being waited for.

Following are the reports from various U.S. points:

NEW YORK.—The market is experiencing a very fair demand, and some iron has been sold for export. One lot of 100 tons has been sold to Holland for the full price of $45, at the furnace, and 250 tons No. 2 x at $28.25 furnace, which is equivalent to $32.55 New York. Low phosphorus iron is holding well; with a better outlook. A sale of No. 2 x for delivery over last half, amounting to 500 tons, has been made by a Western dealer at $28.50 Pittsburgh, which is equivalent to $32.80 New York.

PHILADELPHIA.—The quotations on the market here are varying widely, with the tendency towards lower prices. In some cases makers who have sold at the full Pittsburgh basis are agreeing to give purchasers the benefit of any reduction that may be made after the conference. Basic is in little demand, consumers apparently being well provided for. A further reduction in the number of stacks working is expected soon.

PITTSBURGH.—There is little business moving in pig iron in this district. Quite a few sales of carload lots are being made, but no quantities. Production is still being reduced, and last week the Cambria Steel Company blew out another furnace, and the Alice furnace of the Valley Mould and Iron Corporation was blown out. Total production in this district is not above 40 per cent. capacity.

BUFFALO.—With furnaces operating at 50 to 60 per cent. capacity, prices are holding firm. Little business is being done, the aggregate being under 1,000 tons for the week.

CLEVELAND. — The quietest week since the beginning of the year is the verdict on the past week's business. Makers think that this is due to hesitancy on the part of buyers who are waiting for the result of the Government's price adjustments.

CHICAGO. — The necessity of some consumers to obtain small quantities of pig iron to help out their mixtures has resulted in the sale of a few carload lots. Some shading of prices has occurred on sales of small lots to Southern interests, amounting to from $2 to $4 a ton.

CINCINNATI.—Southern prices are holding firm, nothing having occurred to affect quotations during the week. Enquiries are few and sales fewer.

BIRMINGHAM. — One furnace has been blown in during the week. There is no movement in the market, and while there is talk of readjustment, no method has been proposed. What sales there are are on a carload lot scale.

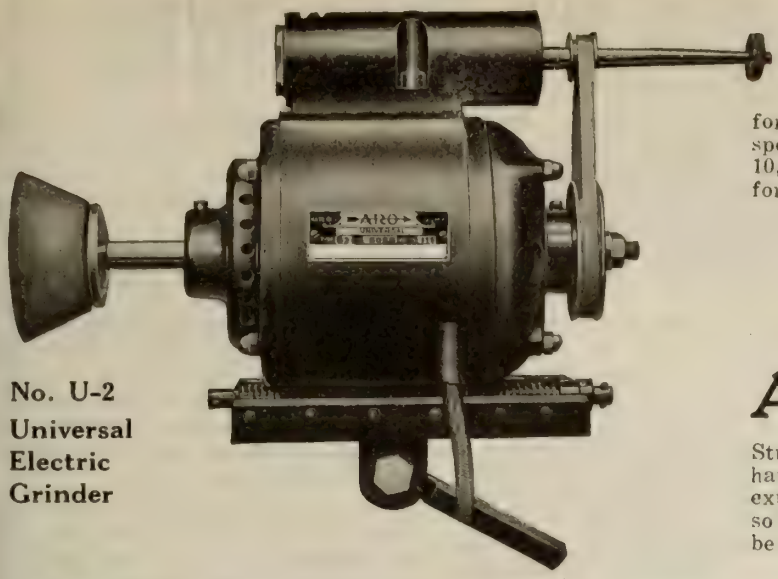
ST. LOUIS.—The week has seen no sales of pig iron. Not very much is expected from Washington in the way of help, and an open market is the only hope of a return to normal. The starting up of some large building operations will call for large tonnages of iron and steel, the new plant of the General Motors Co. alone costing over $4,000,000.

The aim of the fireman should be to keep his fires bright, and to have the combustion go on so that carbon monoxide and smoke shall be kept down to a minimum, and so that carbon dioxide shall be present in the flue gases in a proper proportion. The only practicable way to accomplish this, in small plants, is by employing firemen who understand their business thoroughly, and who know by the appearance and behavior of a fire whether it is working properly or not. For larger plants, where a greater expenditure of time and money is permissible for securing economy, various forms of carbon dioxide meters have been devised for showing the percentage of this gas that is passing away through the flues. Some of them are good, and well worth using; but they must be handled by men of a higher grade than are ordinarily intrusted with the duties of the fire-room. Complete flue-gas analyses are also quite helpful in maintaining high efficiency of combustion, but these can be made only by men who have some knowledge of chemistry. In plants where large quantities of coal are burned, it will usually pay to keep a record of the percentage of carbon dioxide that is passing away through the flues. By varying the method of firing a little, and studying the effect of the changes upon this percentage, it is often possible to improve the fire-room practice in a considerable measure.

EFFICIENCY IN BELT DRIVES

By D. Street

In almost every factory and machine shop a certain amount of power is wasted in transmission through driving belts, the percentage of loss depending on the attention paid to the matter. Slipping, the trouble most frequently encountered, is common to all classes of belting, and generally speaking the remedy applied is to cut and tighten, or "take up" the belt so that it will run free from slackness with a better grip of the pulley; but probably more belts are broken and prematurely destroyed in this way than by actual use, not to speak of the additional load thrown on the engine and the consequent waste of power. To overcome slipping, many engineers incline to the principle of using belts wider than is actually necessary. This permits a heavier load to be carried, but when the practice is generally adopted all over a machine shop with fifty or more belt There is, however, a growing tendency to run belts slack, as not only is friction thus reduced and the life of the belt increased, but no power is wasted and the strain on the prime mover is considerably reduced. Immediately the tension is reduced the friction is proportionately lessened. Further increase of the arc of contact round the pulley (after the belt has been sufficiently slackened to have no initial tension) will not lessen the friction, but the load-carrying capacity of the belt is increased. As an example in many engineering shops it has been found that cuts 50 per cent. heavier can be taken on lathes where the arc of contact has been increased from 180 deg. (with a tight belt) to as high as 220 deg. (with a slack belt) and in one instance with a corn-crushing machine the increase in output was over 50 per cent. To permit of driving belts being run slack a proper belt dressing should be employed. Many belt dressings rely almost entirely on their capacity to "stick," due to the inclusion of rosin or tar in their composition, but others take the form of a non-sticky preservative or belt food free from acid or alkali action, which is absorbed into the belt, rendering it pliable and highly effective, and at the same time protecting it from the effects of moisture, dryness, or chemical fumes. Such a preparation properly applied tends to give belts a velvety cling through the setting up of a vacuum suction between the belt and the pulley face, and will permit of slack running without fear of slip, even under the heaviest loads.



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Aikenhead's

Aro Grinders

Strong, dynamic-balanced machine capable of handling with ease tool and die work. The "Aro" extension arm attaches direct to armature and so travels at the same speed 10,000 R.P.M. Can be supplied 5, 10. 15 and 20" long.

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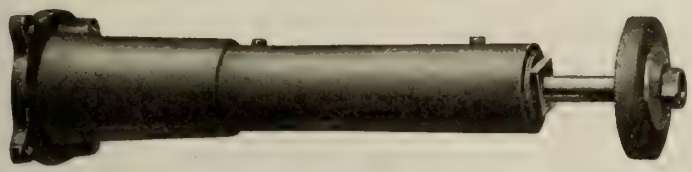

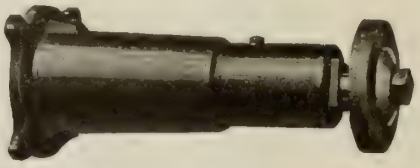

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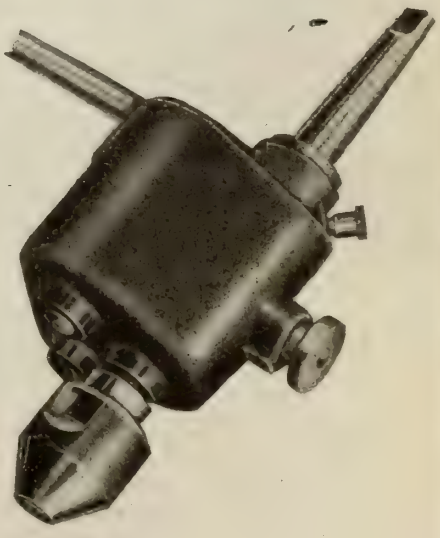

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Technical Education Plus Horse-Sense

By ROBERT MAWSON

I read with much interest the letter which J. H. Harrison wrote, on page 395, in reply to my short article in the issue of March 27th.

Let me say, however, in the first place that I was not attempting to criticize machine designers—that would be folly.

A machine designer in my estimation is a man, up to the minute in ideas and at all times ready to absorb knowledge that will help him to design better, no matter where the information comes from.

Let me say this for the three examples which I mentioned to illustrate the point in my article, in each case the design was fabricated by a man considered to be a designer—not a tracer.

Each man had received a college education and graduated from mechanical engineering classes, and knew the theoretical side of the profession.

The viewpoint I take is, that before a man can perform the work of machine-designing to advantage and sensibly, he must use not only the theory he has obtained, either at college or by study, and add to it what I called "horse sense."

I agree with Mr. Harrison, that the lathe I mentioned was not good design, but the fact remains that it was designed, and that by a man who called himself a machine-tool designer.

This case, however, was taken simply to illustrate my point, and that is why it is first of all foolish for a man to assume he knows everything because he has graduated from college and can figure out stresses, strains and the like. The graduating from college is merely the beginning of an education.

The knowledge gained there places the man's mind in a receptive mood for practical knowledge, which can be incorporated with the theory he has already received.

But to gain this practical knowledge he must get out amongst the things being made and gather information from the people doing these things. He may be asked many foolish questions, but he can sift out the ideas worth while and forget the others.

Again, Mr. Harrison says later in his article, "That a designer must have a good working knowledge of the methods and practices employed in the shop."

This is true, and the manner in which this knowledge has been obtained is by taking the technical knowledge he already had, and adding practical shop experience, and then using "horse sense" in his designs. Many elements used on machines are much stronger than any stresses to which they are placed call for, but they are so made because the human unknown factor enters into their use. Take as one example the equalizing levers for the brakes on an automobile. These are made abnormally strong; stress caused by either tension or compression does not enter into the question. The only way these can be designed is to forget theory and use what I have called "horse sense," and the only way this can be secured is to get down to the practical end of the profession.

And this same truth is evident all along the line.

There may be examples where the opinion of the executives in the shop are at fault, but in every case the designer will profit by asking for their advice.

If, after receiving it, he then considers it to be wrong—after due consideration—he has not lost anything by the interview, but rather tends to gain, as his certainty of the subject is strengthened.

This viewpoint is given, not as theory, but from actual experience—I have worked on both sides of the fence, the designing department and manufacturing end.

The big men in the game are those who are ready to listen to any advice given, no matter where the source may be, and use such portion as will broaden them in the engineering profession.

To illustrate this with only one example—one of the best engineers I ever met, a man of world-wide renown, made a practice of going through the various departments of the shop every morning and asking how the men found things in general, could they think of anything that they considered not right, either in design or manufacturing methods.

Many foolish remarks were made, of course, but some were worth consideration, and this engineer acted upon them and everybody in the plant received the benefit.

To sum up the matter, theory is good if incorporated with practical knowledge; separate the two and there is a state of chaos. Get all the theory you can, add to it practical knowledge; know why certain things are done, not only how to do them, use a little "horse sense" in doing them, even if it knocks your theoretical, book training into a cocked hat, and you will be a designer. With such an education, gained either up through the shop to the office, or up from the office to the machine shop, mistakes such as I recorded will be impossible, and designs made will look right, operate correctly, and be a credit to you. In conclusion, let me add that I do not blame the designer, I only wish to show him the mistakes of others, and how he can avoid them by obtaining the correct experience from the proper source.

HARDNESS AND WEAR

Hardness is a metallic quality which practically defies definition; anyhow, recent attempts to define it are, to say the least of it, disappointing. Unusual cases of wear always provide interest to the engineer, and have a bearing on the subject; most often alteration in the material of one member provides a remedy.

In a milling machine of good U. S. A. type there was a worm and wheel meshing. A few days in service found trouble; examination showed that both worm and wheel had the tried and worn appearance as if abrasive had been used for lubricant, the teeth of the wheel were over one-third worn away and the worm itself scored.

The cause—steel worm and steel worm wheel both unhardened; the wheel was replaced by one of cast iron, and gave no subsequent trouble.

In another instance a hand-actuated toggle press of simple type to stretch pieces of solid drawn tube to a shape unobtainable commercially was designed; at all events, although quotations were invited in several likely quarters, none were received, the quantity was moderate, and probably would not pay for special tools and usual drawing methods. Whatever the reason, it was decided to have the job home-made, and a simple toggle drawing press was made up from available material. The screw was fixed at 1¾ in. diameter, for the reason that the shop possessed a pair of R. and L. square thread taps of that size, which were dug out from obscurity; and were a veritable find. The smith was commissioned to make two nuts and blank for threading, and no one gave a thought to material. The smith made screw blank nuts from the same steel bar. It took exactly twelve hours' work to produce fine steel powder, visible on screw and exterior of nut, and lubrication had no effect whatever, while turning the handle became a matter of horsepower. The job was dissembled, the screw cleaned up, and two gun-metal nuts obtained from a local foundry to a hastily made rough pattern. The job never gave trouble after, and the press used for occasional jobs has screw and nut threads in perfect condition after a lapse of years. The question of wear is not altogether one of hardness, M. steel and cast iron work perfectly together as a wearing surface, so also do the usual babbitt and bronze: but a mild steel shaft will not work with a mild steel bearing—try it and see. The shaft will cut and score, while if the pressure is considerable, as in a worm or pressure screw, the freezing qualities of the similar material in contact merely emphasizes the matter. Lubricant has literally no affect whatever; it is merely a vehicle to float away the disintegrated particles of steel as they are produced. Two pieces of steel glass, hard and perfectly polished, might slide for years, but such an instance is, to say the least

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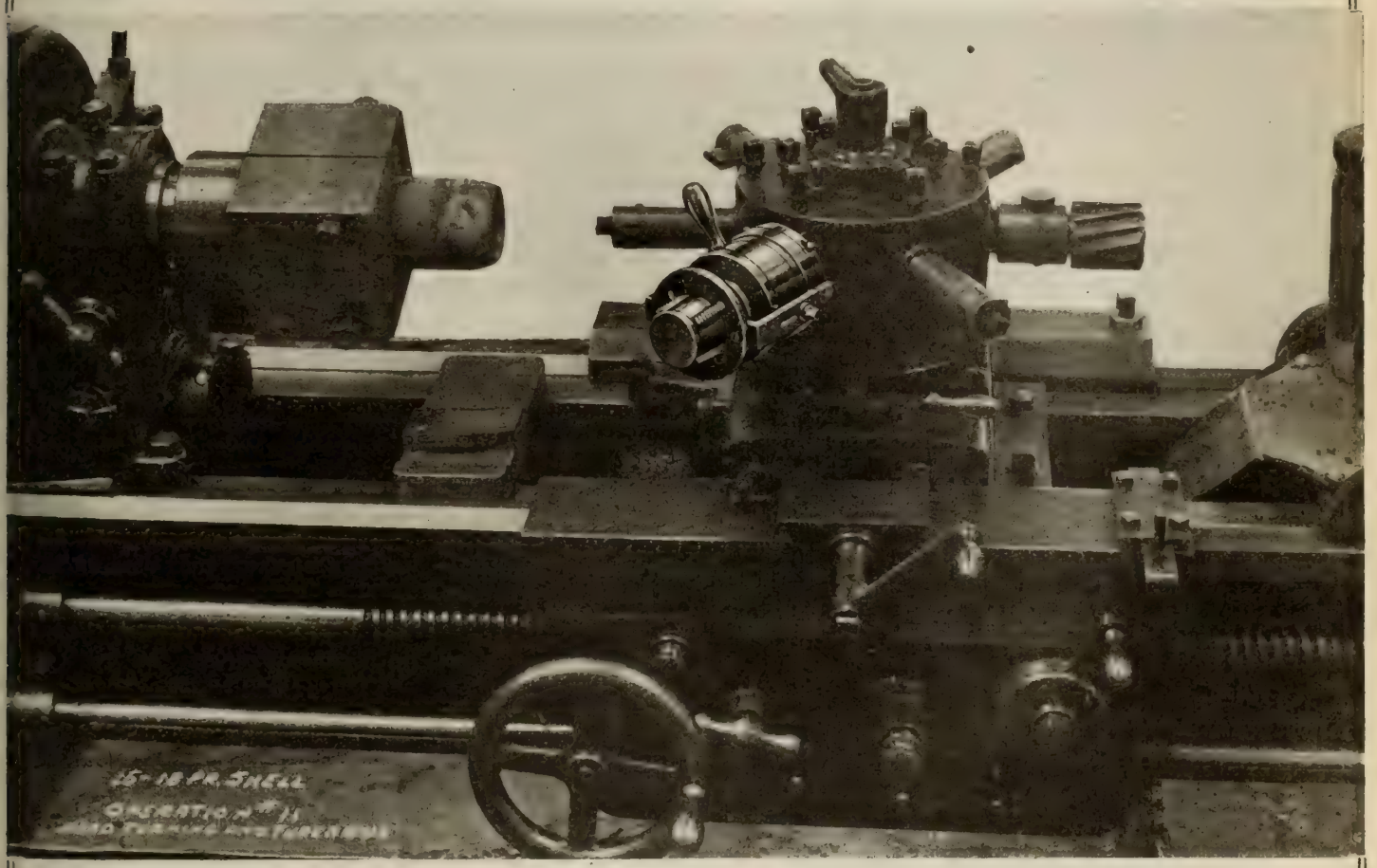
"The engine lathe shown in the photograph which we are sending you commenced work on shells within four months of the start of the war, when methods were in course of development, and special machines were unknown. Material and labor were both frequently unsatisfactory. Rejections due to poor threads were



frequent troubles with shell makers. Despite many adverse conditions the contract was successfully completed, and the Geometric Tap used on this lathe (fitted to cross-slide on carriage) was an important contributing factor in the good work done in the early strenuous times."

Very truly yours,

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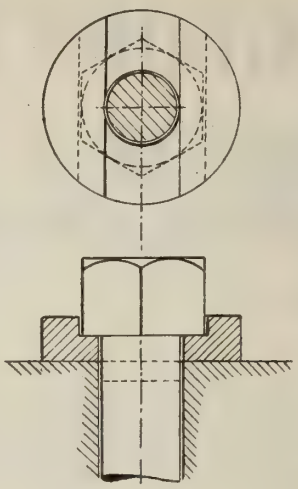
of it, unusual in mechanical matter. Cast iron, as a wearing surface, is a puzzle. In engine cylinders, worn to a glassy surface, there are minute pin-holes, and a close examination shows that the harder points in the structure stand in relief. The essential beauty of cast iron as a wearing surface is the glaze or surface it acquires after running in under proper treatment. If from any cause the glazed surface, becomes abraded the cast iron wears with great rapidity, scores and cuts up in a remarkable manner. Whether the material actually has a surface flow and gets an increased skin tension analogous to that produced in a fluid when solvent substances are introduced it is impossible to say, although theories to explain the facts are numerous enough.

The glazing property of cast iron is not without drawbacks. Possibly the largest single surfaces exposed to running wear in cast iron are those in the reciprocating marine engine. Guides, slide valves and cylinder surfaces are all of considerable size, and the glazing is very marked. Cast iron is by no means the hardest of known substances, but its resistance to abrasive wear places it in the forefront of substances used by the engineer for wear resisting. This lends interest to the subject of hardness versus abrasion.

The glaze on cast iron after prolonged wear is extremely hard; in fact, on a large slide valve it can hardly be touched by a file under all the pressure a man can exert to make the implement bite.

When a large slide valve on a marine engine gets into this condition, efficient lubrication becomes difficult; at all events, there is a decided tendency for the valve to squeak, and the trembling of the eccentric rods show that it is difficult to propel. Usually high flash cylinder oil in quantity fed by a mecanical lubricator will not effect a cure. The only remedy is to break up the surface of the valve at the earliest opportunity, and every marine engineer is aware of the necessity and deplores the hard work involved. The breaking of the skin on the valve with coarse block files does the trick, while the seating is very rarely touched, except that at long intervals it becomes necessary to remachine both valve and coat. It appears, therefore, that under conditions of large area and considerable pressure with the temperature usual to steam practice, that the skin of machined cast iron undergoes a molecular change, beneficial up to a certain point and then detrimental to running. The same remarks apply to the large guide surfaces and crosshead slippers.



SPECIAL WASHERS FOR ADAPTING BOLTS TO PLAIN SLOTS

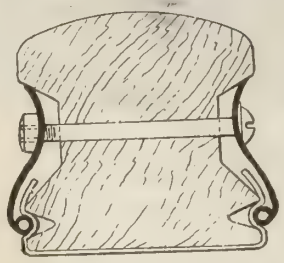
WHEN plain hexagon or square-headed bolts have to be used in the plain slots of drilling or other machine tables, there is no provision for preventing their rotation while the nut is tightened or loosened. But by making special washers, see the sketch, turning can be prevented. On one face the washer is milled out (or cast) with a groove to match the sides of the bolt head; on the other face portions are cut down so as to leave two tongues on either side of the hole, these fitting in the table slot.—FRED. HORNER.

BANKING FIRES

When the boilers are to be put out of service for a short time, but are nevertheless to be kept hot and ready to be restored to use within a few hours, it is customary to "bank" the fires instead of drawing them or allowing them to burn out. The operation of "banking" consists in disposing of the fires so that they will cease to burn actively, the combustion being reduced to the lowest limit that is compatible with the maintenance of the ignition. In this way unnecessary and wasteful loss of fuel is avoided, while at the same time a large body of intensely hot coal is maintained in a condition that makes it possible to start up the fire again very easily, and with little loss of time or material.

Fires that are to be banked should first be well cleaned, and a supply of fresh coal should be thrown upon the grates and allowed to become well ignited. The dampers should next be nearly closed, and the fires pushed back against the bridge wall so as to leave the front part of the grates bare. The fires should then be entirely covered with a considerable supply of fresh coal, the front part of the grates being still left bare, however, so that any air that enters the ash-pit may pass up into the furnace freely, and over the deadened fire instead of through it. Some firemen haul the fire forward, and bank it in a windrow across the front of the furnace. It will keep best if covered with fine, damp coal, well tamped down; for a crust then forms over it which excludes the air so effectively that the fire will often remain alive for two or three days.

Coal-gas is slowly distilled off from a banked fire, and to guard against accident from the ignition of explosive mixtures of gas and air in the furnace and the passages connected with it, care should be taken to ensure sufficient ventilation of the furnace and its connections by permitting a small quantity of air to stream continuously up through these spaces and out into the stack. The ash-pit doors should be closed tightly, and the damper in the uptake of the boiler should be as nearly closed as is compatible with the maintenance of the ventilation to which we have just referred



EMERY-CLOTH BLOCK

A NEAT mode of securing a strip of emery-cloth on a polishing block or stick is illustrated in the transverse section, the object being to use the minimum width of paper or cloth (to save wasted edges) and keep it strained tightly along the bottom of the block. A vee-groove is cut in the edge of each side of the block, and the cloth is pulled into each groove and wedged tightly by the curled ends of spring clamps, drawn together by a screw or screws passing through as shown.—Fred. Horner.

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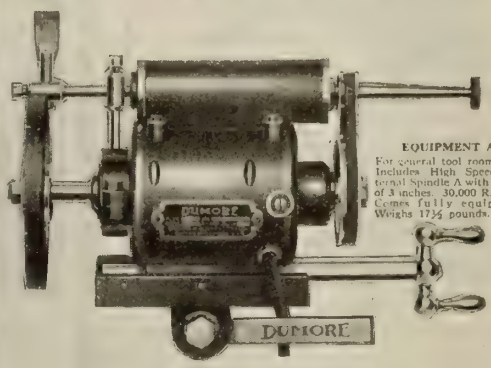

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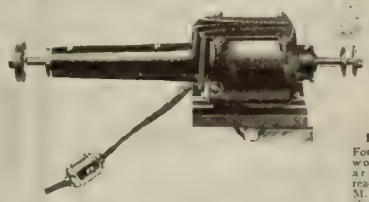
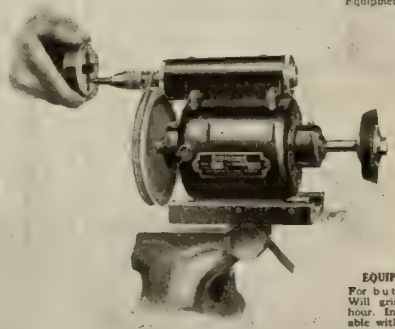


EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
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THE PRODUCTION OF FINE-SKINNED CASTINGS

In cases where castings are to be machined, a somewhat open and coarse skin, which cuts easily, is preferable, and in the production of this rather open sand and ordinary blacking works bests, owing to the metal usually being clean and free from pinholes just under the skin. This is wanted in bright work, so that waste of time and labor should be avoided, but it is doubtful whether strength is affected appreciably by the occlusion of the air or gases which cause the pinholes, the impervious character of the surface of the mould largely causing their occurrence. In cases where machining has to be avoided, it is necessary to have a fine, close skin on castings of all sorts, and as this largely depends on the face of the mould, it is necessary to, as far as possible, produce moulds that will give the desired results. In fact, it is possible with a pattern where the grain has lifted or been raised by damp and use, to make moulds showing the grain of the wood, so that this feature is repeated in the casting, but usually this is going too far for ordinary practice.

The fineness of the outside of a casting depends very largely on the grade of sand used for facing the moulds, and usually it is well to prepare a stock sand as follows: The new sand is thoroughly dried, and if there is a mill, well ground, and then the finer parts are taken out through a 32-mesh—or finer—gauge sieve, the rejections being again ground and sieved to obtain as much as possible of the sand. This alone is used for all but iron, but for iron facings ordinary floor sand should be similarly prepared, and kept in a separate bin for use as required.

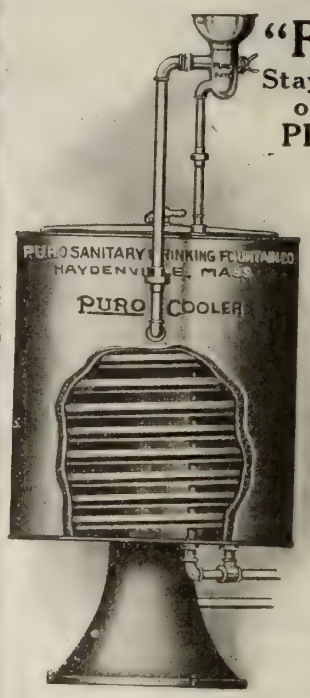
For facings for brass and the like, a proportion of pea flour is intimately mixed with the fine new sand while in a dry state, the amount varying from a pint to a quart of flour to the peck of dry sand, according to its character, and enough is damped down over night for each day's work, being rubbed "tough," as the moulders term it, on the morning of use.

For facing moulds for iron, part new sand and part floor sand is mixed together, according to the character of the new sand, and to this from 10 to 15 per cent. of ground coal, as fine as the sand, is added, the whole being very thoroughly mixed dry, and then wetted, and worked up tough by treading and beating on a clean floor, usually about three parts of new and one of floor sand being about right. This should be prepared at least one day prior to using, but, as it does not alter in storage, it can be made up in bulk at convenient times.

As only a facing of less than ½-in. in thickness is used, and the flasks filled with the ordinary sand, there is no very large quantity of the prepared facing needed, and although its preparation occupies some amount of time as a matter of course, the cost for each mould is very small, and would scarcely be felt in the ordinary costs of the year's working.

Beyond the facing sand, however, a small weight of very finely ground graphite or plumbago is necessary for polishing the surface of the moulds, this material being of good commercial quality free from additions of clay or other matter. In some cases, also, some finely ground steatite, or French chalk, is necessary, as the plumbago would be likely to stain some metals and alloys, while as its use is chiefly to mechanically polish the surface of the mould, and the amount used is very small, the best grades can very well be used. As the casting reproduces the surface of the mould very fairly, the smoother the mould the smoother the casting, and vice versa, hence the reason for polishing.

THE "FLU" Stayed out of this PLANT



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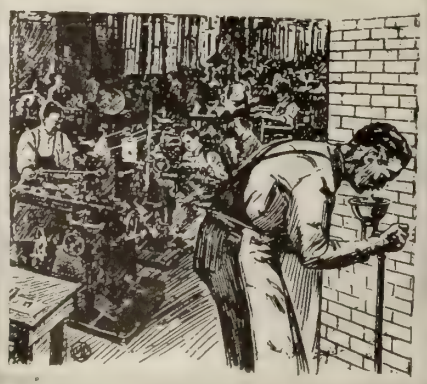

In use, the facing sand is placed over the pattern, in most cases being sifted on, and when ready for the ordinary sand, a section of half the flask would appear very much, as shown in Fig. 1, if the pattern was on a board for ramming up. From this point the mould would be rammed up with ordinary sand and finished off, the vent wire being freely used, care being taken that it only just touches the facing sand, however. In all cases where facing sand is used, it is scarcely possible to provide too much egress for the gases formed, and in this way the vent wire becomes valuable so long as it removes the gases from the back of the facing sand. If you penetrate the facing sand to any depth or touch the pattern with the vent wire, you secure roughness on the casting, and so nullify all the trouble taken to secure a good mould.

After the first half of the flask is rammed up it should be turned over, and the top surface or "joint" trowelled off and well dusted with the parting sand. More facing sand should be arranged over the pattern, and the flask should be completed, a runner stick being inserted at a convenient point for gating the mould. Venting should be done as well on the top as at the bottom half of the mould, and with the same precautions.

The mould being so far finished, and the runner stick removed, the flask should be opened, and the gates cut, unless it is preferred to do this after the pattern has been lifted. In any case the pattern must be lifted, and the mould finished and cleaned up, after which it should be lightly dusted with plumbago —or steatite—shaken through a cloth, and with a soft camel hair or other similar brush the powder should be polished over the face of the actual mould, any dust being gently blown out with the bellows. The mould should then be closed and poured, a section appearing as shown in Fig. 2.

In some cases surface drying is necessary, but in regard to this individual practice must form the deciding factor, and in such instances smoking the surface of the mould may be adopted instead of using plumbago, the deposited carbon being polished with a soft brush. Smoke from a mineral oil lamp or torch is best for the purpose, a smoky flame being purposely produced.

The gating has to be done carefully, because, on the one hand, it has to be efficient, while, on the other, it has to be as inconspicuous as possible, this, of course, being often a difficult point to arrange. If some part of the casting has to be turned, or otherwise machined, it probably will be possible to gate the mould where this machined part will come, although this is not always feasible, but in all cases the least conspicuous spot must be chosen, consistent, of course, with efficient casting. The dressing of the casting must also aid in this particular item, but, unless on machined work, the gating must be discernible, as the skin of the metal does not cover this.

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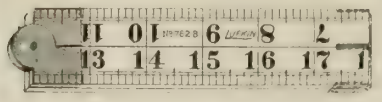
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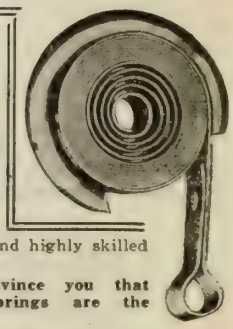
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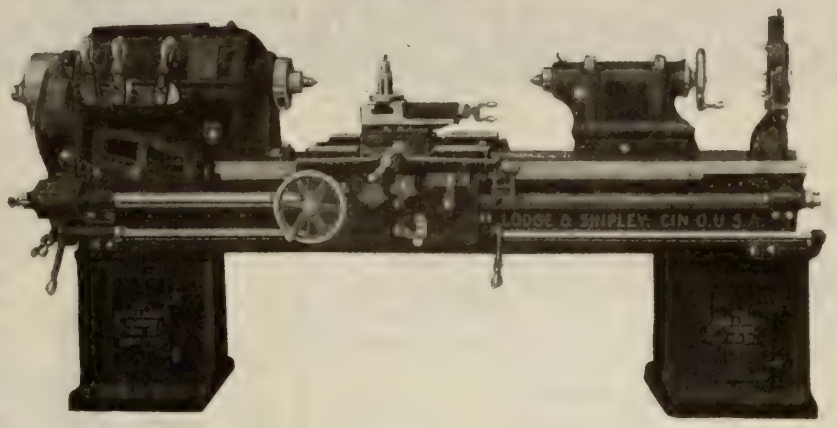

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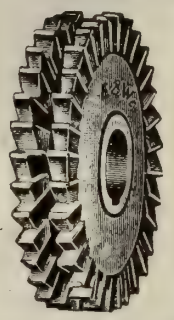

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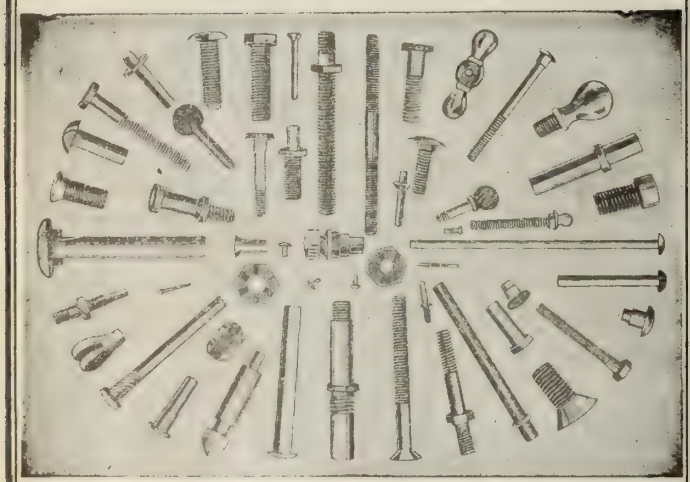

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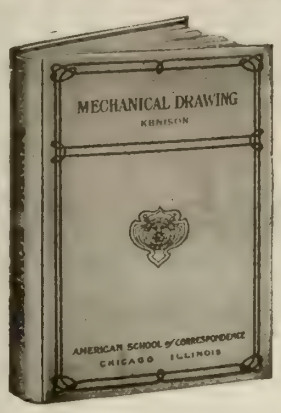

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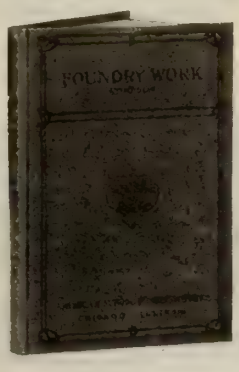

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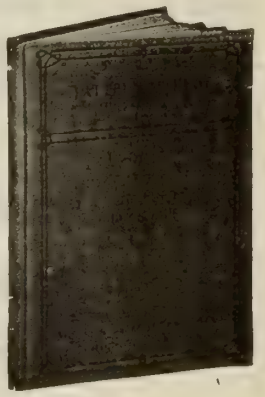

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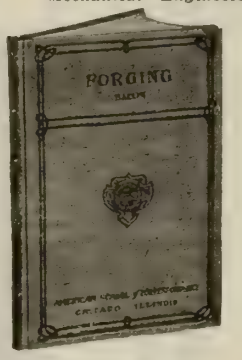

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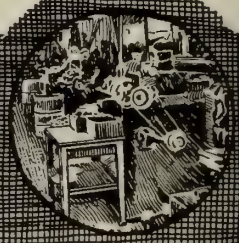

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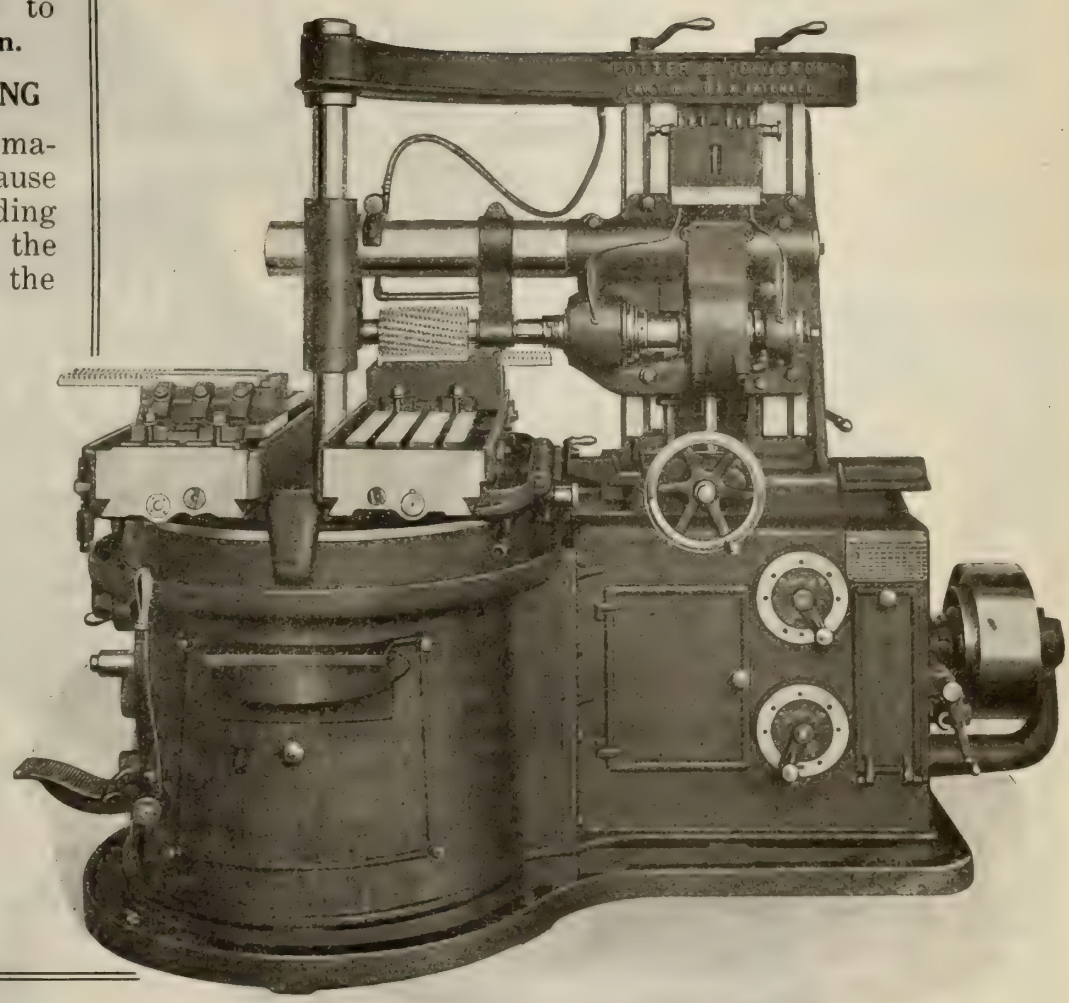

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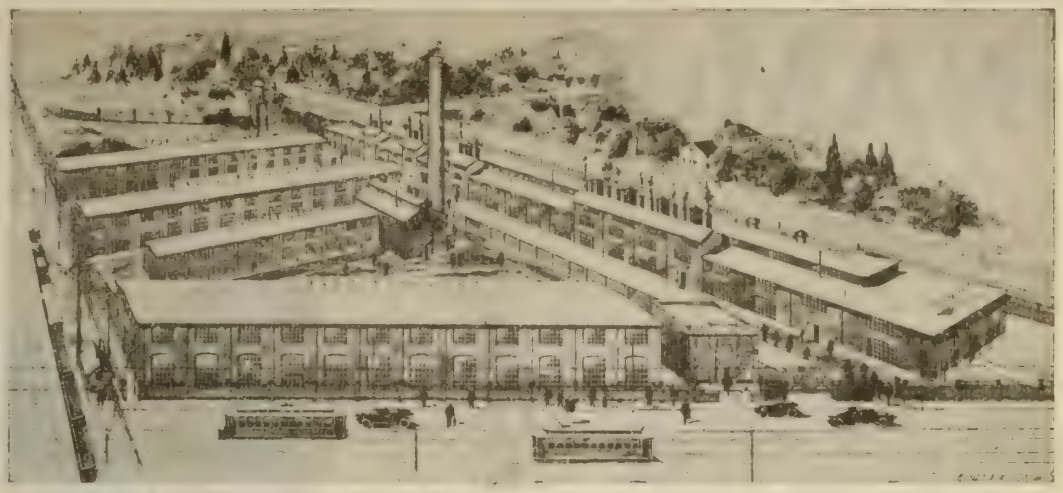

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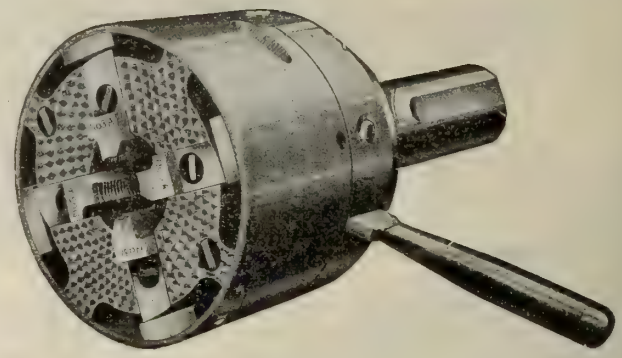

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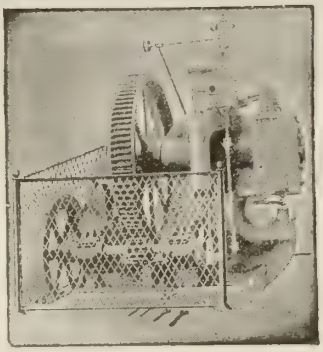

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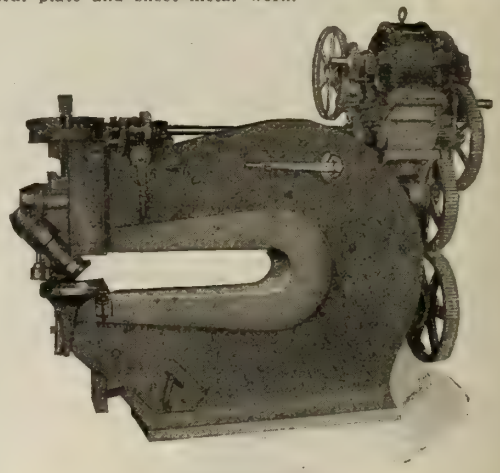

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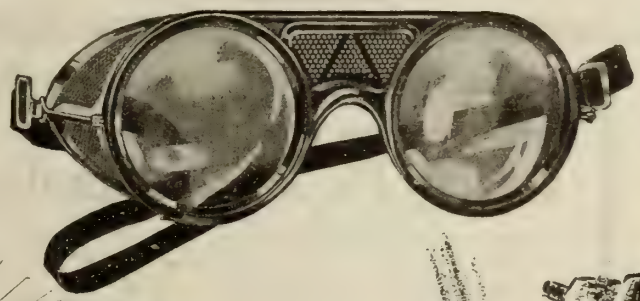
ADEQUATE eye protection not only preserves eyesight under hazardous conditions, but also makes your men better workmen. The man who is constantly dodging, or fearing eye injury, is not a competent workman.

STOCO safety goggles with Celoglas shatter-proof lenses are the best possible eye protection. The frame itself is light in weight and comfortable, but very strong. Celoglas lenses, even when fractured, will not leave the frame or pieces fly into the eyes of the wearer.

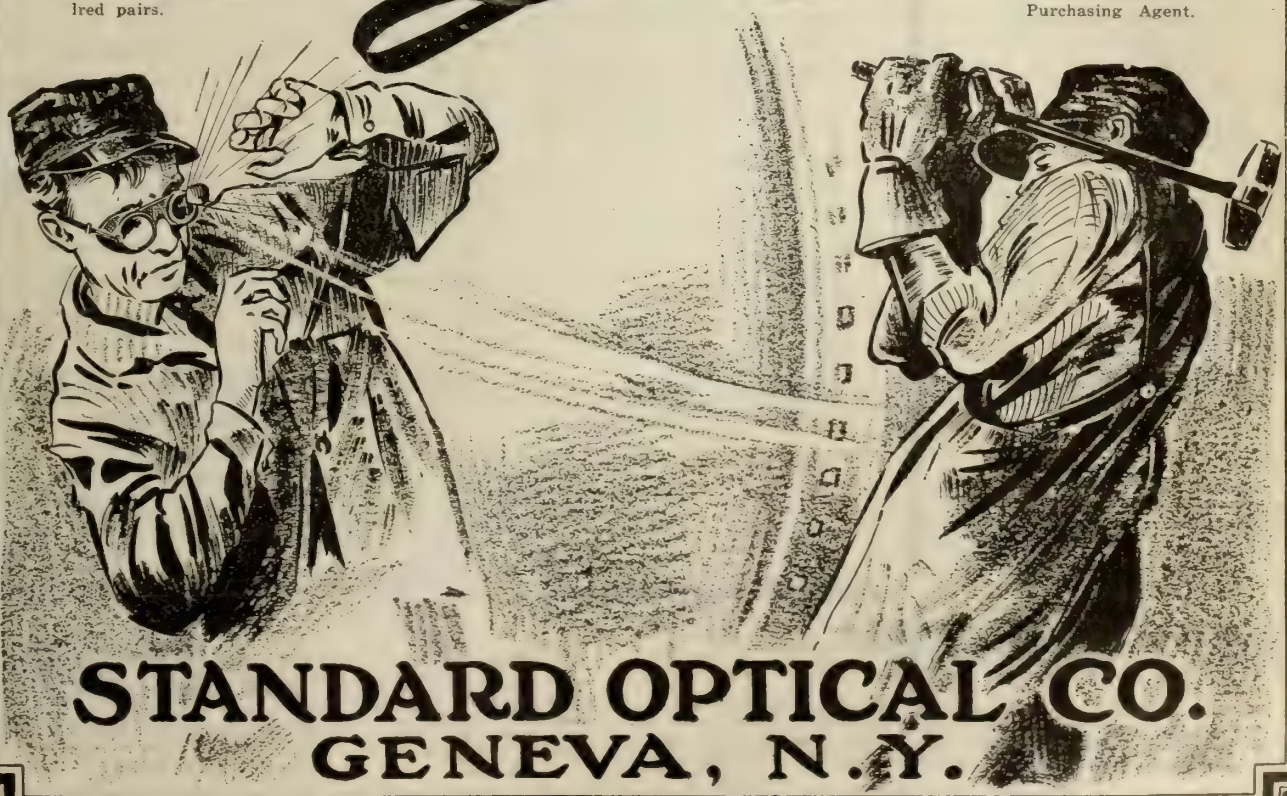
Made with elastic headbands as illustrated or with easy cable ear-bows at the same price.

STOCO safety goggles with Celoglas lenses, $150 per hundred pairs.

With regular heavy weight optical glass lenses, $115 per hundred pairs.

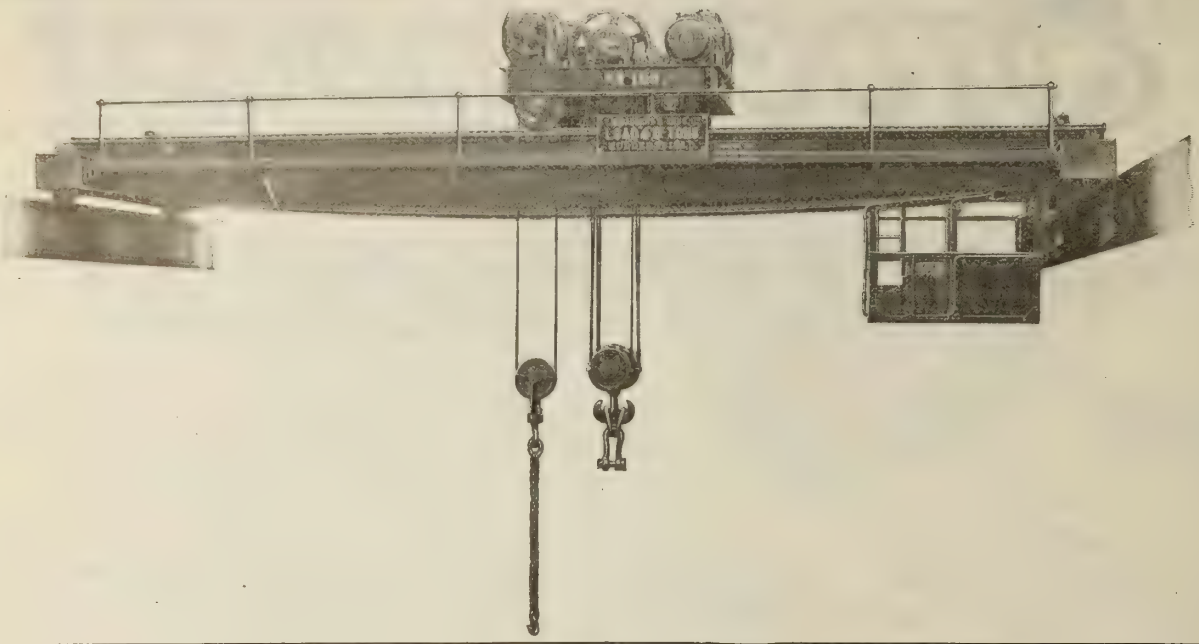


You are invited to test the STOCO goggles without expense or obligation. A sample will be sent free on request to any Superintendent, Safety Engineer or Purchasing Agent.



STANDARD OPTICAL CO.
GENEVA, N.Y.

ELECTRIC CRANES & CAPSTANS



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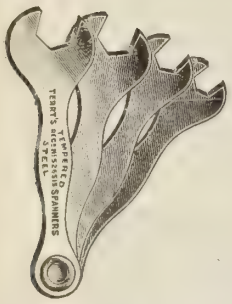

No. 427.—Four folding spanner sets. Made from thin, well-tempered steel. Serviceable. In 3 sizes. (1) 5-32" to ¼" across flats. (2) ¼" to 7-16" across flats. (3) ¼" to 7-16" Whitworth.

We have specialized on washer production, and for high grade quality, quote advantageous prices.

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Now in Canada

OUR commercial manager, Mr. E. Clarke, is making a business trip through Canada. He is visiting all the cities of note, and shows a full range of samples. Watch your local press for details of his visit.

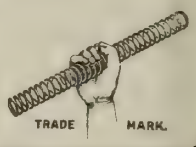
WE have been manufacturing for 63 years, and our workmanship has an honored reputation, in the Homeland, amongst manufacturers. To the Canadian manufacturer using springs, presswork, wirework, washers, cable work for controls, etc., we are wishful to be of service.

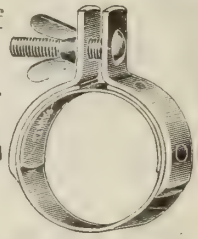
HERBERT TERRY & SONS LTD.

The Spring and Presswork Specialists

REDDITCH
ENGLAND

Established 1855





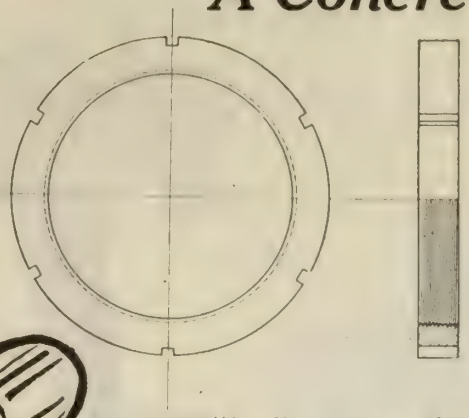
Terry's flexible and waterproof cable covering and controls, with inner mechanisms of high grade high tension wires. Supplied to lengths complete with caps, etc. Covering is manufactured in any color, one color all through, or if desired, armored to protect against chemical, accidental or fire.

If supplied with samples or prints we can quote for any pattern for quantity needed.

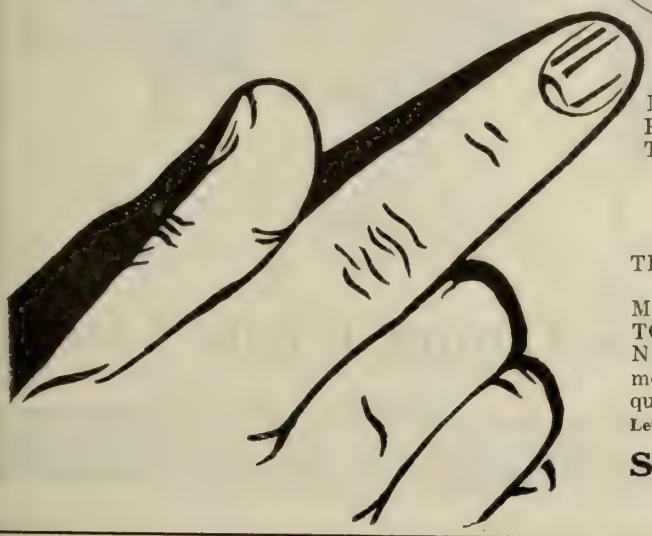
Terry's springs are used by all the leading manufacturers who are jealous of the reputation of their product.

Smalley-General Thread Miller Saves Time on Main Spindle Nut Work

A Concrete Example



A vital factor in competition to-day is speed in production. You need the Smalley-General Thread Miller for quantity work. Speed, convenience and accuracy are the features of this modern cost-cutter. The following time-study illustrates what it will do:



MACHINE—Smalley-General Thread Miller No. 2.
PIECE MACHINED—Main spindle nut.
THREAD—Diameter, 8"; length, 1¼"; 8 pitch U.S. Standard.
1. Work chucked.
2. Threaded surface milled from rough.
3. One side faced.
4. Put on mandrel. Turn other face and outside.

TIME—Milling operation, 1 min. 45 sec. Milling feed, 14.3" per min.
MATERIAL—Cast iron.
TOTAL TIME in thread miller, floor to floor, 3¼ min.
NOTE—Smalley-General Thread Miller Method involves no more chuckings than in a lathe and saves much time. Also quality of work better.

Let us tell you more about the "Smalley."

Smalley - General Company, Inc.
Bay City, Michigan

Canadian Agents—Rudel-Belmap Co., Limited, Montreal and Toronto.

THE FINANCIAL POST in the House of Commons

IN the House of Commons the other week the attention of the Government was drawn to the article in THE FINANCIAL POST containing a reference to the financing of Roumanian orders through an agency established in London by Sir Clifford Sifton. Sir Thomas White, who is familiar with THE FINANCIAL POST, stated his opinion that the reference was to private marketing of bonds.

This is merely a small item from THE POST of recent date, but it goes to show that

POST BUSINESS NEWS HAS THE ATTENTION OF MEN WHO COUNT

SIR THOMAS WHITE, with other prominent Canadian men of affairs, has found THE FINANCIAL POST of swift and sure business service. When you "get down to business" you want the plain facts—all of them—without frills—and quickly. You get them like that in THE POST. THE FINANCIAL POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

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are replacing larger and more expensive lathes every day for tool work, light manufacturing and repair work.

They save space, initial investment and power and are very easily operated.

Write for catalogue giving full particulars on our 9-in., 11-in., 12-in., and 13-in. swing sizes.

The Seneca Falls Mfg. Co., Inc.
366 W. Fall St.
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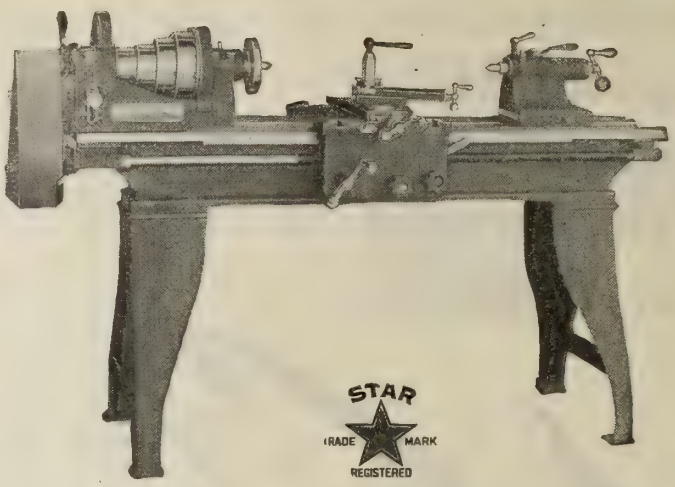
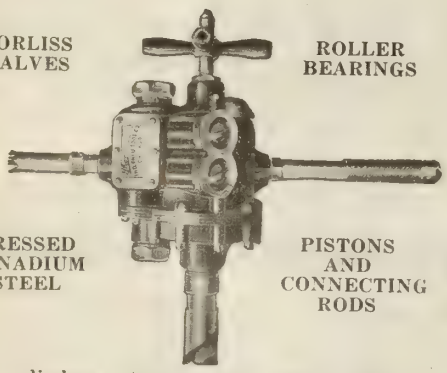


13″ x 6′—Style E

"Star" Screw-Cutting Engine Lathes

PNEUMATIC TOOLS

AIR DRILLS



Four cylinders — two on each side — with Semi-Corliss Valve close to each pair, giving greater power and efficiency.

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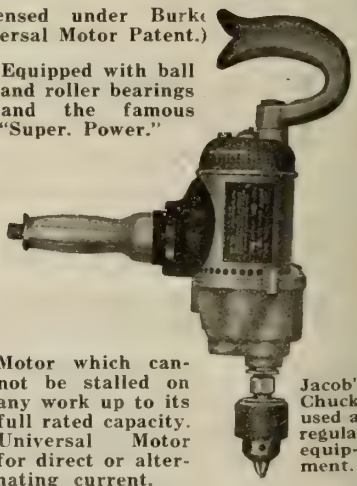
CHIPPING HAMMERS

4 Sizes, 1 in. to 5 in.
All parts hardened and ground.

ELECTRIC DRILLS

(Licensed under Burke Universal Motor Patent.)

Equipped with ball and roller bearings and the famous "Super. Power."



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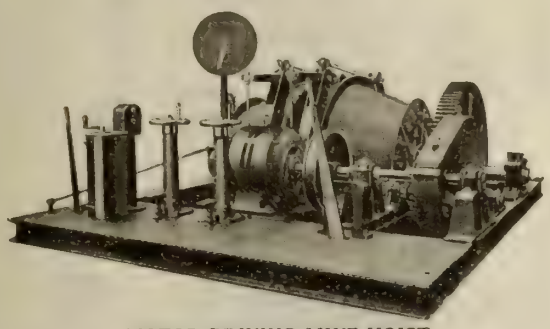

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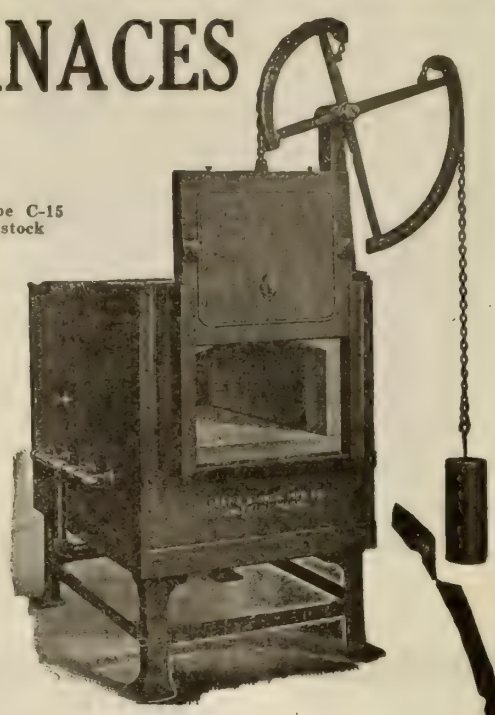
Type C-15
in stock



Shipped on Receipt of Order

If additional proof was required of the efficiency of Gilbert & Barker's heat treating furnaces, this proof was generously supplied during the World War. Industrial plants throughout the United States and Canada engaged on war contracts covering the manufacture of munitions, ordnance, airplanes, motor trucks, tanks, etc., found it necessary to secure on short notice a thoroughly efficient furnace. As designers and builders of heat treating furnaces for a period of more than 50 years it was quite natural that the demand for G & B equipment should be heavy.

You don't have to pay for experience nor do you have to take chances on inefficient heat treating furnaces. G & B furnaces can be depended upon for accuracy and efficiency, plus low operating cost.

There is a G. & B. furnace for every heat treating requirement. Tell us your problem and we will promptly tell you the type of furnace best suited to your needs, but first send for Bulletin 24. Today is a better day than tomorrow—write.

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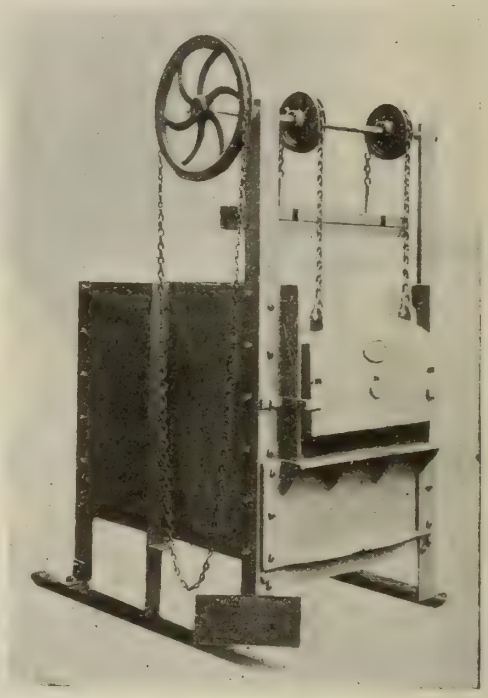
It's economy — requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. *Can you afford to lose the Advantages of this oil Furnace?*



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ECONOMIZER FORGE

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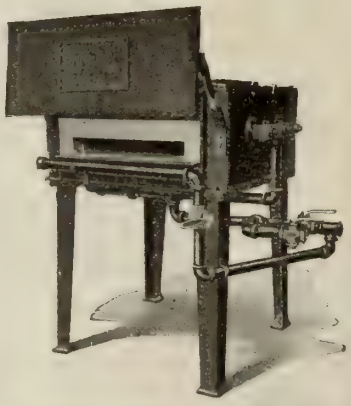

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For
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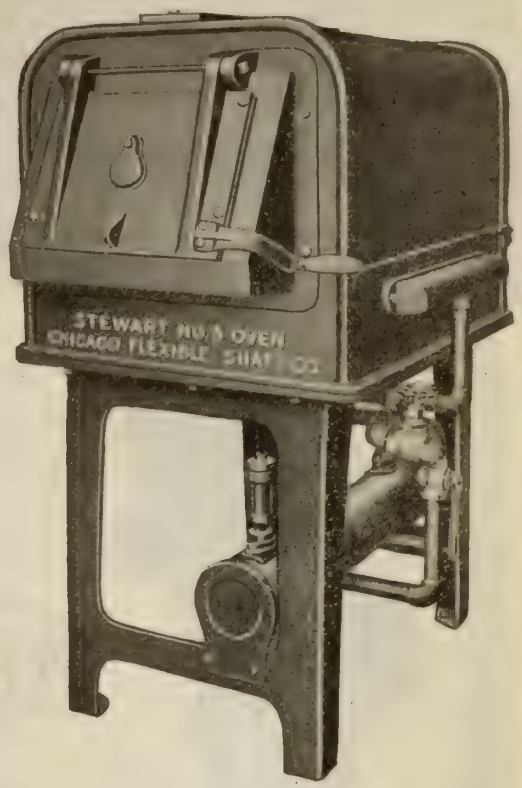
STEWART FURNACES

are popular in Canadian Shops



The fact that so many of our Canadian first orders are speedily followed by orders for additional Stewart equipment, tells its own story of satisfaction.

Furnace-men trained in England and Scotland seem especially to favor the Stewart line, because our sturdy construction and heavy linings remind them of the furnaces they used to use at "home."

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Send for our catalog and remember that all Stewart Furnaces are sold on 30 days' trial basis at our risk.

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30,000 now in use in 10,000 shops. Over 100 types and sizes to choose from.

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Applied to Pexto Wrenches it is ability to take hold, hang on, come through and stand ready to do the job over and over again.

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Whether you are buying a hundred tools for the shop or a single wrench for your home you'll find the same genuine economy in Pexto.

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Solid Handle Wrench

This solid handle Pexto Wrench is made of three strong, simplified parts with heavy wooden riveted handles. The head, bar and handle frame are all forged in one piece from high quality steel, next is the sliding jaw, and third the screw.

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This Pexto Wrench carries out the highest ideals of Pipe Wrench design. The hardened jaws of steel grip like a vise yet they are easily tightened or released. When you get a pipe wrench be sure it's Pexto-made

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FOR THE MECHANIC IN EVERY TRADE

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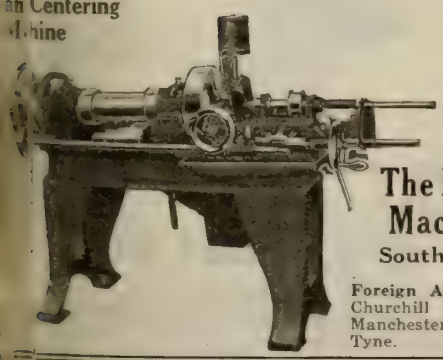
One Cuts Up
Another Cuts Down
and
They Both Cut
At Once

Here's Real Economy

This patented Hurlbut, Rogers Cutting-Off and Centering Machine embodies two cutting-off tools—one cutting up and the other cutting down; each holding the work against the other. What is the result?—**the production is doubled and the cost is cut in half.** Further, the centering operation goes on at the same time. Doesn't this appeal to you as real economy in production? When you are assured of such good-paying results why hesitate to adopt this machine? Soon pays for itself.

Let us hear from you and we will give you the full story of its ability.



The Hurlbut, Rogers Machine Company
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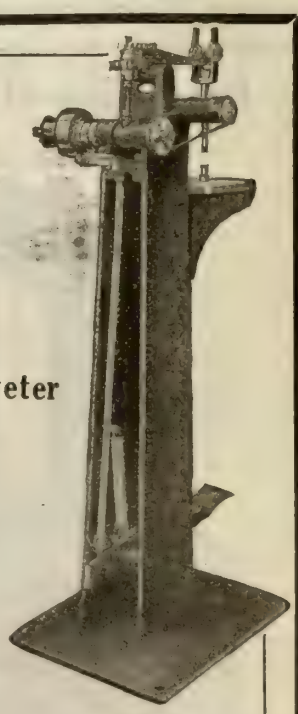
A Boy with this GRANT

Rotary Vibrating Riveter

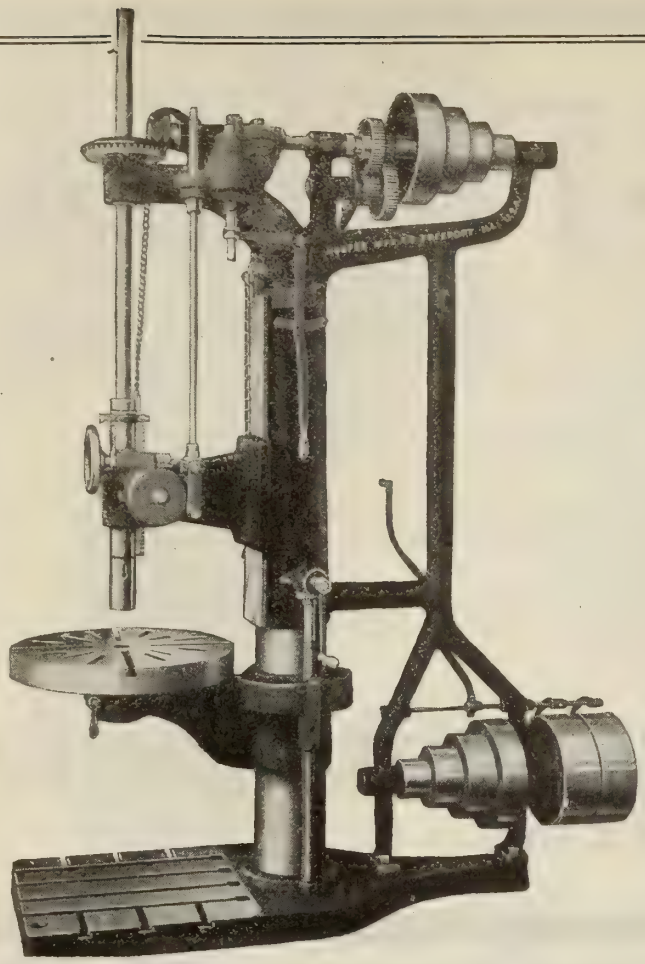
will do better work and more work than any man with any other riveter.

A dollar-a-day boy will place rivets in small, out-of-the-way corners or close up to the shoulder of the casting that will be as smooth and good looking as any placed in easy-to-reach spots. Can you say that of any other riveter, even with a man operating?



And a boy and a Grant Rotary Riveter are a safe combination. For although the Grant can be operated at a speed limited only by that at which the operator can feed the machine, its friction stopping device enables a boy to regulate its speed at will. **Write us.**

Grant Mfg. & Machine Company
Bridgeport, Conn.



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And know-how is a lot different from know-it-all. The Hoefer engineers are eternally plugging away to make a better driller.

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Our product, Hoefer Drillers, embodies the latest word in design, efficiency and accuracy.

Regardless of the size of the press, drilling is possible to a fine degree of precision, provided you use Hoefer Drillers, the recognized standard for a quarter of a century.

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Drilling Machines

You can use them to great advantage on any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

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Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

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Gang Drills.—Horizontal Drills.

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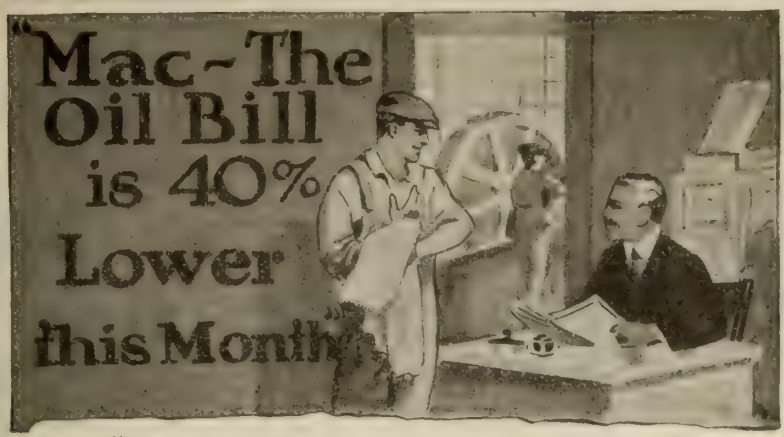

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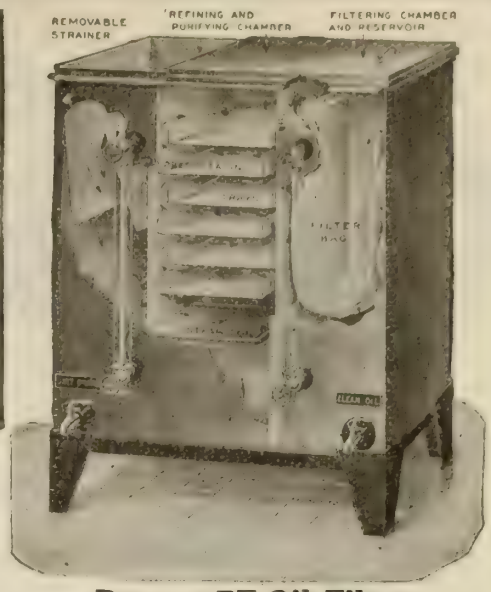

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Third, IT PAYS FOR ITSELF over and over.

WRITE FOR LITERATURE DESCRIBING OIL FILTERING SYSTEMS SUITABLE FOR YOUR POWER PLANT.

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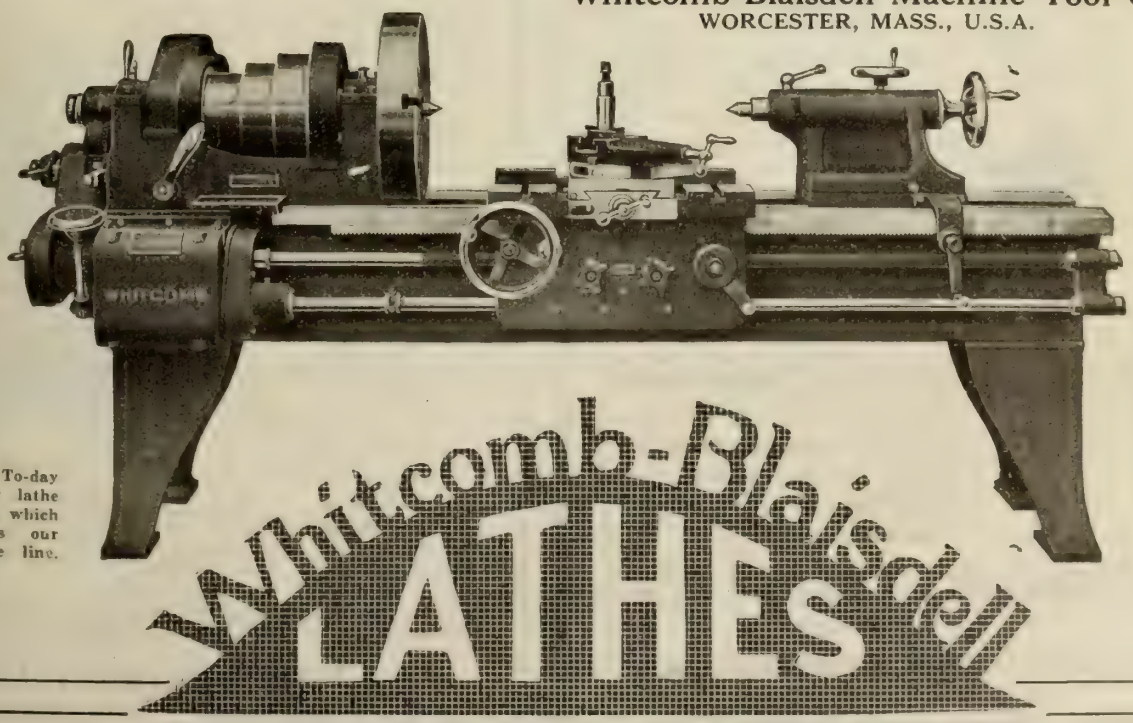
WORCESTER, MASS., U.S.A.



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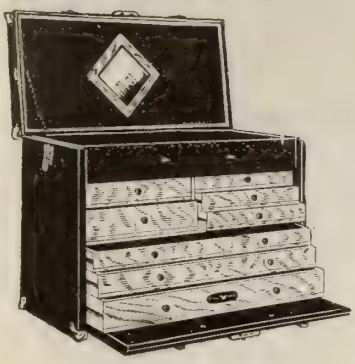
We have in stock for immediate shipment the highest grade Bar Iron, Black and Galvanized Sheet Iron, Machine Steel, Cast Steel, High Speed Steel, Cold Rolled Steel, etc.

Machinist's Tool Chests

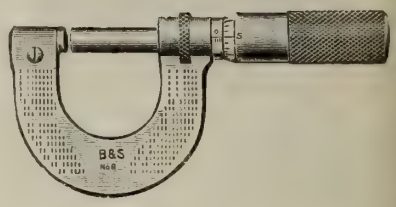


Time and again skilled machinists have remarked on the strength of construction and compact design of our Tool Chests. Have us give you full particulars.

CRESCENT BELT FASTENERS

Clinch beneath the surface of the belt on the pulley side—no part in contact with the pulley. They maintain uniform grip the entire width of belt and never weaken from wear.

Micrometer and other fine tools



Select from such wholly dependable makes as Starrett or Brown & Sharpe, or from other makes you have proven in your own shop to be most durable and efficient. Our stocks are complete.

"Victor" Hack Saw Blades for Tough Metal

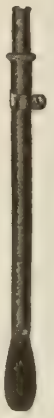
Durable, fast-cutting blades that you can rely upon to cut true through toughest metals. Users have found that these blades increase every day's output and serve much longer than ordinary blades.

Write us about your requirements.

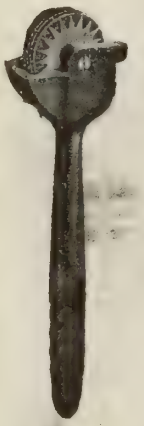
RICE LEWIS & SON, LIMITED

Established 1847 TORONTO, ONT. 19 Victoria Street

Every Emery Wheel With Its Own Dresser



Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.



For all ordinary shop grinding wheels specify **"Diamo-Carbo"**—the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

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The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

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HAMILTON, ONTARIO

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PARTIAL LIST OF TOOLS

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1—60" Niles Vertical Boring Mill
No. 4—B. & S. Plain Miller
1—36" x 36" x 8' Gray Planer, two heads
No. 3—Cincinnati Universal Miller
5—No. 0 Steptoe Hand Millers
13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
14" x 6' New Carroll-Jamieson Quick-Change Lathe
15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
15" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 17"
17" x 8' New National Quick-Change Lathe
3—17" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 19"
17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 19"
18" x 24" New Rahn Larmon Lathe, D.B.G. Quick-Change
19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 21"
9—19" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 21"
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33" x 14' Putnam, arranged fo. Motor Drive
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5' Bickford Single Pulley Drive Radial
100-lb. New Little Giant Hammer
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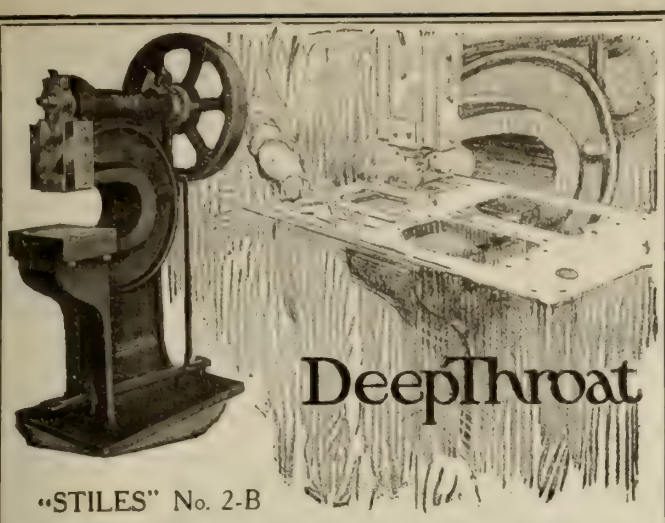
30-ton Watson & Stillman Hydraulic Press

FRANK TOOMEY INC.

127 North Third Street PHILADELPHIA, P.A.



"STILES" No. 2-B

For reaching into the center of large sheets of metal, this model of the "Stiles" type of Press is provided. The massiveness of the frame and its special design make it rigid, even under the most severe punching strains.

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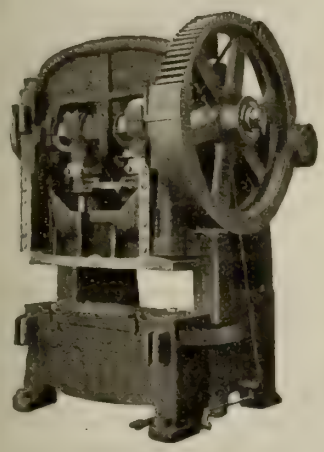
The "TOLEDO"
DOUBLE CRANK PRESSES



Notable for their almost incredible resistance to wear and as economizers of human effort.

The overhanging type is adapted to a general line of multiple punching, shearing, blanking and forming.

The heavy steel tie rod construction is of particular importance as the rods take the entire stress of the press while the uprights take the reaction.

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EFFICIENCY DURABILITY

A Time Tried and Proven Economy Bearing Primarily Built for Line Shafting

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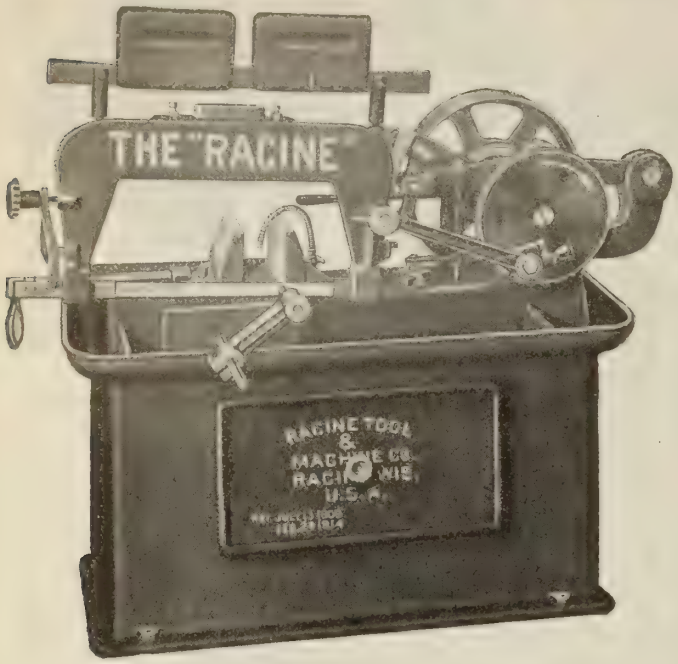
Standard the World over

"THE RACINE"

HIGH SPEED METAL CUTTING MACHINE



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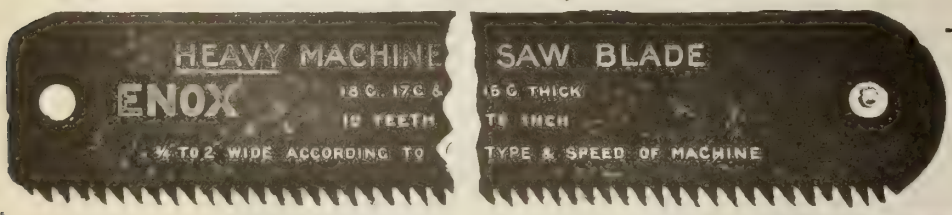

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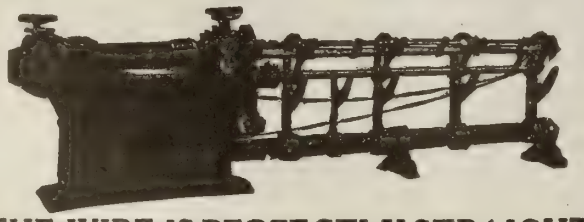

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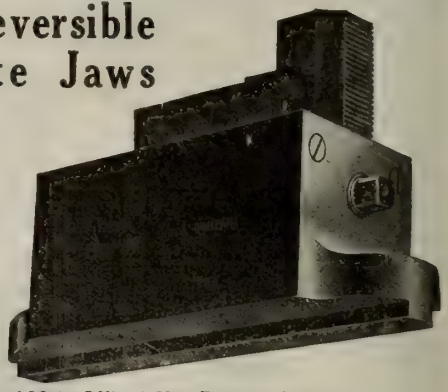

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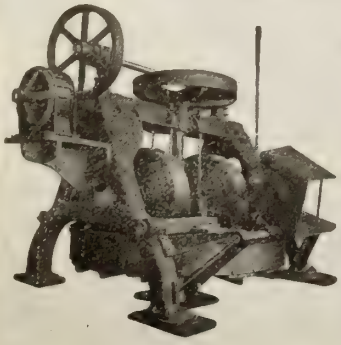

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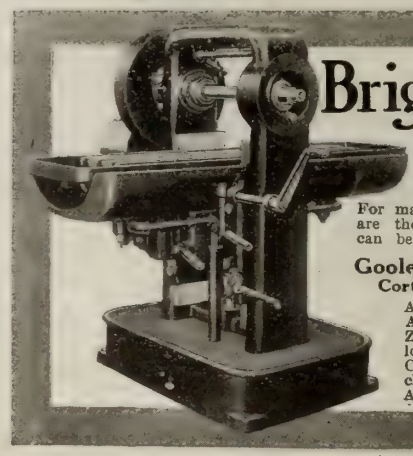

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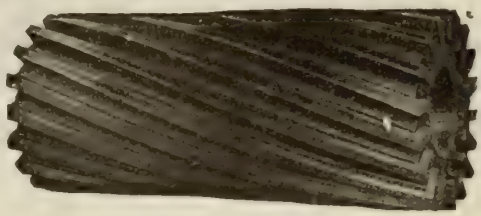

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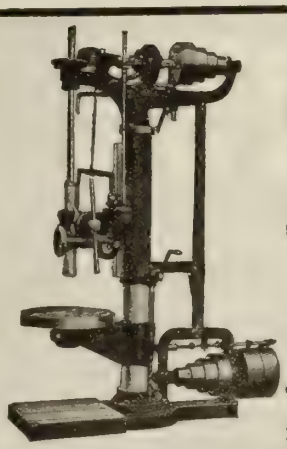

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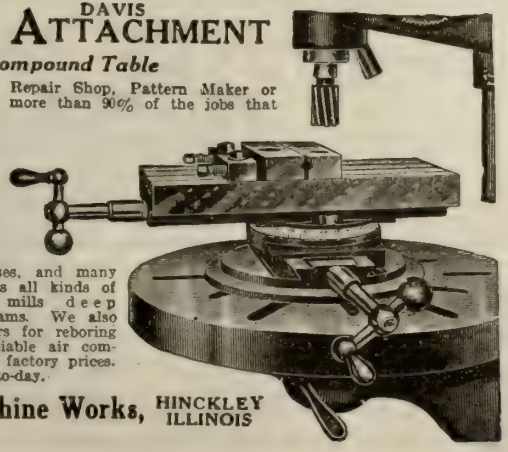

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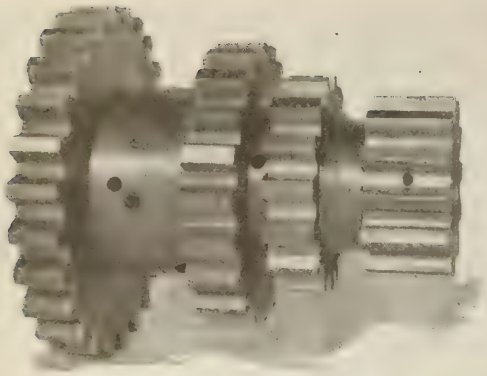

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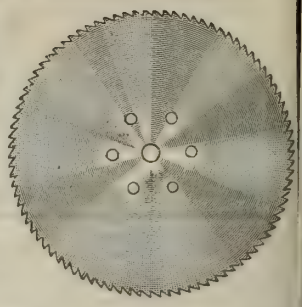

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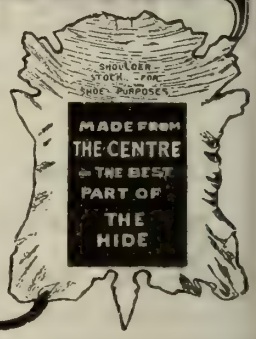

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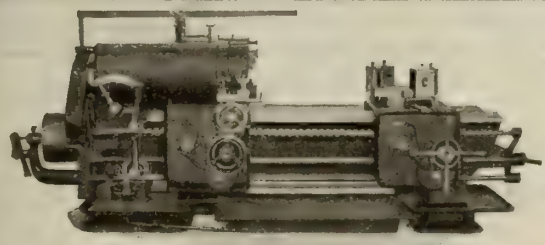

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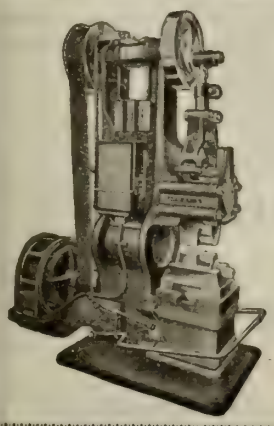

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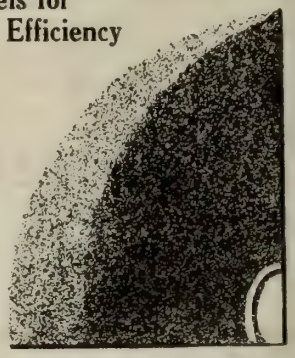

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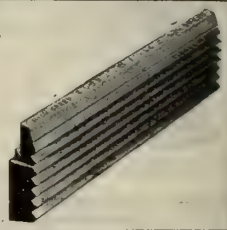

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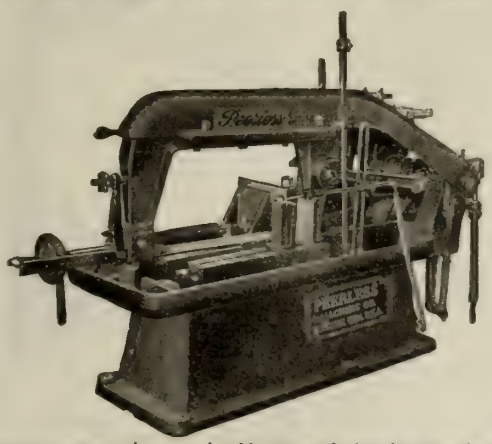

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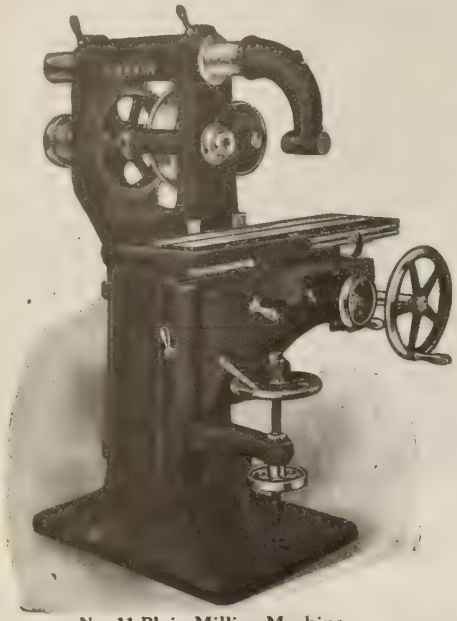

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Feed Works located and protected inside of column.
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Elevating Screw does not pass through the floor.

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11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

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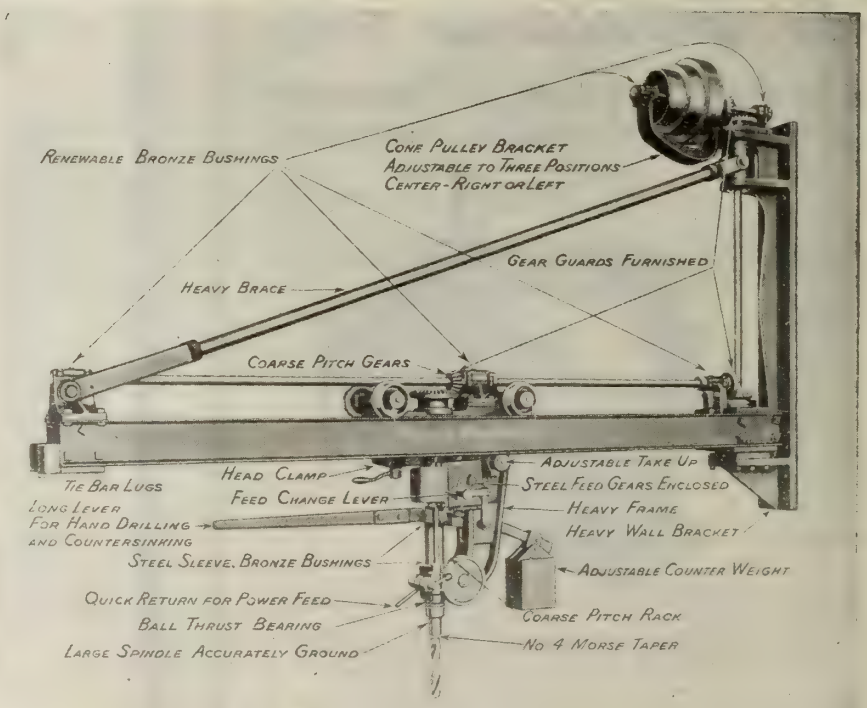

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Franklin Mfg. Co., Syracuse, N.Y.

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Morse Chain Co., Ithaca, New York.

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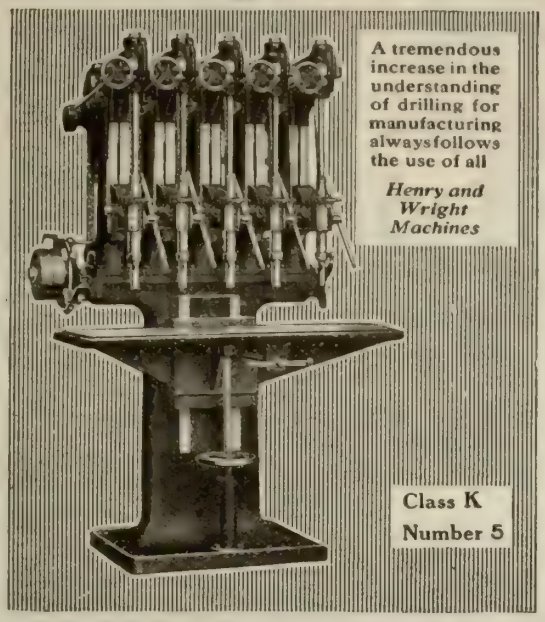

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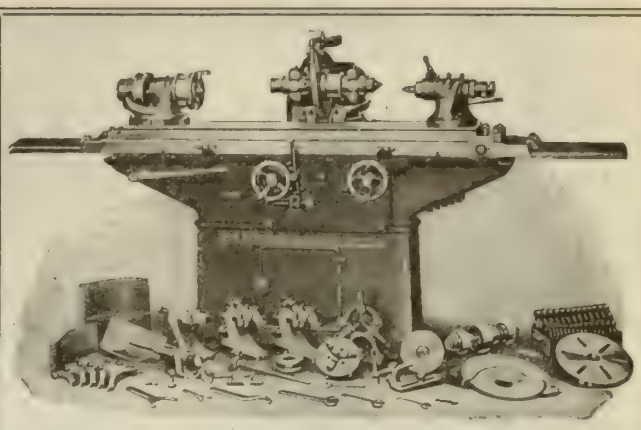

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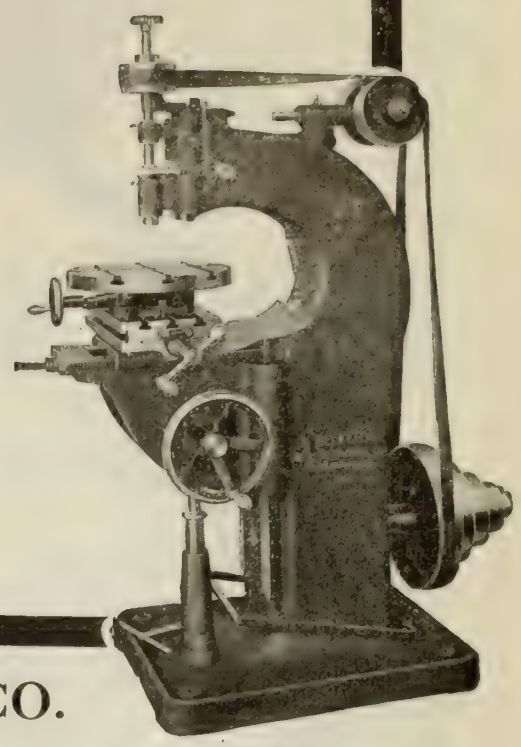

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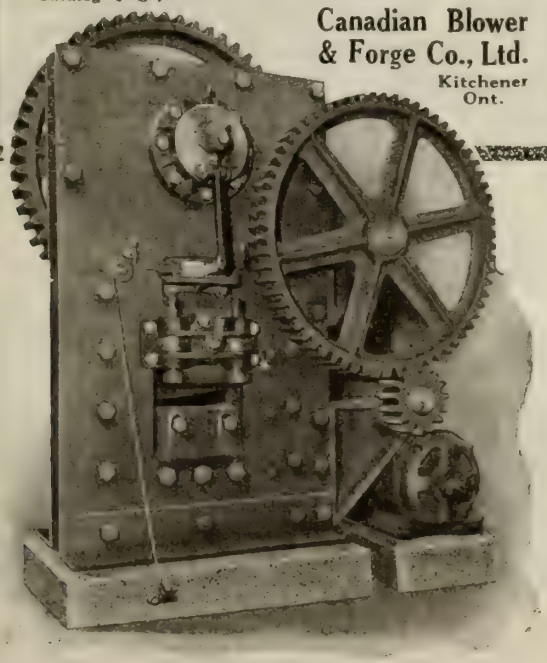

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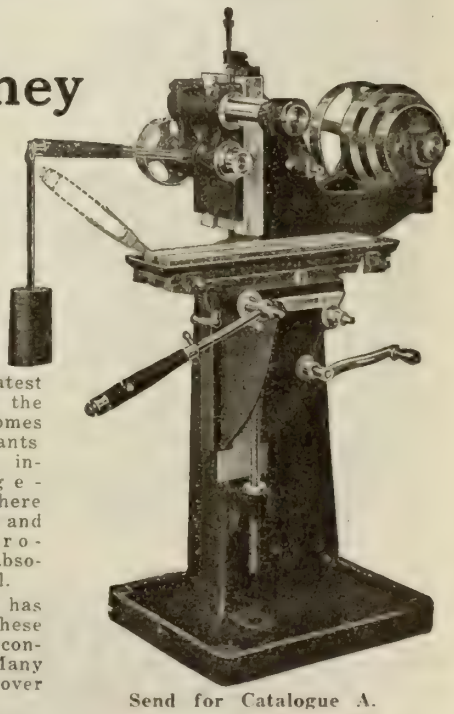

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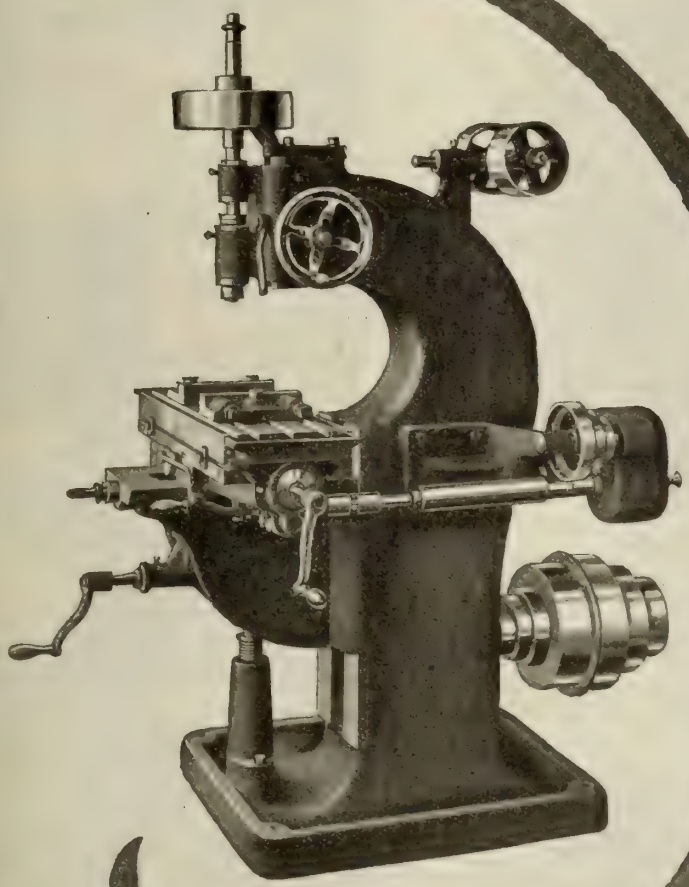

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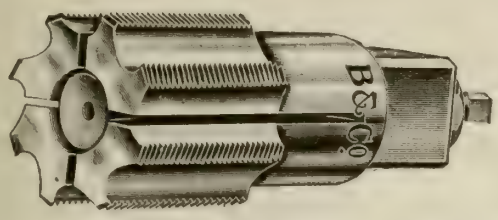

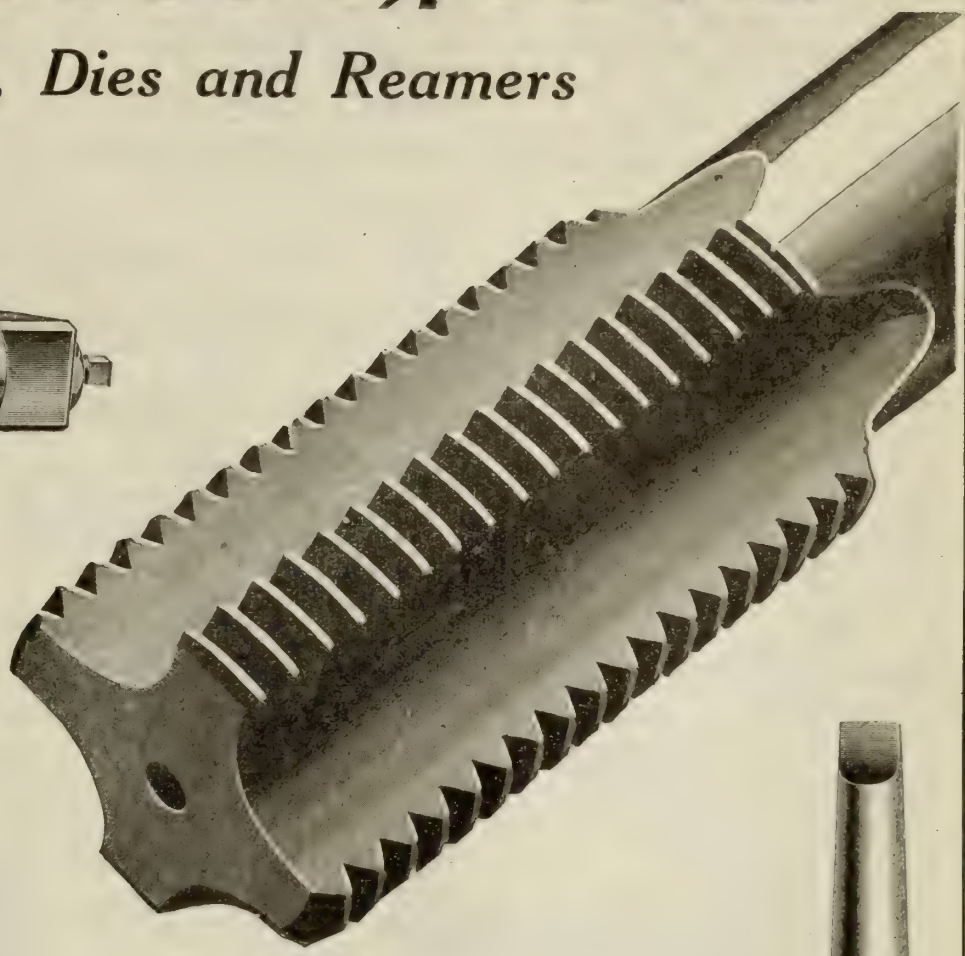

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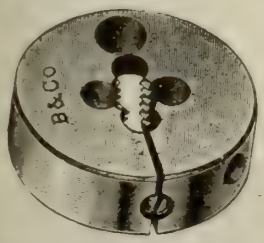

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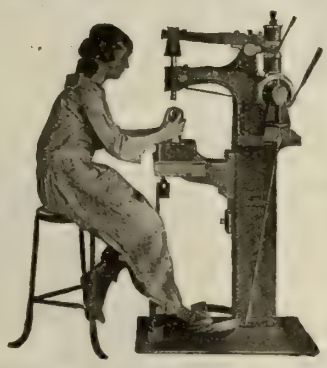

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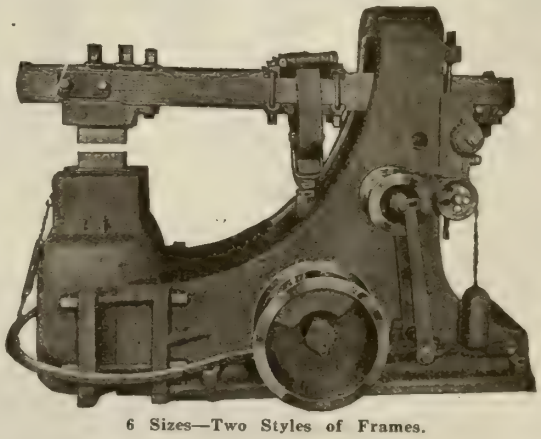

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Garlock-Walker Machy Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SCREW CUTTING
Bertram, John, & Sons Co., Dundas, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPEED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPINNING
Bliss, E. W., Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TOOL ROOM
Cisco Machine Tool Co., Cincinnati, Ohio.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TURRET, HAND, HORIZONTAL
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram, John, & Sons Co. Dundas Ont.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
H. C. Dodge, Inc., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

LEAD BURNING
St. Lawrence Welding Co., Montreal, Que.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LENSES FOR GOGGLES
Standard Optical Co., Geneva, N.Y.

LIDS, SCREW TOP AND HINGE
Can. Winkley Co., Ltd., Windsor Ont.

LIFTS, PNEUMATIC
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LOADERS, WAGON AND TRUCK
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.

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Cataract Refining & Mfg. Co., Toronto.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

LUMBERMEN'S TOOLS
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MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

MACHINERY DEALERS
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Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
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Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, MULTI-DRILLING
National Automatic Tool Co., Richmond, Ind.

MACHINERY, TRANSMISSION (POWER)
Morse Chain Co., Ithaca, New York.

MACHINES, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

MACHINES, MULTI-BORING
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James Ballantyne, Montreal.

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Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H. Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MACHINE TOOLS
Williams & Wilson, Limited, Montreal, Que.

MACHINE & REPETITION WORK
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Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MASKS, WELDING, SMOKE, FUME, GAS, ETC.
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Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
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Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

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METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

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Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, AUTOMATIC
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Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
The Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
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Williams & Wilson, Limited, Montreal, Que.

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Modern Tool Co., Erie, Pa.
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Sheldons, Ltd., Galt, Ont.

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Can. Fairbanks-Morse Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
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Garlock-Walker Machinery Co., Toronto, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.

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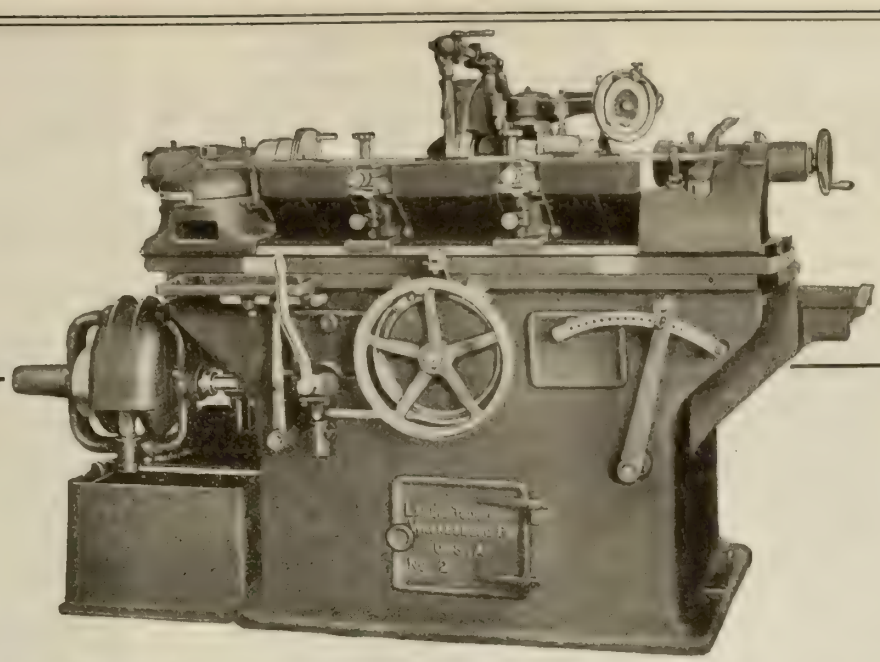
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.



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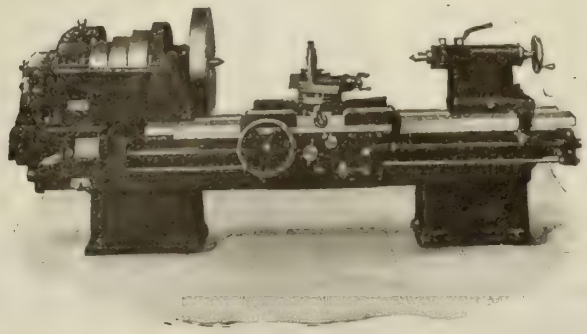

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National Machinery Co., Tiffin, Ohio.
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Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

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Frost Mfg. Co., Chicago, Ill.

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Oliver Machinery Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Ridout & Maybee, Toronto.
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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
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Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
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Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Ltd., Brantford, Ont.
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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE REAMERS
Greenfield Tap & Die Corp., Greenfield, Mass.
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Greenfield Tap & Die Corp., Greenfield, Mass.
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PIPE THREADERS
Greenfield Tap & Die Corp., Greenfield, Mass.
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PIPE TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
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Canada Machinery Corp., Galt, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
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Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Steptoe, The John Co., Cincinnati, Ohio.
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Williams & Wilson, Limited, Montreal, Que.

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POWER TRANSMISSION MACHINERY
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MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

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Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.

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MacKinnon Steel Co., Sherbrooke, Quebec.

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Williams & Wilson, Limited, Montreal, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Williams & Wilson, Limited, Montreal, Que.

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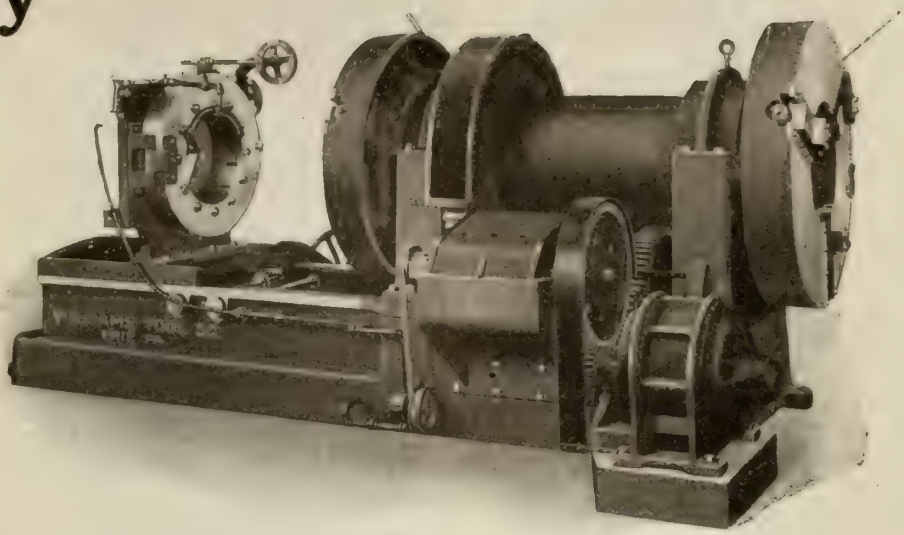

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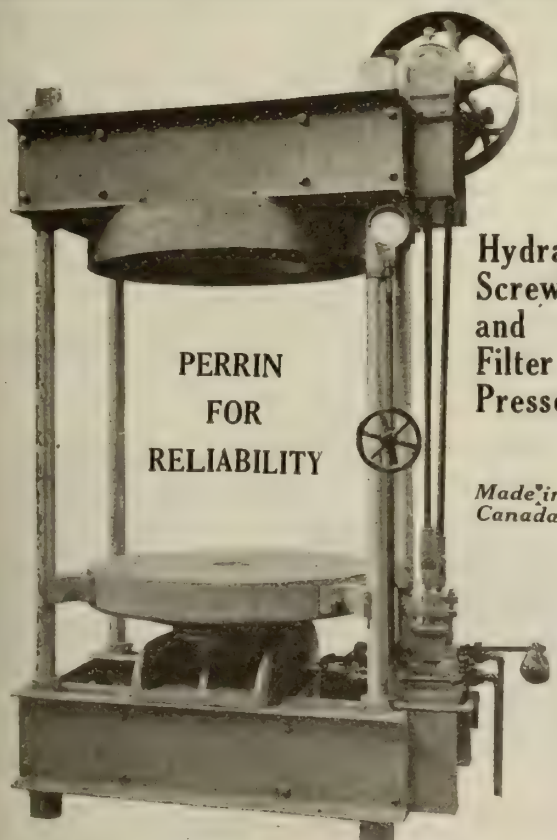

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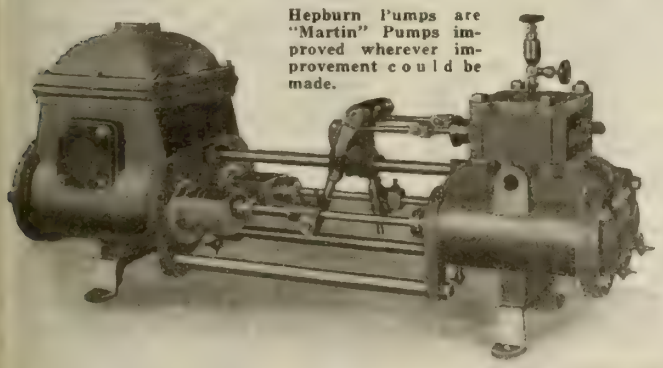

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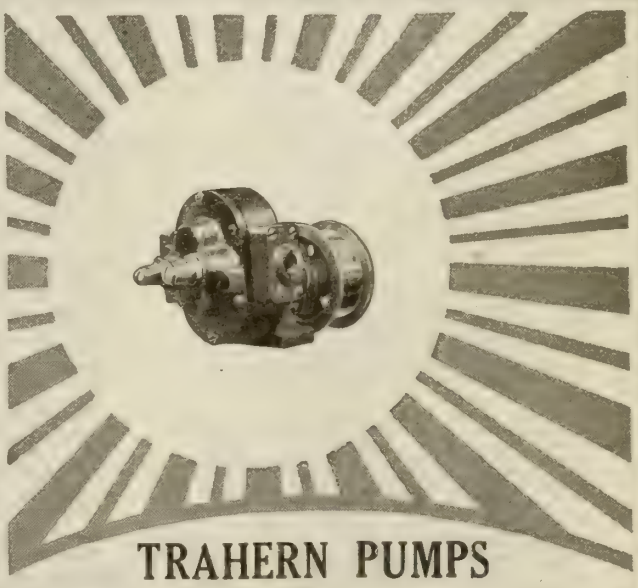

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WILSON FEARED THE BRITISH

THE American President crossed the Atlantic in the first place with the idea in his mind that his ideals would be thoroughly in accord with those of the French statesmen; but he was rather afraid of a conflict with the British delegates. He found in reality that his plan for peace terms was as far removed from the French plan as the two poles. Then he crossed to London and was surprised to find that the ideas of the two Anglo-Saxon powers were identical.

This situation, according to J. W. Dafoe in the May issue of MACLEAN'S MAGAZINE, explains much that has developed at Versailles. Further, it contains the promise of a close *rapprochement* between the two great English-speaking democracies for all time to come.

Mr. Dafoe has contributed a remarkably interesting article to this number of MACLEAN'S, lifting the curtain on many of the puzzling situations that have arisen overseas. As the editor of the Manitoba *Free Press*, he is the dean of Canadian newspapermen; as the representative of the department of Public Information on the Canadian Mission to the Peace Conference, he was in a special position to learn what was transpiring. He tells of the really big part that Canada has played in the Proceedings and points out that Canada's status as a nation was firmly established in the eyes of the world when she was allowed separate representation.

A Dozen Other Features---Nationally Important

This May issue is full of articles of unusual significance for Canadian readers.

"SOLVING THE PROBLEM OF THE ARCTIC"
—By Vilhjalmur Stefansson

The second instalment of his remarkable story of the four years of exploration that he undertook for the Canadian Government in the region of the "Pole of Inaccessibility"—a harder place to reach than the North Pole.

"ORGANIZING FOR PEACE"
—By George Pearson

An article of the Great War Veterans' Association by a well-known author-soldier.

"THE CANADIANS IN SIBERIA"
—By Capt. W. E. Dunham

A graphic story of what our forces did in combatting the Bolsheviki, by an officer who has just returned.

"SAFE IN THE SADDLE"
—By J. K. Munro

A review of affairs at Ottawa in which the opinion is expressed that Union Government for the time being is safely entrenched.

The National Idea

The articles in this issue of MACLEAN'S reflect the national idea—Canada's part in the Peace Conference, the political situation at Ottawa, the exclusive report of Stefansson's national explorations, the national organization of our returned men, the work of our forces in Siberia. The reader of MACLEAN'S gets a broad idea of what Canada as a whole is doing. The value of this issue— and of all issues —is very great, therefore, from an educational standpoint.
MACLEAN'S is the one magazine that should be selected for young Canadians to read.

Four capital stories by famous authors—W. A. Fraser, Lloyd Osborne, Frederic S. Isham and C. W. Stephens.

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An unusually fine array of articles is given in this department, selected from the best in magazines and periodicals the world over. Some of the titles are:

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How Mackensen Was Caught.
Events of War Foretold by Stars.
What is Life Like Beyond the Grave?
A High-born Bolshevik.
The New Life in Dry America.
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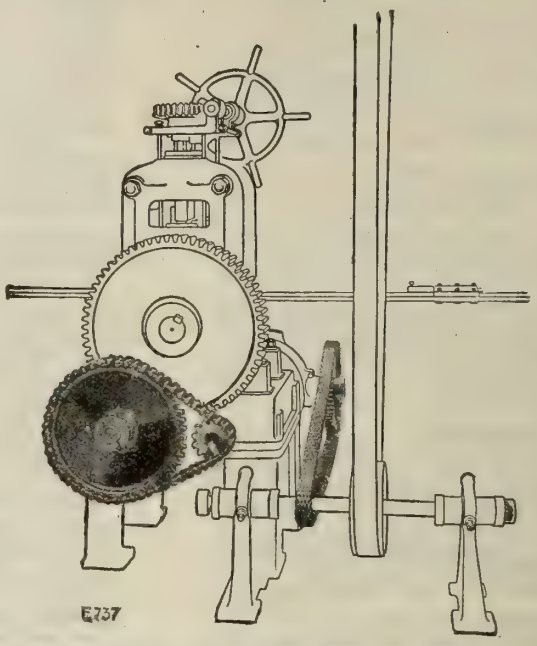

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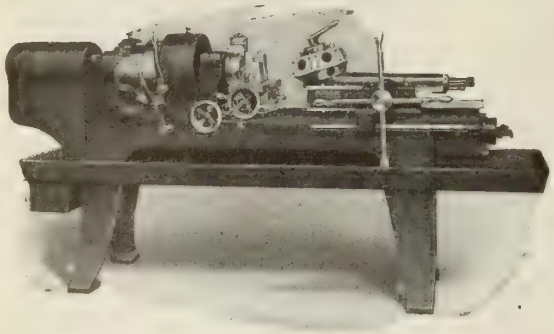

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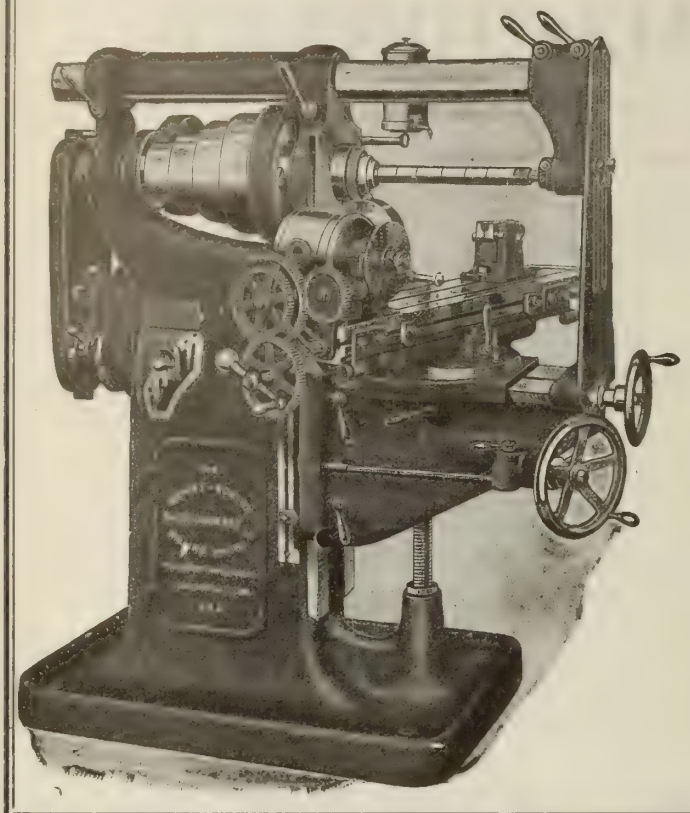

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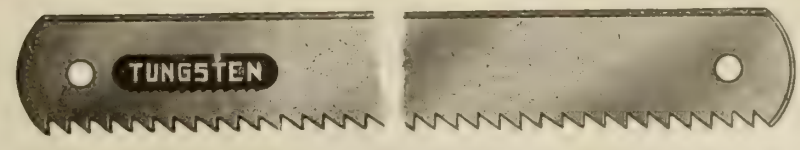
QUALITY **"FOSS"** *SERVICE*

"TUNGSTEN"

HACK SAW BLADES



We have demonstrated to more than one thousand different users of Hack Saw Blades throughout Canada the great saving that takes place in the using of our Genuine Tungsten **Hack Saw Blades,** both for Hand Frames or Power Machines.

They master all cutting-off difficulties. Efficiency and economy are the two things that every manufacturer is working for to-day, and Tungsten **Hack Saw Blades** from this standpoint are superior.

The best evidence of the superior cutting quality of **Tungsten Blades** is a trial in actual use. We want you to know by using Tungsten **Hack Saw Blades** just what they can do. Each and every blade stamped.

Send trial order. You will find them even better than we claim.

The Geo. F. Foss Machinery & Supply Co., Limited

Machinery and Supplies

305 St. James St. Montreal, Que.

C.M.C.

GAP LATHES

WITH QUICK CHANGE GEARS

are distinguished by many points of superiority, among which we may mention:

The design of the gap and gap plate is such as to permit the large face plate and thin work to swing without the removal of the plate.

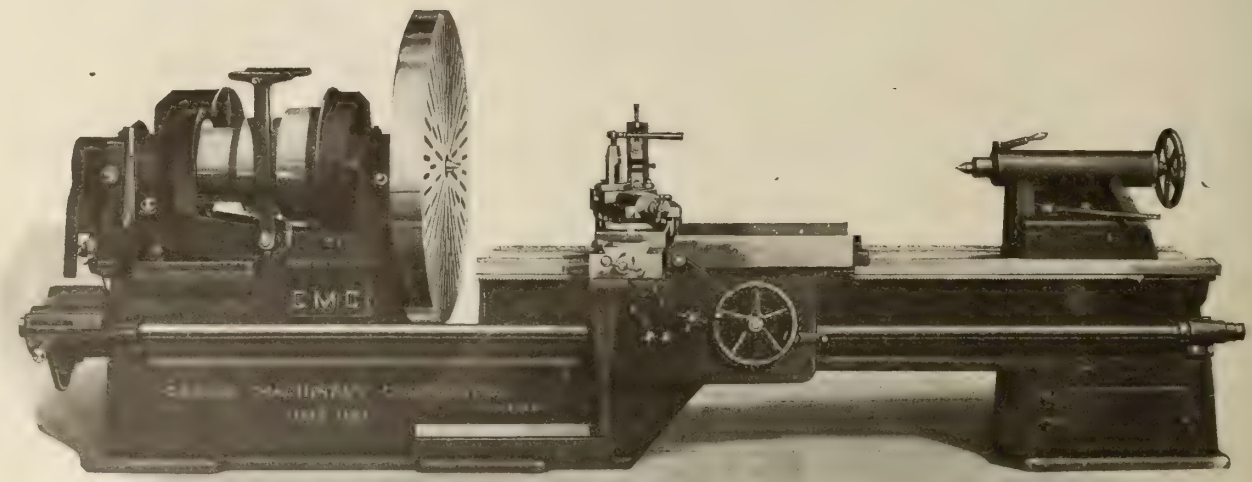
When the plate is removed jobs of considerable width may be successfully handled.

The Bed, especially below the gap, is of unusual weight and strength to insure the maximum stiffness under the heaviest cuts.

The Headstock is of the three step cone, double back geared type, allowing the use of wide drive belts and giving ample range and number of speeds.

We can effect good deliveries.

Send us your inquiries.



Sizes 26" and 32"

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: BROCK AVE. SUBWAY

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 21 Publication Office: Toronto, May 22, 1919 Subscription Price $3.00 per Year

Our New Montreal Premises in the Heart of the Business District

The A. R. Williams Machinery & Supply Co. Limited

320-328 St. James Street Montreal, P.Q.

Another link in the chain of our organizations at

HALIFAX ST. JOHN TORONTO WINNIPEG VANCOUVER and BUFFALO, N.Y.

Machine Tools, Woodworking Machinery, Boiler Shop Equipment, Power Plants of every description, Contractors' Machinery and Equipment, Garage Equipment, Boilers and Engines, Gas and Gasoline Engines, Electric Motors and Generators, Machine Shop, Power House and Factory Equipment and Supplies.

If It's Machinery---Write "Williams"

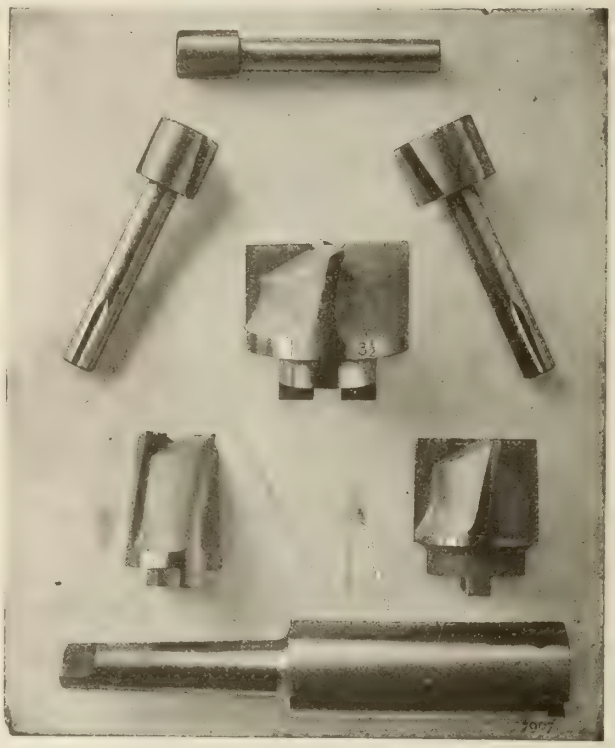
Canada's Leading Machinery House

SMALL TOOLS

Equip Your Tool Room With

PRATT & WHITNEY

Interchangeable Cutter Counterbores



and get the right combination at once.

HOLDER, CUTTER and GUIDE

With this combination you can immediately make the right combination for every counterboring job.

HOLDERS

End of holder is milled to receive the driving lug of the cutter, and there is also a hole and set screw to accommodate the shank of the guides.

GUIDES

Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

CUTTERS

Can be furnished of either carbon or high-speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face, and the guide is simply pushed further in the hole after grinding.

Holders, Cutters and Guides are furnished in a wide range of sizes.

PROMPT SERVICE

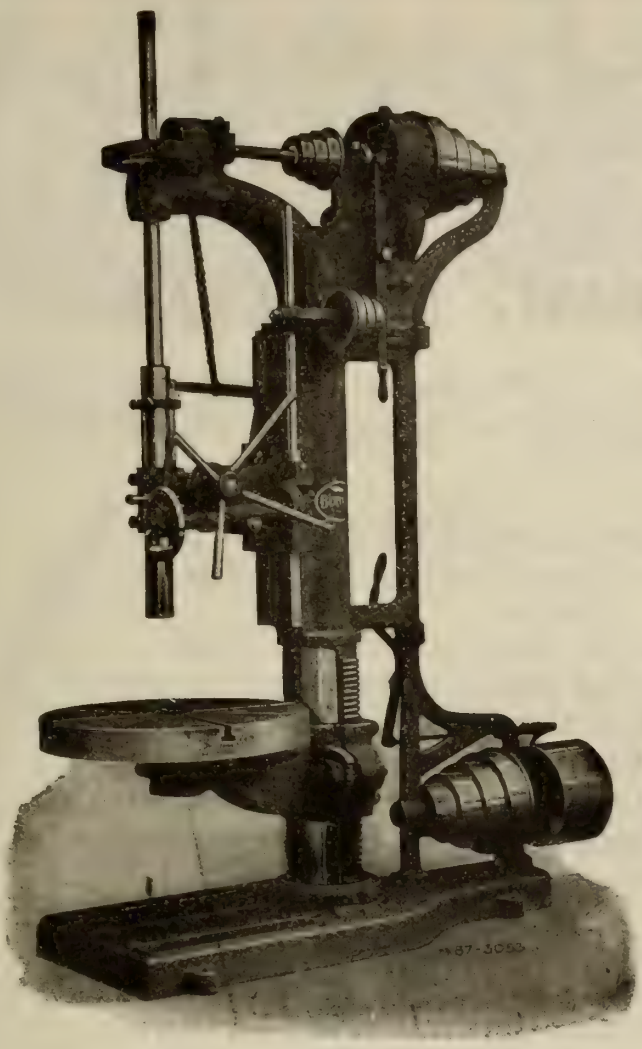
is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.



Bertram MACHINE TOOLS

Locomotive and Car Shop Equipment

Structural and Bridge Shop Machinery

Repair Shop Machinery

General Machine Shop Equipment

30-Inch Vertical Drilling Machine

Photographs and full particulars gladly mailed upon request.

WRITE US NOW

We'll be pleased to submit photographs and full details on any line or lines in which you are interested.

The John Bertram & Sons Co., Limited

DUNDAS, ONTARIO, CANADA

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TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO MAY 22, 1919

NO ADVERTISING MIRACLES

THERE are no miracles in advertising. Sound principles are back of every advertising success, says *The Scalpel.*

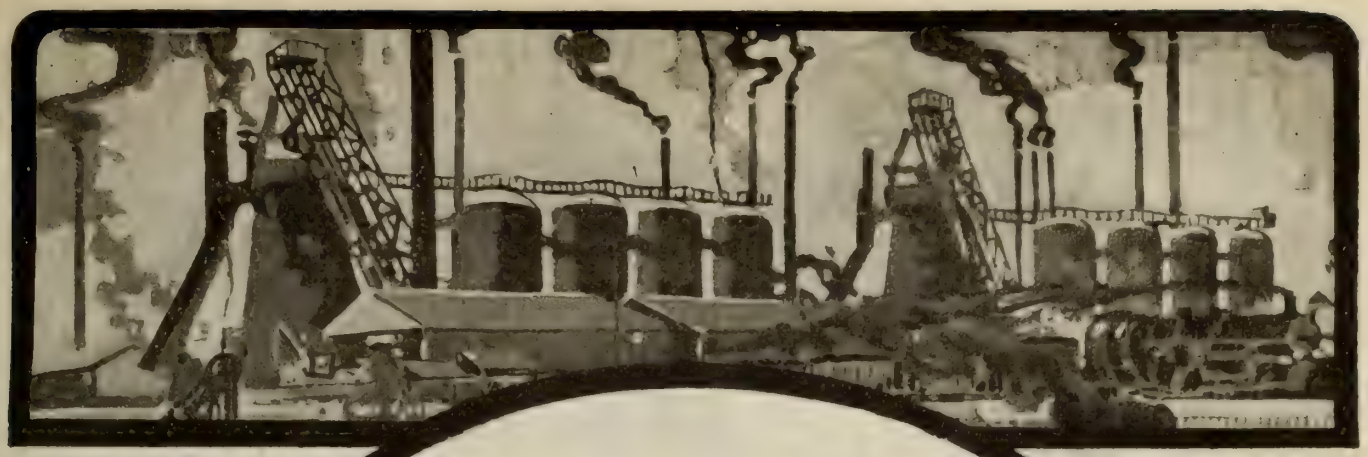
The advertiser who gives an order for a quarter-page, one time, and expects to be deluged with orders, is due for a bump. He is riding on a flat tire.

Single insertion advertising cannot be defended on any sound advertising basis. Most of the time it's money wasted. Marshal Foch confounded the enemy with a bewildering series of consecutive drives that permitted no recuperation nor organized counter-attacks. This lesson was learned after three years of uncertainty and defeat.

Advertising victories are won in this way. Give your prospects no chance to forget your goods. Force him to capitulate. Organize your campaign and push your drives with no interruption. Hammer away with direct mailing, backed by your display advertising. Display space is your heavy artillery, preceding and protecting your infantry or direct attack, either by mail or salesmen or both. Don't send your detail men over the top without machine gun (direct by mail) and heavy artillery (display space) support.

Back up the trade with service and supplies. This is your S.O.S. Department. Detail your men in the field to air scout duty in observing and reporting the effect of your promotion, on distribution, dealer interest and general demand. Have your men in the field follow up your inquiries personally whenever possible. If this is not consistent, put your inquiries in an incubator and keep them warm with gentle follow-ups. Nurse them along when they show signs of hatching, and don't, for a minute, treat them like so many scraps of paper. Once they get chilled with inattention, delay or careless handling, the stuff is all off. You can't bring them back to life.

Canadian Machinery and Manufacturing News, May 22nd, 1919. Vol. 21, No. 21. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



Quality Service

USE GOOD JUDGMENT

And contribute your share to the prosperity
of the Country in which you live.
Spend your money where you earn it.

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar
is Worth One Hundred Cents
in Canada

THE
STEEL COMPANY
OF
CANADA
LIMITED

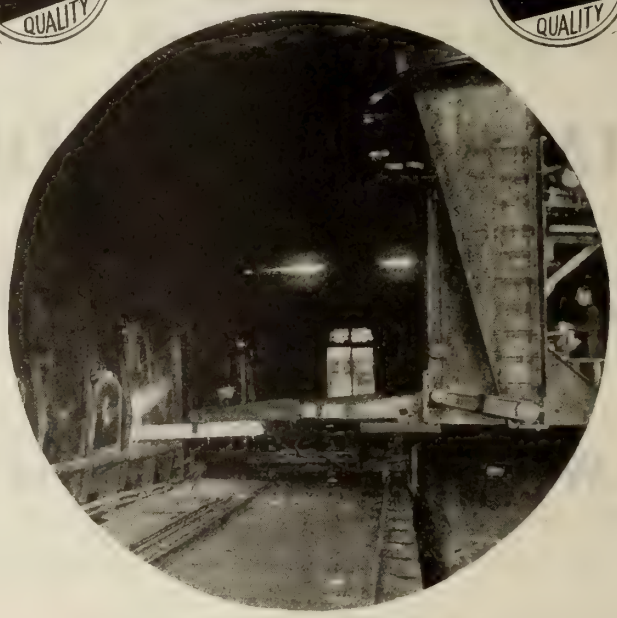
HAMILTON ▪ ▪ MONTREAL

ALGOMA STEEL CORPORATION, LTD.

SAULT STE. MARIE, ONTARIO

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

MARK OF ALGOMA O.H. QUALITY



Charging and Withdrawing Crane

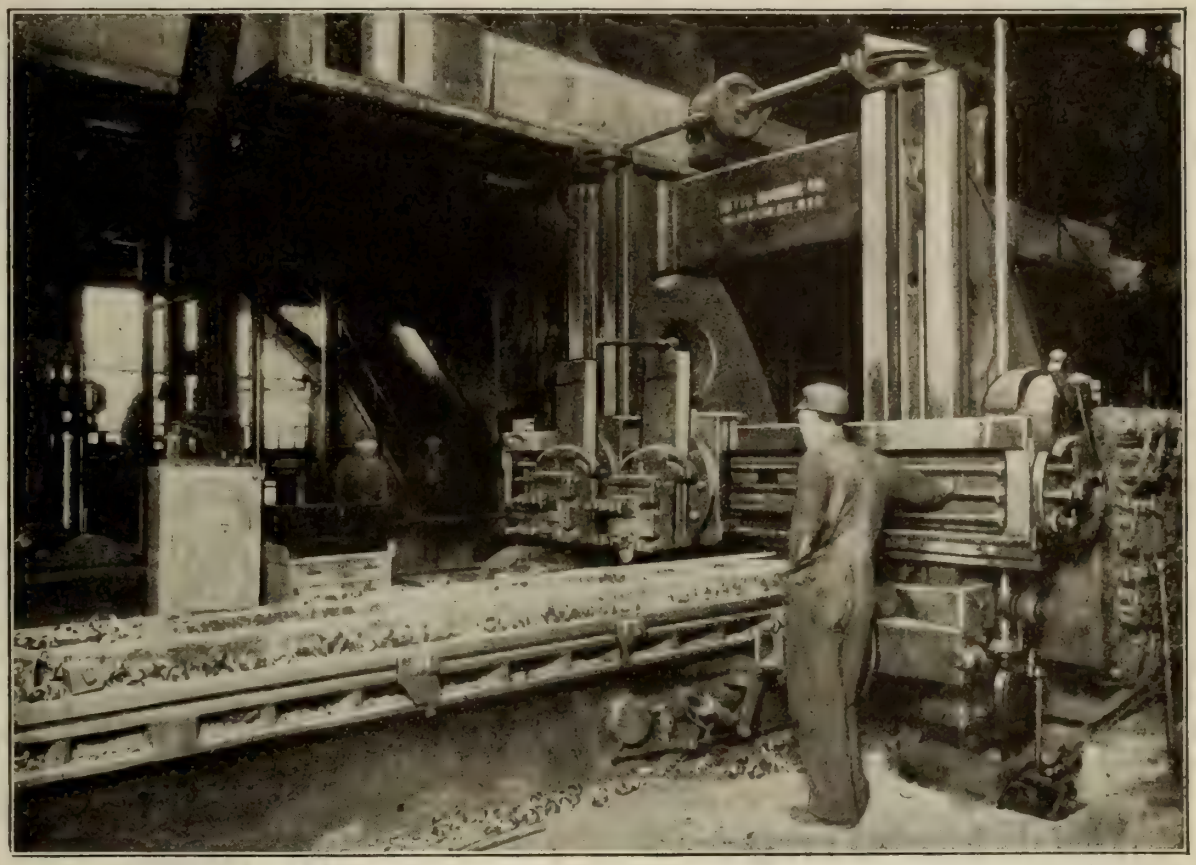
Sulphuric Acid. Nitre Cake

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORAT ION FROM THE WATERFRONT

BETTS

Taking Two Cuts 1 Inch Deep with 1/4 Inch Feed in High Carbon Steel



Planing steel trailer frames, taking two 1-in. cuts with 1/4-in. feed at a cutting speed of 30 feet per minute in tough high carbon steel, would strain or break down an ordinary planer.

This Betts Planer in one of the leading locomotive works takes cuts like these as a matter of routine and is running night and day without trouble or repairs.

Service like this is possible on a Betts because of their exceedingly heavy construction—steel gearing throughout—steel rack—bronze bushings—extra heavy cross rails and uprights—heavy box type table and other features of the Betts standard of world leadership.

When you think of planers, think of Betts Planers. Specifications, quotations, etc., on request.

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.

"LITTLE DAVID"

GRINDER

Useful in the Foundry

Canadian Ingersoll-Rand Company
Limited

Sydney Sherbrooke Montreal Toronto Cobalt
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E&M

ELECTRIC

Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings
for estimates.

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COMPANY, LIMITED
WELLAND ONTARIO

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Forging Billets and Bars
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Die Blocks
Annealed—Heat Treated

Piston Rods
Rough Turned—Annealed—Heat
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High Speed Steel

General Steel Company
Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

WILT

HIGH SPEED AND CARBON
TWIST DRILLS
REAMERS AND MILLING CUTTERS

Quality First

The Keystone Upon Which All WILT Products Are Built

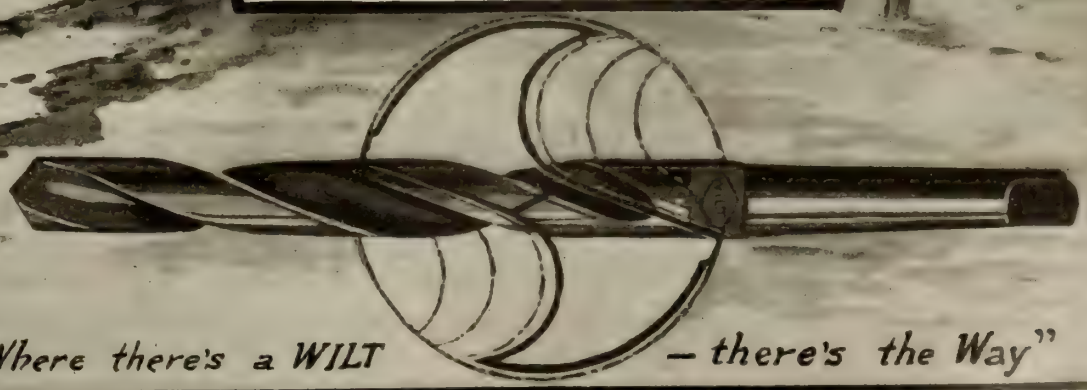
A high standard of perfection is maintained throughout the various processes of manufacturing WILT High Speed and Carbon Twist Drills, Reamers and Milling Cutters. WILT products improve production! This is no theory, no untested statement, but an established fact backed by many of the largest manufacturers throughout Canada. For steady, reliable output of work that is satisfactory from the standpoint both of quantity and quality there is no better choice than WILT Products.

Put them to the Test.

WILT TWIST DRILL COMPANY

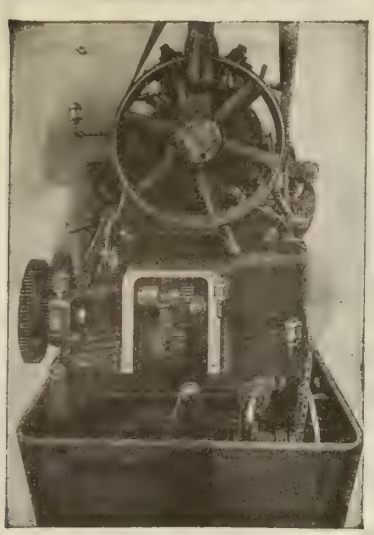
OF CANADA, LTD. WALKERVILLE, ONT.

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C 2, England.



"Where there's a WILT — there's the Way"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



Courtesy National Acme Co., Cleveland, Ohio.

WATCH

is subject to exceptional hard usage, but it gives unfailing service.

YOUR MACHINE

should be equipped with clutches that will give just such satisfaction.

What are your requirements? Let us know. We maintain an engineering force to work out all clutch installations. They will co-operate with you.

Write for our Yellow Data Sheets and Booklet, "Clutches as Applied in Machine Building"

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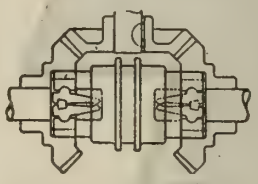

Double Clutch in Nest of Gears

THE JOHNSON FRICTION CLUTCH

Coal
Coke
Iron Ore

Pig Iron
Victoria

FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

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FIRTH'S Speedicut HIGH SPEED Steel

Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

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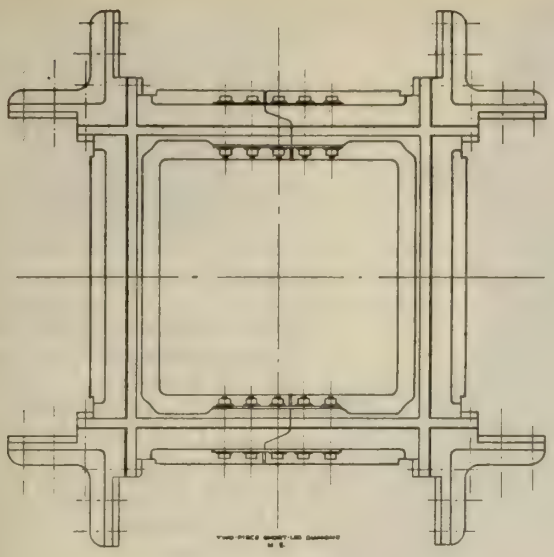
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager



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for Steam & Electric Railways

SWITCHES · MATES · FROGS
CROSSES · DIAMONDS · ETC.
COMPLETE INTERSECTIONS

Built-up, Hard-Centre or Solid Manganese-Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings.

CANADIAN STEEL FOUNDRIES, LIMITED

Transportation Building. Montreal

Electrite Uranium High Speed Steel

Electric furnaces, automatically regulated, the most modern methods, and the **introduction of Uranium** — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE
ELECTRIC STEEL CO.
LATROBE, PA.

LOCOMOTIVE AND CAR WHEEL TYRES

HIGH-SPEED AND CARBON TOOL STEEL

MISCELLANEOUS SHOP TOOLS

MADE IN CANADA

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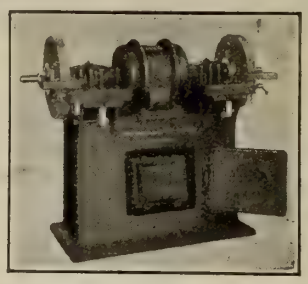
FORD-SMITH

Grinders

A fine example of high grade material and workmanship

Water Tool Grinder

General Purpose Grinder



Motor Driven Floor Grinder

Motor-Driven Grinders
Floor Grinders
Bench Grinders
Water Tool Grinders
Swing Grinders
Disc Grinders
Special Grinding Machinery
Hack Saws
Swivel Tables

Write for Catalogue and price list.

The Ford-Smith Machine Co., Ltd.

HAMILTON - ONTARIO

FOREIGN AGENTS:
W. E. Storey, 3 Arundel St., London, Eng. Alf. Herbert, Limited, 54 Dey St., New York, U.S.A.

IMPERIAL GENUINE BABBITT METAL

The Highest Grade Manufactur ed

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

HOYT METALS

"Frost King"
"Trojan"
"Nickle Genuine"
BABBITTS

Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.

Annual sales over $5,000,000.

Hoyt Metal Co., Toronto

New York, N.Y. London, Eng. St. Louis, Mo.

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Steel Ingots
by the
HARMET
Liquid Process

Nova Scotia Steel and Coal Co., Limited

Head Offices:
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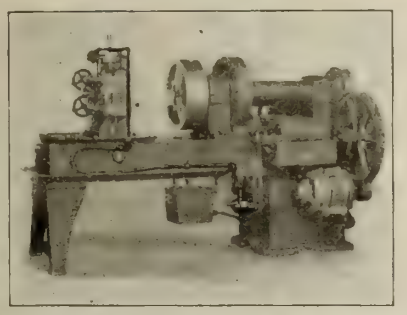
Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL



Massive Pipe Threading Machine

is equipped with

TRAHERN Lubricating Pump

The Merrill Mfg. Company recognizes the increased efficiency of their product when equipped with good lubricating pumps.

They have tried TRAHERN Pumps and know they can be relied on to throw an unceasing stream of coolant over their dies. Throughout the world TRAHERN Pumps are gaining an enviable reputation. Customers everywhere are thoroughly satisfied with them.

We know that you would be as thoroughly satisfied with TRAHERN Pumps as they are. Will you give them a chance to prove their worth?

TRAHERN PUMP COMPANY

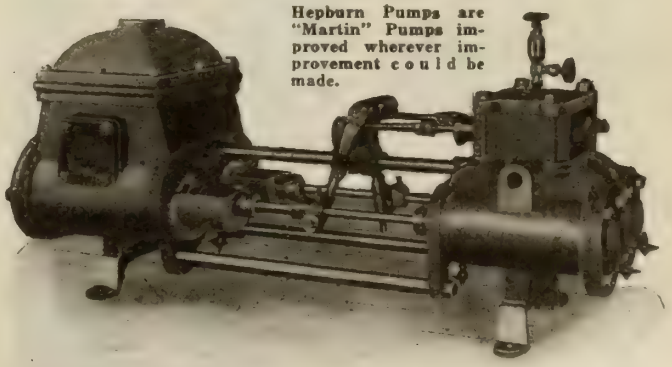
ROCKFORD, ILLINOIS

Canadian Agents:
A. R. Williams Machinery Co.
Toronto, Ont., Canada

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

Are your Tools made of Red Cut?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.

BOSTON
BUFFALO
CINCINNATI
CHICAGO
CLEVELAND
DETROIT
PITTSBURGH
MONTREAL
NEW YORK
TORONTO

Swedish Steel & Importing Co., Limited

Montreal
New York
Toronto
Denver

Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS "DOUBLE ESS"

PROMPT SHIPMENTS from large stock

CANADA
FOUNDRIES & FORGINGS
LIMITED

A SOLEMN WARNING

A flood of business will overwhelm this country inside of two months. Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hesitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, "Don't blame us because you didn't see this vision."

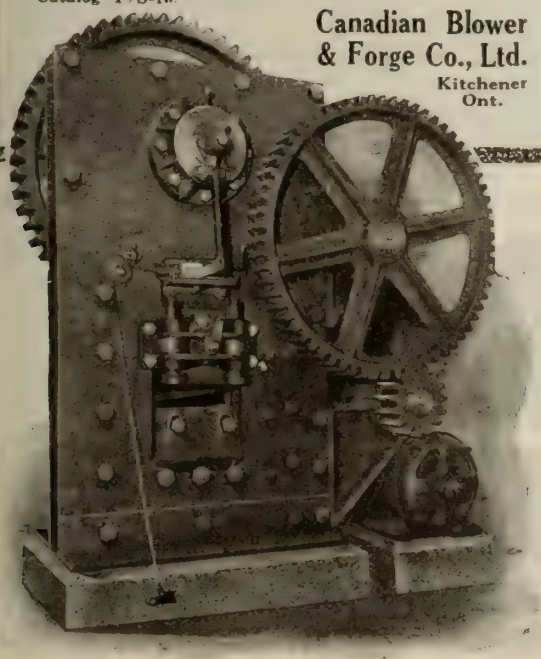
Canada Foundries & Forgings, Limited
WELLAND, ONT.

CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

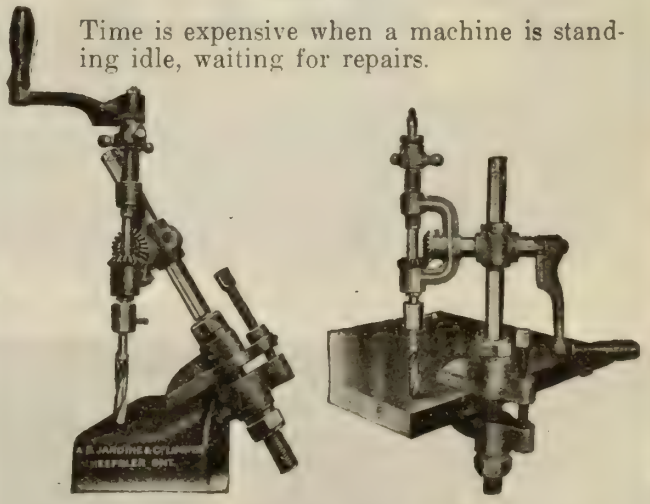
That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

Canadian Blower & Forge Co., Ltd.
Kitchener Ont.



Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

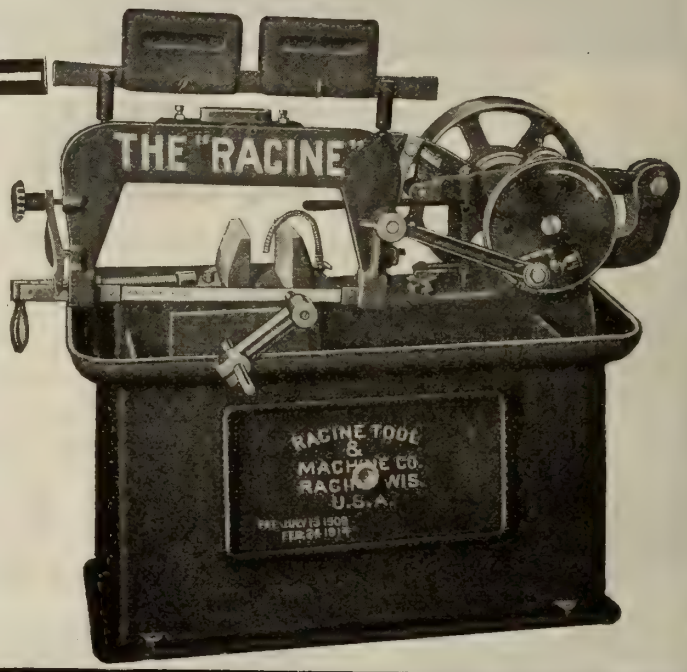
Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

"THE RACINE"

High Speed Metal Cutting Machine

Standard the World Over



This is the only machine in the World that has an ABSOLUTELY POSITIVE AUTOMATIC LIFTING DEVICE, a feature secured by patents. Another feature is the rigid saw frame guide. These two assets combine to give long life to the cutting blades and save a lot of money.

"THE RACINE" minimizes wastage, cuts accurately and with great speed. Then they are easy and cheap to operate. These features are appreciated by the best shops everywhere and that's why "THE RACINE" sets the "Standard the World Over." Write for full particulars.

Use "RACINE" H. S. Tungsten-Power Blades.

RACINE TOOL & MACHINE COMPANY

Melbourne Ave. ∴ RACINE, WIS., U.S.A.

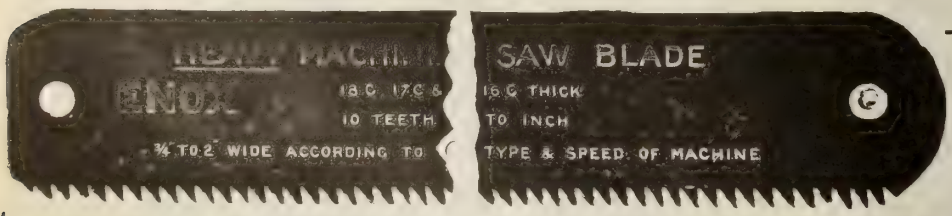
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

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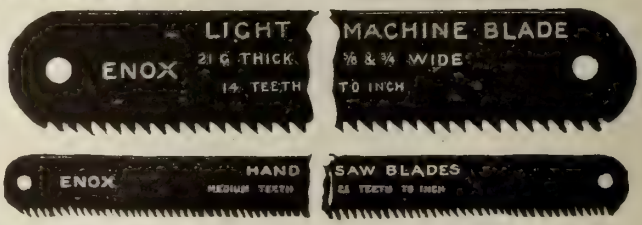
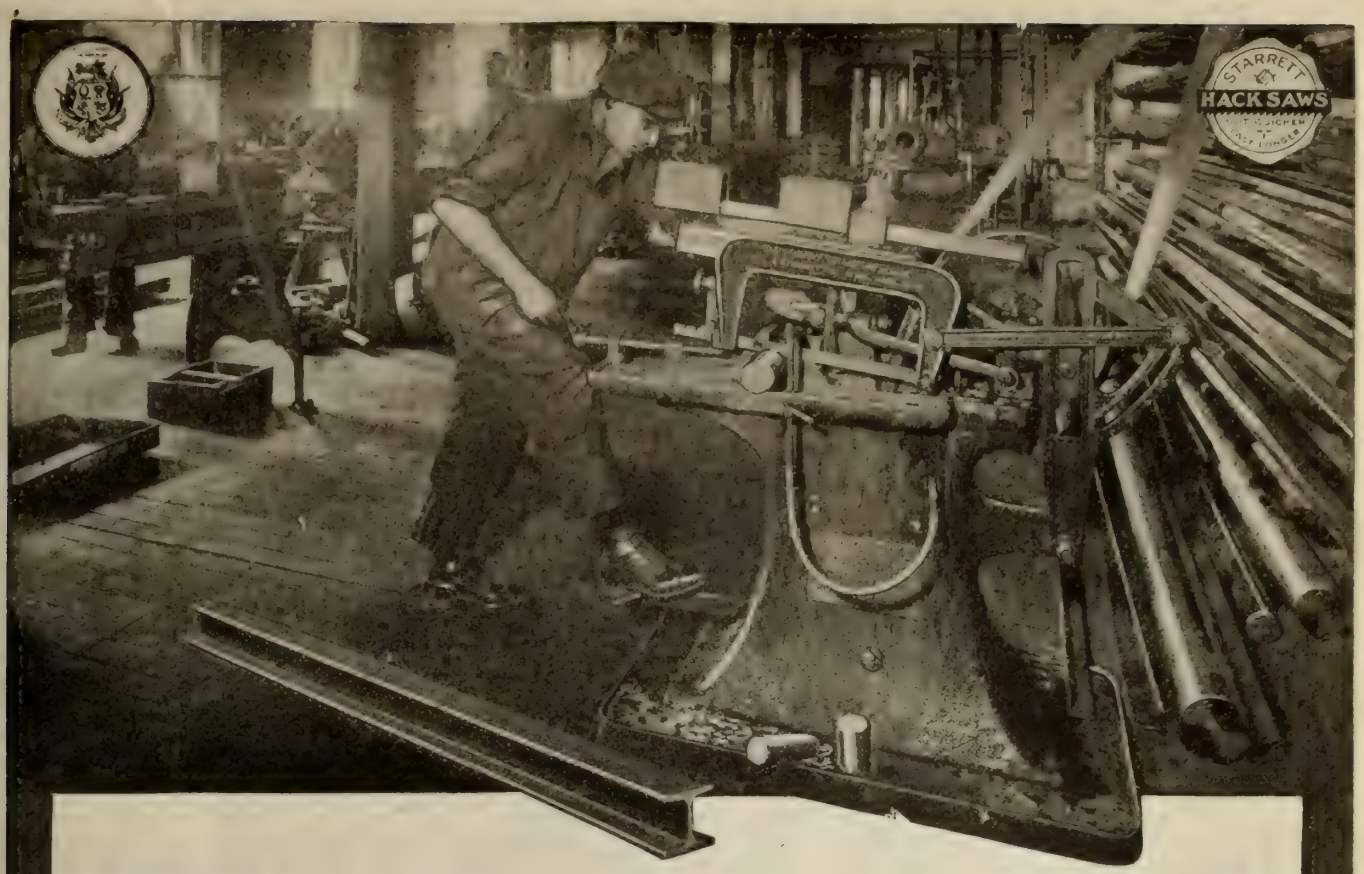


THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.



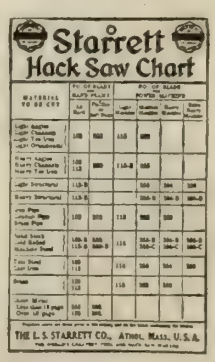
CHOOSE YOUR BLADE TO FIT YOUR WORK

If you've been cutting 3″ round machine steel with a heavy gage, coarse blade and find your next job is on structural beams—7″ I-beams for instance—it's cheaper to change to a blade designed for that class of work than to keep on with the coarse blade you used on round stock.

If you use the same blade on both jobs, all the weight and strain of cutting the I-beam at any period in the cut must be borne by a smaller number of teeth than were engaged at any single instant on the round stock. The fewer the teeth that are cutting at any given time, the sooner they will become dull and the greater likelihood there is of their stripping.

That's the reason why the Starrett Hack Saw Chart recommends different kinds and shapes of metal. In this case, our tests show that a blade with more teeth to the inch should be used on structural steel than on round stock.

Follow the Starrett Hack Saw Chart 3 and watch your cutting cost go down.


Starrett
Hack Saw Chart

MATERIAL TO BE CUT	TO USE PLAIN BACK BLADE		TO USE BLADE WITH SCALLOPS			
	14 Gage	Heavy Gage	Light Section	Medium Section	Heavy Section	Very Heavy Section
Light Angles, Light Channels, Light Tee Irons, Light Channels	140	110	110	100		
Heavy Angles, Heavy Channels, Heavy Tee Irons	100, 110	100	110-B	110		
Light Structural	110-B			110	100	100
Heavy Structural	110-B			100-B	100-B	100-B
Iron Pipe, Galvanized Pipe, Brass Pipe	100	100	110	100	100	
Solid Stock and Rolled Machinery Steel	100-B, 110-B	100, 100-B	110	100-B, 100-C	100-B, 100-C	100-B, 100-C
Tee Steel, Light Iron	100, 110		110	100	100	100
Brass	100, 110		110	100	100	
Iron Mine Ties (over 1½ pegs), Chain (all pegs)	100, 110	100, 100				

THE L. S. STARRETT CO., ATHOL, MASS., U.S.A.

THE L. S. STARRETT COMPANY, Athol, Mass.

The World's Greatest Toolmakers

Manufacturers of Hack Saws Unexcelled

New York London Chicago

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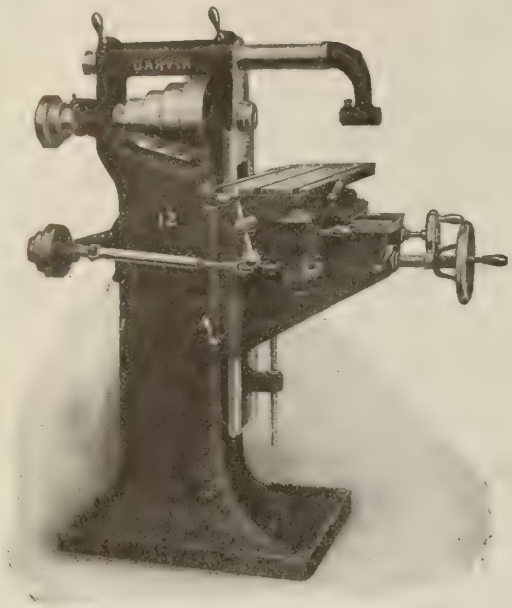
Starrett Hack Saws

GARVIN



No. 12 Plain Milling Machine-Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....**18 x 6 x 15 in.**

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

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Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

Marshalltown, Iowa

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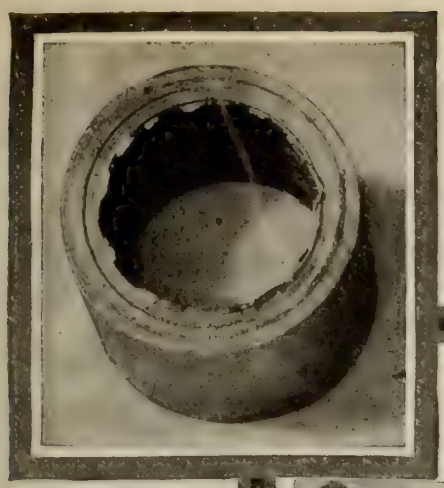
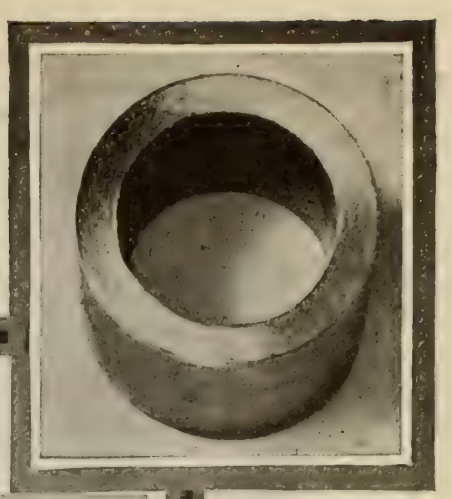
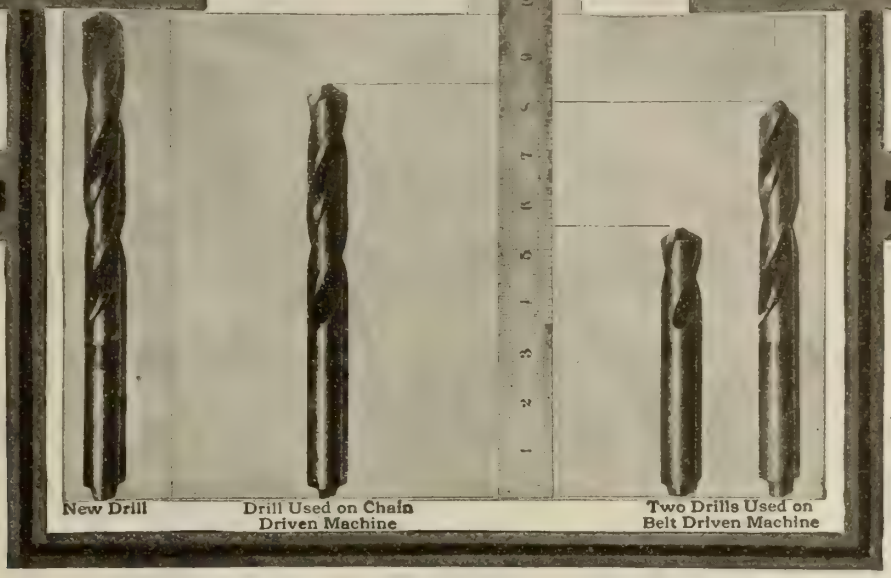


Enlarged View of Roller Produced on Belt Driven Machine



Enlarged View of Roller Produced on Chain Driven Machine



23% Greater Output—50% Less Tools

IN all of our advertising we have told you that Link-Belt Silent Chain Drives increase output and reduce production costs.

Here's a concrete example.

A belt driven automatic screw machine was used for cutting off small rollers. The enlarged illustration in the upper left hand corner shows the class of work produced.

Later this machine was driven with Link-Belt Silent Chain. The enlarged illustration in the right hand corner shows the class of work produced after the change was made.

Two drill presses running at the same speed were used in drilling these rollers. One was belt driven—the other was driven with Link-Belt Silent Chain. Both were run 138 hours drilling the same class of material with the same class of drills.

The chain driven machine turned out 3074 rollers. The belt driven machine produced 2485 rollers. The chain driven machine did the work with one drill. The belt driven machine required two. The chain driven drill was sharpened twice. The belt driven drill was sharpened ten times.

The chain driven drill press produced 23% more work—used one drill instead of two and did an infinitely superior class of work.

Our Machine Tool Drive Book No. 312 tells why. Send for a copy.

CANADIAN LINK-BELT CO., LTD.

Wellington and Peter Sts., Toronto

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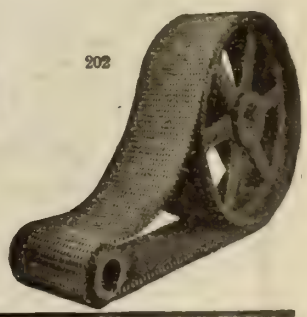
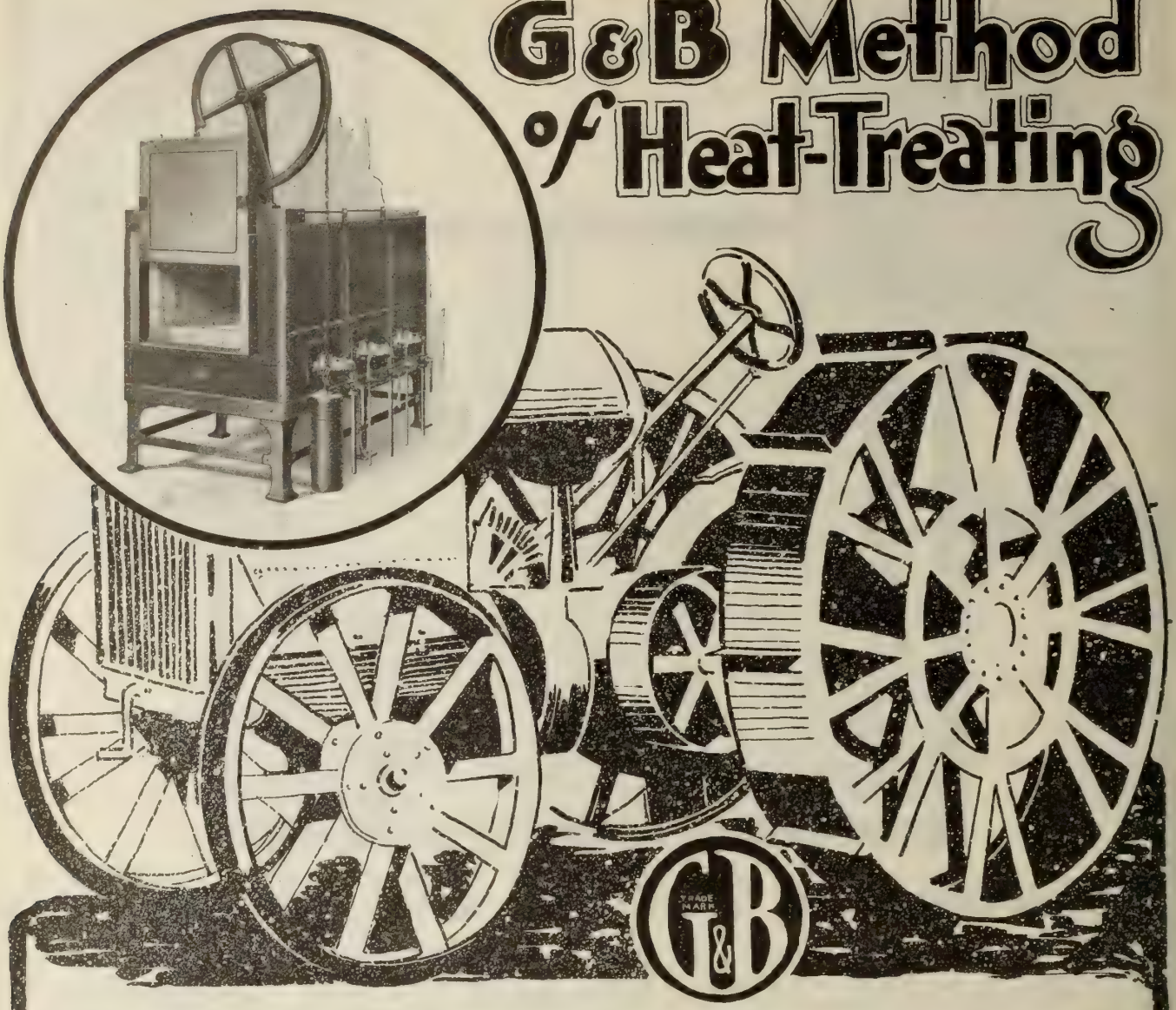
LINK-BELT

SILENT CHAIN DRIVES



G&B Method of Heat-Treating



Gilbert & Barker Method the Right Method of Heat-Treating

Used by the Largest Manufacturers of Autos and Trucks.

Whether you manufacture tractors—automobiles—trucks—crankshafts—camshafts—tools—machine parts or anything else that requires heat-treating unless you have the **right** kind of heat-treating furnace for the purpose, you are defeating your own purpose, that of turning out a first-class product of uniform high quality.

GILBERT & BARKER FURNACES INSURE
PERFECT COMBUSTION—ABSOLUTE TEMPERATURE CONTROL
UNIFORMITY OF HEAT

the result of which is an exceptionally high grade product which measures up to the best manufacturing standards. There is a G. & B. Furnace exactly suited to your requirements. Let our engineers advise you—write. **To-day is a better day than to-morrow to send for Bulletin 24.**

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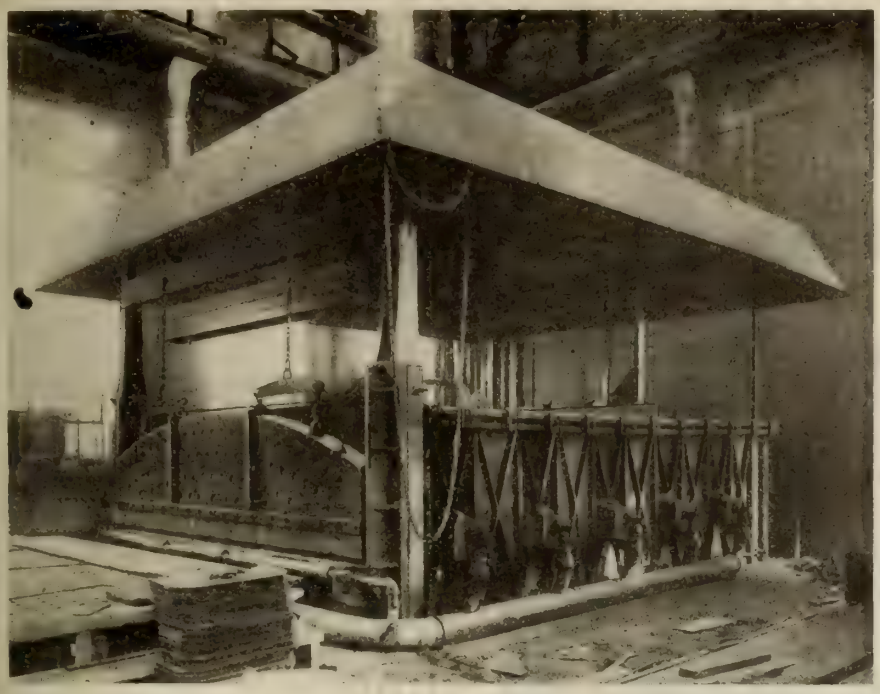

Any Size

Illustration shows a Plate Heating Furnace installed in the plant of Canadian Vickers Ltd., Montreal.

Your proposition, if out of the ordinary, would be bettered by our co-operation. Get in touch with us.

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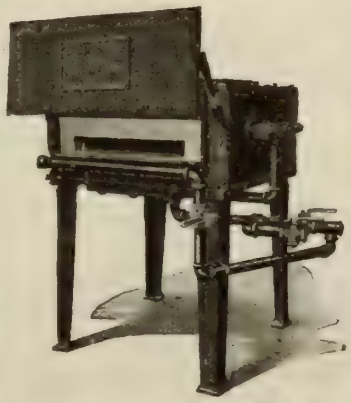
OIL or GAS

Immediate delivery on all tool room types



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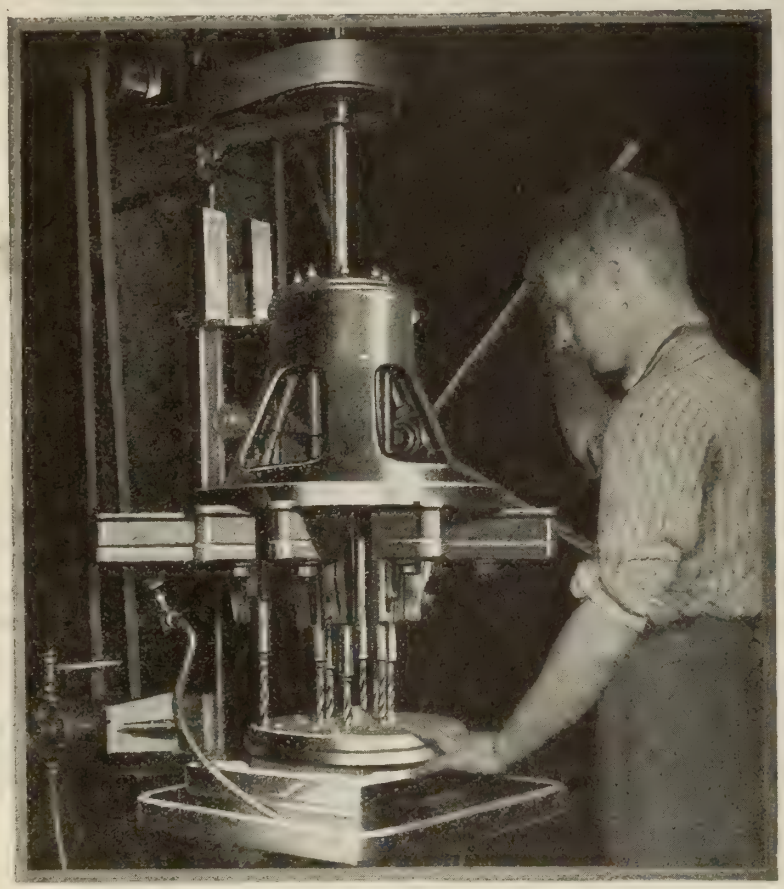
1

NATCO



Wages are too high to drill one hole at a time—

Do your drilling the Natco way

This Baby NATCO has many jobs at the plant of the H. H. Franklin Mfg. Company, Syracuse, N. Y. — among them the drilling of eight 7-16 in. holes, 5/8 in. deep, in cast iron Fly Wheels for Gas Engines. Production brings cost down to the lowest point.

The NATCO patented one-nut adjustable arm is clearly shown. This provides quick and accurate adjustment of the drill spindle. Total vertical adjustment 2 in. Arms are readily changed for different set-ups.

NATCOS equipped with our patented Independent Change of Speed for each Spindle permit holes of different sizes to be drilled at the same time with each tool at its approximately correct cutting speed. This is an exclusive NATCO feature.

NATCOS are built in eleven standard sizes with a wide range of drilling area and of spindle capacity. We specialize in Multiple Drilling Machinery and will be glad to have you put your drilling problems up to us.

The National Automatic Tool Co.

Richmond, Indiana

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TEMPERATURE INSTRUMENTS

Indicating Recording Controlling

This General Trade Mark

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covers all indicating, recording and controlling instruments made by this company and is a synonym for standard apparatus—precision, reliability and permanence.

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Our stock models cover every usual industrial requirement, with very moderate outlay.

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There's a Tycos or Taylor Thermometer for Every Purpose

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Cuts Costs ---*it is a Rockford Machine*

Increases Production

This powerful machine is made to drive high-speed drills up to 3″ diameter, for drilling and boring tools up to 8″ in diameter, for boring out cored holes in cast iron.

It has a lateral and vertical adjustment of the head that permits the spindle to operate anywhere on a surface 18″ high by 36″ wide.

Sufficiently accurate for the finest jig work.

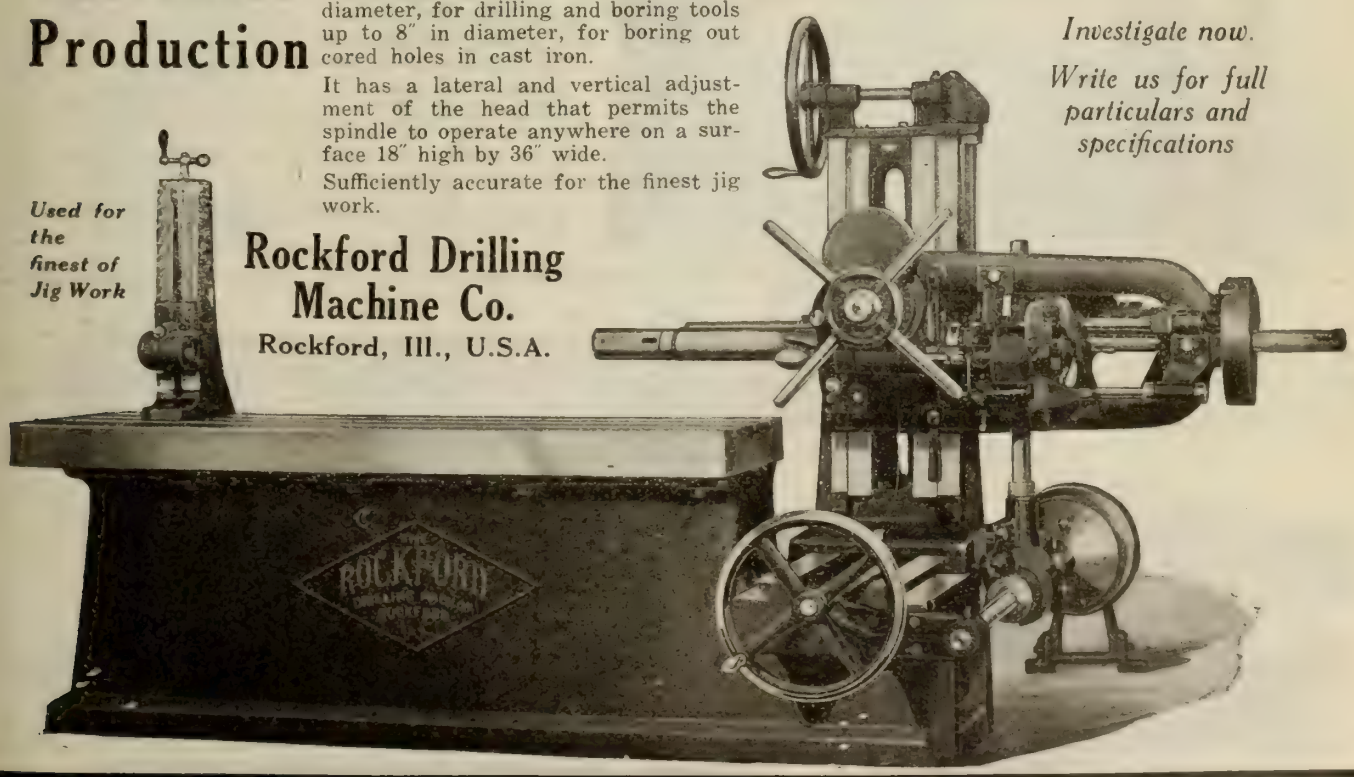
Investigate now.

Write us for full particulars and specifications

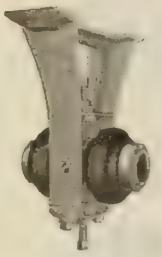
Used for the finest of Jig Work

Rockford Drilling Machine Co.

Rockford, Ill., U.S.A.



MADE IN CANADA



Friction Practically Eliminated

Lubrication required only once or twice a year

There's a Good Reason

When such firms as Pierce Arrow Motor Co., Ford Motor Co., Bethlehem Steel Co., International Harvester Co., Fairbanks-Morse Co., Goodyear Tire & Rubber Co., and 3,000 other plants installed **Chapman Ball Bearings** for their transmission machinery they did so for one good reason—because **Chapman Ball Bearings** eliminate friction and reduce power loss to a minimum.

The power saved by **Chapman Ball Bearings** will in two years' time pay for their installation.

Chapman Ball Bearings will fit into the hangers you have now—there is no necessity of going to the time and expense of new equipment.

Write for Catalog 3-B, which explains in detail the savings **Chapman Type Ball Bearings** will effect for you.

The Chapman Double Ball Bearing Co., Limited

339 Sorauren Ave., Toronto, Canada - 408 Shaughnessy Bldg., Montreal, Que.

The Transmission Ball Bearing Co., Inc.

1050 Military Road, Buffalo, N.Y.

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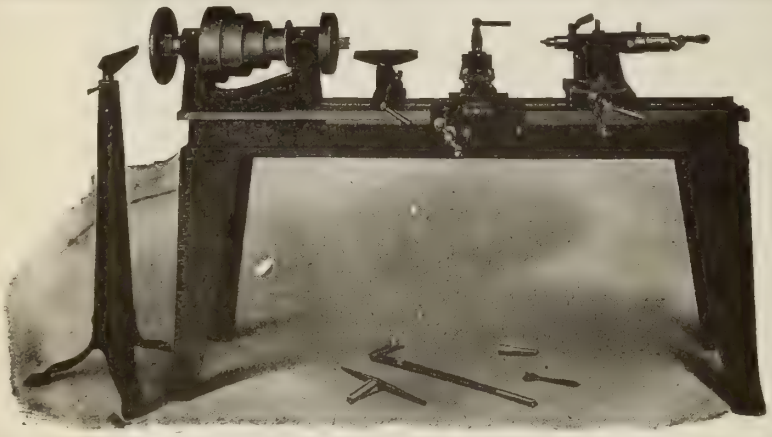

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FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catolog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

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THE TILTED TURRET

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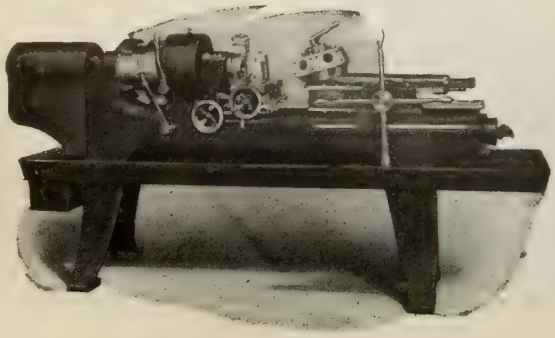

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WOOD TURRET MACHINE CO.

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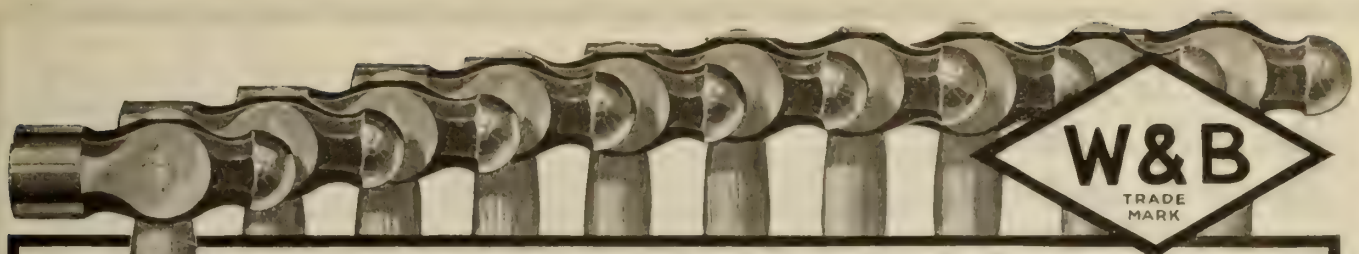

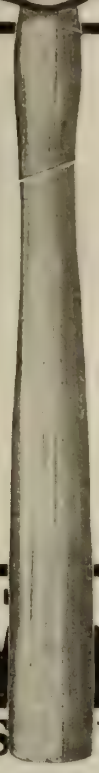

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Absolute uniformity is only one of the big merits of every "W & B" Hammer in every class.

Aside from perfect drop-forging from the right grade of steel, all "W & B" Hammers are accurately balanced, finely finished and correct in every detail.

If you lose your hammer or change your shop you can get another "W & B" that will fit your hand and work just like the old one.

Machinists, Ball Pein, Straight Pein and Cross Pein Hammers in octagon pattern with selected white hickory handles are ready for immediate shipment — made in Canada.

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Noiseless Rotary Riveter

Spins a Polished Rivet Head

Strong, swift and noiseless, it spins the rivet head to perfect smoothness. Whether rivets used are steel or soft brass it never bends the shank. And it can't break or scar the casting. Rivets tight or loose.

Women operators — or boys—run the Grant. **You need it.**

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IMPERIAL CARBIDE
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Large Stocks maintained at convenient distributing centres throughout Canada

A WALL RADIAL DRILL

That Puts Dollars In Your Pockets

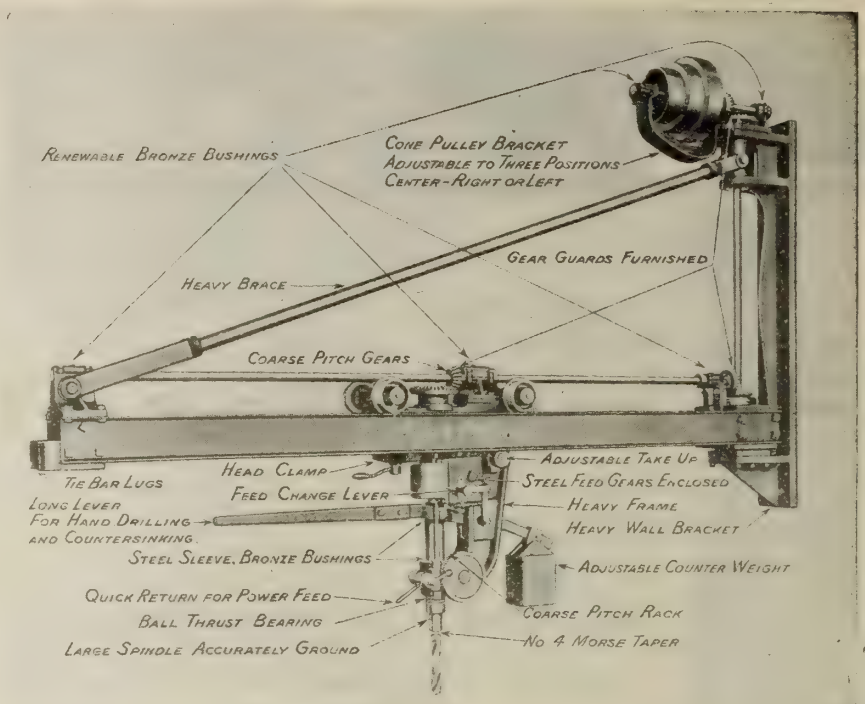
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the machine is made of high grade materials throughout and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling proposition in your pocket, by the installation of this machine.

Send for detailed bulletin.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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419-425 Atlantic Avenue **BOSTON, MASS**

H. COLLIER SMITH

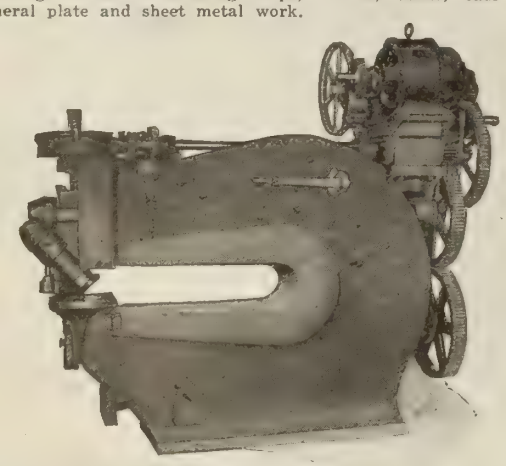
"QUICKWORK"

Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



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SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

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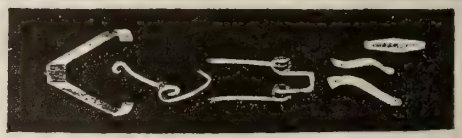
THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

DUNBAR SPRINGS

are dependable springs

We've been making springs since 1845. We've evidently made good. The demand for Dunbar Springs has forced us to put up a big new plant. With better equipment than ever before, we are ready to handle your orders. You might be interested in spiral or flat Vanadium Steel Springs—we've done some good work in this line. If there's anything in small springs or oil tempered Steel Springs of any sizes that you need, it might be well to get in touch with us.



The Dunbar Brothers Co. BRISTOL CONN.

The hoist, as a simple rope and pulley proposition, is centuries old, but the labor-saving hoist is comparatively modern. Being pioneers in the manufacture of hoists of this type, we have learned from experience just how a hoist should be made. It is on this experience that Wright superiority is based.

Wright Hoists serve better because they are made better.

WRIGHT MANUFACTURING COMPANY

LISBON, OHIO

TRADE MARK

CONSOLIDATED

All the energy of America's most modern machine shop and foundry is concentrated upon one product.

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CONSOLIDATED POWER PRESSES

CONSOLIDATED PRESS CO.

HASTINGS - MICHIGAN
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CONSOLIDATED

For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

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CONSOLIDATED POWER PRESSES

Does Continuous Operation Mean Anything To You?

LANDIS

Continuous operation means more than super production; it means the ability to withstand long and continued abuse without failure in any part, and yet produce accurately and economically.

As "The Cincinnati Planer Co." states:

"It is operating night and day, on very heavy work, without a moment's trouble, and is giving first class satisfaction."

This is only part; send for catalog covering Landis Boring, Milling and Drilling Machines.

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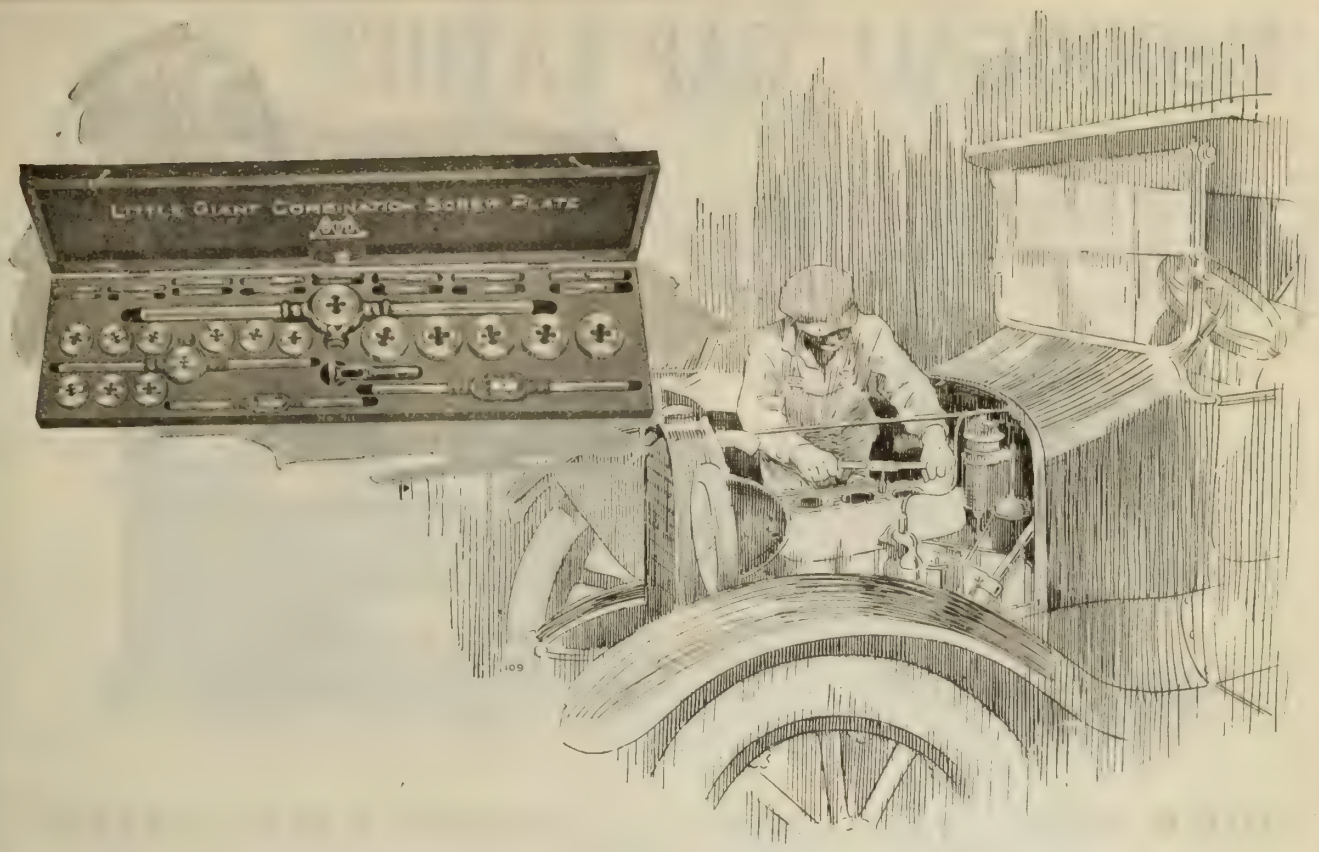

Anticipate your sales!

Stock Little Giant Screw Plates!

Little Giant Combination Screw Plates, cutting a variety of sizes in both U. S. and S. A. E. standard threads, are particulary good sellers to the garage and auto repair trade.

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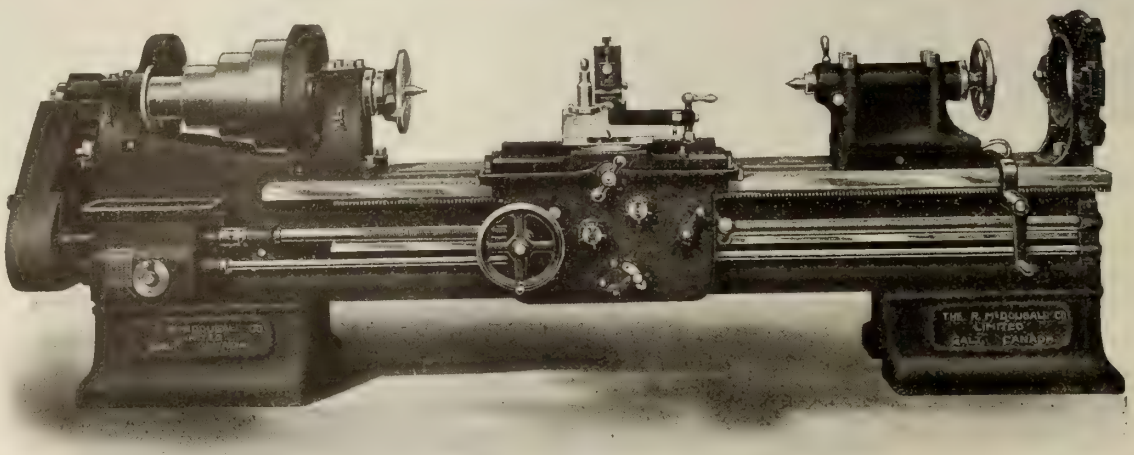

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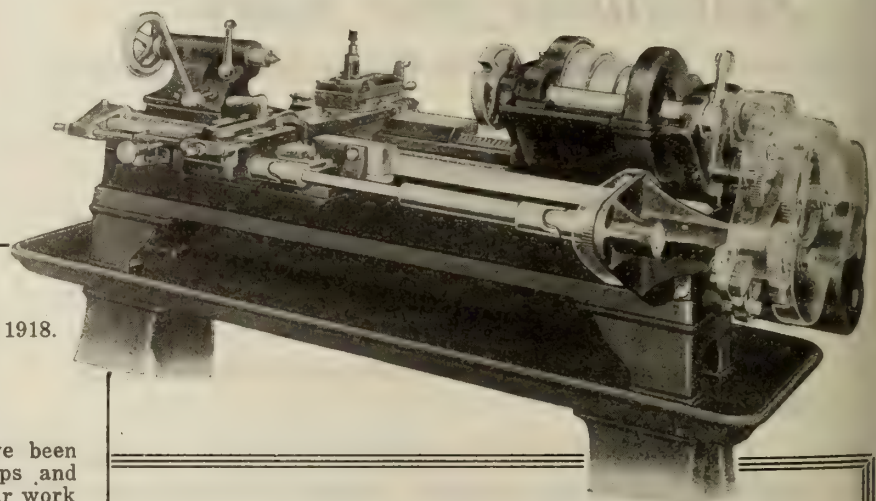

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We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

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EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

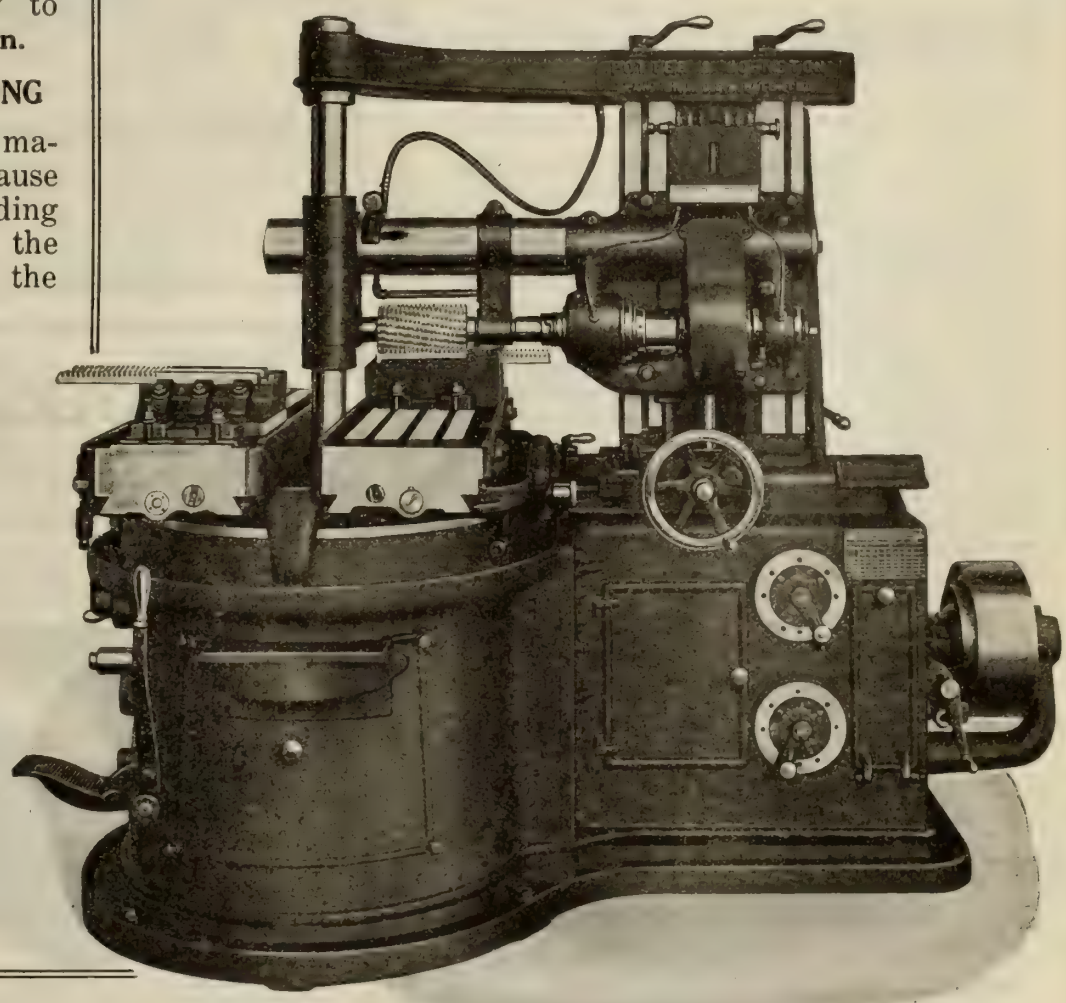
No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches. 12 Spindle Feeds, 20 to 180 R.P.M.

Send us your Blueprints and we'll gladly give you production figures.

Bulletin 36 on application.



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Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 43A

Wheel Speeds In Saw Sharpening

When saws begin to show cracks, when they begin to case-harden, and when other things go wrong in the filing room, even though a wheel may be satisfactory until the trouble starts, it is usually the grinding wheel which receives the blame, because no other reason for the trouble can be found.

However, the average filer must be given credit for becoming more educated every day with regard to grinding wheels. He is learning to look upon his wheel as one of his tools and is beginning to treat it as such.

Wheel speeds cannot be depended upon in a filing room where the machinery is run by individual steam engines. The steam line as a rule is connected with the same line as that which furnishes steam for the carriage gun. The number of machines used controls the steam supply and power delivered. A change of 200 to 300 r.p.m. of the wheel may result from a change of only one or two revolutions of the steam engine. When it is realized that a change of 500 surface feet will show an appreciative effect in grinding action, it can be seen that this change is a vital one. Generally speaking, a wheel will act considerably harder as the speed increases.

The generally accepted correct speeds for wheels, the sizes of which are usually used in saw gumming work are listed below. These speeds will give approximately 5000 s.f.p.m.

Wheel Speeds

Diameter	R.P.M. for 5,000 S.F.P.M.
6	3,200
8	2,400
10	1,900
12	1,600

With the use of Alundum wheels saw sharpening troubles are minimized.

NORTON COMPANY

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B. Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

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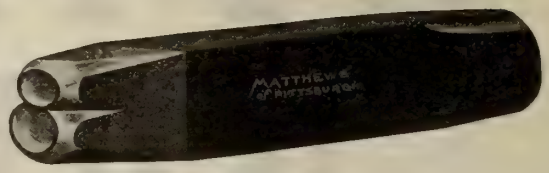

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Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

Canadian Fairbanks-Morse Co., Limited

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

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The New Standard of Production

Why Not Cut Off Stock From 50 to 100% Faster?

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We will prove to you what the Peerless is doing in some of the largest plants in the country, or will let you prove its superiority in your own plant. A machine is ready for you to try, and if after 30 days' use you want to let it go, you may ship it back at our cost for freight both ways.

Write us about it—now.

PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN

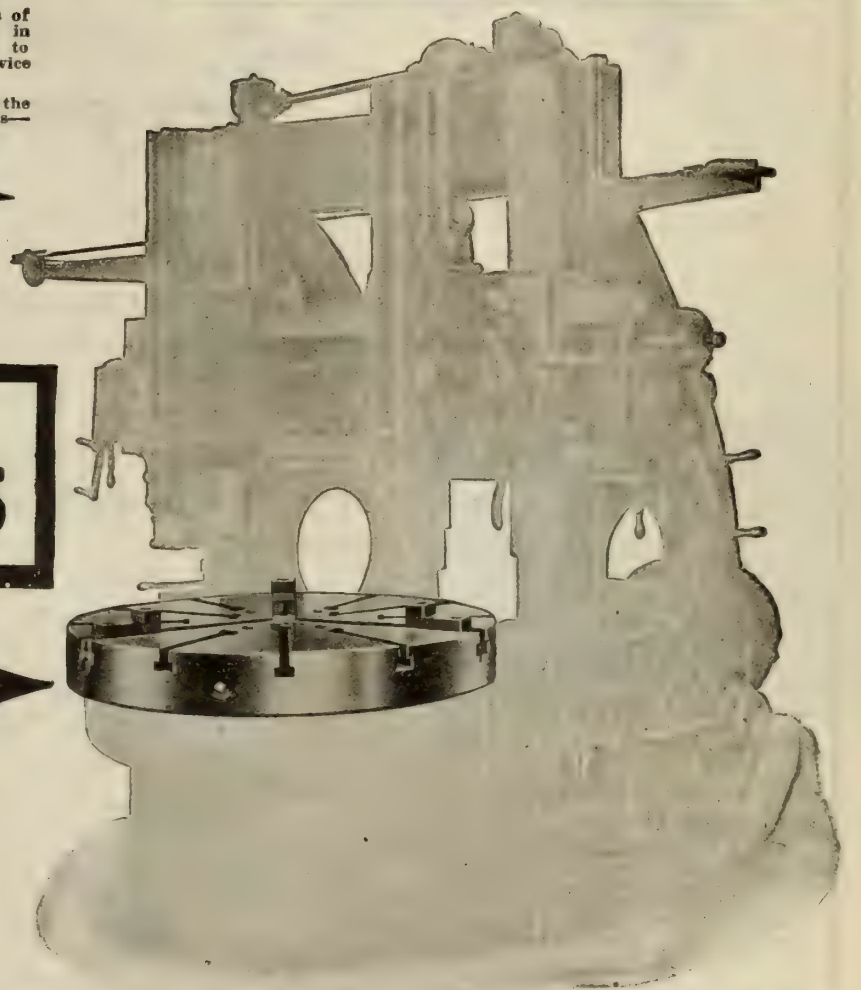
GISHOLT

Complete Boring Mill Service

THE MILLS

Built with the Gisholt standards of quality and performance cast in every pound of metal. Built to uphold the Gisholt ideal of service expressed in work produced.

Judge Gisholt Boring Mills by the test applied to all Gisholt Tools—the test of results achieved.



THE TABLES

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Gisholt forethought is amply shown in this branch of the Gisholt service line.

Gisholt Methods Insure Accuracy and Economy

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Builders of Standard and Automatic Turret Lathes; Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery, etc.
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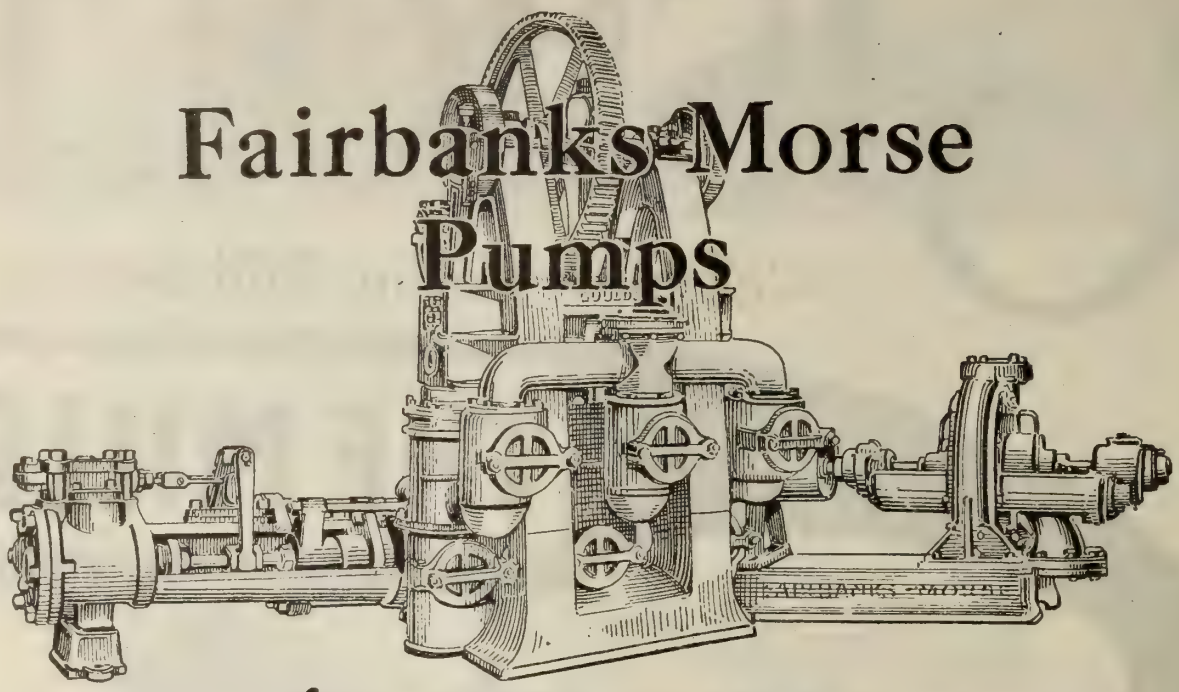

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 21. May 22, 1919

Some Interesting Features of The Massey-Harris Brantford Plant

An Article Dealing With Various Jigs and Fixtures as Used, Together With a Description of the First Aid Department, a Very Necessary Adjunct to Any Up-to-Date Plant

By J. H. MOORE, Associate Editor Canadian Machinery

IN these days of advanced machine shop practice, the jig and fixture has come into its own for without the aid of these valuable assets, speed or interchangeability is an utter impossibility. Keenly aware of this fact, the Massey-Harris Company of Brantford, Canada, have kept well abreast of the time, for their machine shop department is a splendid study from a jig and fixture standpoint. Practically every operation of any importance passing through this department has its jig and special tools. These are kept in such a manner that

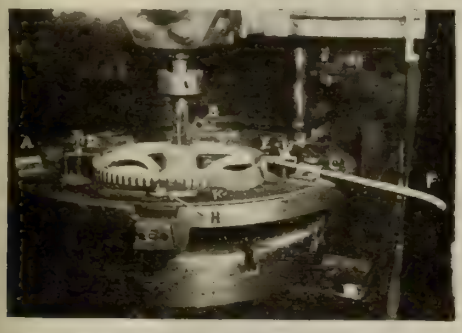


FIG. 1—QUICK ACTION CHUCK.

when the workman desires some certain jig or fixture, all he needs to do is enquire of the jig room attendant for this particular jig, when not only the jig, but its tools, can be found at once.

It is impossible to attempt to describe all these various fixtures, but the writer has picked out a few which he believes will interest the various and many readers of CANADIAN MACHINERY.

Quick Action Chuck

In Fig. 1 is illustrated what is known as a quick action centering chuck, installed on a vertical boring mill table. This chuck is used to grip quickly the gear shown in place on the photograph. This gear is known as the mower driving gear for the 18, 20, and 21 size mower. A study of the photograph will be well worth while.

On placing the gear in the fixture, you use the handle F to tighten the chuck jaws, one of which is seen at G. There are three of these jaws, each being held in place by its dovetailed slide, together with the bolt H. The slot K is constructed on the eccentric principle. Of course, all three slots are arranged similar, so that the very action of pulling the handle in a clockwise direction tightens the work, centralizing it at the same time, while the two clamps D and E are merely safeguards to ensure that the work is pulled down flat on its seating. Readers will notice that there are three receptacles for the handle F, namely, A, B, and C, respectively, the idea for this, of course, being to ensure that one of these holes will always be in about the correct position to the operator when he stops his machine.

The operation performed is that of reaming and facing, the tool being clearly shown on the photograph.

Automatic Milling

The next fixture illustrated at Fig. 2 is that of a special machine and fixture, which is automatic in its action. This machine consists of 4 heads, as shown.

The work itself is what is termed the guard for a binder, and its shape is clearly outlined at A. The two faces, B and C, are the faces to be milled in this operation. Their heights are different, which, of course, necessitates a step cutter, which can be seen at D. These cutting edges are made of stellite and staggered, for the two diameters. They fit together on the male and female principle. E represents the holding device, which is simply a vise, operated by quick action cams, F and G. The work is now fed in by placing the feed lever H in proper position. When the work has traversed through its correct length, the table trips automatically, and returns to its idle position. The standard of this operation has greatly improved since this fixture has been installed, besides ensuring speed and interchangeability.

Another Automatic Milling Fixture

Another milling fixture of splendid design and wonderful production results is shown at Fig. 3. The machine on

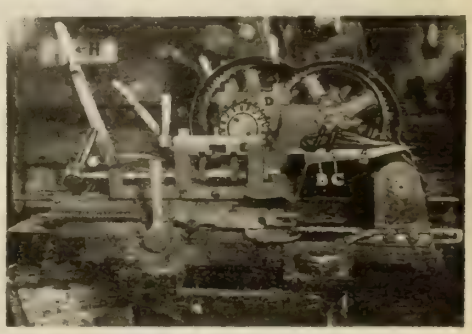


FIG. 2—AUTOMATIC MILLING FIXTURE.

which the fixture is used is a Potter and Johnston automatic milling machine. Of course, readers are, no doubt, well aware that a machine of this nature has a revolving work table, which allows the operator to load up one side of the table, while the fixture on the other side is passing under the cutter. To illustrate in the clearest possible manner the general construction of this jig, the writer has taken this photograph just as the table was swinging around. By this means he has been able to show one complete fixture, the other fixture, of course, being on the other side of the table. It will be noticed that eight pieces are held in each fixture by means

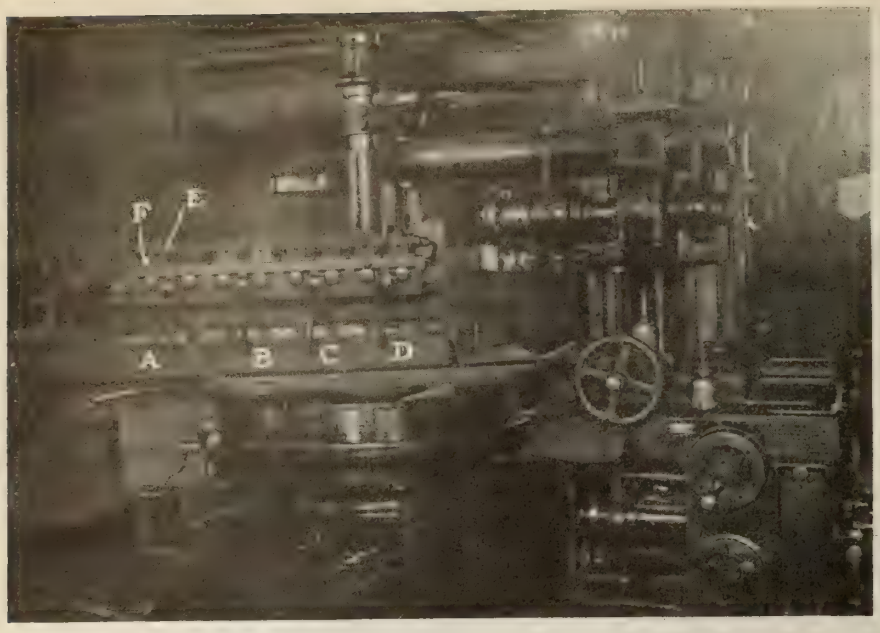


FIG. 3.—AUTOMATIC MILLING MACHINE WITH SPECIAL FIXTURE ON TABLE.

of the four handles, A, B, C, and D. The work itself is a mower guard. The faces in this case to be milled are E and F.

To loosen the work, the handles A to D are released, which in turn releases a spring clamp, connected to the bolts shown on either side of these handles. The work then drops out underneath the fixture by a gentle tap with a hammer, in fact in many cases they drop out without this aid.

The cutter used is one with inserted stellite bits, and runs at a very high rate of speed. The work is malleable iron, and is machined dry.

To illustrate the surprising difference which often can be made in production figures, let us quote what this firm used to do with a former fixture on an ordinary miller, and what they accomplished now. Previous to the installation of this new fixture, the speed of production was as follows: 700 guards per day, With the new machine and fixture at work, 1,600 guards is the production figure, with accuracy and interchangeability, which goes to prove that keeping up to date pays in more ways than one.

Snapper Drill Jig

Another very interesting jig is shown at Fig. 5. This fixture is known as a snapper drill jig, the jig receiving its peculiar name from the fact that the spring A causes a snapper action. By this method the work is held firmly until drilled. The cams B and C raise and lower the slide casting D, which in turn pushes the work up against the bushing E. At F we show how the head of this rear coupling bar (as it is called) appears after having been drilled. 15 pieces every hour are turned out on this fixture, an ordinary drill press being the type of machine used. Formerly this work was caught in the vise with very poor results.

Lubrication System

Let us now take up an entirely different subject, namely, that of the lubrication system adopted by this firm in supplying their various machines with the necessary cutting compound.

Fig. 6 illustrates the system clearly. The centrifugal pump A pumps the lubricant up from a settling tank in the floor directly alongside of the pump into the supply tank B. From this tank the lubricant travels by piping to the various machines over which the system has control. This one pump, as shown, controls all the machines in the nut and bolt department. Any excess lubricant pumped up into the supply tank runs back again into the settling tank, forming a continuous process. Under each machine, or alongside it, as the case may be, are constructed channels in the floor about 12 in. wide by 12 in. deep, through which the used lubricant runs back to the settling tank. These channels are covered by iron protection plates, as shown on the photograph at C. Such a method as this is a decided improvement over the usual one pump to a machine scheme as ordinarily adopted.

Novel Stock Rack

In this plant there is a huge warehouse where all the various shapes of iron bars, etc., are stored. One style of storing rack struck the writer as well worth mentioning, owing to its novel and simple construction, so he took a photograph of the same for illustrative purposes, which is shown at Fig. 7. Readers will note that this storage rack is simply nothing more or less than a series of vertical bars, one on each corner of the pile, together with cross bolts of double eye construction for spacing purposes. The advantage of such a scheme is self-apparent, for when not required, your rack, so to speak, can hang up on a good sized nail on a post out of the way. To say that this sys-

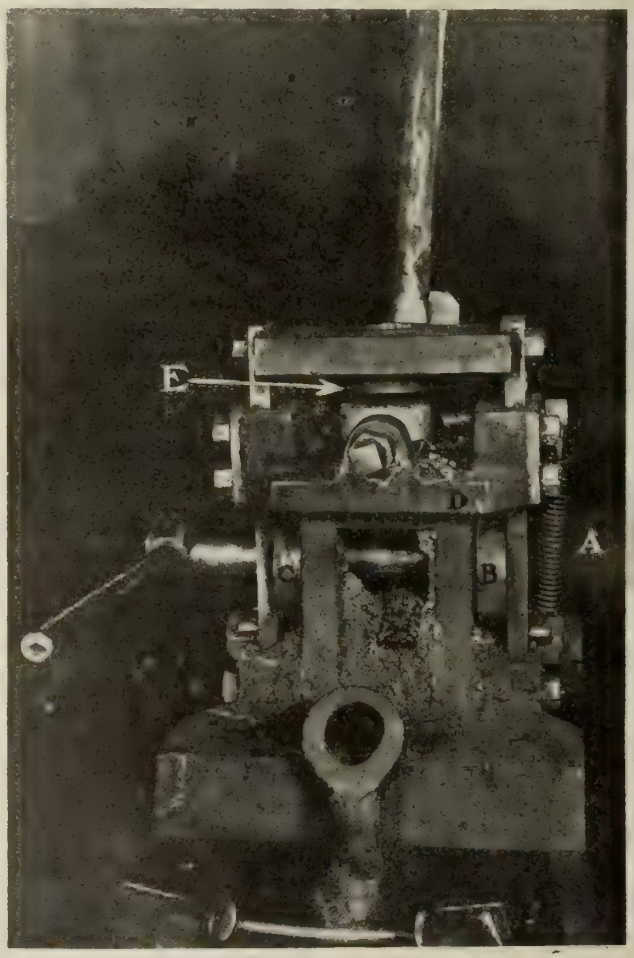


FIG. 5.—INTERESTING SNAPPER DRILL JIG.

tem makes a neat looking pile is unnecessary, for the photograph proves such beyond a doubt. An idea such as this can be adapted to almost any line of business.

FIG. 6.—SYSTEM OF LUBRICATION AS ADOPTED FOR MACHINES.

First Aid Dept.

Last, but not least, we touch on the subject of the provision made by this firm for the safety and medical attention to their employees.

At Fig. 8 we illustrate the first aid department, and as no room of this kind is complete without its attendant nurse, we persuaded Miss Slee, the nurse in charge, to grace the photograph with her presence. It was impossible to show all the various fixtures in this room with a camera from one viewpoint, so we have taken merely one corner of the department for illustrative purposes. One can see from the photograph the neatness and cleanliness of this very necessary department, and the writer can only add that it really has to be seen to be properly appreciated. Everything is finished in white, and, of course, this room contains all the necessary medicine cabinets, etc., which form a part of such a department.

Miss Slee, on being questioned as to the workmen's promptness about reporting the little minor cuts and bruises, which so often develop into greater trouble, stated that it was surprising how well they were following out the proper course of reporting. About an average of 30 cases pass through her hands each day.

From the foregoing article readers can readily see that here is a firm strictly up to the minute, and at some future time the writer hopes to again go further into the details of the organization, presenting the same through the columns of CANADIAN MACHINERY.

NEW ELECTRICAL METHODS IN MEDICINE

Electricity, as is well known, plays a large part in the treatment of disease, but its usefulness in diagnosing faults and breakdowns in the human machine is less familiar, except in the case of X-Rays for the detection of fractures and foreign bodies. Several ingenious electrical instruments have been invented and manufactured in Great Britain for giving accurate records of the heart's action and of the temperature of the body. When a current of electricity is passed through the body between the extremities of the limbs, the contraction of the heart alters the strength of the current; by an ingenious arrangement this alteration is made to record itself on a photographic plate. A "cardiogram" is thus secured which gives a diagrammatic account of the heart's action and enables the physician to detect conditions which might escape other means of detection. In taking temperatures, the usual method is to insert a thermometer at intervals and to "chart" the record, drawing straight lines between the points ascertained. With the up-to-date electric method, the record is continuous, showing the slightest variation from minute to minute. Much new light has been thrown on the course of fevers and other diseases by this electrical record, which represents yet another contribution of British scientific and engineering skill to the advancement of the healing art.

FIG. 7.—NOVEL AND SIMPLE STOCK RACK.

FIG. 8.—VIEW SHOWING A PORTION OF FIRST AID DEPARTMENT

Arranging Trays, Wrench Holders and Pans on Machine Tools

An Article Describing in Detail the Various Type of Pans as Used on Machine Tools, Together With Their Advantages

By F. SCRIBER

(Continued from May issue)

MANY types of machines are built up on pedestals, such as cutter grinders, polishers, and various special purpose machines. The nature of the work done on these machines often makes it advisable to provide them with a large work-holding pan. Such a pan is illustrated in Fig. 18, and the pan portion itself is held to the pedestal at A by means of two bolts B, these clamping the pan in place. On some occasions a ring is bolted on the pedestal and this pan is allowed to rest against this ring, it being free to swing on the pedestal in such a case. Unless the pedestal of the machine is so arranged that a pan of the type shown can be slipped over

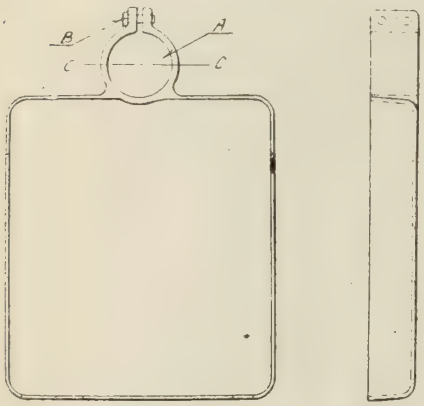


FIG. 18—LARGE PAN FOR GRINDER.

the top it would be necessary to split the round portion of the pan on the line C-C and clamp it on the pedestal with four bolts. In regard to the ring mentioned above, this is sometimes cast in place as part of the pedestal.

A rather ingenious arrangement, combining a door, tool tray and inside tray or receptacle, is illustrated by Fig. 19. The sectional view of this shows quite clearly how this is accomplished, the door, which is of the usual panel type, has the hollow tool tray cast to the outside while to the inside is cast a deep pocket into which may be placed large wrenches, waste, oil can, and various

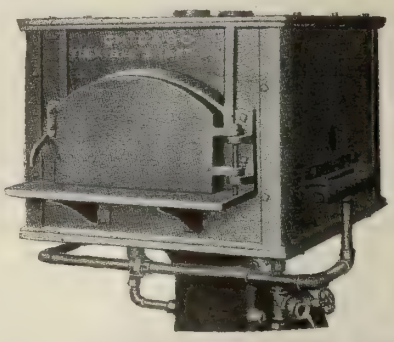


FIG. 20—MUFFLE FURNACE WITH SHELF BELOW THE DOOR.

other articles. This large pocket takes the place of a shelf inside which cannot be very conveniently arranged on some designs.

Fig. 20 shows a muffle furnace with a large shelf below the door, this being very convenient for holding work while slipping it in and out of the furnace, and this is held in place by bolts in the usual manner while Fig. 21 shows a furnace on which the door is arranged to swing down and act as a shelf when so desired.

Locating a pan on a change gear box of a drill press is illustrated in Fig. 22, this being at the left-hand side of the drill at the back; it is not very convenient to the operator in his usual working position, although as most drill presses have no conveniences for keeping tools in it is useful to a limited extent.

Any reference to work holders would be far from complete were not some reference made to the rack or tray shown in Fig. 23. The tray shown in this particular instance is for blacksmith use and is made by the New Britain Machine Co. This contains suitable tongue and hammer holders, a drawer, two shelves and a tray. Various combinations of racks similar in general purpose are in vogue for use with lathes, milling machines, screw machines, and in fact most any purpose where a shelf is needed in a machine shop.

A broaching machine having a combination of four pans is illustrated by Fig. 24, some of which are for holding work and some for catching the chips and oil. A cutter grinder having two pans, one of which, A, is fixedly mounted between the column and bracket, and the other being free to swivel on the column, is shown by Fig. 25.

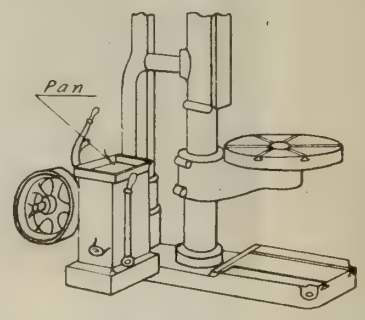


FIG. 22—PAN ON CHANGE GEAR BOX ON DRILL PRESS.

Figs. 26 and 27 show examples of a pan mounted or cast on the change gear box of a lathe, of which Fig. 27 shows how this appears in position on the lathe, while Fig. 26 shows two sectional views of a change gear box having pans cast on top of them.

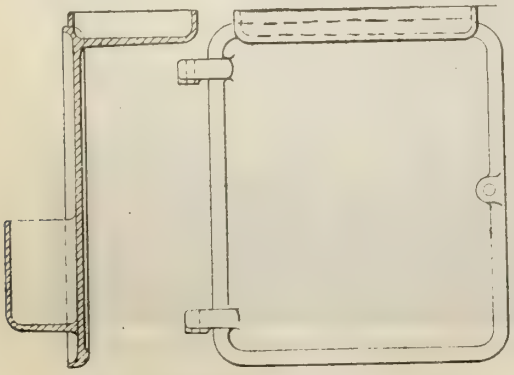


FIG. 19—SPECIAL COMBINATION TRAY.

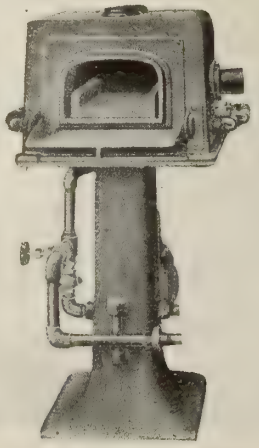


FIG. 21—FURNACE WITH COMBINED DOOR AND SHELF.

FIG. 23—RACK OR TRAY FOR BLACKSMITH.

Referring to the view at the left of Fig. 26, it will be noticed that where the lever A goes through the pan bottom

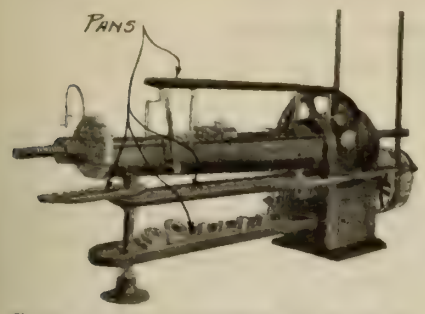


FIG. 24—ARRANGEMENT OF PANS ON BROACHING PANS.

there is a hole through which dirt is almost sure to work into the gears, while by constructing this pan with a wall as at the right of Fig. 26 this difficulty, although not entirely done away with, is very much minimized.

FIG. 25—CUTTER GRINDER EQUIPPED WITH PLAIN AND SWIVEL TRAYS.

A type of stand which most anyone can make cheaply is illustrated in Fig. 28; this is made with a pipe for a stand which has a pipe flange at the top and bottom. The bottom flange is held to the floor by screws, while a suitable board is also held to the flange at the top for holding the work.

It would be almost impossible and undesirable to attempt to cover all the varieties of pans, trays and wrench holders which are met in the factory, and in fact some of our shops abound in such conveniences, put there by nobody knows who, and oftentimes to suit individual whims, but it is believed that enough has been shown of combinations to make us stop and think if we have enough, too many, and are they located properly? These and other questions should suggest themselves from a reading of this discussion.

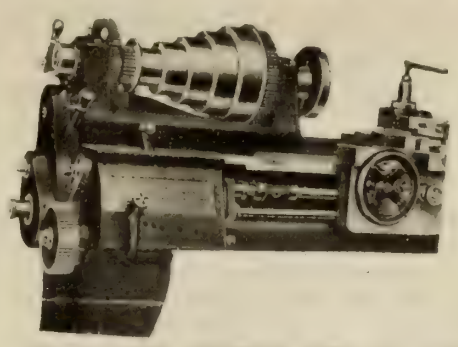


FIG. 27—VIEW SHOWING HOW PAN AND GEAR BOX LOOK ON LATHE.

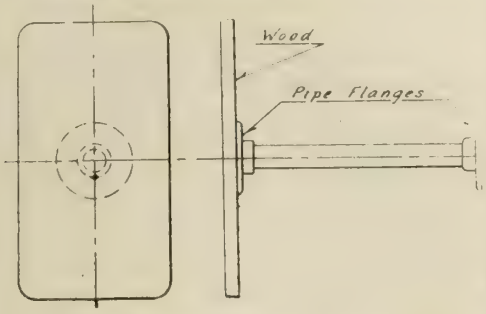


FIG. 28—SIMPLE TOOL TRAY.

SCARCITY OF TINPLATE AND THE USE OF SUBSTITUTES

The short supply of tinplate seems already to have reached the United States, for the Bureau of Standards of the Department of Commerce at Washington invites manufacturers of substitutes for tin cans and boxes to send in their devices to be tested. They are requested to state for what purpose the container is to be used, to give the price, and to say if they are prepared to contract for early deliveries. It seems to be the object of the bureau to obtain co-operation between the manufacturers of tinplate and of substitute containers, packers of foodstuffs and other articles generally put up in tins, and the general public. Great activity seems to be looked forward to in the coming months, presumably in connection with the present war. In every case the object of a package that shall be equal to tinplate is to keep off damp or insects or both.

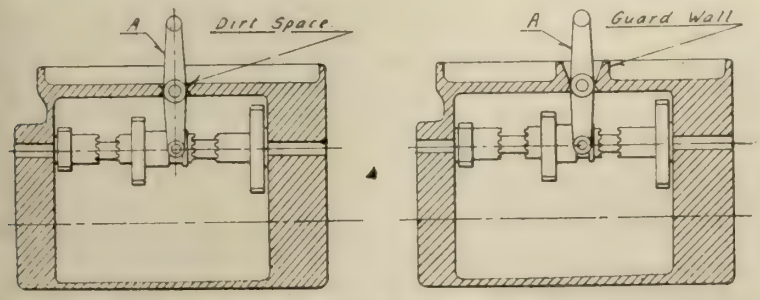


FIG. 26—PAN ON CHANGE GEAR BOX OF LATHE.

The subject is a very large one, and its history goes a long way back to the time when skins were the only protective covering used, sometimes tanned, at other times coated with tar. Waterproofed and hardened paper plays a large part in the list of prospective coverings in the shape of bottles, pails, basins, jars and boxes of forms innumerable. India, for many generations, has produced durable papier-mache, but in spite of her vast resources in raw materials she has not touched any of the modern applications of fibre except strawboard boxes that are the reverse of waterproof. At least 20 years ago the Salt Department offered a prize for a suitable package to contain salt, but no satisfactory response seems to have been made. There is no lack of materials in India of timber, fibres, gums and oils which seem to offer the most likely materials with which to work. Glass and pottery can only be used to a limited extent on account of their weight or fragility. Waterproofed cloth has a limited application as it is difficult to find perfectly elastic and cheap coatings. Paper toughened by the sulphuric acid process and afterwards waterproofed, should serve for a good many purposes.

The scarcity of tinplate in India at present, and its abnormal price, should offer a strong inducement to investors to find some substitute that will protect perishable goods from the ravages of moisture, insects and larger vermin. Light material that is not rigid would require to be tough as well as waterproof, free from disagreeable smell and stickiness. A very great improvement might be made in the strawboard if it were rendered damp-proof, with solutions of soap and alum or other insoluble soap, for it loses much of its rigidity in damp weather owing to its porosity. The covers of large boxes begin to sag in wet weather for this reason. Outer coatings are not sufficient to render the material sufficiently stiff. It is possible that with better sizing with a damp-proof material the weight for any given purpose might be reduced and its use for book boards increased.

Many years ago toughened paper was used in bags instead of gunny cloth to carry screw bolts to the extent of several pounds in weight. Unsized paper may have its strength increased to five times the strength of ordinary paper by treatment with diluted sulphuric acid, which is immediately washed away. Commercial sulphuric acid is diluted with half its volume of water. The paper is immersed from 5 to 20 seconds, at a temperature of about 60 degrees F. It is next passed through water, then through ammonia solution to remove the acid, and again through water, after which it was dried in the usual way with felted and hot rollers. It is unaffected by boiling water. A similar effect is obtained by treating the paper with a syrupy solution of zinc chloride at from 120 degrees to 212 degrees F.

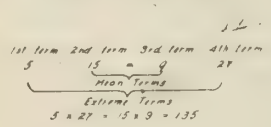
Vegetable parchment is principally used as covers for preserve jars, bottles, etc.

Shop Arithmetic; Proportion and Ratio

Fifth of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinists' Trade—The Present Article Takes Up the Subject of Proportions and Ratios

By J. H. RODGERS

AN element of mathematics that is extensively used in the solution of shop problems, is that of proportion or the equalization of two or more ratios. When comparing the relative values of one number with another it is invariably expressed in the form of a ratio. In comparing an inch with a foot we would say that an inch is one-twelfth of a foot, or that a foot is twelve inches—a yard is three feet, and a foot is one-third of a yard. When figures are used the ratio could be expressed in three different ways, as: $12 \div 1$; $12 : 1$; or $\frac{12}{1}$. It is seldom, however, that ratios are used in their primary sense, as their practical application is more clearly recognized when used in couplets, in the form of a proportion. For instance, in finding the value of the ratio—48 : 16, we would divide the 48 by the 16 and obtain 3, but the 3 implies very little, so that the proper method is to couple the primary ratio with one that will determine its value in a simpler form. Then the above would read: $48 : 16 = 3 : 1$. That is, 48 is to 16 as 3 is to 1, showing that 48 is three times greater than 16. This form of equation is called proportion, or the rule of three, and the general rule may be stated thus: the product of the two extremes equals the product of the two mean terms.

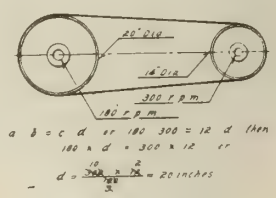


For general application the rule may be expressed in the form of a formula, using the first four letters of the alphabet as symbols of the respective terms:

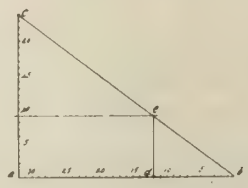
$$a : b = c : d \quad \text{or} \quad a \times d = b \times c$$

In using proportion for the solution of shop problems, remember that each terms of a couplet should have the same denomination. Decide, mentally, whether the unknown term is lesser or greater than the known quantity and arrange the proportion in the proper order. Proportion is generally adopted for finding a number that will make one ratio equal to another; in other words, three terms are given, and it is required to find the fourth. Suppose we are installing a new machine, the countershaft for which must have a speed of 300 r.p.m. The pulley on the same is 12 inches in diameter and the line shaft runs at 180 r.p.m.; what diameter of pulley is required for the main shaft?

The unknown quantity is the diameter of the line shaft pulley. Making this the last term and figuring, mentally, that the pulley required must be larger than the known one, we have:



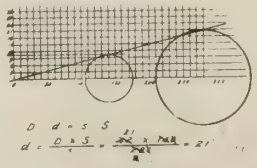
Any proportion may be shown graphically by a simple geometrical figure like the one here shown. Suppose it is desired to show the relative value of the proportion 24 : 32—9 : 12.



With a base of a certain unit, say ⅛ inch, draw a horizontal line A-B equal to 32 eighths, and a vertical line A-C from the initial point A, equal to 24 eighths. Joining c and b forms a right triangle, and any line drawn parallel to one of these sides will divide the space, or the length of the lines, into a similar ratio. For the proportion above stated, a vertical line drawn from the twelfth division would give the desired length to represent the ratio 9 : 12, the vertical line equalling 9 eighths. Expressing the proportion by the letters shown would be:

$$a : b \quad a : c = d : b \quad d : e$$
$$32 \quad 24 = 12 \quad 9$$
$$32 \times 9 = 24 \times 12 = 288$$

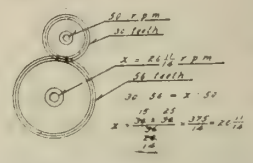
In finding the speed of pulleys it must be remembered that the proportions are of an inverse ratio, that is to say, the speeds of the respective shafts are inversely proportionate to the diameters of the pulleys. This might be more clearly shown by a graphical figure.



It will be seen here than when two pulleys are belted together the surface speed will be the same, but the revolutions will vary inversely as the pulley diameters.

The design of modern machinery tends to reduce the necessity for operators to figure out gear trains for the cutting of different threads, or the operations of shafts at various speeds; this being accomplished now by the shifting of fixed gear trains fitted to the machine and controlled by one or more levers. However, instances are still common where calculations are still required by the men in the shop before certain work can be performed. On the more recent design of standard lathes a man may be able to cut an accurate thread on a shaft and yet be ignorant of the gears that are in mesh in the body of the gear box.

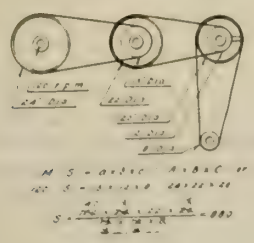
The process of finding gear trains is virtually the same for that for pulleys, with the exception that the number of teeth is used instead of the diameters. In many forms of mechanisms it is essential that a positive drive be maintained, and under such conditions the use of a belt is impractical owing to the presence of slip on the pulleys. A positive drive is absolutely necessary in the cutting of threads, as any inaccuracy or irregularity would spoil the uniformity of the work. If two gears of 30 and 56 teeth are in mesh and the speed of the former is 50 r.p.m., what would be the speed of the latter? As in the case of the belt drive the speed varies inversely as the number of teeth, therefore the proportion would be $30 : 56 = X : 50$—X being the unknown value. Then:



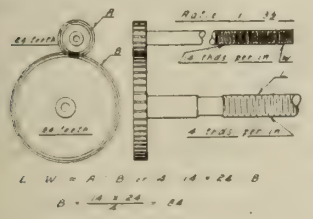
In the case of compound drives the principle is the same, although more factors are involved. The method of solving both compound belt and gear drives is the same, and might be stated, briefly, by the following rule: The product of all the driving units must equal the product of all the driven units. In the sketch here illustrated the capital letters represent the driving pulleys and the small letters the driven pulleys. Using the rule above given the solution would be as shown on next page.

As a train of gears is virtually the same as a belt drive, the chief difference being that the former is direct connected. In the cutting of threads on a lathe the

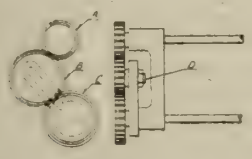
important factor is the selection of the gears that will give the desired advance to the cutting tool, per revolution of the work, so that the required pitch will



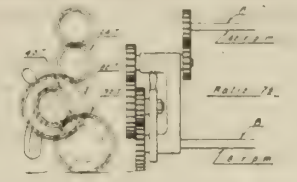
be obtained. As the lead screw of a lathe is always a fixed member it is immediately seen that a different train of gears is necessary for every variation in the pitch of screw to be cut. With a lead screw of 4 threads per inch, what is the ratio of the gears required to cut a thread of 14 to the inch? The gears (direct connected) would be in the ratio of 4 : 14 or 1 : 3½. In the majority of cases the change gears will vary in the number of teeth by 4's or 5's, the smallest in the set being a pinion of 20 teeth. The selection of the gears depends on the ratio required and the gears available. It is not desirable to use too small a gear in a train, although sometimes it cannot be avoided. For the above problem, selecting a 24 gear for the spindle, the gear for the lead screw would be found thus:



The sketch shows the two gears in direct mesh, but this would seldom occur in practice, as it would mean a definite centre distance for the two shafts, a factor that minimizes the possibilites of using various sets of change gears. It is true that the lathe spindle and the lead screw are located in definite relative positions, but some provision is necessary for gearing the lathe to meet the various conditions that are required. Whether this be the modern system of change gears, or by the old method of calculating to find the gears desired, the principle of linking up the train is practically the same, and is done by means of a swinging lever or quadrant that carries the intermediate gear or gears to complete the train. A familiar setting or simple lathe gearing is here shown:



A little study will show that the intermediate gear B has no effect on the relative speed ratio of A and C, its purpose being solely to connect the two main shaft gears. It will be noted, however, that the gears A and C will run in the same direction, whereas two adjoining gears will travel in opposite directions. Compound gear trains are figured out on the same lines as those described for pulleys. A sketch showing a compound train is here shown.



Suppose the shaft A to run at a speed of 60 r.p.m., and it is desired to have the shaft B run at a speed of 8 r.p.m., the change gears to advance by 4 teeth. First find the ratio of the speeds, which in this instance would be 60 : 8 or 7½ : 1.

For simple gearing, using a 24-tooth pinion on the spindle A, the wheel required for the shaft B would be:

$$\frac{7\frac{1}{2}}{1} = \frac{x}{24} \quad x = 7\tfrac{1}{2} \times 24 = 180$$

A change gear for a lathe would seldom be as large as this, so compounding is necessary. A convenient method is to divide this result in half and use one of the fractions (90) for the shaft B, and any two with a ratio of 2 : 1 for the intermediate pair. This would be:

$$\frac{2}{1} = \frac{40}{20} \times \frac{90}{36} = \frac{72}{24} \times \frac{48}{24}$$

To prove the correctness of the result it is well to figure back, as indicated by the general rule, that the product of the drivers should equal the product of the driven members.

$$\frac{40 \times 24 \times 48}{24 \times 36 \times 24} = \frac{60 \times 90 \times 8}{24 \times 36 \times 24}$$

Further application of ratio and proportion will be dealt with in the following lesson, and likewise throughout the course.

"EFFICIENCY"

By F. G. C.

The word "efficiency" has recently been extensively used in our manufacturing industries. There are some who are not in sympathy with this work as a special branch of shop organization, perhaps because someone they have met has misappropriated the word while aspiring to be more than they had a right to. I have witnessed efficiency work as a workman in the shop, as an executive and in my present position of efficiency engineer, and I firmly believe that an efficiency department, properly managed, is a great asset to every large industrial plant.

Right here let me distinguish between "an efficiency man" and an "efficiency engineer." An efficiency man's work is more or less clerical, or with some simple drawings or chart work, or he may even do time study work, but he should never consider himself an efficiency engineer unless he has a complete knowledge of efficiency work and a thorough practical knowledge of draughting, machine and tool design, pattern making, foundry, machine shop and millwrighting, conveyor systems, etc. Some industrial plants require an applicant for a position as efficiency engineer to show his mechanical engineer diploma, and prove his shop experience before they will engage him. I want to make this point perfectly clear because I believe there are some splendid shop executives who consider efficiency engineering as more of a fad than as an essential part of a good industrial organization. The fact that efficiency engineers have been aped by incompetent impostors should prove that the really competent men have been very successful or others would not have aspired to be like them.

The lot of an efficiency engineer is not always an easy one, sometimes shop executives consider that he is interfering with their work, and as they have been in the shop perhaps for years they think they should know more than he does, and they don't need his help, and others seem to thing that he is trying to show them up, or maybe get their job. Now this is all wrong. He is free to study special problems throughout the shop, while an executive has numerous duties to perform and rarely has time to concentrate long on any one point, and then an efficiency engineer specializes on his work and constantly going through different shops his knowledge is very broadened, more so than the man confined to one shop manufacturing one line of goods or machines. By careful planning and layout wosrk routing of work through the shop, time and motion study, etc., an efficiency enginer can, with the cooperation of the men and shop executives, greatly increase the average shop production (under some conditions as much as 200 per cent.) without undue strain on men or machines.

Theodore E. Butler, London, England, manager for the Whitman & Barnes Mfg. Co., Akron, Ohio, for the past twenty years, recently visited the twist drill and reamer plant at Akron, Ohio, and the wrench and drop forge factory at Chicago, Ill. It was just five years ago that he last paid a visit to the W. & B. factories, having returned to England when the nations were entering the world war. Mr. Butler's conduction of the W. & B. interests abroad during the conflict has been highly commended by the company. Mr. Butler is in his seventieth year, but age has not left its mark upon him and he is the same genial, well-preserved gentleman who twenty years ago succeeded the late H. D. Dennis at London. While at Akron the company tendered him a dinner, where were gathered together a number of his old-time friends and representatives of the company.

Jig Tools and Special Machines

An Article Showing Their Relation to the Production of Standardized Parts

By H. C. ARMITAGE*

THE use of jigs and special tools has grown enormously in the last ten years, and there are very few engineers who have not used jigs, in some degree or form, in the production of their work. Special tools now occupy such a very large place in repetition work that the author makes no apology for presenting a paper on some aspects of them which may be of general interest.

There are many advantages to be derived by the use of jigs and tools, but in this country they have not yet been developed nearly to the extent that is possible. The broad advantages are as follows:

1. Interchangeability of the work. This benefit does not necessarily follow from the use of special tools, yet they help very materially towards it, and interchangeable production cannot be obtained without them.

2. Cheapening of production.

3. The ability to use a less skilled class of labor on manufacturing and production work.

4. The elimination of fitting and the introduction of assembling methods.

What disadvantages there are can be summed up briefly in the following:

1. The use of jigs does not encourage individual ingenuity, skill, or resources, except in a small section of the labor employed.

2. The advantageous use of specialized tool methods requires considerable organization. This is not liked by the British employee, but he complains very much if there is a lack of system.

3. Unless the jigs and tools are designed rightly, the results are likely to be as disastrous as if they were not made correctly.

4. It is usually difficult to synchronize the tool manufacture with the desired production of manufactured parts, due chiefly to the fluctuating requirements of the producing departments.

The ideal system which a firm should cultivate is simply to become staffed and arranged in such a way that full use can be made easily and quickly of a correct relationship between the planning department, the progress department, the tool office and tool-room. If there be a solid foundation upon which to build a good system, the works can expand rapidly with increased business, and in addition there will be little difficulty in changing over from one type of manufacture to another of similar construction.

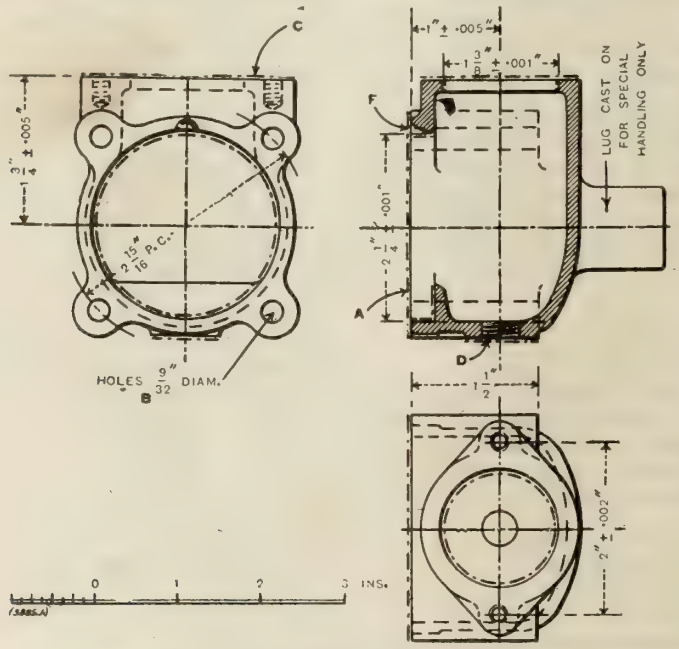


FIG. 1—COMPONENT OF AERO ENGINE.

The effect of the war upon production conditions in workshops has been stupendous. Many firms had laid out their works more or less efficiently for the manufacture of some specialty in comparatively small quantities, and had arrived at accurate manufacture only by "trial and error" methods. In some cases such firms had not altered methods of manufacture for many years, unless forced by competition. In this connection, it is interesting to study the types of works organizations in existence in this country at the outbreak of war.

Development of Engineering Manufacturing Methods

The commencement of the steam engine era was about a century ago. This, together with the railway boom, developed our oldest engineering concerns. At their commencement there was no mild steel, and the process of cutting metals was second in popularity to the forging, casting, and rolling processes, owing to the latter being much cheaper and easier to work; and this was probably due to the non-development of machine tools at that time. Machine work was largely a matter of sheet templates; drawings were almost unknown except as works of art, and the caliper was the recognized measuring instrument. Swiftly following this period came the general development of power-driven machines, and the rapid growth of engineering manufacturing works demanded more and better machine tools. The machine tool industry become firmly fixed, and almost about this time the Springfield Co. of America started the use of independent gauging. Then electrical machinery came into use, and in its wake numbers of new electrical manufacturing concerns were instituted all over the country. These firms in their early days were able to use mild steel, the telephone, electric driving and lighting, turret lathes, and early automatic machines; and, the author believes, were amongst the first to develop the use of drilling jigs, on large size work chiefly owing to electrical machines being more easy of standardization than previous engineering products.

Prior to this date the "toolmaker" was perhaps a man with a bench in the machine shop, whose sole duty was to repair chucks, "peg" broken gears, etc., and any machining he required was done in the general shop.

The electrical machine, however, necessitated the extensive manufacture of press tools, and gradually the tool-room idea was developed, namely, to make tools entirely without interference with production work. Unfortunately, like the pattern shop, the tool-room appeared to have a non-productive aspect, because the goods it made were not directly saleable. The then works managers, therefore, would generally start reducing costs in that department when any criticism of works expenses arose.

The importance of the tool-rooms grew but slowly until the introduction of high-speed steel, which again revolutionized shop practice. Then followed a rapid extension of the "closed-in" department, due probably to the fact that high-speed steel could not be worked upon by all. The milling machine and its cutters were developed, any cut gearing had to be used in machine tools. The grinding requirements of the cutters gradually evolved the tool store, and this, combined with the increasing use of jigs and the increasing importance of the tool-room,

*Paper read before the Institution of Mechanical Engineering.

made a tool-drawing office absolutely essential. At about this date, say 1902, the automobile and petrol engine made its appearance, and again numerous new factories sprang up to take the fresh field of production. Gear hobbing and planing methods, the use of alloy and case-hardening steels, with the consequent development of the grinding machine, rapidly followed.

The grinding machine at once set a new standard of accuracy on all machine tools. With the exception of one pioneer firm in this country, which developed an entirely new line of machine tools, British machine tool makers did not realize that a new era of production had set in, and in the new automobile factories scarcely any machine tools, except of American origin, were to be found. In these new works it soon became possible to work to required systems of limits, but at the outbreak of war only a small percentage of general engineering firms knew how to handle work containing a large number of parts which had to be produced to give limits of accuracy.

Effect of War Conditions on Engineering Practice

The period of the war has seen another rapid development of engineering progress, namely, the manufacture of aero engines and planes, and they in their turn will exert an enormous effect upon the manufacturing methods even of the automobile firms.

The great problem ahead now is to settle the relationships and values between skilled, semi-skilled, and unskilled labor. There is every reason to believe that skilled workers will realize that their welfare eventually depends upon the maximum of production being obtained. Granted this condition, attained by means of a bonus system, or otherwise, successful production then depends upon two things only—organization and special tools. The two go together, and one is useless without the other. Combine the two and there is at once obtained the only desirable features of what America calls "scientific management."

General Works Organization

The centralization of work, with consequent grouping of similar machines, was considered to be the ideal engineering practice a few years ago, but the practice is now deservedly losing much of its favor, where the finished product contains a large number of detail parts. Its chief advantages can only be obtained by the formation of a centralized system of arranging the work on every machine independently of the various foremen. A large workshop should be an aggregation of small shops or sections, in the author's opinion, which can preferably be separated by some form of barrier, but it is essential they should be under a centralized progress system and centralized management. In this way, taking as an example a works producing petrol engines, there would be a crank shaft section, a cylinder section, a crank case section, and each would have its own complete quota of necessary machine tools and its own bonus on output. To start upon a new type of engine, under these conditions, would not be a great problem, as every part on a new design is more or less similar to its predecessors.

There is yet a very much wider field for the semi-specialized manufacturing machine tool. As an example, there is not a lathe for sale which it is not possible radically to alter and improve, which is designed solely for motor car or aeroplane engine crank shafts. It still seems necessary for every concern to design and build a large proportion of its own manufacturing machine tools to maintain its progress and commercial supremacy. The professional machine tool maker can use very few specialized tools in his manufacturing, and a batch of twelve similar machines is as near as he usually gets to repetition work. It is, however, rather a hopeful sign that many machine tool firms are now specializing in particular lines and not making everything that offers itself to them, as in the past.

Degrees of Use of Special Tools

It is a debatable point to know to what extent components should be "jigged and tooled" according to the quantity required "off." There are several firms in this country who lay out and manufacture a complete set of tools for so small a number of pieces as five. This is a small quantity, and depends upon the organization and manufacturing methods employed by the concerns. In the author's opinion, it is more a question of time that should decide the matter; that is to say, if the component can be machined by special tools and unskilled labor in very much less time than with standard fixings, the special tools should certainly be made even if the total cost, including the tool making, comes higher than the mathematically calculated saving. There will be other things to consider, for instance, the time occupied by the shop administration in rigging up temporary tools, the chances of error and scrap, or the possibility of a repeat order. Furthermore, the special tools themselves will have a certain plant value.

Formulae of Output to Pay for Tools

Some formulae, and the mode of procedure, in connection with the foregoing remarks, may be of interest, and are given below:

1. Lay out operations for the piece, using existing tools.
2. Lay out operations for the piece, using special tools.
3. Ascertain definitely what is the total number of parts required.
4. Estimate the cost of machining, using existing tools.
5. Estimate the cost of the special tools required.
6. Estimate the cost of machining with the special tools. In doing this, points peculiar to the establishment should be observed, and the various fixed charges put on each. This is important as the tool-room charge and the manufacturing working cost load is usually different. It should also be borne in mind that with special tools, cheaper labor can be used.

If E equals cost of the component, using existing tackle.

If S equals cost of the component, using special tools.

If T equals cost of the special tools.

If N equals number of parts to be made.

Then, excluding items of expediency, the least number of components required to cover the cost of the tools will be given by:

$$N = \frac{19\,T}{20\,(E-S)}$$

The formula allows for the plant or metal value of the tools (assuming they are never used again for the component), as 5 per cent. of the original cost, which is perhaps rather high.

Similarly, the maximum that may be spent on special tools for "N" components is given by:

$$T = \frac{20\,N\,(E-S)}{19}$$

To give an idea how the formulae work out, they have been applied to a small aero engine component, Fig. 1, above. There is comparatively little machining upon it, and assuming that the casting is to be tooled without special tools, the operations will be as in Table I. To grip the work in a chuck, it will be necessary to cast a small spigot on it for holding purposes.

It is to be noted that the slowest operation is that of setting the angle plate to the correct dimension, 1 in.—0.005 in., but if there were five or six pieces to run through consecutively, a considerable saving in time would result, as the machine could remain set up.

Employing jigs, but no special reamers or other tools, the job would work out as in Table II on this page.

The usual practice in most of the English automobile works at present is to make special tools for quantities of at least 25 components, as the advantages in practice outweigh the difference in cost.

Financial Aspects of Manufacturing Improvements

There is another item worth notice, which applies only to a component which is in continuous manufacture. Let it be supposed that by the methods already in use, each piece costs 100d. to manufacture, and that by designing certain tools it were possible to reduce the cost to 95d. What amount would be justified in plant expenditure in order to effect this saving? The gain obviously would be 5 per cent. (apart from a possible increase in selling value and decrease in percentage of scrap).

TABLE I.

Operation.	Time Allowed. hr.	min.	Rate. per hour. s.	d.	Cost. s.	d.
1. Preliminary marking off	0	10	1	6	0	3
2. Bore and face (hold in chuck by special spigot) (A)	0	30	1	2	0	7
3. Mark out and drill four holes in front (B)	1	0	1	2	1	2
4. Set up on an angle plate to bore and face end (C)	2	0	1	2	2	4
5. Mark out for drilling 3-16 in. holes on face (C)	0	30	1	6	0	9
6. Drill and tap 3-16 in. holes on face (C)	0	30	1	2	0	7
7. Drill face and tap bottom hole (D)	0	20	1	6	0	6
8. Cut off turning spigot	0	17	1	2	0	4
9. Hand finish where spigot is cut off	0	10	1	0	0	2
10. File notch (F)	0	20	1	6	0	6
	5	47			7	2

If the component is to be manufactured indefinitely, the value of the extra plant expenditure allowable may be taken at 50d. per component per annum, since the increase of capital to produce 5d. extra dividend would have been 100d. This, therefore, leaves a margin of 2½ per cent, and if the output had been 100 per week only, this would give a safe expenditure of £1,080.

Where a component would last, say six months only, the balance between the saving and the total output must be reckoned. Following the previous example, under the given output of 100 per week and the saving of 5d. per component, the expenditure thus allowed to improve methods would have been only £54, but since a lower cost of manufacture implies a proportional reduction in the time occupied, a further 5 per cent. of the 26 weeks' output value may be added for this, giving a total of £108.

This is the manner in which the plant cost of jigs and tools should be considered, but there is no special machine tool which is likely to be designed for cost reduction purposes (and this is a most important consideration), which would not be easily adaptable to alterations in the design of components. Take the matter of tool expenditure in an even larger aspect. If a car or aeroplane could be produced to sell at £500 by using existing methods, then possibly £550 could be obtained for the better quality that would result if special machine tools were used and interchangeability obtained; and certainly the manufacturing cost could be reduced by £50 at least. This gives a total of £100 on every £500, or 20 per cent. If the original capital of the company were £500,000, then they would be quite justified in spending a further 15 per cent. of their original capital on special plant to attain this object—in this case, a sum of £75,000. Unfortunately, the plant and engineering side of the question is not the only one to count, as there would have to be a guarantee that the works could be organized to make use of the special machines to the fullest extent.

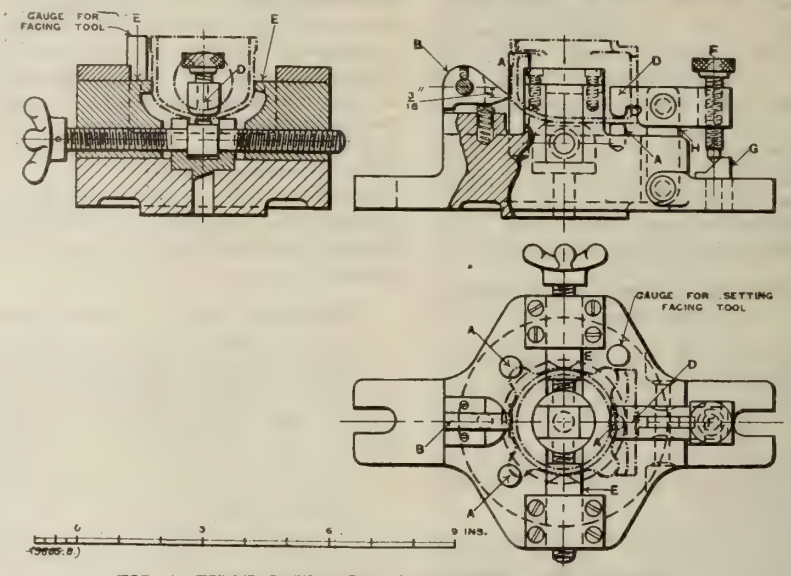


FIG. 2—FIRST OPERATION JIG BORING AND FACING.

TABLE II

Operation.	Jigs and Gauges	Cost. £	s.	Time and Rate.	Cost of Labor. d.
1 Set in jig ... Bore and face at (A)	Jig	10	0	10 min. at 8*d*.	1.33
	Combined depth and plug gauge ..	0	15		
2 Set in jig ... Bore and face at (C). Revolve jig and face at (D)..	Jig	8	10	10 min. at 8*d*.	1.33
	Plug gauge ...	0	10		
3 Drill all holes. Tap holes where required	Drill jig	12	0	15 min. at 6*d*.	1.5
4 Mill slot (F).	Mill jig	4	0	2 min. at 6*d*.	0.2
	Total cost of tools	35	15	Machining cost . . .	4.36

From these two sets of figures we get:—

Cost of component for machining, using existing tackle ..... E = 7*s*. 2*d*.

Cost of component for machining, using special tools and gauges S = 4.36*d*.

Cost of special tools... T = 35*l*. 15*s*.

The number of components to cover the cost of tools is equal to:—

$$\frac{19 \times 35l.\ 15\ s.}{20\ (81.64)} = 100.$$

Jigs for Aero-Engine Component

It is now proposed to give a description of the tools for the small component previously mentioned, Fig. 1. The boring and facing jig is shown in Fig. 2, page 403. The machining which will be performed in this tool will be used in locating all the subsequent operations, and is therefore the most important. The work rests on three pegs A, two of which take support under the bolt bosses, and one at the back of the casting. To make certain that the bored hole will be central with the outside, an equalizer E is employed, which consists of jaws moved by a right and left hand screw. These will grip the work and be sufficient to drive the component against the cut. To make certain that the work is set down properly upon the pegs, a special stop B is employed, of which the point of contact is 3-16 inch below the centre line of its pin, and the more horizontal pressure there is against it, the more the component will be thrust on to the seating pegs. The clamp D fills a double purpose by the action of one set screw F. When this is turned round it moves down the taper of the hardened bevel block G, and the clamp being held pivotally upon a link H, it presses both forward and downwards.

With unskilled and female labor it is worth almost any expense in a tool to

save the tightening of several screws in setting work. If a job can be put in a jig and all the necessary locations properly seated, and clamping achieved by one action, the tool is quite "fool-proof." To show how multiplicity of clamping operations can be avoided, the jig, Fig. 3, page 403, is more interesting, and although it is complex, the work cannot be put in wrongly. The piece is located from the previous operation on spigot A, and it is now necessary to face and bore the hole in the top of the component. The jig is practically an angle-plate set positively in two directions, but the component must yet be located in such a way that the machining is square with the general form of the casting. The clamp B with a floating fork C is hinged round the stud D, and clamped by the nut on stud E. On studs D and E is a bevelled recess which slides on longitudinal studs F, and these in turn are bevelled against the equalizing studs. When the nut is tightened, the hardened pins slide against one another and the work is equalized and clamped at one operation. When the front face has been bored and machined, the whole fixture is indexed round 180 deg. by means of index pin J, and the back is then faced and drilled without disturbing the component.

Multiple-Operation Machine

The multiple-operation machine is usually very expensive in first cost. It also requires highly skilled setting up, and is often dependent on one particular man, who has specialized the machine. The cost of the set-up, and the wear and tear of the tools, will be expensive. Multiple operations lengthen out the actual time of handlings per piece, and great care and judgment must be given to the chucking of the work. Usually when several operations have to be performed upon a particular component there is very little space left for gripping, as the area to be tooled is large, and necessitates a very firm grip being taken on a small area, thereby very likely seriously deforming the work. It is sometimes possible to have two multiple machines worked by one operator, and there is a certainty of accuracy between the hole and periphery of the job, which cannot be otherwise guaranteed.

Single-Operation Machines

The chief advantages appear to lie with the simple machine, that is to say, a machine which does the very minimum amount of work and spends the least time upon the individual component. In a large production there is a great advantage to be obtained by making as many operations, and employing the maximum of machines upon the work as is possible. This practice certainly necessitates extra handling, but the gain in time is enormous. The speed with which a job can be put through is entirely regulated by the length of time of its longest operation. It is a point worthy of note that in arranging the work for a shop, there is a great disadvantage in basing the production upon the time of the longest operation, compared to basing production on the time occupied by the shortest operation. Taking a week of 50 hours, and a longest operation of 15 minutes, it is obvious that the maximum production of the components will be 200 per week, and limited by this machine, no matter how many other types or quantities of machines there are in the place. Every other machine which is engaged on other operations will have to be idle throughout a large portion of that week, or set up on other work. For instance, an operation which occupies 7½ minutes would have 25 hours unoccupied. The policy of setting up and breaking down machine tools which have been set up for the particular job is not to be recommended, although necessity sometimes forces the practice. On the other hand, consider the production from the time of the shortest operation. Suppose that it is 2 minutes, then the 2-minute machine would be kept fully occupied the whole of the week, and in order to cope with this production of $30 \times 50 = 1{,}500$ pieces, two machines would be required for an operation which occupied 4 minutes, and eight machines would be required for an operation which occupied 16 minutes. It is therefore very much to the advantage of the work in every way to be able to work upon the basis of one machine for the shortest operation, and balance up from that; there are then no idle machines. It will be further observed from the foregoing remarks that if the 16-minute operation can be split up into two parts which occupy 10 minutes each, there would be a very decided gain in production, and it would be far more advantageous than installing two machines of the 16-minute operation, because it is reasonable to assume that the 10-minute operation will be only five-eighths as complicated. The simpler and shorter the operation, the cheaper is the labor which can be used, and the machine will require very much less setting up, and very much less skilled attention. Output therefore depends upon the time of the longest operation, and if this can be reduced there will be an increase of production.

It will be found in the majority of cases that simple operations are very readily adaptable to existing machine tools and plant, which are often widely different in their original purpose from that required.

In a very large subdivision of operations, consecutive gauging becomes a necessary item, and this should be done immediately after every operation. It is essential that every piece should be gauged as it comes off the machines, even if it has to be moved to a special viewing room, before a large amount of scrap work can be produced.

Tools Scheme for Various Outputs

It is now proposed to show the different ways in which a component may be equipped with special tools, at the same time describing the various jigs in detail, showing the methods to be used. An auto engine connecting rod has been taken as the example. The author would much prefer to have used an aero engine crank shaft for this purpose, but the number of operations and the consequent descriptive matter would have been too great altogether for the scope of the paper. The connecting rod, however, is now of nearly as standardized a form as the crank shaft, but unfortunately for the purpose in view it is a very straightforward piece of work.

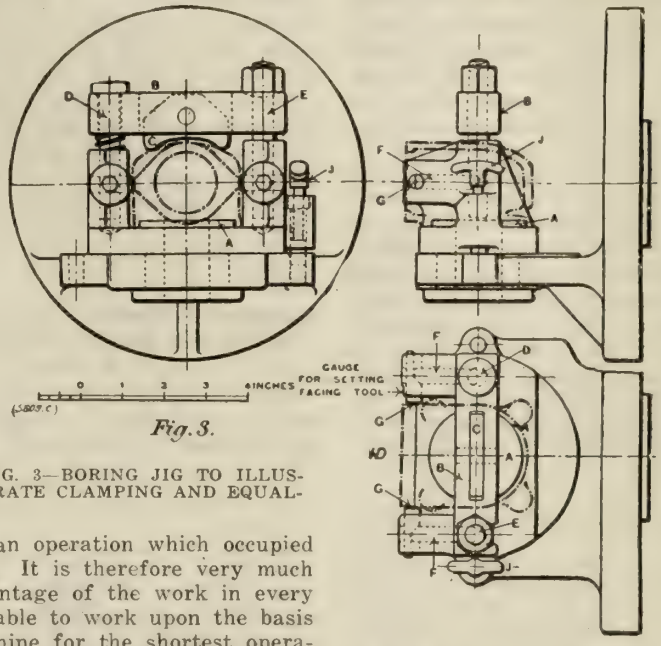


Fig. 3.

FIG. 3—BORING JIG TO ILLUSTRATE CLAMPING AND EQUAL-

The considerations of the tools required for the manufacture of this component are divided under three headings.

Scheme 1.—A lay-out suitable for a contract of, say, 500 to 2,500 connecting rods.

Scheme 2.—A lay-out suitable for contract of, say, 2,500 to 50,000 connecting rods.

Scheme 3.—A lay-out suitable for the permanent manufacture of the piece, or rather, a practically unlimited output in rate of manufacture and total quantity.

In each case the output will be estimated on the basis of the shortest operation, to obtain the most economical results, as mentioned previously in the paper.

To be continued

WELDING AND CUTTING

Repairs to Boilers and Engines by Welding

An Article on the Welding of Boilers and Engines, Being the Observations of E. G. Hiller at the April Meeting of the Institution of Mechanical Engineers

PROCESSES of autogenous welding had been much used and much experimented with in recent years, both in the form of acetylene welding and electric welding. Such welds would appear to consist of the formation of a fused mass which adhered to both of the surfaces and thus connected them, and the structure of which was more like a soldered joint than an old-fashioned smith's weld. The old term of "weld" generally conveyed that two pieces of metal were raised to nearly a white heat and then hammered together, resulting in practically identical structure at the junction. This condition did not exist with the kinds of welding under discussion, and there might be, with these fused welds at any rate, a change in quality of metal at the junction and possibly a hardening or deterioration.

Welds in New Work and Repairs

Such "fused welds" were of importance and utility, both in relation to new structures and old ones. In new boilers, for instance, it might be useful in some cases for replacing riveted joints, and in old boilers as a means of effecting repair. In engines it might be adopted in the construction of various new parts, and in engine repairs in welding up cracks and similar defects. When used successfully in this way, it has considerable advantages, because it would generally enable the repair to be carried out in much less time and at much less cost than would be involved in casting, machining, and fitting a new part. From this point of view, the question of the adoption of welding had been of importance to the National Boiler and General Insurance Co., particularly in those departments dealing with the repairs to engines.

Advantages of Welding

If broken and cracked cast-iron castings could be satisfactorily welded up, this would be a great advantage from the point of view of the user. With a company, for such welding would generally be much less expensive than providing a new casting, and would also enable the plant to be repaired and set to work in much less time, which generally would be of great advantage from the point of view of the user. With a view to making progress in this particular direction, a considerable number of experiments had been made in repairing under the direction of the company's engineers, and brief details of a few of these welding repairs, both for boilers and engines, were given in the following notes:

Examples of Welding Repairs for Steam Boilers and Similar Structures (Fig. 1, A, B, and C)

(A) Owing to leakage from the bottom of the combustion chamber, wasting as indicated on the sketch took place, corroding away the rivet heads and the overlap. The defective rivets were taken out and replaced, and the whole of the wasted part was successfully built up by the electric welding process. Successful in working.

(B) Broad grooving developed in the root of one of the flanged seams of the flue-tube of a Lancashire boiler, extending about 18 inches round and fracturing through for some distance. The fractured part was cut out by a "V" cut, and the whole of the wasted area afterwards built up to the original form. Successful in working.

(C) A number of the flanged seams of the flue-tube of a Lancashire boiler were severely wasted, as shown on the sketch. These were built up by electric welding and the parts dressed off by pneumatic hammers, and a smooth level surface left. Successful in working.

Other Examples of Welding (Fig. 2, D to K)

(D) Wrought-steel hot-water boiler. Fractured at the fire-hole as indicated. Welded by oxy-acetylene. Repair failed.

(E) Original weld of chimney-tube of a vertical steam-boiler failed; leakage through the weld. Attempted to repair by acetylene welding, but failed. Reasons given for failure: original weld bad; plate burnt; metal would not mix with the soft iron used in welding. Position difficult of access without cutting opening in the shell.

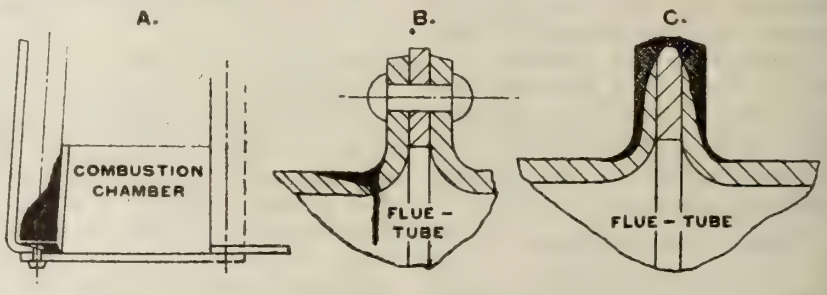


FIG. 1—A, B AND C.

(F) Fracture developed in the chimney-tube as indicated on the sketch. Two attempts were made to weld this by oxy-acetylene, but they failed, and a new chimney-tube had to be fitted.

(G) Wasted at overlap bottom of combustion chamber. Parts built up by oxy-acetylene welding. On completion all appeared satisfactory, and the boiler was worked for a period of three months. On entering the combustion chamber it was found that the seam was again leaking, and on attempt to caulk the deposited metal broke off in layers quite freely. It was decided to remove this down entirely to the original metal, and afterwards to build up the parts by

electric welding, and this was done and a satisfactory job made.

(H) The first two rings of each furnace-tube of a Lancashire boiler wasted on the fire side at each side of the bar level, as indicated on the sketch. It was decided to build up the wasted parts on the fire side by the oxy-acetylene welding process. On completion of the process the boiler was hydraulically tested, but leakage occurred through the welded portion. On examining it on the water side, it was found that the plate had been drawn in, as indicated, during the operation of building up. Further repair was afterwards effected by applying metal at the water side, and this made a satisfactory job.

(I) Leakage showed itself through a fracture, as indicated on the sketch, between two cap-holes in a wrought-steel superheater box. The defect was electrically welded. On steam being got up, the part leaked freely, and it was afterwards suggested that this was due to inefficient work by the operator. The deposited metal was cut out and the groove itself refilled by the same process, and it appears to have been since satisfactory.

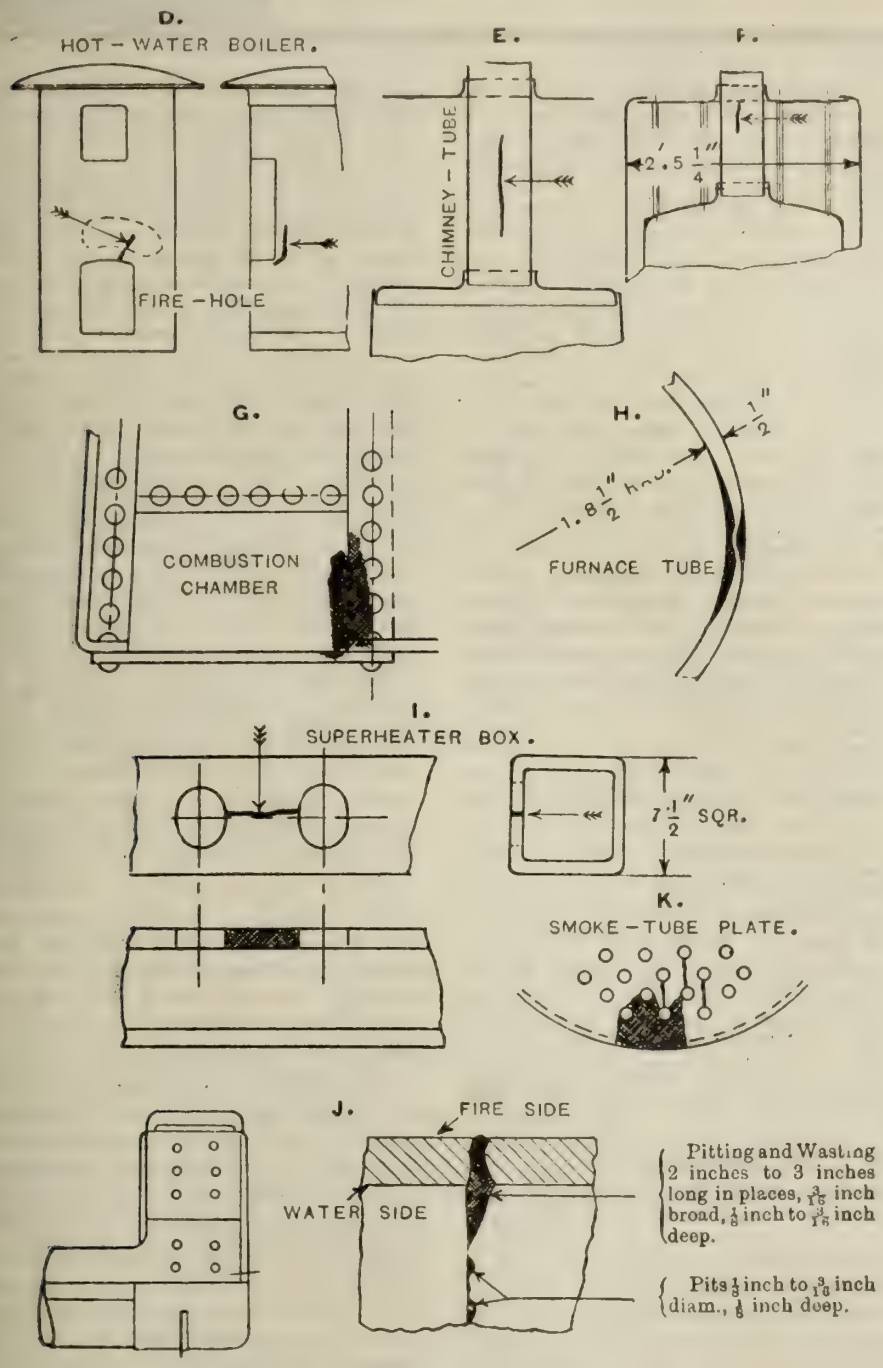


FIG. 2—EXAMPLES OF WELDING.

(J) In this case a repair had been effected by welding in, by the oxy-acetylene process, a patch on the bottom of each combustion chamber, extending the full width of the combustion chamber, and about 3 feet circumferentially. The bottom of the back end-plate of the combustion chamber also had a piece welded in. After about two years' work the bottom of the right combustion chamber fractured, due to local overheating during welding. The plate was found to be brittle, and wasting as indicated on the sketch was noted at the welded joints.

(K) There was wasting, as indicated, at the bottom of the smoke-box tube plate of a portable multitubular locomotive boiler. The wasting was built up by electric welding. When welding was being carried out three fractures occurred between tube-holes in the vicinity as shown. These fractures were also welded up and the repairs appear to have been satisfactory.

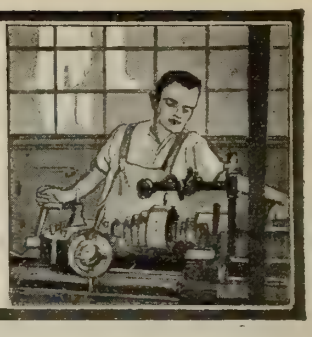
NOMOGRAPHY

Nomography probably deserves to be better known and more widely used than it is. This is a popular account of this art of drawing up laws in proper form. As a general rule nomographs can be easily constructed to give the solution of all formulae, and they are a device of great importance to the engineer of to-day, assisting in the calculations necessary with more rapidity than a slide rule, and without the possibility of the introduction of errors which exist in the use of that instrument. It is equally true that nomography can be an aid to efficiency in the drawing office and factory. With a view to make the plotting of nomographs more easy, have been devised simple adjustable attachments to a slide rule. The first of these is a celluloid protection, with ruled cross lines, one of which is carried across the face of the scale, as in ordinary slide rule cursor, thus enabling it to be shifted to define an exact position on the scale. The other slide has a pivoted arm, capable of being rotated around its pivoted centre, and yet always remains as a radial line through it and be fixed in any position desired. With the improved slide rule the art of nomography should be made much more easy to the engineer and draughtsman.

FIXING LATHES AND MACHINE TOOLS

While everyone admits that tools should be fixed level and firmly, it does not follow that the fixing is all that can be desired, because the time element in the work is too often neglected, especially in the rush of fitting up new shops. Probably the best method of quick fixing is that of using thick wide timbers like railway sleepers, these being on a sound, firm bed and run in with equal parts of Portland cement and sand after being levelled up; but better than this, where time can be allowed, would be beds of concrete of sufficient strength to carry the weight of the machine tool on the existing soil. If such cement concrete beds are reinforced with expanded steel lathing, so much the better, but in all cases the holding down bolts should be put in while making the beds. Small inequalities can be made good after fixing the equal parts of cement and sand run under the machine base, and a firm, level bearing secured.

WHAT OUR READERS THINK AND DO

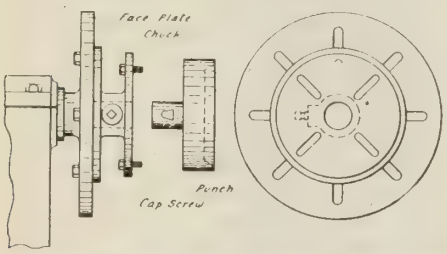


SIMPLE PUNCH CHUCK

By S. Simpson

IN finishing or refitting of punches for sheet metal work, difficulty is frequently experienced in holding them while the operations are being performed. It is not convenient to hold the shank in a four-jaw chuck, and when a solid chuck is used it is often found that the punch will not run true. To overcome this trouble the chuck shown in the accompanying sketch was designed. It is generally found that when holding the shank by the ordinary set-screw the punch will be twisted a little, and it becomes a difficult task to obtain accurate results.

The flange on this chuck has four small slots through which the punch can



GENERAL VIEW OF SPECIAL CHUCK FOR PUNCHES.

be firmly bolted to a true surface without the use of the set-screw. In using the set-screw either with or without the flanged chuck, the shank should be cut as shown, so that pressure of the screw will force the shoulder of the punch back against the face of the chuck.

THE PASSING OF INGENUITY

It was once said of Sheffield that the city was more notable for its industry than its ingenuity. The phrase is one that bites into the mind. Is it possible that a century hence a new race of engineers will use it once more, not only of Sheffield, not only of the United Kingdom, but of all Europe and America as well? We see justification for that reproach—for reproach it is—growing daily greater with every step that leads us nearer to the very things that made Sheffield famous in her day and promised in the end to be her undoing. Only now in her staple trade is she beginning to throw off the lethargy of industry, only now to revive, to re-welcome, imagination and ingenuity. Nothing, in the long run, fails like success. Sheffield brought the manufacture of files and cutlery to the highest position that could be reached by manual methods. She standardized and she specialized and she did all the things that mechanical engineers are now being urged to do in other industries, and the result was magnificent, for a time. Then, when industry had effected its complete mastery of ingenuity, the danger of success began to show itself. Sheffield could not escape from the toils of tradition, she could not throw off the bonds of her standard methods, she could not divert workmen from one way of doing things to another way. We say she could not. That is not quite fair, for she is, in fact, effecting a change, but with infinite difficulty, with pain and tribulation. Ingenuity is coming back to Sheffield. She is winning it back. Will it be recovered by others when their time of trial comes?

It is impossible to change the trend of twentieth century mechanical engineering. It would be bad business to attempt to do so. We are committed irrevocably to mass production, to specialization, to rigs and jigs and standards, to gigantic industrial "combines," to the supersession of individual merit and the apotheosis of mass merit; skill is being transferred from the man to the machine; knowledge is being replaced by the schedule; organization by rule is taking the place of organization by mother-wit; Westminster conference regulations and Whitley council rulings are displacing the power of personality, and welfare systems are regulating bowels of compassion with a card index. We say this flood cannot be stemmed, but let us at least know whither it is bearing us. Let us at least recognize that borne on it mechanical engineering will return whence it was lifted by the old masters, by Newcomen, Smeaton, Watt, Stephenson, Trevithick, Whitworth, Armstrong, Maudslay, Penn and many another whose ingenuity raised it from a craft to an art. Can there be any but one outcome to the methods which are now commended by the most advanced thinkers, by the Cecil Waltons who propose that from youth to age the mechanic should do but one thing, be it no more than the screwing of three-eighth bolts of the gauging of taper pins; or the less advanced thinkers who are content with the proposition that whole factories should be given up to one produce, turning out, year after year, nothing but three-inch piston rings, aeroplane connecting rods, cylinder covers or what-not, all to be assembled in due course on an endless moving platform in a factory which does nothing but erection? Many curious prospects are opened by the vision of these later-day works, but none more striking than the obvious fact that technical education of many will be uncalled for. For of what service will it be? What will it benefit a man—we cannot call him an engineer—to know the stresses in a crankshaft when he can procure nothing but standardized patterns, or to be knowledgeable in the matter of armatures when he buys them off the trays like penny buns? Why waste his time on thermodynamics when modifications of engine design are made impossible by the fact that a million or two sterling has been invested in jigs and rigs, and to change them would be industrially uneconomical? The war showed us that to such perfection had we brought machines that even wholly unskilled labor could do highly skilled work. It showed us also that untrained intelligence could fill the duties, within specialized limits, of trained intelligence. But whilst it carried us forward in four years a step that might have taken forty, it has left us with such a deal of momentum that the wheel it started whirling continues to carry us forward on its rim with barely abated velocity. In another fifty years these things we now foresee dimly will be commonplaces of industry. Brought up in standard creches on standard feeding bottles with standard milk, we shall pass through a course of standard education, be dressed in standard clothes, carried in standard conveyances, live in standard dwellings, dine off standard china, behave like standard citizens all our days, and in due course be carried in standard coffins in a standard hearse to a standard crematorium.

The prospect of mechanical engineering made perfect in industry and robbed if the disturbing element of ingenuity casts a gloom upon the real mechanical engineer, but it has some redeeming features. The acceleration of output will be so considerable that even the six-hour day will be found unnecessarily long, and men will thus have leisure to ponder upon the happier days of the past when their distant forbears might exercise their creative talents—"it is undeniable," wrote Matthew Arnold, "that the exercise of a creative power, that a free creative activity, is the highest function of man; it is proved to be so by man finding in it his true happiness"—to idle with their collections of curios of a time when there was still some variety in the world; to pore upon old books with their descriptions of varied mechanisms or to discuss the nuances of the word "ingenuity" marked with an asterisk in dictionaries of the time to show that it was obsolete. Just as in the present day the twisted legs of

a Jacobean table, carved by hand, are more esteemed than those made by the thousand, like rifle stocks, on a copying lathe, so in those days men will value the things that are not to standard, things that show the personality of some ingenious mechanical engineer of an earlier day, more than the standard things to which progress has brought them. Thank Heaven, much water must flow under the bridge before that time comes, and for us mechanical engineers of the present there is plenty of work in the designing of ingenious machines and methods for the murder of ingenuity in our descendants. Much as we may regret its effects, we are forced to admit that the redemption of trade can be secured only by mass production.

LIGHTING FIXTURES FOR DRAUGHTSMEN

By S. H. PHILLIPS

It is a well-known fact that in order to secure maximum efficiency from the humble draftsman, you must give him the best of light conditions, natural or artificial, as the case may be. The writer, however, leaves the question of natural lighting entirely to one side, for, after all, such a matter depends entirely on the forethought spent in the drawing office and its location.

The matter of artificial light, however, is one seldom gone into with the care and detail which it deserves, so the writer submits to the readers a fixture used on the drawing board with good success.

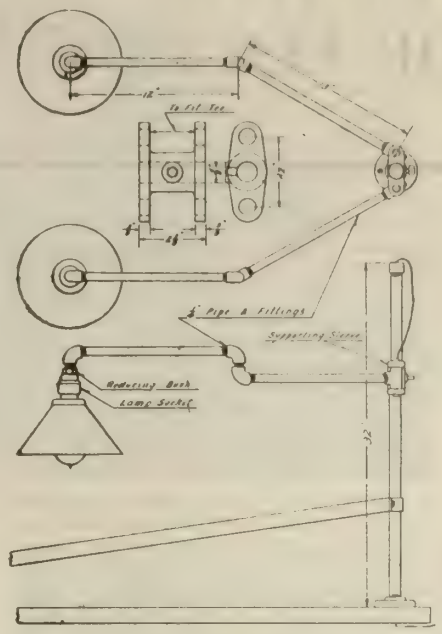
The illustration is practically self explanatory, but a few details will not be amiss.

The bracket is made of ¼ in. and ½ in. pipe and standard pipe fittings, with the exception of the cast iron supporting sleeve, of which detailed dimensions are given. The pipe flange used as a base is drilled and countersunk for four wood screws, and should be a standard ¾ in. pipe flange, bushed to suit, not ½ in. as shown. If the construction of the drawing desk is not the same as shown in the drawing, the base could be supported on a bracket fastened to the desk or in some other way. The strap shown fastening the standard to the drawing board is in most cases undesirable, as it prevents free movement of the board, and would interfere with the cords of the parallel attachment.

The lamp cords are standard No. 18, and lead to the adjacent wall, a separable attachment plug being provided on the main opposite each desk. The cords must, of course, be threaded through the pipe, elbows, etc., as they are being put together, and it will be found that the fixture can then be made up in very short order. The fixture should be given a coat of some suitably colored paint.

40 watt lamps are recommended as giving ample light, plain white tin shades being used. Key sockets should be provided.

The adjustability and flexibility combined with low cost of this fixture has been a source of satisfaction in the engineering department of the Canadian Ingersoll-Rand Co., Ltd., of this



GENERAL VIEW OF THE LIGHTING ATTACHMENT.

city, where they have been used for some time, each draftsman suiting his own tastes as to height and position of the lights, under various conditions.

AN ANSWER TO OUR EASY MONEY ARTICLES

By HARRISON JENKINS.

In your April 24th and May 8th issues the writer noticed two articles on the subject of easy money. The first of these seemed to me to be asking the question: "Is there such a thing as easy money?" and answering the very same question in the affirmative. The second was a sort of follow-up story, at which one had to smile to read, how that sometimes easy money is a troublesome affair after all is said and done. But the writer's intention is not merely to speak of these articles, but rather to comment on the effect they have had on him personally.

He has made me think that perhaps I have been turning down real easy money, for with my present mechanical experience I should be able to prepare for your paper some articles of practical value to readers in general. So much have these talks impressed me that I am at present preparing an article which I shall later send for your approval.

I was just wondering if this letter of mine would be suitable for your use, to show that at least one reader has answered your challenge (for so I call the two articles spoken of), and intends to see if he cannot collar some of that easy money spoken of.

Editor's Note:—We believe this letter should be printed in order to get other readers, likewise, interested.

BRITISH AUTOMATIC TELEPHONES

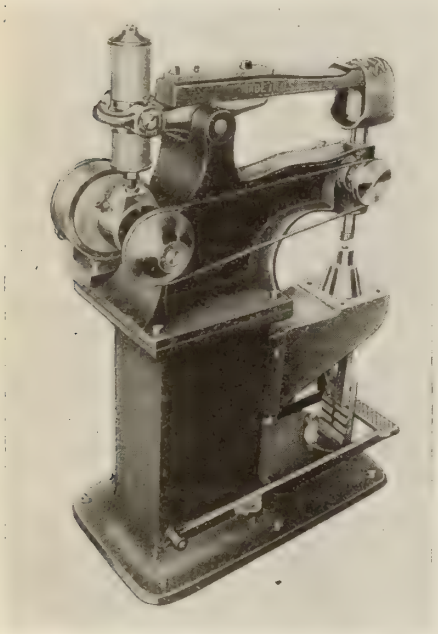
Great Britain has shown conspicuous activity in developing the automatic telephone exchange; and the announcement that a sum of £7,000,000 is to be spent on converting the telephone system of London from "manual" to automatic working is proof that the enterprising trials at Leeds and other English towns have been successful. In the automatic telephone the instrument is provided with a rotating dial having numbered depressions near its circumference. To effect a "call" the user places a finger in a certain depression and pulls the dial around to a mechanical stop; this operation is repeated for each figure in the telephone number required. Thereafter the mechanism at the exchange does all the work. It "selects" the line required, rings the bell of the called subscriber and continues ringing it until the receiver is lifted; "holds" the line clear until the conversation is finished and both receivers are hung up; and then disconnects the line. If the called number is engaged a clear signal is given in the calling telephone. The advantage of replacing the fallible exchange operator by almost infallible machinery is so great that the British example is likely to be widely followed, especially in countries where skilled labor is not cheap and plentiful. Several firms in Britain have specialized in the production of automatic telephone equipment, both for public exchanges and for private installations in offices, government and municipal buildings and factories.

"Kinite, a patented alloy steel," is the title of a new 4-page, 8½x11 in., descriptive folder being distributed by the Kinite Company, of Milwaukee. This new steel is especially adapted for making cutters, dies, taps and other tools with multiple cutting edges. Unlike other tool steels, Kinite is cast and not forged. It has the appearance, however, of a good, smooth forging, and also has a peculiar property in that it does not elongate under tensile strain, nor decrease in cross-sectional area. Castings made from it do not change shape nor form in the hardening process, hence it is possible to make a casting so near the desired shape and size of the finished tool that very little machining or labor is necessary to complete it. This characteristic of not shrinking makes it a valuable metal for moulds for casting hot substances such as glass and metals that melt at or below 1600 degrees F. These substances usually contract on cooling and do not adhere to the Kinite mould, since it does not change shape or dimensions with changes in temperature. The booklet calls attention to the other properties of this new tool steel and contains illustrations of several large dies, one of them being a multiple die, which, while working at a temperature of 550 degrees F., has punched and formed about 4,000,000 pieces. To have made this die from ordinary tool steel, many parts would have to be lapped and ground together, whereas with Kinite, the complete die was cast in a single piece.

DEVELOPMENTS IN SHOP EQUIPMENT

HIGH SPEED RIVETING HAMMER

REALIZING the growing need for a machine handling heavy sizes of cold riveting, the High Speed Hammer Co., Rochester, New York, in designing this model, have covered the essential points.



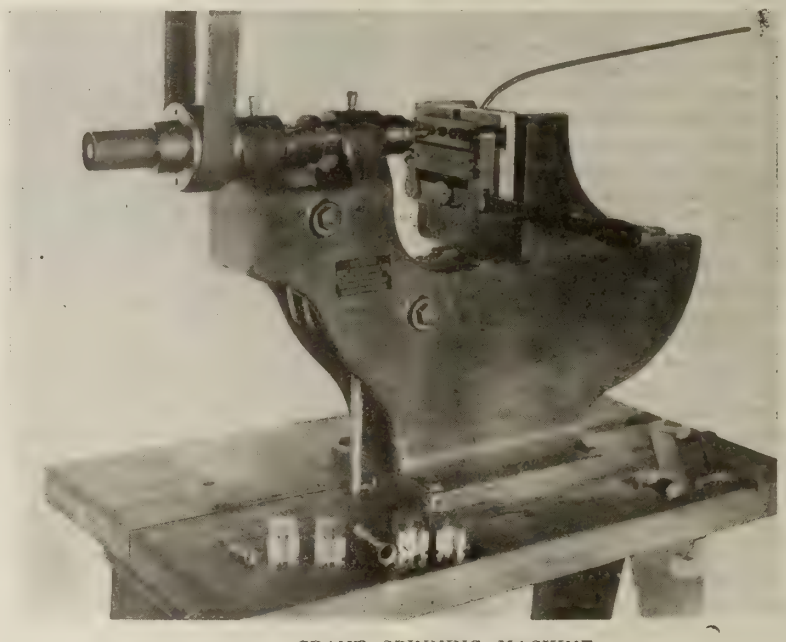
HIGH SPEED HAMMER.

The machine is sufficiently heavy to stand up under the vibration required of a riveting hammer. The bronze vibrator, which is the connecting link between the hickory helve and rubber cushions, constitutes the non-crystallizing member through which all shock is transmitted to the hickory helve, where it is absorbed and is so designed that there is no possibility of rigid motion or striking of parts should the vibration in any case be excessive. This vibrator is a solid bronze member and weighs forty pounds. The eccentric and rear main shaft are made from one solid piece of special steel ground to precision. In connection with this we use special ball thrust bearings; also housed within the eccentric strap and around the eccentric we use a special Hyatt roller bearing. The anvil block is provided with rack and pinion and gear for any adjustment. The net weight of this hammer is a ton and a half. The height overall is 6 ft.; length of hickory helve 2 ft. 8 in.; horizontal gap 16 in.; vertical gap 16 in.; dimensions of base 2 ft. x 3 ft. 8 in. The pein is revolved by means of worm and worm gear, producing a finished sightly head. It produces full round heads cold 5-8 in. to 3.4 in. and oval heads 7-8 in. to 1½ in. inclusive without disintegrating or crystallizing the metal.

NEW SPINNING MACHINE

The Grant Manufacturing and Machine Co., Bridgeport, Conn., have developed and placed on the market a new spinning machine, intended principally for flanging the ends of brass and copper tubing, such as that used for connecting brass or copper pipes to carburetors and oilers for automobiles, aircraft engines, motor boats, also copper coils for hot water heaters. A quick hand clamping arrangement is attached to the table or knee of the machine for holding the tubing securely in position while the flanging is being done. This clamping arrangement is so designed that the gripping jaws can very easily be removed and others inserted to accommodate different sizes of tubing.

The machine will flange tubing from the smallest up to and including 1 in. diameter, and the output from the machine will depend entirely upon the operator, as it requires not over one second's time to form a perfect flange on the end of the tubing.



GRANT SPINNING MACHINE.

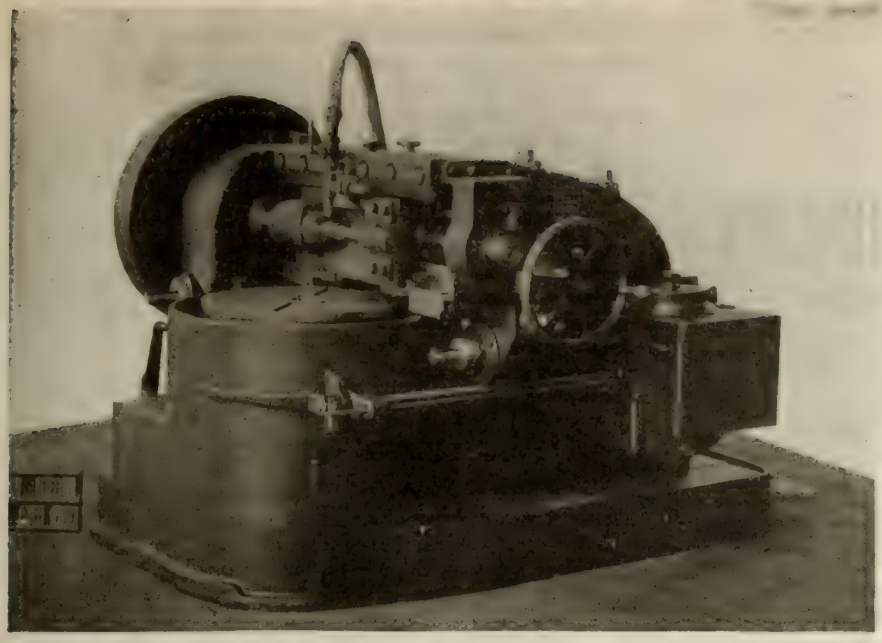
It will also be noted on the accompanying cut that the machine is mounted up on a bench in a horizontal position, which will permit the flanging of pipes any desired length. The machines are arranged for either belt or motor drive. The flanging is done through the medium of a foot treadle, thus leaving the operator's hands free to manipulate the work.

WORM WHEEL GENERATING MACHINE

The rapid increase in the manufacture of worms and worm wheels, for use in motor trucks, tractors, elevators, and worm gear reduction sets, has created a demand for machines designed especially for this class of work.

To meet this demand, the Gould & Eberhardt Co., Newark, N.J., have developed an automatic worm wheel generating machine, which has been made especially for doing this kind of work.

They have embodied in this machine the many essential features that are necessary to correctly generate worm wheels such as are used in the above applications. These machines will automatically generate worm wheels with a tapered hob, having a tangential feed; a straight hob, wherein the hob is fed into the worm wheel and not across it; and means are provided for cutting worm wheels by using a flytool. The latter method is particularly useful when



WORMWHEEL GENERATING MACHINE.

carrying on a series of experiments, where it would be costly to make up special hobs for every wheel.

The success of the worm and worm wheel drives depends largely upon the accuracy and smoothness with which the worms and worm wheels are cut. The machine to cut the worm wheels of the required quality must be unusually substantial, and with the least number of parts to teminate torsional strains, and to obtain the greatest amount of production from the hobs, without their requiring grinding.

Worm wheel hobs, by nature of their design, cannot be ground back as far as ordinary hobs, with the result that it is highly important that the machines, in which the hobs are used, be of such substantial proportion that the hobs will cut the greatest number of worm wheels, without getting dull.

The cutter spindle drive in this machine is through a powerful worm and worm wheel, with a large flywheel mounted directly on the end of the cutter spindle. It is also important that the work table be of substantial design, and powerfully driven, so that it will be rigid under the heavy strains. To insure this rigidity the table is mounted in a permanent bearing in the base, while the cutter or hob carriage is mounted on horizontal adjustable stanchion. This permits the work table being arranged with a long, cylindrical hub bearing, in addition to a conical and flat bearing and an indexing worm wheel of large diameter, which could not be incorporated if the work table was mounted in an adjustable carriage.

It is essential that the work table or face plate be of convenient height for loading and unloading, and consideration has been given to this in the arrangement of this machine. The first impression gained on looking at this machine creates a confidence that it is capable of doing the work for which it is intended.

All running parts are readily accessible, and all necessary operating levers are conveniently located at the front of the machine, giving the operator full and instant control.

The machine is driven with a single pulley, and an efficient high speed clutch is incorporated so that the machine may be started or stopped instantly. This is operated by a lever at the front of the machine. There are six changes of cutter speeds, ranging from 58 to 183 r.p.m., making it possible to run various diameter hobs at the proper speed for the material being cut.

It is essential in a machine of this type to have a different mechanism to enable the operator to take a second cut through a worm wheel when using a tapered hob or flytool, without losing the lead. It is also an advantage, as it permits changing the feed without changing the lead gears. When using a straight hob, with automatic infeed, the differential is not required and convenient means are provided for locking it.

A portable cutter arbor is furnished. Cutter carriage has automatic tangential feed, in one direction and power return. Automatic stopping device is also provided and may be set so as to stop cutter carriage at any predetermined point. A graduated dial located on stopping device allows operator to set stopping mechanism to stop cutter carriage at any predetermined point.

The stanchion is provided with automatic infeed and power return. When feeding automatically into revolving worm wheel blank an automatic stop is provided, which is equipped with graduated dial so that the operator can set the mechanism to stop at any predetermined point. When tangential feed is being used, stanchion is adjusted to proper depth of tooth and then securely bolted to base of machine, by means of four bolts.

An efficient centrifugal pump is regularly furnished with each machine to allow the use of a coolant when cutting steel or bronze. It is neatly attached to one side of the machine, being driven by gears. It may be conveniently disconnected by means of a clutch.

Specifications

Will cut maximum diameter of worm wheel 18 in. Will cut worm wheels having ten teeth to 100 teeth, including prime numbers of teeth, also from 100 teeth to 120 teeth, except prime numbers of teeth, with hobs having from single to quintuple thread, inclusive.

Will swing maximum diameter of hob, 5½ in.

Maximum length of hob.

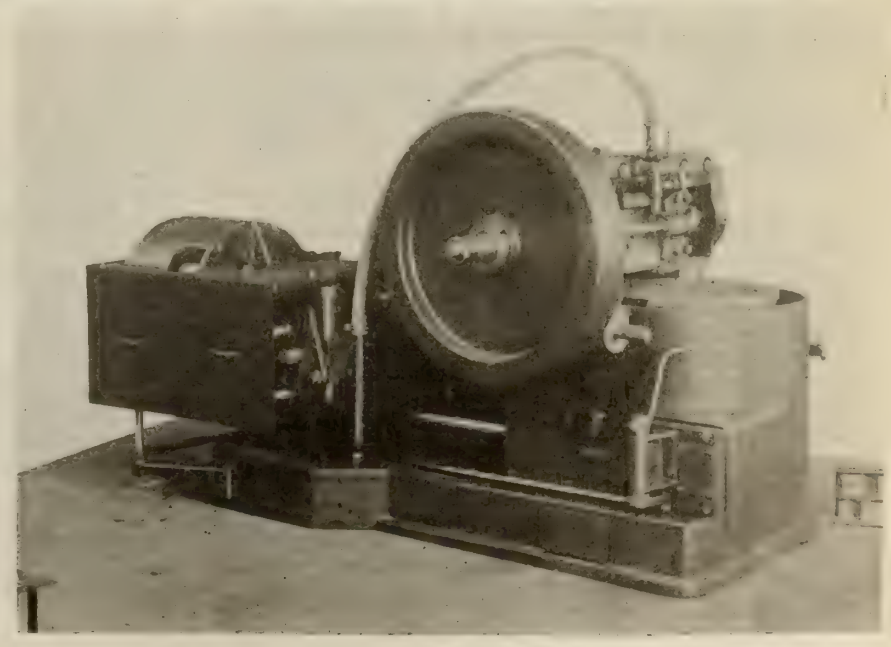
Tangential travel of cutter slide, 10 in.

Maximum centre distance from cutter to work spindle, 13¼ in.

Minimum centre distance from cutter to work spindle, 3 in.

Fixed distance from top of face plate to centre of cutter arbor, 7 in.

Diameter of cutter arbor, which is portable, 1¼ in.



GOULD AND EBERHARDT WORM WHEEL GENERATOR.

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Pessimists Get Out And Stay Out

HE was sitting in his comfortable office, and everything was going fairly well with the business. But that did not make much difference.

Things in general, according to him, were bad. Our exchange rate abroad was putting a millstone around the national neck; strikes and threatened strikes were putting the finishing touches on the ruin; conditions in Europe were so uncertain that nothing could help them.

In fact, he was out to spray with pessimism every person with whom he came in contact.

There should be some recognized and legal method for dealing with the likes of this. He ought to be "canned," to use the rather pungent talk of the street.

He is living in a great country, better than which there is none. He is right in the midst of one of the greatest periods for usefulness and common-sense the world has ever seen.

And yet this chap, just at the period when the world, and Canada in particular, needs his shoulder at the wheel, is sitting at the side of the road, hoping that the cart will start and slip down hill to jibe with his silly little notions.

It would be too much to expect that a world, which had been churned and shaken from centre to circumference for four years, would, at a day's or a week's notice, slide back and jog along just as though nothing had happened.

This country needs the sane optimism of clean-thinking, courageous men. It does not need the whines of the pessimist nor the groans of the blue-ruin brigade.

Unionism, Be Careful

WITHOUT discussing the merits of the present strikes that are tying up several of the industrial centres in Canada—particularly Winnipeg—at a time when they are trying to grope their way from war to peace lines, it is well that the sympathetic strike should be looked into. By this method unions that have no quarrel with their employers, who are bound under agreement to work at certain hours and for certain wages, have quit their shops because other unions are involved in strikes.

One of the basic principles of unionism is that the organization shall be recognized, and that it shall be the medium by which the men shall do their collective bargaining for stated terms and conditions of employment.

One of the greatest things any union ever had to fight for was recognition. And now being recognized, are the unions going to abide by their agreements, or are they not?

The greatest thing that any man can have is the reputation that his word is as good as his bond.

The same thing holds good of a labor union, an employer of labor or anything else.

If labor unions sign agreements to work at certain rates of wages for certain periods of time, and thereby give their employers cause to go ahead and make their plans accordingly, how do they suppose wages can be paid at all if the men refuse to live up to the agreement that they negotiated in good faith?

Unionism is on trial in Canada, and it can either make for itself a reputation for integrity and for the keeping of contracts, or it can toss them aside in such a manner that will make their signature to an agreement in time to come of no more value than the now historical "scrap of paper."

Government's Plate Supply

A DESPATCH from Ottawa, appearing in the Toronto *Globe*, says the Government will buy steel from U.S. at market prices and sell to the shipbuilders here at a profit of $10 per ton. The figures give the Pittsburgh markets at $2.75 per hundred for plate, which is wrong, as the quotation given on March 21, which was the latest change, is $2.65 per hundred pounds. The Government will have to pay 2c per hundred freight, and even if it gets away from exchange, war tax and duty, there will be enough expense in handling to make the freight cost at least 3c laid down here, so the Government would have only $5 per ton spread on the plate, and it would simply be a matter of bookkeeping to show that any money was being made at all.

The article in question goes on to state that the Government, on the plate used in an 8,100-ton vessel, would save $28,000 on the 2,800 tons of plate used. The Government can do no such thing.

If the Dominion Government cares to, it might be in the position of trying out the U.S. market with a good-sized order for plate, that is, unless it is bound up to accept market prices without the influence of competitive bidding.

The American Government, nor any of its departments, have so far recognized the fixed price, and if the Ottawa authorities do so they will be taking an attitude that official Washington has fought and defeated.

Running the U.S. Roads

IF the dear general public of United States ever had occasion to think that riding on the train was an expensive piece of business in years gone by, chances are that they will have a real chance to revise their opinion.

Experts have it figured out that, basing the computations upon the January payrolls that wages being paid by the railways are substantially in excess of $900,000,000 a year more than they were when Government control was adopted. Since then other advances amounting to about $65,000,000 a year have been made.

All this means that some person has got to come forward and pay the fiddler.

As long as Governments control the roads it is possible that all sorts of pressure shall be brought to bear on the situation.

It is a simple matter to shove up wages, but it is not nearly so simple to sit down and try to figure out where the earning power is to be increased to provide for these larger wage bills.

We have read and heard so much stuff about the public running utilities and transportation systems, that we have made the mistake of believing much of it.

From present indications it begins to look as though the Government operation of roads in United States was going to amount to running them into the ditch of financial disaster.

Two Points at Variance

THE Bell Telephone Co. made a strong plea with a poor face that it had to have more money to run its business. It managed to get this past the Railway Board at Ottawa, and consent was given to the increasing of the rates ten per cent.

The ink had hardly been dry on the paper when it was announced that there would be a new stock issue of $4,500,000 to its own shareholders at par.

Bell Telephone is placed, at the time of writing, at 130 on the Toronto exchange, and 132 in Montreal. This is equivalent to a handout to the shareholders of $1,350,000 on the Toronto rate, or of $1,440,000 on the Montreal price.

If the Bell Co. could not get along on the rates it was securing it stands to reason that it should have secured every possible dollar for the stock it had for sale.

The plea that it was hard up and the fact that it sells stock on the new issue away under market price are two points that cannot be reconciled.

A CALIFORNIA man got fined for running his car at 43 miles an hour. Forty-two miles an hour on a crowded street is not bad, but adding that extra mile is the straw that chokes the camel.

* * *

CHICAGO police say confidence men in that city took in at least ten million dollars last year. If these folks only knew enough to keep their coin in a sock or the Sunday sugar bowl they'd be saved a heap of trouble.

* * *

A WOMAN conductor on a New Jersey street car was kind to an old man and got $6,000 in his will. The only trouble with this is that most old men with $6,000 have about 60,000 places to put it.

* * *

U.S. shoemakers say that each immigrant who returns home to Europe takes eight pairs of shoes with him. The Yankees are in danger of losing their sole in this way.

* * *

ICE in Chicago increases $2 per ton. This is the high cost of a warm winter. If the coal man don't get you the ice man will.

The Millionth of an Inch

SOME folks is always hankerin' for to do some foolish thing, to say some startlin' statement or 'sassinate a king. They seem to have a mania for things what's strange and queer, you wouldn't think they had a brain tucked in behind their ear.

And then there's other things they do that seem to me most strange, they're clean beyond my vision, ten miles outside my range.

Now, take the chap what took an inch and carved the thing in two, I guess he thought that was a trick to puzzle me and you. And then some prune, he come along and split the thing in four, and them what watched the show that day they hollered out "encore!"

Well, time went on and bye-and-bye these choppers whacked away, until the chiefest of the lot rose up one day to say, "I've took that inch and by the use of hammers and of charts I've sliced the thing, by heck I have, into a thousand parts!"

Well, folks they donned their goggles for to see the bloomin' speck; it weren't no bigger than a hair what sprouts upon yer neck.

Well, not content with that there stunt, they started in once more, and sliced and rubbed that thousandth right down unto the core, until we read in words what make my fists go in a clinch, about there being in measurements the millionth of an inch.

Oh, I'd like to lay my husky hand upon that whiskered guy, who caused my head to swim about when I went out to spy, to gaze upon the millionth part of that there inch of ours, I've looked until my eyes most bust, I sweat for hours and hours.

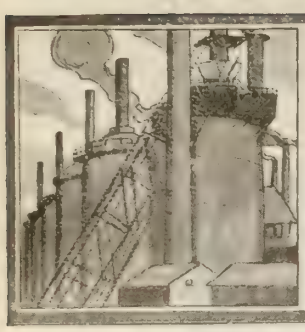
I rise to say out good and loud so all your folks can hear, no matter if you dub me odd and just a trifle queer, "There ain't no such a thing about—to me that is a cinch —as that there atom that they call the millionth of an inch!"—ARK.

THE U.S. cables, railroads, steamships, 'phones and telegraph service are soon to be restored to those who owned them prior to the war. It looks from here as though the job of getting them ironed out again would be proof against unemployment in certain circles for some years to come.

Current Events in Photograph

THE MACHINE HAWKER USED

This is the machine in which Harry Hawker and Grieve left to cross the Atlantic. Up to the time of this paper going to press no word had been received as to what became of them. One report had it they were sighted off the Irish coast.



MARKET DEVELOPMENTS

Market is Apparently an Open One Now

But It Has Made No Difference as Far as the Prices Are Concerned —New Lines in the Scrap Market Are Showing a Little More Strength

THE steel market is supposedly an open one now, but there is nothing on the surface to indicate such a condition. Prices are the same and the limited volume of business moving is also about the same. The return to an open market removes all the reasons that have been advanced for the non-recovery of the steel purchases. The keeping on of restrictions was blamed for a while, then the prices fixed were too high. These were lowered, and still no improvement. As a last resort the fixed price was made the goat, but now the machinery for maintaining a fixed price—if indeed any ever did exist—has passed away. If buying shows no signs of improvement a new set of reasons will certainly have to be presented to the trade in short order.

As a matter of fact there are more disturbing elements in operation just now than there are corrective or reassuring influences. The fact that peace has not been signed and the number of serious strikes are tendencies that are being felt in several ways. There are indications, though, that good business is not far away. Several firms are getting returns from adjustments from war work that was cancelled, and this is going to provide money for new lines, and also enable old plants to be sold or scrapped. In fact, the scrap metal market is expecting that some of this machinery will come its way, as the quotations are a little stronger now for No. 1 machinery scrap.

Coppers are also showing a little stronger in the scrap market, thus sustaining the belief that copper is going to be stronger and higher for the fourth quarter. As soon as shipping space is available there should be a good business done in exporting scrap metal to the Old Country, as this market has been cut off for a long time. Before the war it was one of the biggest items of the business in this country.

Dealers in machinery and supplies are doing a fair amount of business. The automobile and railroad business are the biggest buyers at the moment. In fact, they have been the best customers for some time.

MONTREAL HAS HAD A RATHER QUIET WEEK IN MACHINERY LINES

Special to CANADIAN MACHINERY.

MONTREAL, QUE., May 22—Despite the fact that a general feeling of unrest prevails throughout the country, there is an undercurrent of activity among many manufacturers, not outwardly pronounced, perhaps, but, nevertheless, evident when the surface of reserve has been removed. Several plants in this district, that have been idle since the beginning of the year, are gradually being cleared of the old munitions machinery and made ready for more permanent lines. Others are quietly preparing for new enterprises, but definite announcement of their intentions is being deferred. The prospects are that general business activity will show substantial increases during the summer months. Operations in steel circles show little change as a result of the release from Government control in the States, and the supposition that open competition would tend to lower prices has, as yet, come to naught, as market conditions have not been greatly influenced by the recent developments in the American situation. Machinery is again creating interest, with the general increasing demand. Scrap is still in a dormant condition, with inquiry light.

Recent Changes Have Little Effect

Steel and iron trading has entered on another epoch, following the resignation of the American Control Board, and the placing of the market on an open basis. Nothing has developed, however, that would indicate that the actual conditions were really a consequence of Government regulations, as the situation has not yet been affected as a result of the change, nor is it expected that any radical change will take place for some little period. Present selling prices are of a reasonable character, when due consideration is given to all the circumstances surrounding the working conditions in the steel trade. The factor that is the chief controlling influence in maintaining a steady market is the labor situation. Price-cutting in steel could only come about by reduced costs, and reduced costs would probably mean lower wages, and any immediate proposition to this end would likely result in increasing the unrest that is evidently prevailing at the present time. Many are beginning to see that the best way to reestablish the pre-war state of affairs is to provide work for the unemployed, and developments are shaping into a renewal of domestic activity that will ultimately result in a resumption of enterprise, both old and new. Movement of steel in this section is not heavy in volume and dealers are well able to take care of the business passing, but are still showing a reluctant spirit regarding the restocking of warehouses. In some instances material is being sold at figures lower than purchase price, due to the fact that this stock was obtained at high war prices and carried over. This stock, however, is gradually being disposed of, and dealers are willing to see it leave the racks, even at a small loss. When approached regarding the possible trend of the market, few will come out with a clear prediction, but invariably the contention will be that price reductions are unlikely, rather the other way. The uncertainty of labor is a big factor, and any move on the part of producers must be carefully studied before action is decided on. Developments in the Nova Scotia steel situa-

tion are occupying the attention of steel men at present, and sensational developments in this direction are anticipated. Price quotations here are unchanged, with the market quiet on light demand.

Steady Improvement Continues

It still appears that the steady inquiry for machine tools is of a permanent character, as many dealers here report a good week. No particular line seems to feature the trading, as sales of a general nature. The refitting of several plants here is quietly progressing, but no definite announcement has been made regarding the product to be manufactured. One firm here has had a representative in the States looking over the tool situation and general business conditions, and in a short time they anticipate entering on an extensive manufacturing program of a new line. The refitting of the Lachine plant of the Maple Leaf Manufacturing Co. and within a month production of commercial motor vehicles will probably commence. Supply business has shown improvement during the past week and prices generally are firmly maintained.

Several Disturbing Factors

But Dealers Say Conditions are Better Than Anticipated in Post-War Trading

TORONTO.—In spite of the many unsettling influences that are at work dealers are prepared to admit that business is fairly good. The automobile business and the railways are still the chief buyers, but their orders are for fairly good lists.

Even that section of the trade that is inclined to be rather pessimistic is willing to admit that conditions since the armistice have been much better than they had anticipated could be possible in the first six months following the war.

The settling of the strike disturbances, and the signing of the peace terms would go a long way to giving to the markets that degree of assurance and confidence that is so necessary before there will be very much buying done on an extensive scale.

The Machine Tool Trade

Local dealers state that on a good many of the best lines they have to handle delivery dates are much poorer than they are as a general thing. Several weeks, in some cases months, are required before the machine can be delivered. They attribute this to the extensive buying campaigns that have been carried on by several of the automobile concerns which were all ready as soon as the war restrictions were taken off to go ahead with an extensive line of manufacturing. This has in many lines lifted all the available tools out of the market, and leaves nothing in stock.

As one of the men in the trade pointed out to-day, "A number of the firms that had contracts with the American Government for war work are coming nearer to the point where they will get their settlements, and in this way considerable money will be loosened up to enable these organizations to go along with any programme they may have under way, which calls for the laying out of money on equipment. There has been a lot of cash tied up in this way and the settlement of these claims ought to be a matter of considerable convenience to several of the firms thus involved."

The Scrap Metal Trade

Light and crucible coppers show a little more strength in the market than for some time past, and as a result the prices are up a half cent. per pound. Dealers believe that this tendency will be maintained and that it will become more pronounced later in the year. There does not seem to be enough confidence in this opinion yet, though, to lead to speculative buying. Machine scrap is also up a little, and $15 is offered for it. There is liable to be more of this material coming into the market shortly. The dealers are looking for more of the single purpose war machinery to come into the scrap yards as the firms that were using it get their settlements from the Government. It would be somewhat of a relief to the machine tool salesmen were the expectations of the scrap dealers to come true in good measure, and a large amount of the war machinery led off to the scrap yards.

The scrap metal trade in Canada should get along better when there is more shipping space to the Old Country. That is the big end of the business for some of the larger concerns, but since the outbreak of the war there has not been tonnage to take over scrap metal. Things are shaping so that there will be a reopening of the trade before so very long, and the general belief is that once this happens there will be good times ahead of the scrap trade in this country. They have had a pretty barren row for the past six months. In fact there has been little doing in their line of business since the signing of the armistice.

At the present time there is little buying from the yards as neither the steel mills nor the foundries are taking in any stock, apparently being well supplied for the present needs, which are not by any means heavy.

The Steel Trade

Orders coming in for plate, bars, etc., are not by any means heavy. As a matter of fact it can all be summed up by saying that the trade in general is buying just what it has to buy and no more. When this class of business is going on there is something else that usually accompanies it, and that is that the orders are wanted at once. There is practically little or no buying going on now that can be properly classed as the old-time warehouse trade that used to make up the volumes of business that spelled something pretty close to capacity and good ties for the rolling mills. It hardly seems likely that prices will break much in such an atmosphere, as the mills are likely to see that there is only a limited amount of business to be had and figure that their best plan is to make as much money as possible out of it.

POINTS IN WEEK'S MARKETING NOTES

Scrap metal market is still very dull, but there is some improvement in copper, which seems likely to continue in line with the belief that copper will be higher at the close of the year.

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There are chances of machinery scrap becoming stronger as quotations are up slightly. Now that the firms are getting settlements with the Government it is expected that some of the shell shop stuff will be scrapped.

—

Dealers report that supply business is fair. Auto shops and railroads are the chief buyers.

—

Pittsburgh reports have stated that the mills are not now handling sufficient business to guarantee over 55 per cent. of capacity.

—

Warehouses in this district are not buying material in quantities as they did before. There is not the demand yet and the houses show no signs of storing much material against a possible revival.

—

Montreal business, with the opening of navigation, shows signs of improvement.

CHEAPER ELECTRIC WIRING

A special committee of the Institution of Electrical Engineers (Great Britain), has been formed to consider the revision of the existing rules for electric wiring in buildings. This committee is the outcome of a growing conviction that the high quality of British cables and accessories justifies a relaxation of the standards hitherto imposed. During the war an enormous number of army buildings have been wired on the surface and in other ways not consistent with standard British practice, and the experience that is gained will be turned into account in cheapening the cost of installation and materials. British manufacturers of wires, switches, insulators, and other accessories will thus be led to expand the production of types which will be peculiarly adapted to meet the needs of overseas markets. Satisfactory quality will be ensured by the National Electric Proving House which is about to be established in Great Britain. The Proving House will put the hall mark of good design, material, and workmanship on every class of electrical apparatus, thus giving British productions the full benefit of the high reputation they have always held.

APPARENTLY NOTHING TO PREVENT RETURN OF AN OPEN STEEL MARKET

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., May 22.—The steel market continues to drag. There may be a slight improvement in spots, but it would require a very large improvement in buying to do any good, when even the present 55 per cent. operation of steel mills is based chiefly upon old orders, current orders accounting for only between one-third and one-half of the production.

Pig Iron

More than half the merchant furnaces in Western Pennsylvania, the Mahoning valley and the lake front district of Ohio are idle. The furnaces have been blowing out steadily, one after another, and the end is not yet. This makes it that the few furnaces remaining in blast have a good demand for their iron. The buying is all in small lots, usually single carloads, as buyers will not take any chances with prices. This, however, makes the business easier for the furnaces since the price is not much of an issue. When a consumer wants only a carload he does not haggle over the price. The furnaces are not piling iron, at least to any extent, and the situation in this respect is illustrated by the case of one merchant furnace interest which has a stack making a well-known brand of foundry iron, and desires to blow the stack out for relining, but must first accumulate a stock to take care of trade meanwhile. The furnace would work better with its new lining than it is working now.

Pig iron consumers likewise are not accumulating iron, but rather have been drawing upon stocks, chiefly iron they had to take on contracts. Sales of foundry coke indicate that the melt of iron is greater than a month or two months ago.

There are various rumors of price concessions on pig iron, but nothing definite is established as to prices below those that became effective March 21. As to the local Pittsburgh market, however, there is a slightly easier position, in that some furnaces that have lower freight to Pittsburgh than the rate from the valleys to Pittsburgh will give away their freight advantage, something they will not do when there is a strong market. Thus the regular valley market on foundry iron is $26.75, furnace, which with $1.40 freight to Pittsburgh, would make the Pittsburgh price $28.15, but there is a furnace interest with $1.10 freight to Pittsburgh, which will sell at $26.75 furnace, making the cost delivered Pittsburgh $27.85. Other valley prices are: Bessemer, $27.95; basic, $25.75; malleable, $26.25; forge, $25.75. If there were inquiry for any sizable tonnage these prices would probably be cut.

Steel

There is hardly any new inquiry in the market for either billets or sheet bars. There are rumors that sheet bars have sold at $2 to $3 under the recognized quotations, but these rumors cannot be confirmed. Most mills will allow a brokerage to middlemen, but the amount is not large enough to justify the middleman splitting the commission with the consumer. Specifications on long term billet contracts are very light, and on sheet bar contracts they are quite moderate, representing 50 to 60 per cent. of normal. Regular quotations remain at $38.50 for billets, $42 for sheet bars and 2-inch billets, and $41 for slabs, f.o.b. mill, Pittsburgh or Youngstown.

Finished Steel

Regular prices are: bars, 2.35c; shapes, 2.45c; plates, 2.65c; blue annealed sheets, 10-gauge, 3.55c; black sheets, 28-gauge, 4.35c; galvanized sheets, 28-gauge, 5.70c; plain wire, 3c; wire nails, $3.25 per keg, base; merchant steel pipe, basing discount 57½ per cent. In general these prices seem to be well maintained, but there are rumors of considerable shading in wire, and of some shading in sheets.

Buyers' Attitude

There is little opportunity to determine the attitude of buyers as to prices. Nearly all the time there is a controlled market in steel, as there is at present, and buyers are trained to pay the price or do nothing. The buyer probably feels he has only two alternatives, to pay present prices or wait until lower prices develop. Jobbers and manufacturing consumers are buying sparingly, taking only the material they must have. As to steel for construction purposes, which is usually the heavy end of the steel demand, there is practically none in the market. A large amount of work has been figured on by the engineering and construction firms, but there is no disposition on the part of the investor to go ahead with the projects. Many jobs have had all the engineering work done and are in shape for quick action whenever favorable conditions arrive. One of these, of course, is an open market for steel, a market that would give the buyer confidence, but there are other influences holding back the investor, particularly the fact that the peace settlements have not been made.

Producers' Attitude

The view of steel producers is that they would lose by throwing the market open, that there would be a decline in prices more than sufficient to balance such increased business as would result. They hold that the time is not yet ripe for a general buying movement. No steel producer is willing to predict that the time will be ripe before summer, which means that next fall is the earliest time, and many predict that there will not be really good business until next year. That means, of course, that the producers are willing to peg along with such orders as have to be placed, plus such old orders as remain on books. There was an average of 77 cent. operation in March, and 65 per cent. in April, while the present rate seems to be about 55 per cent., and June may show an average of 45 per cent., with still lower operations in July and August. With such light operations production costs are, of course, exceptionally high, but if prices were lower and there were only a slightly greater demand the mills would be worse off, in point of total earnings, than at present.

For weeks past the steel producers have insisted that there is "an open market" for steel products. On April 1 the Attorney-General rendered an opinion that the Industrial Board plan of "price stabilization" was illegal, but the opinion was not given to the public until after the resignations of the members of the Industrial Board were accepted, on May 9. Undoubtedly the steel producers had prompt knowledge of the Attorney-General's opinion and, in the circumstances, would be prompt to disclaim any allegiance to the Industrial Board plan. This left it, however, that while, technically, there is an open market, since there is no authority for anyone to dictate prices, there is practically a controlled market through the steel producers individually adhering to the recognized quotations, just as they have done in past years in more or less similar circumstances. The producers claim this is not illegal, the substance of the argument being that the producers do not agree to maintain prices, they merely do maintain prices.

SCRAP METAL MARKET SHOWS LITTLE CHANGE—PRICES ARE FIRM

AS in the pig iron market, there is a better tone prevailing in the scrap market. While prices are still at the low level, they are holding firm. Reports from the various U. S. districts follow:

Chicago—Trading is confined to dealers who require scrap to fill contracts and while quotations have declined, they have not reached the low levels of the early part of the year. The railroads continue to put a large quantity of material on the market, this week's offerings amounting to over 12,000 tons.

New York—With a great amount of uncertainty over future conditions, prices have not changed, except in the case of wrought pipe scrap, which dropped 50 cents. There is little business doing, and very little interest shown in the market.

Pittsburgh — Little business, but prices holding well, is the report from this centre. A number of furnaces being out of blast, and the largest consumer being out of the market, narrows the field considerably. There are but few transactions in heavy melting steel, the price remaining at $15.50 to $16.

Buffalo—Cast scrap is in demand in this district, and turnings and borings are being asked from outside. Actual business is small. The Government is reported to be about to put a large quantity of steel rails on the market.

Cleveland—There has been practically no business during the past week, and prices have remained unchanged. The general opinion is that after a few weeks of uncertainty there will be a general upward movement. Now that the market is free from political interference a resumption of trading is looked for.

Cincinnati—Nothing has occurred to change the level of prices during the past week. Cast iron borings are quoted at $8 per ton in carload lots. Steel turnings are quoted from $7.50 to $8.

St. Louis — Railroads are offering large quantities of scrap, the largest in some time, but the response is weak. There have been some sharp drops in scrap, prices coming down from 50 cents to $8, this last being on heavy relayers. Railroad offerings amounted to 10,000 tons, which buyers will likely get at their own price.

Philadelphia—Steel works are using low phosphorus as heavy melting steel and prices on the latter are now quoted at from $14.50 to $15.50 delivered. The market is generally dull. Shell steel scrap is now being delivered as heavy melting steel.

SLIGHT IMPROVEMENT NOTED IN THE PIG IRON MARKET FOR THIS WEEK

THERE seems to be a feeling of optimism in the market this week, the tone of the market being brighter in all districts reporting. A sale of 10,000 tons foundry iron lends some basis to the feeling. The reports from United States points follow:

Pittsburgh.—Notwithstanding a strictly limited field of both inquiry and sale, prices hold firm. The reason for this may be said to be the fact that production is very light, while stocks are being depleted from yards fairly steadily. The opinion of the trade is that prices have as good a chance of going up as of receding. The Carnegie Steel Co. have cut out three more furnaces, making a total of 33 down out of 59.

Boston.—With the passing of Thursday inquiries became more active and a better sentiment prevailed. There is considerable activity in the textile industry, and this presages a more active demand from makers of textile machinery. Enquiry for over 1,500 tons foundry and malleable for last half shipment is reported.

New York.—Business for last half has commenced to show itself. Most of the Eastern makers are now quoting on a furnace basis, at slightly higher prices than the schedule. Enquiry for prompt shipment has been brisk, and for last quarter about 1,500 tons has been asked for. Sales during the week were better than for some time past.

Philadelphia.—There has been an aggregate sale of 10,000 tons foundry iron during the past week, all for prompt shipment. Prices continue to vary and dealers do not want to take business further ahead than 60 days. The probabilities are that more furnaces will be blown out shortly. Low phosphorus is quoted at $35 per ton.

Buffalo.—With better reports of both sales and enquiries a better tone prevails. Foundry and special iron are in greater demand, and there is a change for the better in shipments. Another furnace in this district is being blown out this week, the firm having sufficient stock on hand to take care of their customers.

Cleveland.—Dullness, with small enquiries running to carload lots, and some sales of the same quantity is all that is moving this week. Furnace shipments are running to from 60 per cent. to 80 per cent. of capacity. An enquiry from New York for 10,000 tons Bessemer for export has been in the market this week.

Chicago.—There is a good deal of buying in small quantities, and the foundry yards are using their stocks up pretty quickly. It is hard to say how they really stand for iron, as there may still be material coming to them on unfinished contracts. Present indications are for a further period of dullness.

MR. P. M. LAING,

Recently Toronto Branch Manager of Herbert Morris Crane & Hoist Co., now appointed Toronto Representative of Jones & Glassco (Reg'd.), Power Transmission Specialists.

Jones & Glassco, Reg'd, announce the appointment, as their Toronto representative, of Mr. P. M. Laing, recently Toronto branch manager of Herbert Morris Crane and Hoist Co. Mr. Laing has had broad experience in the engineering field, particularly as applied to transmission appliances and equipment, having been for a number of years connected with the Positive Clutch and Pulley Works, and also the Elmira Machinery and Transmission Co. This experience, combined with several years' architectural, engineering and industrial study of applications serving a wide clientele, has earned for him a highly respected connection both in Toronto and throughout Ontario. A call at the Toronto office, located at 1203 Bank of Hamilton building, will find Mr. Laing ready to respond to all enquiries of the well-known firm of Jones & Glassco Reg'd, in the power transmission field.

Cincinnati. — The price stabilizing plan has had no effect on the pig iron market here. There is an absence of enquiry that would tend to make an open market, and furnaces are sticking to the recommended prices. There have been some orders taken for shipment before July 1st at prices below the schedule. Beyond July 1st nothing is reported.

St. Louis.—A few carload lots for prompt shipment was the extent of the trading this week. Further curtailment of production is being carried out in the hope of stimulating buying. For the third quarter some small enquiry is reported.

Birmingham.— A little better tone is evident here due to a few good enquiries for a fair tonnage. There is but little business, and further curtailment of stacks in operation is reported.

BIG ORDERS FOR MACHINE TOOLS ARE PLACED IN NEW YORK MARKET

Special to CANADIAN MACHINERY.

NEW YORK, May 22.—The E. W. Bliss Co., Brooklyn, has purchased more than $300,000 worth of machine tools—large planers, lathes, shapers, slotters, etc., and about $100,000 worth of large capacity cranes during the past week, this constituting the greatest amount of buying by any single company in the New York market since the end of the war. This equipment is for an addition to its plant which the Bliss Company is building. From this the machine-tool trade takes renewed hope that the many plans for manufacturing expansion which are under consideration will soon culminate in more general machine-tool buying. As has been repeatedly stated in these letters, the trade has believed that eventually a large business would develop. This has been indicated by the great number of inquiries, a large majority of which are still pending.

Inquiries have been about equally divided between domestic and foreign trade, but the indication now is that domestic business will go ahead much more quickly than export trade. Considerable export business which is pending will, however, go ahead in all probability as soon as the peace treaty has been signed and adequate financial arrangements for the various European countries have been arranged, particularly for France, Belgium and Italy.

One result of the recent convention of the National Machine Tool Builders' Association at Atlantic City, N.J., may be to check further reductions in prices. It is reported that some of the manufacturers who cut their prices the deepest may make slight increases, though no action has been taken as yet to confirm this. The attitude of the association clearly was that some prices had been reduced more than is justified by present conditions. The president of the association, A. E. Newton, of the Reed-Prentice Co., Worcester, Mass., pointed out in his opening address that profits on machine tools before the war were often inadequate, and he made the further statement that some of the machine-tool builders do not figure their costs closely enough or they would not reduce prices further than they have already gone.

The Bureau of Aircraft Production, War Department, is continuing to offer new and used machine tools, nearly 400 now being on sale at Buffalo from the plants of the Pierce-Arrow Motor Car Co. and the Curtiss Aeroplane & Motor Corporation. Most of these tools have never been removed from the shipping crates. The bureau is selling the tools to the highest bidders, reserving the right, however, to reject unsatisfactory bids. More than 600 tools from the plant of the Union Switch & Signal Co., Swissvale, Pa., have already been sold. A part of the equipment of the Wright-Martin Aircraft Corporation at Long Island City, N.Y., will doubtless be offered for sale soon, though a part of these tools may be retained to manufacture motors for the aviation branch of the War Department.

Several of the automobile plants in the East are figuring on new equipment and some plants which were engaged in making shells and other war munitions may engage in some phase of automobile manufacturing.

Altogether, it may be said that prospects in the machine-tool trade continue to look brighter, although the actual increase in business is not yet worthy of any special note. One feature which is pointed out is that there is a better demand for tool-room equipment, and this is usually a forerunner of active buying of manufacturing tools.

During the next 30 days the peace treaty may be signed; Congress may provide funds for the railroads, and some of the shipyards may show increased activity, due to the permission granted by President Wilson to take foreign contracts. All of these factors will have a favorable influence upon machinery business.

TENDERS

Tenders for the erection of a central fire hall for the city of Welland will be received up till 4 p.m., June 3rd, 1919. Plans and specifications can be seen at the office of W. W. Lachance, architect, Temple Building, Welland.

The city of Toronto is calling for tenders for copper wire, battery couples and battery plates. Tenders will be received up to May 27th. Two motor cycles are also called for, the whole being for the fire department. Specifications and applications can be obtained at the Fire Department, Adelaide Street, Toronto.

The Department of Indian affairs is calling for tenders for a school at Tyuendinaga Indian Reserve, and tenders must be endorsed "Tender for School at Tyendinaga Indian Reserve" on the envelope. Plans and specifications can be obtained at the office of the Indian agent, Deseronto, and at the post offices at Belleville, Napanee and Trenton, and the department at Ottawa. Tenders will be reserved up to May 28th.

Tenders for the erection of an extension to the revetment wall at Fort William, Ont., will be received at the office of the Department of Public Works, Ottawa, up till June 5th. Tenders must be accompanied by a cheque to the amount of ten per cent. of the amount of the tender. Plans and form of contract can be obtained at the Department, at the offices of the district engineers at Fort William, Equity Building, Toronto, and Shaughnessy Building, Montreal.

Winnipeg. — Sealed tenders marked "Tenders for Pumping Engine" will be received by the undersigned up to 4 o'clock p.m. on Tuesday, the 3rd day of June, 1919, for the supplying of a 100 h.p. 6 cylinder motor, combination pumping engine and hose car, capacity 600 gallons "Imperial measure." Parties tendering to state price delivered at the Fire Hall, Berry St., St. James. Said engine to be provided with 26 feet of soft suction hose with coupling to attach to hydrant of Winnipeg standard thread. For further particulars apply to Fire Chief Dickson, at the Fire Hall, Berry Street, St. James. — FRANK NESS, Sec.-Treasurer, Rural Municipality of Assiniboia, Kirkfield Park P.O., Man.

PERSONAL

James Mathews, vice-president of the Mathews Steamship Company, died at eight o'clock last evening at his residence, 114 Farnham Avenue, Toronto, aged 69 years. Mr. Mathews had been ailing for nearly a year. His death makes the first break in a family of four sons and six daughters left by the late James Mathews. The Mathews Company are the largest individual owners on fresh water and the oldest steamship company on the lakes. Mr. Mathews was a life member of Zetland Lodge, A.F. and A.M., and a member of the Royal Canadian Yacht Club, and the Toronto and Montreal Boards of Trade. He attended Heath Memorial Church. Being of a retiring nature, he had never taken a part in public life.

T. & N. O. Extension.—A party of 24 men of the Government survey has reached Cochrane in charge of W. R. Maher. They are to locate a route for the extension of the Government railway to Moose Factory. The party is made up of W. R. Maher in charge, W. J. Bishop, assistant engineer, and the majority of the men have seen active service at the front.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$18 50	$18 50
Electro copper	17 50	17 50
Castings, copper	17 00	17 00
Tin	54 00	55 00
Spelter	8 00	8 25
Lead	6 50	7 50
Antimony	8 00	8 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 50
Copper, crucible	13 00	13 25
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	17 00	15 00
Pipe wrought	8 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	12 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	.....
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	$0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	..
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

A. R. WILLIAMS MACHINERY & SUPPLY CO. TAKE OVER NEW MONTREAL PREMISES

THE A. R. Williams Machinery and Supply Co., Limited, Montreal, took possession on May 1 of new premises at 320-28 St. James Street, Montreal. St. James Street can well be called the Machinery Street of Montreal, and the A. R. Williams Building has a most favorable location on this thoroughfare.

J. N. Robinson has charge of the new business, having gone to Montreal about a year ago. Prior to that, Mr. Robinson was for fifteen years in the Toronto office, having charge of the Hamilton territory. He is thoroughly familiar with every phase of the machinery business and is admirably qualified for the important position he is now called upon to handle. Associated with him are R. H. Harmer, secretary-treasurer of the company, also from the Toronto office; S. Norton, late sales manager of the Standard Machinery Co., also at one time with the Foss people; Mr. Baynes, formerly with the Rudel-Belnap Co.; Mr. Clarke, who will specialize in woodworking and general machinery, and A. Hopewell, who will have charge of the supplies department. Mr. T. A. Hollinrake, president of the Toronto organization, is also president of the Montreal firm.

It is the intention of the Montreal firm to follow the same sound lines that have been adhered to in the Toronto office.

It is 30 years ago since Mr. A. R. Williams first opened the office in Montreal, and when the A. R. Williams Company was organized in Toronto some five years later it was taken over. The development of machinery business in Quebec made it highly desirable that the company should have in Montreal a special organization, and business premises adequate to keep closely in touch with the trade there, and to that end the premises on St. James Street, formerly occupied by Williams and Wilson, have been secured. When some alterations are made the A. R. Williams Machinery and Supply Co., Ltd., will have in their new property in Montreal undoubtedly one of the most thoroughly complete premises on the continent for the handling and displaying of all classes of heavy machinery, as well as the various other lines.

It is the intention of the Montreal business to carry lines similar to those at the Toronto office, including Canadian made machine tools and the best American and Old Country lines. In fact they will cater to anything in the line of engines, boilers, steam equipment, water wheels, electric motors, machine-shop tools, boiler rooms, railway shops, shipyards, pulp and paper mills, saw mills, lath, shingle and heading outfits, contractors' equipment, mining, road-making machinery, gas engines and equipment, and other general lines.

NEW PREMISES OF A. R. WILLIAMS MACHINERY & SUPPLY CO., 320-28 ST. JAMES ST., MONTREAL.

TRADE GOSSIP

Henry Engineering Co.—The Henry Engineering Co. announce the formation of a company of three well-known gentlemen, experts in their various lines. Their offices are at 71 Bay Street, Toronto, where they are prepared to act as consulting engineers on general engineering lines. They will also specialize in the purchase and sale of power equipment, steam, electrical and hydraulic, both new and used. The company is composed of Thomas Henry, James A. Rumgay, and Edwin B. McBryde. Mr. Henry was for many years chief engineer of the Interurban Co., and the Erindale Power Co. Later he was associated with the sales department of the Toronto Electric Light Co. Mr. Rumgay was for some years with the Canadian Allis-Chalmers Co. as draftsman and estimating engineer. More recently Mr. Rumgay has been designing engineer and manager of the boiler department of the Polson Iron Works, Toronto. Mr. McBryde has been, since coming to this country, assistant distributing engineer of Toronto Electric Light, and later assistant sales manager. For the past two years he has been manager of the Fisher Electric Co., Toronto.

Outlook Is O.K.—"The demand for marine engines and boilers is quite large and activity in this department appears to be assured for several months at least. The shipbuilders of Canada have embarked on a fairly extensive program and until it is completed there will be active production of boilers and engines. etc.," stated Mr. J. E. Waterhouse, of Engineering and Machine Company of Canada. "The market for stationary boilers for land use is, on the other hand, not active just now. We are not worrying about the future, however. There is plenty of room for optimism."

JAMES POWELL
For 14 years Secretary of the Canadian Railway Club at Montreal. A presentation marked his retirement from the position.

New York.—The Italian Government has ordered 150 locomotives from the American Locomotive Co. The locomotives are of the heavy freight type. The company has received enquiries from several other foreign Governments for locomotives it is stated.

Railway Board Can't Fix Ocean Rates.—The amendment proposed by J. E. Armstrong, of East Lambton, to give the Railway Commission control of inland water and coastwise navigation, including the fixing of rates, was defeated in a vote before the special railways commission. The majority was five against the amendment.

New Bridge for Niagara.—The New York Central are making a survey and estimate of cost for a new bridge over the Niagara River. Four points are being considered as crossings, two of which are at Grand Island, one at Strawberry Island, and the fourth being the enlarging of the present bridge of the Michigan Central below the Falls.

Big Thing For Goderich.—Further particulars are available regarding the great new industry planned for Goderich, to be known as the Lake Huron Steel Corporation, with $15,000,000 capital. J. J. Mahon, of Newark, N.J., who was the steel expert for the Imperial Munitions Board, confirmed the news of the plans. It is understood that he will be vice-president of the concern and in active charge of the practical side of it. The corporation expects to start work on its plant within two months. Though ultimately it is intended to carry the manufacturing process right through from the ore to finished steel products, at first the plant will be used for assembling work, such as is now done at many automobile and other works in this country. The company is in a sense an amalgamation of various steel and steel products companies, with a Detroit automobile, a St. Paul tractor and others interested. The capital will be largely from the United States. It is claimed that it will mean the manufacture in Canada of many millions' worth of steel products now imported.

MARK OF ESTEEM TO RETIRING SECRETARY

Canadian Railway Club in Montreal Hold the Annual Election of Officers

The seventeenth annual meeting of the Canadian Railway Club was held last week in Montreal, at the Windsor Hotel. During the past year the membership has increased from 883 to 1,100, and the financial statement shows the club to be in a very flourishing position. James Powell, who has been the club secretary for the past fourteen years, has resigned from the position, as his duties with the vocational classes in connection with the reestablishment of the returned soldiers prevents him from giving the proper attention to the affairs of the club. In recognition of his services and to show their appreciation of his genial and faithful efforts, the members of the club presented him with a solid silver epergne, suitably engraved. Past President Hudson was likewise presented with the gold past president's badge. The newly elected officers were:

President, J. Hendry, master car builder, G.T.R.; first vice-president, W. H. Winterrowd, chief mechanical engineer, C.P.R.; second vice-president, C. H. N. Connell, division engineer, C.N.R.; executive committee, A. Crumpton, G.T.R.; E. A. Nix, C.P.R.; B. F. Shortly, C.N.R.; E. R. Battley, G.T.R.; R. A. Pyne, C.P.R.; W. H. Sample, G.T.R. Audit committee, W. H. Langridge, C.P.R.; G. M. Wilson, G.T.R.; R. M. Harvey, Safety Car Lighting Co. Treasurer, E. E. Lloyd, C.P.R. Secretary, W. A. Booth, chief draughtsman of the Grand Trunk.

AT LEAST TEN CONVERSATIONS NOW PLACED ON A SINGLE WIRE

By means of Multiplex Telephony apparatus at least ten simultaneous conversations and several telegraph messages may be transmitted over a single copper wire for practically unlimited distances. Demonstrations of the wonders of the new invention were given a party of civic officials and newspaper men at the Strachan avenue Hydro plant at Toronto.

The demonstration is being carried on by the Canadian Independent Telephone Co. of Toronto, which has brought to Canada Dr. Lee DeForest, with a corps of DeForest Radio engineers and Prof. Charles A. Culvert of Beloit College. Major-General George O. Squier, Chief of Staff of the United States Army Signal Corps, is the inventor of "Wired Wireless," and Dr. Lee DeForest the inventor of the appurtenances which made its commercialization possible.

Four on One Wire

Over a single Hydro telephone wire to Dundas four newspapermen carried on conversations at yesterday's demonstration. Every word came clearly and distinctly, and there was no wire noise, such as is encountered on standard connections. On the Bell system there are thirty circuits from Toronto to Hamilton.

According to demonstrators of the "Multiplex Telephony and Telegraphy," with their apparatus nine hundred telephone connections can be made in addition to scores of telegraph connections. It would cost $1,000, they said, to install the apparatus from Toronto to Hamilton—much less when it is manufactured in commercial quantities.

"Viewed from the standpoint of public ownership," say the men in charge at the Hydro plant, "the Province of Ontario now owns several hundred miles of long-distance copper telephone circuits which are used only by the Provincial Hydro-electric officials and employees in the operation of the system.

"These inventions of Squier and DeForest, without interfering with the present use of the line by the Hydro-electric System, can be used to increase the use of these long-distance lines to many times their present capacity and the extra telephone circuits used for public telephone service.

"The Dominion of Canada has recently become owner of the G.N.W. telegraph system and of the Transcontinental telegraph system. These telegraph systems combined represent a very large expenditure of money, and at least part of the Transcontinental is equipped for both telephone and telegraph use. The invention would multiply the possibilities of these lines by at least ten times their present capacity."

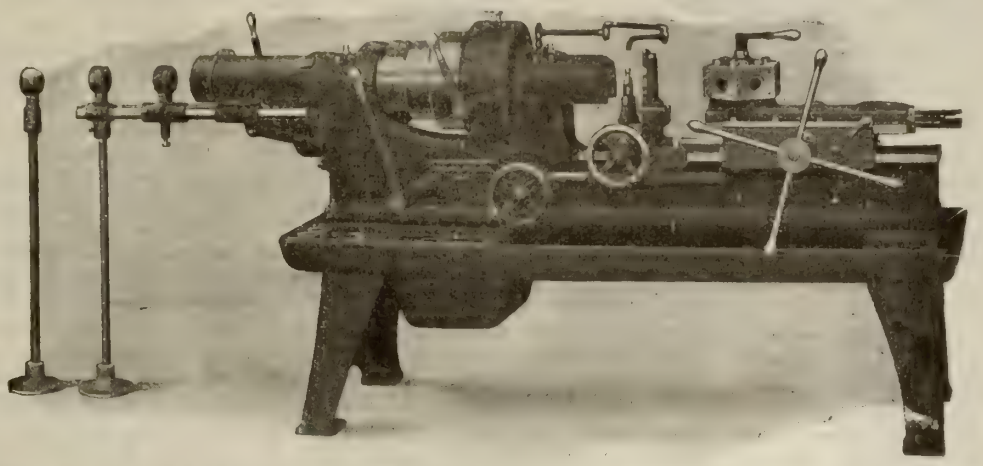
Montreal.—The General Currie, built at the Dominion Shipbuilding Co.'s yards in Toronto, has arrived here to load for Great Britain. She was built for the Imperial Munitions Board, and was launched in March last.

J. HENDRY
Master Car Builder of the G.T.R., elected President of the Canadian Railway Club.

Warner & Swasey Screw Machines

For large output and close limits—If you are figuring on screw machine work you can depend on W. & S. machines being right for the job.

We can supply you from stock immediately.



The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

64 Front Street West
TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

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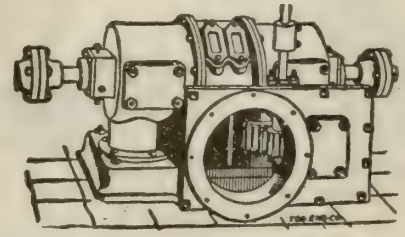
Phone Victoria 1492

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

ENGINEERS DISCUSS VARIOUS POINTS IN CONNECTION WITH METRIC SYSTEM

THE merits and demerits of the metric system were discussed at a joint meeting of the Toronto sections of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers, and the varied character of the discussion was indicative of the opinions held by these two branches of engineering.

The growth of the metric system was traced from its origin in the French Revolution, together with its gradual legalization in many of the European countries and in South America. While originally intended to represent the one forty-millionth part of the earth's quadrant, the standard meter is not in agreement with this original conception of the length, and a more accurate representation of its value is given in terms of the wave length of Cadmium red light.

The multiplicity of English weights and measures leads to an incalculable loss of time, and to the loss of considerable time in the schooling of the adolescent generations. In connection with the gradual penetration of the metric system, spoken of as desirable, it was pointed out that the best way of acquainting the general public in its use was to make use of it in the schools, training children in the use of both systems and making both equally familiar.

The fugitive decimal point was dealt with and the unwieldy numbers common to metric working drawings also came in for criticism. The decimal point on a blue-print is at best a nuisance, and on shop drawings and those used in the field is easily obliterated by the dirt and wear of everyday use.

The metric system is not, as may be supposed, universally used, even in the country of its origin, and in France the people and many industries still cling to the old weights and measures of their forefathers.

The munition business has done much to acquaint the manufacturers of the United States and Canada with the merits of the metric system. French guns and ammunition were both made to metric measurements by many firms without the slightest difficulty, and during the war the Baldwin Locomotive works made locomotives for the French Government to the metric system at no additional cost, the mechanics being supplied with gauges, etc., to metric scales. The present trend to the metric system was shown in the recent action of the wholesale grocers in the United States, who are recommending the printing of the metric equivalent and the English measure, together on all packages, thus familiarizing the general public with its nomenclature. This action will, undoubtedly, have a far-reaching effect.

In the field of export conflicting opinions were expressed. While the systems in general use in foreign countries have no uniformity, it is to be expected that diverging views should be held. Exporters to countries where the metric system is in common use, undoubtedly would be benefited by its use, while on the other hand, those exporting to countries, particularly in South America, where it is legal, but not universally adopted, find no difficulty in marketing their goods according to English weights and measures. In fact, some of these countries have brought their weights and measures into line with the English systems.

The adoption of some rational decimal system for English weights, measures and coinage would be extremely beneficial. In the dimensioning of drawings for such materials as armature punchings, it is, of course, customary at the present time to say, 12 inches plus or minus, a few thousands or ten thousands, otherwise the mechanic would get busy with his two-foot rule instead of using his mikes.

The enormous expense and difficulty of the transition period will undoubtedly greatly deter the adoption of the metric system in the machine shops and in those industries producing standard and interchangeable mechanisms. The production of mechanisms to metric dimensions offers no great difficulty, as may be illustrated in the fact that the Sunbeam aeroplane engine was manufactured in large quantities in Toronto to metric sizes. In this case, however, all metric measurements were transformed into English measurements, being carried to the nearest ten-thousandth. The machine tools in use at the present time would do equally well for production in one system as in the other, but it is in the making of jigs, fixtures and gauges that the greatest expense would be involved. New jigs, gauges, and, where stampings or forgings are involved, costly dies would be required and the old ones kept for replacement.

The automobile may be cited as one instance of this difficulty. It would be easy enough for a maker, turning out an entirely new car, to use metric measurements, but the transition from one system to the other, in the case of a maker already marketing a well-known line, would be costly and would involve considerable inconvenience to the public.

The transition period would create many other troubles, for instance, in the pipe-fitting trade. Two standard lines of pipe would have to be carried, one metric and one English, and pipe fittings numerous enough as it is would be multiplied enormously. An ordinary pipe tee would have to be stocked in five times as many sizes as at present to allow for interchangeability.

The electrical industry would have much to gain from the adoption of the metric system, as in the design of electrical apparatus both systems are in common use at present, with the metric system the more predominant. Electrical theory is, to a large extent, even in its practical applications, founded on the C.G.S. units, and much laborious calculation and the use of troublesome conversion constants would be avoided.

It is idle to suppose, that in the present state of the world's labor market, such a change could be accomplished without friction and trouble. It is doubtful if the average workman would take kindly to an innovation which would necessitate his acquiring a new system of measurements. The best way to introduce a new system to the inhabitants of any particular country would not be to make it compulsory, but to make the old system illegal and to make it the more difficult of the two to acquire and use.

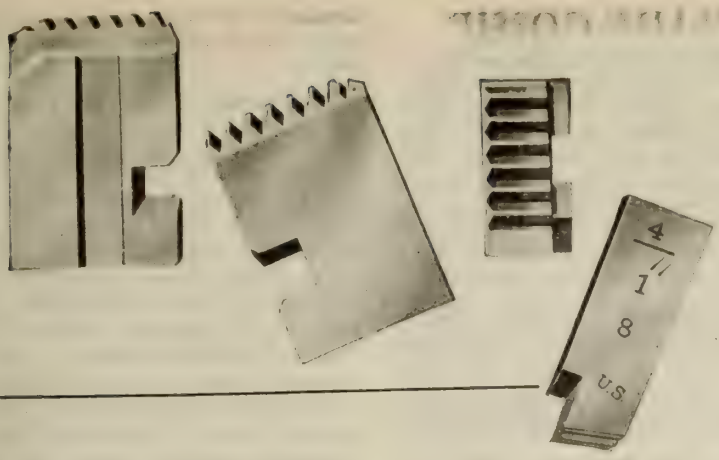
One important point developed in the course of the discussion had to do with the advantages a country at present using the metric system would have over one using the English system if the latter adopted the former system. With mechanics trained in the metric system and with the whole population acquainted with its use, the country familiar with it would undoubtedly be in a greatly superior position as regards export trade and would have an advantage even as regards competition in the home market of the country just changing over.

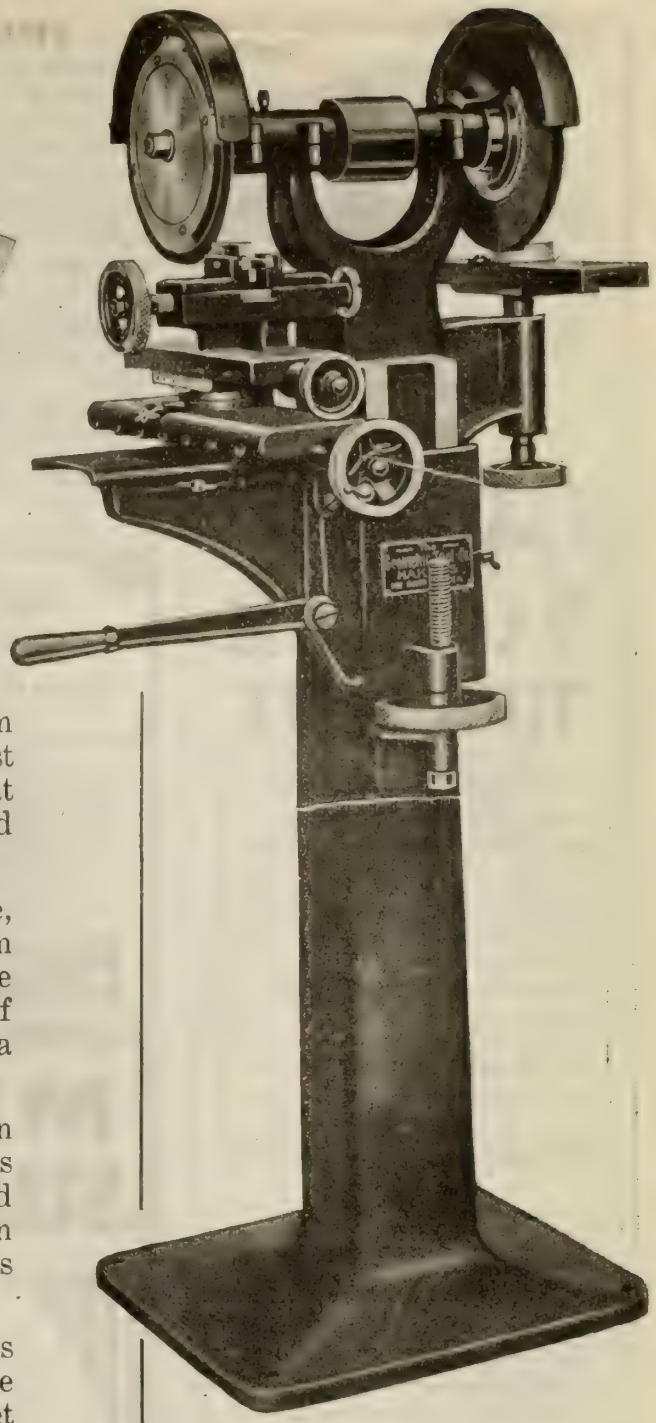
SULPHUR MARKET IN FRANCE

Investigations into the local market discloses that there is at present no market for sulphur products in France, according to a Consular statement, and, in fact, the same condition appears to hold for all of France in any large commercial way. This is due to the fact that the French Government controls the buying and distribution of these products. In commerce, sulphur products are used in this connection with the vine-growing and wine-production business. In regard to copper sulphate, the Government has purchased a large quantity at a high figure, nearly enough for next season's needs for all of France, and, it appears, will not let down the bars for importation until its contracted stock is disposed of.

SHIP PRODUCTION IN 1918

Outside of Germany and Austria-Hungary, the shipyards of the whole world during 1918 produced 5,477,444 gross tons of merchant shipping, as given in the annual summary of Lloyd's Register of Shipping. This is 63 per cent. higher than the total in the year 1913, which held the record for construction, and included the output of Germany, Austria, etc. The total for the United Kingdom in 1918 was 1,348,120 gross tons, and the output for the United States was 3,033,030 gross tons, which is equal to that for the ten years 1907 to 1916 in the United States, and half of this was built on the Pacific Coast. Of the United States total output of 3,033,030 tons, about 1,000,000 consisted of wooden ships.





Sharp Chasers Cut Clean Threads

Accurate, uniform threads result only from dies which are maintained in the highest state of cutting efficiency. This means that chasers must be kept sharp, and ground uniformly.

Even if just touched up from time to time, the chasers respond splendidly, with clean threads. And with this machine — the Geometric Chaser Grinder—the matter of keeping threading tools up to scratch is a comparatively simple matter.

Various makes of chasers can be ground on this adaptable machine. The two wheels permit the easy grinding of both milled and tapped chasers. In addition, the plain wheel lends itself readily to various kinds of tool grinding.

Uniform grinding of a set of chasers is purely a mechanical matter through the use of adjustments which can be accurately set to govern the grinding of an entire set of chasers.

The Catalog describing this machine is a mine of information on chaser grinding. Write for it.

THE GEOMETRIC TOOL COMPANY

NEW HAVEN **CONNECTICUT**

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TRADE GOSSIP

Toronto Saves Money.—The saving to the city of Toronto, due to their fighting the rate increase of the Bell Telephone Co., amounts to $440,000. The reduction of the rate increase in 1919 from 20 to 10 per cent. makes a saving of $250,000, while the refusal of the installation charge amounts to $40,000. The saving due to the whole increase being delayed six months is $150,000.

Increase Pensions.—The C. P. R. directors have decided to grant a special allowance for a period of at least 18 months, of an increase of 25 per cent. on all pensions to officers and employees now on the pension roll. This action was taken with the realization that the higher cost of living justified the extra allowance. The annual amount now paid out to pensioners was upwards of $267,000.

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Buy Asphalt Plant.—At a meeting of the council of Charlottetown, P.E.I., a short time ago, Councillor McKinnon reported that it had been found advisable for the city to purchase an asphalt plant. This would enable the city to make its own pavings and to do as much work as they were able each season. None of the firms he had been in touch with would consider coming for less than a $100,000 contract.

Foreign Markets for Canada.—The Canadian Commissioner for Trade, in a message to the Government, gives particulars of markets that are open to Canadian producers. These include markets in Norway, Sweden, Denmark and Hollond. The list covers wheat and grain, fodder, cheese, canned goods, chemicals, minerals, agricultural and industrial machinery, paints, wire and wire rope, boots and shoes, leather and automobiles and cycles, binder twine and rubber footwear.

Placing Returned Soldiers.—Since the inception of the Government Employment Bureau at Guelph in March last, it has been instrumental in placing 210 returned men in positions. Most of these men found places in the city. 232 civilians have also been placed, most of these being also being fixed up in the city. There is a good demand for labor at present, both in the factories and on the farms. One firm outside of Guelph wrote to the bureau asking for 50 men for factory work.

Will Continue to Act.—The Montreal Metallurgical Association, which was formed in 1915, as a war factor in connection with the more efficient operation of munition factories, will now continue its activities on a permanent basis. This was decided at a recent meeting of the council. Dr. A. Stansfield, the founder of the association, has retired from the presidency, and G. Percy Cole has been elected to that office. H. J. Roast is vice-president, and Capt. J. G. Ross is the new secretary.

April Fire Losses.—Fire losses in Canada during April totalled $850,000, where the damage was $10,000 or more, according to a summary made by the New York "Journal of Commerce." The losses by fire for the United States and Canada were considerably smaller than was the case for April, 1918. The largest fire reported during the month was at the wire and cable plant, in West Toronto. One other fire occurred where the damage exceeded $100,000; this occurred in the railway yards at St. Boniface, and forty cars of grain and coal were destroyed, involving a loss of $105,000.

New Trade Service.—The establishment of a monthly shipping service between Canada and Roumania was decided upon recently and the first sailing from Montreal has been announced for some time in the latter part of this month. The exact date will be an-

nounced later. The business secured by Canadian firms with Roumania led to the decision to inaugurate this service. The steamship Jiul on its arrival from Liverpool will load for the voyage to South-Eastern Europe. The merchandise to be carried will consist of the material to be used for reconstruction. The extending of credits through the Canadian Trade Commission is the cause of the direct steamship being established. The vessels will call at Greek ports.

To Aid Education.—Federal support for technical education aggregating ten million dollars within the next ten years, the money to be paid to the provinces, is provided for in the following resolution, of which notice has been given by Hon. J. A. Calder, Minister of Immigration and Colonization: Resolved that it is expedient—(1) To bring in a measure for the promotion of technical education in Canada. (2) That for the purpose of promoting and assisting technical education in Canada, sums, aggregating ten million dollars, shall be appropriated and made available for payment out of the consolidated revenue fund of Canada, during each fiscal year for the period of ten years, beginning with the year ending March 31, 1920.

MARINE

Collingwood.—The steamer City of Meaford, owned by the Collingwood Steamship Co., was totally destroyed by fire while lying at the wharf on the west side of the harbor. The steamer was valued at $12,000, and was partly insured. The fire is said to be due to an incendiary.

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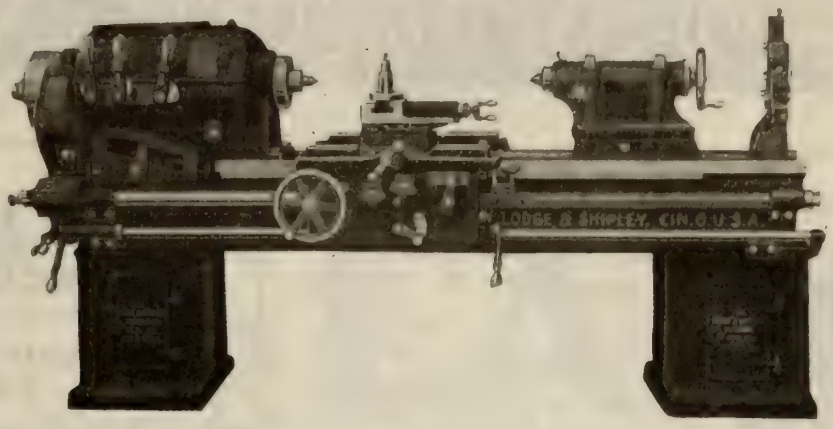

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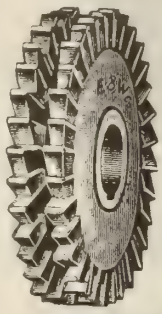

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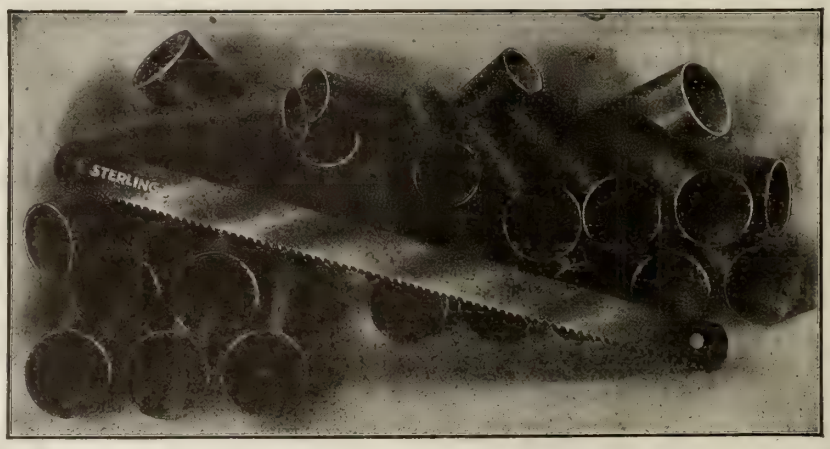

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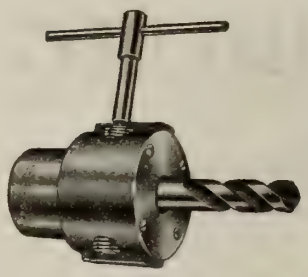

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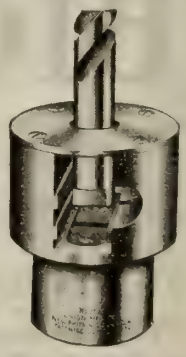

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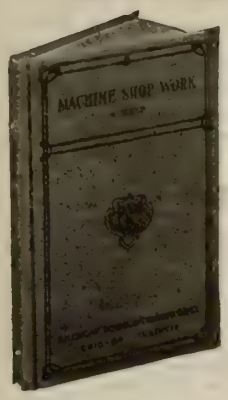

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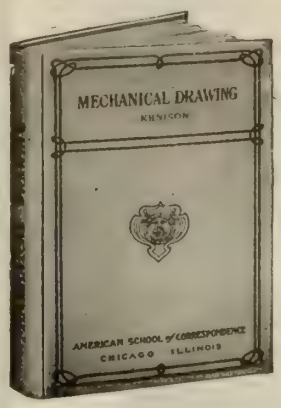

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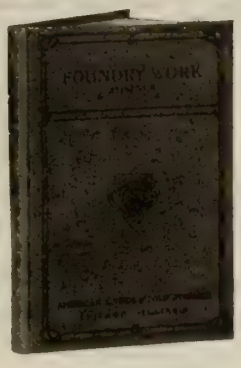

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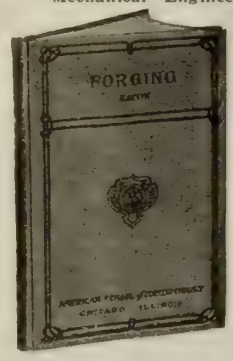

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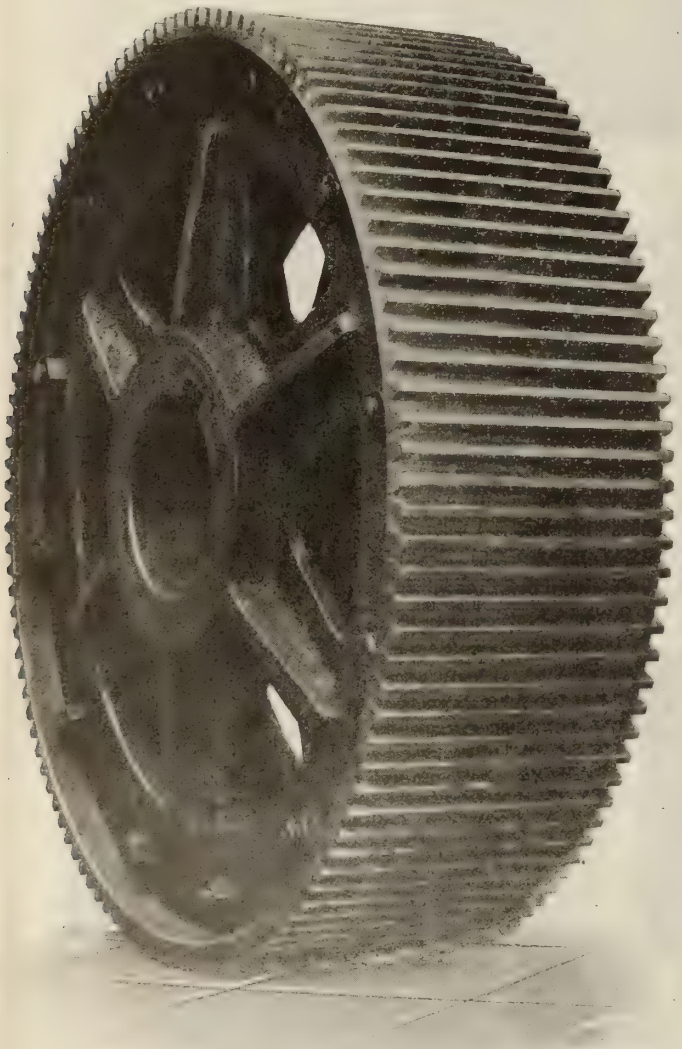

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SPEAKING at Leeds, England, the other day, Lloyd Harris, chairman of the Canadian Trade Commission in London, said: "Canada must no longer be thought of simply in terms of prairies, but in terms of factories. The economic effect of the war had been to change Canada within four years from a primarily agricultural to a predominantly industrial country. In the year ending March, 1914, the value of exported manufactures was $57,000,000, against agricultural exports valued at $198,000,000. In the year ending March, 1918, the value of exported manufactures was $636,000,000, against the value of exported agricultural products of $567,000,000."

U.S. Firms to Conduct Export Trade from Canada

The announcement from Detroit that the Maxwell Motor Car Company is planning to conduct its entire export business from Windsor, and that $6,000,000 will be spent in the next eighteen months on extensions and new construction work at the plant at Walkerville, is only one of a number of contemplated industrial developments which reflect the importance of Canada's favorable trade relations with Great Britain. And in this connection the recent arrangements effected through the activities of Lloyd Harris and the Dominion Trade Mission are significant.

The Financial Post Informs You Early on Business Developments

Canada is gradually going forward into vastly greater industrial development. It will pay you to keep in close touch with the whole Dominion in this respect. For this purpose THE FINANCIAL POST is undoubtedly the paper for you. The information given above is from THE POST of April 12th (Special Insurance Issue). Here are a few more titles from the same issue:—

Advances for the Industrials Recent Feature
Discriminate Use of Pruning Knife in Tariff
Nearly $1,000,000 for Canadian Shoes
Montreal Cement Co. to Erect Big Plant
Canadian Trade Commission Gets Big Timber Order
Millers Seek Assistance of Government
Globe Attitude on Abitibi Paper is Bolshevism
Steel Industry Unsettled by Price Fixing
People Must Discharge the Debt of the Nation
Railroads for Tariff Commission
Ames, Holden Dividend in Sight
Dividend Near for Atlantic Sugar
Dominion Iron Making Claim to $21,000,000
Montreal Power Refuses to Bow to Union Demand
Goodwins Show $34,000 Gain in Gross Profits
Business Ideas in Financing Stock Raising
Reserve Bankers Favor Canadian Bank System
Can Sir Adam Beck Run Toronto? (Editorial)
Purchasers of Manitoba Bonds are Disclosed
Moose Jaw had Surplus from 1916 Operations
March Building Permits Show Good Gain Over 1918
House Demand in Toronto is Very Brisk
INSURANCE SECTION
Enormous Expansion in Fire Insurance
Marked Growth of Automobile Insurance
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Life Companies Swamped With New Business
Actuaries Favor 'With Profit' Life Policies
Advantages of Commercial Life Insurance Recognized
Business Grows in Employers' Liability Field
Important Part Played by Current Surplus Earnings
Influenza did not Boom Health Insurance so Much
Fire Co. Stocks may be Very Lucrative
More Demand for Mortgage Loans is Taking Place
Types of Policy that Have the Call

Business Building News Items Appear Each Week in *The Financial Post*

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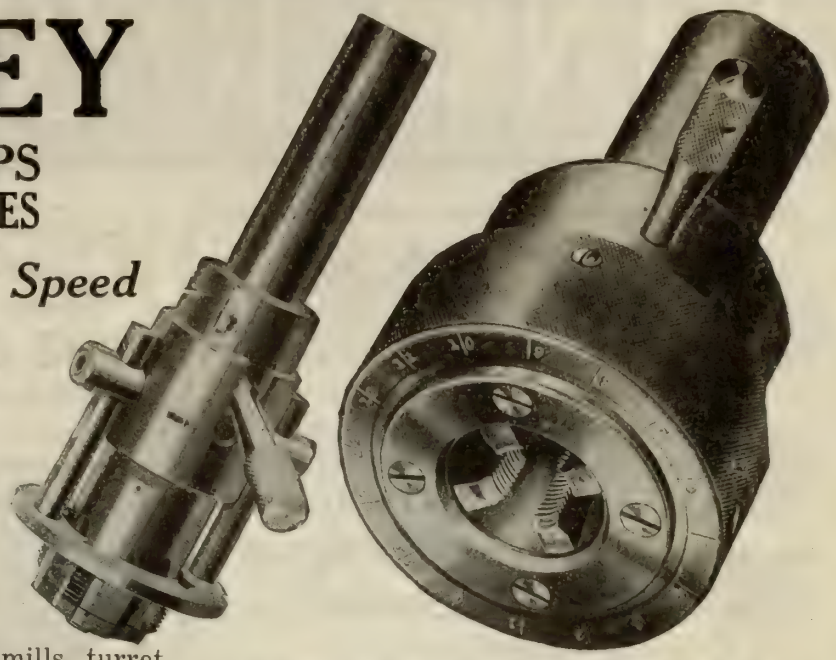

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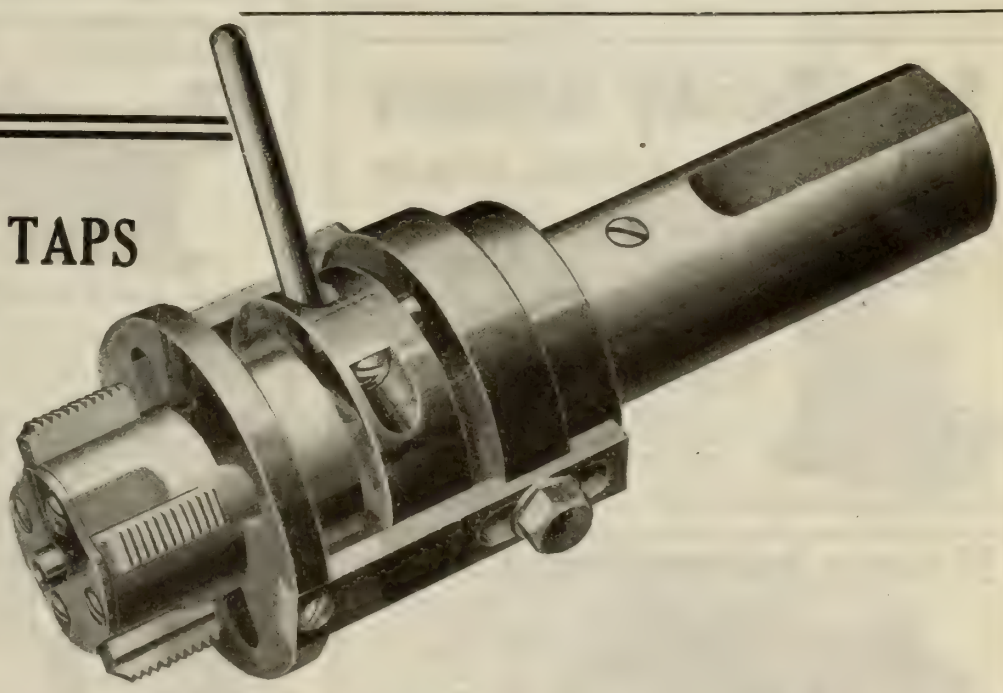

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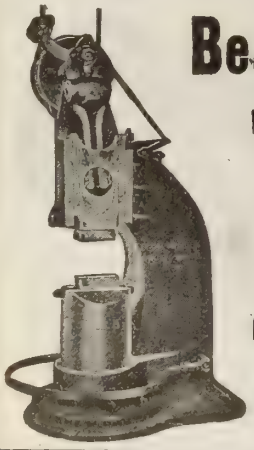

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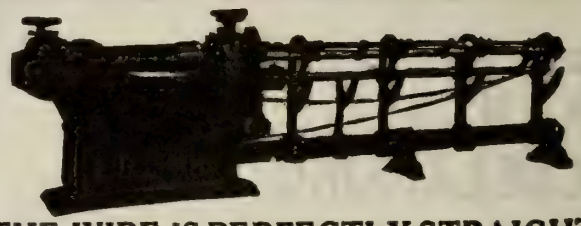

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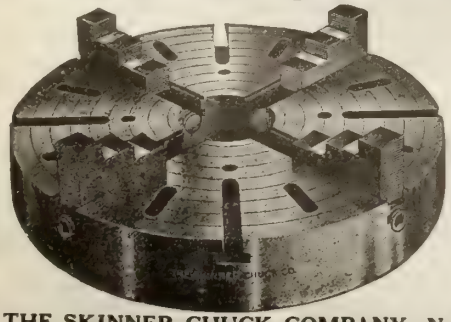

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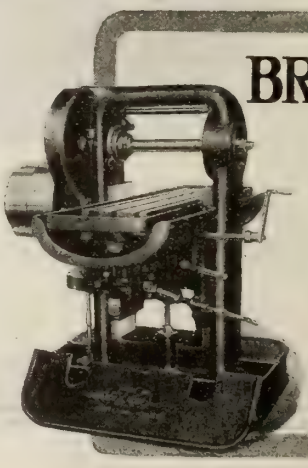

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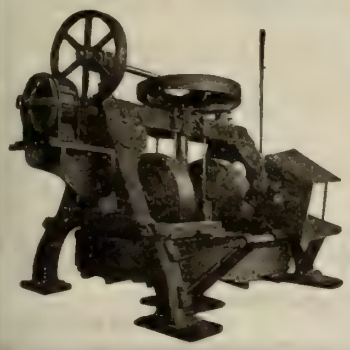

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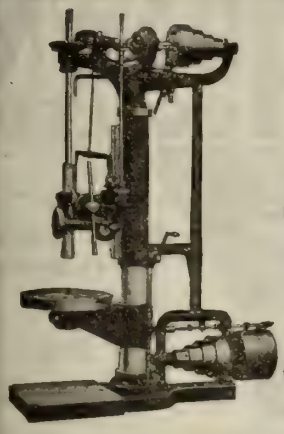

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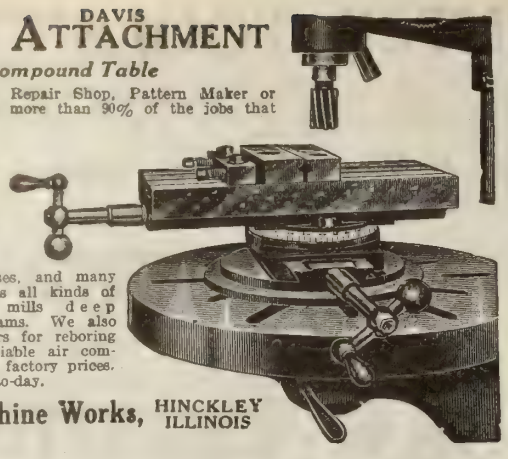

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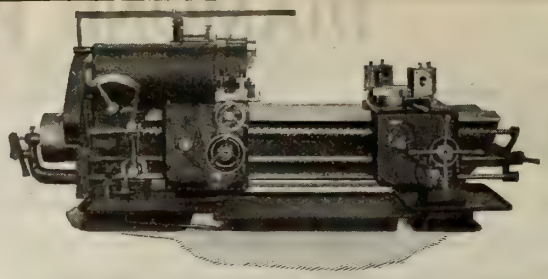

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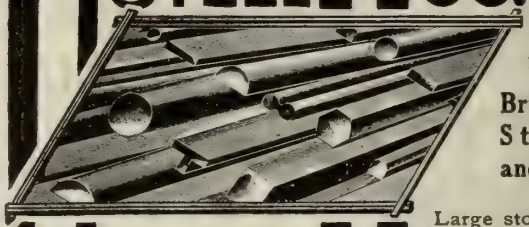

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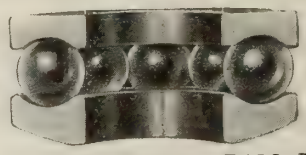

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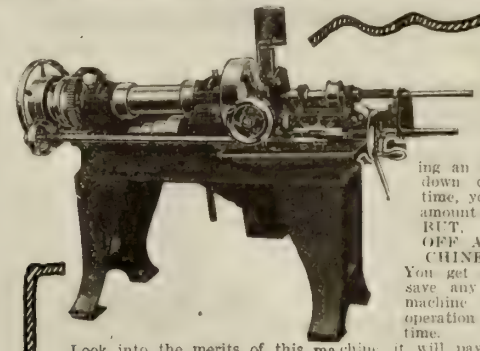

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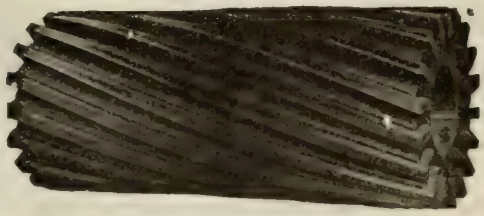

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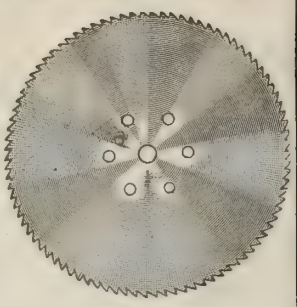

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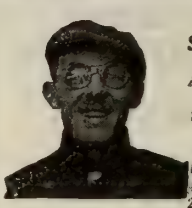

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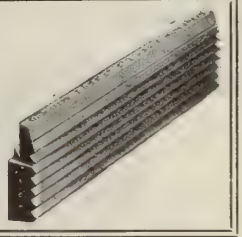

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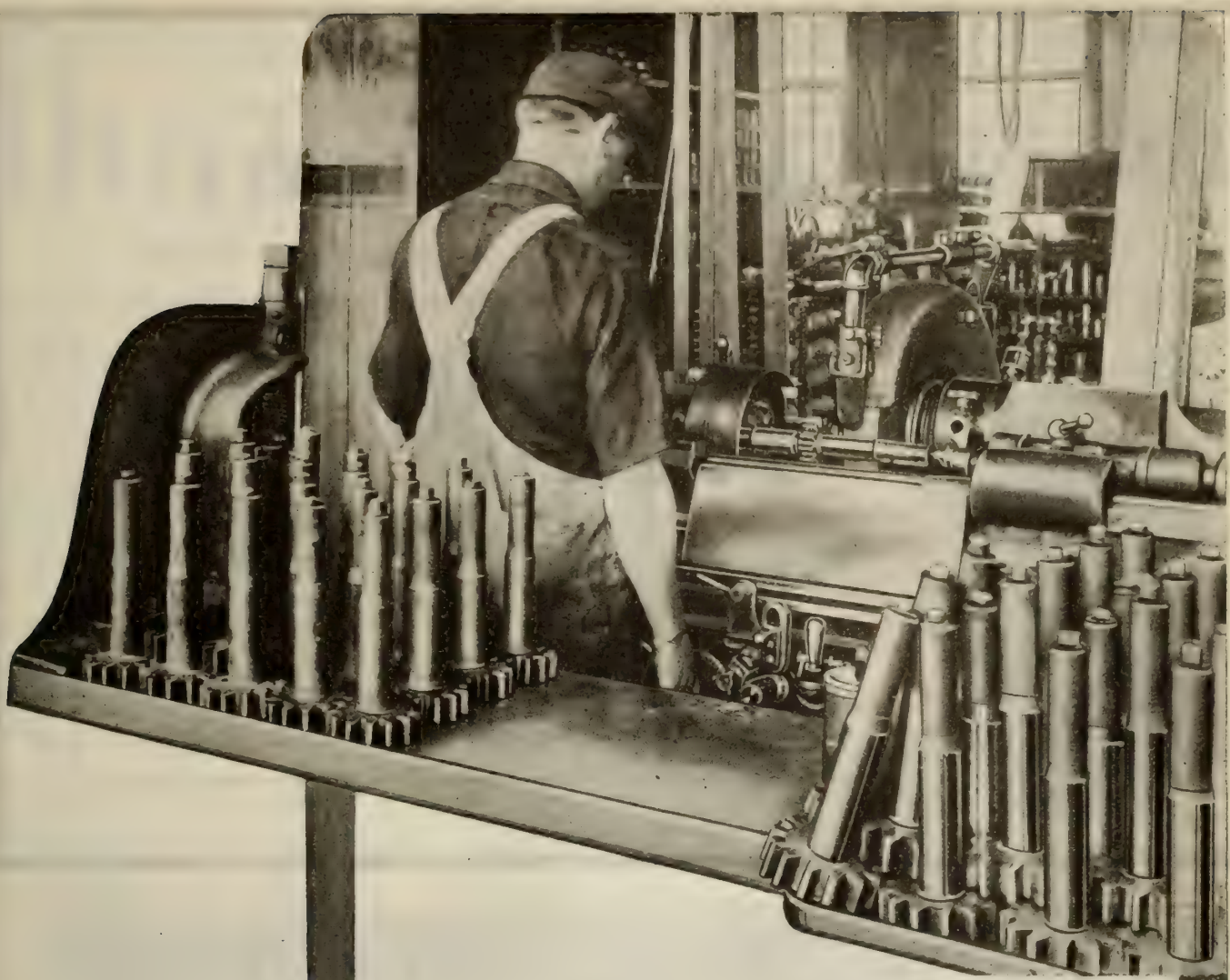

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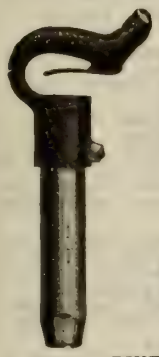

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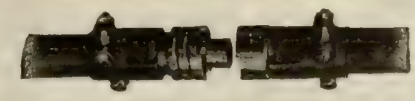

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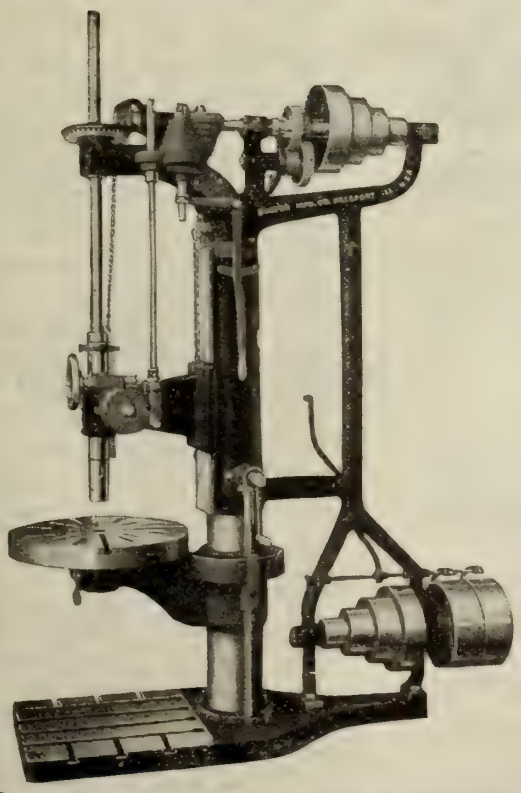

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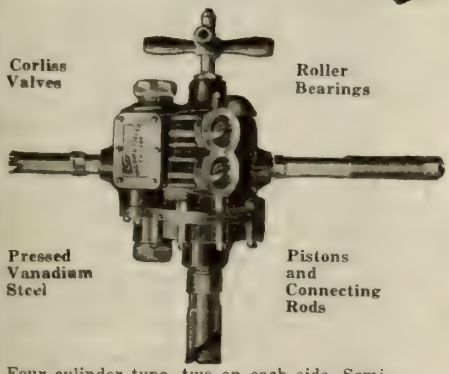

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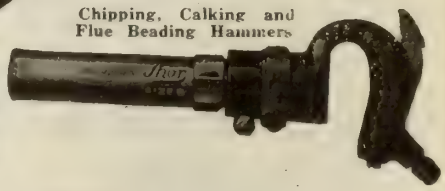

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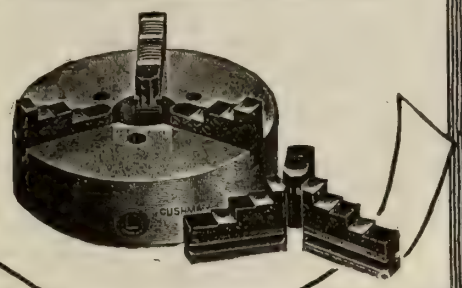

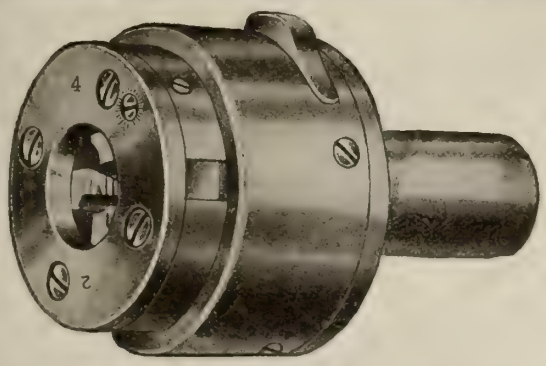

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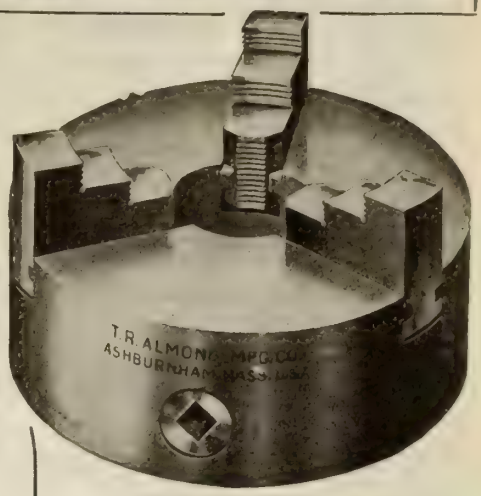

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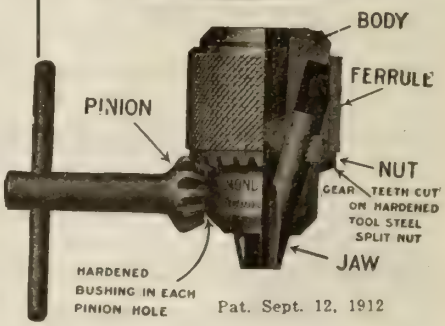

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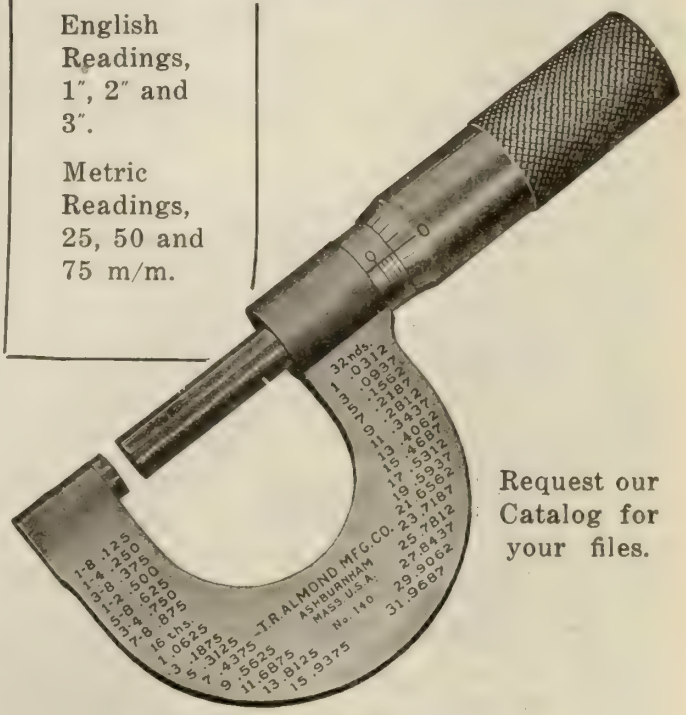

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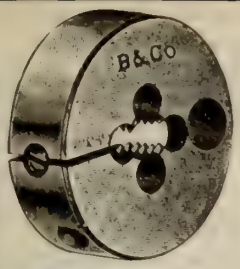

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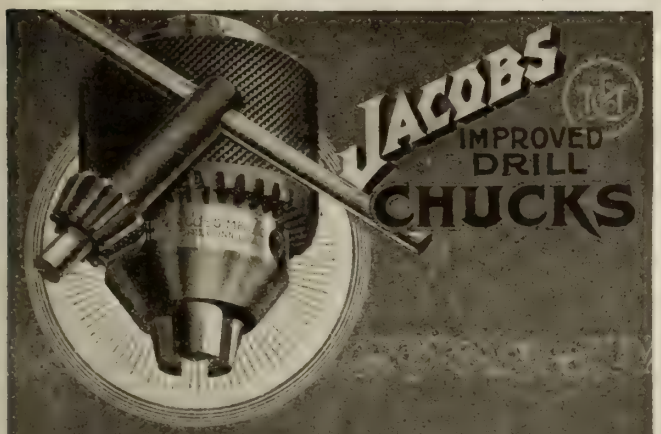

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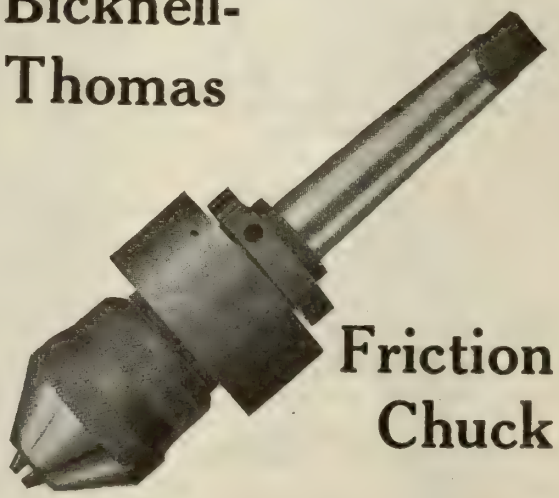

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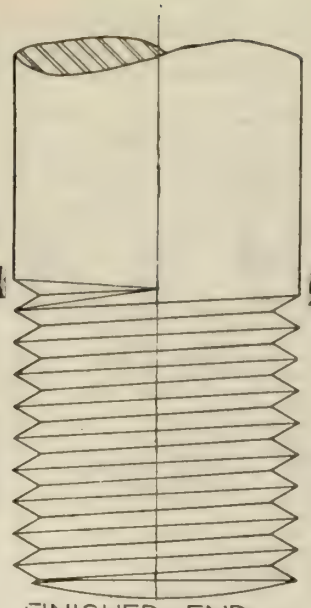

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Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SINGLE PURPOSE
Baxter & Co., Ltd., J. R., Montreal, Que.
Bertram, John, & Sons Co., Dundas Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SCREW CUTTING
Bertram, John, & Sons Co., Dundas, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Whitcomb-Blaisdell Mach. Tool Co., Worcester Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPEED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPINNING
Bliss, E. W., Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TOOL ROOM
Cisco Machine Tool Co., Cincinnati, Ohio.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TURRET, HAND, HORIZONTAL
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram, John, & Sons Co. Dundas Ont.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
H. C. Dodge, Inc., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co. Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

LEAD BURNING
St. Lawrence Welding Co., Montreal, Que.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LENSES FOR GOGGLES
Standard Optical Co., Geneva, N.Y.

LIDS, SCREW TOP AND HINGE
Can. Winkley Co., Ltd., Windsor Ont.

LIFTS, PNEUMATIC
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LOADERS, WAGON AND TRUCK
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.

LUBRICANTS
Cataract Refining & Mfg. Co., Toronto.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

LUMBERMEN'S TOOLS
The Thos. Pink Co., Ltd., Pembroke, Ont.

MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal, Que.
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Marten Mach. Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, MULTI-DRILLING
National Automatic Tool Co., Richmond, Ind.

MACHINERY, TRANSMISSION (POWER)
Morse Chain Co., Ithaca, New York.

MACHINES, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

MACHINES, MULTI-BORING
National Automatic Tool Co., Richmond, Ind.

MACHINE SHOP WORK
James Ballantyne, Montreal.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MACHINE TOOLS
Williams & Wilson, Limited, Montreal, Que.

MACHINE & REPETITION WORK
Katie Foundry, Ltd., Galt, Ont.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co. of Canada, Ottawa, Ont.
Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MASKS, WELDING, SMOKE, FUME, GAS, ETC.
Strong, Kennard & Nutt Co., Cleveland, Ohio.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Toronto Testing Laboratory, Ltd., Toronto.

METAL SAWS
Simonds Mfg. Co., Fitchburg, Mass.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

METAL STAMPINGS, SMALL
Can. Winkley Co., Ltd., Windsor, Ont.

METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn..

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
The Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

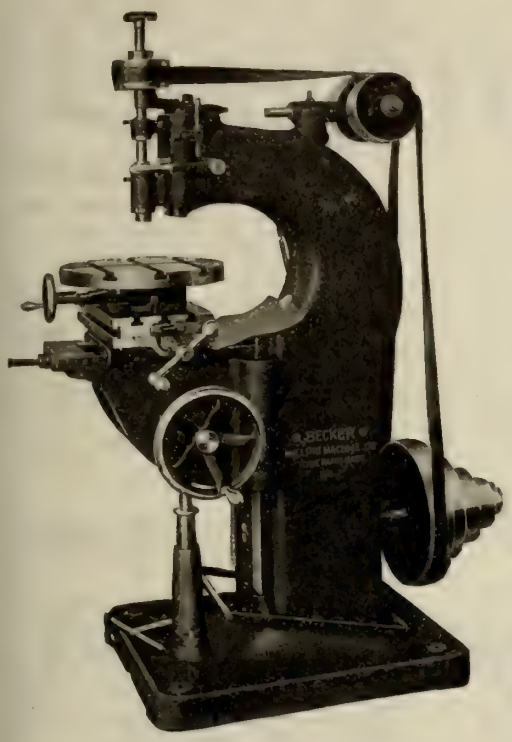
MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING EFFICIENCY



The after-war competition requires absolute elimination of waste by manufacturers who would succeed. Costly machining must be replaced by economical methods and in no way can you reduce costs so quickly, so well and so completely as by employing

BECKER
BELT DRIVEN
MILLERS

The Model 2 Miller, shown here, is one of the machines that make for inexpensive milling. It is inexpensive not only because it is a production tool of high calibre, but because the initial investment is low. It is so perfectly made and so accurately assembled, that the maintenance is practically nil.

In the last analysis—the "Becker" is efficient.

Write for circular 0-504—now.

BECKER MILLING MACHINE CO.
HYDE PARK, BOSTON, MASS.

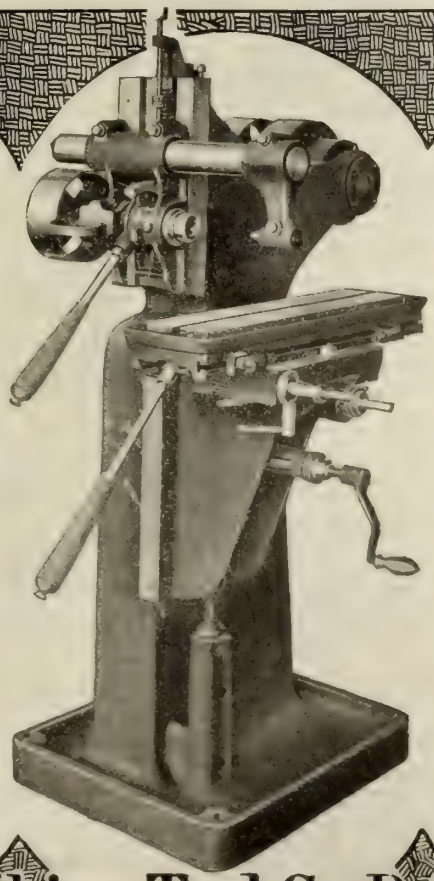
Canadian Agents:

Rudd-Belnap Machinery Company, Limited, 137 McGill St., Montreal, Que.
A. R. Williams Machinery Company, Ltd., 64 Front St. W., Toronto, Ont.

The "BRISTOL" Hand Milling Machine

Extensively used in the manufacture of small parts where accurate duplication is essential. Illustration shows our number 1 Heavy Type Hand Miller.

Specially designed for use on work where heavier machine than standard type is necessary.



Convenience Assures Big Production

The lever controls make a very convenient method of operation, though crank is furnished for table feed for use when so desired.

Users acknowledge these machines to be exceptional producers, proving in many cases more satisfactory than milling machines of the more expensive type.

Write for catalogue.

BRISTOL

BRISTOL

The Bristol Machine Tool Co. Bristol, Connecticut

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The Dunbar Brothers Co., Bristol, Conn.

MOTORCYCLE FRAME AND FORK
The Dunbar Brothers Co., Bristol, Conn.

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Pritchard-Andrews Co., Ottawa, Ont.

NICHROME CASTINGS
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

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Boker & Co., Inc., H., Montreal, Que.

NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL
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Kayser-Ellison & Co., Ltd., Montreal.
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Landis Machine Co., Waynesboro, Pa.
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Wilkinson & Kompass, Hamilton, Ont.

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NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

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National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
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Sheldon's, Ltd., Galt, Ont.

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Carborundum Co., Niagara Falls, N.Y.
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OIL STORAGE SYSTEMS
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OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS

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Brantford Oven & Rack Co., Brantford, Ont.

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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

OXY-ACETYLENE WELDING AND CUTTING PLANT
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Prest-O-Lite Co., Inc., Toronto, Ont.

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Cleveland Wire Spring Co., Cleveland.

PACKINGS, LEATHER, HYDRAULICS, ETC.
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Graton & Knight Mfg. Co., Worcester, Mass.
William R. Perrin, Ltd., Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

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Bertrams, Ltd., Edinburgh, Scotland.
MacKinnon Steel Co., Sherbrooke, Que.

PAPER MILL MACHINERY
Garlock-Walker Machinery Co., Toronto, Ont.

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Oliver Machinery Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

PATTERN MARKERS' LATHES
Oliver Machinery Co., Grand Rapids, Mich.

PATTERN MAWERS' VISES
Oliver Machinery Co., Grand Rapids, Mich.

PATTERN SHOP SUPPLIES
Oliver Machinery Co., Grand Rapids, Mich.

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Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
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Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

PEDESTALS WITH DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Canada Wire & Iron Goods Co., Hamilton.

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Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PINS, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph, Ont.

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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Toronto Iron Works, Ltd., Toronto.

PIERCING
Oliver Machinery Co., Grand Rapids, Mich.

PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE REAMERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE STOCKS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE THREADERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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General Steel Co., Milwaukee, Wis.

PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Oliver Machinery Co., Grand Rapids, Mich.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

PLANER-SHAPER, COMBINED OPEN SIDE
Lund-Farquhar Co., Boston.
Williams & Wilson, Limited, Montreal, Que.

POWER HAMMERS
Quickwork Co., St. Marys, Ohio.

POWER TRANSMISSION MACHINERY
Williams & Wilson, Limited, Montreal, Que.

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Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

PLIERS
Aikenhead Hardware Co., Toronto.
Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.

POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Quebec.

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Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
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WILSON FEARED THE BRITISH

THE American President crossed the Atlantic in the first place with the idea in his mind that his ideals would be thoroughly in accord with those of the French statesmen; but he was rather afraid of a conflict with the British delegates. He found in reality that his plan for peace terms was as far removed from the French plan as the two poles. Then he crossed to London and was surprised to find that the ideas of the two Anglo-Saxon powers were identical.

This situation, according to J. W. Dafoe in the May issue of MACLEAN'S MAGAZINE, explains much that has developed at Versailles. Further, it contains the promise of a close *rapprochement* between the two great English-speaking democracies for all time to come.

Mr. Dafoe has contributed a remarkably interesting article to this number of MACLEAN'S, lifting the curtain on many of the puzzling situations that have arisen overseas. As the editor of the Manitoba *Free Press*, he is the dean of Canadian newspapermen; as the representative of the department of Public Information on the Canadian Mission to the Peace Conference, he was in a special position to learn what was transpiring. He tells of the really big part that Canada has played in the Proceedings and points out that Canada's status as a nation was firmly established in the eyes of the world when she was allowed separate representation.

A Dozen Other Features---Nationally Important

This May issue is full of articles of unusual significance for Canadian readers.

"SOLVING THE PROBLEM OF THE ARCTIC"
—By Vilhjalmur Stefansson

The second instalment of his remarkable story of the four years of exploration that he undertook for the Canadian Government in the region of the "Pole of Inaccessibility"—a harder place to reach than the North Pole.

"ORGANIZING FOR PEACE"
—By George Pearson

An article of the Great War Veterans' Association by a well-known author-soldier.

"THE CANADIANS IN SIBERIA"
—By Capt. W. E. Dunham

A graphic story of what our forces did in combatting the Bolsheviki, by an officer who has just returned.

"SAFE IN THE SADDLE"
—By J. K. Munro

A review of affairs at Ottawa in which the opinion is expressed that Union Government for the time being is safely entrenched.

The National Idea

The articles in this issue of MACLEAN'S reflect the national idea—Canada's part in the Peace Conference, the political situation at Ottawa, the exclusive report of Stefansson's national explorations, the national organization of our returned men, the work of our forces in Siberia. The reader of MACLEAN'S gets a broad idea of what Canada as a whole is doing. The value of this issue— and of all issues —is very great, therefore, from an educational standpoint.
MACLEAN'S is the one magazine that should be selected for young Canadians to read.

Four capital stories by famous authors—W. A. Fraser, Lloyd Osborne, Frederic S. Isham and C. W. Stephens.

The Review of Reviews

An unusually fine array of articles is given in this department, selected from the best in magazines and periodicals the world over. Some of the titles are:

Planned to Destroy British Fleet.
How Mackensen Was Caught.
Events of War Foretold by Stars.
What is Life Like Beyond the Grave?
A High-born Bolshevik.
The New Life in Dry America.
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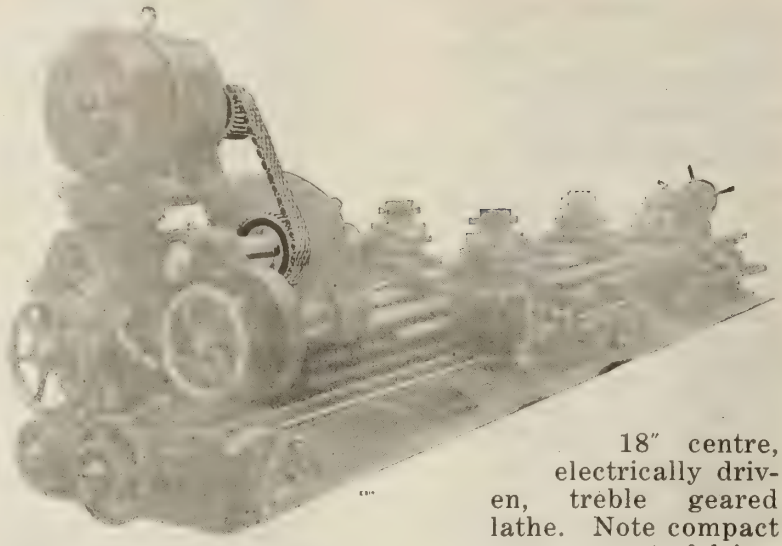

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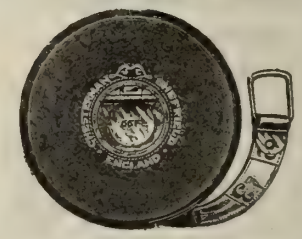

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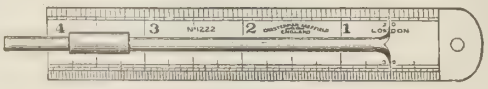

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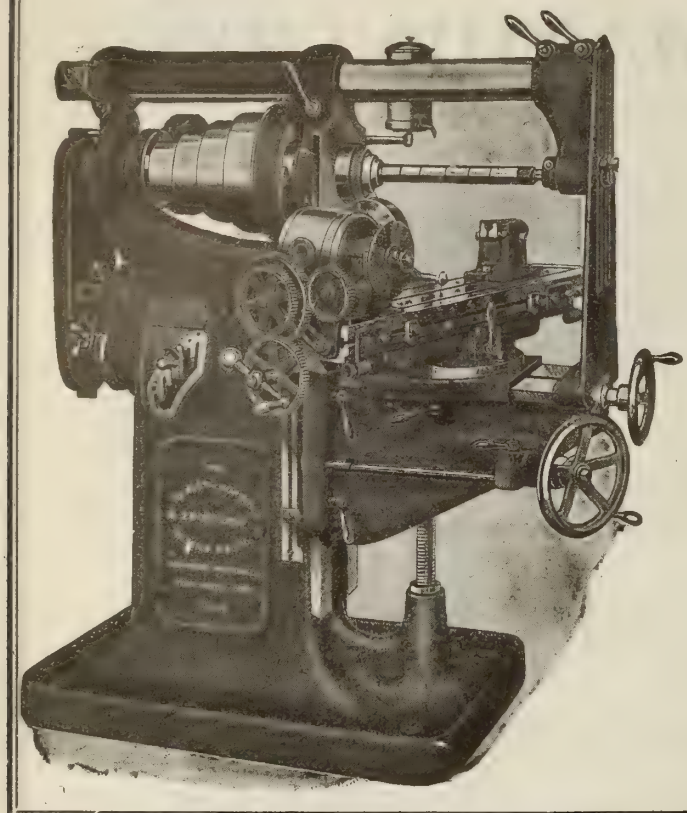

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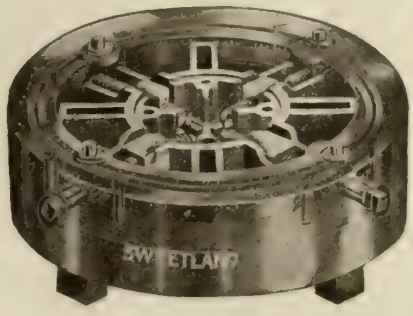
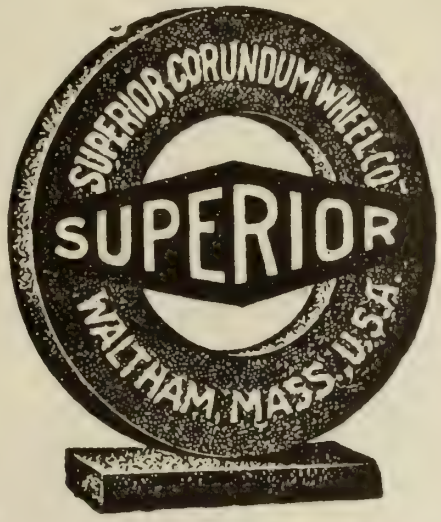
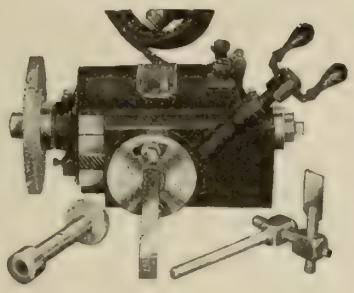


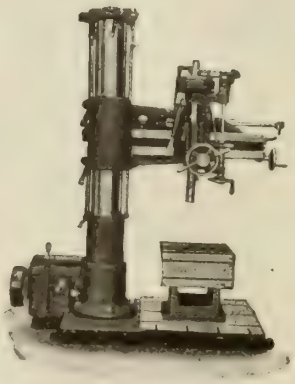


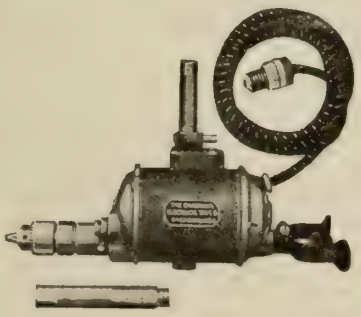


Let "Foss" be Your Guide

when in the market for machine tools.

Long experience and extensive organization, and a reputation which we are proud of, stand behind **each** and **every** line that we sell. Write or wire us.



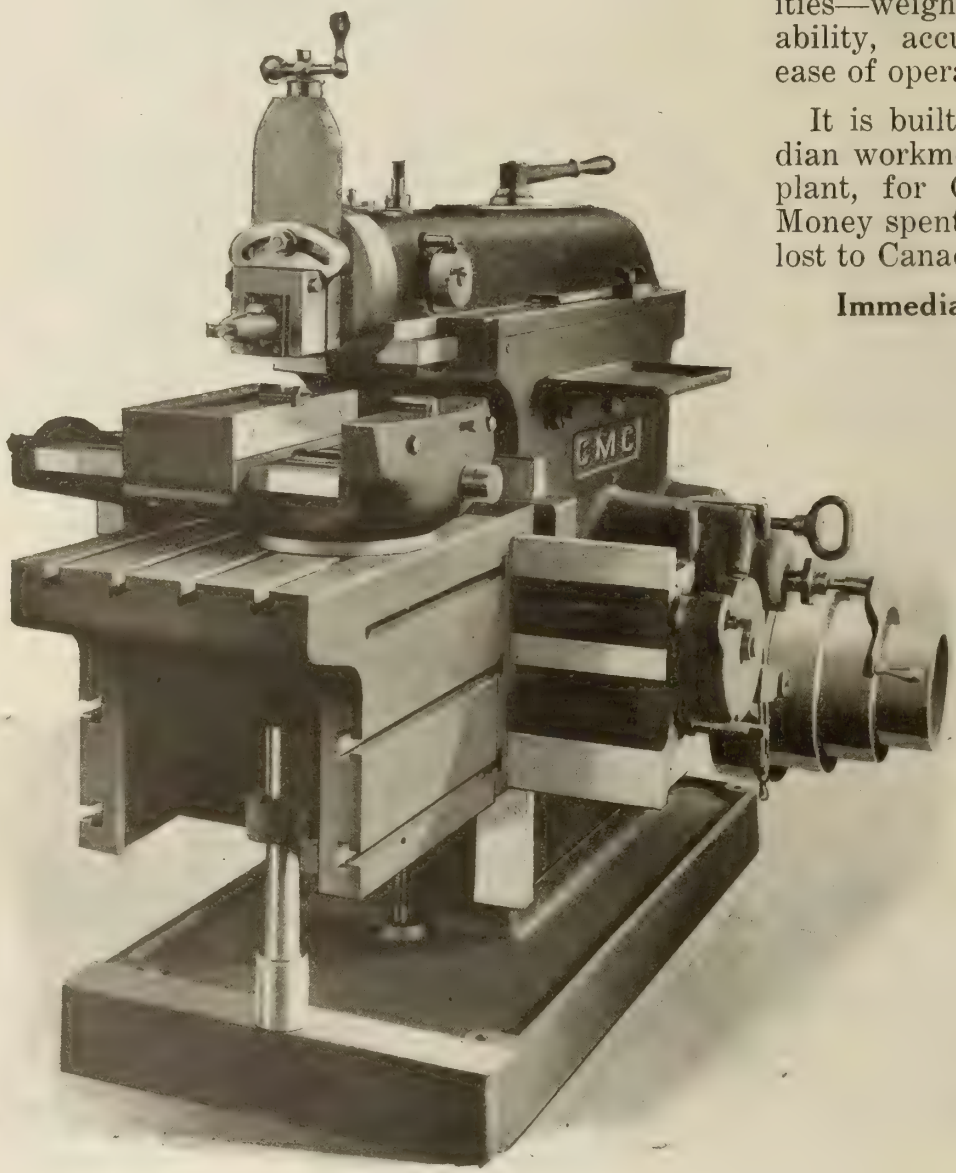


The Geo. F. Foss Machinery & Supply Co., Limited

305 St. James St. Montreal, Que.

QUALITY • Foss SERVICE

CRANK C.M.C. SHAPER



The C.M.C. crank shaper is a machine of recent design having all the essential qualities—weight, rigidity, durability, accuracy, speed and ease of operation.

It is built by skilled Canadian workmen, in a Canadian plant, for Canadian service. Money spent in Canada is not lost to Canadians.

Immediate Deliveries.

SIZES:
26″ x 30″
and
20″ x 22″

BUY W-S S WAR-SAVINGS STAMPS

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: BROCK AVENUE SUBWAY

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXI. No. 22. Publication Office: Toronto, May 29, 1919 Subscription Price $3.00 per Year

60 IN. MOTOR DRIVEN FORGE LATHE

CUTTING FROM STEEL SHAFT .35 CARBON 24 IN. DIAMETER, 2¼ IN. REDUCTION IN DIAMETER, 1/16 IN. FEED, AT 30 FT. PER MINUTE

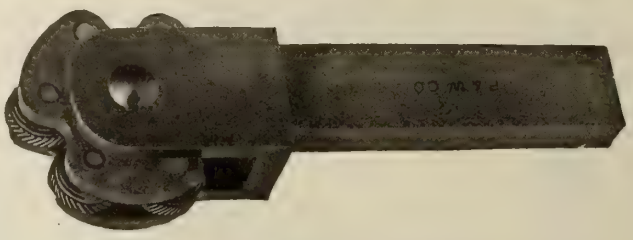
The John Bertram & Sons Co., Limited

DUNDAS, ONT., CANADA

Montreal - - - - 723 Drummond Building
Toronto - - - - - - 1002 C.P.R. Building
Vancouver - - - 609 Bank of Ottawa Bldg.
Winnipeg - - - - 1205 McArthur Building

SMALL TOOLS

P. & W. Combination Lathe Knurling Tool

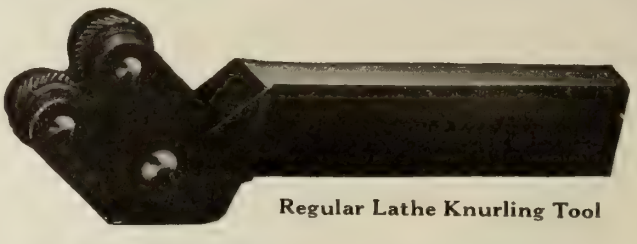


Combines Three Distinct Knurling Tools In One

You will save time by using this three-in-one Lathe Knurling Tool.

It carries three pitches of knurls fine, medium and coarse, as shown in sample. This does away with necessity of having three holders or of changing knurls where but one holder is available. Same knurls can be used in this holder as are used in our regular Lathe Knurling Tool.

FINE MEDIUM COARSE



Regular Lathe Knurling Tool

PROMPT SERVICE

is assured at our present store where P.W. Small Tools are carried in stock. Place your order there to-day.

Precision Machine Tool---Standards & Gauges

PRATT & WHITNEY CO.

OF CANADA, LIMITED

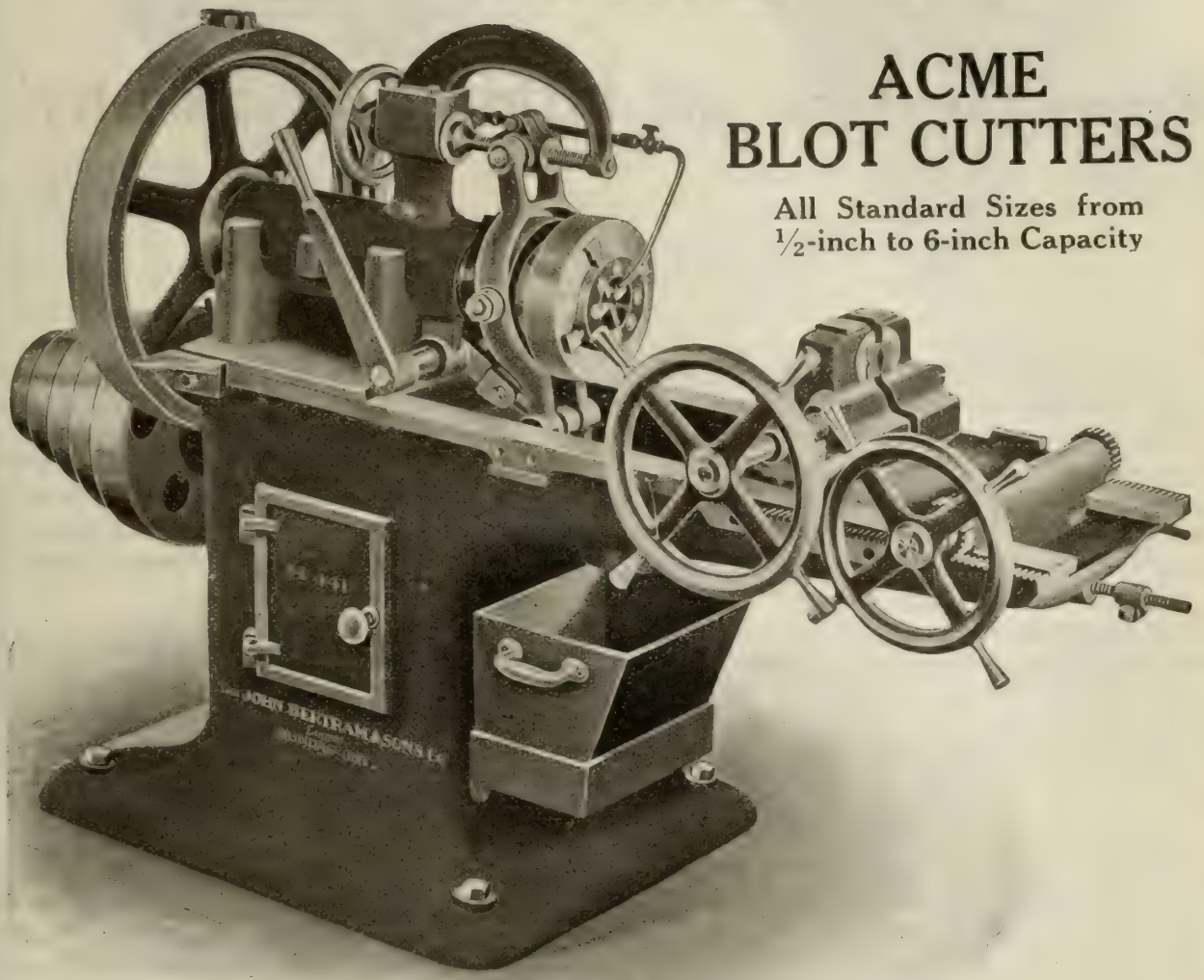
Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS

ACME BLOT CUTTERS

All Standard Sizes from
½-inch to 6-inch Capacity



Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of Pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE
OR MACHINES IN WHICH YOU ARE INTERESTED

The John Bertram & Sons Company
Limited

DUNDAS, ONTARIO, CANADA

MONTREAL	TORONTO	VANCOUVER	WINNIPEG
723 Drummond Bldg.	1002 C.P.R. Bldg.	609 Bank of Ottawa Bldg.	1205 McArthur Bldg.

The Publisher's Page

TORONTO MAY 29, 1919

"Raises the Tone and Efficiency of Industry"

Mr. H. J. Sherman, of the Toledo Scale Co., Toledo, Ohio, writing in "Printer's Ink," issue of May 8, 1919, among many other good things, says:—

"IT is true that advertising protects a company's business from sudden inroads being made by a competitor who, by a stroke of genius, brings out a revolutionary improvement. It makes the marketing of any established product more stable. It enables the company with the older idea to fight for its crown of supremacy while it is developing a newer idea to meet its competitor. But unless it does develop a newer and better idea the goodwill and position which advertising has built up in the past and endeavors to continue building, is swept away, and these assets must be written off the books.

The right sort of advertising leads to revolutionary movements and improvements, rather than insurance against them. Advertising of this sort makes for the development of new ideas in and by the organization which is advertising its product. Such an organization is of necessity a progressive one. It is constantly on the lookout for new angles and viewpoints to incorporate in its copy, new ideas and improvements to broaden its market. Such an organization very often has its own corps of inventors and engineers working on new ideas.

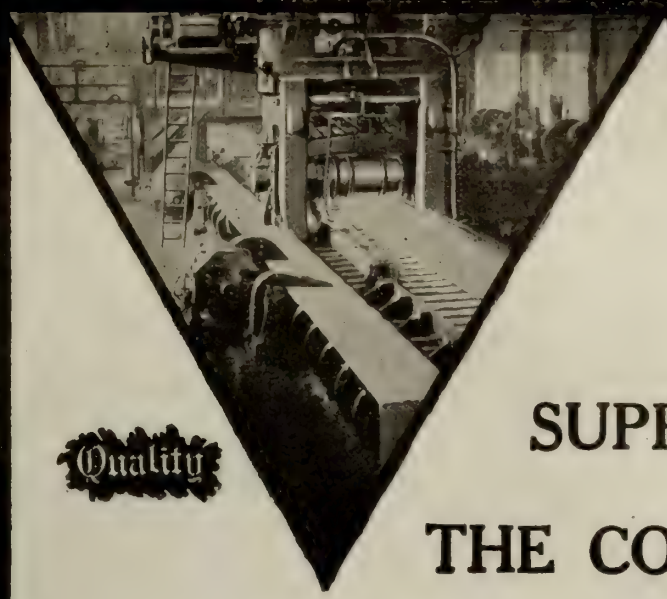
At the same time the competitors of the progressive advertiser are more or less forced into the search for new ideas, and the inauguration of revolutionary movements. They have to do it in order to remain as competitors. Consequently, advertising on the other fellow's part forces the competitor to work out revolutionary improvements in self-defense.

Advertising is progressive. Advertising encourages inventions and improvements, and increases the market for them. Probably the fact that a company advertises gives it first call on the ideas of inventors who are working independently.

Perhaps we might add as another thing which advertising will do the fact that it will make for progress in the industry as a whole. Powerful it is as a competitive weapon, but it is even more powerful as **a constructive implement.** It builds up the advertiser and his business, and it forces those who are to remain as his competitors to work on a sounder, more progressive basis. It raises the tone and efficiency of the industry and gives it a higher standing and character. Of course, the advertiser profits most, but the entire field profits as well."

Everyone profits by good advertising—every reader, superintendent, mechanic and apprentice, keeps thoroughly acquainted with new ideas in equipment through the advertising pages of CANADIAN MACHINERY.

Canadian Machinery and Manufacturing News, May 29th, 1919. Vol. 21, No 22. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



SUPPORT

THE COUNTRY

THAT SUPPORTS YOU

If you consider your personal interests—the interests of your family and the community in which you live, you will

PURCHASE THE PRODUCTS
OF
CANADIAN MILLS

A Canadian Dollar
is Worth One Hundred Cents
in Canada

THE
STEEL COMPANY
OF
CANADA
LIMITED

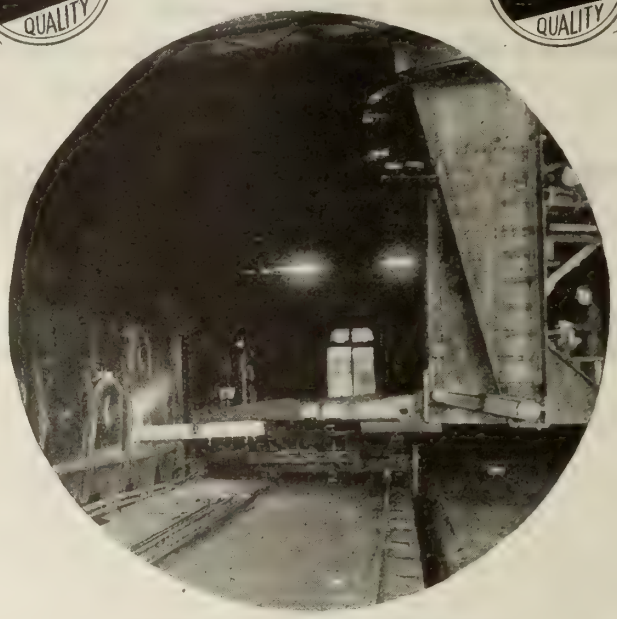
HAMILTON - - MONTREAL

ALGOMA STEEL CORPORATION, LTD.

SAULT STE. MARIE, ONTARIO

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

MARK OF ALGOMA O.H. QUALITY



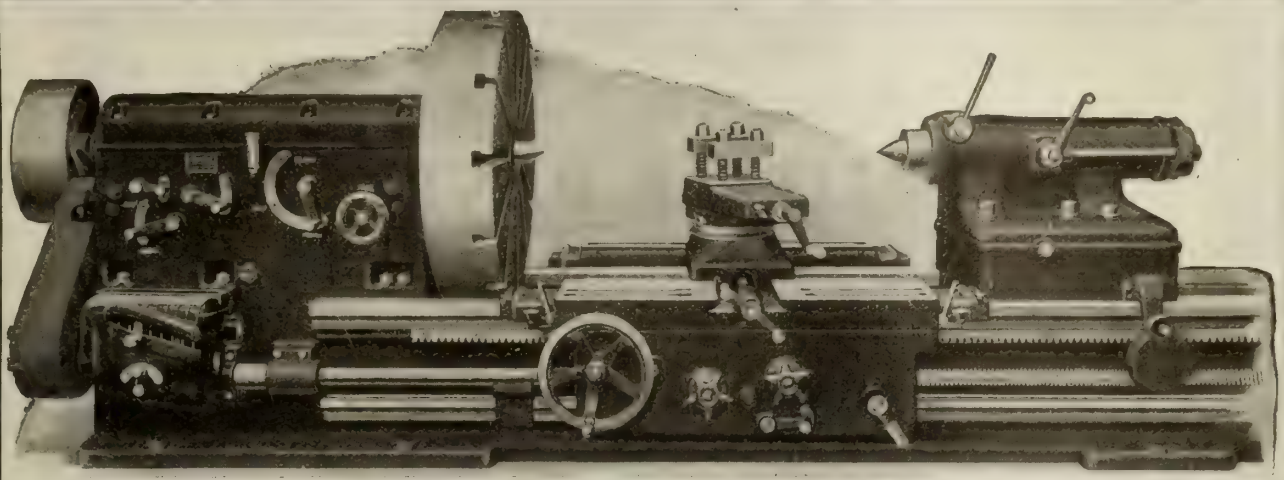
Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORAT ION FROM THE WATERFRONT

BRIDGEFORD



VALUE

Not the price you pay, but the years of service you get, determines a lathe's cost. The production you get and economy of operation and maintenance are determining factors.

You might buy a lathe at an extremely low price and in doing so pay dearly each month you run it. On the other hand, if you invest a little more money in a Bridgeford lathe you reduce cost of production and eliminate expensive repairs.

Distribute the difference in cost between a real machine built for service and one built to sell at a price and figure out how many times you would pay the difference in what it might appear you have saved.

Just one point for your consideration—Bridgeford Lathes have* all steel gears. *There are numerous other features you should know about.

Send for our Catalogue

BRIDGEFORD MACHINE TOOL WORKS 161 Winton Road Rochester, N. Y.

Manufacturers of Heavy Duty Lathes for more than 20 years

BRIDGEFORD

"LITTLE DAVID"

GRINDER

Useful in the Foundry

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

Swedish Steel & Importing Co., Limited

Montreal Toronto
New York Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

WOLFRAM

MADE IN THE U.S.A.

HIGH SPEED STEEL

TRADE MARK

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO.
ESTABLISHED 1900
Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company
MONTREAL QUE.

Strong in the Neck

WILT

Machine shop foremen and superintendents who invariably specify **"WILT"** when requisitioning tools know **WILT Drills** are superior—are absolutely guaranteed against defective material and workmanship—are rigidly inspected before being shipped. To produce more, use **WILT Drills.** To produce more economically, use **WILT Drills.** Elimination of breakage alone will save you much.

WILT

HIGH SPEED AND CARBON TWIST DRILLS

WILT TWIST DRILL CO.

OF CANADA, LIMITED

Walkerville. Ontario.

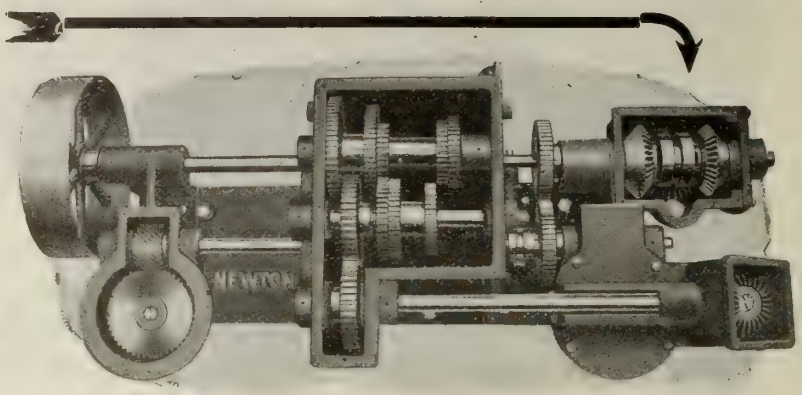
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C.2, Eng.

"Where there's a WILT, —there's the Way."

THE JOHNSON FRICTION CLUTCH

OVER THERE

is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.



Courtesy of Newton Machine Tool Works, Philadelphia, Pa.

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads., not the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are your requirements?

Our "Booklet "Clutches as Applied in Machine Building" and Yellow Data Sheets are Free

AGENTS: CANADA—Williams & Wilson, Montreal. The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashi-ku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main St., Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Faubourg du Temple, Paris.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

E&M

ELECTRIC

Steel Castings

High Grade STEEL Castings

Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

GSC

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

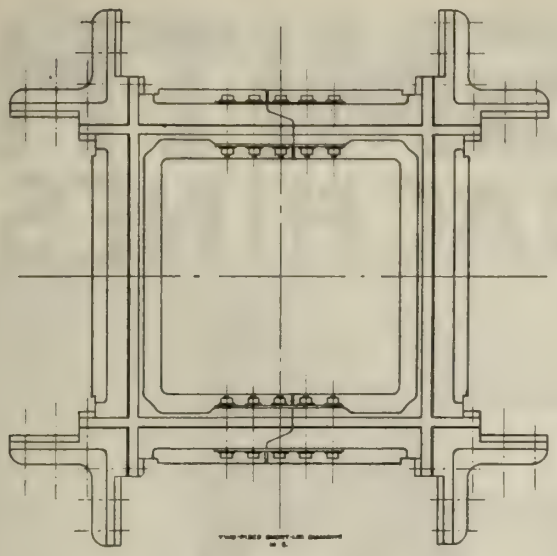
Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

Milwaukee, Wisconsin

DETROIT - 823 Dime Bank Building



TRACK WORK

for Steam & Electric Railways

SWITCHES · MATES · FROGS
CROSSES · DIAMONDS · ETC.
COMPLETE INTERSECTIONS

Built-up, Hard-Centre or Solid Manganese-Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings.

CANADIAN STEEL FOUNDRIES, LIMITED

Transportation Building. Montreal

Electrite Uranium

Electric furnaces, automatically regulated, the most modern methods, and the **introduction of Uranium** — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE
ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

MacKINNON STEEL CO., LTD.

Engineers, Manufacturers and Erectors of Steel Structures

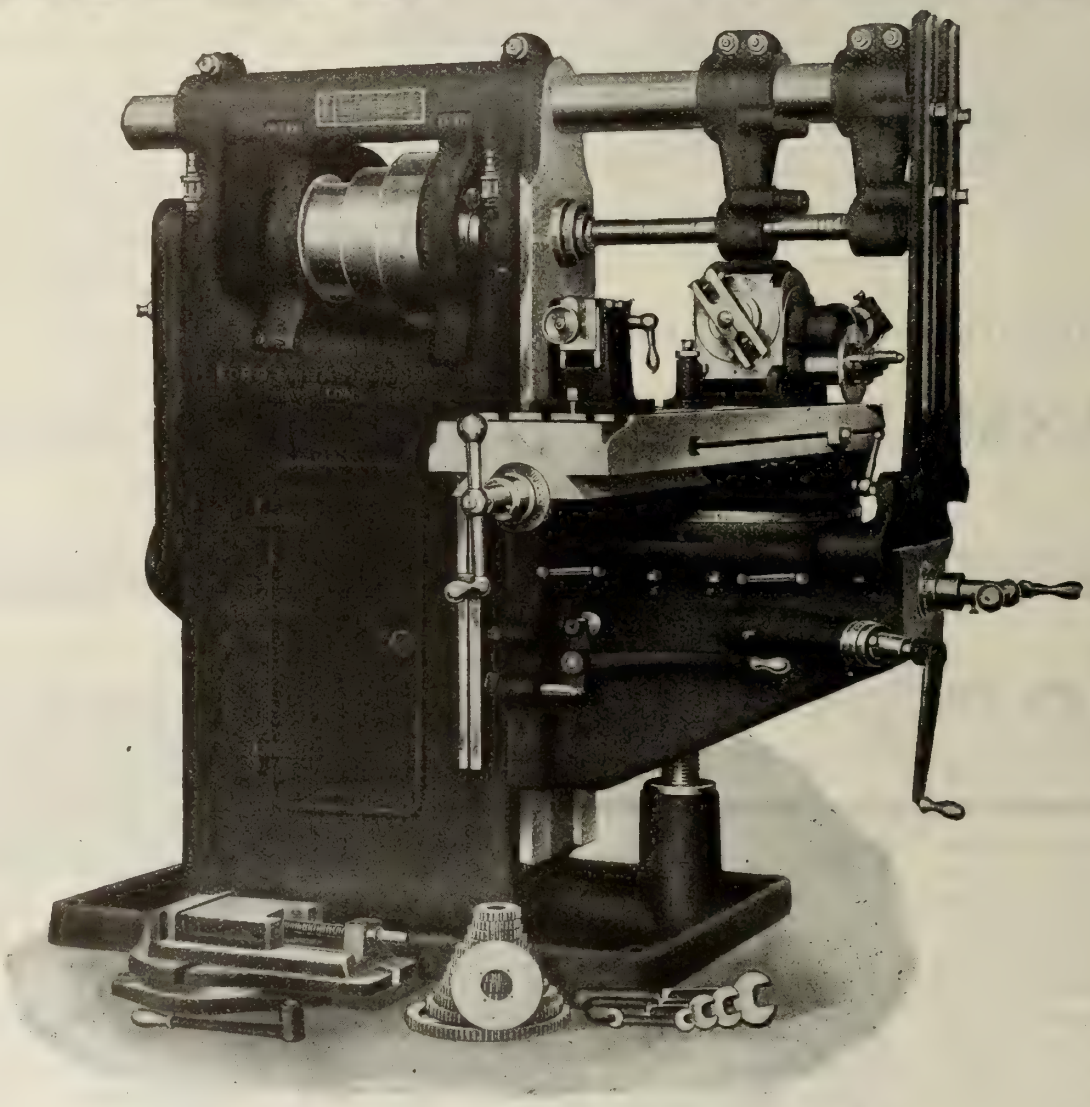
Industrial Bridges, Buildings, Towers, Smoke Flues and Stacks, Chutes, Coal Bins, Ore Bins, Tanks, Cranes, Engine Houses, Grain Elevators, Derricks.

Structural Steel and Steel Plate Work, and a combination of the two lines.

Prompt Deliveries Assured.

MacKINNON STEEL CO., LIMITED
Sherbrooke, Quebec
Montreal Office: 404 New Birks Building

FORD-SMITH MILLING MACHINES



PLAIN AND UNIVERSAL

These machines are accurate, strong and rigid, with well-balanced design to handle rapid and accurate production. **Made in four sizes.** Illustration shows Ford-Smith No. 3 Universal.

Our catalogue will interest you.

Agent for Great Britain: W. E. Storey, 3 Arundel St., London, Eng.
Agent for United States and Foreign Countries: Alfred Herbert, Limited, 54 Dey St., New York.

The Ford-Smith Machine Co., Limited, Hamilton, Ont., Canada

Makers of Milling Machines, Grinders and Special Machinery

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada

THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

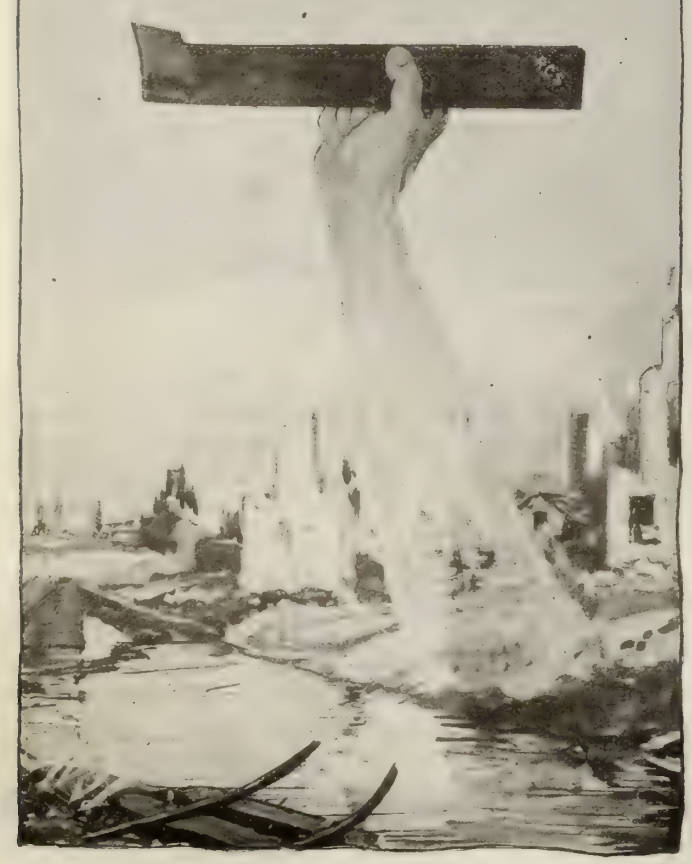
Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

Are your Tools made of Red Cut?

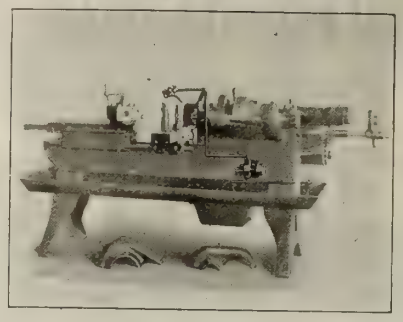
VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.

BOSTON
BUFFALO
CINCINNATI
CHICAGO
CLEVELAND
DETROIT
PITTSBURGH
MONTREAL
NEW YORK
TORONTO



TRAHERN LUBRICATING PUMPS



Screw Machine
W. K. Millholland Machine Co.

It does not take much reasoning to reach the conclusion that W. K. Millholland Machine Company would be very careful when selecting a pump to install on their product before its sale.

They would choose a pump which they had tried and knew to be dependable.

They would select the best type from the dozens which are being manufactured to-day.

They chose a TRAHERN, for they knew it would increase the efficiency of their machines.

A trial is all that is necessary to convince you that they are THE logical installation.

We'll Stand By You.--TRY ONE.

Trahern Pump Company

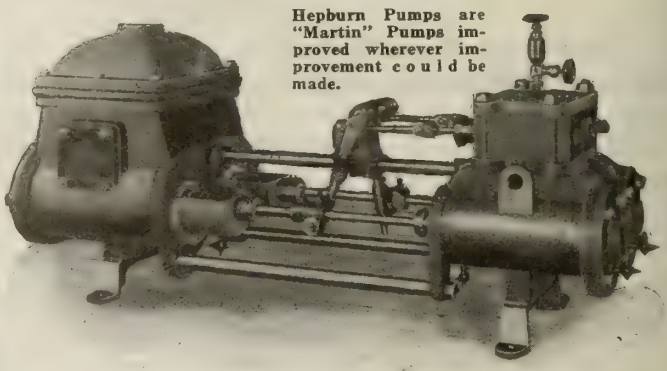
Rockford, Illinois.

Canadian Agents:
A. R. Williams Mchy. Co. - Toronto, Ont., Can.

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario

CANADA
FOUNDRIES & FORGINGS
LIMITED

A SOLEMN WARNING

A flood of business will overwhelm this country inside of two months. Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hesitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, "Don't blame us because you didn't see this vision."

Canada Foundries & Forgings, Limited
WELLAND, ONT.

Crucible
AND
Open Hearth Steel

Tool Steel

"ARGO" BRAND *HIGH-SPEED* STEEL

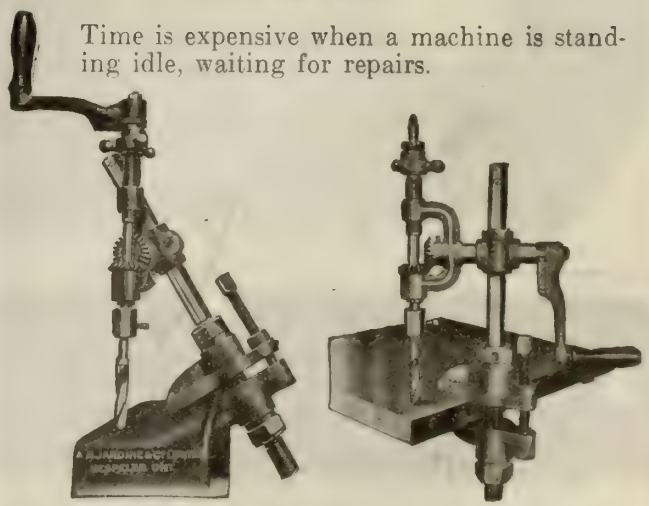
The John Illingworth Steel Co.
1856

Frankford, Phila.
New York Office 217 Broadway

RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

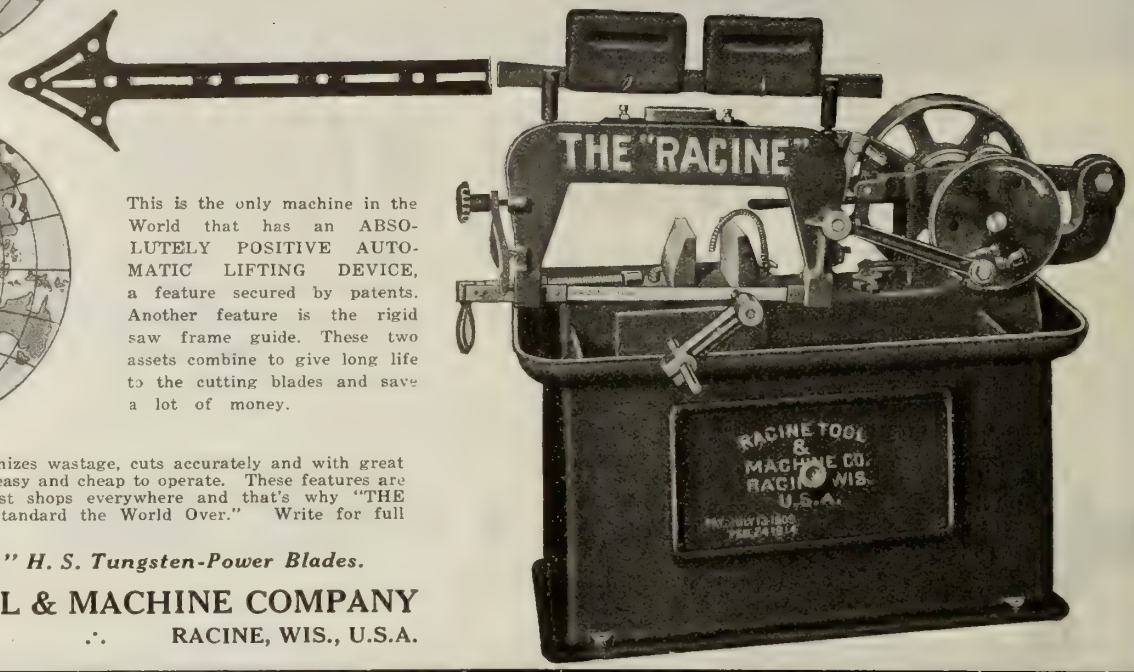
Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

"THE RACINE"

High Speed Metal Cutting Machine

Standard the World Over



This is the only machine in the World that has an ABSOLUTELY POSITIVE AUTOMATIC LIFTING DEVICE, a feature secured by patents. Another feature is the rigid saw frame guide. These two assets combine to give long life to the cutting blades and save a lot of money.

"THE RACINE" minimizes wastage, cuts accurately and with great speed. Then they are easy and cheap to operate. These features are appreciated by the best shops everywhere and that's why "THE RACINE" sets the "Standard the World Over." Write for full particulars.

Use "RACINE" H. S. Tungsten-Power Blades.

RACINE TOOL & MACHINE COMPANY

Melbourne Ave. ∴ RACINE, WIS., U.S.A.

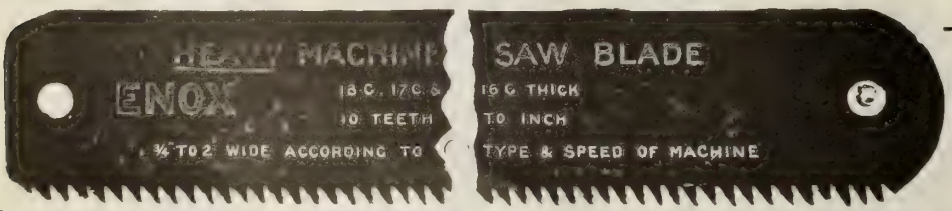
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

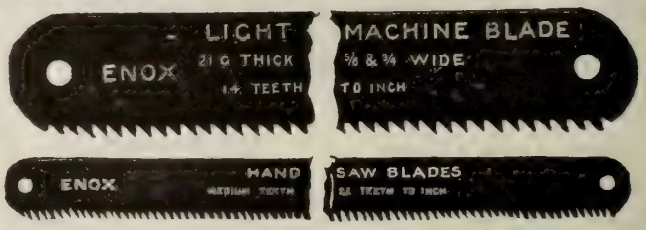
ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST



AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Makers:

FRY'S (LONDON) LIMITED

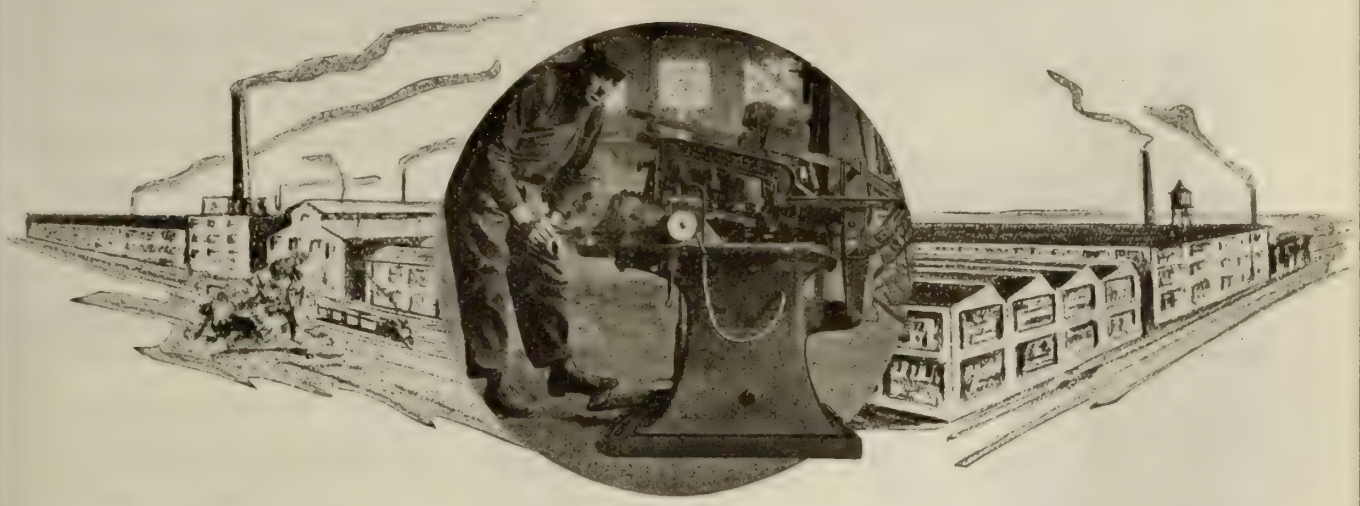
AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.



Starrett Hack Saws

are more than just hack saws—each blade is a cutting tool specially designed to cut one or more kinds and shapes of metal most economically.

It's only a small shop with a wide range of miscellaneous work and very frequent changes that can afford to use one hack saw blade to cut every kind of metal.

The big concerns, cutting quantities of metal, work the Starrett way. They standardize by specializing because they've found it cheaper in cost per cut.

Follow the Starrett Hack Saw Chart 3 and watch your cutting costs go down.

The L. S. Starrett Company

Athol, Mass.

The World's Greatest Toolmakers

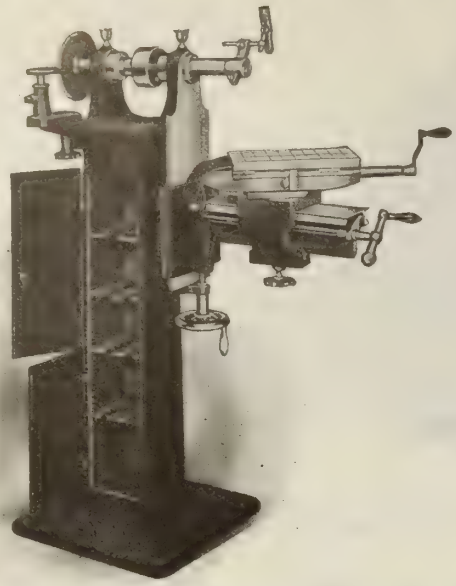
Manufacturers of Hack Saws Unexcelled

New York London Chicago

STARRETT HACK SAWS CUT QUICKER LAST LONGER

42-934

OBTAIN THE BEST RESULTS



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL

CUTTER AND SURFACE GRINDERS

Simple **Light Running** **Accurate**

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) **50 Years New York City**

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

Marshalltown, Iowa
U. S. A.

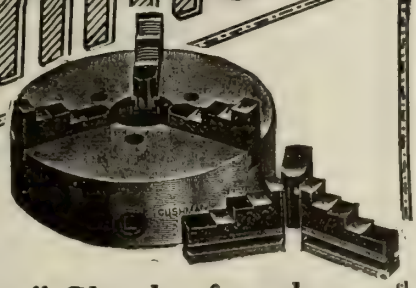
Made to work quickly, conveniently, safely and easily —closed and opened by a slight twist of the key—

Jacobs Chucks

hold tools firmly and precisely and save time and labor. Wherever durable, reliable chucks are demanded there Jacobs Chucks are found.

THE JACOBS MFG. CO. HARTFORD CONN. U.S.A.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

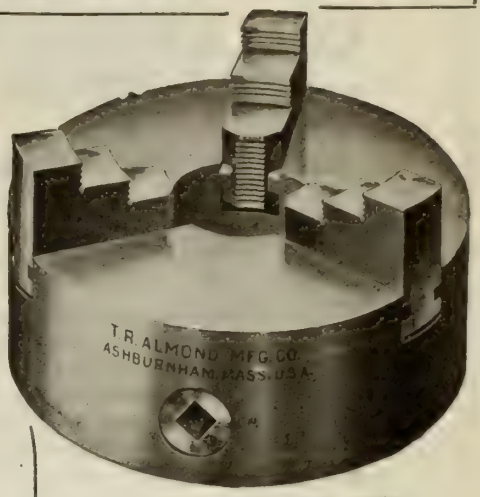
Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

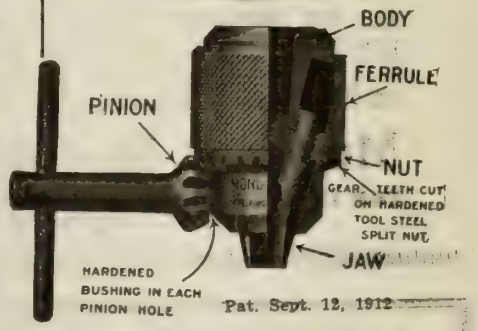
CHUCKS

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



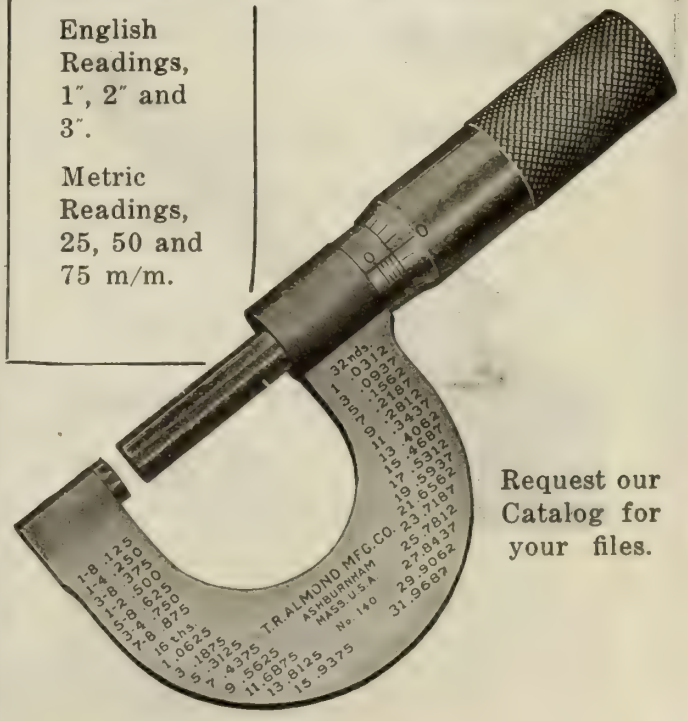
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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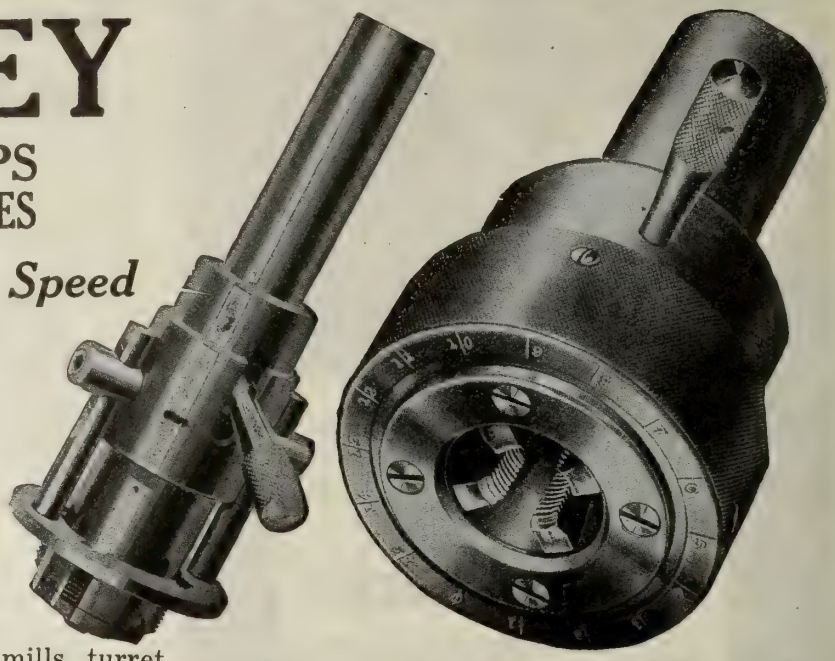
T. R. ALMOND MFG. CO.

6 Maple Avenue, Ashburnham, Mass.

MURCHEY

COLLAPSING TAPS and SELF-OPENING DIES

Promote Accuracy and Speed



MURCHEY Collapsing Taps and Self-Opening Dies are cleared free from the thread instantly, preventing all danger of stripping, besides cutting time for production in half. **Thus you are sure of greater accuracy and greater production.** Murchey Tools are speeding production in all parts of the country on tapping machines, drill presses, monitor machines, boring mills, turret lathes, and on all other machines to which taps or dies may be attached.

Let us know the class of work you are handling and we will show you how to increase your production 50 per cent. without running up the cost.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.

Bicknell-Thomas

Friction Chuck

not only prevents tap breakage but saves loss due to damaged parts and removing taps. It is the simplest Tapping Chuck made; it is the most efficient and fits any kind of machine. It can be used on multiple spindle drills or tapping machines, even when the spindles are close together.

Try one out on us. Write to-day for illustrated circular, describing same fully.

BICKNELL-THOMAS COMPANY
GREENFIELD, MASS., U.S.A.

H & G

Die Head Cuts

Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

Eastern Machine Screw Corp.

New Haven - Conn.

A Durable, Waterproof Roof for Your Factory

If you are going to build a new factory or re-roof an old building, it will pay you to investigate the merits of Brantford Roofing.

If the roof is flat, your roofing contractor can lay **Brantford Asphalt Roofing** or **Brantford Rubber Roofing** according to our Brantford Specification and give you a permanent, waterproof roof that will last for many long years.

If the roof is sloping, **Brantford Crystal Roofing,** which has a crushed slate surface of red or green, can be used and an attractive, durable roof secured.

An Artistic Roof For the Home

Brantford Asphalt Slates, in red or green, make a beautiful roof for the home. They are fire-resistant, weather-proof and long-wearing.

Brantford Asphalt Slab Slates are four **Asphalt Slates** in one. They are used on large buildings and save time and labor in laying. Fewer nails are required.

For Temporary Buildings

Brantford Leatheroid, a smooth surface roofing, and **Standard Mohawk,** sanded on one side, are two popular roll roofings at a low cost.

For Insulation Purposes

Climax Building Paper is used for making buildings cooler in summer and warmer in winter. Its use results in a saving of coal. It makes a house dry, including the cellar. It is also used for cold storage insulation.

Samples and further information about any of our lines of Brantford Roofing furnished promptly on request.

Brantford Roofing Co., Limited

Head Office and Factory, Brantford, Ontario

Branches at Toronto, Montreal, Halifax, Winnipeg

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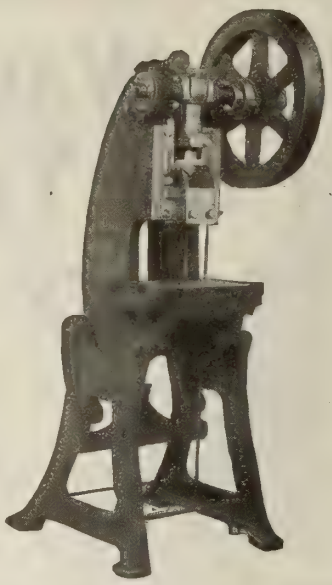
All the energy of America's most modern machine shop and foundry is concentrated upon one product.

CONSOLIDATED POWER PRESSES



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U. S. A.

CONSOLIDATED

For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

CONSOLIDATED POWER PRESSES

This is the
BEMIS & CALL
Never-Slip Wrench

It works in hard-to-get-at places—in places where a straight handled wrench could not be used. It is specially designed for pipe and nut work, and is easily operated and handled by one hand.

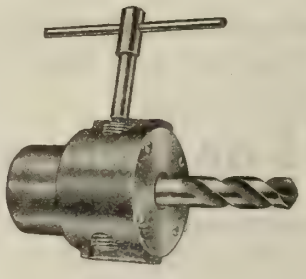
The sliding Jaw is a steel drop forging. The operating nut is steel. All parts are interchangeable.

All B. & C. Tools are as good as this Never-Slip Wrench—and we cannot make it better.

Write to-day for Catalog.

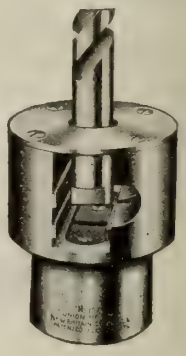
BEMIS & CALL
Hardware & Tool Company
Springfield, Mass., U. S. A.

TRADE B&C MARK



UNION
POSITIVE DRIVE DRILL CHUCKS

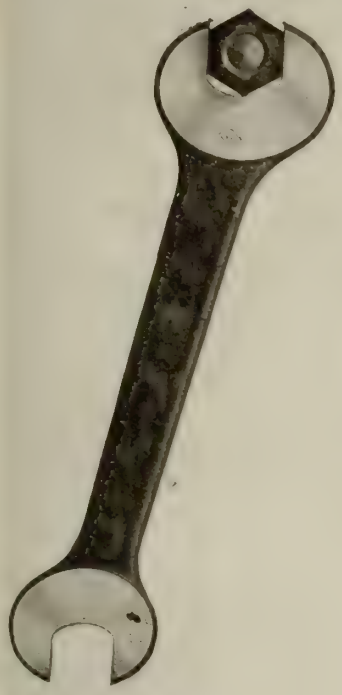
The Union Drill Chuck is made in seven sizes (0 to 2 inches) with PATENT TRANSVERSE SLOT—so that drills with tenons can be inserted (see illustration). The shank of drill should be squared on two sides to enter the TRANSVERSE SLOT, giving a positive rotation to the drill independently of the jaws, permitting the jaws to centre and align the drill accurately. The drill is held absolutely true and will not slip under the hardest strain. This type of chuck will be found to give the best of results on all classes of work from HIGH SPEED drilling to the hard BLACKSMITH and GENERAL REPAIR work.



UNION
Manufacturing Co.
New Britain, Conn.

New York Office 26 Cortland St.

Makers of a complete line of chucks.



Williams' Superior Drop-Forged Wrenches

ARE unequalled where exacting service and dependable strength mean speed and efficiency.

There is as much difference in wrenches as in men:—power and worthiness in both are the fruit of careful, systematic development.

That's why the growth, for nearly half a century, of the Williams' Line stands for excellence in design and quality—that's why the words, "Standard" and "Superior," as applied to Williams' Drop-Forged Wrenches mean dependable service under the most severe conditions.

Every one of the 40 patterns in about 1,000 sizes, with openings from 3/16" to 7 5 8"—*standard* in design and size for every recognized trade need—carries the Williams' guarantee.

When you specify "Williams' Wrenches," you ask for the best.

Our Wrench Booklet gives full particulars.

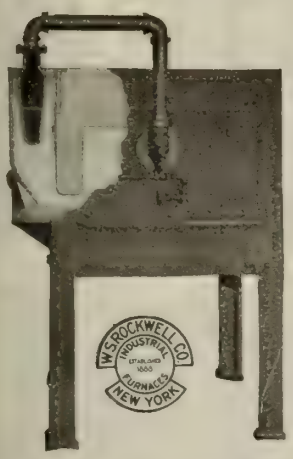
J. H. Williams & Co.

"The Wrench People"

45 RICHARDS STREET, BROOKLYN, NEW YORK

THE A. G. LOW CO., LIMITED, 45 Pacific Ave., Saskatoon, Sask., Agents for Manitoba Saskatchewan, British Columbia and Alberta.

ECONOMIZER FORGE



It is economical in fuel, air and power; protects workmen from flame and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into forge shop.

Write to-day for catalog 34-T

W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors

50 Church Street New York

(Hudson Terminal Bldg.)

Canadian Representative: R. J. McLean
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STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.

Oil Tempering Furnace

For
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High Speed Steel
Lead and Salt
Oil Tempering
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Furnaces built for special requirements

STANDARD FUEL ENGINEERING CO. DETROIT, MICH.

Standard Fuel Engineering Co.

1646 Woodward Ave. Detroit, Michigan

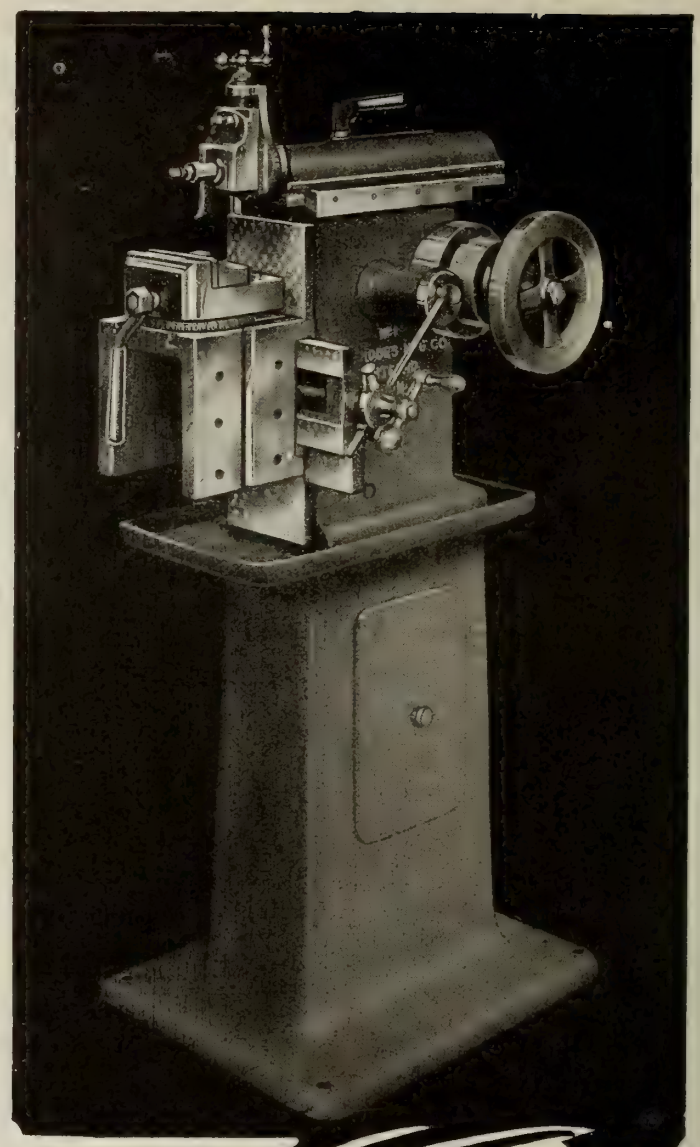
Presswork

We take contract work—and turn it out quickly and accurately. We have facilities for:

Drawing
Piercing
Forming
Blanking

in all kinds of sheet metal. If you have any work of this kind let us quote you prices.

Henry Hope & Sons
of Canada, Limited
Peterborough



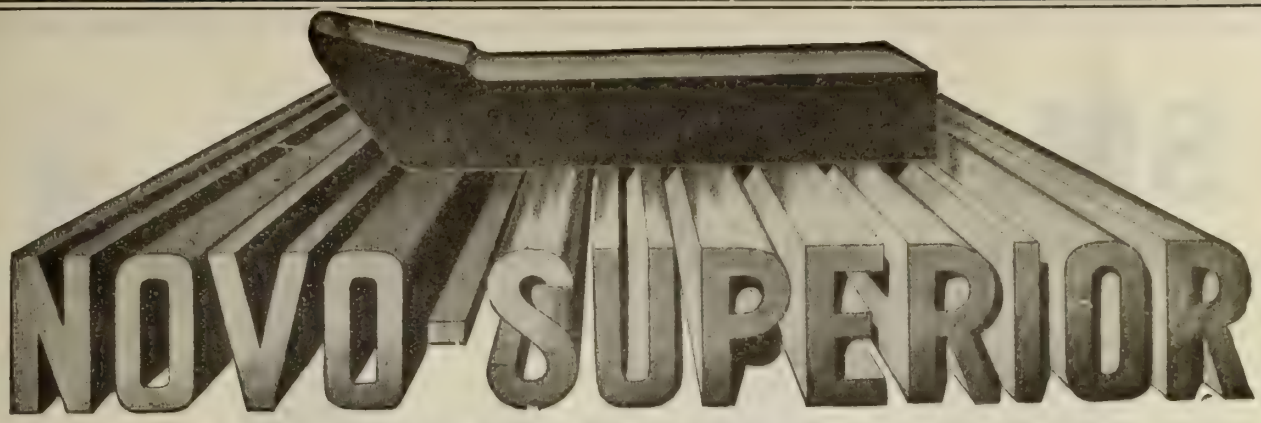
RHODES

Vertical and Horizontal Shaper Gives Maximum Efficiency at Minimum Cost

Don't do your shaping and slotting, tool-making, die-making, modeling and other classes of light work on big and expensively-operated machines when all this work can be done more accurately, quicker and cheaper by far, with the RHODES Machine. Being introduced all over the world on their cost-cutting merits.

They will increase your profits. Look into the matter. Write for description of various types—do it now.

The Rhodes Mfg. Co.
Owned and operated by the JACOBS MFG. CO.
Hartford, Conn., U.S.A.



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INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc., Music Wire for Springs, Steel Balls. Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws for wood and for hot or cold metal cutting
Machine Knives for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James St., Montreal, P.Q.

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

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Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

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J. A. SHERWOOD
Canadian Manager

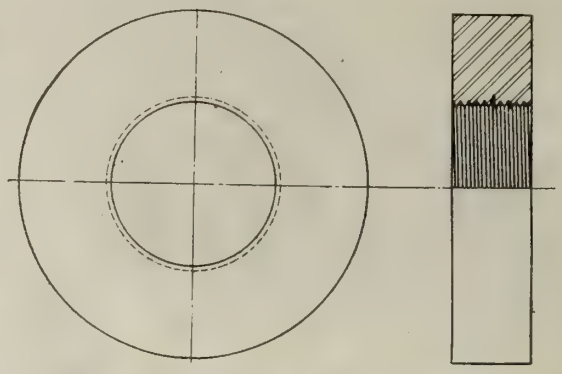
SMALLEY

GENERAL THREAD MILLER

Reduces Cost of Production

To the manufacturer who cuts threads in quantities the Smalley-General Thread Miller is urgently recommended. It turns out a larger volume of work in less time than any ordinary machine. Let us prove it! Send us a blue print of what you consider the most difficult thread milling operation in your plant. Or better still, send us samples of the work at our expense for actual test. Our engineering department will give you a time-study and a detailed report of the operation. The test will be fair, practical and convincing. It will prove the ability of the "Smalley" machine on your particular work.

You have everything to gain—take advantage of our offer now.



The Proof in Detail

We herewith give a practical demonstration of the Smalley-General Thread Miller's work:
MACHINE—Smalley-General Thread Miller No. 2. Air collet chuck.
PIECE MILLED—Threaded collar.
THREAD—Diameter 2¾", length 1¼", 8 pitch thread U.S. standard.
LIMITS—.001.
MILLING FEED—25" per minute. Not limit of machine but of hob. Job also faced at same chucking.
MATERIAL—Machinery steel.

Smalley-General Company, Inc., Bay City, Michigan

Canadian Agents—Rudel-Belnap Co., Limited, Montreal and Toronto

HOYT METALS

"Frost King"
"Trojan"
"Nickle Genuine"
BABBITTS

Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.
Annual sales over $5,000,000.

Hoyt Metal Co., Toronto
New York, N.Y. London, Eng. St. Louis, Mo.

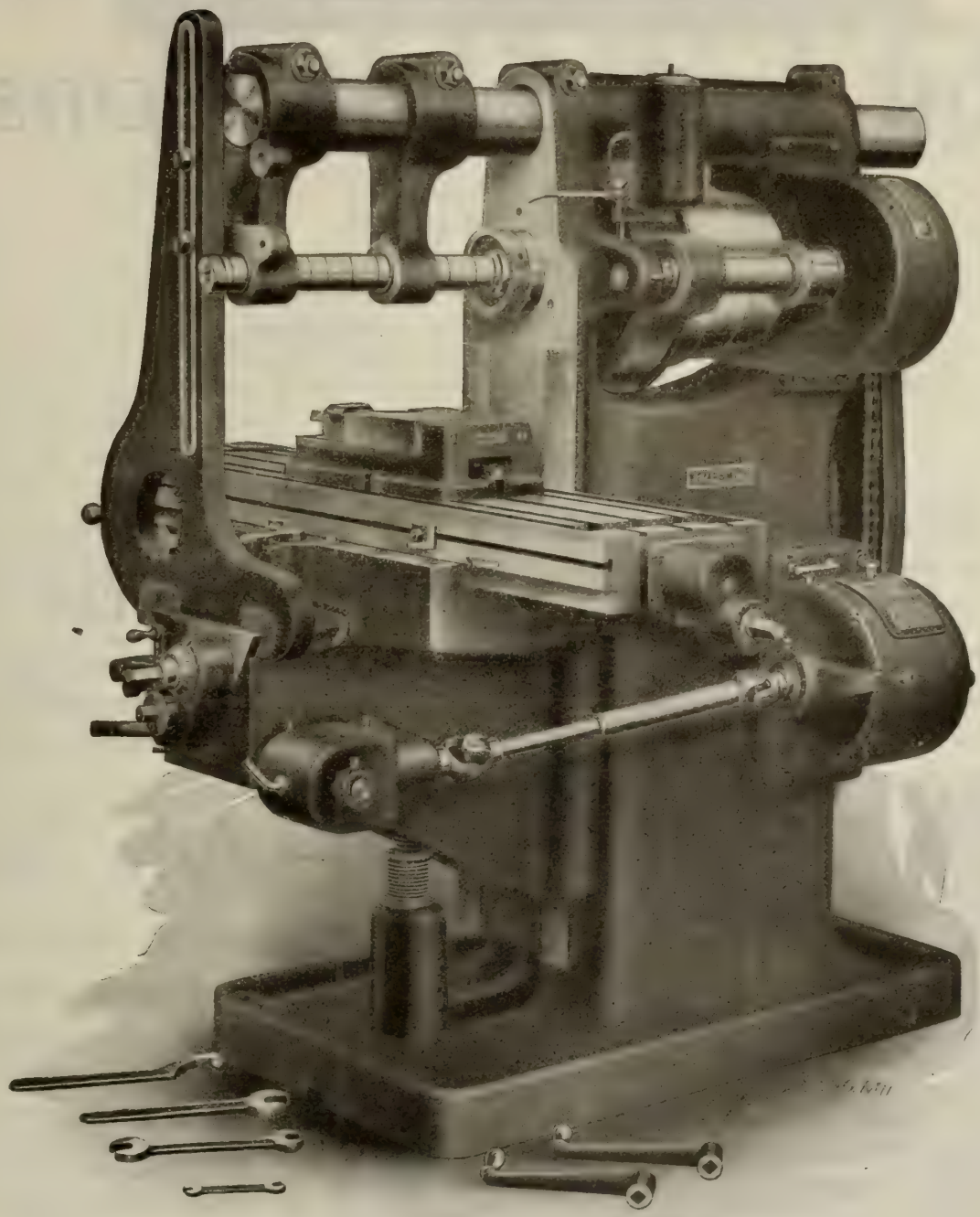
IMPERIAL GENUINE BABBITT METAL

The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

KEMPSMITH



KEMPSMITH No. 3 Plain Milling Machine

Double Back Geared.

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our catalogue "B" describes and illustrates many notable features of the Kempsmith Milled. Write for a copy to-day.

THE KEMPSMITH MANUFACTURING CO.

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FOR AIR COMPRESSORS

IRON CAP COPPER COMPANY,
Copper Hill, Arizona

Magnolia Metal Co. 11-11-18

Gentlemen:—

We have used MAGNOLIA METAL for several years and the best endorsement that we can give it is that one small compressor has run almost **continuously** for TEN YEARS without renewal of babbitt.

Yours very truly,
IRON CAP COPPER COMPANY,
F. A. Woodward, Supt.

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Over 600 Pages
A valuable reference work imported from England and sold as an advertising medium at the low price of 40c post paid.
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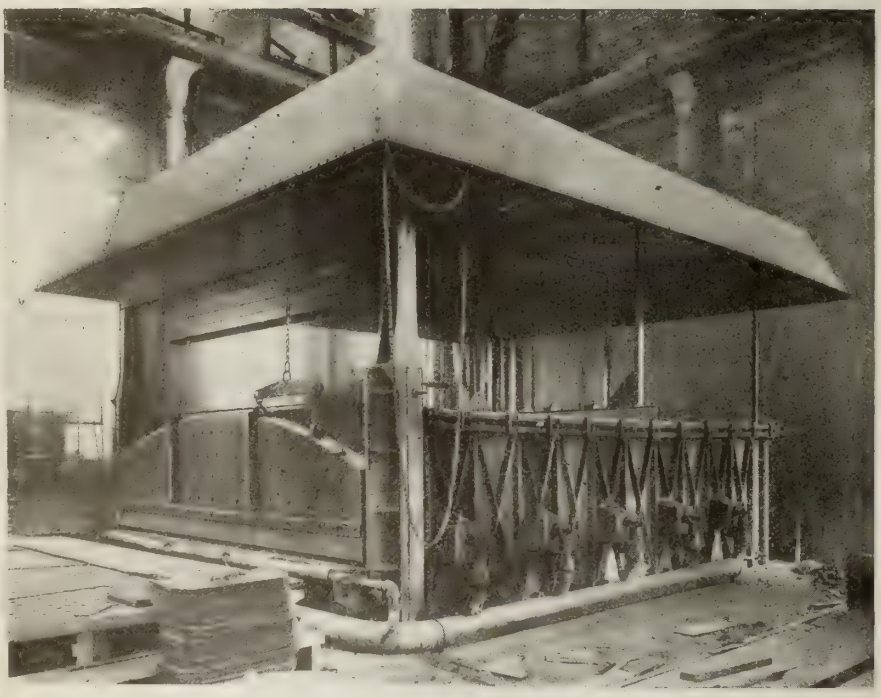


Any Size

Illustration shows a Plate Heating Furnace installed in the plant of Canadian Vickers Ltd., Montreal.

Your proposition, if out of the ordinary, would be bettered by our co-operation. Get in touch with us.

Mechanical Engineering Co., Ltd.
Room 308, Bank of Toronto Bldg., Montreal
Three Rivers, Que., Canada

POTTER & JOHNSTON

AUTOMATIC MILLING MACHINES

HORIZONTAL VERTICAL

EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

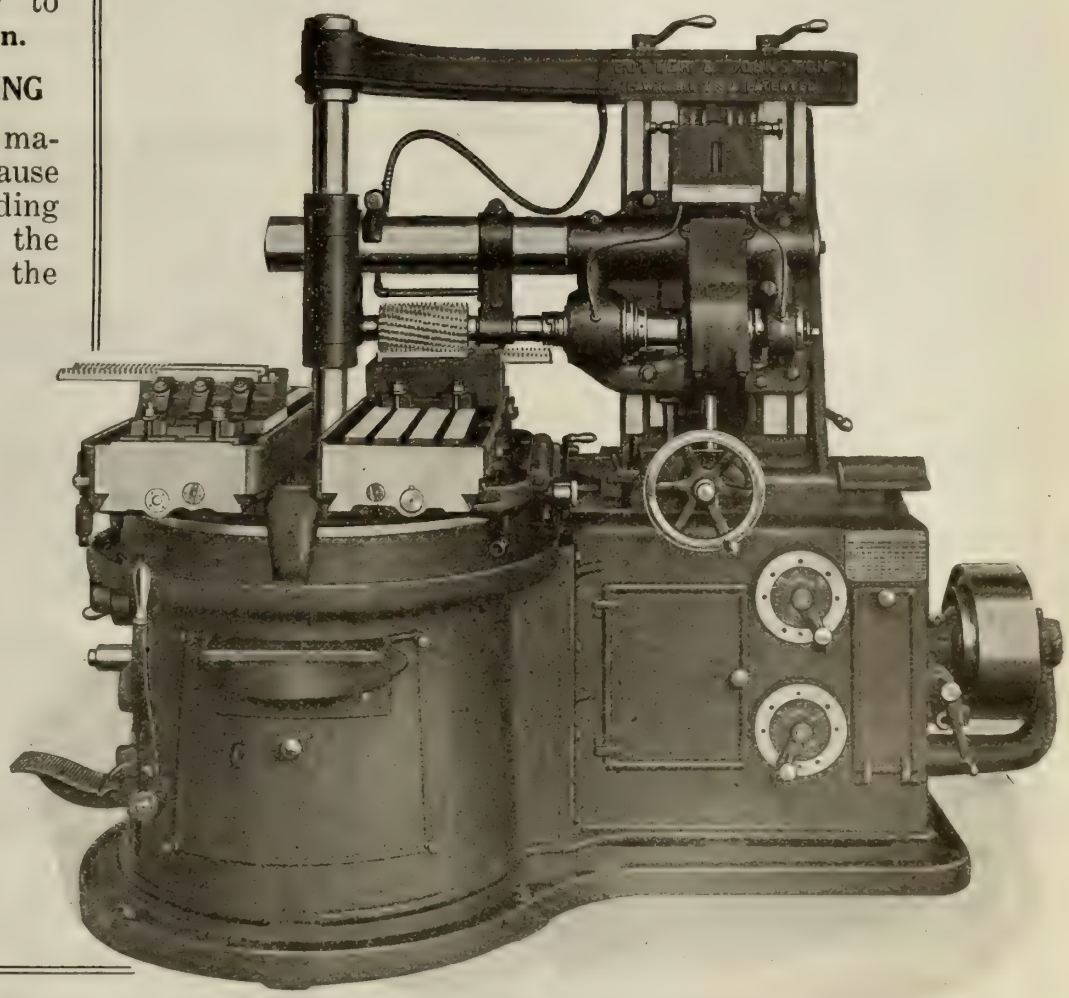
No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches. 12 Spindle Feeds, 20 to 180 R.P.M.

Send us your Blueprints and we'll gladly give you production figures.

Bulletin 36 on application.



Canadian Offices: POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse: Galt, Ont., Canada

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 43A

Wheel Grains and Grades

The Norton wheels found to be most satisfactory in actual practice for grinding lathe and planer tools of high speed steel are the medium grades M, N, O and P in Alundum, the grain ranging from as coarse as 20 in the larger wheels to as fine as 80 in the small ones. When they are to be used for off-hand grinding on bench and floor stands at approximately 4,500 surface feet, the Norton standard recommendations are:

Wheels 4 to 6 in. diam., 80M, Alundum vitrified.

Wheels 6 to 10 in. diam., 46 to 60M and N, Alundum vitrified.

Wheels 10 to 14 in. diam., 46N or 36O, Alundum vitrified.

Wheels 14 to 24 in. diam., 30 and 36O, Alundum vitrified; also 24 and 30P Alundum vitrified and silicate.

Wheels over 24 in. diam., 24P, Alundum silicate.

The following are the wheels usually furnished for some of the principal machines in use:

Automatic Grinding

Gisholt, 20M and N, Alundum vitrified; 24M to P, Alundum silicate.

Sellers No. 1, 20 and 24L and M, Alundum vitrified; 20 and 24L and M, Alundum silicate.

Sellers No. 2, 36L, Alundum vitrified; 30 and 36M, Alundum silicate.

Taylor 24O, Alundum silicate.

Hand Grinding

Blount, 30O, Alundum vitrified.

Diamond, 24 to 30O and P, Alundum silicate; 36O Alundum vitrified.

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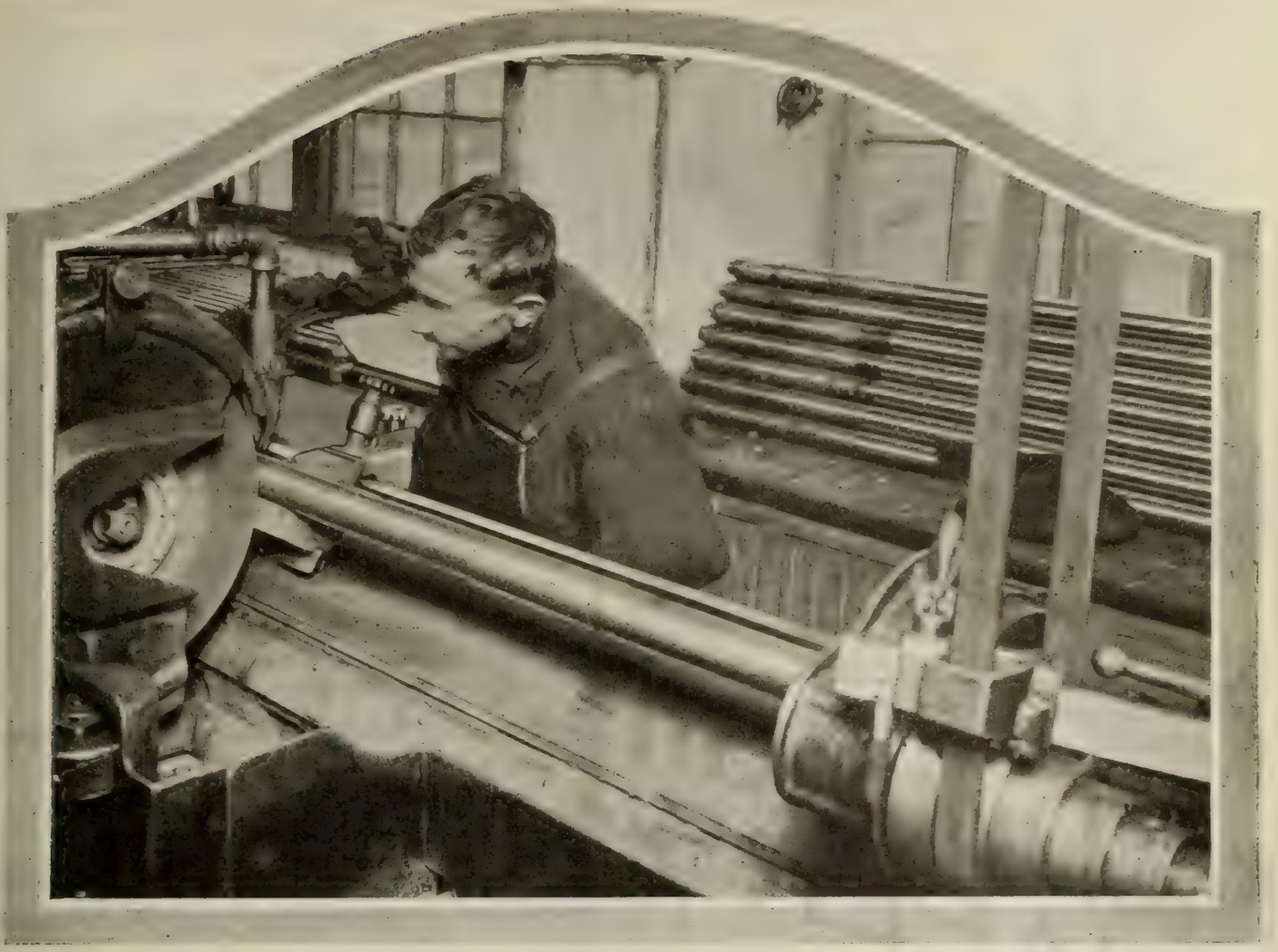

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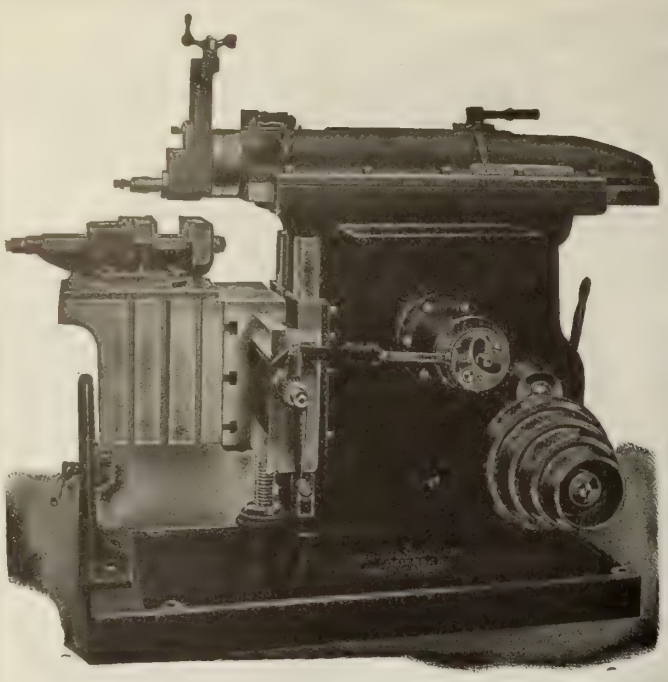

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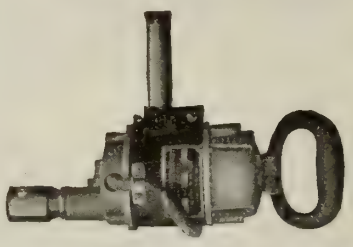

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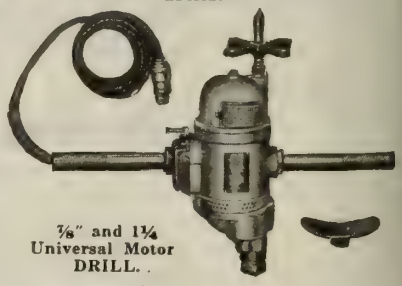

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CANADIAN MACHINERY
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MANUFACTURING NEWS

Volume XXI. No. 22. May 29, 1919

Manufacturing Brantford Roofing Products

An Article Describing the Plant of the Brantford Roofing Co., Together With the Manufacturing Process, From Start to Finish, of This Already Well-Known Line of Roofing Material.

By J. H. MOORE, Associate Editor Canadian Machinery

IN entering upon an article of this nature, about the best plan to follow out is the adoption of the principle of starting from the very beginning, and working up gradually until the actual sale of the material has been completed.

For this reason we will commence by going into, in a very brief way, the plant of the Brantford Roofing Co., whose product we are about to study through its various stages of manufacture.

The complete plant, buildings and yard, covers an area of about seven acres. The construction is modern throughout, with every facility to prevent fire being installed. A patrol fire system and the regular sprinkler system forms a part of this fire prevention scheme.

The plant, of course, is laid off into various departments, which will be taken up in due course later in this article, as we step through each stage of manufacture. It might be well to mention at this point, however, various notable features employed, namely, that this firm conducts its own forge shop, tool room, and steam fitting department, handling all its needed repairs of this nature without outside help. When we state that there is some 35,000 to 40,000 feet of steam pipe ranging in size from ¾ in. to 6 in., one can easily see that there is a great need of such departments. They also develop their own electricity for lighting purposes, and have a 50 h.p. Goldie & McCullough Wheelox engine, together with a 100 h.p. boiler as their power equipment. They have also in operation an up-to-date condensation system, all steam returning direct to the boiler.

To give the readers a sort of glimpse of the financial side of this matter, we are in possession of information that this Company has just been granted a new Dominion Charter, with an authorized capital of $250,000.00. Another notable point in this matter is the fact that practically all the capital invested is Brantford money.

FIG. 1—A GENERAL VIEW OF THE LOADING TRUCK.

In connection with the plant, there is an up-to-date office, where all business matters are rapidly attended to.

Actual Manufacture

But as this article is primarily intended as a study of the manufacture of the products turned out by this firm, we will get on to the subject of asphalt as used in their various lines. This asphalt is refined from Mexican, Texas or California asphaltic crudes. The Mexican crude is either refined in Mexico or comes by tank steamer to New York, or Montreal, where it is refined and then shipped in barrels by rail to Brantford. Texas and California crudes are refined in these states, and shipped in barrels by rail to Brantford. They also use in their coating a Gilsonite, which is the purest grade of natural asphalt and is mined in Utah.

The asphalt, which comes in barrel form is simply stored in their yard until required. When needed, the barrels are rolled onto a wagon specially constructed for the purpose, as illustrated at Fig. 1. This wagon, by the way, has a history all its own. Previous to the use of this method, the scheme employed was as follows: An ordinary lorry was used, and three men had to strain all day lifting up and down the heavy barrels, until the idea of this wagon was suggested. Immediately the staff got busy and built this wagon themselves (in fact, it's a habit they have there of building what they want), with the result that now only the one man actually loads the barrels, the other directing the horse. Time has also been cut to about one-third of what it was formerly, so the change was worth while. The wagon itself was made from miscellaneous material around the shop, so the cost was practically nothing to speak of. The trailer A hooks on the back, and is

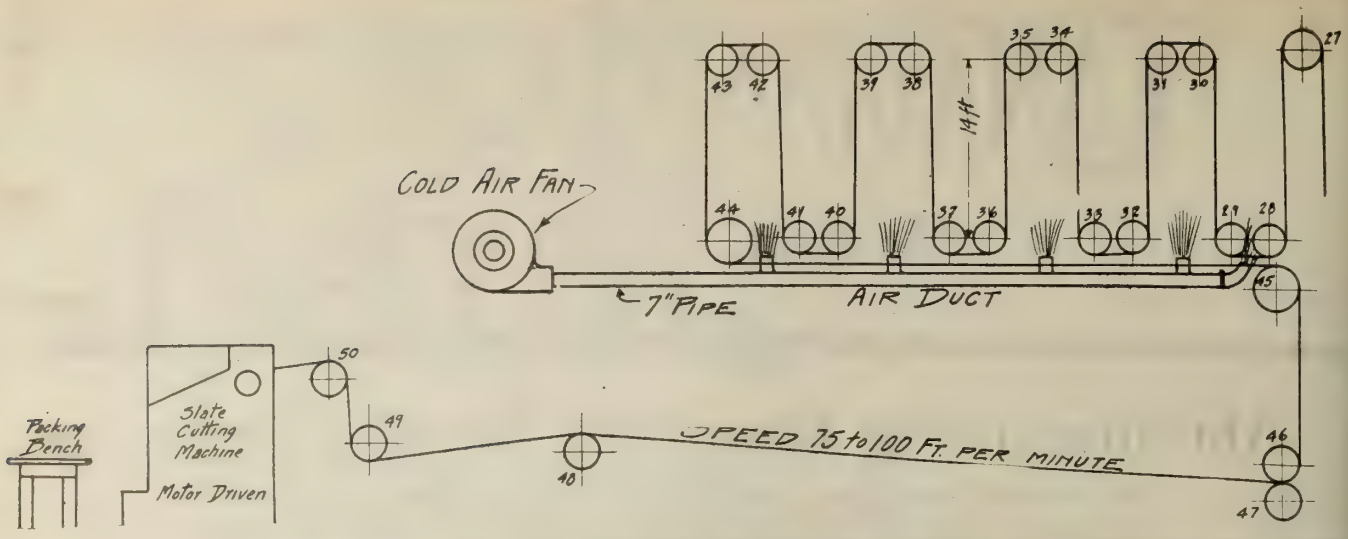


FIG. 2—THIS MACHINE SPREADS OVER A DISTANCE OF 150 FEET FROM END TO END.

simply dragged along, never requiring to be lifted off and on.

The Next Stage

The barrels are now brought by this wagon to the scale house where the gross weight is obtained, after which the barrel goes up on an elevator, or conveyor, to the working floor of the tanks. Here the barrel staves are ripped off and sent down to the scale to be reweighed. This amount is then deducted from the gross weight, which, of course, gives the actual net weight of the asphalt. When it is quoted that last year these reweighed staves weighed over 300 tons for the year, one can form some idea of the wonderful amount of the asphalt used in this plant.

The asphalt on the working floor of the tanks is now broken up by an axe, and thrown into the tanks, together with the other materials, which goes to make up the proper mixture. It is now heated in boilers to a temperature of 400 to 450 degrees Fahrenheit.

There are at present five boilers in operation, two round in shape, and five rectangular. The former are 6 ft. in diameter, 18 ft. long, and have each a capacity of 50 barrels. The latter are 12 ft. x 4 ft. x 4 ft., each with a capacity of 16 barrels. The saturation compound goes to the round tanks, the coating compound to the rectangular, but these technical terms will be explained a little further on in the article. Separate valves control all these tanks allowing either one to be shut off, or vice versa, as desired. After the contents of one of these tanks has reached the desired heat, the fire underneath can be safely drawn, for the temperature of the mixture, after once being heated to the proper point, will not vary even two or three degrees in a space of 48 hours. Of course, the material is always used well inside this time.

Preparing the Felt

Before going on with the saturation or coating used, let us see what happens to the felt on its arrival at the plant.

Before being used for roofing purposes, it is placed in dry kilns, to remove all moisture, both cellular and atmospheric. This is in order that all saturation and coating possible can be soaked into the felt in its process of manufacture. Thirty-two kilns are used for this purpose.

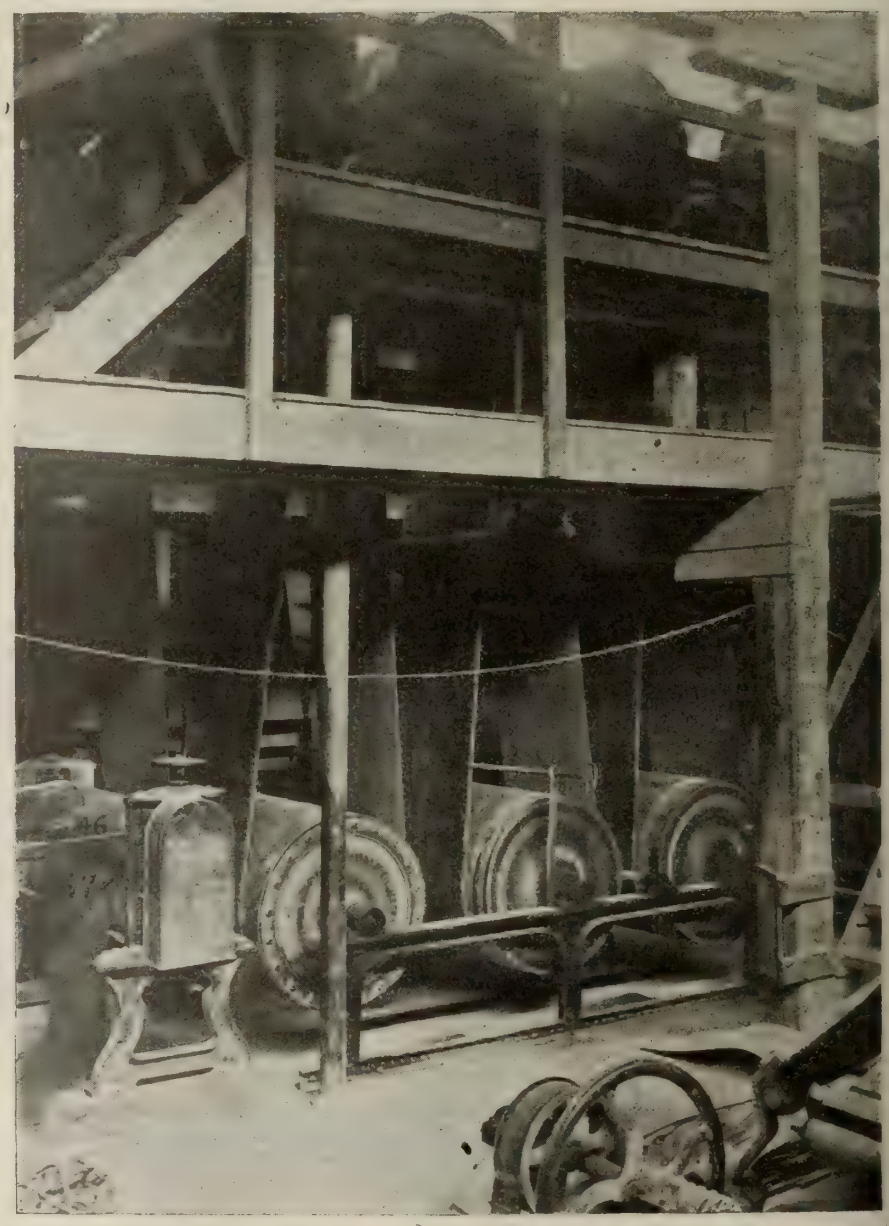
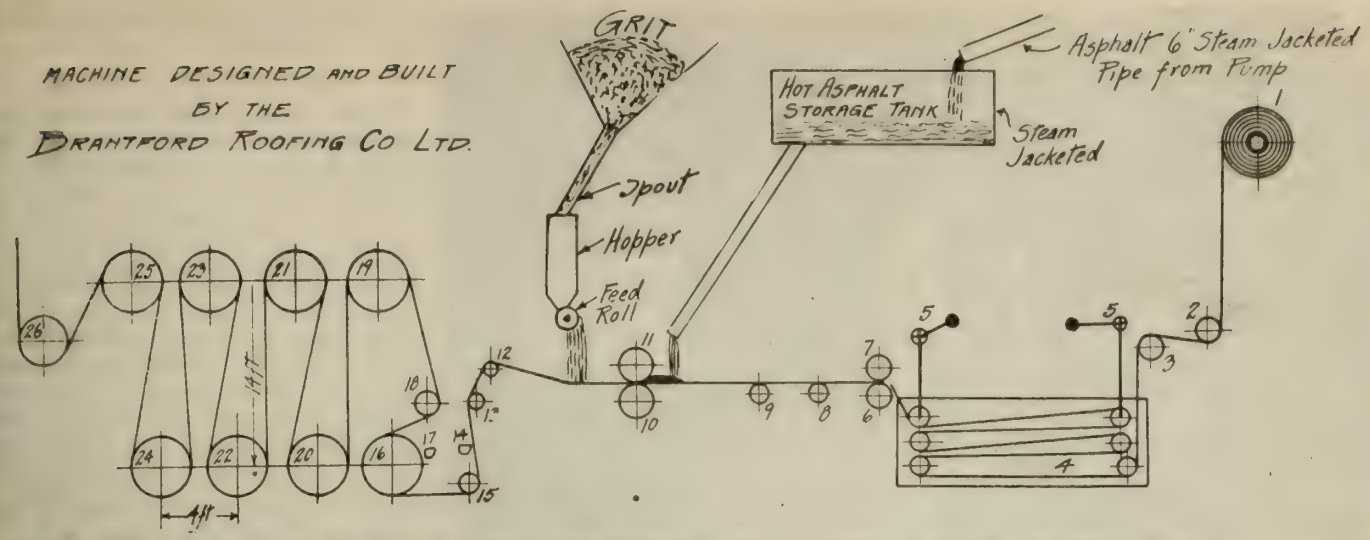


FIG. 3—VIEW SHOWING THE WATER COOLED ROLLERS.

Manufacturing Asphalt Shingle

This dried felt (which is made up in



AND REQUIRES OVER 600 FEET OF FELT TO THREAD THE MACHINE. THE MATERIAL TRAVELS AT ABOUT 75 TO 100 LINEAL FEET PER MINUTE.

rolls of from 50 to 60 squares, and weighing approximately 700 lbs.) is now placed in its starting position on roller 1 (see sketch No. 2). From here it goes down and around the idlers 2 and 3, dropping from there into the saturation pan 4. In this pan are a series of rollers, which allow the felt to travel to and fro in the saturation compound before leaving. This pan has a capacity of 20 barrels of saturation. About 100 feet of felt is running through this pan at all times, allowing ample time for saturation purposes. A handle 5, (with a gear attached), which, in turn, engages with a rack, allows a means of raising or lowering these rolls as desired.

After passing through this pan, the felt goes between the two squeeze rolls, 6 and 7, where all excess compound is removed. The felt now proceeds on its journey over the idlers, 8 and 9, where, after leaving these rolls, it meets in with a stream of coating compound coming down from an overhead supply tank, with spout of correct style for coating purposes. The felt now passes on its way between the steam rollers 10 and 11. These rollers do not move, simply allowing the felt to pass between them.

Immediately after leaving these rolls, a constant stream of crushed slate grit pours down on the felt, bedding itself into the coating, forming a weatherproof covering. From here the felt continues on over the steam pipes (12 and 13), and, of course, by this time the felt is fairly dry. Any excess grit now drops off into the trough (14), where it is returned to its original overhead hopper by means of a spiral conveyor, altogether with an endless bucket elevator.

The felt now passes over the idler roll (15) and over the larger water-cooled roller (16). The trough (17) at this point catches any excess grit that did not fall into the first trough. The work now proceeds over the idler (18), then through the series of water-cooled rolls (19, 20, 21, 22, 23, 24 and 25). The photograph at Fig. 3 illustrates clearly this part of the process. It will be noticed that up at the extreme top of this picture are seen various other rolls. These particular rolls and their function are later explained.

On the drawing at Fig. 2 we have shown a few approximate dimensions to illustrate the general proportions of the apparatus.

After leaving these water-cooled rollers on which the roofing naturally has reduced its temperature, the felt now passes over a series of idlers (26) to (45) inclusive. It will be noticed that the felt at this point has moved up another 14 ft. in height from the first series of rollers.

5. On these idlers the roofing is dried through contact with air supplied by electric fans.

These slots are cut in the following manner: A large roller, which constantly revolves, has inserted in it two knives, as shown at sketch to the right of the shingle at Fig. 4. These two knives, looking from the two directions appear as shown on the sketch. Every revolution means two series of slots being cut. A trimming knife also cuts the shingles to 12 in. deep, as shown. To prevent any tendency of the knife edges to stick to the roofing, a small piece of felt saturated with water comes in contact with the knife each revolution. There are also kickers, which work in harmony with these knives, and kick out the portions cut away.

Fig. 5 illustrates clearly the work coming from this cutting machine; also

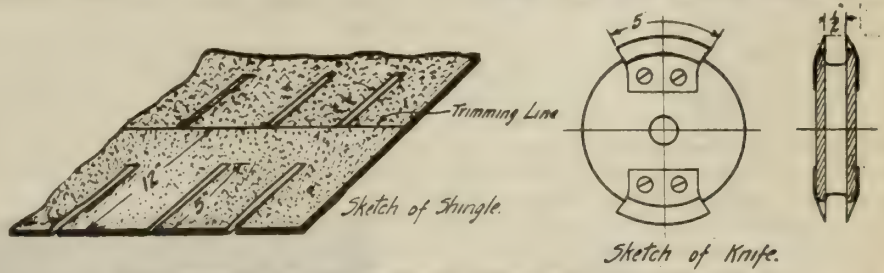


FIG4—SKETCH OF THE SHINGLE, WITH TYPE OF KNIFE USED.

Readers will also notice that after leaving the idler roll (44) the roofing comes back in a horizontal distance to the idler (45). From there it passes down through the pull rolls (46 and 47), (see photo at Fig. 3), where the roofing is pulled over the idler (48) into the flanged guide rolls (49 and 50).

From here it goes direct into the cutting machine, where it is cut into shape as desired.

The material being manufactured while the writer was taking the accompanying photographs was what is known as slab shingles, and an idea of its style might not be amiss. The sketch at Fig. 4 illustrates a portion of this shingle, which is 32 in. in width over all. It will be noticed that the slits, or slots, as cut in this material are about ½ in. width and 5 in. long.

illustrating the method of packing ready for shipment. After completion the material is stored in a concrete floored warehouse, heated by exhaust steam, until shipment is desired. This material, together with many others of their lines, can be finished in two colors, namely, red or green grit, or crushed slate, as it is sometimes called.

To go into all the various materials this firm turns out would take a volume, but following is a brief list of some of their products:

Sanded roofing, smooth finish roofing, Mohawk roofing (which is sanded on one side only), slate, red and green; crystal, red and green; and Climax building paper. As can be understood by readers, all these various materials serve their own particular function, each

FIG. 5—A VIEW OF THE CUTTING MACHINE AND PACKING BENCHES.

being especially adaptable to various conditions and requirements.

To avoid confusion, it might be best to add at this point the method employed of pumping the asphalt used throughout the processes just described. The only reason for not mentioning this matter earlier was in the writer's endeavor to allow the roofing to pass through its various stages of manufacture without interruption.

As readers can understand, if an ordinary type of pump was used the asphalt would soon lose its heat and congeal, (or to use the general expression freeze up) and block the supply pipes. For this reason Kinney steam jacketed pumps are employed for pumping purposes, in this way keeping the asphalt up to proper temperature. It can be easily understood that all supply tanks have to be emptied each evening, otherwise the result would be a solid mass of asphalt in the morning.

As readers no doubt already know the roofing is held in position on the roof by means of large-headed roofing nails, the laps being cemented with lap cement, both of which are packed in containers in the centre of the rolls. With the asphalt shingles, no cement is used, but they are nailed according to the directions supplied by the Company. The lap cement is manufactured by the Company in their paint department.

Paint and Lap Cement Process

The rosin and oils used are first placed in a storage shed until required. They are now run up to a large varnish kettle, and melted in correct proportion. From here it is pumped into storage tanks in the paint department, each tank being controlled by separate valve. There are 14 tanks in this department. The size of this paint dept. alone is 24 x 100 ft. The lap cement is now placed into small cans and the tops capped on a special capping machine for the purpose, no solder being used. A 5 h.p. electric motor and a Gould rotary pump form a part of this department's equipment. The other styles of paint are made up in the usual standard sizes of cans.

It might be well to add before going any further, that all material turned out by this firm undergoes a severe test before even being placed on the market. For illustrative purposes we will suppose they contemplated placing on the market some particular brand of roofing.

The first step would be to make some of the proposed material and mount it in the regular way on a test roof. There it is left through all sorts of weather conditions, until they are perfectly satisfied in their own minds that the workmanship, material, and ingredients are all satisfactory.

Preparation and Shipment

We will now go on to the actual preparation of the various materials for shipment, taking into consideration the rolled roofing first. This material is carefully put up in roll form and in the centre of each roll is placed about 2 lbs. of roofing nails in a package, together with a tin of lap cement. A metal protection cap is now placed tightly on each end of the roll and the material is now ready for shipping purposes. The actual amount in each roll varies according to the material being handled. When slate or shingle material is being packed it is placed in bundles with wooden tops and bottoms, as shown at Fig. 5, being protected by paper as well and securely tied with strong cord.

The material is now taken from the warehouse to the car on the siding, which runs directly up to a large shipping door for this purpose. Fig. 6 illustrates clearly the actual packing of the car, and hardly needs any comment, as the photograph is self-explanatory.

Other Features of Interest

Before closing this article it will be interesting to follow other features of interest which go to show that the energy is not alone confined to the inside of the plant.

First, and very important, all the material as used throughout this plant undergoes laboratory inspection. Samples are sent regularly to the Milton Hersey Co. of Montreal, who test the various materials carefully, sending in their reports. The writer personally looked over these, and could not help but notice the splendid reports given, showing that care is exercised in the choosing of these materials.

The sales force of this firm is another notable feature of the Company; they sell their products in all parts of Canada. Branch offices and warehouses

FIG. 6—LOADING THE MATERIAL ON THE CARS.

are maintained in Winnipeg, Toronto, Montreal, St. John, Amherst, and Halifax. The company, in all, have ten salesmen selling their products. The salesmen usually travel by motor car, as in this way they can cover more territory and keep in better touch with their customers.

Another feature in their selling campaign is the sending out of samples and booklets of their various lines to those interested. They also advertise extensively.

In conclusion the policy of the Company from first to last is Quality and Service, with the idea of producing only roofing materials, etc., which have stood the test and proven to be goods that they can be justly proud of.

Japanning and Enamelling Cot and Bed Frames

An Article Discussing the Various Heat Methods Employed, Holding Up in Particular the Electrically Generated Heat System as That producing the Best and Most Uniform Results

By B.S.B.

THERE are so many manufacturing processes which require ovens or furnaces heated to different degrees of temperature for one or more operations that the field for electrically generated heat is becoming larger every day.

"Ovens heated by steam, oil or gas have been in use for some time and have been fairly successful," says A. M. Clark, Industrial Heating Department, General Electric Company, "but no one will contradict the statement that electrically generated heat, in most cases, produces better and more uniform results. Wherever applicable, it is usually cheaper in the long run, due to the avoidance of losses which are present in gas, steam or oil-heated ovens."

"Skilled workmen are being concentrated more and more on our most vital industries, but other industries must continue to manufacture with best help obtainable. Unskilled labor can be employed where electrically heated ovens are used without lowering the standard quality of the product. This is, in a great measure, made possible by the fact that the temperatures in an electrically heated oven may be automatically controlled within very close limits.

"The New York Couch Bed Company, of Long Island City, N.Y., manufacture all kinds of couches, beds and hammocks, both collapsible and otherwise.

A japan baking and enamelling oven, equipped with General Electric heaters and automatic temperature control, bakes the finish on the metal frames, brace rods, and legs of beds, couches, etc. This oven is 21 ft. long, 8 ft. wide, 9 ft. high, and is insulated throughout with a double course of heat insulating material, protected by a facing of common building brick. The inside walls and ceiling are lined with sheet metal.

Fig. 1 shows the outside of this oven with the automatic control and part of the ventilating system. The heaters installed total 45 kw. and are distributed under the floor throughout the length of the oven, being connected in series parallel. Two controlling Tycos thermostats, one for each end of the oven through relay coils to the contractors, control the temperature, thereby affording a very even distribution of heat in all parts of the oven. There is also a motor and blower, forming a part of the ventilating system for carrying off the vapors which are given off by the japan during baking. Two-thirds of the ventilation is from the bottom of the oven, the other third being from the top. Ventilation is provided for in this way, because most of the vapors from japan and enamel are heavier than air and sink to the bottom of the oven. The parts to be treated are baked for 3 hours at a temperature of 170° F.

As shown in Fig. 2, the work is either run in by means of an overhead conveyor system, or put on racks on trucks which are placed in the oven in the manner shown.

MOLTEN METAL

The death-dealing energy stored up in molten metal is immense, and it is an extraordinary fact that it is possible to meet foundrymen who still do not appreciate or understand the dangers they are facing when acting thoughtlessly when dealing with such metal. No man—for the sake of others as well as himself—should be allowed to run risks in this way. In the foundry the taking of chances should be rigorously suppressed.

A furnaceman who heedlessly pitches lumps of cold metal into a melt already well under way disregards the fact that the destructive energy contained in the molten metal is probably sufficient to wreck the place in which he is working —as to what would happen to him in the event of such an accident occurring we must leave to conjecture.

It is the duty of the executive to see that the furnaceman does not act carelessly in such a way as that mentioned; also they should see that he is not troubled by anyone when he is dealing with molten metal; his whole attention should be devoted to the job on hand.

TUNNEL TYPE JAPANNING OVEN AT NEW YORK COUCH BED CO., LONG ISLAND, N.Y.

INTERIOR VIEW OF TUNNEL TYPE JAPANNING OVEN.

The Use of Jigs, Tools and Special Machines

Being an Article on Jigs, Tools and Special Machines, With Their Relation to the Production of Standardized Parts. A Study of This Article Will Prove Well Worth While

By H. C. ARMITAGE*

(Continued from May 22nd issue)

The connecting rod and cap which are manufactured throughout together, are illustrated in Fig. 4, and produced from one stamping, so that the connecting rod and cap are made together when forging. The manufacturing operations in the smallest basis of production are as in the lay-out under Fig. 4, Table III, page 406.

Jig for Milling Large End of Connecting Rod (Fig. 5)

There are two connecting rods placed in the jig at once, and a gang of four straddle mills are advanced across the work. The components are held at the bottom in fixed V-blocks, AA; and both are gripped together by a clamp B, which is given a wide range of movement by a cam C, pivoted on fixed stud D. The clamping action is transmitted to the work by two sliding V-blocks, and at the top of each is a small steel ball, to take the thrust. As it is most important that there should be no distortion of the connecting rods in this operation, the other end is held vertically by means of a fixed V-block, which is as near a knife-edge in section as practicable, and a set-screw pushes the small boss against a rounded stud, thereby preserving the alignment of the connecting rod sufficient for the next operation. Theoretically the rod should have been "equalized" at this end, but, if there is a moderate machining allowance for facing, it becomes an unnecessary refinement.

This operation is likely to give trouble if the cutters are not of a reasonable stiffness, and should there happen to be more metal to remove from one face of the connecting rod than the other, the cutter is likely to spring, owing to its large diameter. To get the best results there should be a close spacing of the cutter teeth—the opposite of the modern practice of giving cutters the fewest possible teeth. The reason is that the metal to be operated on is likely to prove hard. If there is a fairly large feed (say, 1 in. per minute) and wide spacing, there is a substantial knock, due to the large shoulder of metal which will have fed up while the cutter tooth space has been passing. This knock is transmitted throughout the milling machine, and causes the cutter teeth rapidly to become dull, as well as producing a poor finish on the work. The setting gauge G is made of hardened steel, and is about 30 thousandths less in width than the finished work. In setting up, a feeler is used 15 thousandths in. thick, and the cutters thereby spaced equally on each side of the game.

Milling the Small End of Connecting Rod (Fig. 6).

In all milling jigs it is one of the chief aims of the designer to make the height as small as possible to prevent vibration and obtain stiffness. The rods are clamped at the large end against one of the machined faces and as longitudinal accuracy is not yet required, pegs are a sufficient support. The part where the cut has to be supported is clamped to a flat or slightly dished plate, and tightening one bolt is sufficient to hold two rods without distortion. Note that the direction of the pressure from the cut must be downwards on to the solid plate, and not against the clamps.

Rough Drill Both Ends of Connecting Rod (Fig. 7)

This jig is of "box" form, and as the walls of metal around the small hole are not to be machined outside, and also are comparatively small, the location is taken from a screwed bush, which seats conically upon the small end, thereby obtaining concentricity. The bosses of the connecting rod rest upon hardened bushes, the holes of which are larger than the drill-guide bushes, to clear the drills when breaking through the work. The bush under the large end has three relieved feet to keep the face clear of the chippings. The bushings are formed to make cups for the lubricant, and the whole base of the jig forms itself naturally into channels for carrying away the cutting solution. The bushes of the screw-down type are far from being ideal construction, as it is practically impossible to say that a threaded bush is perfectly square or without play. Bushes with a spiral recess are now largely used instead.

Broaching the Small Hole

The small hole having been drilled about 12 to 15 thousandths smaller than the finished size, it is possible to broach out this amount in one "pull through," on a modern broaching machine. At the present date, however, the reamer still seems to have preference over the broach in the majority of work for this purpose, although in the author's opinion the former should only be used by hand when the parts are being assembled, and then with a strong jig to guide the tool, and keep it square. On an operation of this description a reamer would be under size after doing about six connecting rods, whereas a broach can do from two to three hundred at the very least without being touched.

The reason why the broach is not universally used is chiefly due to the manufacturing difficulty. There is considerable amount of work in cutting and sizing every separate tooth, and, being long in proportion to its diameter, it invariably bends when being hardened. The usual practice is to use a case-hardening steel which can be "peaned" straight afterwards. This is one example of the general problems before the tool-making and manufacturing world to-day, and on which a few remarks will be offered later in the paper.

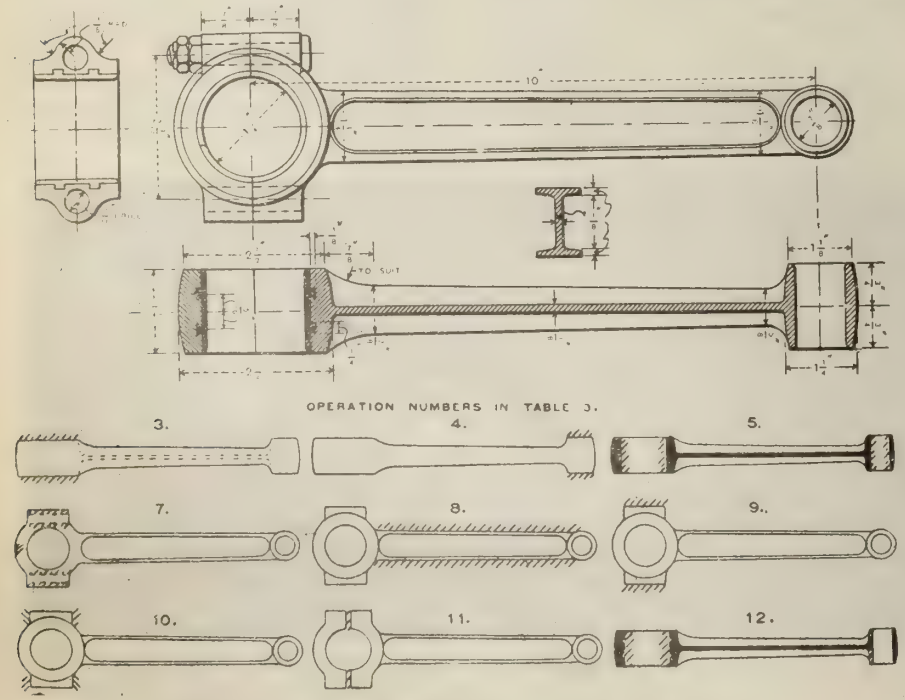
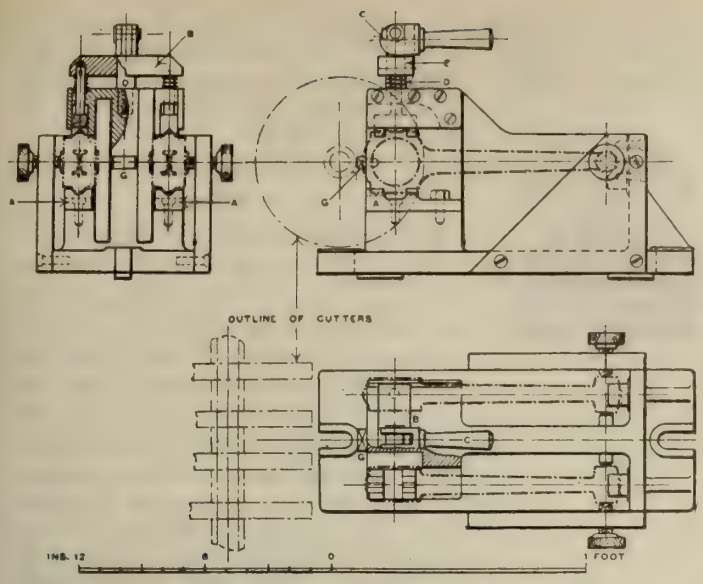
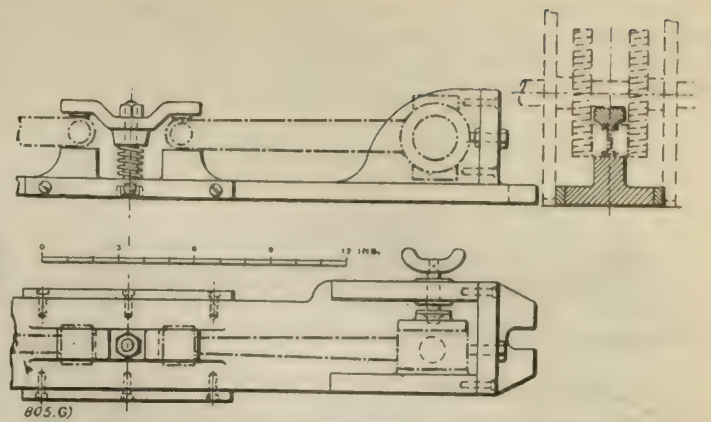


FIG. 4—VIEW OF THE ROD AND ITS OPERATIONS.





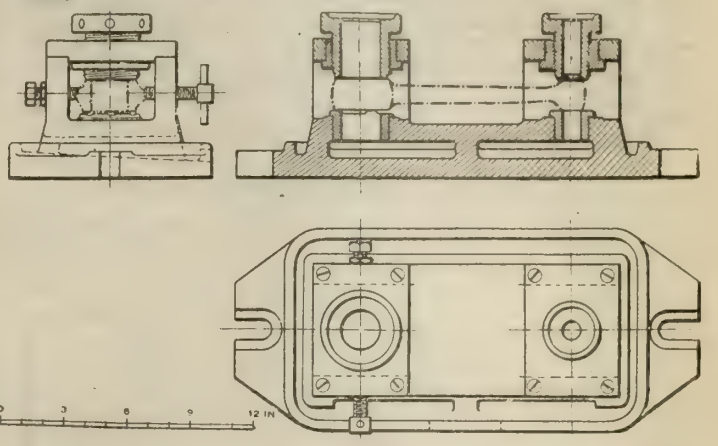


FIG. 5—JIG AT LEFT. MILLING FOR LARGE END OF ROD.
FIG. 6—JIG AT RIGHT UPPER. JIG FOR MILLING SMALL END OF ROD.
FIG. 7—JIG AT RIGHT LOWER. JIG FOR DRILLING ROD.

Drill Bolt Holes and Centre End of Connecting End (Fig. 8)

The small hole having been finished to size by reaming or broaching, it is then used as the principal location for every subsequent operation. To drill the bolt holes, the connecting rod is placed upon two pegs which are fixed to a vertical plate. The jig illustrated is for use on a box-bed drilling machine, care being previously taken that the side of the bed is perfectly square. Attention must be drawn to the centre which is put into the top of the connecting rod during this operation. If this centre were not put in as a locating point for finishing operations, there would be no accurate location for the boring, since bolts have to be put in to secure the cap and thereby destroy the side holes as the natural spotting points.

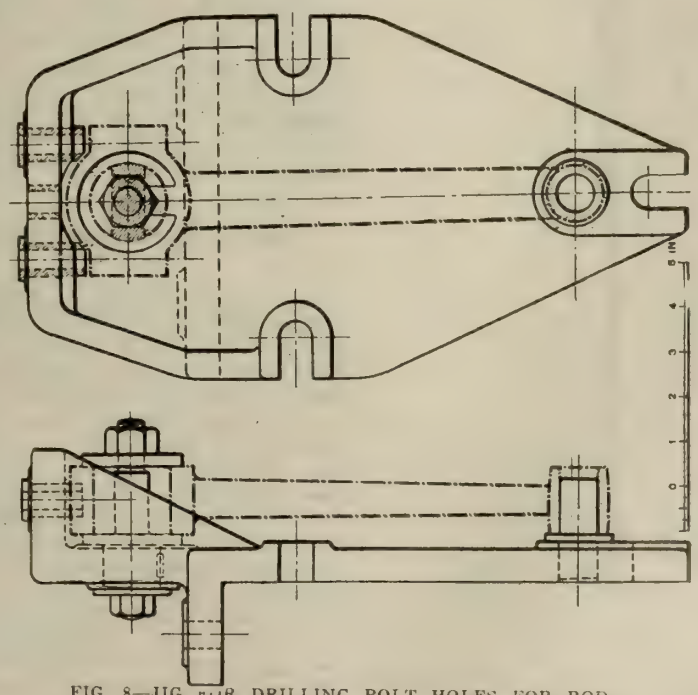


FIG. 8—JIG FOR DRILLING BOLT HOLES FOR ROD.

Mill Sides of Rod

This is a duplex jig, and similar to Fig. 9, and calls for little special comment, except that the peg which supports the large end has been cut away at the sides. As will be noticed in subsequent illustrations, this allows for slight errors of a few thousandths in the diameters and centres of the holes.

Mill Across Bolt Hole Bosses (Fig. 9)

In this jig it is possible to machine four rods at once. Two form cutters are used, and the importance of getting them in the correct position sideways will be noted. This is obtained by means of the three case-hardened spacing bushes ground accurately to make up the total width required. In setting up the cutters lateral accuracy is obtained by the hardened steel guide working in the recess. The middle bush must have a considerable clearance to avoid the chippings which might rest on the top face of the strip.

Milling Bolt Face

It has not been considered necessary to show a drawing of this jig, as it will be practically the same in construction as Fig. 9, except that side facing cutters are used, and the cutters will operate at right angles to the direction in that case.

Parting Of the Cap

This is done in a jig, and the cap removed by means of a 3-16 in. circular saw. The disk method of positioning the cutter laterally is again used, and location taken from the small hole.

Finish Bore the Large End (Fig. 10)

The cap having been bolted to the connecting rod after the sawing operation, the rod is ready for finish boring. To do this (since the large hole is no longer round) the location is obtained from the centred hole. The boring jig shown is for use in a lathe, and the spigot fits in a recess in the face plate. The equalizing clamp is a construction detail worthy of notice, as it is placed here to make

a support against the pressure of the cutting tools. If no stops are used there is danger of twisting the connecting rod and throwing the finished hole out of alignment with the small hole; and accuracy in this respect is most essential. When the rod is machined in a centre lathe, the work will require turning round and resetting. The rod is then white metalled, and afterwards only requires a finish boring operation on the soft metal. The boring jig is practically identical with the one already illustrated in Fig. 10.

To be continued

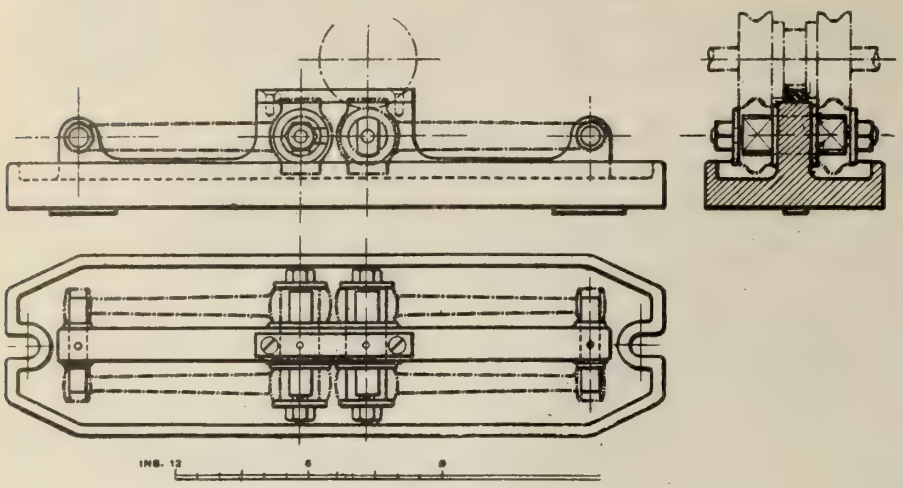
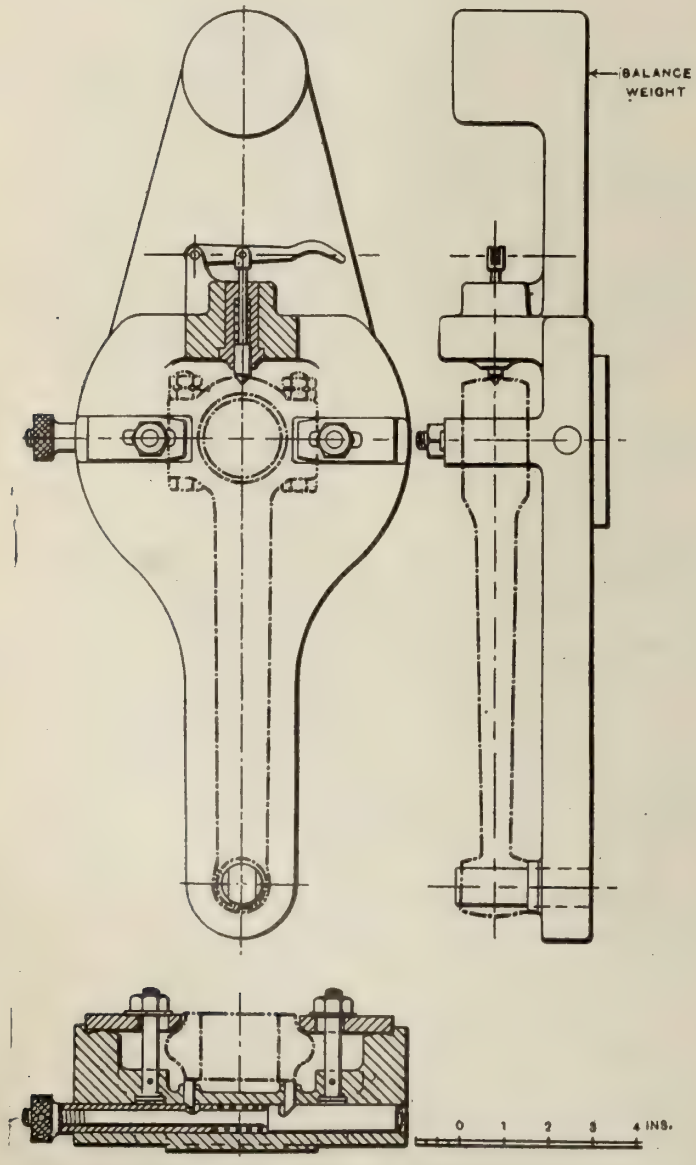


FIG. 9—JIG FOR MILLING SIDES OF ROD ON BOLT HOLE BOSSES.



BORING JIG FOR FINISHING LARGE END OF ROD IN THE LATHE.

SIMPLIFIED ELECTRIC WINDING

The latest practice in geared winding plant for mines is represented in an equipment recently installed in a British colliery, with a shaft 720 feet deep. An old beam-type steam engine was replaced by electric plant driven by a 370 horsepower electric motor operating the drum through double helical gearing, giving a reduction in speed of nearly 10 to 1. A remarkable feature of the change was that the steam engine stopped work on a Saturday afternoon and the electric plant started up promptly on the following Monday morning. This rapid transition was accomplished by building the electric winder house just behind the existing house; only a few hours were required to move the wire ropes from the old drum to the new. In winding plant it is necessary to have a very even and rapid speed control at starting and stopping, and this essential is secured in the electric winder by the use of an ingenious liquid controller of the "weir" type. The liquid is continuously pumped from a lower tank to an upper tank fitted with a sluice gate, which is raised and lowered by the driver's operating lever. When the gate is raised the level of the liquid rises and the electrical resistance falls, thus allowing the motor to gain speed. When the gate is lowered the liquid runs away, the resistance rises, and the speed of the motor is gradually reduced. Auxiliary devices are also used to prevent over-winding and over-speeding. The whole equipment is, in fact, an excellent example of a "fool-proof" electric plant.

IRON CEMENT OR FILLER

By T. H.

In workshops where there is filing and drilling there is usually a lot of fine cast iron in powder to be thrown away, the stuff being a nuisance generally, yet when a joint has to be made or a hole in a casting stopped, filings are conspicuous by their absence. Sufficient finely-sifted stuff passing a 32-in. gauze sieve should be secured, thoroughly dried and kept in an air-tight tin or bottle, and when wanted for use, 80 parts of filings, 2 parts sal-ammoniac, and 1 part flower of sulphur should be very intimately mixed, being careful to finely powder the sal-ammoniac. Immediately before use this mixture should be made into a stiff paste with water and pressed into the cavities, ramming with a piece of wood. In two or three days the material will be hard, and can be filed down level if desired, but it has a slightly brown appearance caused by the formation of oxide or rust.

Canadian Machinery Drafting Course—Part V

As Promised in the Previous Portion, We Will Only Touch on the More Important Problems in This Subject of Geometrical Drawing. Following Are the Next Six Problems, Together With Explanatory Data

By J. H. MOORE, Associate Editor Canadian Machinery

IN the previous instalment on this very necessary subject we defined certain definitions, up to the point of the obtuse angle, stopping at the aforementioned angle in order to proceed with plate No. 4.

We will now go further into the subject of geometrical terms and their meanings.

Leaving the angles we next come to the subject of surfaces, which prompts the enquiry, "What is a surface?"

A surface is produced by the motion of any line. It always has two dimensions, namely length and breadth.

There is another type of figure termed the plane figure. This could be explained as follows:

A plane figure is a plane bounded on all sides by lines, the space included within these lines (that is, taking it for granted that they are straight lines) is called a polygon, or as sometimes termed, a rectilinear figure.

So now, since we've come to polygons, let us see what various types we find.

A polygon proper is a plane figure which is bounded on all sides by straight lines, these lines being called sides, and the sum of these sides being termed the perimeter, which of course means all the way around.

These polygons are classed according to the number of sides they have and are as follows:

A triangle is a polygon with three sides; a quadrilateral is a polygon with four sides; a pentagon, with five; a hexagon, with six; a heptagon, with seven; an octagon, with eight; a decagon, with ten; a dodecagon, with twelve; an equilaterial is a polygon whose sides are all equal. A regular polygon is one all of whose angles and sides are equal.

These definitions describe in full the various type of plane figure met with in geometrical problems, in fact some of those mentioned in the list very seldom appear, but for the student's benefit have been spoken of in order that he may familiarize himself with the names.

Now polygons again can be classified into various headings, in fact such is necessary, so briefly we will proceed to find what some of these general headings are.

First we come to triangles, namely the polygon, with three sides. The angles of a triangle are of course the angles formed by these sides. Figs. 1 to 6 illustrate the different type of triangles met with. At Fig. 1 we see the right angled triangle, or as it is commonly termed, the right angle. The longest side of this angle, that is the side opposite the right angle, is called the hypotenuse, the other sides are simply termed sides, or, as some people prefer to say, legs.

Fig. 2, the obtuse angled triangle, is one that has an obtuse angle as shown.

Fig. 3, the acute angled triangle, is one which has all its angles acute.

Fig. 4, the equilateral triangle, is one (as the name denotes) having all its sides equal.

Fig. 5, the isosceles triangle, is one, two of whose sides are equal.

The altitude of a triangle is the perpendicular drawn from the vertex to the base, see lines A on Fig. 5.

Fig. 6 illustrates the scalene triangle. This triangle has no two sides equal.

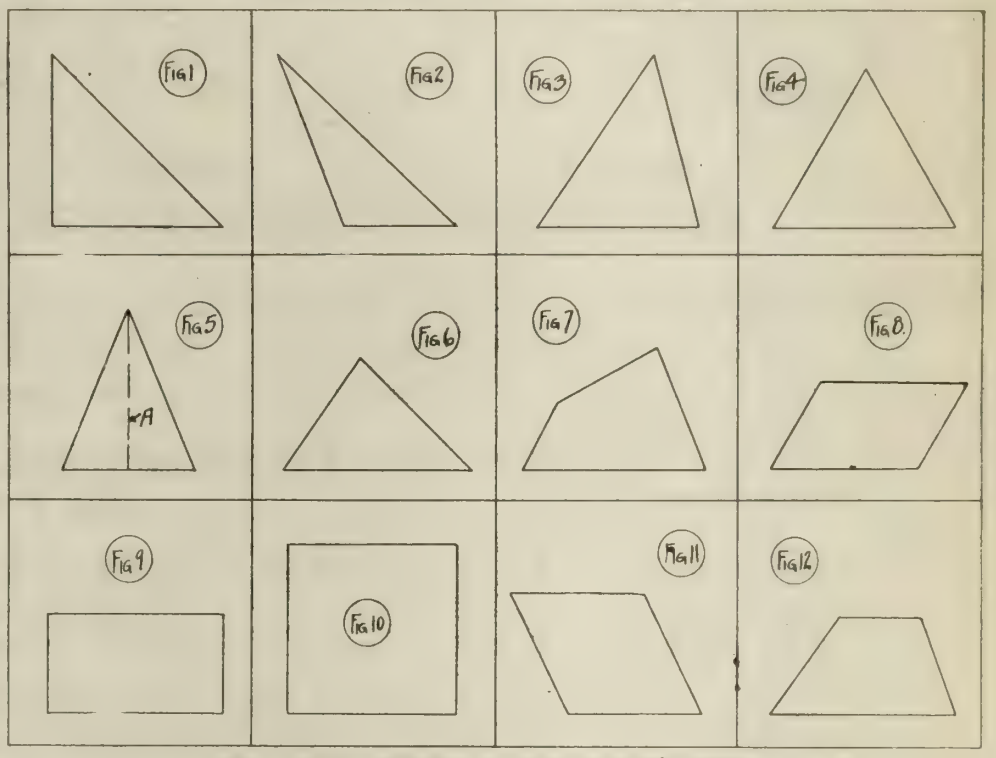
A square is a parallelogram whose sides are all equal, and whose angles are all right angles (see Fig. 10).

A rhombus is a parallelogram whose sides are equal but whose angles are not right angles (see Fig. 11).

A trapezoid is a quadrilateral having only two sides parallel (see Fig. 12).

But enough of definitions in this section, so let us get on to plate No. 5.

As will be noticed, this plate is divided into six problems, each dealing with polygons in one form or another. As before, the dimensions are 9 in. by 13 in. for the border lines, and 9½ in. by 13½ in. for trimming. Divide the 8 in. by 13 in. space into six portions as shown and proceed as follows:



FIGS. 1 TO 12—SHOWING VARIOUS TYPE POLYGONS.

The lowest side of a triangle is always called the base. Any side may of course be taken as the base, but usually the side upon which the triangle is supposed to stand is generally accepted as the base.

Quadrilaterals

Polygons are again subdivided into quadrilaterals, or polygons, with four sides, of such shape and names as follows:

A quadrilateral is, to commence with, a figure bounded by four straight lines (see Fig. 7).

A parallelogram is a quadrilateral whose opposite sides are parallel (see Fig. 8).

A rectangle is a parallelogram whose angles are all right angles (see Fig. 9).

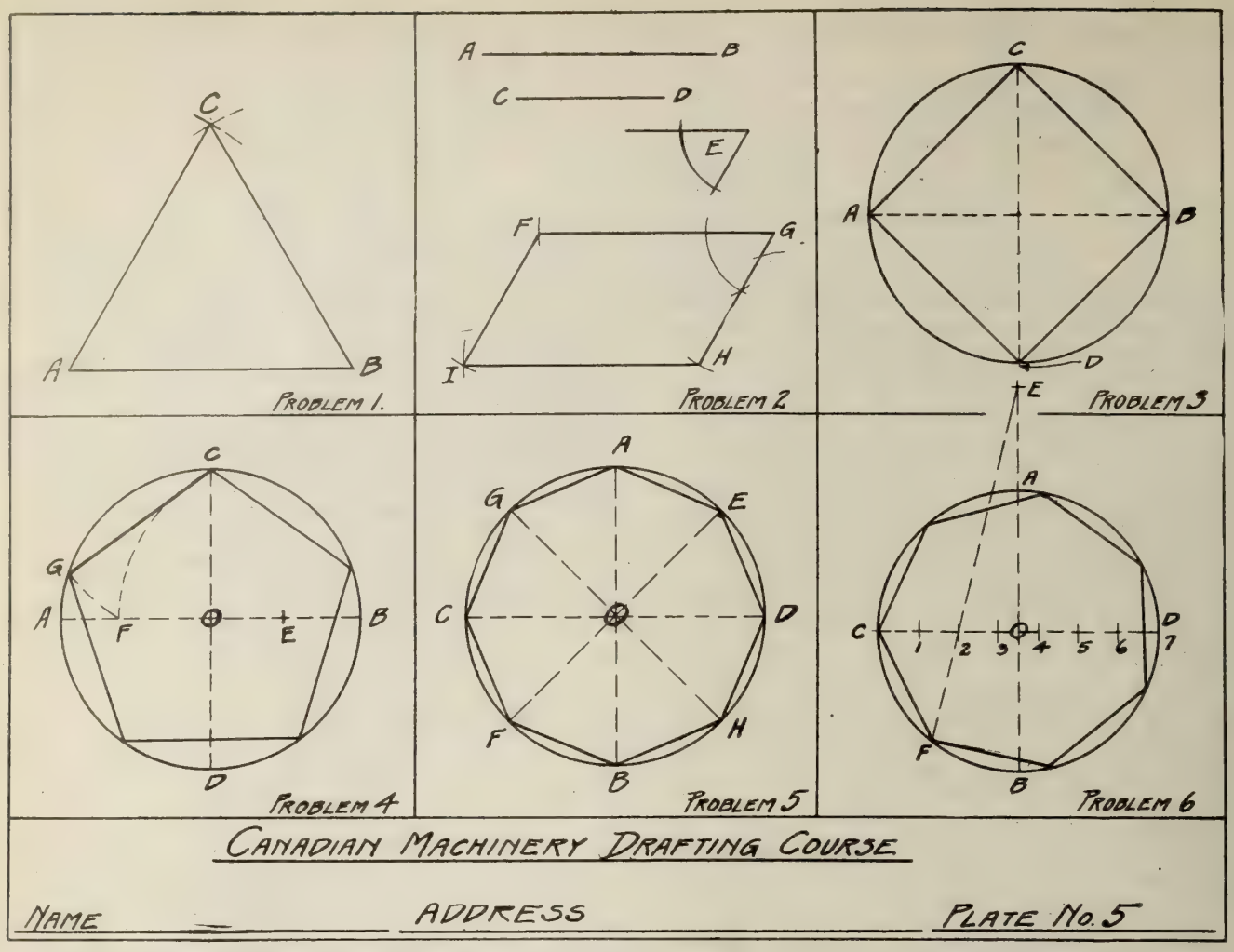
Instructions for Plate 5

Problem 1.—To construct an equilateral triangle, one side being given.

Draw A B 2¾ in. long. With A B as a radius, and A and B as centres, describe two arcs intersecting at C; join CA and CB. The result being an equilateral triangle.

Problem 2.—To construct a parallelogram when the sides and one of the angles are given:

Suppose AB and CD to be the given sides, AB 2¼ in. long, CD 1¾ in. long. Let E be the given angle. Draw FG equal to AB and draw GH, making the angle with FG similar to the angle E.



THIS COURSE DEPENDS ON YOUR REPLIES FOR ITS SUCCESS. ARE YOU SENDING IN YOUR WORK REGULARLY?

Make the line GH equal in length to CD. With H as a centre and a radius equal to AB, describe an arc at I. With F as a centre and a radius equal to CD, describe an arc cutting at I; join FI and IH, when you have constructed your parallelogram.

Problem 3.—To inscribe a square in a circle:

Draw the circle, as shown, 3 in. diameter; draw next the two diameters AB and CD at right angles to each other; join these points of intersection with the circle, and in short order you have a square completed as shown.

Problem 4.—To inscribe a regular pentagon in a given circle:

Draw the circle as shown 3 in. diameter; draw the two diameters AB and CD as before; consider the centre of the circle as the letter O; bisect OB as shown at E (note: your previous plate gave this problem of bisecting a line). With E as a centre and EC as a radius draw the arc CF, cutting AO at F. With C as a centre and CF as a radius, draw the arc FG, cutting the circumference of the circle at G. The chord GC is one side of the pentagon. The rest of the construction is left to the student, for it is self apparent, the one side being obtained.

Problem.—To describe a regular octagon in a given circle:

With O as a centre describe a circle

HERE ARE THE PRIZE WINNERS FOR PLATE NO. 2

R. Learmonth, 49 Wychwood Ave., Toronto, Canada.
J. O'Brien, St. Jerome, Quebec, Canada.
A. C. Bailey, Bracebridge, Ontario, Canada.

Is your name here? If not, make up your mind to work your hardest; send in your work and win a prize.

Tear off and send with drawing

Name .....

Address .....

Position .....

Firm's name.....

3 in. diameter; draw the two diameters AB and CD, bisect angle AD at E, and draw line E to F; bisect the angle AC at G, then draw GOH. Join the points of intersection with the circle and you have your regular octagon constructed.

Problem 6.—To inscribe a regular polygon of any number of sides in a given circle:

With O as a centre draw a circle 2½ in. diameter. Draw the two diameters AB and CD; prolong AB as shown, making AE equal to three-fourths of the radius OA; divide the line CD into as many equal parts as the polygon has sides as shown at 1, 2, 3, 4, 5, 6 and 7. (Of course this can be any number). Now draw a line through points E and 2, cutting the circle at F; draw the chord CF, this is one of the sides of the polygon. Of course the others are easily obtained by spacing off around the circumference.

This completes plate 5. Print in Problem 1, etc., in their proper places, also be sure and print in the title, for it is all good lettering practice. Do not let the fact that summer is here detract you from your work, but keep on sending in your plates.

A Summary of the Mineral Production in Canada

This Article Covers the Preliminary Figures for 1918, Mentioning the Various Metals, Such as Copper, Gold, Silver, Platinum, Nickel, Iron, Steel, etc., and Where These Metals Were Mined

"The usefulness of statistical data on mineral production," says the preliminary report for 1918 of the Canadian Department of Mines, "is greatly increased by the promptness with which the records can be presented to the interested public." Acting on this principle, estimates, based on the periodical returns made to the various war boards organized by the Government were put together at the end of the year. These estimates, further revised and supplemented, have now been issued as a preliminary report—"still subject to revision." The department, in this way, has secured prompt presentation of the broad results of mineral production.

The total value of the metal and mineral production of Canada in 1918 was 210,204,970 dols., an increase of 20,558,149 dols., or 10.8 per cent. on the values for 1917. In comparison with 1913, there was an increase of 44.3 per cent. Though much of this increase in values is due to higher prices, "it is satisfactory to note that, out of about forty-five items or products no less than eighteen products have reached their highest production in actual quantity during 1918 or 1917." Cement, stone, bricks, and other building materials fell off by about one-half, but the war demand led to large increases in metals, various non-metals and fuels. Half the total increase in value, as compared with 1917, was due to the higher prices obtained for coal, and a considerable proportion of the balance to higher prices of silver, cobalt and asbestos. Metal production in 1918, valued at 113,563,111 dols., increased by 7,107,964 dols., or 6.7 per cent. The metals—cobalt, copper, lead, molybdenum, nickel and zinc—all increased in quantity. Gold and silver slightly declined. Non-metallic production, valued at 96,641,859 dols., increased by 13,450,185 dols., or 16.2 per cent. Most of these non-metallic products—except clay and stone quarry materials—increased in quantity.

Copper

Copper production in 1918, which amounted to 118,415,829 lb., increased by 8.4 per cent. in quantity but decreased by 1.8 per cent. in value. The high mark of 117 million lb. in 1916 was passed. The average price of copper in 1918 was 24.628 cents per lb., against 27.180 cents in 1917. Of the total production 92,769,167 lb. were contained in blister copper and in matte produced in Canada, and 25,646,662 lb. estimated as recovered from ores exported. Ontario's output of 47,047,801 lb. increased by 9.7 per cent. in quantity, and the British Columbia production of 62,858,628 lb. increased about 9 per cent. in quantity. The total amount exported was 60,536 tons (of 2,000 lb.) against 59,961 tons in 1917.

Gold and Silver

Gold declined slightly in quantity. The amount was 710,526 fine ozs., as compared with 738,831 fine ounces in 1917. Ontario produced 411,270 ounces, or about 57.8 per cent. of the total production of Canada. British Columbia yielded 187,069 ounces, as against 133,742 ounces in 1917, an increase of about 40 per cent., due to increased activity at the Rossland Mines and to the entry of the Belmont Surf Inlet Mines. The Yukon gold output fell by 42 per cent. to 102,382 ounces, and was much below the average for the past ten years. Gold exports were valued at 10,040,813 dols., as against 15,929,051 dols.

The production of silver is estimated at 21,284,607 fine ounces, valued at 20,597,540 dols., as compared with 22,221,274 fine ounces, valued at 18,091,895 dols., in 1917. The decrease in quantity was 4.2 per cent., but the increase in value 13.8 per cent. Ontario's output of 17,109,389 ounces was 80.4 per cent. of Canada's silver production. Most of this silver came from the ores of Cobalt and the adjoining districts. In 1917 Ontario produced 19,301,835 ounces, British Columbia produced 3,965,828 ounces against 2,655,994 ounces in 1917, an increase of 49.3 per cent. in quantity and of 77.5 per cent. in value. The average price of silver for the year was 96.772 cents per ounce.

Platinum

The recorded production of platinum was 39 crude ounces (25 fine ounces), valued at 2,560 dols., as against 57 crude ounces, valued at 3,823 dols., in 1917. This was all obtained from Similkameen district of British Columbia. A definite record of the total recovery of the metals of the platinum group has not been obtained. The most important sources of the metals are the nickel-copper areas of the Sudbury district, Ontario, which are refined at Port Colborne, Ont., in the United States and in Wales. On the basis of the reports from the Canadian Copper Co., the total matte shipments in 1918 would contain, among other precious metals, 8,677 ounces of platinum and 13,016 ounces of palladium. The United States Government in June last fixed the price of platinum at 105 dols. per ounce.

Nickel

The amount of nickel produced in 1918 was 92,076,034 lb., valued at 36,830,414 dols., as against 84,330,280 lb., valued at 33,732,112 dols., in 1917. As usual, the nickel was chiefly derived from the Sudbury district, Ontario. The new refinery at Port Colborne started operations on 1st July last. The nickel-copper matte yielded by the smelters in the Sudbury district amounted to 86,773 tons (2,000 lb.), containing 45,670 tons of nickel and 23,472 tons of copper. The smelters of the silver cobalt-nickel ores of the Cobalt district reported a production of 243,186 lb. of metallic nickel and 962,309 lb. of nickel salts; the corresponding figures for 1917 were 265,896 lb. of metallic nickel and 657,549 lb. of nickel salts. The exports were 1,710,800 lb. of fine nickel, at 41.3 cents per lb., and 85,767,700 lb. of nickel in ore, matte, etc., valued at 12.3 cents per lb.

Lead and Zinc

Lead amounting to 43,846,260 lb. was produced in 1918, as against 32,576,281 lb. in 1917. There was an increase of 34 per cent. in quantity, and of 12 per cent. in value. The average prices in Montreal for the two years were 9.25 cents per lb. in 1918 and 11.137 cents in 1917. The exports were: lead in ores, concentrates, etc., 22,684,100 lb. against 13,410,400 lb. in 1917, and pig lead, 7,461,700 lb., against 1,004,500 lb.

Previous to 1916, all zinc ores mined in Canada were exported for both smelting and refining, but during the last three years much of the ore raised has been treated in Canada. The total production of zinc in 1918 was 33,663,690 lb., valued at 2,746,620 dols. (8.159 cents per lb.), as compared with 29,668,764 lb., valued at 2,640,817 dols. (8.901 cents per

lb. in 1917. British Columbia yielded 31,011,164 lb. and Quebec 2,652,526 lb. The refined zinc produced in Canada from native ores was 12,278 tons (2,000 lb.), in 1918, against 9,985 tons in 1917 and 2,974 tons in 1916.

Iron and Steel

Iron ores showed a further falling off in 1918, being 206,820 short tons (2,000 lb.), valued at 863,186 dols., as compared with 215,302 tons, valued at 758,621 dols., in 1917. Most of the ore, 197,637 tons, was raised in Ontario. The quantity of ore charged to blast furnaces in 1918 was 2,242,337 tons, of which 96,745 tons were domestic and 2,145,592 tons imported—Newfoundland and "Lake ore."

Pig-iron production was 1,194,000 short tons (2,000 lb.), valued at 33 million dols., as compared with 1,170,840 tons, valued at 25 million dols., in 1917. Of the total production 1,163,520 short tons were made in blast furnaces and 30,425 tons in electric furnaces from scrap steel, chiefly shell turnings. In 1917 the blast furnace output was 1,156,789 tons, and the electric furnace production was 13,691 tons. In Ontario the blast furnace pig iron made was 748,258 tons, as against 684,642 tons in 1917, and was the largest amount made in this province. Nova Scotian blast furnaces made 415,870 tons, against 472,147 tons in 1917, and, with the exception of the year 1914, was the smallest production in this province since 1911. The grades of pig-iron last year were: Basic 966,409 tons; Bessemer, 15,415 tons; foundry and malleable, 181,696 tons; and electric furnace low phosphorus iron, 30,425 tons. The export of pig-iron in 1918 was 2,130 tons, and the imports 67,396 tons.

Provisional estimates of steel ingots and direct steel castings put the quantity as 1,893,000 short tons for 1918, of which 1,820,000 tons were ingots. In 1917, the production was 1,745,734 short tons, of which 1,691,291 tons were ingots. Electric furnaces produced in 1918 about 120,000 tons of steel, as against 50,467 tons in 1917, 19,639 tons in 1916, and 5,625 tons in 1915.

Coal and Coke

Although Canada has very large undeveloped reserves of coal, especially in the Prairie Provinces, the Dominion still imports the greater part of the coal consumed. The total production of marketable coal in 1918 was 14,979,213 short tons (2,000 lb.), valued at $55,752,671, and, except for the output of 1913, was the largest quantity raised in any one year from Canadian mines. In 1917, 14,046,759 tons were produced, valued at $43,199,831. The 1918 output shows an increase of 6.64 per cent. in quantity and of 29.06 per cent. in value. Most of the coal—11,154,251 tons—was bituminous. One mine in Alberta yielded 115,405 tons of anthracite; the remainder, 3,331,216 tons, was lignite. Alberta was the biggest producer, and increased its 1917 figures by 1,205,496 tons, or 25.45 per cent. British Columbia increased by 134,703 tons, or 5.53 per cent., but Nova Scotia fell off by 474,289 tons, or 7.5 per cent., and yielded less than in 1913 by 2,127,271 tons, or 27 per cent. The total exports of coal entered for consumption were 21,678,587 tons, valued at $71,650,584, as against 20,857,460 tons in 1917, valued at $70,562,357. Bituminous coal increased, while anthracite fell off. The consumption of coal in 1918 was 34,840,605 tons, as compared with 33,123,735 tons.

The output of oven coke was 1,234,347 short tons made from 1,945,475 tons of coal, of which 1,348,232 tons was domestic and 597,243 tons imported. The average was 0.634 tons of coke per ton of coal. In 1917 the output was 1,231,865 tons of coke from 1,928,923 tons of coal, or an average of 0.639. The estimated consumption of oven coke was 2,363,270 tons in 1918, against 2,192,373 tons in 1917. The by-product recovery ovens, which dealt with 71.2 per cent. of the coke production, yielded 10.525 tons of ammonium sulphate and 7,697,435 gallons of tar.

Petroleum

A slight increase in Canada's petroleum output has been seen during the past two years. This has been due to the development of the new Mosa field in the county of Middlesex, Ontario. From all sources 304,741 barrels (10,665,935 Imperial gallons) were produced, valued at $866,544, as against 213,852 barrels (7,484,120 Imperial gallons), valued at $542,239 in 1917. This was the largest output since 1910. A bounty of 1½ cents per gallon is paid on the marketed amount of crude oil from Canadian fields. Ontario's production was 288,692 barrels, or 10,104,220 Imperial gallons. Complete returns of the oil refineries have not yet been received, but in 1917 nine refineries used 199,256,799 gallons of crude oil, of which 190,822,740 gallons were imported and 8,434,059 gallons obtained from Canadian wells. The total quantity of petroleum oils, crude and refined, imported into Canada in 1918 was 420,728,933 gallons, as compared with 379,148,006 gallons in 1917.

Other Metals and Minerals

It is estimated that the molybdenite content of ores and concentrates shipped was 377,850 lb. in 1918, as against 288,705 lb. in 1917. Quebec produced about 88 per cent.

Some six tons of tungsten ore were received for treatment at the ore-testing laboratories of the Mines Branch.

The production in 1918 of arsenious oxide was 2,483 tons and of arsenic in concentrates, 1,015 tons. This compares with 2,656 tons of arsenious oxide and 280 tons of arsenic in 1917.

During the past four years the production of asbestos has largely increased, the prices in 1918 being from three to four times those of 1914. The total output was 143,456 tons (crude and mill stock), against 141,743 tons in 1917. The average price of crude was $671.35 per ton, against $510.47, and that of mill stock $46.87, against $34.08—the whole production was yielded by the Province of Quebec.

The total shipments of chromite ore and concentrates in 1918 were 21,994 short tons, valued at $39.40 per ton, against 23,712 tons, at $24.54 per ton in 1917. The total content of Cr_2O_3 was 8,526 tons, against 8,472 tons. Thus the slightly reduced output of 1918 exceeded that of 1917 in chrome content and in total value. A feature of the year was the entry of British Columbia as a producer of chrome ore. The bulk of the quantity raised came, as before, from the Eastern Townships, Province of Quebec.

Fluorspar increased substantially, the principal production from Madoc, Ontario, being supplemented by recently opened deposits in the Yale district, British Columbia. The total amount was 7,362 tons, valued at $135,712, as compared with 4,249 tons, valued at $68,756 in 1917. Canadian steel companies use from 10,000 ton 15,000 tons per annum.

In spite of the strong war demand the output of graphite fell off. The total product was 3,051 tons, valued at $270,054, as compared with 3,714 tons, valued at $402,892 in 1917. Ontario yielded 2,934 tons.

The production of magnesite—obtained entirely from Argenteuil County, Quebec—also declined from 58,090 tons in 1917 to 39,365 tons in 1918. The price, however, advanced so much that the 1918 production was valued at $1,016,765, against $728,275 in 1917.

The output of pyrites declined from 416,649 tons in 1918 to 413,698 tons in 1917. The total sulphur content in 1918 was, however, 157,311 tons (an average of 38 per cent.), against 155,163 tons (an average of 37.2 per cent.), in 1917. Canada consumed 85,951 tons of pyrites last year, and the balance of 327,747 tons was exported to the United States.

For the first time since 1907 the quantity of salt sold from Canadian wells showed a decline. The sales in 1918 were 131,727 tons, valued at $1,285,039, as compared with 138,909 tons, valued at $1,047,792 in 1917. There was a decline in quantity of 5 per cent. and an increase in value of 22.6 per cent. The Canadian product was, as usual, entirely from the saltfield of Southern Ontario. A deposit of rock salt is being opened up in the neighborhood of Malabash, Cumberland County, Nova Scotia. This is the first known discovery of rock salt in the Maritime Provinces, and the first deposit in Canada to be discovered at a depth sufficiently shallow to enable it to be won economically by actual mining.

PAINTING CORRUGATED STEEL

The corrugated steel used for airplane hangars in this country and overseas was painted before shipment. Owing to the large quantity of steel, it was out of the question to do this work by hand, and machines could not be used on account of the corrugations. For this reason, a spray system of painting was employed. First, the sheets were coated with red lead before being corrugated, and after that they received a coating of green on one side and grey on the other side, applied by means of a jet 14 inches wide.

PART OF SEA WALL, HALIFAX TERMINALS

The Canadian Government's Ocean Terminals

The Government Are Spending Thirty Millions of Dollars on the Port of Halifax—Will Make Halifax the Best Equipped Port on Atlantic Seaboard—Considerable Progress Has Been Made

THE visitor to the port of Halifax, who has not been there for two or three years, will find vast changes. The first thing to come to his notice on entering the city by the Government Railway is the fact of the line branching off from the harbor front at the north end of the city, and making a detour through about two miles of rock cutting to the new station at the south end. Here the train runs into the temporary depot, erected on the site of the new union station, which will be a beautiful granite structure. Outside of this depot there are already constructed a network of tracks for handling freight cars, communicating directly with the new quays and basins. Of the new piers and basins, the northernmost is practically completed, and is in daily use. Large coal clams for loading and discharging coal have been erected on the wharves of this basin and numerous vessels are handled daily. On the occasion of the writer's visit recently, the following vessels were observed at the wharf, loading and unloading: The "War Gaspe," "War Huron," "War Quebec," "Canadian Voyageur," and "War Witch." It is noteworthy that all of these vessels are of Canadian build, and represent both wood and steel construction. The "Canadian Voyageur" is the first of the Canadian Government's new programme, and bears the distinction of having descended the St. Lawrence at a later date than has hitherto been attempted by any large merchant steamer.

The large landing quay has been practically completed, as far as the sea wall is concerned, and its magnitude can well be realized on gazing along its length. The following general description, prepared for the Halifax Board of Trade, gives a very good idea of the extent of the whole undertaking. The illustrations show different points in the progress of the work.

Some idea of the extent of the business handled by the port of Halifax can be gathered from the statistics for the year of 1918. The customs receipts for the year were $2,261,581. The tonnage of vessels entering and leaving the port amounted to 15,836,554 tons. The value of the imports was $14,760,000, and of the exports $127,642,512. The bank clearings were $216,084,415, and the population 62,840.

Halifax, as a port of call and terminal, outgrew its facilities years ago. Steamship companies have been seeking an entrance into this port, on account of its exceptional advantages. Its port charges are the lowest on the Atlantic seaboard. Steamships of the largest type—the "Olympic," for instance—berth here without the aid of tugs and other incidental charges.

The harbor is one of the finest in the world—open all the year round, one of the easiest of access either by night or day, and also one of the best protected; a rise and fall in tide of 4 to 6 feet only.

Delegates of representative men, from the City Council and Board of Trade, from time to time visited Ottawa to discuss increased terminal facilities with the Dominion Government. These delegations were joined by some of the leading steamship men of Montreal, who have interests in the "city by the sea."

Several plans for the development of the harbor were subsequently submitted, but none of these were acceptable, being considered entirely inadequate, in view of the yearly increase in port tonnage, etc. At that time, the port was equipped with ten berths, capable of accommodating the largest ocean liners of the day and increased accommodation for sixteen steamships only.

In May, 1912, the Government placed the whole matter in the hands of Mr. F. W. Cowie, B.A., Sc. M. Inst. C. E., of the Montreal Harbor Commission, as consulting engineer, and Mr. James McGregor, A. M. Inst. C. E., A. M. Can.

CONSTRUCTION WORK ON TERMINALS

PREMIER BORDEN LAYING STONE.

Soc. C. E. The latter, who had previously been with the Grand Trunk Pacific Railway on construction work in Western Canada and also had considerable experience in the building of terminals in some of the principal ports of the world, was appointed resident engineer.

He selected a site, formerly known as "Fresh-water" at the extreme south end of the city and bordering on Point Pleasant Park, and planned a landing quay 2,006 feet long and five piers, 1,250 feet long by 360 feet wide, with basins 360 feet between, the whole scheme occupying a mile and a half of water front, within twenty minutes steaming from the Atlantic ocean and considered one of the best sites in the harbor front for the purpose. The plan gives berthing accommodation for twenty-seven Atlantic liners of the present largest type, and the total area used for the locating of these mammoth piers is 260 acres, of which 198 acres is of land and 62 of water. The piers will have a depth alongside of 45 feet of water at a low water of ordinary spring tides.

The quay and pier walls are unique of construction on this Continent, consisting of cellular reinforced concrete blocks 31 feet wide, 22 feet long and 4 feet 1½ inches in height, and weighing in the neighborhood of 64 tons each; those blocks, facing the bulkhead passenger landing quay and piers, are being placed one on top of the other, thirteen in height, some of the cells being filled with concrete and some with rubber; thus the entire project will have a concrete facing of 30 feet in width, its entire length faced with granite from one foot below the low water mark upwards.

For the purpose of moving these immense concrete blocks a powerful travelling crane is used. First, however, a foundation under water is laid by means of a diving bell with a working chamber sufficiently large for eight or ten workmen to move easily about on the bottom of the harbor. After rock bottom is obtained, concrete bases of about 6 feet square are built, on which the blocks are placed by being lowered by the crane; this crane travels along on the concrete blocks already laid.

The concrete blocks are so formed that each stack of blocks by being cemented together by the concrete placed in the cells forms a unit, but each stack is a separate unit kept together by concrete diamond shaped piles, used as keys and guides in placing. Thus the units are allowed to expand and contract—there being practically the same contraction and expansion in concrete as in steel.

The plan also calls for up-to-date immigration quarters. This building will be 800 feet long, built of granite, and with the best appointments procurable. It is in direct connection with the Union Passenger Station.

The Union Passenger Station, with concourse and train sheds for ten passenger tracks and sufficient room for future extension when required, will be of granite and of very fine architectural design. The contour of the land will place the main floor on the same level as the landing deck of a first class Atlantic liner, consequently no steps to ascend or descend. The baggage and express will be handled underneath the main concourse. The appointments of this building will be in keeping with the entire scheme and the cost of this building, alone, in the neighborhood of $2,000,000. Each of the piers will have four large freight sheds with tracks on either side and eight tracks the entire length. There is a grain elevator of large capacity and most modern type to be built in connection.

The well-known construction firms of Foley Bros., Welsh, Stewart & Fauquier, who have been engaged in large railway undertakings in the West, and the Cook Construction Company and Wheaton Bros., Limited, have been working on these mammoth docks and railway connections for three years, and sufficient progress was made in pier construction for the docking of four steamers the past winter.

The plan also calls for direct service yards, with sufficient car storage accommodation, round house, and otherwise equipped.

The whole scheme is connected with the present railway by a cutting travers-

CORNER OF NEW BASIN.

ing the western section of the city, and meeting the present main line at Fairview. At the latter point a terminal yard is being built, a mile and a half long by 300 feet wide, with standing room for about 2,000 cars.

The present terminals at the north end of the city, also at Richmond, consisting of ten berths, with all rail facilities, etc., will continue to be used—those at Richmond for bulk freights, such as lumber, etc. At the latter point a concrete pier (New No. 2) was completed in 1915, 700 feet long by 245 feet wide, containing two tracks within the shed and one on either side, without. The shed on this pier, also, of concrete, is of two storeys, the lower storey having two freight platforms, 90 feet wide, the entire length of the pier; upstairs is fitted for immigration quarters, etc. This pier cost, completed, $1,250,000.

The increases in the port's business, of late years, have been enormous—the imports and exports of 1913 totalled $26,979,816 and in 1918, $142,402,512.

With Transcontinental railway lines seeking an entrance into this city, an average increase in shipping tonnage of practically 2,000,000 per year during the past five years, will give some idea of how the port of Halifax is forging ahead.

The building of the new terminals and the area used, meant the re-housing of a large number of families, as it contained 111 dwellings, and consequently, has increased the building boom in other sections of the city. Building permits in 1915 were over $250,000 in value, in excess of the previous year and a relative increase in 1916. In 1918 they totalled $2,955,406.

THE BASIN UNDER CONSTRUCTION.

WORKS READING ROOMS

One of the beneficial results of the war has been the broadening of the basis of relationship between the employer and his workmen. Welfare schemes have been created with the direct object of giving the workers a more comfortable life, and they have had the indirect result of increasing output. They represent a growing consciousness that the aim of employer and employee is ultimately the same. It is now quite common for engineering firms of any considerable size to have a canteen where a good meal can be had for quite a nominal figure, and it is rather surprising that such firms, while recognizing the value of catering for the material needs of their workers, fail to provide reading rooms, or even a distributing centre, especially of a technical nature. A very large proportion of men and women do not live near the works, either because housing accommodation is bad or because another district is desirable, and those men and women, after eating their breakfast or dinner, idle at street corners, play cards, or sometimes frequent the bars of public houses. Apart altogether from the waste of time, the moral effect is bad. It is these also who are away from home all the day, and perhaps who have a long journey to and from work, who have least inclination to read and study in the evening. The consequence is that they do not keep abreast of the times by reading technical journals; they lose their grip of fundamental principles and their value as producers is lessened. Oftentimes also, in the highly skilled trades, where every new task requires a special effort and much thought, it would be a real boon, and probably result in saving of time, if suitable books could be referred to during meal hours.

Very few of the free libraries cater as they might do for the technical reader, and they are usually adjacent to large works, so they are inaccessible in the short meal hour. By the institution of works reading rooms and libraries there would be no overlapping. The greatest difficulty in a large works is to provide a sufficiently large room, but this difficulty can be surmounted by dividing the library into two sections—a student section and a general section. A large room should certainly be provided for apprentices and others who can prove that they are bonafide students and attending classes at a technical school, but a smaller room with a counter will suffice for passing over periodicals and text-books in exchange for a "tally." It is possible to dispense altogether with this counter by a distributing scheme through the shop. The outlay which such a librray scheme would involve would be small compared with the gain which would accrue from it. One or two attendants would be necessary. The initial cost would be considerable, of course, because it would be necessary to provide the best and most up-to-date technical literature, but the workers would willingly pay their share of such a scheme. Under the Whitely scheme, industrial councils will shortly be formed in all works, and these industrial councils could form a sub-council or committee for library supervision. This would place works libraries on a democratic footing and ensure that only the most suitable matter would be taken. Workmen are naturally suspicious of any new suggestion or schemes which are administered solely by the employers. It has so long been the custom to regard their interests as inherently antagonistic that the only way to allay suspicion and prove the genuineness of new ideas is by a mutual sharing of responsibility.

On the other hand, works libraries such as they have been outlined above would speedily result in a scientific class of craftsmen, and they would not affect adversely the sale of technical literature. The demand would be whetted, because it is a proved adage that the appetite for knowledge grows by being fed, and the favorite book or periodical at a library is likely to become the favorite one at home. The reading public grows steadily, and if we are to retain our world supremacy as a nation it will be well to divert the reading tendency into the best channels.

SECURING HANDLES TO BOXES

By M. E.

The transport of heavy boxes is often difficult, owing to the ordinary drop handles being of small dimensions, which prevents more than one man from assisting when removal is required, while if wood strips are attached at the sides with projecting handles they take up extra space and are in the way when not in use.

A simple method will obviate this. A short handle is formed and secured with a bolt and nut to the sides of the box with a small block of wood fixed above.

Immediately the handle is lifted up in position it rises against the block and is thus secured in position when required to be removed. The bolt must be fitted so as to allow the handle to rise and fall.

WELDING AND CUTTING

Welding Performed on Cylindrical Bodies

An Article Covering the Welding of Seams, Also the Welding of Head and Bottom Into Cylindrical Bodies

By ERNEST SCHWARTZ

Welding of Cast-Iron Boilers (Fig. 3, L and M)

(L) One of the sections was fractured as indicated at "A." As a new section was not easily obtainable, it was decided to attempt welding by the electric process. Three attempts were made, and these appeared to be satisfactory and stood for a time, but at a later date the repair gave out and it was finally decided to replace the boiler rather than go to further expense in welding experiments.

(M) A short fracture occurred in one of the sections of a cast-iron hot-water circulating boiler. This was welded in position by the oxy-acetylene process. The welding was apparently satisfactorily completed, but on cooling down, the section suddenly fractured with a sharp report close to the welded part, this being evidently due to contraction stresses. The section was, therefore, scrapped and a new one fitted. Since that time the makers who carried out the above experimental attempt had installed a heating furnace at their works to use with this form of repair. The whole section was first put into the furnace and made red hot all over, and the casting was then withdrawn and the crack immediately welded up by the oxy-acetylene process. The section was then at once put back into the furnace and the fire allowed to die out. It was stated that the cost of carrying out this form of repair was about equal to the cost of a new section, but it was reported to have been successful in operation, and this was very useful under war conditions when new sections could not be obtained.

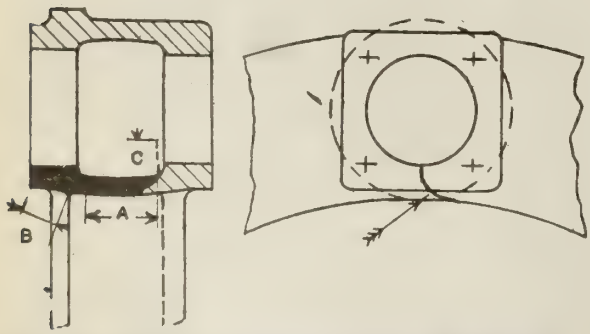
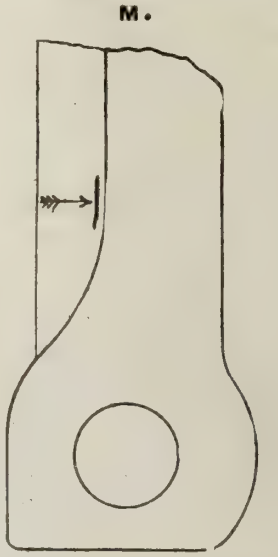


FIG. 3—A—ORIGINAL CRACK. B—FOUND CRACKED AFTER FIRST WELDING. C—PART NOTED WEEPING AND SLIGHTLY CRACKED AFTER SECOND WELDING, AND WHICH WAS WELDED UP AT THIRD TRIAL.



General Observations on Welding Repairs to Steel and Wrought-Iron Boilers

The experience of the National Company had shown that welding repairs could generally be successfully carried out to the common grooving of end-plates over the furnace connections, and to defects in the flue-tubes and parts under compression. The company did not generally approve of any extensive welding repairs in parts under tension, such as external cylindrical shells of steam-boilers of steel or wrought-iron. In such parts the extent to which the repair had been approved was in filling up local pittings and similar small defects.

Welding Repairs to Cast-Iron Engine Parts

The foregoing notes referred to repairs attempted to boilers of various kinds. In those repairs generally the National Company was not so much interested in the question of paying for the repairs, but rather in assisting the boiler owners to get the boilers made satisfactory for work with as little delay as possible. The following notes on attempts to repair engines by welding referred to cases where the engines were insured against breakdown by the company, and welding was adopted for repairs, not only with a view of expediting the repairs and getting the engine to work again in the insurer's interest, but also with a view of reducing the cost of the repairs to the company. Some of these repairs had been quite satisfactory, although they had not always proved to be as cheap and as easily effected as the welding firms anticipated. Brief notes of some repairs of this class follow.

Welding of Cracked Castings (Cast-Iron) (Fig. 4, N to Z)

(N) 16-inch Gas-Engine. — Jacket cracked. Welded by oxy-acetylene process. Repair took some time, but welding was satisfactory.

(O) 10-inch Gas-Engine.—Breech-end fractured and welded by oxy-acetylene process. Casting gave out again by cracking at the same place six months later. Welding unsatisfactory.

(P) 22½-inch Gas-Engine. — Piston cracked at back end and oxy-acetylene welded. Welding seemed satisfactory, but piston was 5-16-inch oval due to the welding, and consequently a new piston had to be ordered. Welding a failure.

(Q) 9-inch Ram Hydraulic Cylinder for Lift.—Welded by oxy-acetylene process. When repaired and put to work, another crack occurred near the old one when the working pressure of 1,100 lb. was in use. Welding was a failure, and a new cylinder had to be ordered.

(R) 10-inch Gas-Engine. — Jacket cracked longitudinally, repaired by oxy-acetylene process, but gave out again at same place immediately on being put to work. Welding was a failure.

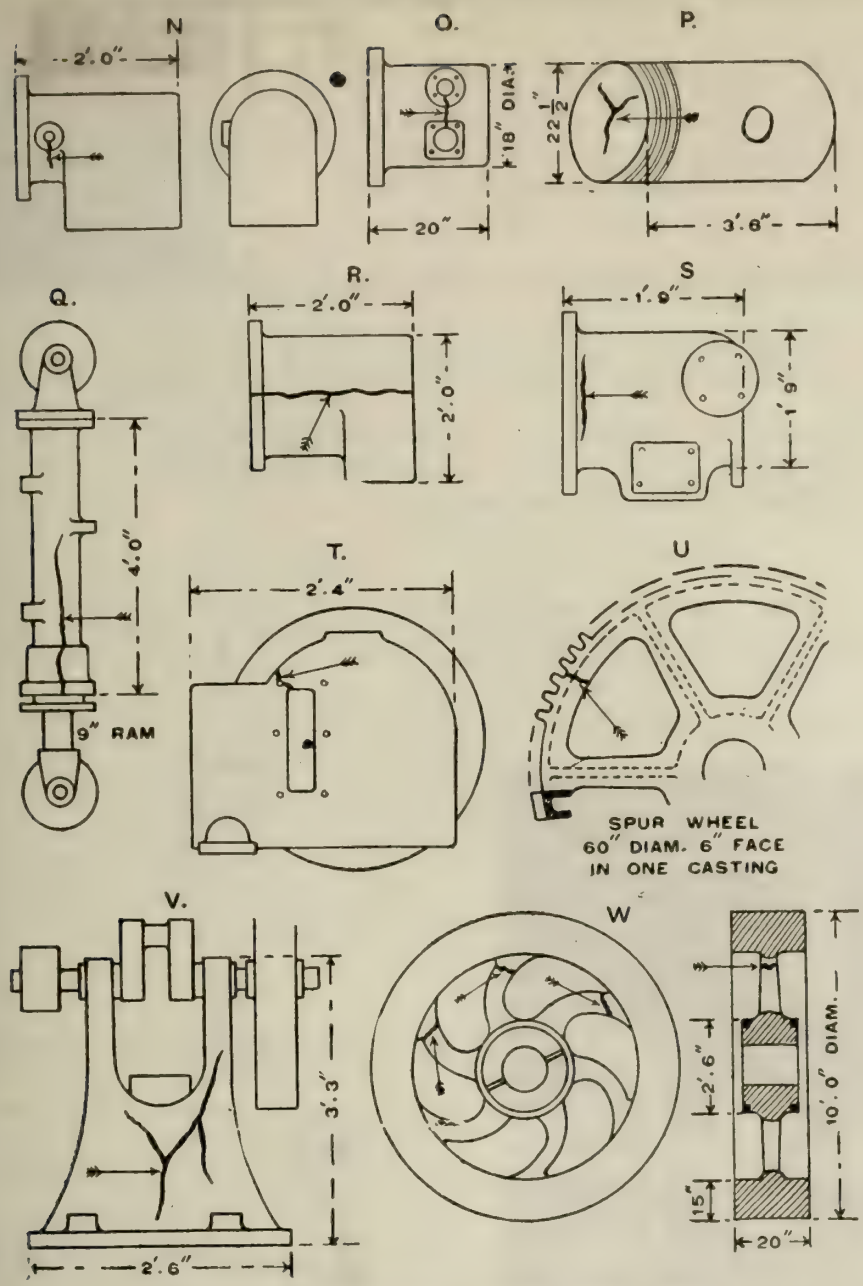


FIG. 4—WELDING OF CRACKED CASTINGS (CAST IRON)

(S) 12½-inch Gas-Engine.—Cracked round the flange. Repaired by oxy-acetylene welding. Repair satisfactory, and cost £15 against £50 for a new casting.

(T) 14-inch Gas-Engine.—Crack in breech-end. Repaired by oxy-acetylene welding. Repair satisfactory.

(U) Spur-Wheel of 3-Throw Pump.—Broken through rim. Repaired by oxy-acetylene process, the whole wheel being heated. The welding appeared satisfactory, but after three weeks' work it cracked again in the neighborhood of the weld, and a new wheel was ordered. Welding was a failure.

(V) 6-inch Vertical Gas-Engine.—Jacket cracked and repaired by oxy-acetylene welding. Repair satisfactorily carried out. As the engine was of an old pattern, and the maker's patterns had been destroyed, the successful welding in this case was of great advantage.

(W) Gas-Engine. — Fly-wheel fractured at 3 spokes. Oxy-acetylene welding tried, but was unsuccessful. Electric welding was then tried, as the makers thought the heat would be more local. After welding it appeared satisfactory, but cracked suddenly two hours later on cooling. Both methods of welding in this case were unsuccessful, and a new wheel had to be ordered at a cost of about £500.

(X) (Not Illustrated.)—Diesel cylinder-head cracked between the fuel and exhaust opening. Repaired by oxy-acetylene process, but casting distorted and hard places at the valve-seats; in consequence the casting was scrapped. Welding was unsatisfactory.

(Y) (Not Illustrated).—Diesel cylinder head cracked and repair failed, owing to the distortion of the casting and the difficulty of regrinding the valve-seats to make them perfectly tight.

(Z) (Not Illustrated).—Standard of a small vertical steam-engine broken across and successfully repaired by oxy-acetylene process.

PROTECTING IRON FROM CORROSION

In a paper read before the Iron and Steel Institute, Mr. J. N. Friend summarized as follows the results of his researches on the usefulness of paint for protecting ironwork from atmospheric corrosion: 1. The practical value of acceleration tests is very small in the present state of the knowledge on the subject. Reliable results can only be obtained from tests carried out under conditions closely resembling those prevailing in practice. 2. Addition of pigment to oil increases the efficiency of the latter as a protective paint until a maximum is reached. After this, further addition of pigment causes deterioration. The best results are obtainable from paints possessing as high a percentage of good oil as is compatible with good body and any other working property that has to be considered. 3. Linseed oil, on setting, expands by some 3.3 per cent. This is the primary cause of crinkling. Further oxidation causes a decrease in volume, which in time leads to cracking. 4. Linixyn is permeable to moisture. The permeability is reduced by heating in absence of air, the oil increasing in density, viscosity and molecular weight. 5. Polymerized linseed oil affords a better protection than raw oil when used as a paint vehicle. 6. The functions of a pigment are to toughen the film and render it less permeable to water vapour and oxygen. It also reduces the expansion of the oil on setting, and thus minimizes the tendency to crinkle. 7. A thick coat of paint protects the underlying metal more efficiently than a thin coat, provided the coat is not so thick that running or crinkling takes place. 8. The very best results are obtained by multiple coats. Two thin coats are better than one thick one of equal weight. 9. Thinners enable thin coats of paint to be applied. Turpentine leaves a very slight residue behind upon evaporation, but its effect on the efficiency of the paint is small. 10. Other things being equal, the most permanent paints are those containing black or red pigments, since these absorb the shorter rays of light and prevent them from hastening the destructive oxidation of the linoyn by the air. 11. Finer pigments afford more efficient protection than coarse pigments, since they are more thoroughly in contact with the oil. 12. Iron structures should be painted whilst their scale is still on, after loosely-adherent flakes and rust have been scraped off. The paint will last rather longer than if applied to the pickled or sand-blasted surface, and the labor of removing the scale is saved. 13. Experiments with rusty plates are not conclusive but suggest that the rust need not be so carefully removed, prior to painting, as is usually thought to be necessary.

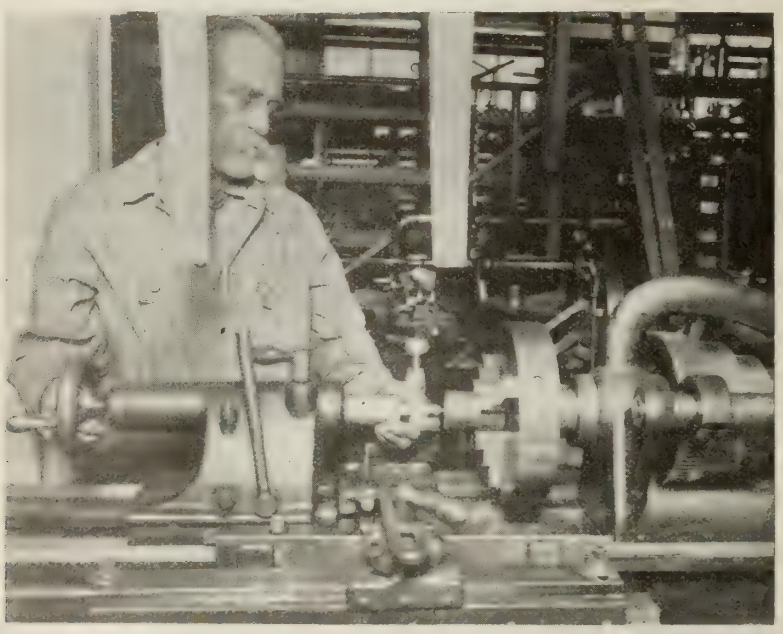
WHAT OUR READERS THINK AND DO

An Exchange of Ideas on Centering Chuck Work

These Replies to the Article Published in Our May 8th Issue Are, to Our Mind, Proof Positive That This Section is Read With Interest by Our Many Readers

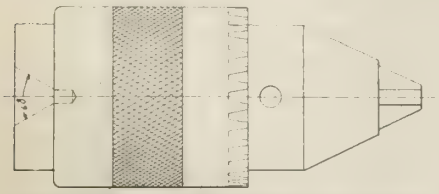
Compiled by J. H. M.

TO bring before the reader's mind the article on "Quick Method of Centering Chuck Work," which we published in our May 8 issue, we reissue the photograph and line drawing of this chuck in order that a comparison can be made between this chuck and the ideas about to be suggested.



NOTE THE FACT THAT OPERATOR'S HAND IS HOLDING THE KNURLED PORTION OF CHUCK.

First we received a suggestion from S. Simpson regarding his views on the matter, so first we will illustrate by sketch his idea of improvement, together with the text matter he provided.



VIEW OF THE CHUCK UNDER DISCUSSION.

QUICK CHUCKING DISCUSSION

By S. Simpson

Regarding the quick method of chucking as shown in your May 8 issue.

This idea is very good as we often use a similar scheme, for it is not always possible to procure a Morse taper sleeve.

Yet such a scheme has its disadvantages, for first, it is difficult to tighten the chuck with the hand so that the drill will not revolve or push inside the chuck when feeding up to the work. Then again there is a second difficulty, namely, that the chuck as illustrated must be held in the hand by the knurled portion, which, upon pressure being applied to the drill, tends to cause the chuck to loosen, as the torque or twist is from the drill, rather than from the chuck. We overcame these difficulties, however, by arranging in the manner shown on the accompanying sketch, Fig. 1.

We tightened the chuck in the vise as shown, also used a lathe dog on the straight part of the chuck shank, holding the chuck by this dog while drilling in the lathe.

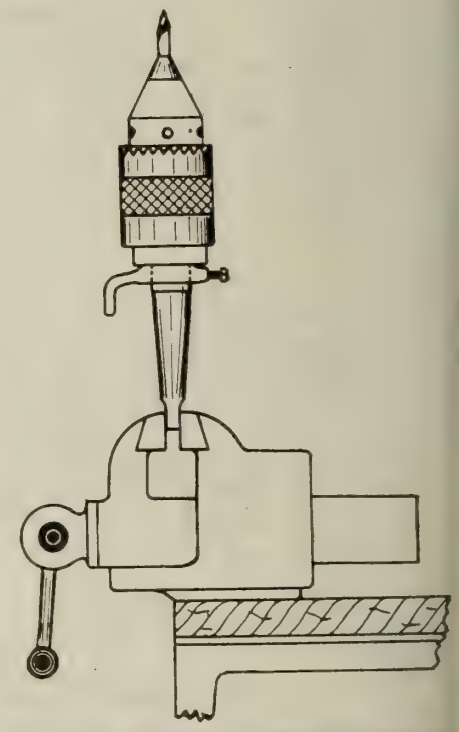


FIG. 1—THIS IS HOW S. SIMPSON BELIEVES IT SHOULD BE DONE.

So now, since we have presented Mr. Simpson's views, let us go on to the second suggestion received, and which came all the way from Nova Scotia.

QUICK CHUCKING DISCUSSION

By Cornish

Regarding your article on quick method of chucking, I believe that the idea has not been carried out sufficiently, but that the tool as shown has limitations as to its usefulness.

My suggestion would be as follows: Make up a combination drill and countersink holder in the manner shown in Fig. 2, and knurl the portion B shown

FIG. 2—ANOTHER SUGGESTION FROM CORNISH.

in the illustration. A is simply a small set screw to hold the centre drill securely.

In this way you increase the usefulness of this tool at very little additional cost.

How about it, readers? Do you agree with the above authors, or have you still a better suggestion? If so, pass it along. Remember we pay for ideas and work them up into shape for you, even to the finishing up of the sketches, so take a stab at it and try your luck at submitting material to us.

It need not necessarily be on the above subject but can be on any idea you have seen throughout your experience, so get that old brain working and we feel sure something will arrive to us in the near future.

One reader sent in a note this week mentioning that this was his first attempt although he had been reading CANADIAN MACHINERY for some considerable time.

His first attempt was successful, so no doubt when he reads this he will say, "Why didn't I start before?" This about covers the matter, for all you need is a start. Make up a sketch and send us your ideas, we will do the rest.

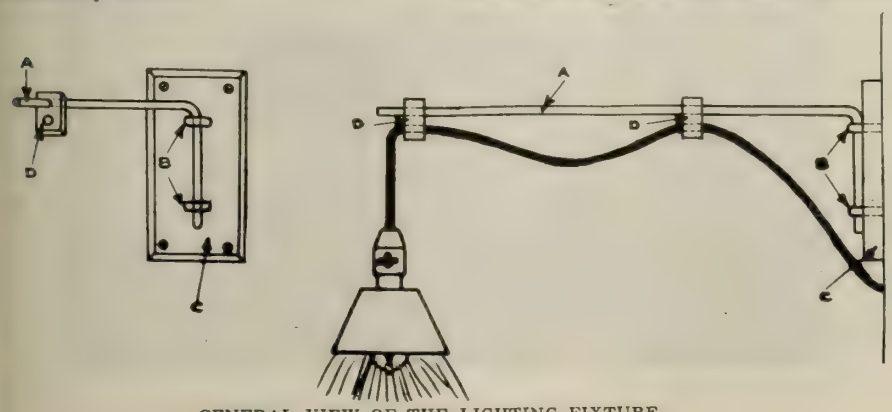
NOVEL ELECTRIC LIGHT BRACKET

By H. Scott

A novel electric light bracket which has proved of considerable value throughout the shop is shown in the accompanying sketch.

The swinging arm A is held by the holders B, which in turn are fastened to the block of wood C. This block is fastened by screws directly into the wall. From these points readers will gather that this fixture is used on the bench.

The position of the lamp is controlled by the cord passing through the holes in the wood blocks D. This fixture is quickly adjusted and is giving very satisfactory service.



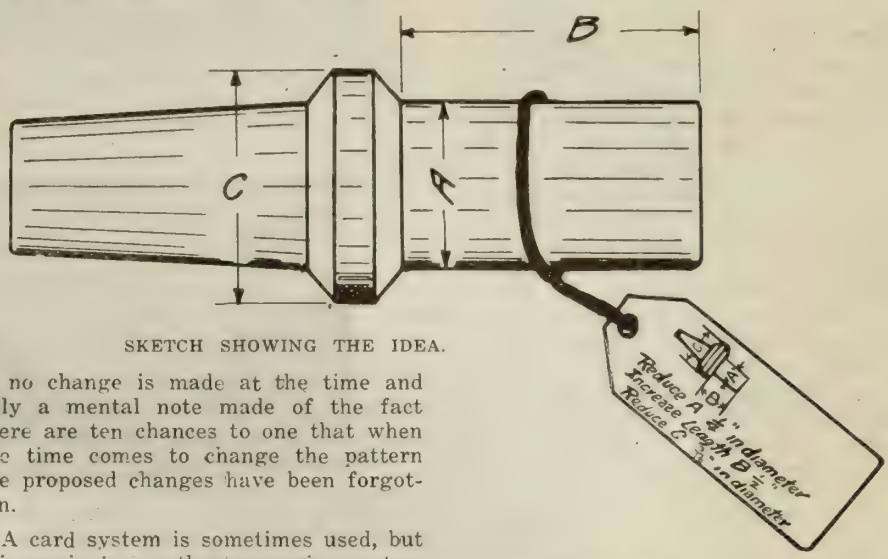
GENERAL VIEW OF THE LIGHTING FIXTURE.

KEEPING TAB ON THE PATTERN CHANGES

By J. H. Moore

The problem of changing patterns is often a many-sided one, for it sometimes happens that while you wish a pattern changed there is no immediate necessity for its being changed. This is especially true in the case of special machinery, where if any further machines are made certain changes must be made, and yet should not repeat orders come in, the cost of changing these patterns would be a total loss.

From this, some readers might say: "Well, don't change it." Quite true, but if no change is made at the time and only a mental note made of the fact there are ten chances to one that when the time comes to change the pattern the proposed changes have been forgotten.



SKETCH SHOWING THE IDEA.

A card system is sometimes used, but this again is a rather expensive system to keep up to date.

About the simplest method of following up such changes that the writer has ever come in contact with is shown at Fig. 1. Here we see a pattern which requires certain changes. A tag is attached on the pattern and a little rough sketch drawn on this tag and lettered as shown at A, B, and C.

For example, we will suppose we are now looking on the tag, on which is a sketch similar to our Fig. 1. On this tag is also marked the following:

Reduce A ¼ in. in diameter.

Increase length B ½ in.

Reduce C 3-16 in. in diameter.

Here in a nutshell we have all the changes desired, and it does not matter how long a space of time ensues between the rate the tag was put on and the date of actual change, the instructions will be perfectly clear. Such a system as this requires no upkeep expense to speak of other than the initial cost of the tag, and is adaptable to almost any conceivable shape of pattern. Readers would do well to look around and see if they could not use to good advantage such an idea.

HOW TO ERASE TRACING CLOTH

By M. L. TURNER

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Most draftsmen have observed that when erasures are made on tracing cloth sometimes the cloth wrinkles and sometimes it does not. Very few, however, understand the reason for this phenomenon and do not know how to guard against it. The following explains: In weaving the cloth, the strands which run lengthwise in the finished product are always held taut. But the threads which lie crosswise in the finished cloth are not drawn as tightly in the weaving as those which run the long way of the strip. Therefore, if in erasing the eraser is always moved in a direction parallel with these tight threads, wrinkling will not occur. On the other hand, if the erasure is made across the tight threads, the cloth will wrinkle. A simple verification of the fact that the lengthwise strands are tight and the crosswise strands are loose is this: Tracing cloth when ripped lengthwise will tear in a relatively-straight line. On the other hand, if an endeavor is made to rip it crosswise, the resulting tear will be jagged and without regularity.

CONCRETE DOCK GATES

Owing to the scarcity of timber and steel during the war, the gates for a private dry dock in England were made of reinforced concrete. The dock is 40 feet wide and the gates are 14 feet deep. They are circular in form and despite the 14-foot head of water, are only 3½ inches thick. No waterproofing compound was employed, and yet they are said to be perfectly watertight.

DEVELOPMENTS IN SHOP EQUIPMENT

PORTABLE CONVEYORS REDUCE COST OF HANDLING COAL AND ASHES

TO secure economical operation and greater efficiency in handling material, labor must be supplanted by machines, and those selected which are best adapted for the particular work. Men with wheelbarrows are too costly to use in storing, moving or loading material, but, at the same time, the old style conveyors required a great deal of labor in shovelling the material up into the receiving hoppers.

A new type of portable conveyor, which cuts the labor of feeding one-half, is shown in the accompanying illustrations. The most distinctive feature of this machine, called the scoop conveyor, is the scoop on the feeding end, which can be pushed or completely buried in the material to be conveyed. This makes it possible to simply scrape the material onto the carrying belt, instead of lifting it up by shovelfuls into the feeding hoppers of ordinary conveyors.

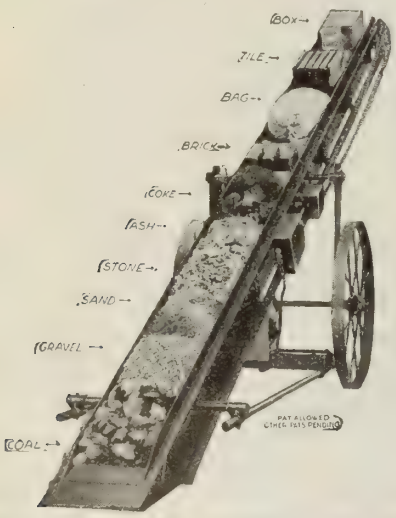

FIG. 1—A 19 FT 8 IN. CONVEYOR EQUIPPED WITH 16 IN. WIDE BELT AND DRIVER BY 2 H.P. MOTOR.

Another exclusive feature of this machine is the construction of the sides or skirt plates, as they are called. These form a trough, which enables a 12-inch wide belt to equal in carrying capacity a 20-inch ordinary troughed belt. This is readily understood when one remembers that on a troughed belt the material is carried in the centre or trough, that on the sides falling into the trough or rolling back, whereas the side plates on the scoop conveyor hold the material together, giving the whole width of the belt carrying effectiveness. It is due to the skirt plates, also, that a 24-ft. long scoop conveyor will convey material as high as a 30-ft. troughed belt. The resultant saving in belt expense is considerable, as two new 12-inch x 24-ft. scoop conveyor belts can be purchased for the price of one 20-inch x 30-ft. troughed conveyor belt.

FIG. 2—UNLOADING FROM WAGON TO STORAGE PILE.

Actual Savings

The money savings resulting from the use of a scoop conveyor are due, first, to the saving in labor; second, to the speed at which material is conveyed. In comparison with handling material by hand, one or two men with a scoop conveyor will do the same work as from four to twelve men, depending upon conditions. The scoop conveyor will load trucks in one-fourth to one-sixth the time required by men shovelling. It often enables one truck to do the work of two trucks and of getting two days' work done in one day.

Storage capacity is another factor of saving attributed to this machine, as it increases the available capacity of a shed or yard space by enabling the men to pile higher.

A few statements of actual savings made by the use of portable conveyors may be of interest:

Gay Bros. Co., (Cavendish Woollen Mills), Cavendish, Vt. One man now used instead of four to pile coal for storage and to move it into boiler house. Average saving is $7 per day.

Baird Machine Co., Bridgeport, Conn. Reduced yard force from five men to one. Now unload coal from cars quickly, without having to pay demurrage charges.

FIG. 3—LOADING TRUCKS WITH A CONVEYOR.

Fonda Glove Lining Co., Fonda, N.Y. Load from 2 to 3 tons of soft coal from ground into auto trucks in from 3 to 5 minutes.

Colonial Steel Co., Pittsburgh, Pa.

FIG. 4—UNLOADING FROM COAL CAR TO STORAGE PILE WITH A SCOOP CONVEYOR.

Unload coal from hopper cars with scoop conveyor at 50 per cent. of former cost. They figure machine has paid for itself more than once in a year.

J. L. Prescott Co., (shoe polish manufacturers), Passaic, N.J. Former cost of unloading coal from cars and putting it into storage bins was 28c per ton. It is now done with a scoop conveyor at 4c per ton, or a saving of 85 per cent.

Marcus S. Wright, (miner of foundry sands and clays), South River, N.J. Before using the scoop conveyor employed 6 men to load railroad cars. Now do the work with 3 men and get out larger tonnage. Load 150 to 175 tons of silica sand into cars with scoop conveyor in a 9 hour day with 3 men, which was impossible with 6 men working without the machine.

Capacity and Uses

The carrying capacity of the scoop conveyor, based on handling coal, is one ton per minute, provided a sufficient amount of coal is maintained at the receiving end of the machine. If the storage pile is of sufficient height, one man can easily feed one ton in one and a half minutes, or if the pile is low, he may require from two to four minutes. Where speed is required two men may be provided for feeding. In unloading hopper bottom cars the machine and one man can remove one ton per minute.

Large size coal, coke, crushed stone, etc., fed by one man, require from three to six minutes for one ton, or half that time with two men.

The scoop conveyor is used principally for storing, reclaiming and loading bulk material and light articles. There are an unlimited number of uses for the machine, in addition, such as elevating material to tanks or platforms in chemical and industrial works, feeding from cars and delivering into fixed conveyors or stoker magazines at power plants, etc. Almost any kind of material can be handled, such as coal of all kinds, ashes, sand, earth, crushed stone, blast furnace slag, ore, fertilizer, salt, chemicals, grain, bags and light packages.

The scoop conveyor may be used singly, in tandem or in triplicate, as may be required. The employment of sets of two or more allows for an increase in height of the storage pile or conveying distance. Fig. 5 illustrates three machines unloading coal from hopper cars up a long steep incline.

Construction

As may be seen from Fig. 1, the scoop conveyor is strongly constructed, light in weight, compact and portable. The steel frame holding the rollers and conveying belt is mounted on the wheels so the balance is perfect. One man, by inserting the pipe handles into the ends of the horizontal members, can easily lift and move the machine around.

FIG. 6—ONE MAN CAN MOVE THE SCOOP CONVEYOR FROM PLACE TO PLACE.

The electric motor or gasoline engine mounted under the frame transmits power to the conveyor by means of a chain and sprocket connection to a shaft extending beneath the conveyor. From a sprocket on the other end of this shaft the power in turn is transmitted to the driving sprocket, located at the upper end of the conveyor.

The carrying belt is a high grade of heavy duck and rubber conveying belt and duck cross strips. These transverse cleats are provided to prevent the material from slipping back down the incline.

The scoop conveyor is made in three different sizes: 13 ft. 8 in., 19 ft. 8 in., and 24 ft. The width of the conveying belt on any of these sizes may be either 12 in. or 16 in. wide, as desired. Size 13 ft. 8 in. elevates to a total height from the ground of 5 ft. 9 in.; the 19 ft. 8 in. size may be adjusted for any height from 6 feet to 9 feet, and the 24 ft. size may be adjusted for any height from 9 feet to 12 feet. The machines are furnished with either electric motor or gasoline engine, or where customer prefers to furnish and install motor himself, motor support and drive from motor shaft are provided.

For catalogue and other information address the manufacturers, The Portable Machinery Co., Inc., Passaic, N.J.

COPPER EXTRACTION FROM PYRITIC ASHES

By L. P.

A new method for the electrolytic extraction of copper from pyritic ashes has just been discovered and is based on the electrolytic conversion of sulphide or sulphate of copper into cupric or cuprous chloride by the action of chlorine at the anode. If in an electrolytic bath containing hydrochloric acid in solution the anode is surrounded by a mass of pyritic scoria, the chlorine liberated by the hydrogen attacks the oxides, sulphates, or sulphides of copper more rapidly than the oxides of iron, and combines with them to form cupric chloride. This reaction extends to the entire mass of scoria, so that the latter acts as an electrode. The copper loss by this method is only 0.1 per cent.

FIG. 5—USING THREE SCOOP CONVEYORS TO UNLOAD FROM HOPPER BOTTOM CARS TO LARGE STORAGE PILE.

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Confidence Returning

ONE hears so much of strike news, of unsigned peace terms and other unsettling items, that there is sometimes a chance that we may overlook the other side of the question.

What other side? Simply this, that business is good in Canada.

Rather a bald statement, but one that can stand up and call for successful contradiction.

When you remember that the first six months after the war was looked forward to as somewhat of a nightmare, you will have to admit that you have come through it in pretty fair style.

When you pause to consider that the great war machine has stopped—and that great war machine was accounting for almost eighty per cent. of the business that was being done—you will see that there was a pretty big space there to be filled with other business.

But it is being done. There have been strikes and other differences that could not be settled. These have made the work harder, but it is proceeding.

Buying is being done now by firms who have stayed out of the market for a long time. They are buying stock, the first time in months and years. For a long time all their purchasing has been done on a hand to mouth plan.

When business was secured they immediately purchased the raw material necessary, but very little more. They were afraid that they would be caught in a falling market, and have to attend a little financial funeral on their own premises.

This feeling is going. Orders are being placed more freely, and on the understanding that the buyer gets the advantage of any concessions that are made up to the time of delivery.

Firms are going ahead and they intend now to manufacture for stock instead of immediate delivery.

They have faith that some person is going to come along soon and buy what they make. They have confidence and confidence is the one thing we have been lacking for quite a while back.

Perhaps we did not like to own up to it. Most folks do not. But the hand-to-mouth business showed it plain as day. The moves that were made in some cases looked like those of a man who had the shirt on his back bet on a game of checkers.

But that feeling is passing. The old-time confidence is coming back. Its advance agents, in the shape of bigger orders and car lots are already on the premises getting ready for the whole family to move in.

Now don't do anything that will stop this procession. If you can't help it along, at least have the good sense to get out of the road, and don't whisper in the ear of Mr. Big Order that the market is going to break.

Remember we've got a powerful lot to be thankful for. For we have come through the first of that "after-the-war" period that we dreaded so much, and we've been able to pay our way and have enough left over to look to-morrow straight in the eye with a clean sheet.

A Risky Occupation

THE Toronto *Globe* man has been figuring out the capacity of electric furnaces. Simple thing, too—just as simple as measuring snow with a stick, or stepping off a frontage with your feet.

The *Globe* goes on to say that Toronto has "the largest single electric steel plant in the world as far as known." So far so good. Then the *Globe* goes on to tell its readers just how great this great furnace is:—

"The ten six-ton Heroult furnaces at the British Forgings plant are capable of turning out sixty tons of high-grade steel per day."

Quite so, but why stop at sixty? The *Globe's* man has proceeded on the good old plan that two and two make four. Therefore, ten six-ton furnaces equal ten times six, which makes sixty! Splendid!

But the *Globe* might be surprised to know that this plant has turned out as high as 350 tons per 24 hours, even with its "sixty tons per day" capacity. As a matter of fact, these furnaces can take a heat every five hours, and if worked at anything near real capacity, can make five heats per day. Taking only sixty tons per day from such an outfit as the British Forgings have would be about the same as having a plant and staff equal to that of the *Globe* for the production of a weekly paper.

The *Globe* is quite right in stating that ten times six makes sixty, but it should also recognize that computing the capacity of electric furnaces is slightly different from painting the political situation at Ottawa.

It's The Net That Counts

MR. DOOLEY was one of the leading restaurant keepers in a small town. Recently he purchased a cash register. The documents of the first trade to be recorded were a 27-cent check and a five dollar bill, the proud proprietor rang up $5.00 and paid out $4.73 in change. When the next customer presented his check it was for 35 cents and a $10 bill was passed over the counter. Dooley operated on the $10 key. Thus things progressed throughout the day. That night, upon checking up, he discovered according to the machine that he ought to have $250.00 on hand, although a careful inventory revealed only $17.30.

"Terrance," said Dooley to his assistant, "have yez taken anything out in the new cash machine to-day?"

"Shure," said Terrance, "I took me carfare home."

"And where d'yez live," inquired Dooley, "Australia?"

Like Mr. Dooley, many a man in charge of a business is ringing up gross profits without the faintest idea of what his net profits really are. And like Mr. Dooley, if he keeps on hammering the gross receipt button, he is "going to have a disappointment in his life," as the fortune tellers say, for after all it's getting the net that counts.

A PAIR of rubbers cost about $1.50 at present, while scrap rubber is quoted at 3¾ cents per pound. There's positively no inducement to go ahead and wear your rubbers out.

* * *

THE Cost of Living Commissioner has notified bakers at Halifax and St. John to lower the price of bread. We fear said Commissioner will be looking for a new job if he makes many slips like this.

The Natives Took Kindly to the Material

By T. H. FENNER, Editor Marine Engineering

SINCE boiler pressures rose from the neighborhood of 15 pounds per square inch to the levels of 100 pounds and over, the question of scale and its prevention, or scale and its cure, has been a live one.

Elimination of scale has given rise to as many nostrums as the curing of coughs or indigestion, and most of the remedies have been made up on much the same principle. The fundamental principle of a boiler compound, like that of a patent medicine, is to make a good profit for the perpetrator, and if it incidentally achieves good while performing the larger object, so much the better.

There are so many more people than boilers that marketing the patent medicine is a much more simple business than selling the compound. Returns are so quick that much money can be spent on display advertising, and a catalogue containing a list of symptoms and a few miraculous cures will get the thing going. Another thing in favor of the patent medicine is that the human being who is afflicted, or thinks that he is afflicted, will pour anything down his throat that sympathetic advisers can think of. The more it upsets him the more good it is evidently doing. Makers of boiler compounds take advantage of this peculiar psychology in getting their medicine for congested boilers into the plant.

There are many ways of treating the scale that accumulates in a boiler, one of the best being not to allow it to accumulate in the first place. Another is by employing some recognized dissolving agency, known to be of use in these cases and possessing no harmful ingredients. Probably the worst way is to listen to the honeyed words of some clever salesman, who has never had any close acquaintance with a boiler, but possesses persuasive power of the highest order.

There is the other kind of salesman, who, after a few preliminaries gets down to business in this way. He backs the engineer into a corner of the boiler or engine room and tells him that he will split half the price of the barrel with him if the engineer will use his influence to get it purchased. Now this will not work often, but the man who employs these methods usually knows who to try them on.

I have heard of compounds that were almost human in their intelligence. They would, immediately on being introduced into the boiler, make a tour of the shell and tubes and find out just what state they were in. The compound would then remove the scale from surfaces where it was detrimental, and use some of it for plugging leaks, precipitating the remainder.

Some would both remove scale and give the boiler a protective coat against corrosion, prevent foaming, and add at least 100 per cent. to the general efficiency of the boiler.

The ingredients of course were a dark secret, but usually a pretty shrewd guess can be made. The chief constituent, as in most specifics, is water. The second is some substance that will impart a pretty shade to the mixture and at the same time give it a smell that will tend to prohibit it too close investigation. The basic ingredient is soda in some form or other. Occasionally, however, a boiler compound appears that has some intrinsic merit for other purposes than cleaning boilers, and it is about one of these that I started to write.

Some years ago I was second engineer of a steamer running from an English port to the Mediterranean. She was one of a line of six steamers, making monthly sailings. Owing to the fact that there was ample opportunity of getting fresh water cheap at all the ports we visited, and using the evaporator very little for makeup, the boilers were always in good shape. Added to this was the fact that we had always about three weeks in the home port, there was ample time to make a good job of cleaning. Under these circumstances we never thought of such a thing as boiler compounds in connection with our vessel.

We were just getting ready for sailing, on one occasion. As second engineer, I was busy getting our stores aboard, and was pretty near finished this interesting, if not worrying, task. I was in a hurry, for we were sailing on the next tide, which was about three o'clock in the morning, and I wanted to get ashore for a few hours before we left. The last barrel of oil was being emptied into the engine room tanks, and the men were unloading paint from a truck on the dock wall. Fifteen minutes would see the job finished, and I would set the men on watches, and make a break for town. A messenger boy hurried up the gangway, and asked for the chief engineer. I directed him to the chief's room, and thought no more about him. If I had only known what he carried I would have dropped him in the dock, and left him there till I got away. However, I didn't. In about two minutes the chief came up on deck, with a note in his hand, and a woebegone look on his face. I scented trouble. He came over to me, and, without saying a word, handed me a note. It bore the heading, "Superintendent's Office." I read it twice before I could believe it. This is what I read. It was addressed to the chief, and then went on, "I am sending you, before sailing, 24 (twenty-four) drums of "Ananias" boiler compound. You will use this on the present voyage, and give me a full report on your return. This compound should be at the dock when you get this letter, or immediately after. Don't fail to take it aboard." The first thing that came to my mind was, "Where can we put it?" The idea of following the super's advice and using it was far from my thoughts. I put the question to the chief. "Mr. —, he replied, "if I have to look after the ship's stores then I need another second"; with this pleasing remark he went ashore and left me to tackle this white elephant that had been wished onto us. While I was still thinking, a lorry drove down with the infernal stuff aboard. I called my men, and got it unloaded and standing on the deck, and then went to look for the mate. He and I were very good friends. "Look here, old chap," I said to him, "can you do me a favor?" "I will if I can," he replied. "Very well then. I have a consignment of stuff that I have no use and no room for. Can you put it in the forepeak?" "I'm sorry," he replied, "but the forepeak is full. Why don't you put it where you put the oil last voyage?" This was a very nasty remark, and quite uncalled for. It was like this. The previous voyage we had more oil than we could get in the tanks, and I had lashed a couple of barrels on deck till we could make room. It was summer time, and I had not anticipated any bad weather, but we got it. The result was, that on coming on watch one morning at four o'clock, I was just in time to see the two barrels floating over the lee rail. A bit of bad steering had let the vessel fall off, and she had shipped enough water on the after deck to wash my barrels out of their lashings. I had heard quite enough about those barrels to be able to dispense with any reminders.

Well, I got those drums into the engine room. Some went into the store room, and some on the top grating, and a couple on the bottom platform, round the back of the engine room, and I departed for my delayed visit ashore.

Next day, going down channel, I said to the chief, "Well, when do we start putting the compound in the boiler?"

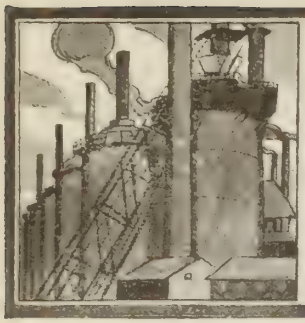
"Not so long as I am chief," he replied.

"Very well, then," I said. "Shall I dump it overboard on the morning watch?"

"Not so," said the chief. "I have an idea that we can use that stuff, down the coast."

Not knowing what he meant, I said

(Continued on page 564)



MARKET DEVELOPMENTS

Movement Starts for Buying on Large Scale

For First Time in Many Months Some Decent Sized Stock Orders Have Been Placed—Prices Show a Tendency to Conform to Demand When a Good Sized Order is in Sight

SOME of the most hopeful signs in months are to be found in transactions that have taken place during the past week. For instance, several of the Ontario firms have come into the market for boiler tubes in a big way. One order ran twelve car loads, while another was for almost five cars. Such orders have not been placed for months before. They are taken in as stock, and it has been demonstrated that all that was needed to test the real strength of the market was a good-sized order. In this case the supposedly fixed figures sagged quite a bit, as the size of the order was highly desirable.

Machine tool dealers are awaiting the placing of orders for the St. Malo shops of the National Railways. It is reckoned that the equipment there, for which specifications have been out some time, will be worth about three-quarters of a million.

There has been liberal buying of plate, too, during the past few days, and the total orders going forward to U.S. mills will make a very fair tonnage from this district. Although the market is supposed to be "open" now there are no signs of breaking the plate price of 2.65. In fact, some of the mills say that any departure from that level will be upward, as they cannot make money at the 2.65 mark. However, orders that are going over now all carry the stipulation that if there are any reductions in price by the time of delivery the Canadian buyer will be entitled to get the benefit. Of course, that is a very reasonable stipulation and no objection can be taken to it.

Pittsburgh reports an improvement in the buying of steel. The volume is greater, not tremendously so, but the movement is starting, and that is what the trade has been looking forward to. The same holds good in regard to structurals. There are lots of structurals being built at present—on paper—but more and more they are being converted into real business, and once that gains momentum the steel business is going to have a recovery that speaks well for the months to come.

The scrap metal market remains dull. Scrap rubber is also unchanged at the lowly figure of 3½ per cent. It will not improve until crude rubber moves to a higher figure. The scrap steel from the shell plants that were working on U.S. contracts is being tendered for this week, but as yet there is no intimation of the possible bids on the material.

MONTREAL SEEMS SURE NOW THAT GOOD TIMES ARE RIGHT HERE

MONTREAL, QUE., May 29. — The optimistic statements that have been circulating through trade circles since the beginning of the year are now commencing to take tangible form, and plans and developments are gradually shaping into concrete enterprises, as has been amply indicated during the past month. That these are only a beginning may well be gathered from the confidential reports that are obtained from time to time. Announcements are withheld for obvious reasons, but sufficient is frequently disclosed to indicate that reconstruction is gradually reaching a stage when production will be an actual factor of the problem. One plant here, which was one of the largest producers of British and American shrapnel in Canada, are just on the verge of new activities, and negotiations for manufacture are nearing completion.

Another local firm is expecting a reorganization of the company that will result in the manufacture of their special firebricks, a plant to be established in Montreal; this material was formerly imported.

It is reported that a large British steel company is expecting to construct a plant in Canada, and at present representatives are looking for a location in or near Montreal. A better business tone is felt in all directions, and activities are gradually showing a degree of settlement that has not been evident for many months, despite the fact that labor unrest is still pronounced. The willingness of many manufacturers to meet, in some measure, the wishes of their employees, is doing much to allay the spirit of conflict. Little change has been effected in steel circles by the recent developments in the States, and in all likelihood the coming weeks will convince the trade that the present is or was, a good time to buy, as prices are as low now as they are likely to be, with the exception of spasmodic cuts that may be made from time to time. The general level will probably be retained, or even go higher. Activity in metals has shown an increase, and in consequence the quotations on most of the metals have been advanced. Inquiry for machine tools is on the increase and the present demand is steady. Old materials are beginning to show strength and prospects are for a steadily increasing business.

Advances Create Better Demand

Steady, but gradual improvement in metals is reported by dealers here, the requirements of the trade, apparently, have slowly increased in volume, and present inquiry promises the developments of business in the near future. "The trade has been moving along quietly," remarked one dealer, "but no heavy buying has taken place, but we are pleased with the improvement of the past week or so. Few consumers have been carrying stock, and in a great number of cases buying has been deferred on the supposition that lower prices would follow the signing of peace, or the withdrawal of all Government restrictions. Peace has not yet been signed, it is true, but with the market firm, and even showing strength in some quarters, with control virtually removed, price quotations show little inclination to decline; as a matter of fact, the steady strength is beginning to influence the trade, and consumers are gradually realizing the conditions as they actually are, and confidence, seemingly, is returning, with the result that present

purchases are increasing in volume." This dealer also stated that a temporary shortage in tin had developed a stronger tone in the market, and inquiries were more numerous. This condition is probably only a temporary one, but sufficient to show that the consumer is ready for a buying movement, as soon as they are convinced of the stability of the market. The copper and spelter demand is steadily increasing and is reflected in the current quotations. Coppers have advanced one cent per lb., the range being 18½ cents for castings and electro, and 19½ cents for lake. Tin quotation are at 58 cents, an advance of 4 cents on the week. Spelter is up ½ cent to 18½ cents per lb. Lead is 7½ cents, and antimony 9 cents, a one-cent advance in each case. Aluminum is unchanged at 38 cents per lb.

Tool Business Developing

"While we cannot say that machine tool sales are heavy at the present time, we are, nevertheless, ready to say that the volume of business being placed is not at all discouraging. We are, I believe, getting our share of what is going and when everything is taken into consideration, think that the trade is comparatively good." This statement by a dealer here appears to define the existing tool situation, and while definite information may be lacking, it seems that optimism is the keynote. The dealer intimated that he believed that developments were pending that would eventually culminate into business of considerable volume, and this is the general opinion throughout the trade.

One large plant here, that was constructed for the carrying out of a large American contract on shells, is still negotiating with the principals for a settlement, part of which has been made, but little progress can be made in other directions, while these adjustments are under way. In the meantime, the plant is being used as a storehouse for much of the American Government equipment in this district. Some of the other shops are making arrangements for new business, but active operations are delayed, awaiting further developments.

Steady Improvement in Scrap

The strength that has been developing in old materials has become more pronounced and advances are more general. The demand is steady and inquiry is of larger volume. The impression that the market will show gradual, but perhaps slow improvement, during the coming month, is steadily growing. The volume of sales is not large, but the range is ample to show that no particular class of scrap is taking a leading position. As one dealer stated: "The steady improvement in business would appear to forecast a confident return to settled activity, and the sales of the past week have shown an increase in volume that has given the impression that industrial enterprise and development are returning to a more normal condition. We are anticipating a good summer's business." A few of the larger dealers here have had a considerable turnover from the disposal of equipment, purchased in bulk from the old munitions shops. Much of this was machinery and material that could be sold for special requirements, and not in the general class of scrap. Price advances in the metal scraps almost cover the complete range, light and medium brass being the sole exceptions. The advances range from ½ cent on red brass turnings to 3 cents on No. 1 machine compositions. Steel advances are less pronounced, but the strength is general. Boiler plate is now quoted at $11.00 per ton; wrought iron pipe, $9.00, and machine shop turnings, $6.00, an advance in each case of $1.00 per ton.

POINTS IN WEEK'S MARKETING NOTES

The biggest order for boiler tubes since the war has been placed by an Ontario firm. It will run 12 car loads. Another order calls for between five and six cars. The orders were large enough to secure price concessions of no small dimensions.

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Business shows improvement in several points and buying is being done on a much firmer scale.

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The specifications are out for the National Railway Shop at St. Malo, Que., and the business will run well on to three-quarters of a million dollars.

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Tenders are being asked this week for the American steel scrap from shell work stored at various points in Canada.

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Pittsburgh reports that there is an improvement in the volume of steel buying, the most noticeable in some months.

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The movement in structurals, though still small in volume, is showing a steady increase.

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Dealers admit that there is quite a departure from list prices when an order of any size shows up for supplies, such as traps, reamers, cutters, etc.

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New York machine tool firms state that business is very satisfactory. Auto trade, gramophone firms, etc., are buying a lot of machinery.

BIGGEST BUSINESS DONE IN TEN YEARS

That Is Report Of One Warehouse In Toronto on Dealing Covering The Past Week

TORONTO.—Mention has been made in these columns several times in recent weeks that confidence was returning to the market in spite of all the unsettling influences that were at work. The parting of the trade with what has been termed the fixed price period has helped to do this. Prices may remain more or less at a fixed standard for some time, but it has been demonstrated quite recently that all that is needed to bring the market back to the old competitive basis is that there shall be an order large enough to get the bidding going. There is a tendency in some lines to trim prices, and it is more marked now than for some time past. This sort of business was pretty much out of the market during the war. There was a tremendous and unprecedented demand, and the element of delivery was greater than the consideration of the price.

English Goods Come Back

English chains are coming back in the Canadian market. It has been hard to get them during the war. We refer here to the heavy chains, from one inch up, that are used for steam shovels, etc. It would be a sore touch for the Englishman to lose his chain trade, but the chances are that he is not going to do it for a while yet. There are some firms in the Maritime provinces that always use these English chains, and the trade could not be pried loose or switched to any other source. English furnaces are also in the market again, and the price is good enough to be securing a fair number of orders.

In other lines the English prices are still a little too high. There are many who claim that this is only a temporary condition, and that once peace is signed and British industries get going on a peace basis prices will come down to enable them to do business in Canada. At present, on such lines as tubes, sheets, plate, wire rope, etc., the price is from ten to fifteen per cent. too steep to get the business.

Big Buying During The Week

"Last week was the biggest business we have done in ten years." That was what CANADIAN MACHINERY was told at one of the largest warehouses this week. Business was general and it was big, and it had also served to demonstrate that there was something in existence nearer an open market than might be supposed. One Ontario firm came into the market and bought twelve carloads of boiler tubes. Another firm in Toronto placed an order that will run about six cars. Another well-known firm of boiler makers have a big order drafted to place this week. It will be for general stock of plate, tubes, etc. There is one feature in this first sale that seems particularly good just now. The

firm in question are going ahead to make boilers for stock. They seem to consider that the prices that were quoted were good enough to warrant them going ahead. Of course on all such business there is the reservation made that the purchaser gets the benefit of any price reductions that are ruling at the time of delivery. Speaking of the prices that were quoted, MACHINERY was not able to secure exact figures, but it is known that there were concessions from the lists in order to secure the desirable order.

Brass and copper products show a tendency to go up in price, and changes were made in that direction during the week. Tubes, rods, etc., are affected by this change.

Several warehouses are placing a good sized tonnage now for stock purposes. One case that we heard of amounted to 250 tons. This has not been done for some time, and warehouses have been acting more as importers, but they feel confident that conditions warrant them building up their stock again to meet the demands that will certainly be made upon it before very long.

Big Specifications

Several of the machine tool houses had imposing looking documents ready to send out this morning to the officers of the Canadian National Railways. They were on account of the St. Malo, Quebec, shops, and the chances are that the total buying for this plant will run well into a million dollars. The lists that are out call for about 75 tools, including shapers, planers, turret lathes, drill presses, grinders, complete forge outfit, spring shop, car wheel lathes. This is the best business that is offering at present, although the automobile trade comes into the market frequently as a good customer.

One customer was rather surprised to find that he could not get a chuck on short notice. He took the matter up with one firm and found that two months was the very best time that he could secure, so seeking to better himself he turned to another firm, and was informed that the business could not be touched at all before September. It seems that there was a shortage on chucks when the war was over and there was a general demand for them that has not yet been overtaken.

Dealers assert that there is considerable price trimming being done now, especially in the matter of supplies. Of course there is no open departure from the lists, but it is known that the pruning hook is put into some of the supposedly inflexible lists when there is a good sized block of business offering. It may be that, like all other markets, all that is necessary is that there should be a fairly good piece of business at stake to find out just where the market really stands.

Scrap Still Inactive

The only thing stirring in the market is the fact that there will be some interest in the disposal of the shell scrap, the property of the U.S. Ordnance Department, which is scattered all over the country, from the Maritimes to Winnipeg. There must be something like 2,000 tons of it and bids are to be in shortly. There seems to be a diversity of opinion as to what the metal will bring, and not a few of the dealers would like to secure some idea of what is liable to be bid. It is desirable material and there is a lot of it.

Otherwise there is nothing much of interest in the scrap metal market. Machinery scrap has not, as was anticipated, shown any improvement. The merket for it is dull and inactive. Copper is better. Fourth quarter is quoted now at 16¾, but of course that is purely speculative. It may be up or down from that figure, but the chances look like stronger copper for the latter part of the year.

The market for old rubber, of which there is a large volume moving, is still down. Dealers only offer 3¾ cents per pound, but with the price of crude rubber still low, the chances are against anything looking like a real recovery in scrap rubber. The steps taken by the British Government, the trade says, in planting so many rubber trees has kept a large supply coming in, so great that the price of rubber actually decreased during the period of the war.

LITTLE CHANGE CAN BE NOTICED IN THE STATE OF SCRAP METAL TRADE

THE tone of the market is on the whole, stronger, though still dull in spots. The strengthening of the pig iron market has had some effect on scrap. Following are reports from U. S. points:

Chicago.—Demand is increasing and a firmer tone is becoming apparent in many grades. Heavy melting and rerolling rails are among the best in demand. Railroads offer about 4,000 tons, including a fair tonnage of steel rails.

New York.—There has been practically no change in prices, though business has been dull. Dealers having little scrap on hand are not making concessions. Clean cast borings are selling at $9.50 and city wrought long stock at $16 to $16.50. While in general supplies are not in great volume, there is considerable heavy melting metal being held in New England.

Philadelphia.—Dealers believing that present prices are low, are accumulating stocks in anticipation of a rise in prices. Very few sales are being made, but an improvement in the demand for low phosphorus is apparent.

Pittsburgh.—There is little demand for scrap in this district. Prices have shaded somewhat in most grades. Heavy melting steel is firm at $15.50 to $16 delivered. Compressed sheets have receded about $1 per ton, and machine shop turnings and cast borings have also gone back some. Malleable has no demand at all.

Buffalo.—While interest is being shown in heavy melting steel, machine shop turnings have suffered a drop of about $1 per ton. More interest is being shown in the market, and a good demand for cast scrap and stove plate is in evidence.

Cleveland.—The geneal opinion is that prices are due for a rise, and heavy melting steel is in good demand at $15.25. The sentiment is much stronger but little business is anticipated until a couple of weeks later.

St. Louis.—There has been little actual sale, but prices remain unchanged and sentiment is good. 650 tons offered by railroads were taken up by small dealers. Consumers are keeping out of the market.

Cincinnati.—Deep dullness characterized the scrap market here. There have been no changes in prices and hope is centred in a buying market which dealers believe will develop next month.

Birmingham.—Dullness and optimism are the conditions here. The market is dull, but the dealers are optimistic. Old car and tram car wheels are now listed as not cast scrap.

PITTSBURG REPORTS IMPROVEMENT IN THE VOLUME OF STEEL PURCHASES

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., May 29.—There has been a distinct increase in the volume of steel buying. This statement applies to practically all products with the exception of tin plate, and includes even rails, since the Railroad Administration has bought 200,000 tons of rails, under protest, and there has been a fair volume of export rail business done.

With only occasional exceptions, as in the case of the rails just mentioned, purchases are confined to the supplying of immediate wants. As formerly, buyers take material only for immediate delivery, for absolutely known wants. They do not buy ahead, even in the most moderate way, and they keep demanding price guarantees, although according to the statements of steel producers the guarantees are seldom given. It may be, however, that guarantees are more common than is admitted. There is a very remarkable rumor, for instance, that one mill has guaranteed a certain product to the end of the year, a still more remarkable feature of the guarantee being that it is to be retroactive, upon shipments made from the date of the guarantee being given.

No new buyers have appeared in the market, the buying being by the same interests as formerly, including jobbers and manufacturing consumers. As ther

is no forward buying, and buyers had previously been withholding their orders as long as possible, it seems to be indicated clearly that general business in the United States has expanded. This may be a reflection of the progress of the season, as well as a general limbering up after the dislocations caused by the war ending, and thus it should lead to still better things in future.

Operating Rate

Since practically the beginning of the year the rate of steel mill operation has been declining continuously, the monthly ingot report indicating 87 per cent. operation in January, 85 per cent. in February, 77 per cent. in March and 65 per cent. in April, while the rate lately may be estimated at 55 per cent. There has been little fluctuation in the rate of new buying in these months, certainly no progressive decline, and the decrease in operations has been due to the gradual exhaustion of old orders. The increase in buying now noted may not be sufficient to make up for the winding up of old orders, so that mill operations may experience some further decrease, but even at that it is encouraging that part at least of the exhaustion of old orders is followed by the placing of fresh orders.

Construction Work

The construction firms and fabricating shops report that they have been estimating on very large quantities of new construction work in the past few months. The investors, however, do no go ahead with the projects. What they are waiting on cannot be conjectured, as there are many possible explanations, but it is encouraging that so much business is under consideration, for obviously these projects have not been abandoned. When conditions become satisfactory the projects will be undertaken. Either the conditions upon which investors are waiting will come or the investors will conclude the conditions never are coming and will go ahead without them.

Jobs now undertaken are small, but still they amount to something. Thus, the Bridge Builders' and Structural Society reported that April lettings of fabricated steel jobs amounted to 24½ per cent. of the month's capacity, this comparing with 17½ per cent. for March, 12½ per cent. for February and 12 per cent for January. While the progress is slow, there is steady improvement.

Steel Prices

The great majority of steel producers insist that they are adhering to the recognized prices This may be true, but in some quarters it is claimed that on almost any finished steel product a cut price could be obtained if the prospective buyer could offer a sufficiently attractive order. Obviously on carload or other small lots for immediate shipment the mills would be indisposed to cut prices. In this connection it is to be noted that the American Locomotive Company has distributed plate orders aggregating 3,000 tons to four mills, the base price being $2.50, Pittsburgh, or $3 a ton under the regulations price of $2.65. In explanation of the cut price it is stated that this was "export" business because the locomotives will be made to go to Italy. As the British price on plates is equal to about 3.90c and the French price, if there is one, would be still higher, it cannot be said that a cut price on these plates was necessary in order to meet competition on the finished locomotives, but it might have been necessary to encourage placing of the locomotive order at this time.

Pig Iron

The pig iron market has now been under test for about two months, or since the majority of merchant furnaces declared their unwillingness to adhere to the fixed schedule of March 21, brought about by negotiations between the Industrial Board and the general iron and steel committee, on which the merchant furnaces claim they were poorly represented if indeed they were not misrepresented. There has been an "open market" in pig iron, furnaces feeling that they had no obligation to their competitors to obtain one price or another. Nevertheless prices have sagged only slightly, and in some districts not at all, while on the other hand, furnaces have been going out of blast. Probably the furnaces could afford to quote slightly lower prices, but costs are so high that they could not come down a great deal, and they prefer to let the situation liquidate itself, by production dropping below the rate of consumption. This would be necessary in the long run, since there have been stocks of considerable magnitude in the hands of consumers. Some of these stocks developed during the war, while some have been occasioned in the past few months by consumers taking iron because they had it under contract and not because they needed it. While steel producers speak of their high costs as a bar to reducing prices, the case is not altogether simliar, there being much more margin in steel than in pig iron, and if there were full operation of steel mills the cost would be still lower, through better distribution of overhead.

Connellsville Coke

Connellsville coke, famous throughout the world for years as an ideal blast furnace and foundry material, was produced to the extent of only 83,284 net tons in the week ended May 17, in the Connellsville and Lower Connellsville region, this comparing with an output averaging 324,000 to 350,000 tons during a considerable part of 1918, and with outputs running some 145,000 tons a week only a few years ago. Of course the coke production of the whole country is greatly reduced, but the Connellsville region suffers particularly at this time because so many furnaces formerly using Connellsville coke have installed by-product coke ovens at their furnace plants. They use Connellsville coal to an extent, but also coal from various other districts.

Connellsville coke is a shade stiffer than a few weeks ago, spot furnace coke being quoted usually at $4 per net ton at ovens, while not so long ago $3.50 and $3.60 were done. Ordinary grades of foundry coke, formerly available in spot lots at $4.25, now bring $4.50, while good brands remain at about $5. The usual time for making contracts for the second half of the year is at hand, but it is somewhat doubtful whether the furnaces still in operation, and not provided with coke plants of their own, will be disposed to make contracts. There is likely to be contracting for foundry coke.

NEW YORK REPORTS MUCH BETTER TRADE

Machine Tool Market is Handling a Lot of Material There at Present

Special to CANADIAN MACHINERY.

NEW YORK, May 29.—Increasing activity in machine-tool markets is apparent. Evidently buyers have become persuaded that prices are as low as they will go this year, or at any rate many of them cannot afford to wait longer to satisfy their needs. For some time the automotive industries have been almost the only buyers in large quantities but other industries are now coming into the market, and this is the most hopeful sign since the end of the war.

The Columbia Graphophone Co., Bridgeport, Conn., has bought heavily for a new six-storey building to be used for the manufacture of talking machines, its purchases totaling several hundred thousand dollars. A Cleveland maker of screw machines received an order for sixty-two, while a New England builder of grinders and milling machines received an order totaling about $100,000. Several other machine-tool builders also received substantial orders.

The Federal Shipbuilding Co., Kearny, N.J., has begun to buy, and its purchases will eventually make quite a total, as it is rounding out the equipment in some of its shipbuilding shops, and will also buy for a dry dock and ship repair plant.

Another purchaser is the New England Westinghouse Co., Springfield, Mass. This company's plant was engaged during the war in making machine guns, and now will be devoted to the manufacture of electric starters and lighters. A part of the work of this kind formerly done at Pittsburgh plants of the Westinghouse companies will be transferred to the Springfield plant.

Automobile work is also to be done at the plant of the Osgood Bradley Car Co., Worcester, Mass., This plant was engaged in making gun mounts during the war but during recent months has been almost idle. The plant is closely affiliated with the Standard Steel Car Co. of Pittsburgh and will make certain parts of the Standard Automobile. A list of about 60 machine-tools has been inquired for and probably will be purchased soon.

The Chicago Pneumatic Tool Co., Chicago, will build an Eastern plant at Franklin, Pa., and will require consider-

able equipment. The work of constructing the plant will be in charge of Westinghouse, Church, Kerr & Co., New York.

Still another war plant is being converted to peace-time production. The American Shell Co., Paterson, N.J., has enquired for machine tools for the manufacture of motors for washing machines and other similar equipment.

Inquiries have been received in New York from the Canadian National Railways for the equipping of the St. Malo shops of this road at Quebec. It is presumed here, however, that most of the buying for these shops will be done in Canada.

A proposition is now under consideration by the War Department, Treasury Department and State Department of the United States Government, which may solve the problem of re-equipping many Belgian and French factories, and at the same time result in quick disposal of about $75,000,000 worth of surplus machine tools which the War Department has on hand. It is proposed that this Government turn all of these tools over to Belgian and French manufacturers, the necessary credits to be established through inter-Government financing. The disposal of these tools in the United States has been arranged for up to a certain point, but it is realized that the problem is a huge one, and the disposal of the equipment in the manner indicated would be an easy and speedy solution, although it is admitted it would ruin the prospects of many exporters of machine tools who have in prospect considerable Belgian and French business. A great deal of machine-tool business should come to America from Belgium, especially as that country has placed an embargo against the importation of German tools, and this embargo, it is understood here, will not be removed even after the peace treaty is signed. Practically the only competition America will have, therefore, will be from England.

THE NATIVE TOOK KINDLY TO THE MATERIAL

Continued from page 559

no more. It was shortly after this that a use for all we had developed.

The fourth was doing something up on the middle grating, and dropped a 14-lb. hammer down on top of one of the drums, which it naturally went through. He came down to recover the hammer and, in his efforts to extricate it from the drum, he upset the whole thing, and our valuable compound ran all over the back platform. Now, part of this platform was of plank, and it had always been a sore point to try and keep it clean, because it was a handy place to wash before coming off watch.

The fourth got a man around to help clean up the mess and, wonderful to relate, wherever the stuff had touched, the planks were white as snow. He was so surprised that he came up after me, and I went down to look it over. The appearance of that platform was a delight to the eye. I got an empty paint pot and put some of the compound in it, and took it up on deck. I found a piece of the deck outside of the galley, that was pretty well stained, and applied the clean-all to it. In two minutes it was white.

This was too good a thing to lose. I made an inventory of my stores, and found I was a bit short of white zinc. I again approached the mate. "How are you fixed for white zinc?" I asked him. He looked suspicious, but replied he had enough. "All right then, if you will give me a couple of drums of white zinc, I will give you a couple of drums of my boiler compound." "No doubt you would," he sneered. "What use would it be to me?" This was what I wanted. "Come here and I'll show you." I took him over to the deck I had cleaned. His eyes lit up joyfully, and he called over to the bos'un, "Give the second two drums of white zinc," he ordered, "and get two drums of that stuff from below."

I told the chief about it. "Just what I thought," he said. "I have had something like that before. Now," he said, "do you savvy what we can do with it down the coast?"

"I have a glimmering," I replied.

Anybody who has ever traded down the Mediterranean can tell you the value set on soap by the inhabitants of these shores. That is because it is a government monopoly, and is scarce and expensive. We always carried a good stock of soap in our rooms and used it as a means of trade. What can be bought down there with a few bars of soap would surprise anyone who has not experienced it. Now, this compound evidently was not soap, but it would achieve some of the results. The next thing was to try it out on a suit of overalls that had done duty in the engine room for a while. A bucket of hot water, a little soft soap, and a half cupful of our compound made a new boiler suit. I gave the men a drum for their fo'c'sle, to wash their floor and their clothes, and waited eagerly for the first report.

The chief conducted the negotiations. He took the ship chandler into his room and showed him what could be done. That night three drums went ashore, and a barrel of grapes came aboard. We had a few more ports to visit, and results were very satisfactory. I suggested that we had better keep some, so as not to have appeared to use it up too fast. "My boy," said the chief, "when you have been at sea as long as I have you will know more. If we take any of that stuff back the super will fire us. It has served his purpose, as it is now serving ours. Keep a drum for your back platform, and one for the men's foc's'le, and you might trade another drum with the mate. I'll look after the rest and will be able to report that we found it easy to use and excellent in its results. Everyone will be satisfied and we will never see any more of it."

And that is how it worked out.

STRONGER TONE IS SEEN IN IRON MARKET

INQUIRIES are more numerous, and foundry iron for last half is being booked. Sales, however, are slow in increasing. The tone is, on the whole, stronger. Following are reports from U. S. points:

New York.—There has been some inquiry for third quarter and even second half from furnaces not covered for those periods. Most consumers, however, have provided well ahead. Foundry and malleable grades have been sold up to about 10,000 tons during the week. Production costs are high, and consumers are not taking more than about ten per cent. of the iron being made. More stacks are likely to be blown out.

Boston.—A fair amount of iron is being sold in small lots, from a carload to 250 tons, mostly for June and July delivery. The tone of the market is good, the aggregate sales being better than for some weeks past. No. 2 foundry sells at $26.75 for all small orders. It is thought that the worst days are now over.

Philadelphia.—Inquiries for second and third quarter requirements are on the market, one of these being for 1,000 tons foundry for last half, and another 500 tons Bessemer for third quarter. The Government has 3,000 tons low phosphorus iron which it is offering to the highest bidder.

Pittsburgh.—Business is being done along very moderate lines, although the general sentiment is better. Inquiries are coming out for last half needs. Shipments against contracts are getting more frequent and no more stacks have been blown out during the past week.

Buffalo.—The usual sales of small lots keep up, but the aggregate has improved somewhat. Enquiries for fair tonnages for forward delivery are being heard of, and some small sales have been made for last half delivery.

Cleveland.—Prices are holding firm, and more interest is being shown by buyers. Business is mostly confined to small lots, mostly foundry grades. Sales are not enough to keep up with production, and further curtailment is effected.

Chicago.—There is no interest being shown in contracts for last half. Another stack has been blown out, this leaving only five merchant stacks in this district. The differentials on silicon that were established during the Government's price fixing period are being adhered to. The average southern furnace price is now $25.50.

Cincinnati.—With several foundries closed due to strikes, there is little demand for foundry iron, but high silicon iron is better situated. The figure quoted chiefly is $26.75. Production is low and yard stocks are being depleted, factors which tend to a steadying up.

St. Louis.—There has been more inquiry and more actual business this week than at any time since the armistice. Prices are standing firm, only one case of shading being heard of

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75

Toronto price:—
Silicon..2.25% to 2.75% $32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$19 50	$18 50
Electro copper	18 50	17 50
Castings, copper	18 50	17 00
Tin	58 00	55 00
Spelter	8 50	8 25
Lead	6 50	7 50
Antimony	9 00	8 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$11 50	$10 50
Copper, crucible	14 00	13 25
Copper, heavy	14 00	12 75
Copper wire	14 00	12 75
No. 1 machine composition	13 00	12 00
New brass cuttings	9 25	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	7 00	6 00
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	5 00	5 00
Heavy lead	4 00	4 00
Tea lead	3 00	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	11 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	17 00	15 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	5 00
Stove plate	12 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ¾" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per Ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	.27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 30
Brass sheets, 24 gauge and heavier, base	$0 38

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard	10%	Best grades	15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

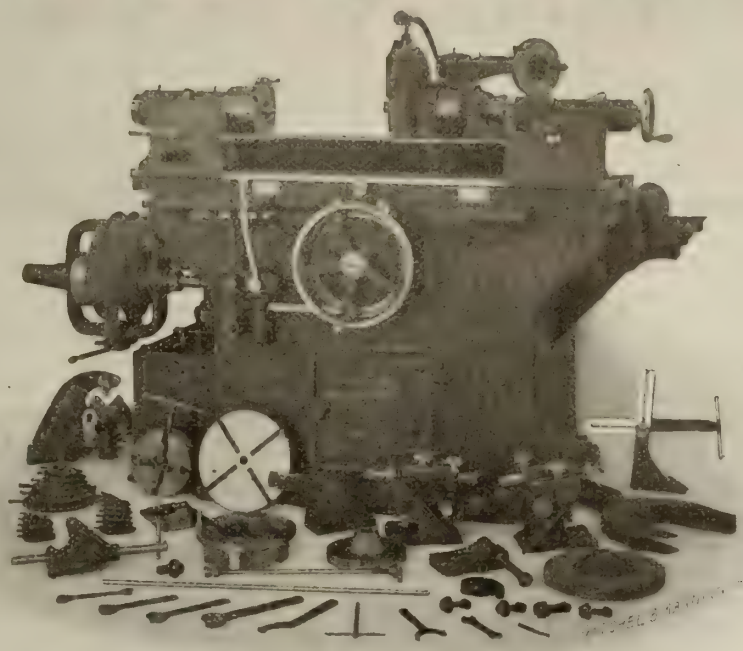
Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	.
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

Landis Grinders for Production



No. 1 UNIVERSAL

Capacity 10" x 20"

will do all kinds of

INTERNAL and EXTERNAL CYLINDRICAL (Straight and taper) and CUTTER GRINDING

It has many special features giving CONVENIENCE, ACCURACY and PRODUCTION.

Write for bulletin giving detailed description and prices. IN STOCK for immediate shipment.

"IF IT'S MACHINERY WRITE WILLIAMS"

THE A. R. WILLIAMS MACHINERY CO., Ltd. 64 FRONT ST. WEST TORONTO

MONTREAL ST. JOHN, N.B. WINNIPEG VANCOUVER HALIFAX BUFFALO, N.Y.

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

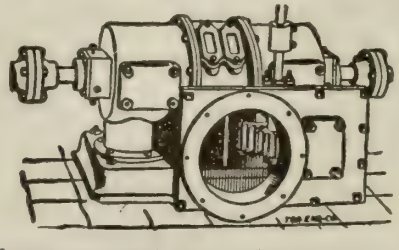
The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

MACHINES SOLD AT SMALL FIGURE

St. Thomas Sale Bidding Did Not Drive the Prices Up Very High

Special to CANADIAN MACHINERY.

St. Thomas, May 28.—Although a good crowd of enthusiastic buyers were on hand, an auctioneer with a rapid fire talk that would be hard to equal, and buying was comparatively brisk, the $9,000 worth of munition machinery, including some of the finest lathes in use at the J. D. Cummings, Elgin Manufacturing plant, sold for less than half their value. The great difference between the sale price and the original price is said to be caused by the signing of the armistice. Mr. Cummings installed his equipment only a few months prior to the cessation of hostilities, and consequently the loss is even greater.

The buyers present included the following: J. E. Armstrong, Fletcher; H. M. Black, Toronto; R. C. Eckert, J. Harris, T. Knowles, Yates Machinery and Supply Company of London; Frankel Brothers, J. Griffin and N. Smith, of Toronto; Hall and Quick, Hamilton; H. Jackson, St. Thomas; W. H. Kennedy, Ailsa Craig; Maxwell's, Limited, St. Marys; M. D. Prendergast, Sarnia; Hugh Park Foundry, Oshawa; and the Thompson Automobile Company, of Windsor.

An evidence of some of the low prices bid for brand new machinery is shown in the following quotations, which were obtained at the close of the sale held in St. Thomas this week:

A. Jones and Lamson, turret lathe, 3 in. by 36 in., complete with chuck, countershaft and tooling, valued at $1,-50, sold for $400; Beaman and Smith combined engine and turret lathe, valued at $900, brought $325; a Martin turret lathe valued at $700 sold for $55; South Bend lathes, double back-geared, in use only one weeg, and valued at $716 each, sold for $475; a 75 h.p. Crocker-Wheeler squirrel cage induction motor, used but one week, and valued at $1,375, sold for $700.

Prices continued throughout the sale in this way, the smallest priced article was a 24-foot dust collector, which sold for 25c. Three air cylinders, only used a short time, and invoiced at $1,300, sold for the magnificent price of $50.

Mr. Cummings, who managed the Elgin Company here for some time, held a similar sale in London this week.

TRADE GOSSIP

Tillsonburg Helps Industries.—The Tillsonburg Shoe Company has had $25,-000 bonds guaranteed by the city, and the company will spend $35,000 on a new plant, and increase the number of employees from 105 to 150 or 175.

France Withdraws Restrictions.—All restrictions imposed during the war on American goods have now been withdrawn, according to a statement by Louis Loucheur, the French Minister of Trade. All remaining restrictions of all character are lifted by this pronouncement.

Ottawa Valley Lumber Sold.—It is stated that all of the lumber in the Ottawa Valley suitable for export has been sold, and great efforts will be made to ship it. The British Government has bought altogether about 700,000,000 feet, which is divided between British Columbia and the Ottawa Valley.

Going to Hensall.—The Jackson Mfg. Co., of Zurich and Goderich, is about to establish a branch in Hensall. The agreement between the town and the company is being referred to the people in the form of a by-law, and if ratified the company will begin operations immediately. It is found impossible in Clinton to get the necessary help to develop as fast as the firm would wish to.

Trade Decrease.—A decrease in trade for the first month of the new fiscal year amounting to $29,244,403, is shown by the figures just issued. The total for April, 1919, was $121,527,952, as compared with $150,772,355 in April, 1918. The decrease was chiefly in importations, which declined $24,368,720 as compared with the corresponding period of last year.

Express Company Change Hours.—The Express Traffic Association of Canada announces the adoption of an eight hour day, and a consequent change in delivery hours. From June 1 collections by the companies will be made between 8 a.m. and 5 p.m. Depot offices, where night staffs are maintained, will be open for delivery to consignees calling for parcels, and to receive shipments after the last collection has been made.

New Engineering Company.—The Engineering Corporation, Ltd., Vancouver, B.C., has been organized by Messrs. DuCane, Dutcher & Co. The directors

PLANT OF BRITISH FORGINGS HAS NOT BEEN DISPOSED OF TO DATE

NEGOTIATIONS have been carried on for some time past between Baldwins, Limited, the Imperial Munitions Board and the Harbor Commissioners relative to the purchase of the plant of the British Forgings at Toronto.

Baldwins, Ltd., will establish a large tin plate mill in Toronto if the negotiations come to a satisfactory conclusion and would use the electric furnace equipment of the present plant in the making of the steel ingots for tin plate.

The plant of the British Forgings, Ltd., Toronto, which is the largest electric furnace plant in the world, was erected in the spring of 1917 by the Imperial Munitions Board for the manufacture of shell forgings for the British and Allied Governments. The electric steel furnace offered the best means of utilizing the steel scrap, which had been accumulating in Canada through the manufacture of munitions and, accordingly, ten six-ton furnaces of the Heroult type were installed with a capacity of almost 350 tons per day. These furnaces each used, while running, approximately 1,500 kilowatts of electrical energy, and the whole plant, if running to capacity, would draw about 20,000 horse power from the distribution system of the Hydro.

This load necessitated the construction of an underground duct through the down-town district of Toronto, about three miles in length.

All the steps from the steel scrap to the finished forging ready for machinery were carried out at this plant, the scrap being furnaced, cast into ingots and the ingots forged.

The plant had a capacity of about 450 tons of steel per day if run at full capacity, and a production of 12,-000 six-in. shell forgings was reached for a 24-hour shift at one time on the presses.

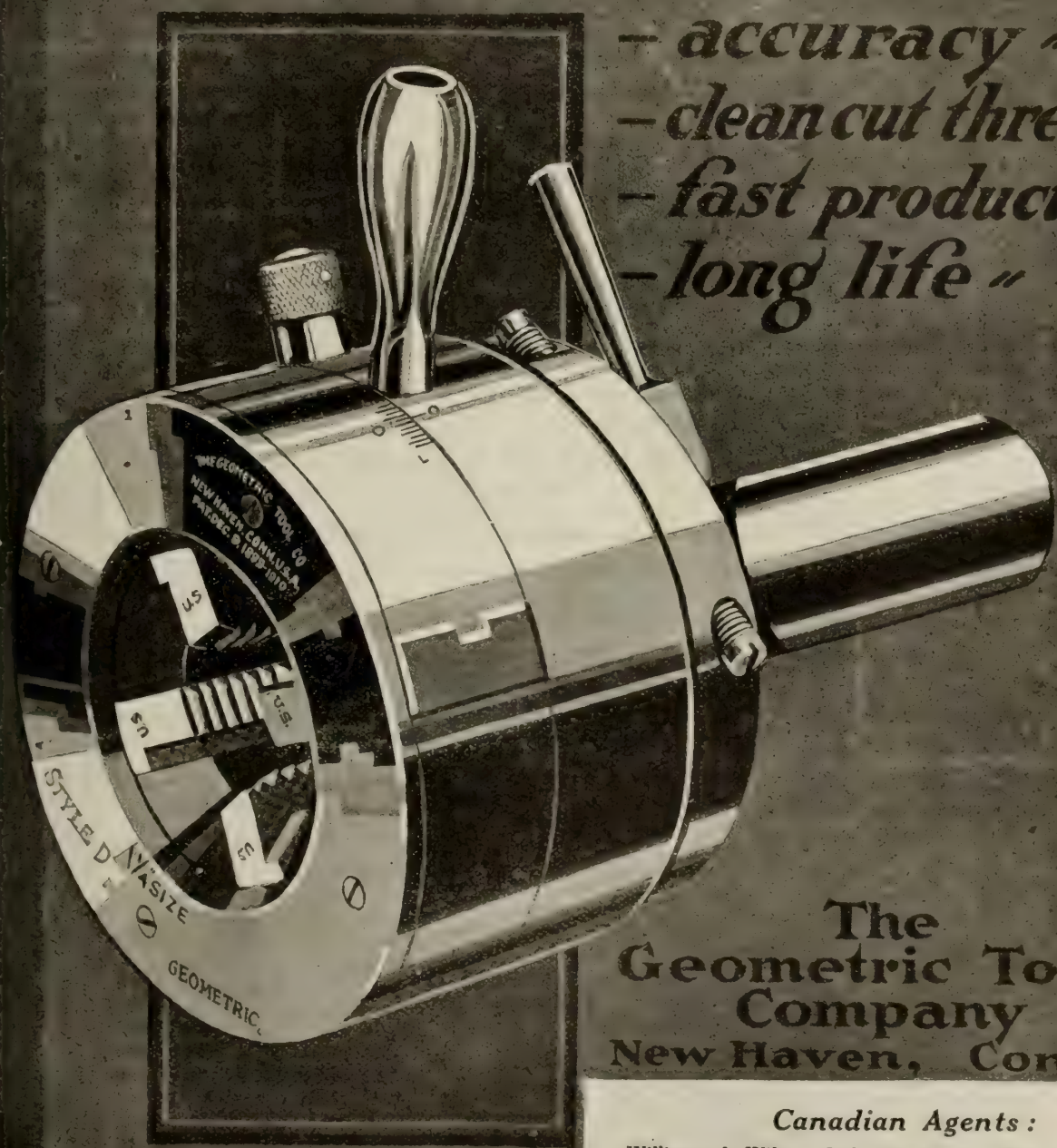
The present furnace plant would be adaptable to the manufacture of tin-plate with few changes, so far as the electric plant itself is concerned, but considerable additions would be required for the rolling and dipping of the plate. A rolling mill would be necessary, and some of the present buildings, formerly used for shell forgings, etc., could be used for housing and additional equipment necessary.

GEOMETRIC

SELF OPENING DIE HEAD

Specify Them for

– accuracy " "
– clean cut threads
– fast production
– long life " " "



The Geometric Tool Company
New Haven, Conn.

Canadian Agents:
Williams & Wilson, Ltd., Montreal; The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

are Howard K. Dutcher, Jasper S. Connell and Major Geo. A. Walker, R.E. The new corporation will undertake general engineering and construction work, and will also handle engineering materials, and equipment in connection with local and foreign business, as purchasing agents.

Brockville Buys Factory Sites.—The Brockville Board of Trade, at a general meeting, authorized the purchase of twenty-four acres of land for factory sites, within the corporation limits. Industrial expansion is booming in Brockville just now, as a result of the introduction of Hydro-Electric power. Negotiations are being carried on between the city and a number of American manufacturers with a view to establishing new industries in the city.

New Sand Deposits.—Hyde and Sons, of 43 Common Street, Montreal, have recently acquired the sole selling rights of the Brockville sand development. This sand has been thoroughly examined and tested both at the deposits and under actual conditions in the foundries, and results have shown it to be a high-grade quality of sand. It is the intention of Hyde and Sons to share the sale of this sand with other Canadian supply houses, so that every possible opportunity will be given for the more extensive use of this Canadian sand.

Future For Douglas Fir—Sir James Ball, the British Lumber Commissioner, at a luncheon in Victoria, predicted a great future for Douglas fir. Sir James believes that it will eventually replace American yellow pine in the British market. If British Columbia firms had pressed its claims as they should have done, it would have won its place ere this. There are immense possibilities for the development of this class of business on Vancouver Island and the mainland. Seattle has just received, through one of its lumber firms, an order for 191,000,000 feet of Douglas fir, which is referred to as one of a series of contracts for reconstruction work in the devastated areas.

Angus Shops Busy.—The Canadian Pacific Railway Company's Angus shops are building ten of the heavy Mikado type freight locomotive. They are being built under the direct supervision of Mr. W. H. Winterrowd, the chief mechanical engineer. The engine and tender in working condition weigh 500,000 lbs. The driving wheels are 63 inches in diameter. Cylinders are 25½ inches diameter by 32 inch stroke, the working pressure being 200 lbs. per square inch. They have a tractive effort of 36,000 lbs. The tender has a capacity of 12 tons of coal, and 8,000 Imperial gallons of water.

New Railway Incorporations.—A line between Baker Lake to Schultz Lake and to Old Fort Reliance, on the Great Slave Lake, about 100 miles altogether, is to be built by a new company under the title of "The Northwest Route, Ltd. The company is English with headquarters in London, and the capital stock is $1,000,000. There is said to be oil in the district. In view of the difficulty of getting materials and supplies to the spot the House Committee reduced the mileage obligatory on new railways from 25 miles in the first two years to ten miles. The bill to incorporate the Athabasca and Grand Prairie Railway Co. was also reported by the Committee. The object of this company is coal, said to be "near anthracite" and equal to the average Pennsylvania grade. The route will be from Brule Lake to the junction of Smoky River, a distance of 60 miles. Montreal capital is behind the project.

Empire Trade Development.—One of the biggest tasks ahead of the Empire in connection with reconstruction is the work of organizing the supply of information on the thousands of matters of importance of the Empire's trade and business that will have to be promptly dealt with. There are, of course, many official sources of which every advantage should be taken, but, in particular, there is the Information Bureau of the Royal Colonial Institute, which has been established for many years and which possesses sources of information that are not available in any other organization. The service provided by this Bureau is not only at the disposal of fellows and associates of the Royal Colonial Institute, but may be made use of by British subjects in any part of the Empire. The Institute, through its Trade and Industry Committee, seeks to promote the economic development of the British Empire and to this end welcomes enquiries on openings for trade and industrial activity not only in respect to manufactured articles, but also raw materials, foodstuffs and transportation and inter-communication facilities. Enquiries should be addressed to the secretary, Trade and Industry Committee, Royal Colonial Institute, Northumberland Avenue, London, England.

New Patents.—The following is a list of Canadian patents recently issued through the agency of Messrs. Ridout & Maybee, 59 Yonge street, Toronto, from whom further particulars may be obtained: Richard P. Park, machines for reducing ore; Dodd Heating Systems, Limited, automatic valve; Wm. J. Lefever, ballast trimmers for railway tracks; Harold W. E. Josling, means for promoting circulation of the fluids in steam generations; Alfred H. Anthony, automatic regulators for boiler feed apparatus; Alfred H. Anthony, float operated water level regulators and the like; Alfred H. Anthony, float operated valves; Donald S. McNeill, dooks, holdfasts and foundation pins; William Wilkie, machines for pressing the seams and edges of the cloth of various parts of wearing apparel during process of manufacture; Aaron N. Warfield, metal car; Wm. T. Stephens, process of producing iron and steel; Francis W. Washburn, gate; Geo. W. Berry, hingeing of sheet metal receptacles; Emile Brooks & Kiro Roberts, pianoforte actions; Henry W. Crowe, the manufacture of cheese or cheeselike food products; Minerals Separation North American Corporation, apparatus for the concentration of sulphide ores; Thos. W. S. Hutchins, muffle furnace; Llewelyn M. Rees, weather strips.

SHORTER HOURS AND MORE WAGES WOULD NOT SOLVE PROBLEM

(Special to Canadian Machinery)

LONDON, May 27.—That there is but little unrest among the employees of the various manufacturing industries was brought out by the evidence taken by the Industrial Relations Commission, which met in London, on May 20. The commission was composed of the following members: Chief Justice Mathers, chairman; Hon. Smeaton White, Carl Riordon, Charles Harrison, M.P. for Nipissing; Tom Moore, president of the Dominion Trades Congress, and J. W. Bruce.

Lieut.-Col. W. M. Gartshore, vice-president of the McClary Mfg. Co., and E. G. Henderson, of Windsor, were the only large employers of labor who gave evidence at the hearing.

Mr. Arthur W. White, vice-president and general manager of George White & Sons Co., was present, but he stated that he did not care to be heard at the session at all.

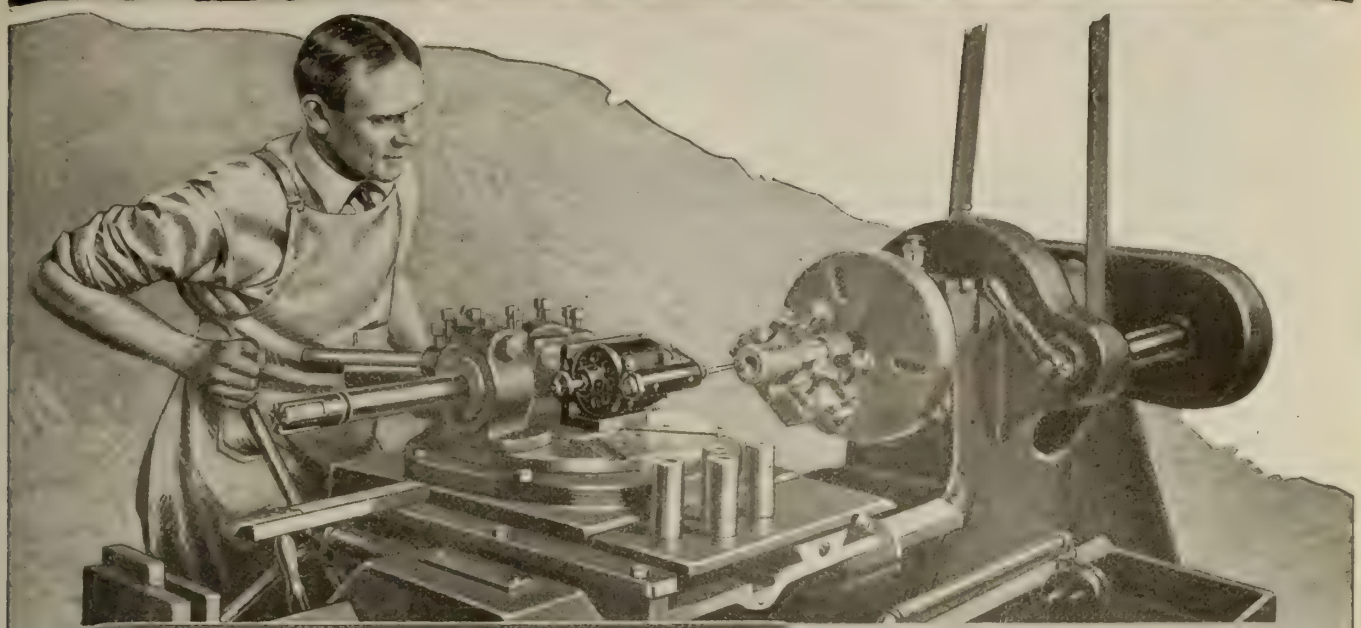
In an interview Mr. White said that "The unrest in Canada is very largely attributable to Bolshevist propaganda spread about, not by organized labor, but by foreign industrial or incendiary socialists.

Continuing, in reference to the Industrial Relations Commission, Mr. White said:

"The evidence taken before the Royal Commission on industrial relations should assist the Government in arriving at just conclusions. While there was some evidence of sane employers and employees, which pointed out that co-operation and common sense would correct the present evils, most of the evidence taken consisted largely of pet theories of men of revolutionary and Bolshevik minds, and the more weird theories of socialistic cranks. It is to be hoped that the Commission, in its wisdom, will sift out the evidence of sane men, and that the report will be instrumental in establishing satisfactory relations between employer and employee.

"The preponderance of evidence before the Commission is toward shorter hours and higher wages. Under the present conditions this would only aggravate matters. What Canada needs is not less production and higher cost of living, which would be the outcome of shorter hours and higher wages, but greater production per capita, which can only be accomplished by everyone "digging in" and doing their best.

It would be unwise at the present



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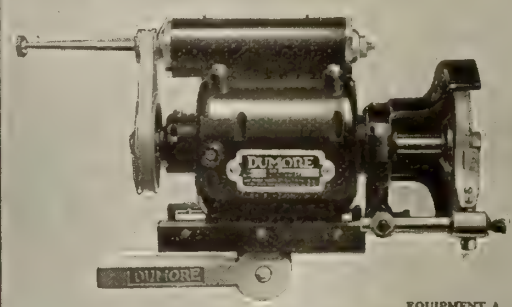

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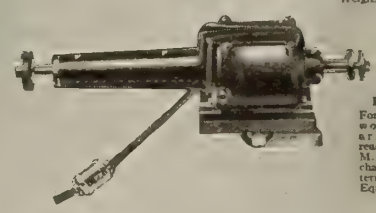
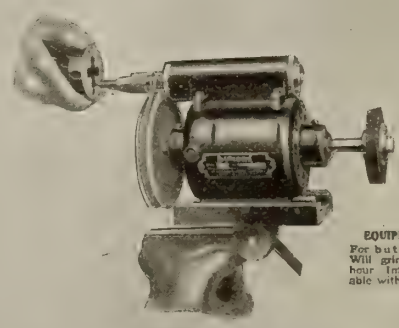
For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches. 30,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.



EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS

time to make any sweeping changes in the tariff, or any other legislation that would tend toward reduced efforts on the part of the industries, the miners, the lumbermen or the farmers. What we need is work for everyone, and everyone willing to work. Patience and courage, and co-operation between employers and employees. Patience and courage for legislators to meet conditions as they arise, and not jump at the beck and call of any section of the country to abolish tariffs, unless it is for the betterment of the whole of Canada, and to make jobs for returned soldiers.

Co-operation throughout Canada is absolutely necessary to overcome the present state of unrest. All must feel that one is dependent upon the other. The law of interdependence is more clearly shown in Canada at the present time than ever before in the history of the world, national interdependence, provincial interdependence, interdependence of employer and employee. There is no room for class legislation or class distinction. We must have leaders with vision. There is no room for the employer who cries, as the Financial Post puts it, "To hell with the trade unions," or the socialist whe spreads revolutionary propaganda. Either means disaster.

The motto of all should be: "Co-operation, courage, patience and production."

SHEFFIELD MACHINE TOOL PLANTS PLAN TO GO AFTER CANADIAN TRADE

(From our London, Eng., office.)

IT is a common thing in Sheffield today to find works managers who will tell you that during the war their works have been extended to five or six times their original size, and that their output has more than trebled since August, 1914. Consequent upon the termination of hostilities the cessation of munition contracts has given rise to the big problem of changing over from wartime to peace work, and the diversion of augmented energies into other channels.

If trade is allowed to shrink back to normal proportions it will be faced with enormous losses in the shape of derelict plant, and a general lockout of labor would be precipitated. The absence for the time being, at any rate, of German competition has produced a big boom and a glut of foreign orders. But manufacturers are taking the long view, and with an eye to future business are ready to cultivate the asset offered by the Dominion markets as an alternative and more lasting solution to the question of finding a profitable field to absorb their magnified output. In discussing export and overseas markets Canada is spoken of freely as a promising field for steel products.

Aid of Intensive Production

By the help of intensive production it is hoped to successfully compete in Dominion markets, and at the same time to meet the increase in cost of British steel, due to the removal of the Government war subsidy, and likewise to neutralize the upward course of the workers' wages.

Firm's New Lines

Figuring prominently amongst the new lines which are to be turned out on an intensive scale are engineer's tools in high speed steel, machine tools, milling cutters, reamers, lathes, grinding machines, and a wide variety of small tools of the highest quality at competitive prices.

Great strides have been made in the employment of stampings. Parts of all kinds are now being accurately stamped out with the result that the amount of subsequent machining necessary is reduced to a minimum. Standardization is also being rapidly adopted, and there is, moreover, a drastic curtailment in the number of patterns being turned out.

Conditions Generally Unsettled

Manufacturers are still rather shy of giving away information as to their plans for the development of their overseas trade, but signs are not wanting that some firms are already negotiating for Canadian business. Two firms specializing in patent steels have already commenced operations, and a host of minor concerns are seeking agents. The reply to enquiries generally takes the form of some statement as to conditions being too unsettled at present to give an opinion. An outstanding feature of Sheffield re-organization is the number of amalgamations and working agreements which are being concluded by firms in the same way of business.

Sheffield Trade Exhibition

Another sign of the times if the formation of a city development committee under the aegis of the municipality. This body has for its objects the promotion of trade, industry, development and general prosperity of the city, its manufacturers, traders and inhabitants. It also exhibits a lively interest in the possibilities of overseas markets, and has the backing of many of the biggest firms. Quite recently it placed before the manufacturers of Sheffield a proposal for holding an industrial exhibition, the main object of which would be to demonstrate the wide range of the city's products in peace and war. The idea is hailed as affording a good opportunity for introducing Sheffield to a wider world area of potential buyers.

PERSONAL

The directors of the Armstrong, Whitworth Co. of Canada, have recently made the following promotions in connection with the operating staff: Lawrence Russel has been appointed general manager; Herbert Johnson, formerly general superintendent of the works at Longueuil, has been promoted to the position of assistant general manager; W. T. Townsend has been made general superintendent of the plant, and G. E. Odell has been appointed chief accountant.

Mr. James T. Mathews, vice-president of the Mathews Steamship Co., the oldest steamship firm on the lakes, passed away at his residence in Toronto recently. Mr. Mathews was in his seventieth year, and was born at Niagara on the lake. He organized, with his father, the firm of J. & J. Mathews, commencing business with one schooner, the Heather Bell. The fleet has since owned twenty-six vessels. When his father died in 1900 Mr. Mathews and his brother, A. E. Mathews, organized the Mathews Steamship Co.

TENDERS

The Department of Public Works is calling for tenders, which will be received up to noon on June 12, for the delivery and placing of stone on portions of the seaward side of the Souris breakwater, Kings County, P.E.I.

The Town of Trenton will receive tenders up to June 10, for the erection of a four-room addition to a public school. Plans and specifications can be seen at the architect's office, S. B. Coon & Son, Excelsior Life Building, Toronto St., Toronto.

St. Catharines Public School Board ask for tenders for the erection and completion of two one-story school buildings. Plans and specifications can be seen at the office of the McLean Daily Reports, Ltd., Toronto, and at the office of A. E. Nicholson, architect, St. Catharines.

The Department of Railways and Canals is calling for tenders for rebuilding lower entrance pier, lock No. 25, Galops Canal. An accepted cheque for $1,500 must accompany each tender, made payable to the Minister of Railways and Canals. Plans and specifications can be seen at the office of the chief engineer of the department, Ottawa, and at the office of the superintending engineer, Ontario and St. Lawrence Canals, Cornwall, Ont.

MARINE

Weymouth, N. S. —The three topmast schooner "Marine" was launched here recently for Messrs. Beasley Bros., Halifax. She is a vessel of 4,501 tons net, and is the finest schooner launched in Digby County since the boom in shipbuilding came in. The boss builder was Augustus Gaudet, of White Cove.

Port Huron.—A collision took place near Algonac, between the lake freighter "John B. Cowie" and the steamer "Byers" at Russell's Island, resulting in the sinking of the former vessel. The "Byers," although badly damaged, took off the crew of the "John B. Cowie," and proceeded to Port Huron under her own steam.

Detroit.—Local shipbuilders are busy turning out oil burning freighters for the U. S. shipping Board. They are of the same size as the coal burning ships,

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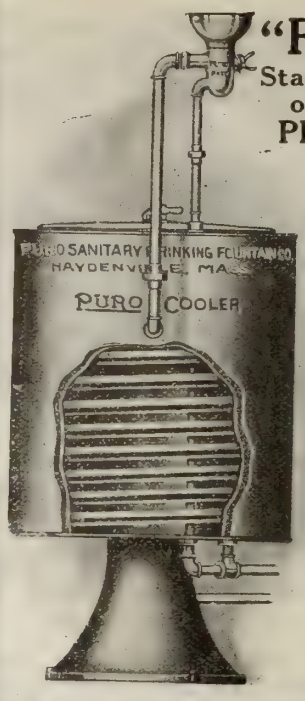

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but will be able to carry more cargo, owing to the absence of bunkers. The first one will be ready to go down to the sea about June 1.

Toronto.—The new life boat for Toronto harbor was tested recently by Commanders Radcliffe and Phillips of the Department of Naval Service, and found satisfactory in every respect. She attained a speed of eight knots, and her self-righting and buoyancy tests were perfectly good. This is the first boat of her kind built in Canada.

Quebec.—A collision, resulting in damage to both vessels concerned, took place in the St. Lawrence, about forty miles below Quebec recently. The ships concerned were the C.P.R. freighter "War Merrill," bound from Montreal to England, and dredge No. 8. The vessels struck head on, and sustained severe damage to their bows.

Sarnia.—The Imperial Oil Company's steamer "Royalite" has gone ashore on Belle Isle while en route for Toronto with a cargo of oil. The vessel is reported undamaged and the Canadian Oil Co. steamer "W. S. Calvert," unloading at Froomfield, has been sent to take part of the Royalite's cargo from her, in the hope that she will then float.

Montreal.—With the sailing of the "Canadian Pioneer" from the port of Montreal to the port of Buenos Aires, with 8,500 tons of general cargo, the actual commencement of the Canadian Government Merchant Service was inaugurated. On the return trip the "Pioneer" will bring back from the South American port a general cargo of tropical products.

Ottawa.—The Federal Government has decided to take over the harbor of St. John, and a bill will be introduced in Parliament this session to enable it to do so. The details have been settled between the members for St. John and the Minister of Marine, Hon. C. C. Ballantyne. It is understood that the compensation to be allowed the city of St. John for their investment will be in the neighborhood of $2,225,000.

Alpena, Mich.—Following a collision with the steamer Quincy A. Shaw, of the M. A. Hanna Co., the steamer D. R. Hanna sank in 141 feet of water eleven miles east of Thunder Bay Island. The Hanna, which was owned by the Pioneer Steamship Co. of Cleveland, was valued at $1,000,000, and her cargo of wheat at over $800,000. She capsized before she sank, and this fact will make raising her a difficult if not an impossible feat. She was 552 feet long and 66 feet beam, and was built in 1906 in Lorain.

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Ottawa.—Mr. Joseph Wilson, of the Department of Naval Service, giving evidence before the Public Accounts Committee of the House of Commons, spoke of the contracts given the Canadian Vickers for trawlers. These were for six trawlers, to be built at Montreal and Kingston, and the contract was based on 6 per cent. of the cost of labor to cover overhead, plus 10 per cent. on the total, including materials. This meant a profit of about $15,000 on each vessel, which the witness thought was quite reasonable.

London, Eng.—Mr. Bosworth, of the Canadian Pacific ocean services, in a recent interview, spoke about the handicap they were under due to the control exercised by the Government over cargo space. There is at the present time 70 per cent. of the cargo space under control, but in June it will drop to 50 per cent. This naturally prevents the C.P.O.S. from taking all the business offering. The line had resumed their service from Antwerp, and would shortly be sending ships to Rotterdam, but no new services would be undertaken, until the line could properly serve the old trades.

Victoria, B. C.—The Foundation Co. has launched its fiftieth ship from its Pacific coast yards. The name of the vessel launched was the "Montcalm," and the event passed off very successfully. As soon as the vessel had left the ways and had been checked up, the sponsor was presented with a gold vanity case, on which was engraved, "From the Montcalm to her sponsor." The vessels launched up to date from the various yards of the Foundation Co. comprise forty 3,000 ton wooden auxiliary schooners for the French Government, built at the Portland and Tacoma yards, the last of which were launched last December; five 2,500-ton wooden vessels for the Imperial Munitions Board in Victoria, and five vessels of 3,000 tons, wood, for the French Government, part of a contract of twenty.

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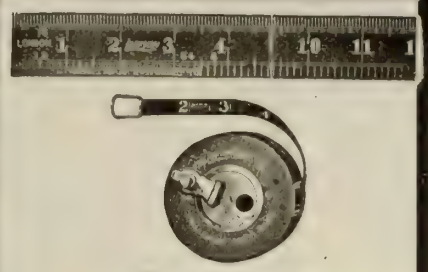

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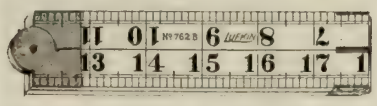

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INCORPORATIONS

A new motor company on a large scale is announced, to be known as General Motors of Canada, Ltd., with an authorized capital of $10,000,000. This will be related to the great General Motors Corporation of the United States. Mr. R. S. McLaughlin, president of the McLaughlin Motor Car Co., Oshawa, has been elected the president of this new concern. Mr. McLaughlin was recently re-elected a director of the General Motors Corporation—a three-hundred-million-dollar corporation in the United States. He is also vice-president of the same concern and a member of the Executive Committee. As president of General Motors of Canada, Ltd., Mr. McLaughlin will have charge of the Canadian business of this mammoth corporation.

Temporary Slack at Shipyard

The first slack period that has occurred for three and a half years was reported at the Esquimalt shipbuilding yards of the Yarrows Company recently. With the exception of repair work on four whalers there was no work in progress. This condition of affairs will be of brief duration, however, as there is considerable work in sight. It has been intimated that repair work in connection with vessels that were hurriedly built during the last two years will furnish some activity at the shipbuilding yards during the coming months.

Close Concrete Shipyard

The Ferro-Concrete Ship Construction Company will shortly cease operations at their shipbuilding yard at Barrow, England. The launching ways are being removed, and the concrete plant and materials are to be sold. So far four craft of this type have been built. These include three barges and an ocean-going steamer named the Armistice, which has made several coastwise trips. Two of the barges are now in the Devonshire Dock, Barrow. These four craft were built for the State, and it is stated that no further orders for this class of work will be given out by the Government. The company was formed in 1917 to fulfil the urgent demands for all kinds of craft. Hopes are entertained of a new shipbuilding industry in steel ships on the same site.

Lead Consumption in Canada

The net consumption of lead in Canada during the five years 1910-14 averaged 31,000 tons a year, and increased in 1915 to 46,000 tons. There is, therefore, ample scope for the extension of lead mining in Canada before even the normal home requirements are completely met. Lead production in British Columbia is growing rapidly, and is certain to increase; the ore is derived chiefly from the Slocan and Fort Steele mining divisions.

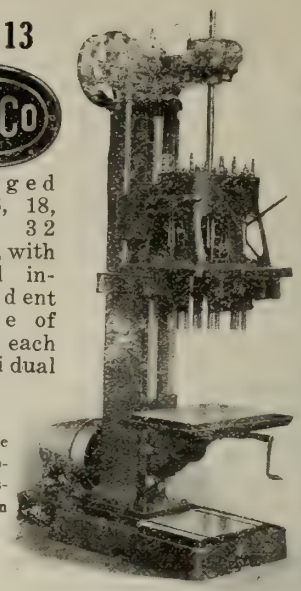
New Toronto Plant

A permit has been taken out by William Neilson, Limited, for the erection of a $250,000 plant at 277 Gladstone avenue. The structure will be five storeys in height. Excavating work has already been commenced.

No. 13

NATCO

Arranged with 16, 18, 24 or 32 spindles, with patented independent change of speed to each individual drill.



Let us give you a production estimate on your work.

THE NATIONAL AUTOMATIC TOOL CO.
Richmond, Indiana, U.S.A.

GAUGES
DIES, TOOLS AND REPAIRS
OXY-ACETYLENE WELDING

WORTH ENGINEERING CO.
163 Spadina Ave., Toronto, Ont.
Phone Adel. 3734
B. H. AYLSWORTH A. E. HACKWORTH

Wants Dairy Machinery

Dairying machinery of all kinds is needed in Jamaica, according to consular advices from that island. Sweden has been trying to secure the largest part of the trade, and United States firms are now being urged to secure business there. Direct shipping connection with the British West Indies should enable Canadian manufacturers to enlarge the trade relations with these British possessions.

Oil Industry Equipment

Materials are required in the Island of Trinidad in the British West Indies that indicate the intention of oil men to explore the petroleum resources of that territory. All kinds of equipment in connection with the oil industry are in demand. Drums, tanks, tools of all kinds, and a large quantity of ten-inch casing are needed by different companies in the island.

ACCURACY

When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

THE
GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company Limited, 49 Common St., Montreal, Que.

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

Oxy-Acetylene Welding and Cutting

Rapid Repairing "On the Spot"

THIS illustration shows an operator repairing a leaky tank car right on the track at a trifling expense, by the Prest-O-Lite process of Oxy-Acetylene Welding. Thousands of railroads, mines, factories and machine shops have adopted this process, and are saving hundreds of thousands of dollars annually.

Costly tie-ups are avoided—valuable castings and machine parts are saved from the scrap pile—and many economies and improvements are effected both in repairing and manufacturing.

Prest-O-Lite PROCESS

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite service, which insures prompt exchange of full cylinders for empty ones. Provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

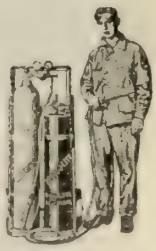
Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment. Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene. Any average workman who understands metals can learn the welding process quickly and easily.

We will gladly send illustrated literature and interesting data showing actual instances of savings made by others. It may suggest valuable ideas to you. Write for it. Address Department C-107.

Prest-O-Lite Company of Canada, Limited
PREST-O-LITE BUILDING
Corner Elm St. and Centre Ave.
TORONTO

Plants at: Toronto, Ont., Merritton, Ont. Shawinigan Falls, P.Q. St. Boniface, Man.



World's Largest Makers of Dissolved Acetylene

CLASSIFIED ADVERTISING SECTION

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

MACHINERY WANTED

MACHINE SHOP FOR SALE PARTLY EQUIPped. A good chance for experienced superintendent with small capital to carry on business already started. Excellent location in Toronto with good prospects. Box 580, Canadian Machinery. (c20m)

WANTED — SECOND-HAND VERTICAL shear or punch to use as pipe crusher. Capacity to shear 3½" Square Bar, ram about 22" wide, 8" thick and 6" stroke. Reply Box 605, Canadian Machinery.

POSITIONS WANTED

EXECUTIVE POSITION WANTED—DO YOU require a man to take charge of either your Purchasing or Accounting Department? One who has initiative, and is not afraid of hard work or responsibility. Have had seven years' experience on foundry and general machine shop work, four of which was on munitions. If interested apply to Box 604, Canadian Machinery.

ACCOUNTANT — COST ACCOUNTANT AND Engineer is open for an offer. Highest reference and bond if required. Box 582, Canadian Machinery, 128 Bleury St., Montreal. (c21m)

WANTED—POSITION AS FOUNDRY FOREman, capable of fulfilling all duties required. Machinery or jobbing shop preferred. Excellent references. Reply Box 603, Canadian Machinery, Toronto.

AGENCIES WANTED

MANFACTURERS' AGENT — CAN PRODUCE results. Open for any good line. Apply Box 578, Canadian Machinery. (c19m)

HELP WANTED

EXPERIENCED SHOP SUPERINTENDENT with few thousands capital can have partnership on favorable terms in a small Toronto shop, partly equipped, with a good device to manufacture and good prospects. Box 529, Canadian Machinery. (c20m)

REPRESENTATIVES WANTED

WANTED—BY A CRUCIBLE STEEL MANUfacturer in the United States a representative in Canada who is thoroughly familiar with the business in Carbon Tool Steels and principally High Speed Steel. State age, previous experience and salary wanted. Box 577, Canadian Machinery. (c21m)

SCOTCH AIR COMPRESSOR
Sentinal
Series B. D. Size No. 3.

Mfg., Alley-McLennan, Glasgow, Scotland. Stroke 16½" x 10" x 8, Speed 345 R.P.M. Piston Displacement 600 ft. free air per minute at 100 lb. pressure.

Twin Cylinder, Vertical direct connected with C.G.E. 125 H.P. 550 V., 3 P., 60 C. Motor. Quotation, complete with Starting panel 150 B.H.P. ammeter, Automatic Oil Switch, T. 20 B. Controller and Starting Rheostat.

Also quantity used lathes, motors, etc.

THE NATIONAL MANUFACTURING CO., LTD. OTTAWA, ONT. (c22m)

AGENTS WANTED

AGENTS WANTED TO SELL COWAN TRANSveyors, Northern Ontario, Maritime Provinces, New Brunswick. Address R. B. Smiley, 120 Glenholme Ave., Toronto, Ont.

WANTED — REPRESENTING AGENTS AND merchants to sell and represent firm manufacturing Milling Cutters, Twist Drills, Reamers, Lathe Tools, Planer Tools, High Speed Steel and Alloy Tools, and Merchants Tools. Good terms and discounts for selling or representing offered. Apply Lawton Bros., Woodseats Engineering Works, Sheffield, England. (c19m)

FOR SALE

ONE SECOND-HAND JENCKES CORLISS ENgine—12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

AGENCIES WANTED

CANADIAN JUST RETURNED FROM U.S.A., A1 mechanic in all branches of the trade; have held executive positions continually for the past 14 years in U.S.A. in the following capacities: Tool room foreman, master mechanic and superintendent, have handled successfully up to 700 hands; last position (for the past 3 years) was superintendent of a large machine tool company manufacturing broaching machinery and broaching tools, a line the Canadian market needs. Willing to start at a moderate salary; can furnish A1 references. Box 583 Canadian Machinery. (c20m

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES shapers, milling machine and planer, etc Hourly or contract basis. Prompt delivery. W. H Sumbling Machinery Co., Toronto. (ctfm

PATTERNS

TORONTO PATTERN WORKS, 65 JARVI Street, Toronto. Patterns in wood and met for all kinds of machinery. (cfm

BRANTFORD PATTERN WORKS ARE PRI pared to make up patterns of any kind—in cluding marine works—to sketches, blue prints sample castings. Prompt, efficient service. Be 'Phone 631; Machine 'Phone 733. Brantford Pa tern Works, 49 George St., Brantford, Ont. (ctfm

FOR SALE

Large Quantity of
USED MACHINERY
In excellent condition.

Automatic and Hand Screw Machines
Drill Presses, Grinders
Milling Machines
Brass Lathes
Time Clocks
Electric Motors
Elliott Woodworker
Automatic Screw Slotting Machine
Twist Drills
Miscellaneous Equipment

P. W. Ellis & Co., Ltd.
St. Clair Ave. and Prescott St., Toronto

For Sale

New and Slightly Used Machinery and Tools

1", 1½", 1⅝", 1¾", Turret Screw Machines.
No. 1, and No. 2 B.G. Automatic Tapping Machines.
⅜" 4-Spindle Acme Automatic Screw Machines.
Floor and Bench Drill—Presses.
Small Floor and Bench Punch Presses.
Burke Millers.
High Speed and Carbon Twist Drills.

Particulars on application to

ST. CATHARINES MACHINERY CO., LIMITED
ST. CATHARINES, - ONTARIO

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Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works
Allentown, Pa., U.S.A.

"Ask the Man Who Owns One"

Lodge and Shipley Lathes

Three Step Cone or Selective Gear Drive

DELIVERIES

14 Inch—2 Weeks
16 " —Stock
18 " —2 Weeks
20 " —Stock
22 " —June
24 " Toronto stock
27 " Toronto stock
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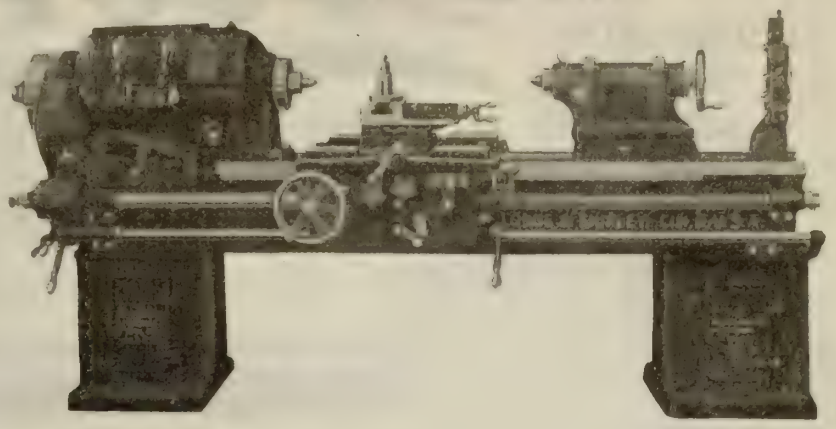

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MONTREAL TORONTO WINNIPEG

"EVERYTHING IN METAL AND WOOD WORKING MACHINERY"

PARTIAL LIST OF TOOLS

2—60" Bullard Vertical Boring Mills
1—60" Niles Vertical Boring Mill
No. 4—B. & S. Plain Miller
1—36" x 36" x 8' Gray Planer, two heads
No. 3—Cincinnati Universal Miller
5—No. 0 Steptoe Hand Millers
13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
14" x 6' New Carroll-Jamieson Quick-Change Lathe
15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
15" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 17"
17" x 8' New National Quick-Change Lathe
3—17" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 19"
17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 19"
18" x 24" New Rahn Larmon Lathe, D.B.G. Quick-Change
19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 21"
9—19" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 21"
25" x 14' New Sidney D.B.G. Quick-Change Lathe, swing 27"
33" x 14' Putnam, arranged fo. Motor Drive
6' Western Radial Drill
5' Bickford Single Pulley Drive Radial
100-lb. New Little Giant Hammer
50-lb. New Little Giant Belt Hammer
25-lb. New Little Giant Belt Hammer
30-ton Watson & Stillman Hydraulic Press

FRANK TOOMEY INC.

127 North Third Street PHILADELPHIA, P.A.

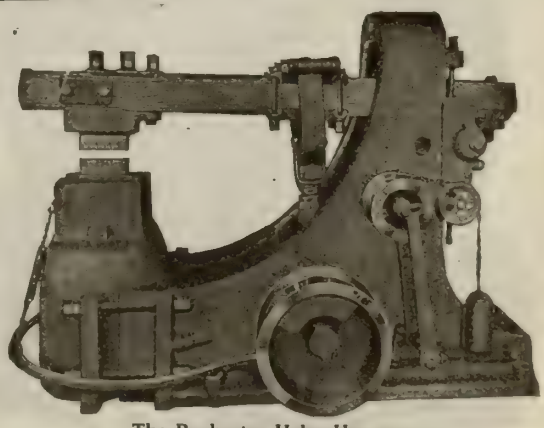
When You're in a Hurry

TO DO THE BEST WORK IN YOUR SHOP IN THE LEAST POSSIBLE TIME

THAT'S INSPIRATION!

WHEN YOU INSTALL A ROCHESTER HELVE HAMMER

THAT'S ACTION!



The Rochester Helve Hammer

It is a well-built, substantial tool for welding and general forging. MADE IN SIX SIZES. 25-lb to 100-lb. Heads and two styles of frame.

Send for our HELVE HAMMER BOOKLET, and give us information regarding character of your work.

WE ARE ALSO MANUFACTURERS OF THE WEST TIRE SETTER? ? ? ? ? ? ?

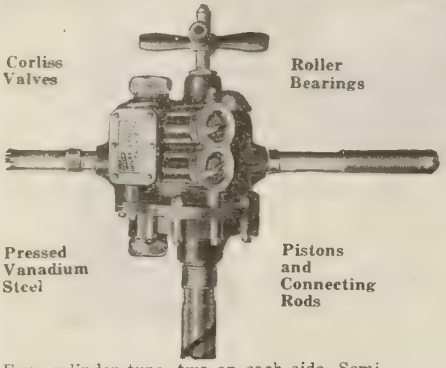
THE WEST TIRE SETTER CO.

ROCHESTER, NEW YORK, U.S.A.

Thor

Pneumatic Tools

Piston Air Drills and Reamers

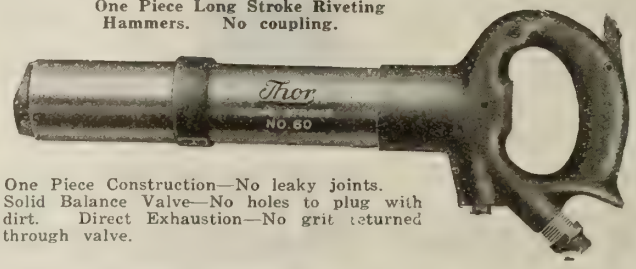


Four cylinder type, two on each side. Semi-Corliss valve close to each pair of cylinders gives greater efficiency and power saves clearance losses and allows air to enter cylinders at full pressure of the pipe line.

SPEED UP YOUR PRODUCTION AND BE PREPARED FOR THE COMING BOOM

Chipping, Calking and Flue Beading Hammers

One Piece Long Stroke Riveting Hammers. No coupling.



One Piece Construction—No leaky joints. Solid Balance Valve—No holes to plug with dirt. Direct Exhaustion—No grit returned through valve.

Four sizes, 1" to 4" stroke. The barrel and all wearing parts are hardened and ground, making the Thor Chipper practically free from vibration.

Independent Pneumatic Tool Company

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CANADIAN OFFICES: 334 St. James St., MONTREAL; 32 F ront St., TORONTO; 123 Bannantyne Ave. E., WINNIPEG; 1142 Homer St., VANCOUVER.

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"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

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P X H

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The Court of Last Resort---The Man at the Bench

Put It Up To Him

Give him a P.H. or Imperial File and one of any other make for comparison. We are willing to abide by his decision, for we know it to be true of P.H. and Imperial Files that

"They Cut Faster and Wear Longer"

Ingersoll File Company, Limited
Ingersoll, Ontario

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Sole Distributors:

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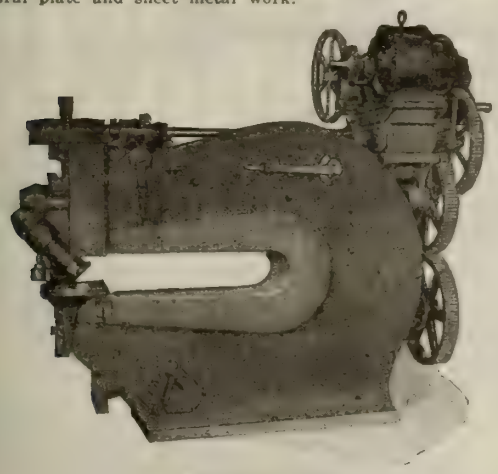
H. COLLIER SMITH
"QUICKWORK"
Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

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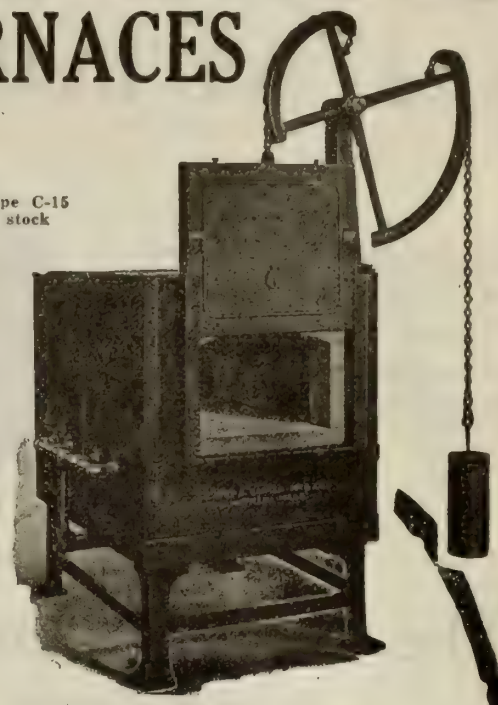
GILBERT & BARKER FURNACES

Type C-15 in stock



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If additional proof was required of the efficiency of Gilbert & Barker's heat treating furnaces, this proof was generously supplied during the World War. Industrial plants throughout the United States and Canada engaged on war contracts covering the manufacture of munitions, ordnance, airplanes, motor trucks, tanks, etc., found it necessary to secure on short notice a thoroughly efficient furnace. As designers and builders of heat treating furnaces for a period of more than 50 years it was quite natural that the demand for G & B equipment should be heavy.

You don't have to pay for experience nor do you have to take chances on inefficient heat treating furnaces. G & B furnaces can be depended upon for accuracy and efficiency, plus low operating cost.

There is a G. & B. furnace for every heat treating requirement. Tell us your problem and we will promptly tell you the type of furnace best suited to your needs, but first send for Bulletin 24. Today is a better day than tomorrow—write.

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GILBERT & BARKER MFG. CO. G&B SPRINGFIELD, MASS. U.S.A. EST. 1865

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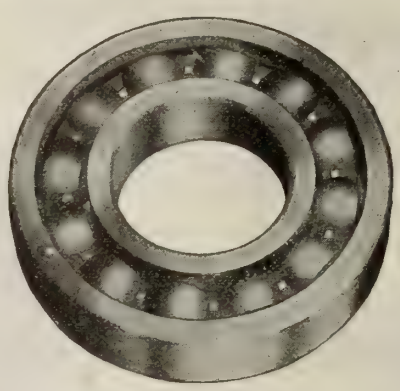
All standard sizes, annular and thrust bearings. Shipped from stock. Quotations on special bearings given promptly.



Automobile parts, heavy and difficult steel stampings—also heat treatment and grinding of steel a specialty.

All Sizes of Steel Balls Shipped From Stock

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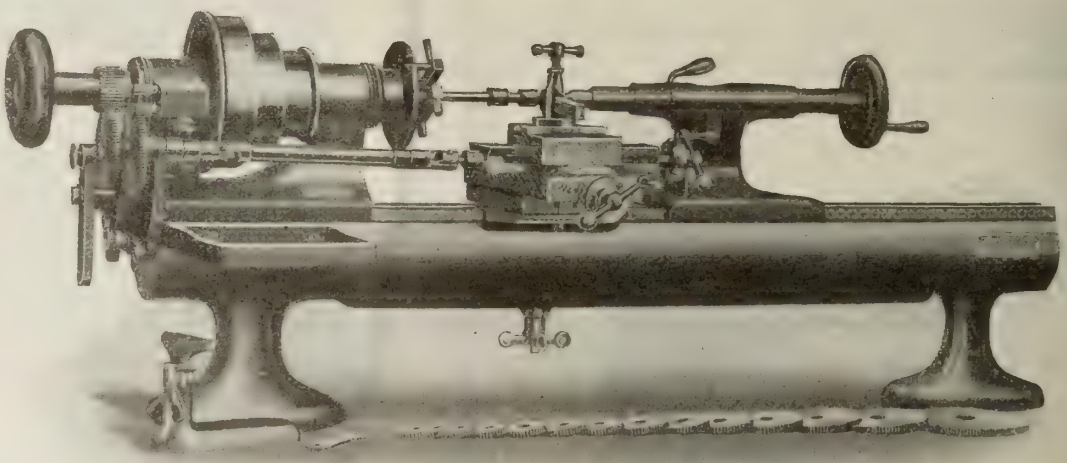
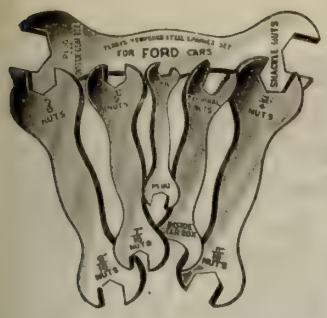
Cataract Bench Lathes are finely constructed precision tools, with responsive controls, simple adjustments and numerous convenient attachments adapting them to a wide variety of work. **Study this illustration.** Note the base, the circular bed, the sliding tool post, massive head stock (indicating strength), range of gears, special tailstock, arrangement of gears.



Hardinge Bros., 1770 Bertau Avenue, Chicago, Ill.

ALFRED HERBERT CO., Limited, Coventry, England, are our representatives for United Kingdom, rance, Belgium, Russia, Japan, Manchuria, Korea, Formosa, China, Italy.



The "Ford" Spanner Set. Fits every nut on a "Ford" car. Made from a high-class THIN STEEL, skilfully hardened and tempered.

A TERRY representative
is now in Canada on business trip

In the Homeland we have been styled "Wizards in metal manipulation" — so wondrous is our range and versatility. We exist for service.

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He carries a full range of samples of our workmanship, both for manufacturers and novelties for the trader. Meantime we wish to familiarize you with details of Terry service.

HERBERT TERRY & SONS, LTD.

The Spring and Presswork Specialists

REDDITCH ENGLAND

ESTABLISHED 1855

We make every kind of washer, to sample or print, and quote for any quantity.

839. Box assorted motorcycle valve springs. Suitable for 18 leading makes of machines. Box contains 3 dozen high grade springs.

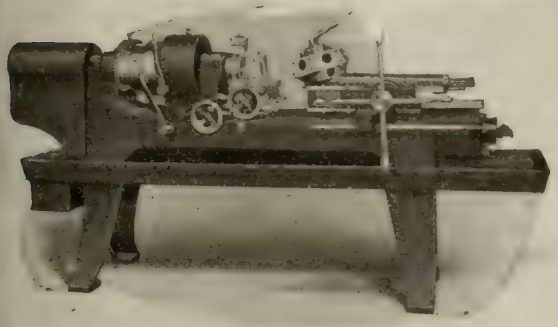
Our Standard range of hose-clips comprises, flat, grooves or cupped sections, in all metals, from 3-16" upwards. But we are ready to quote for any design or size.

CUT GEARS
Theoretically Correct
RAWHIDE OR METAL

PROMPT SERVICE

ROBERT GARDNER & SON
LIMITED
52 NAZARETH ST., MONTREAL, P. Q.

THE TILTED TURRET
A CLEAR TRACK FOR THE STOCK



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BRAZIL INDIANA USA

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Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

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BIG

Repair Jobs easily handled by our outfit

Telephone us the minute you have a breakdown, and the next train will bring our

PORTABLE WELDING APPARATUS
Electric, Thermit and Oxy-Acetylene

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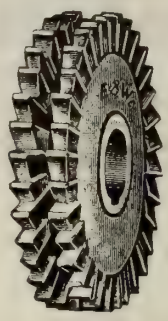
Elliott & Whitehall Machine & Tool Co.

GALT, ONTARIO, CANADA

MILLING CUTTERS AND SMALL TOOLS

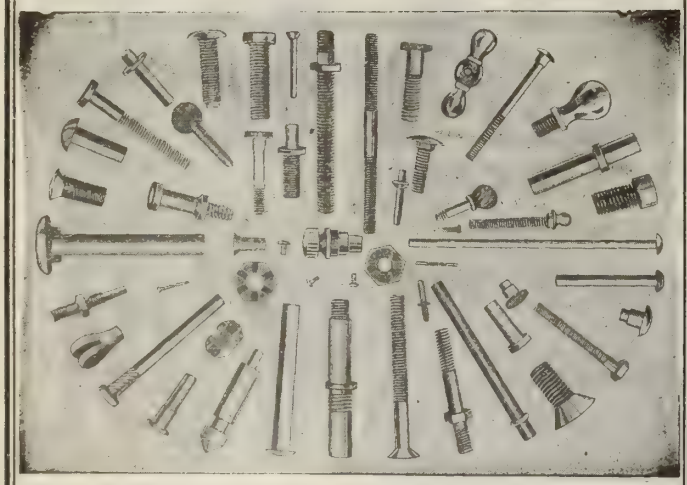


We manufacture the following tools, etc.

Standard and Special Milling Cutters of all descriptions, Gear Cutters, Hand Reamers, Shell Reamers, Chucking Reamers and Taper Pin Reamers, Lathe Mandrels and Arbors, Metal Stamping Dies, Gauges, Jigs and Fixtures, Etc.

All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

ASK FOR OUR NEW CATALOGUE No. 10.



Automatic Screw Machine Products

ACCURACY QUALITY

Our Mechanical Engineers are at the service of our Clients.

United Brass & Lead, Limited

St. Helen's Avenue, - Toronto

W. L. TOBIAS, *Superintendent*
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SPECIALISTS

We specialize in three lines:
Cutters—Reamers—Drills.

We have three selling points:
Quality—Service—Price.

The J. A. M. Taylor Tool Co.

318 Stair Building : TORONTO

Machine Shop Supplies

The HURLBUT, ROGERS CUTTING-OFF MACHINE

Cut Down Cutting-Off Costs

With the Hurlbut, Rogers Cutting-Off and Centering Machine you can double the amount of work now done, thereby reducing your cutting-off cost one-half.

The cutting tools are arranged so that one is cutting up while the other is cutting down, both tools working in the same cut, and one tool acting as a rest for the other. The machine is tried and proven—it is in hundreds of shops. Write for details.

The Hurlbut, Rogers Machinery Co.
South Sudbury, Mass., U. S. A.
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BOLT, NUT, FORGING AND WIRE NAIL MACHINERY

"National" Bolt Cutters, "Wedge Grip" Bolt and Rivet Headers, Forging Machines, Nut Machines, Roll Threaders and Wire Nail Machines are used by leading Railroads and Industrials.

THE NATIONAL MACHINERY CO. TIFFIN, OHIO, U.S.A.

CANADIAN AGENT:
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Manufacturers of UNIVERSAL CYLINDER RE-BORING TOOLS.

Windsor Machine & Tool Works
Windsor, Ont.

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The REGO 100% Efficient Welding Torch
Saves Oxygen Eliminates Flash-Back Better Welding
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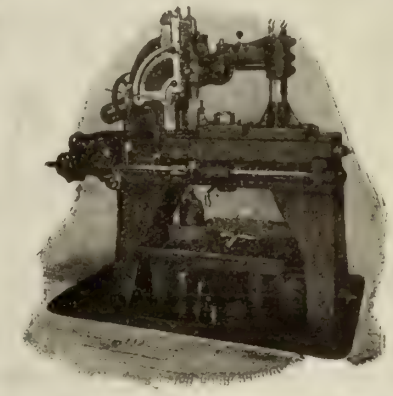
Hydraulic and Hydro-Pneumatic Machinery

Exclusive Sales Representatives:
Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.



The Whiton
AUTOMATIC
Gear Cutting Machine

Do you want Catalog?

The D. E. Whiton Machine Co.
NEW LONDON, - CONN.

MORROW SCREWS MORROW

MORROW
INGERSOLL

Best jobbers carry "Morrow's."

"Morrow" Screws (it's the finishing die that does it).

"Morrow" Nuts.

"Morrow" Twist Drills "will do more drilling with less regrinding."

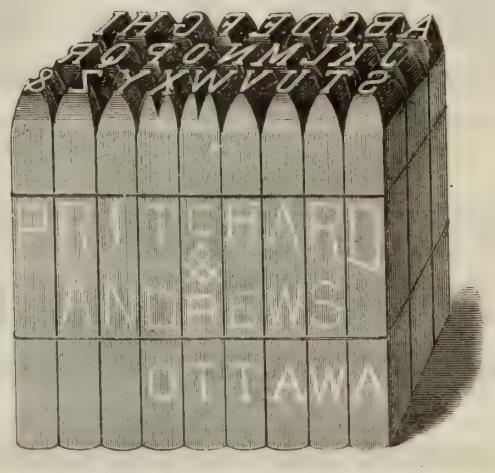
All of the highest possible quality made in Canada by contented, intelligent experts in the largest and best equipped plant of its kind in the Dominion.

John Morrow Screw & Nut Co.
LIMITED
INGERSOLL - CANADA

Always, everywhere, insist on "Morrow" products. Made just a little better than seems necessary.

DRILLS FILES

MORROW NUTS MORROW



STEEL STAMPS

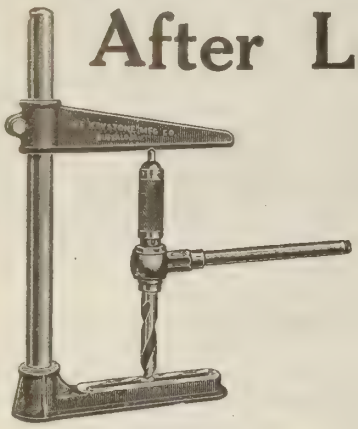
FOR MARKING ALL CLASSES OF METAL WORK

We will Give You Satisfaction on all Work of this Kind.

Send for Prices

PRITCHARD-ANDREWS CO.
OF OTTAWA
General Engravers and Die Sinkers
264 SPARKS ST. OTTAWA, CAN.

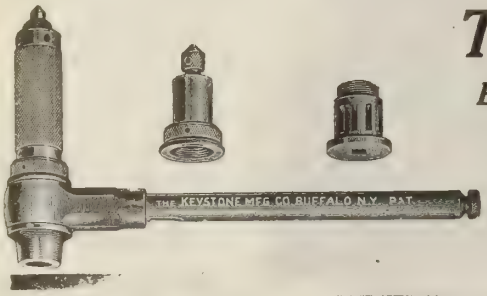
"Keystone Quality" Will Still be There After Long Use Has Worn Away The Name



We like to think of that.

We like to think that the reputation of Keystone Tools is built upon a foundation of service with **Quality** the Keystone rather than a copyrighted name. For it is conceivable that imitators, or even the whims of courts, might rob us of our copyrighted name. But who could take "Keystone Quality" from Keystone Tools?

Write for name of nearest dealer.



The Keystone Mfg. Company

Buffalo, N.Y., U.S.A.

GREY IRON Castings

Special Equipment Built to Specification
Steel Plate and Structural Steel Work

Quality and Prompt Service Double-Sure

WILLIAM HAMILTON COMPANY, LIMITED, Peterborough, Ont.

STEEL TANKS

THE
TORONTO IRON WORKS
LIMITED

HEAD OFFICE: ROYAL BANK BLDG. TORONTO *WORKS: CHERRY STREET*

Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

BELTING

What Belts Should I Use

(Continued from April 24th issue of Canadian Machinery)

FOR MAIN BELTS
AND DIRECT DRIVES
FOR SHIFTERS
FOR OILY PLACES
Foundry Gases, Etc.

PROFIT BY OUR LONG BELTING EXPERIENCE. Read closely the following advice re the installation of belting. We feel sure that by doing so you will not only increase belting service, but save much money, time and trouble.

MAIN BELTS AND DIRECT DRIVES.

Leather, Rubber, Balata and Scandinavia belts can all be used for the above conditions, but the type best adapted for the work must be judged by the requirements. At the present time leather is very expensive, Balata is cheaper and Scandinavia very much cheaper. If an endless spliced joint is required, use Balata. We can make these splices at our own warehouse and do it quickly. Scandinavia belts can only be made endless at the plant in England, and this delay puts it out of the reach of most of our customers. To fasten Scandinavia belts, if no idler is used, we strongly recommend the Crescent plate, if there is no idler or tightener pulley used we have found the clipper lace to be one of the most satisfactory. We are not special agents for either of these fasteners, but are mentioning them merely to give our customers service. Both Scandinavia and Balata Belts will last well on direct drives.

SHIFTERS.

So many textile belts have fallen down in use with belt shifters that the public are depending on leather almost exclusively. We have been watching the performance of Scandinavia belting for years on shifters and we have found that if a good smooth shifter is used, Scandinavia will stand up well. The cross section of the Shifter should be oval or be provided with rollers. A home-made shifter made of round iron is an abomination and should be discouraged. Any mechanic knows this. Do not use Balata Belting when shifters are used, and we do not recommend any ply belt for this purpose. Scandinavia belting is solid woven with an edge especially designed to resist the wearing action of the shifters. Even if the edge does wear through, as it sometimes does, the belt is still good. We have sold lots of this belting to the munition plants for use with shifters.

OILY PLACES.

If oil is dripping on the belt, Leather, Rubber and Balata are all placed at a disadvantage. Scandinavia is the belt for this. Oil will not greatly diminish the life of the belt, but it must be wiped off to keep the belt from slipping, as a slipping belt is sure to crack sooner or later. An adhesive should also be applied to the pulley side of the belt. We can supply an excellent adhesive dressing from stock. By the way, this adhesive should not be used on leather or ply belts as it is apt to open up the plies.

FOUNDRY GASES.

Leather and Rubber are at a disadvantage here. Either Balata or Scandinavia belting can be used satisfactorily under these conditions.

THE CAUSE OF BELTS CRACKING.

Belts are sometimes found to crack across the width. This is due to slipping, and at the first intimation of such a crack, the cause must be removed, or the whole belt will soon be ruined. If the belt is too loose it must be tightened. If there is oil on the belt it must be removed, and an adhesive used if the belt is of a type that will stand an adhesive. Perhaps the belt is too heavy for the pulley diameter, or perhaps the belt is overloaded. Slipping would result from either, which would cause the cracking.

SCANDINAVIA BELTING

Did you notice the advice given in our ad in April 24th issue of CANADIAN MACHINERY? If not, be sure to look it up.

LANCO BALATA BELTING

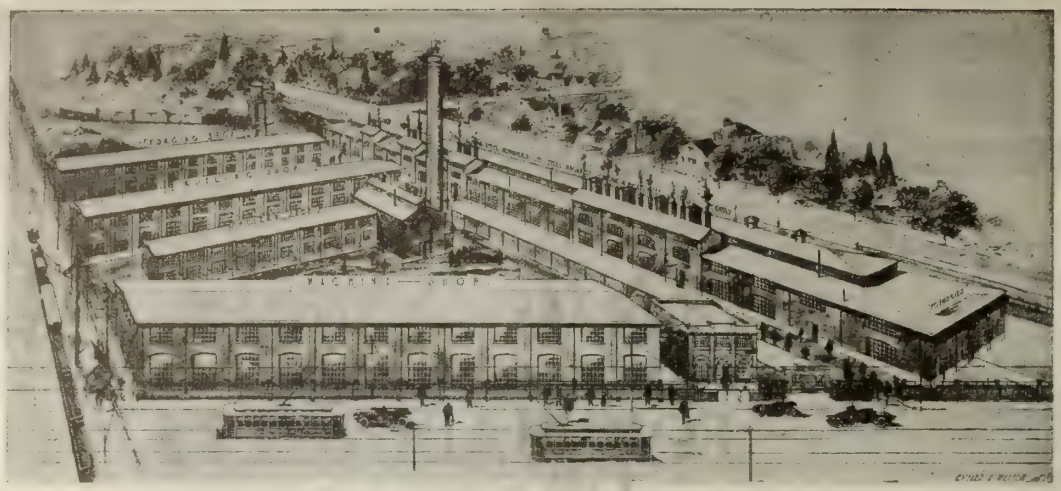
FEDERAL ENGINEERING CO., LIMITED
172 John St., Toronto

We are Growing

When our plans are completed, "HISCO" will be the largest plant of its kind in Canada.

Two big new electric furnaces are being added to our present large equipment. And cleaning and annealing department measuring 300′ x 100′ is about to be completed.

This will place us in a position to handle orders big and small with unequalled facility.



Specify "HISCO" Products

Quality and Service Guaranteed

Steel, Chrome, Manganese and Nickel Steel Castings

Annealed and Unannealed

Cement Mill and Mining Machinery Castings, Stamp Mills, Crushing Plants, Excavating Outfits, Steel Car Wheels, Locomotive Driving Wheels and Frames, etc.

GEARS Machine Moulded, any size up to 18 feet, without Patterns

HULL IRON & STEEL FOUNDRIES, LTD., HULL, QUE.

Her Sure Touch

Her deep-rooted desire to do thoroughly whatever work is expected of her makes

WOMAN

ideally fitted for operating the Grant

Silent Riveter

Instead of nerve-racking, hammer-like blows; with this Grant Rotary Rivet Spinning Machine there is absolute quiet. Noiseless twin rolls, revolving independently of each other, roll heads on the rivets under pressure. One rivet every second, and never a bent shank, whether rivets are soft brass or hard steel. Heads finished perfectly smooth, show no mark of the riveting tool.

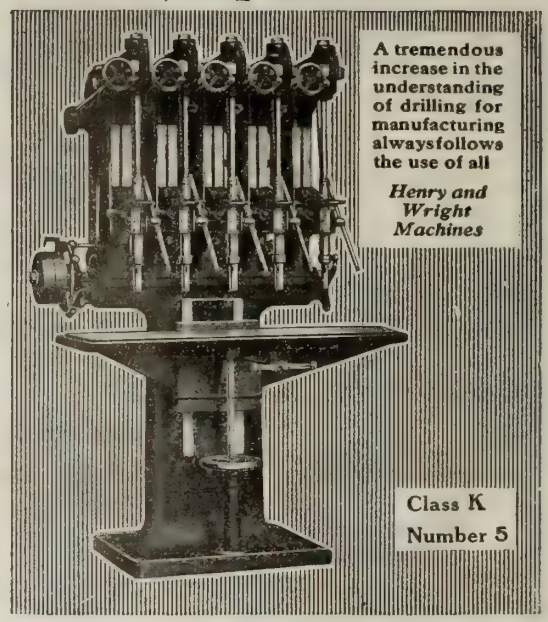
Thousands of articles now being riveted on Grant Noiseless Riveters. **Write.**

GRANT

Mfg. and Machine Co.
BRIDGEPORT, CONN., U.S.A.

HENRY & WRIGHT

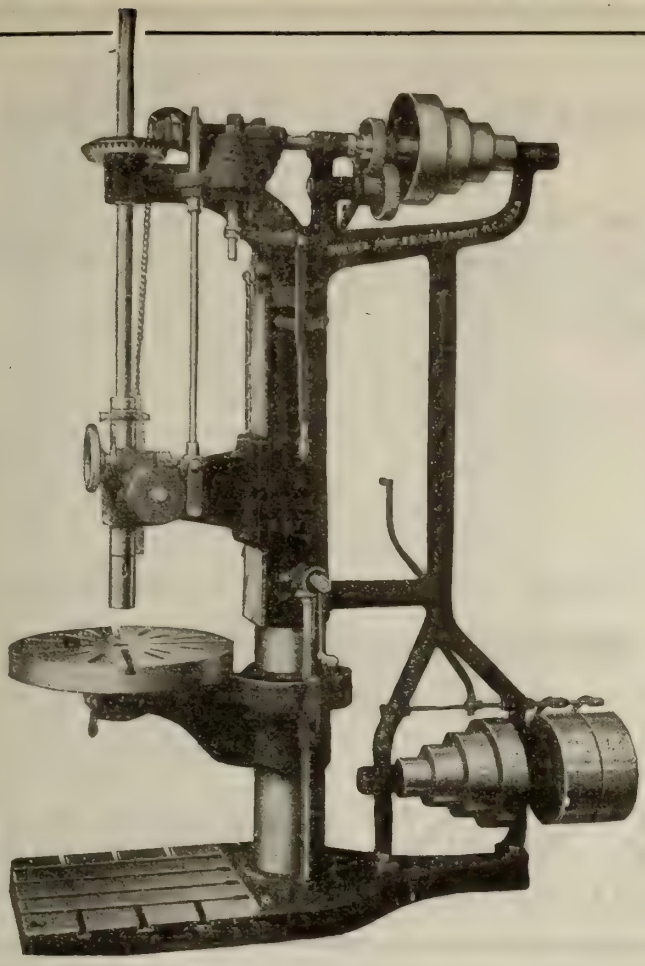
Drilling Machines



The Henry & Wright Mfg. Co.

Hartford, Conn.

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.



HŒFER

For Precision Drilling

For over 25 years the name Hoefer has been associated with drilling equipment. Drillers have been our specialty.

Hence it is only natural that Hoefer Drillers should embody the latest word in design, efficiency and accuracy.

And they do. Regardless of the size of press, drilling to a fine degree of precision is always possible.

Hoefer Drillers are looked upon as a recognized standard—the standard by which satisfactory service can be measured.

Catalog showing complete line on request.

HOEFER MFG. CO.
Freeport Illinois.

DRILLERS

"WACO"

High Speed Steel

REGISTERED

"WACO"

TRADE MARKS

"Double Waco" Quality—for Quick Production Work.

"Turtle Brand"—High-class Tool Steels, Files and Drills.

Wortle Plates for Wire Drawers.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada:

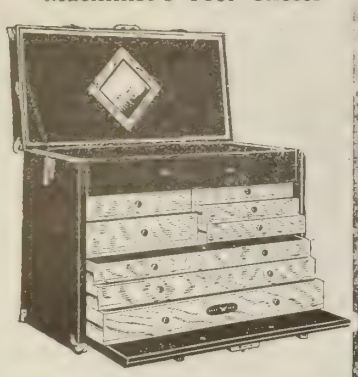
MARSHALL, SON & BUNNEY

39 Richmond Street East - - - TORONTO, ONT.

Ask for Quotations on Iron and Steel

We have in stock for immediate shipment the highest grade Bar Iron, Black and Galvanized Sheet Iron, Machine Steel, Cast Steel, High Speed Steel, Cold Rolled Steel, etc.

Machinist's Tool Chests

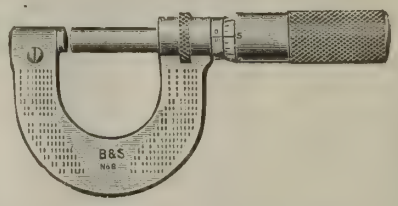


Time and again skilled machinists have remarked on the strength of construction and compact design of our Tool Chests. Have us give you full particulars.

CRESCENT BELT FASTENERS

Clinch beneath the surface of the belt on the pulley side—no part in contact with the pulley. They maintain uniform grip the entire width of belt and never weaken from wear.

Micrometer and other fine tools



Select from such wholly dependable makes as Starrett or Brown & Sharpe, or from other makes you have proven in your own shop to be most durable and efficient. Our stocks are complete.

"Victor" Hack Saw Blades for Tough Metal

Durable, fast-cutting blades that you can rely upon to cut true through toughest metals. Users have found that these blades increase every day's output and serve much longer than ordinary blades.

Write us about your requirements.

RICE LEWIS & SON, LIMITED

Established 1847 TORONTO, ONT. 19 Victoria Street

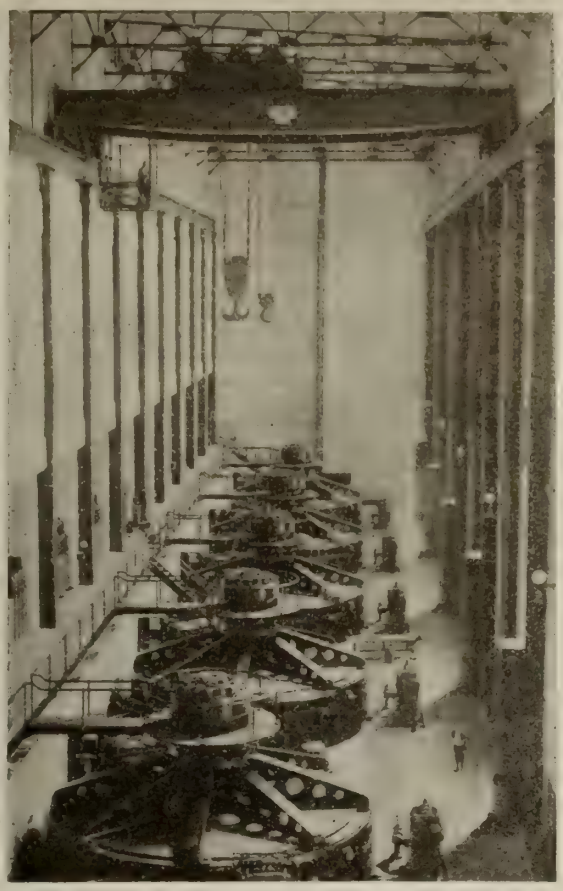
Opportunity Knocks Here Every Week!

It may not knock for **you** this week, but read these pages regularly and grasp the opportunity when it presents itself. Every ad here is an opportunity for someone! Your time is coming. If you think the time is ripe to spring that little proposition of yours, send in your copy now for the next issue. If it is of interest to our readers, rest assured it will get attention.

CANADIAN MACHINERY

Classified Advertising Section

143 University Avenue TORONTO



CRANES

Direct and Alternating Current
Capacities: 2 Tons to 200 Tons

BRIDGE CRANES for all purposes

Including Power House, Foundry, Shop, Steel Works and other uses

Also

REVOLVING TOWER CRANES

for Shipbuilding and Fitting-out Berths

DOMINION BRIDGE COMPANY, LIMITED

Head Office: Montreal, P.Q.

Branches: OTTAWA, TORONTO, WINNIPEG

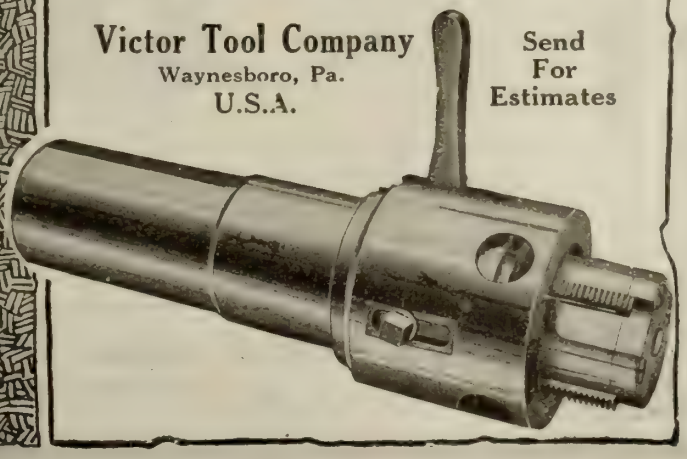
We wanted something original—this is what we got

"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
U.S.A.

Send For Estimates

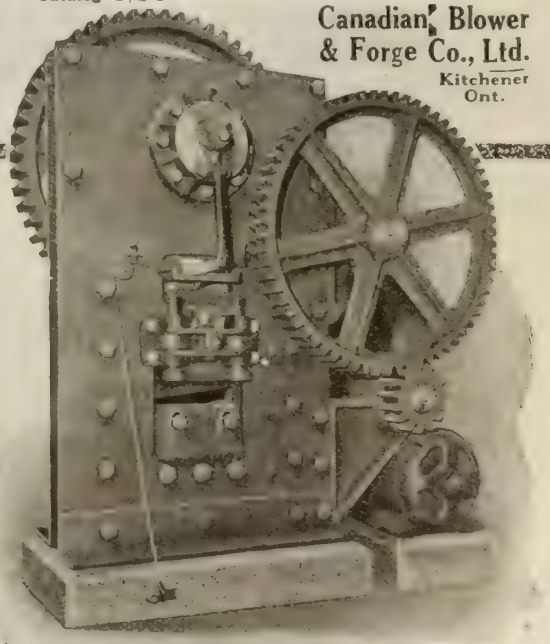


CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

That means a lighter and stronger machine—a machine built to take a lot of punishment. Write for Catalog P/S-16.

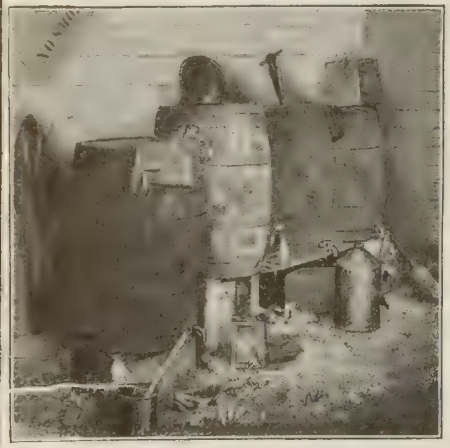
Canadian Blower & Forge Co., Ltd.
Kitchener Ont.



Does Your Storage System Save Oil?

If you have never studied the question of storing, distributing and using oils, you will be surprised to know the enormous losses that occur daily wherever oils are handled by inefficient methods. Losses that could easily be prevented by use of

BOWSER OIL STORAGE SYSTEMS



Such Conditions Are Wasteful, Dangerous, Unnecessary

Save All the Oil!

Store oils in leakproof, dirt-proof tanks. There is no loss of oils from any source, no loss of quality. Labor in handling is cut to the absolute minimum.

Write for literature describing equipment for your needs.

S. F. BOWSER CO., LTD.

66-68 Frazer Avenue
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LONDON 32 Victoria St. S. W. 1
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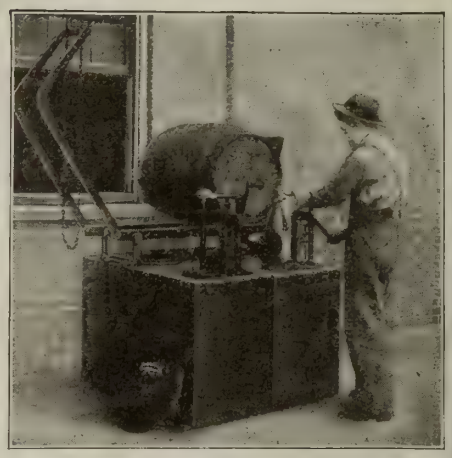
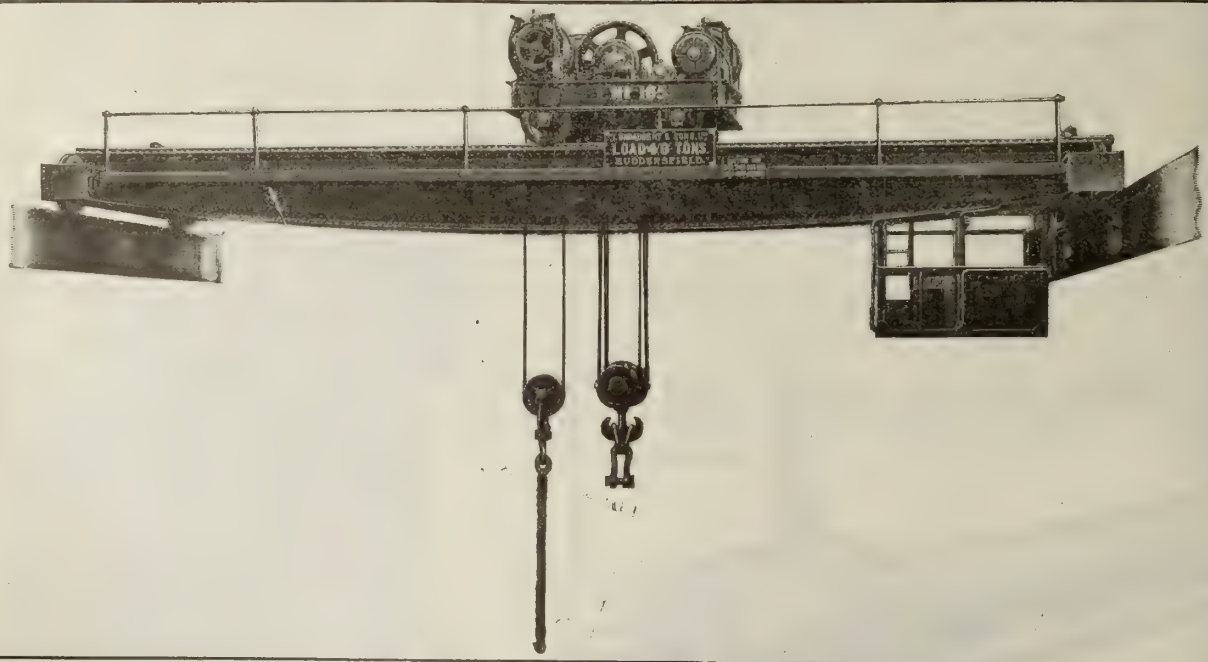


The Bowser Way—Safe, Loss-proof, Convenient, Clean, Systematic

ELECTRIC CRANES & CAPSTANS



CATALOGS POST FREE

THOMAS BROADBENT & SONS LIMITED
HUDDERSFIELD
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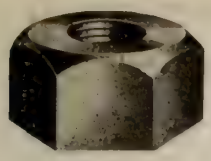
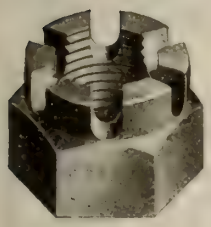
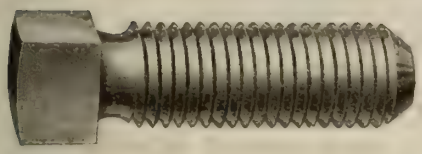
CODES
A. B. C. LIEBER A. 1.





Screw Machine PRODUCTS

Standards in Stock

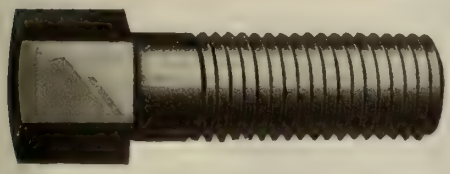


NUTS

Plain and Castellated -- S.A.E. -- Semi-Finished -- V. -- U.S.S.

SCREWS

Cap -- V. -- U.S.S. -- S.A.E. -- Set -- U.S.S. -- V.



Special Parts

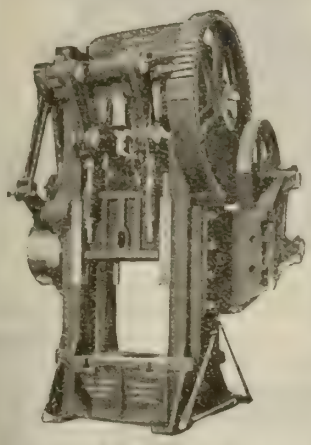
made to customers' specifications. Sizes up to 2-1/4" diameter, 10-1/2" long.

THE NATIONAL ACME COMPANY

De Courcelles and G.T.R. MONTREAL, P.Q.

The "TOLEDO"

TOGGLE DRAWING PRESSES



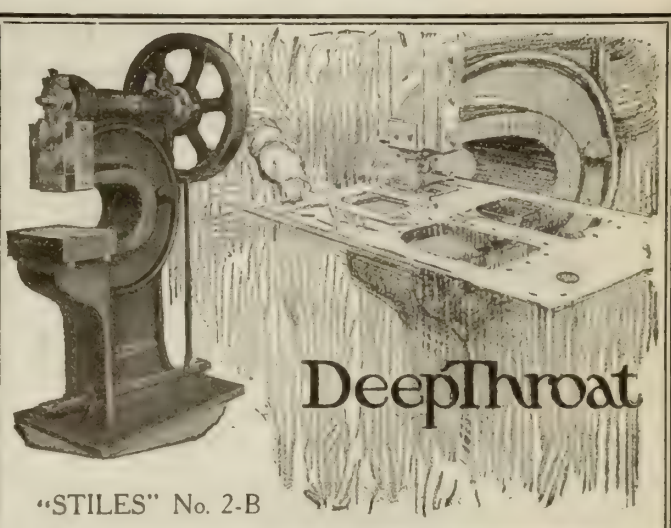
They have achieved almost incredible results in deep drawing and stamping work. The toggle mechanism is simple and effective — secures a perfect dwell of the back holder and exerts all the required power.

Toggle arms, rocker arms and yokes are all steel with inserted bronze bushings at each bearing; these operate on high carbon hammered steel—self-lubricated studs.

80 sizes for all classes of work

The Toledo Machine & Tool Co.

Toledo, Ohio



"STILES" No. 2-B

For reaching into the center of large sheets of metal, this model of the "Stiles" type of Press is provided. The massiveness of the frame and its special design make it rigid, even under the most severe punching strains.

E. W. BLISS CO.

Brooklyn, N.Y., U.S.A.

1857 CHICAGO OFFICE Peoples Gas Bldg. DETROIT OFFICE 1918 Dime Bank Bldg.
CLEVELAND OFFICE - Union Bank Bldg.
LONDON, S. E. ENGLAND Pocock St., Blackfriars Rd. PARIS, FRANCE 100 Blvd. Victor-Hugo St. Ouen

HINTS TO BUYERS

CRANES
All Kinds

GEO. ANDERSON & CO. of CANADA, Ltd.
157 Craig St. W., MONTREAL, Que.

PRESSES and SHEARS
Sheet Metal Working Machinery

THE D. H. STOLL CO., INC.
26 Lansing St., BUFFALO, N.Y.

JAMES BALLANTYNE
HEATING and PLUMBING CONTRACTOR
ALSO
MACHINE SHOP and BLACKSMITH WORK

163 NAZARETH ST.
MONTREAL, P. Q.

Machine Work Wanted for Lathes, Shaper, Milling Machine and Planer, etc.

Quotations given on all classes of work. Wrought Iron Pipe Bends made to order, ¼ to 8". Pipe Cut and Threaded, ⅛ to 12".

Write for Prices.

BRISTOL'S ELECTRIC PYROMETERS
TRADE MARK REG. U. S. PAT. OFFICE.

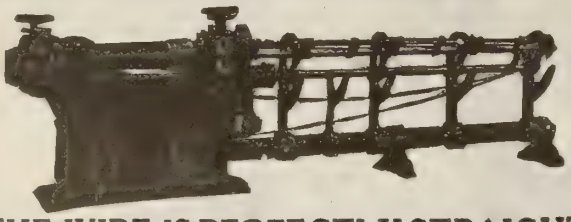
FOR EVERY SERVICE

Bristol's Recording Pyrometer furnished with patented frictionless smoked chart recording system, especially valuable for processes requiring continuous heat treatment.

Simplicity of construction and ruggedness make them ideal shop pyrometers. The ONLY pyrometer equipped with Weston milli-voltmeter movement.

Write for Bulletin I-205.

THE BRISTOL CO.
WATERBURY, CONN., U.S.A



THE WIRE IS PERFECTLY STRAIGHT
and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

May we send you catalogue C?

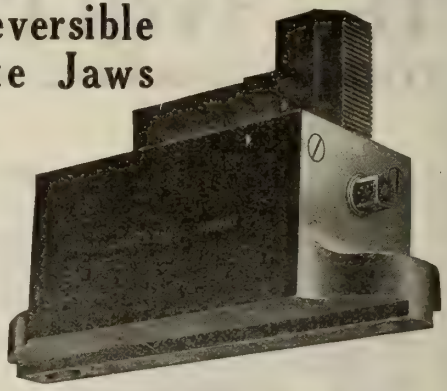
The F. B. SHUSTER COMPANY, New Haven, Conn.
Formerly John Adt & Son. Established 1866.
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

Skinner Reversible Face Plate Jaws

Everything in the line of Chucks.

Write for illustrated catalog.

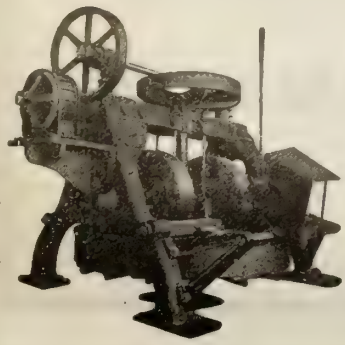
Iron or Steel Body, Single Rib for Large Lathes and Double Ribs Boring Mills.



THE SKINNER CHUCK CO.

Factory and Main Office: New Britain, Conn.
New York Office: 94 Reade St. San Francisco Office: Rialto Bldg. London Office: 149 Queen Victoria St.

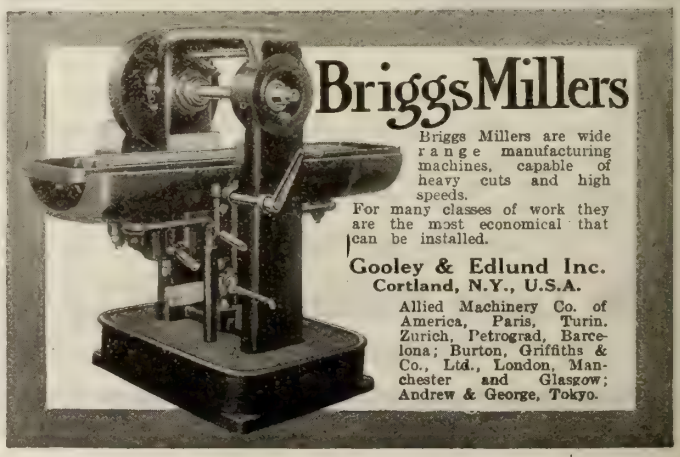
Canadian Steel Foundries Need Frost Improved Sand Mills



WINNING FEATURES

Heavy Mullers
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago



BriggsMillers

Briggs Millers are wide range manufacturing machines, capable of heavy cuts and high speeds.

For many classes of work they are the most economical that can be installed.

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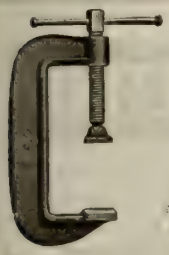

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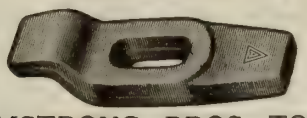

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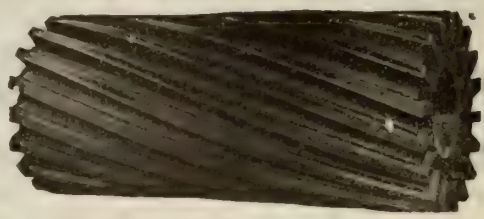

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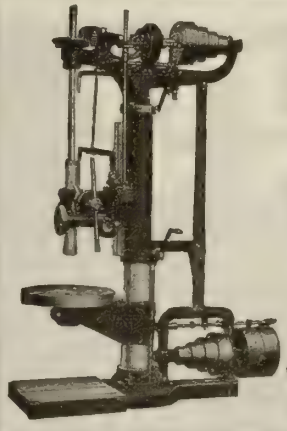

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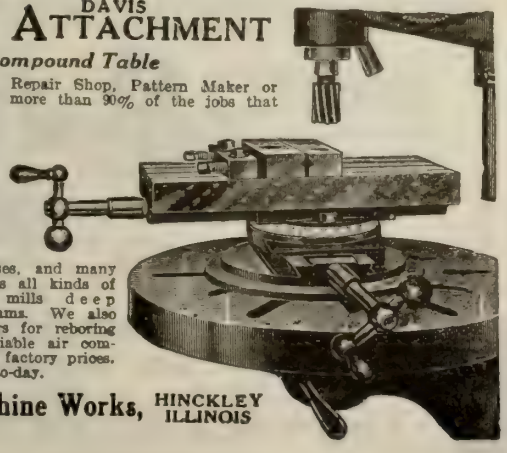

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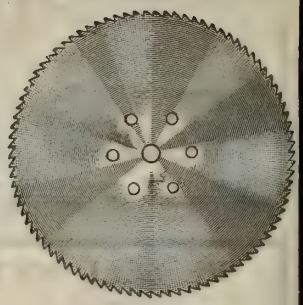

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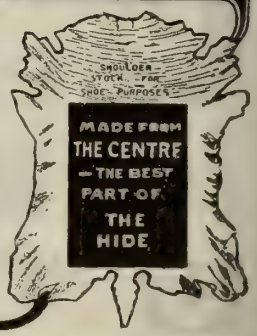

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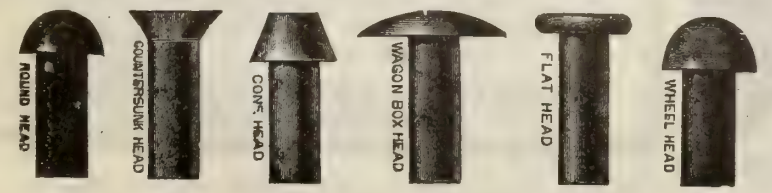

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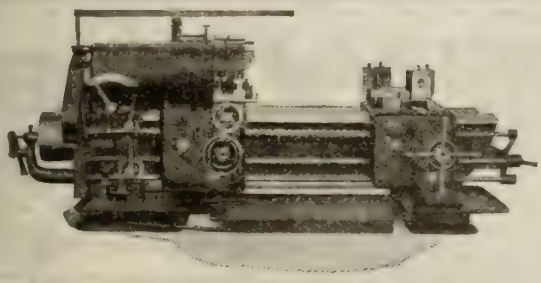

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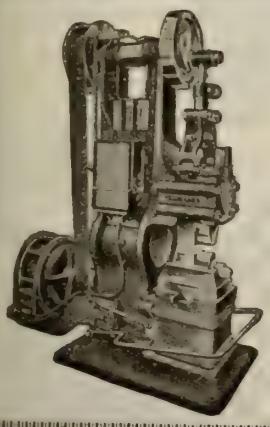

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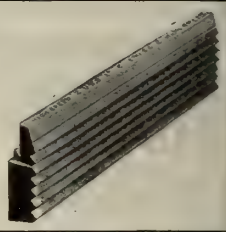

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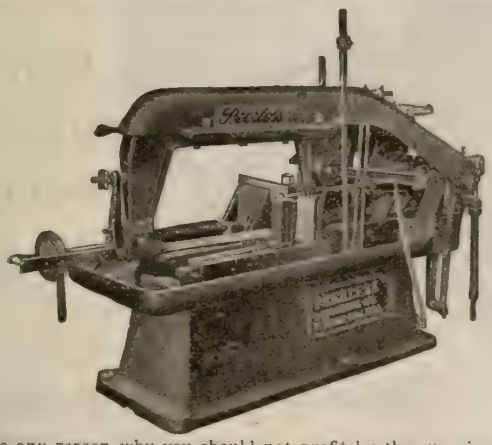

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Better Days Ahead for the Steel Trade

ANOTHER good sign with a bearing on the same outlook is the condition of the steel business. It is pointed out in THE FINANCIAL POST of May 24th that the removal of the price fixing machinery in the States is having a good effect on the industry, and will before long bring out the orders which have been so long in abeyance over the border to the detriment of Canadian conditions as well as U.S. conditions. A hint is given in the same article that prices of plates may take an upward trend. These articles in THE POST are worth close attention. They take their place in the splendid new service on all business conditions affecting Canada, which you find every week in THE POST.

The Labor Situation Comes in for Constructive Comment

"IS an Eight-hour Day Equitable?" is the subject of an editorial in this issue of THE POST. In this article you will find aspects of the labor question investigated with clear, logical mind, and presented in manner to substantiate your most business-like opinions on the situation. From the first THE POST has taken the sane business attitude on the labor question, and upholds the cause of constructive business as against destructive Bolshevism.

A Special Issue of Special Interest

THIS week's issue of THE POST is a special one, and contains in its 32 pages, an immense amount of valuable business information centred about the trust and loan business (which is dealt with in a special 16-page section). The other 16 pages of this issue are well filled with factful information on current Canadian affairs in terse, readable form, which active business men find very valuable and time-saving. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day for yourself or for your assistant. The price is $3.00 per year, and you have only to fill in this form.

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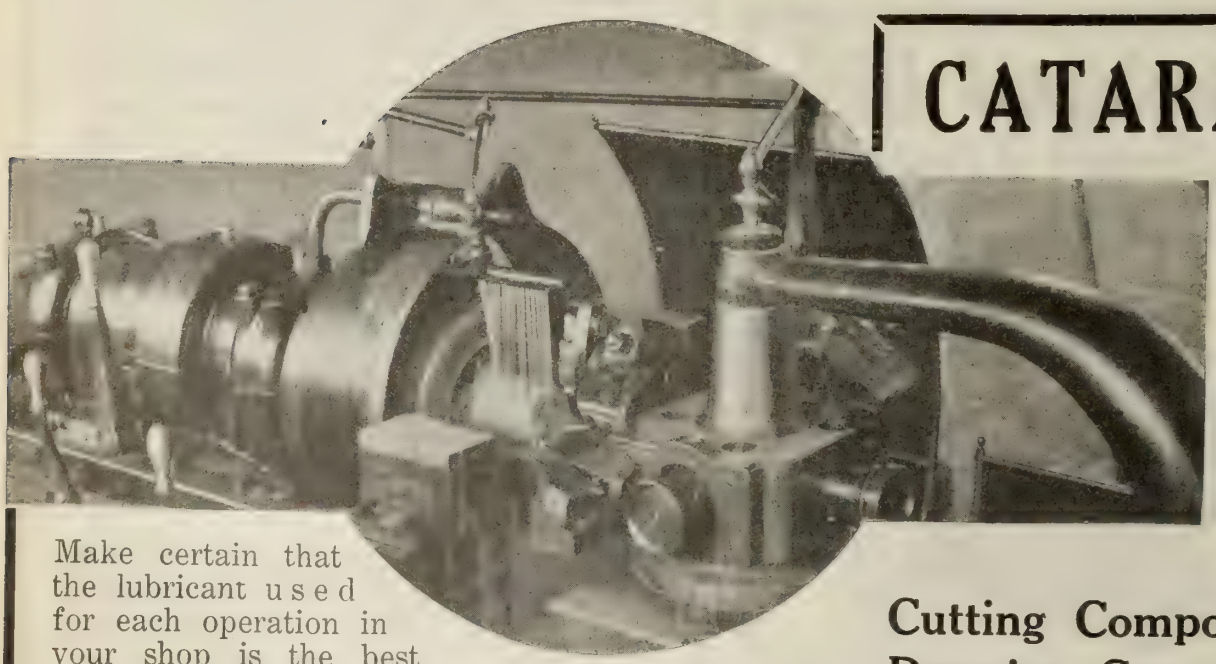

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Wilson & Co., J. C., Belleville, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT-LACING MACHINES, HOOKS AND PINS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

BELT HOOKS, WIRE
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

BELTING, CONVEYOR
Can. Consolidated Rubber Co., Ltd., Montreal.
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BELTING, FRICTION AND SURFACE
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal, Que.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.

BELTING, WOVEN
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENDING ROLLS (PLUTE & AUGH)
Wickes Bros., Saginaw, Mich.

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Bertram & Sons Co., John, Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Matthews & Co., Jas. H., Pittsburgh, Pa.

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Swedish Steel & Importing Co., Ltd., Montreal.
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Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLACKSMITH WORK
James Ballantyne, Montreal.
The Thos. Pink Co., Ltd., Pembroke, Ont.

BLANKING
Henry Hope & Sons of Canada, Ltd., Peterboro.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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United Brass & Lead Ltd., Toronto.
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.

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Wilson & Co., J. C., Belleville, Ont.

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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor, Ont.

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Jones & Glassco, Montreal.

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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Sheldons, Limited, Galt, Ont.

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International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Sheldons, Limited, Galt, Ont.
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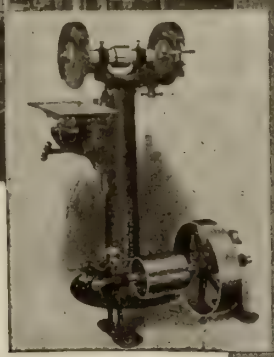

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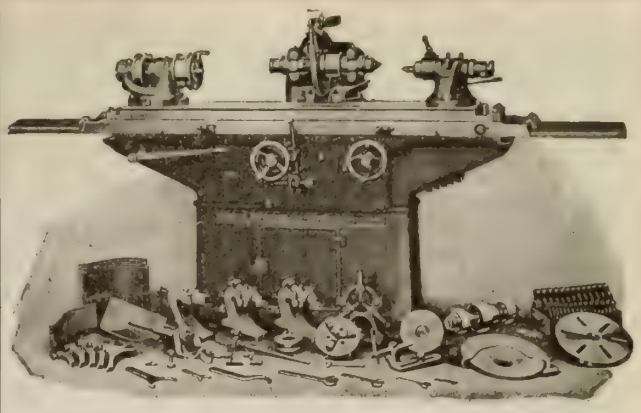

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Williams & Wilson, Limited, Montreal, Que.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CUPS, OIL
Can. Winkley Co., Ltd., Windsor, Ont.

COVERS, OIL HOLE
Can. Winkley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Quebec.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Quebec.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Found's & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURB PUMPS FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, BOLT
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto

CUTTER HEADS
Oliver Machinery Co., Grand Rapids, Mich.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Baker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tabor Mfg. Co. Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

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Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto, Ont
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que

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Cataract Refining Co., Ltd., Toronto.

CUTTING OIL, RECLAIMING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

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Welding & Supplies Co., Montreal, Que.

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Swedish Crucible Steel Co., Windsor, Ont.

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Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

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Kelley Reamer Co., Cleveland, O.

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J. F. A. Comstedt, New York City, N.Y.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal, Que.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
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Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

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Wells Brothers Co. of Canada, Galt, Ont.

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Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
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Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
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Rickert-Shafer Co., Erie, Pa.
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Williams & Wilson, Limited, Montreal, Que.

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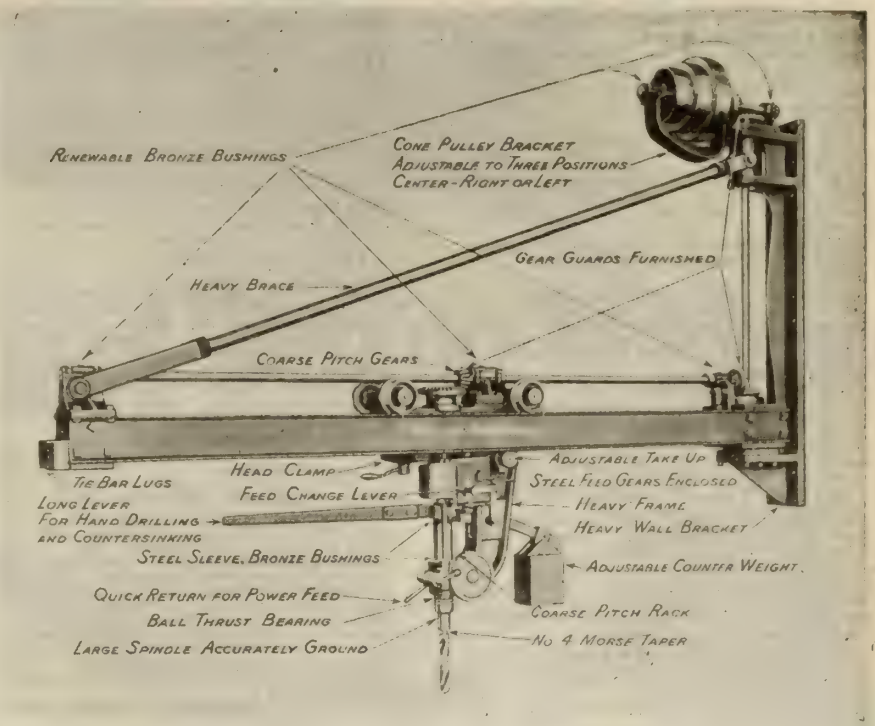

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Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
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Pratt & Whitney Co., Dundas, Ont.
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United States Electrical Tool Co., Cincinnati.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Garvin Machine Co., New York.
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Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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ENGINE LATHES
Oliver Machinery Co., Grand Rapids, Mich.

ENGINES, MARINE
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

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Sheldons, Ltd., Galt, Ont.

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Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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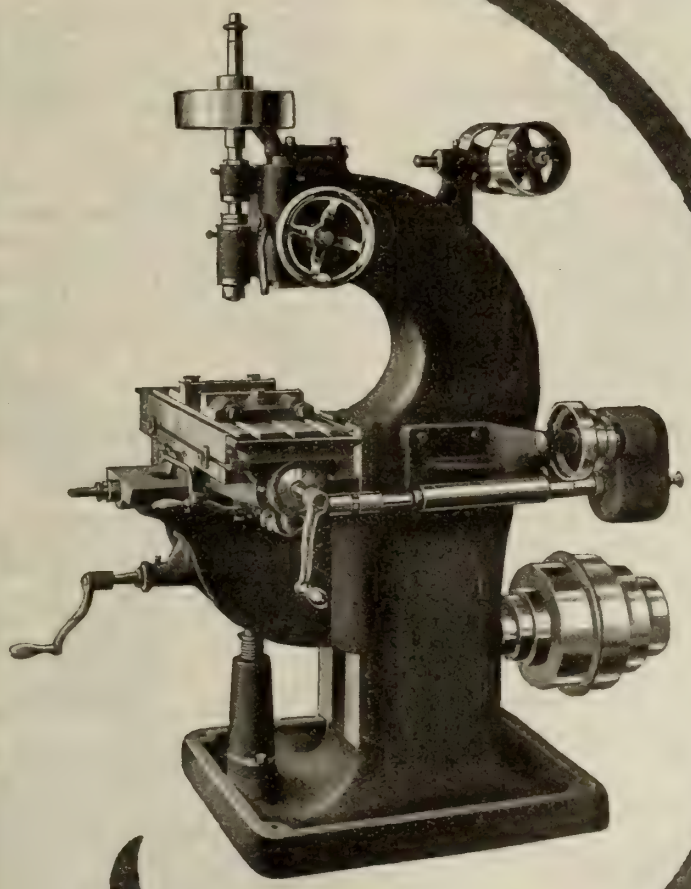

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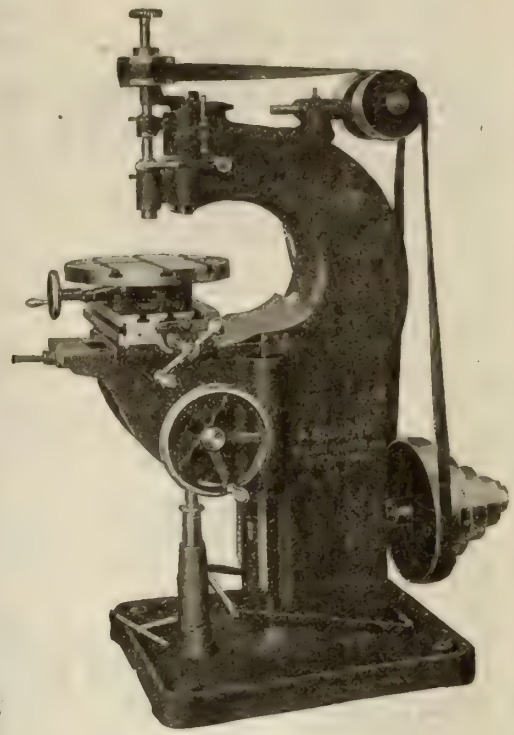

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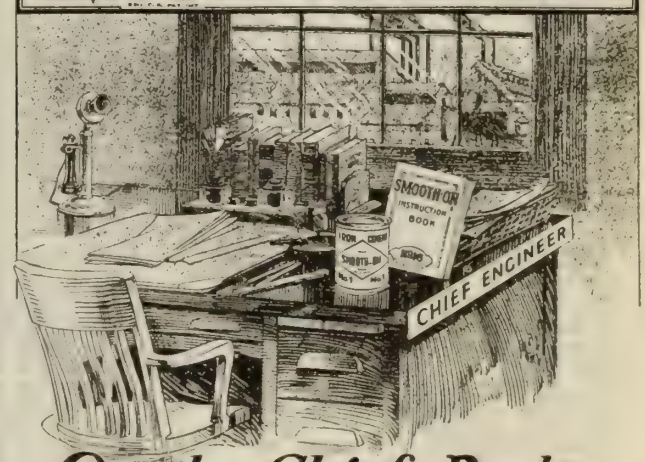

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Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, ELECTRIC
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

HOOKS, BELT LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

HOPPERS
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

HOSE, PNEUMATIC
Baxter & Co., Ltd., J. R., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

HOSE, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

HYDRAULIC MACHINERY
Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.
Williams & Wilson, Limited, Montreal, Que.

HYDROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

INDICATORS, SPEED
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
Fred C. Dickow, Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal, Que.

INDICATING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

INGOT METAL
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
United Brass & Lead Ltd., Toronto.

INGOTS, STEEL
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

INGOTS, FORGING AND ROLLING
Electric Steel & Metals Co., Welland, Ont.

INSTRUMENTS, ENGINEERING
Consolidated Optical Co., Toronto, Ont.

IRON GREY
Brockville Foundry Co., Brockville, nt.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

IRON SAND
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

IRON, WROUGHT, ROLLED AND PIG
Swedish Steel & Importing Co., Ltd., Montreal.

IRREGULAR CUTTING SHEARS
Quickwork Co., St. Marys, Ohio.

JACKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK
Canadian Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

JAWS, FACE PLATE
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JOINTERS
The Gray Ball Bearing Co., Ltd., Toronto.

JIGS, TOOLS, ETC.
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt.
Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.

JOURNAL WEDGES
Canada Foundries & Forgings, Ltd., Welland, Ont.

KEY SEATERS
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

KEYS, MACHINE
Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

KILNS
Can. Blower & Forge Co., Kitchener, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

KNIFE GRINDERS
The Gray Ball Bearing Co., Ltd., Toronto.

LABELS AND TAGS
Matthews, Jas. H. & Co., Pittsburgh, Pa.

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LADLES, FOUNDRY
Northern Crane Works, Walkerville.

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Clipper Belt Lacer Co., Grand Rapids, Mich.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

LATHES, CHUCKING
Acme Machine Tool Co., Cincinnati, Ohio.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHE CHUCKS (SEE CHUCKS)

LATHE DOGS AND ATTACHMENTS
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Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

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Gisholt Machine Co., Madison, Wis.
Wood Turret Machine Co., Brazil, Ind.

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Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, BORING
Bridgeford Mach. Tool Wks., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Blount, J. G., & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, BAND TURNING
Roelofson Machine & Tool Co., Toronto, Ont.

LATHES, BRASS
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Hardinge Bros., Inc., Chicago, Ill.
Wood Turret Machine Co., Brazil, Ind.
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LATHES, ENGINE
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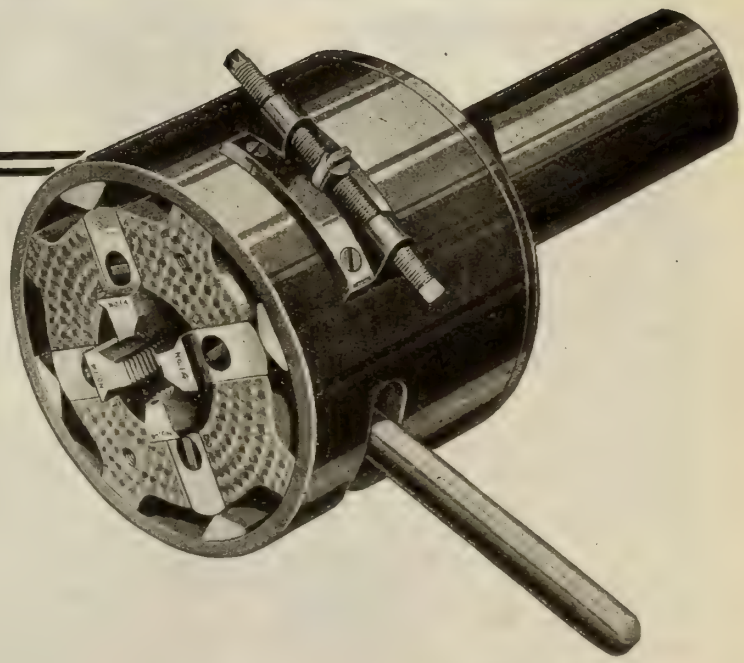

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Garlock-Walker Machy Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
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Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
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Foster Machine Co. Elkhart, Ind.
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Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
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Garlock-Walker Machy. Co., Toronto, Ont.
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A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Marten Mach. Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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National Automatic Tool Co., Richmond, Ind.

MACHINERY, TRANSMISSION (POWER)
Morse Chain Co., Ithaca, New York.

MACHINES, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

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National Automatic Tool Co., Richmond, Ind.

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Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
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MACHINE TOOLS
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MACHINE & REPETITION WORK
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Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
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Matthews, Jas. H., & Co., Pittsburgh, Pa.

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Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MASKS, WELDING, SMOKE, FUME, GAS, ETC.
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International Metal & Trading Co., Montreal, Que.
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Standard Machy. & Supplies, Ltd., Montreal, Que.
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METERS
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METERS, WATER
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Williams & Wilson, Limited, Montreal, Que.

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Bertram, John, & Sons Co., Dundas, Ont.
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Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

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Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
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United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Becker Milling Machine Co., Boston, Mass.
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Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Foss, The Geo. F., Mchy. & Supply Co., Montreal.
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Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

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A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Frost Mfg. Co., Chicago, Ill.

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MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.
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MacGovern & Co., Montreal, Que.
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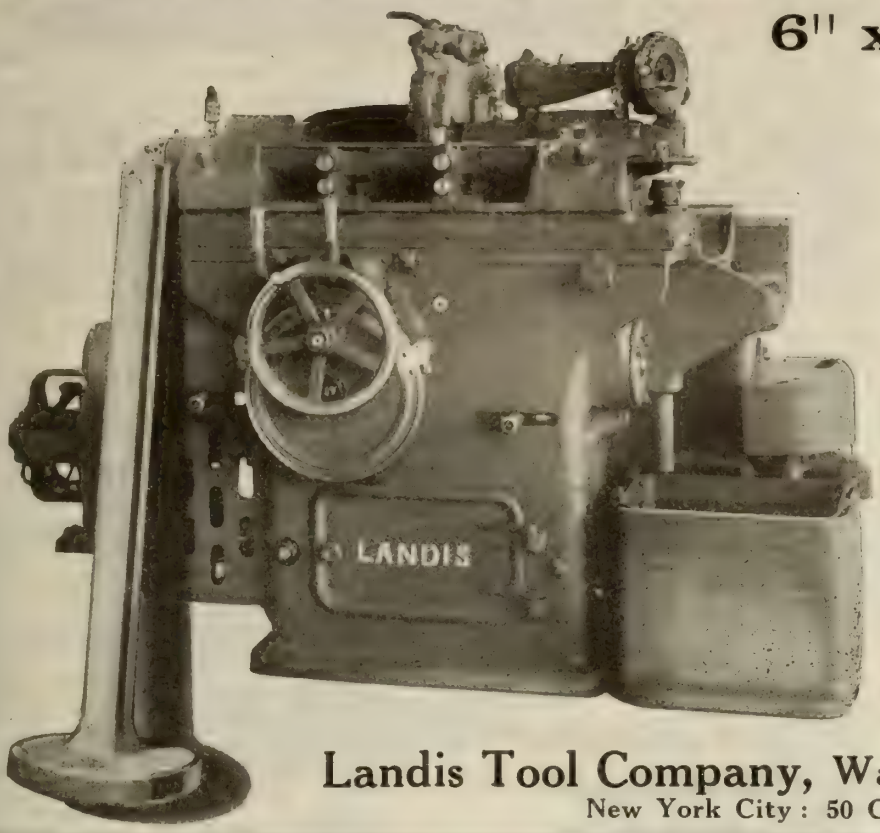
140 Valve Stems per Hour on the "LANDIS" 6" x 18" Grinding Machine



ONE enthusiastic user calls this tool "the biggest little machine on the market." It is a great little producer, compact, sturdy and accurate.

The stems of these valves require finishing within .00025" limits. The Landis does this easily, using a 4-inch face wheel requiring a traverse of only 3/8" to cover the stem and at a speed of 140 valve stems per hour.

Landis Tool Company, Waynesboro, Pennsylvania

New York City: 50 Church Street

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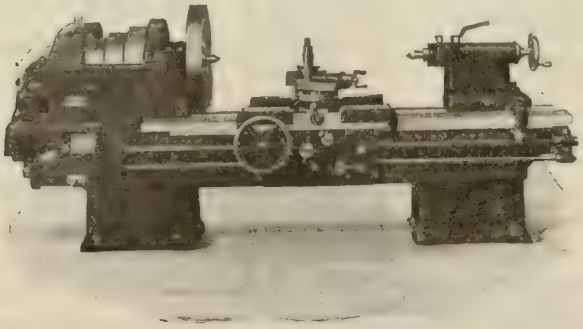
Sidney for Service

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohio

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MOTORCYCLE FRAME AND FORK
The Dunbar Brothers Co., Bristol, Conn.
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Cleveland Pneumatic Tool Co. of Canada, Toronto.
MOULDS, RUBBER
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.
MULTI-DRILLING MACHINERY, VERTICAL AND HORIZONTAL
The National Automatic Tool Co., Richmond, Ind.
MULTI-BORING MACHINES
The National Automatic Tool Co., Richmond, Ind.
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Page Steel & Wire Co., Adrian, Mich.
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Turner Brass Works, Sycamore, Ill.
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Can. Driver-Harris Co., Ltd., Walkerville, Ont.
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Baker & Co., Inc., H., Montreal, Que.
NICKEL SILVER
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NICKEL STEEL
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Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
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Williams & Wilson, Limited, Montreal, Que.
NITROGEN
Carter Welding Co., Toronto, Ont.
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Williams & Co., J. H., Brooklyn, N.Y.
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Wilkinson & Kompass, Hamilton, Ont.
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National Machy. Co., Tiffin, Ohio.
NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.
NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
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Victor Tool Co., Waynesboro, Pa.
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Garvin Machine Co., New York.
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A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.
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Sheldon's, Ltd., Galt, Ont.
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Norton Co., Worcester, Mass.
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Oliver Machinery Co., Grand Rapids, Mich.
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Williams & Wilson, Limited, Montreal, Que.
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Oliver Machinery Co., Grand Rapids, Mich.
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Oliver Machinery Co., Grand Rapids, Mich.
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Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
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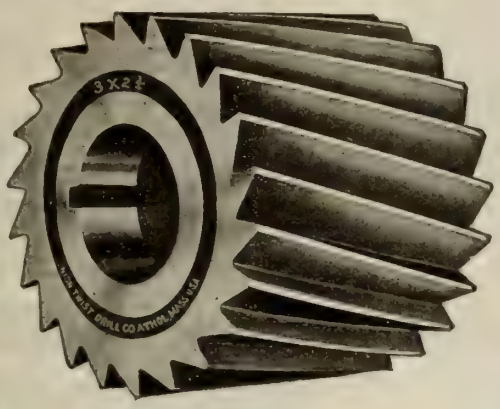

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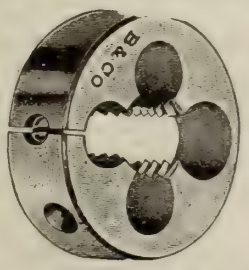

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Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
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Greenfield Tap & Die Corp., Greenfield, Mass.
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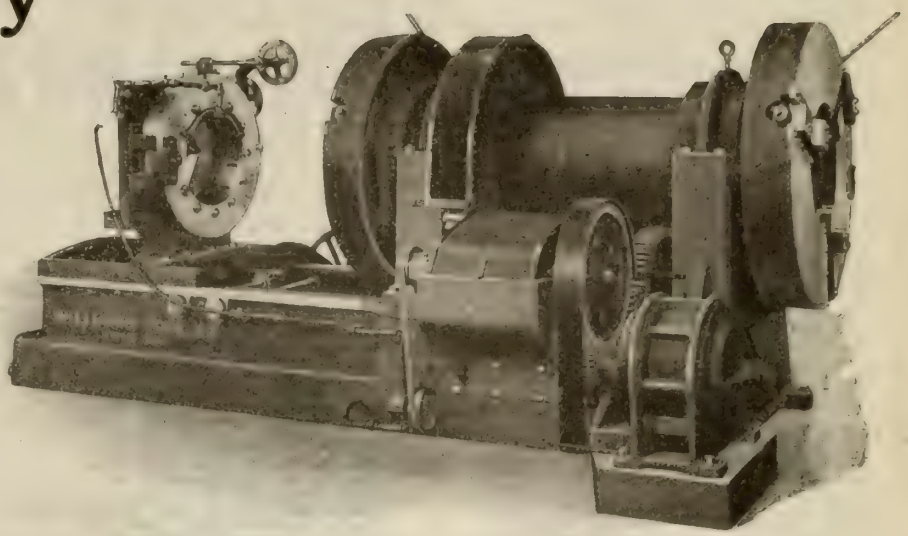

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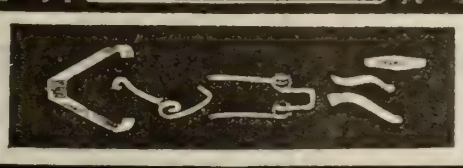

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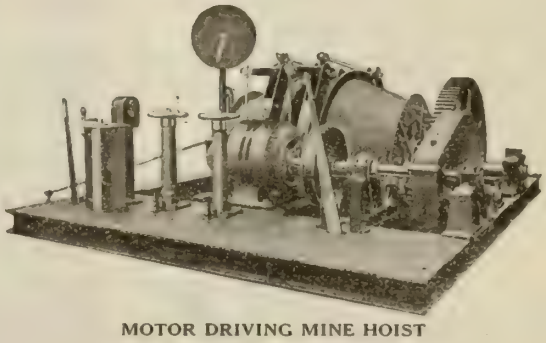

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Why was Trotzky allowed to leave Canada?

Colonel MacLean discusses this question in the June issue of MACLEAN'S MAGAZINE. He tells the story of Trotzky's activities, of his arrest and subsequent release in full detail, tracing the threads of a strange intrigue from Germany to Washington, and Washington to Ottawa. It is a gripping story, the most important inside story of the war.

Other National Features of This Issue

"Victory Stuff" By Robert W. Service.

"Solving the Problem of the Arctic" By Vilhjalmur Stefansson.

"The Gold Wolf" By W. A. Fraser.

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Drury, H. A., Co., Montreal, Que.
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Bowser & Co., S. F., Inc., Fort Wayne, Ind.
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Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
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Toronto Iron Works, Ltd., Toronto.
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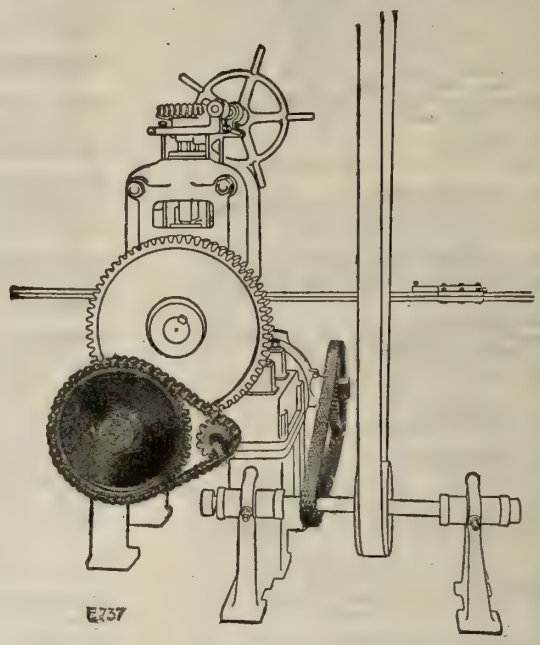

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AND MANUFACTURING NEWS

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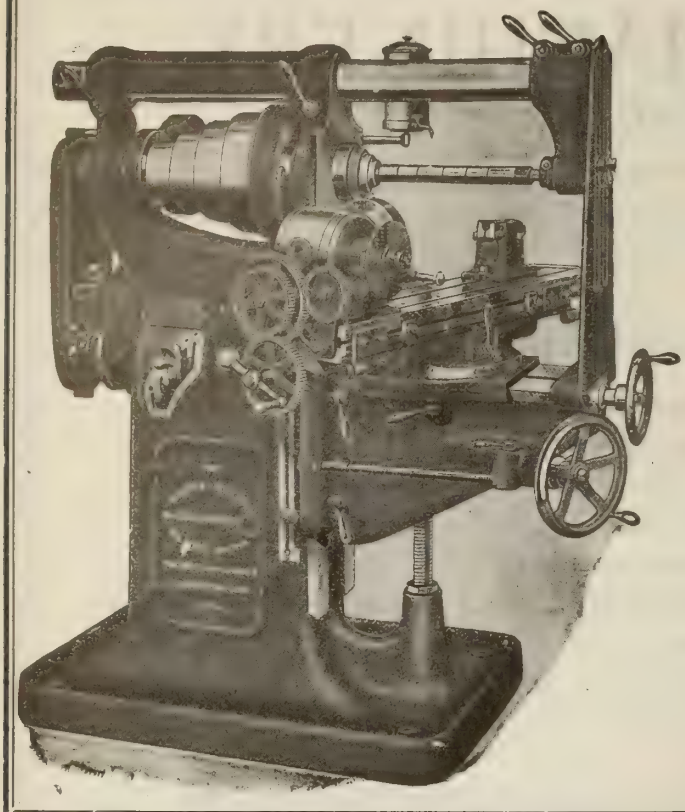
Anybody Can Operate This Miller



and Turn Out a Pile of Work so Simple to Operate is the

"HENDEY"

Skilled mechanics are scarce these days—but anyone can run a machine of its simplicity and turn out work accurately and fast without trouble.

All Feeds positive driven through gearings giving 18 changes.

This is the universal type—designed to handle all milling operations performed on machines of this character, either with regular equipment or by aid of attachments, which can be supplied for increasing efficiency and scope of machine.

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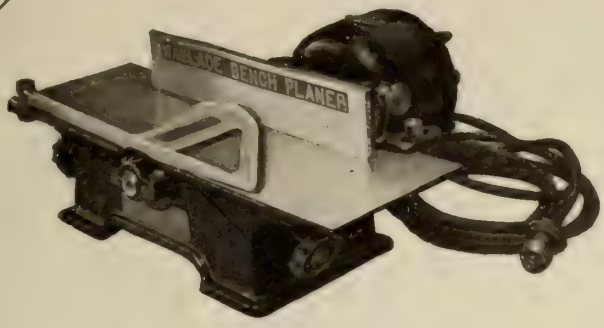

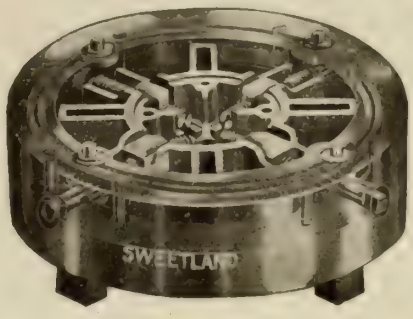

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the name that stands for Sure Quality and Prompt Service when Machinery and Mill Supplies are required

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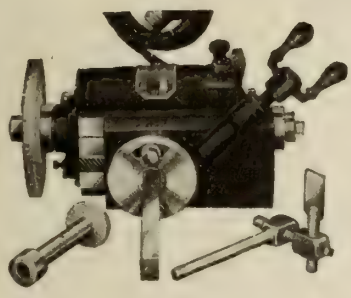

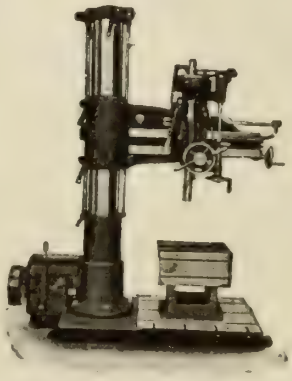

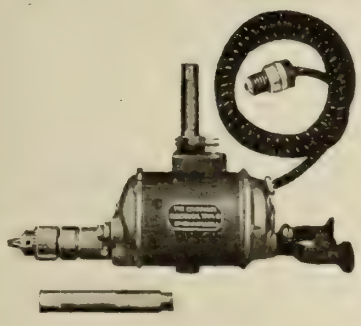

The Geo. F. Foss Machinery & Supply Co., Limited

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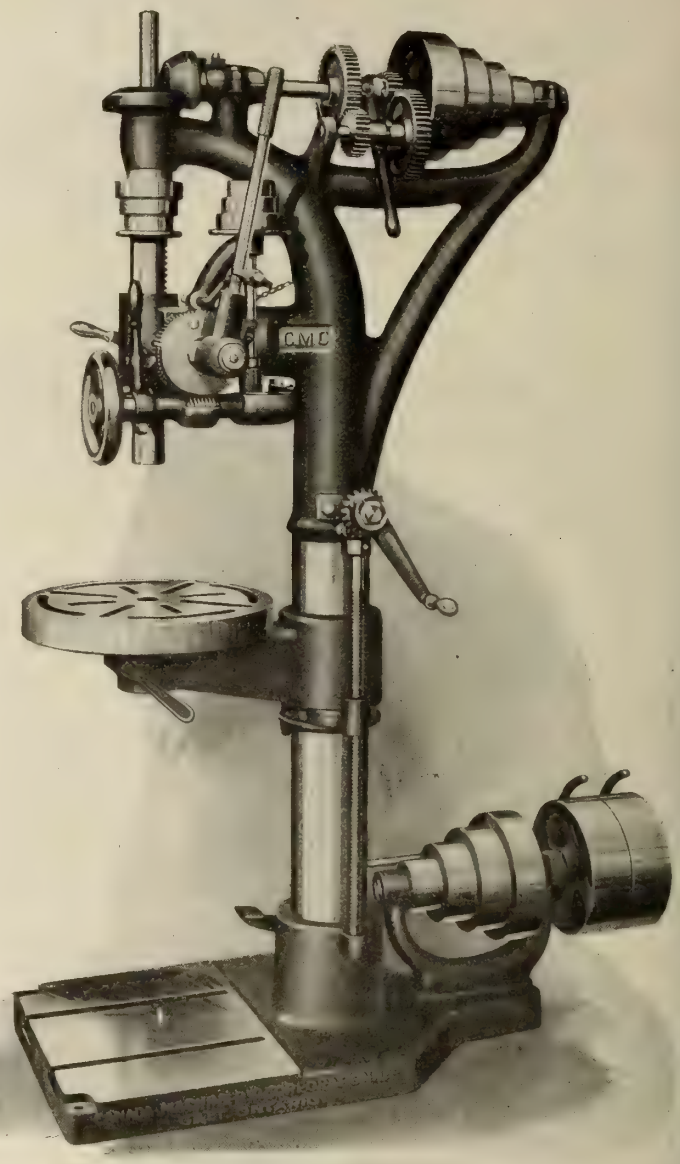
20" DRILL WITH BACK GEARS AND POWER FEED



BUY W-S S WAR-SAVINGS STAMPS

THE ADAPTABILITY OF THIS MACHINE

gives it a place in every machine shop, great or small, and in many other manufacturing establishments.

We manufacture also a similar machine with plain wheel and lever feed.

Both machines are kept in stock for immediate shipment.

Let us send you descriptive bulletins.

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CANADIAN MACHINERY AND MANUFACTURING NEWS

The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg, New York, Chicago, Boston and London, Eng.

Vol. XXI. No. 23. Publication Office: Toronto, JUNE 5, 1919 Subscription Price $3.00 per Year

SILENT RAW-HIDE PINIONS

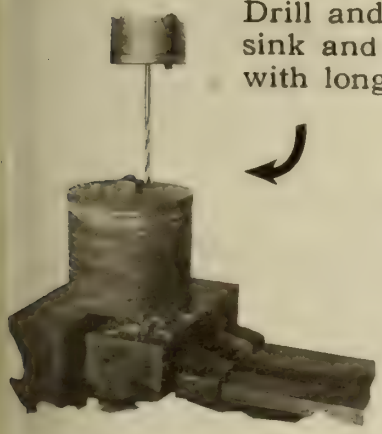
Showing the operations in their production

Rough turn bronze flanges and block of compressed raw-hide discs.

Write or wire

HAMILTON GEAR CO. LTD.

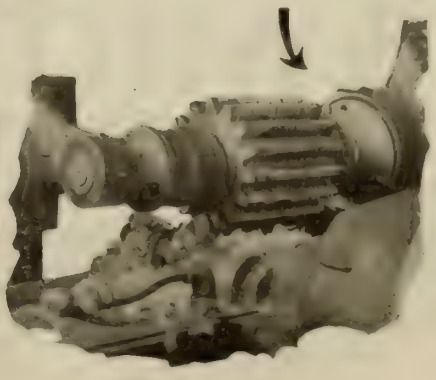
Van Horne St., TORONTO



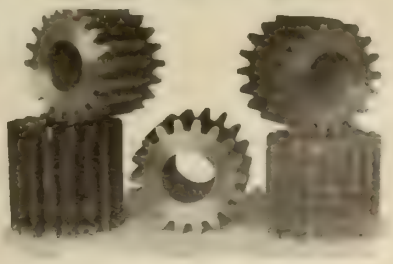
Drill and countersink and assemble with long rivets.

Finish bore and turn all over, and key seat.

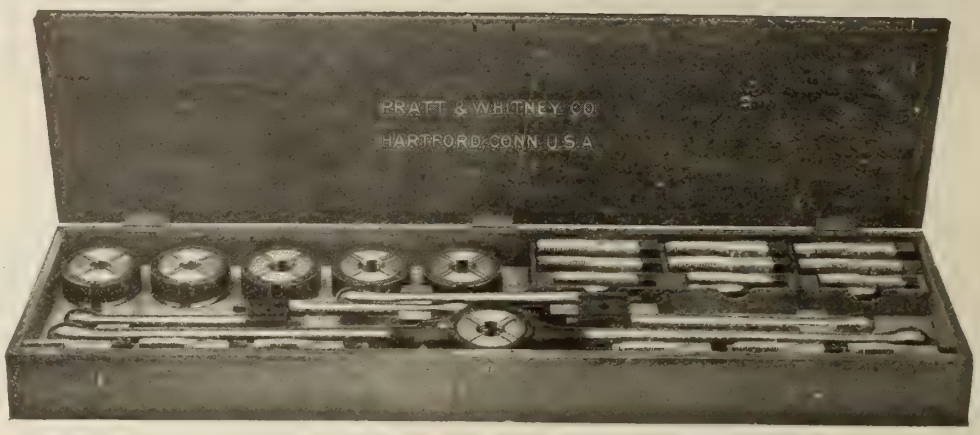
Cut teeth on Brown & Sharpe No. 4 Gear Cutter.



The finished product, when carefully made of selected material, is thoroughly reliable, silent and durable.



SMALL TOOLS



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Standards and Gauges
Accuracy Unequalled

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OF CANADA, LIMITED

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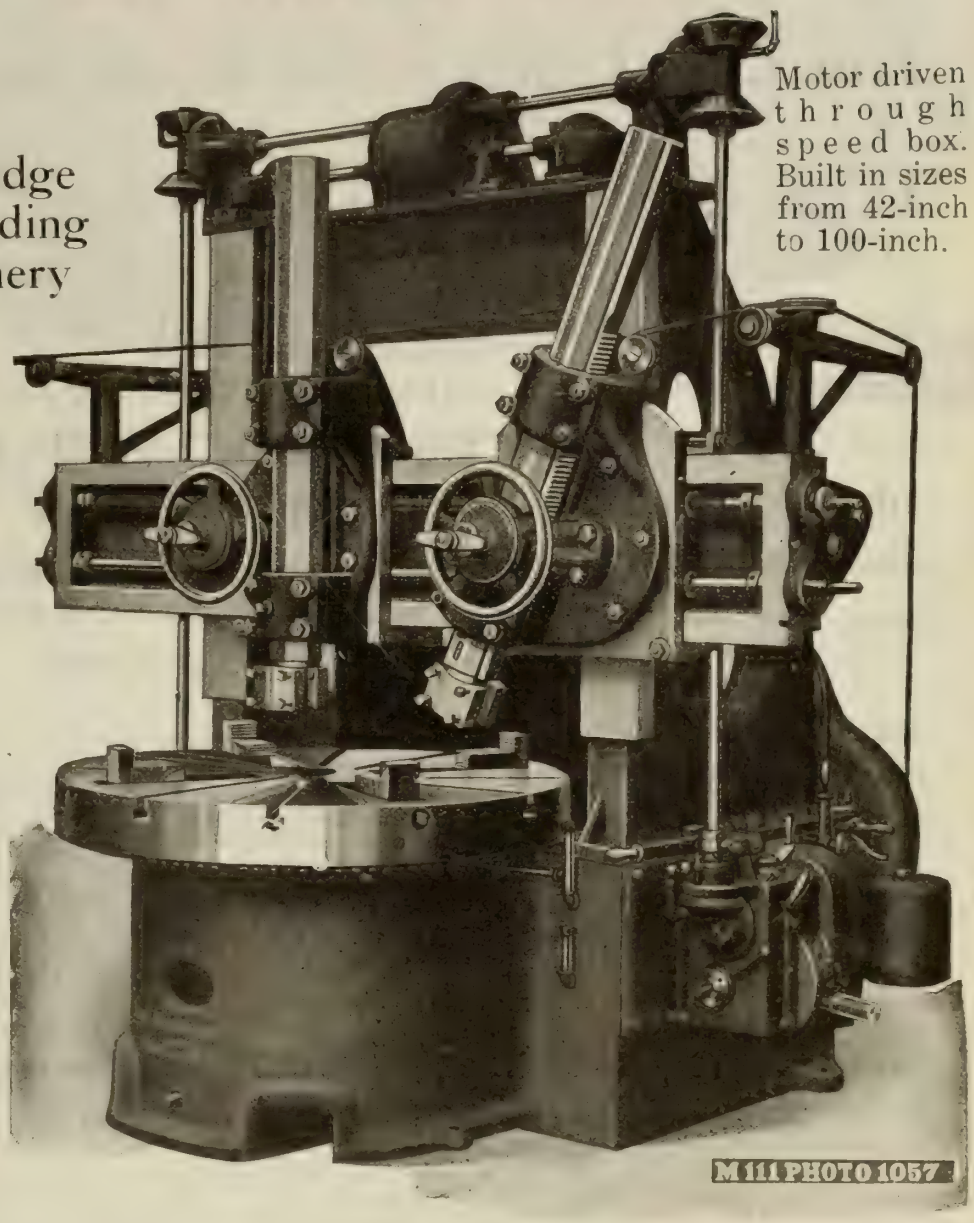
42-inch Vertical Boring and Turning Mill

Motor driven through speed box. Built in sizes from 42-inch to 100-inch.



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The Publisher's Page

TORONTO JUNE 5, 1919

You Can Learn a Lot from Advertising

The main thing an advertiser wants to do is to tell you plainly just how and why his goods are worthy of your consideration. You can learn a great deal from that alone, because many things you see advertised are the things you buy and use in your regular daily life. By reading the advertisements, you can learn the names and read descriptions of the things that are best and most satisfactory.

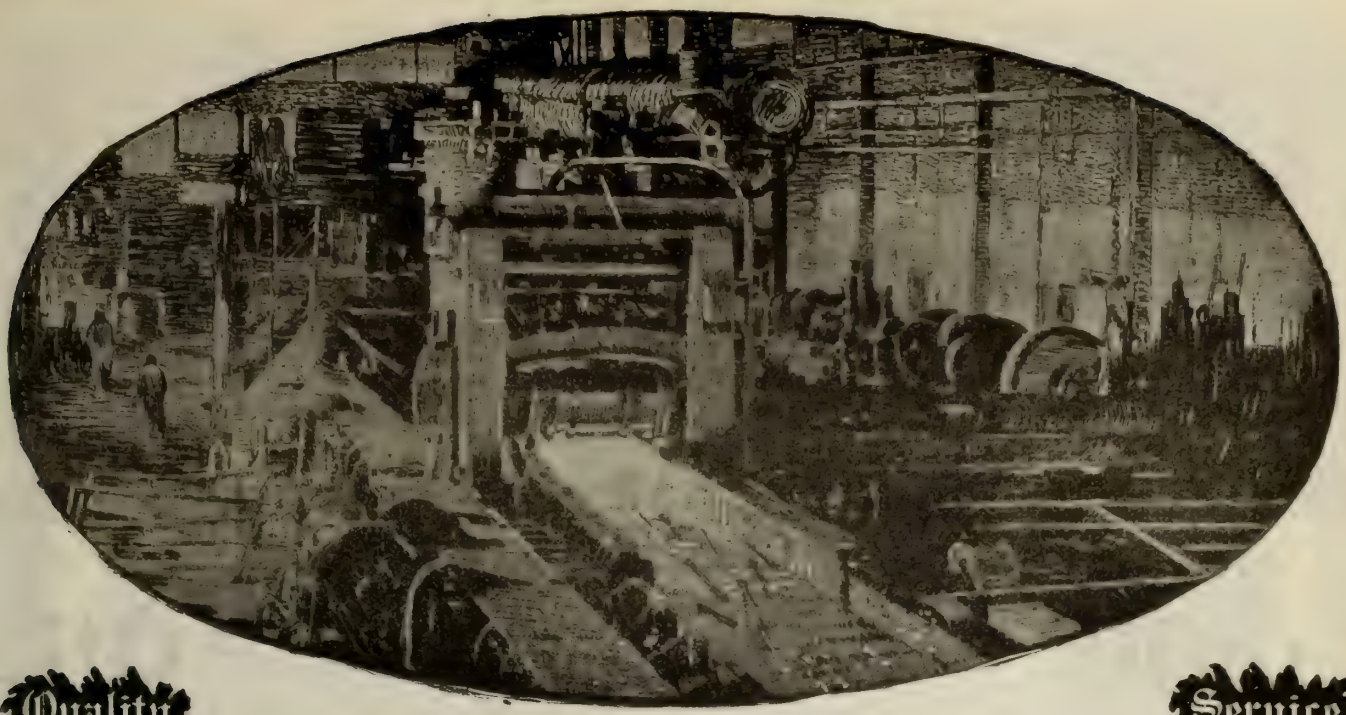
But advertising teaches even more than that. All advertisers try to make their advertisements themselves valuable to you.

A good many people have learned a whole lot about good music, good books, good food, good clothes, ways to keep healthy, ways to live comfortably, ways to keep the house and grounds looking well—they've learned all these things and many other things *just by reading advertisements.*

Read the advertisements right along, and you will learn a great deal that will be helpful and valuable to you as you go through life.

Written by LIFE'S advertising managers. CANADIAN MACHINERY *advertisements have proven of great worth to Canadian engineers. Our advertisers recognize this and prepare their messages accordingly. Keep thoroughly up-to-date by studying BOTH editorial and advertising pages.*

Canadian Machinery and Manufacturing News, June 5th, 1919. Vol. 21, No 23. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



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REASON IT OUT

Demand full value for every dollar by spending it where you earn it

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A Canadian Dollar is Worth One Hundred Cents in Canada

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Algoma Steel Corporation
LIMITED
Sault Ste. Marie, Ontario.

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Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

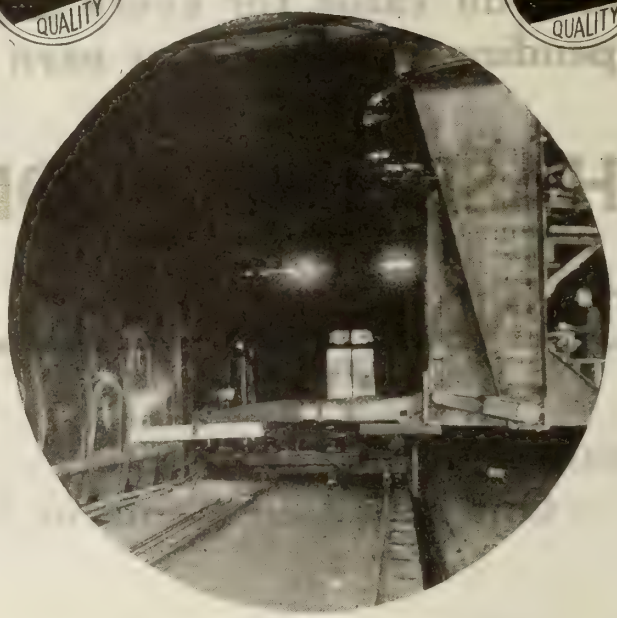
SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

MARK OF ALGOMA O.H. QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

BLOOMS, BILLETS, SLABS,

STRUCTURAL STEEL

MERCHANT BARS

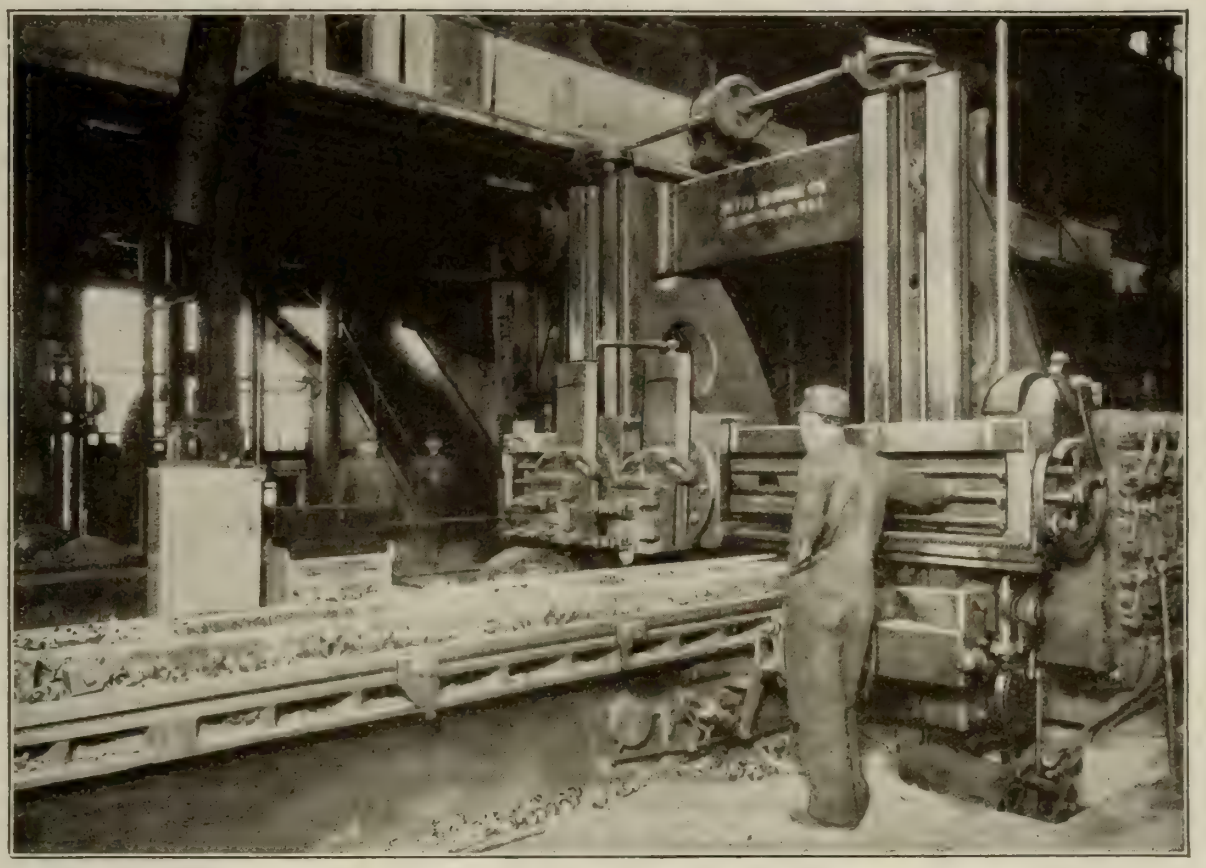
CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

BETTS

Taking Two Cuts 1 Inch Deep with 1/4 Inch Feed in High Carbon Steel



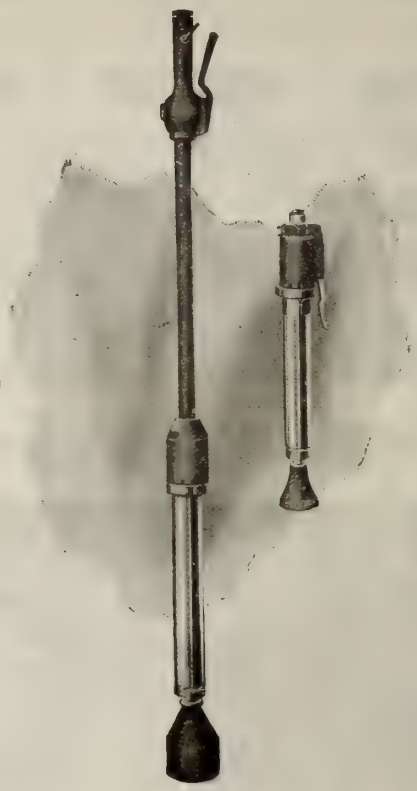
Planing steel trailer frames, taking two 1-in. cuts with 1/4-in. feed at a cutting speed of 30 feet per minute in tough high carbon steel, would strain or break down an ordinary planer.

This Betts Planer in one of the leading locomotive works takes cuts like these as a matter of routine and is running night and day without trouble or repairs.

Service like this is possible on a Betts because of their exceedingly heavy construction—steel gearing throughout—steel rack—bronze bushings—extra heavy cross rails and uprights—heavy box type table and other features of the Betts standard of world leadership.

When you think of planers, think of Betts Planers. Specifications, quotations, etc., on request.

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.



The "Crown" Sand-Rammer

Ramming foundry flasks with the "CROWN" Sand Rammer improves the quality of the castings; compared to hand-work the ramming is much harder, and much more uniform. "Over-weight" castings are avoided, and the saving in metal is as great as the saving due to the greatly increased speed —four times as fast as hand-ramming.

The use of the "CROWN" Sand Rammer gives very real savings in the foundry. The cost of the machine is low, and the cost of upkeep quite small in comparison with the reduction in cost due to its use.

Ask our nearest office for our bulletin 8608; look over the table of results on page 3 and see what this tool has done for other foundries—and will do for you.

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto
Cobalt Winnipeg Nelson Vancouver

WILT

"Where there's a WILT—there's the Way"

HIGH SPEED AND CARBON TWIST DRILLS

Unusual Drills Backed by Unusual Policies

Every superintendent should investigate the unusual qualities of

WILT TWIST DRILLS

The "WILT" has stood the test of all conditions—it is here to stay—its popularity among the mechanics makes that a certainty.

Investigate "WILT DRILLS" and you'll buy no others

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OF CANADA, LIMITED

WALKERVILLE ∴ ∴ ∴ ∴ ONTARIO

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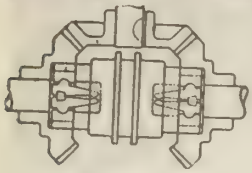
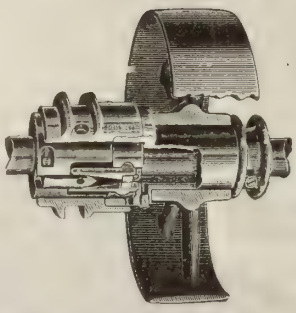
THE JOHNSON FRICTION CLUTCH

FOR SERVICE

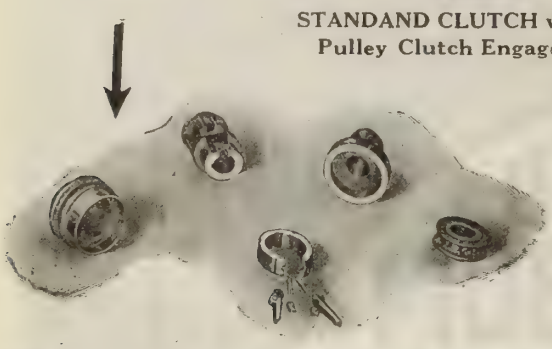


DOUBLE CLUTCH IN NEST OF GEARING

Note the Parts of This Clutch



STANDAND CLUTCH with Pulley Clutch Engaged



The leading engineers are specifying *Johnson Friction Clutches*. Our years of experience in manufacturing friction clutches place us in an excellent position to take care of your requirements. The *Johnson Friction Clutch* has but few parts and is easily modified to meet any conditions. Have *you* noticed the concerns who are using *Johnson Friction Clutches?* There's a reason. Service is in back of it all. What are your requirements?

You Should Have Our Yellow Data Sheets and Booklet "Clutches As Applied in Machine Building"

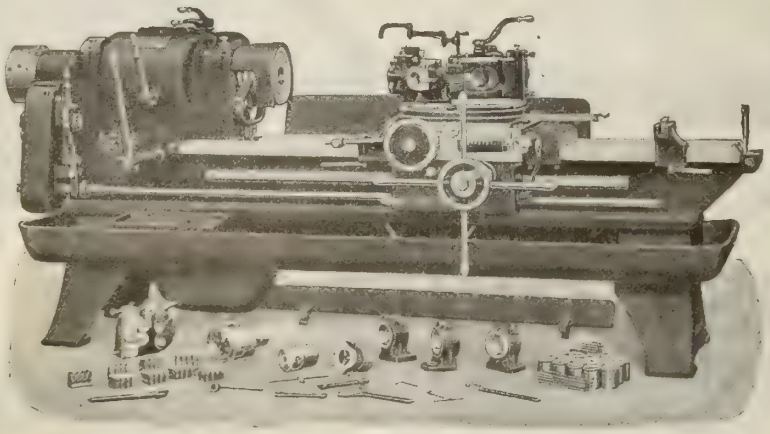
AGENTS: CANADA—Williams & Williams, 84 Inspector St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Doubly Efficient—Does Both Bar and Chuck Work

This Cincinnati Acme Flat Turret Lathe is a double-production, geared head machine of the sliding gear type. It operates on minimum power because the only gears running are those doing the actual work.

This machine saves remarkable time and labor machining either bar work or chuck work up to 16 in. diameter.



3¼ in. x 36 in. Flat Turret Lathe, Equipped for Bar Work

Head is cast solid with the bed. You know what that means: accuracy, rigidity, constant and perfect alignment of spindle with vees, upon which the turret carriage travels.

We also make a full line of Screw Machines and Turret Lathes.

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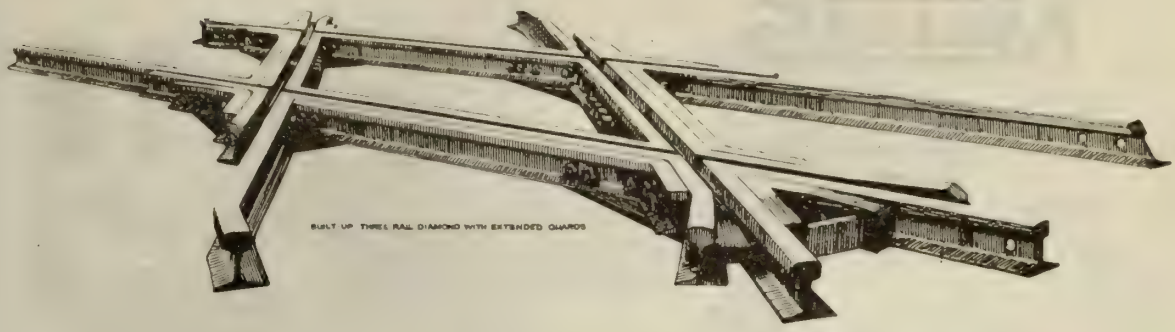

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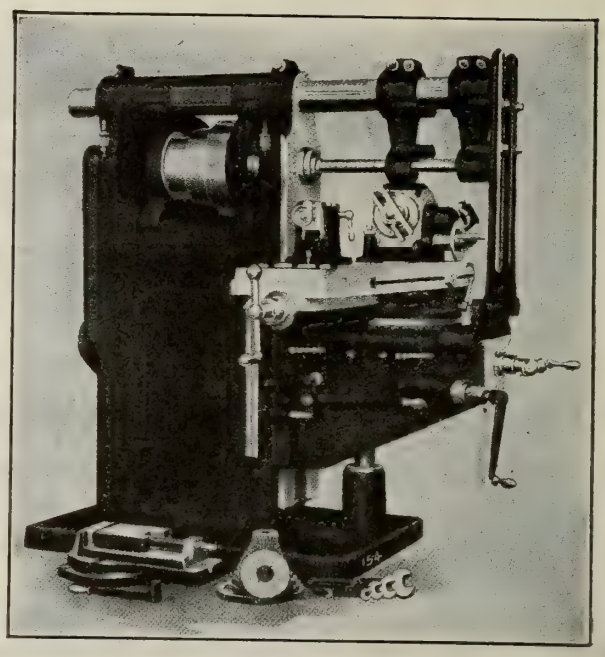

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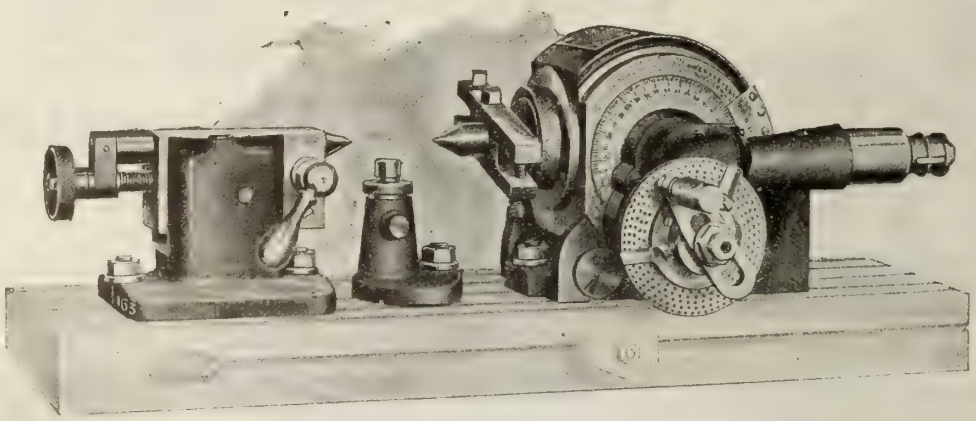
The Dividing Head



The care used in the building of Ford-Smith Dividing Heads is a fair gage of the workmanship in the entire machine. Each Head is thoroughly tested for accuracy so that every finished Head comes within the closest practice limits, giving satisfactory results.

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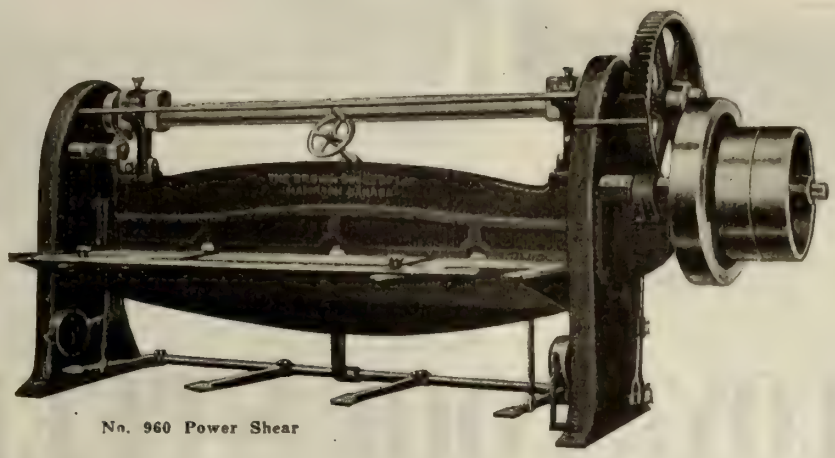
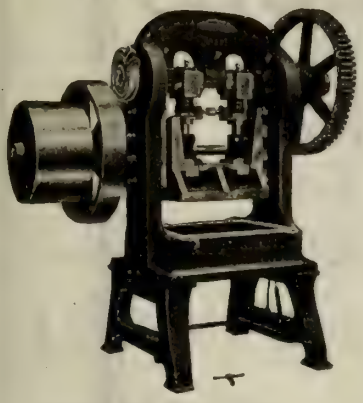


No. 960 Power Shear



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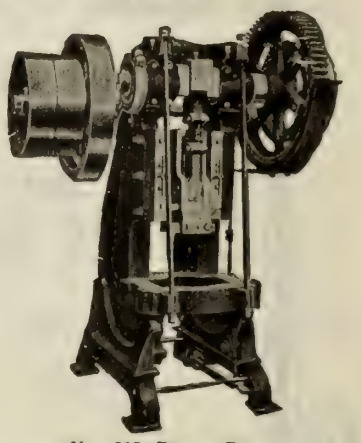

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"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.

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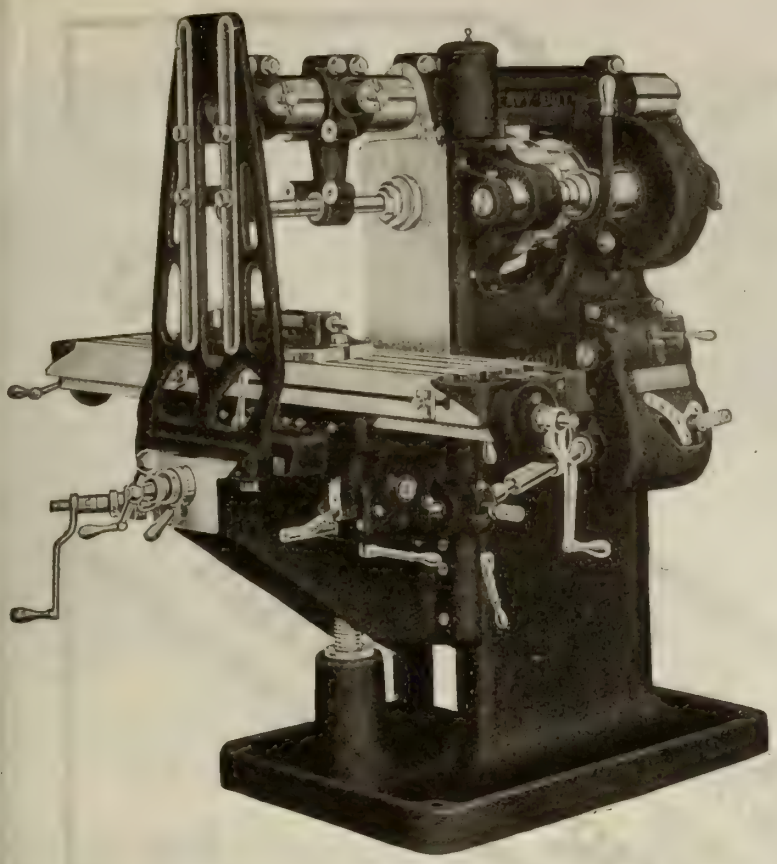

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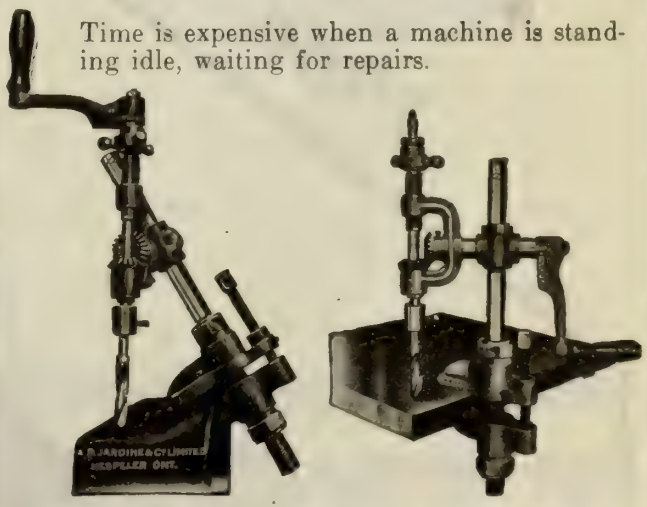
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

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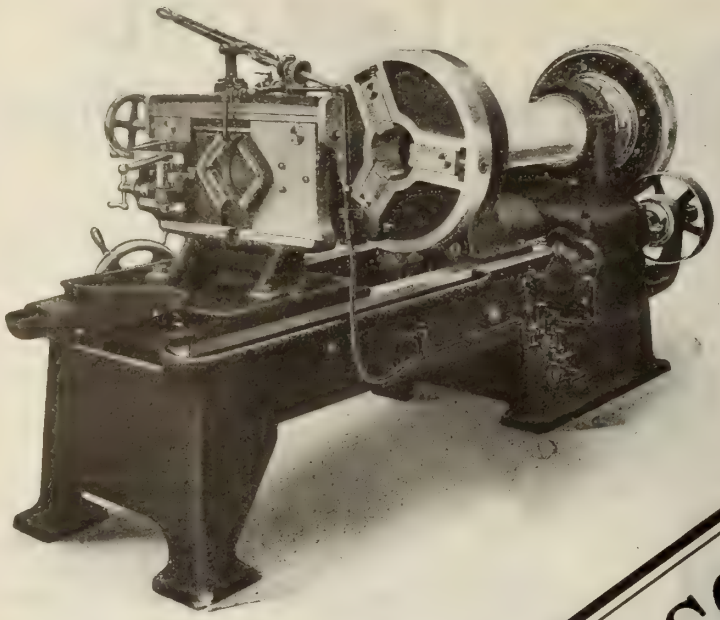

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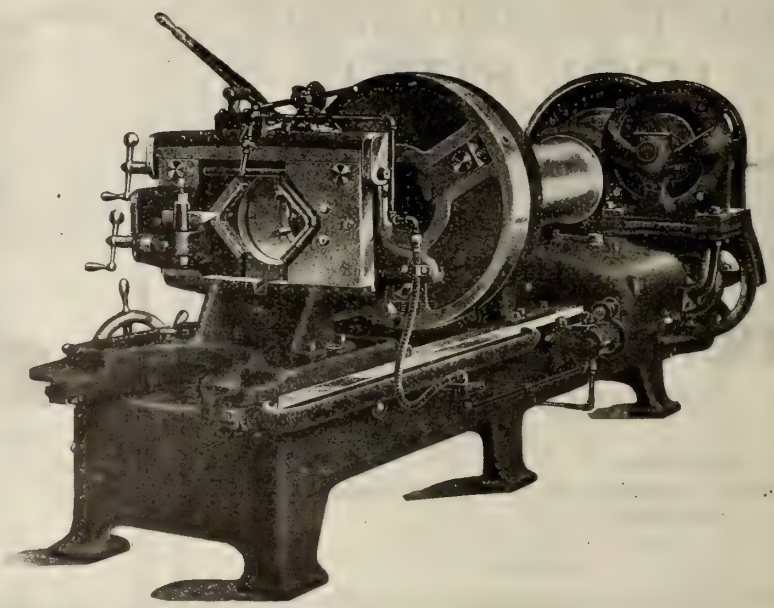

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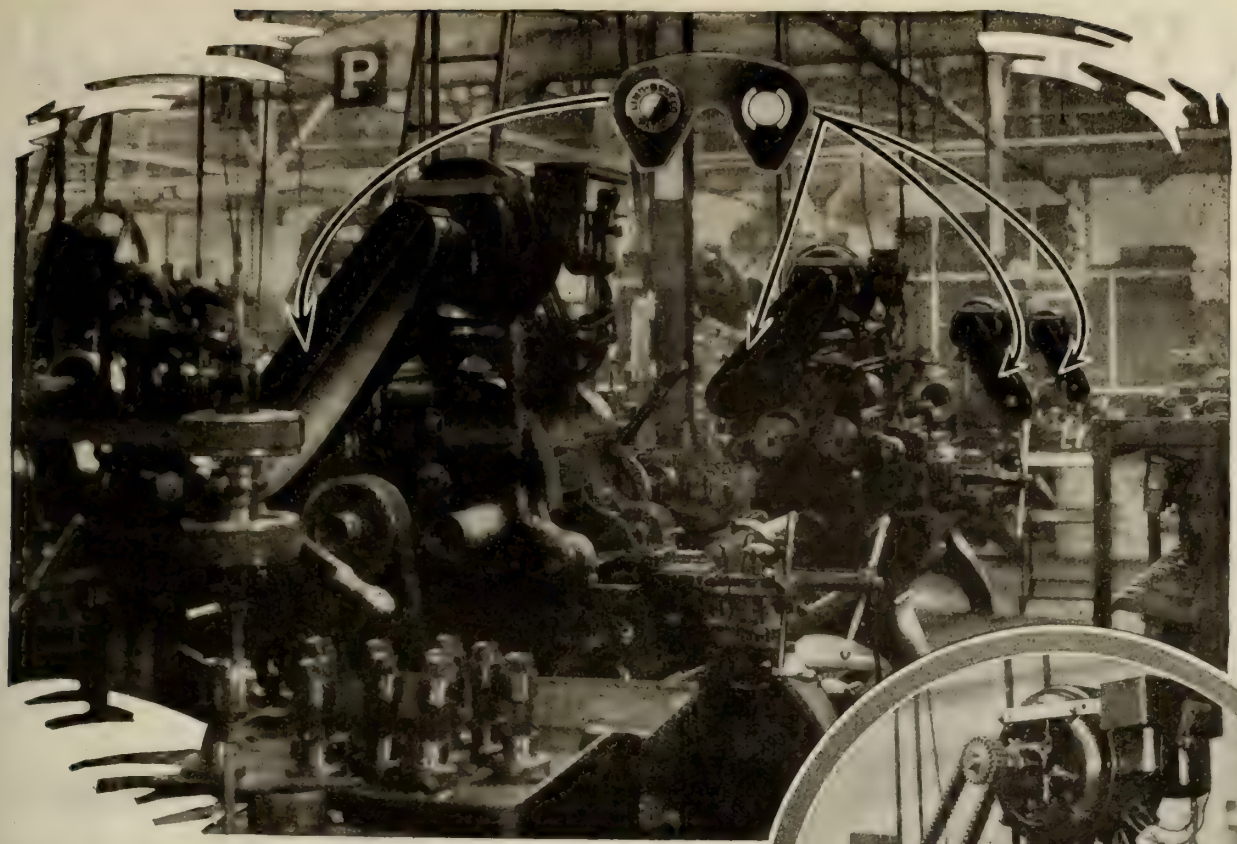

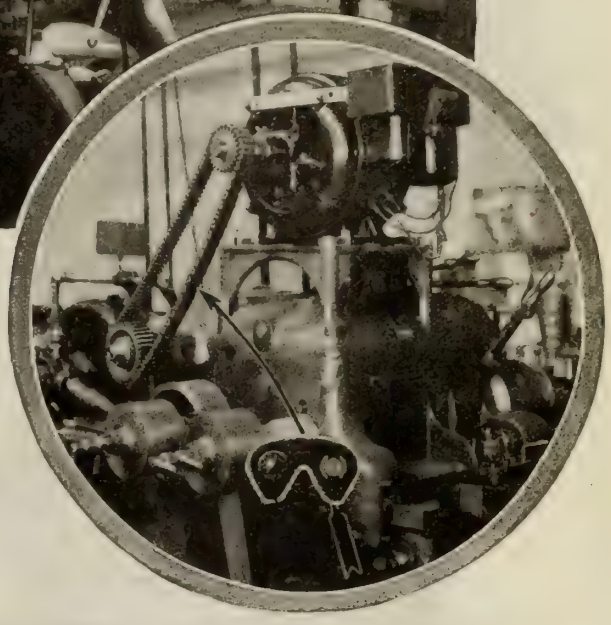

Highly Important in Times of War Just as Important in Times of Peace

DURING the stress of war, when every machine in America was called upon to deliver to its utmost capacity, many machine tools were changed from belt to chain drive.

Reduced output due to slipping belts could not be tolerated. Each machine must produce during every second of the day. The time lost by slipping belts in the average plant soon runs into hours each day.

Link-Belt Silent Chain Drives did their bit to help win the war in thousands of machine shops. They are just as important in helping you increase your output and reduce your costs now in times of peace.

Remember, Link-Belt Silent Chain Drives are "flexible as a belt, positive as a gear, more efficient than either". The ideal drive for short centers. Permits any speed reduction. Improves finish of product. Allows convenient location of machines and driving parts.

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THE money you make—or lose—on Twist Drills and Reamers depends on two things: the quality of the tools, and the way they are used.

Combine the proper Drills and Reamers with the proper methods of use and you can't lose. But you must have the combination.

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Likewise we have mastered the methods of use, as to the proper drill for the work, best speed and feed, and so on.

One customer who invited us to reform his entire Drilling System is now saving $20,000.00 a year as the direct result of the information we gave him and the "W & B" Drills and Reamers he is using.

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Armament made armor plate. High speeds and heavy rolling stock demanded alloy steel rails, crossovers and switch points. Various industries use special steels that resist or break ordinary Drills. Yet no Drilling or Reaming operation has ever been submitted to "W & B" tools and methods without success.

We want to see the Drilling job that "can't be done." Don't worry about it, but take it up with us. A life-time of study in your own plant could not give you the Drill experience that is here —available, now. It is yours for the asking.

"W & B" Twist Drills and Reamers Increase Production

You get more out of your machine tools, secure better results from your men, your men make more money and your tool expense is lower when you use "W & B" Twist Drills and Reamers.

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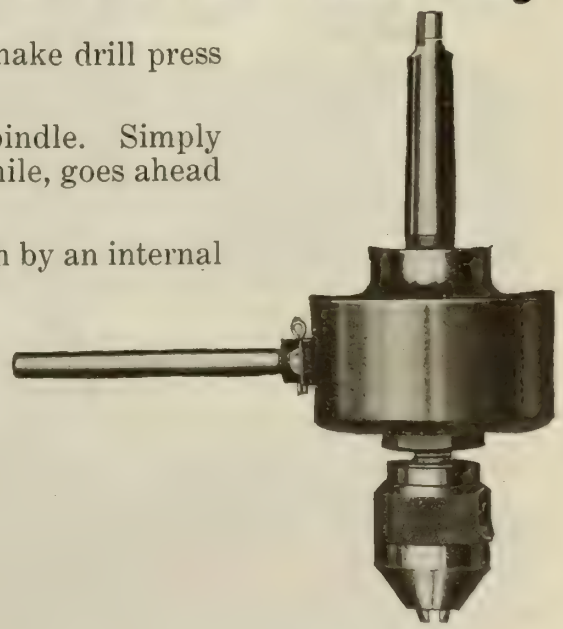
The "B-T" Reverse Tapping Attachment fits any make drill press and is equally efficient on **all** of them.

Eliminates necessity of reversing the machine spindle. Simply raising spindle reverses tap—the machine, meanwhile, goes ahead at full forward speed.

A reverse speed twice that of tapping speed is given by an internal gear drive. It is friction driven—automatically adjusted by the amount of pressure the operator puts on the drill spindle.

Can also be had with positive drive. Both plain and friction chucks are fitted with jaws to grip round and square end of tap.



Get the details—In our Bulletin.
Write to-day.

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"B-T" Reverse Tapping Attachment

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Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

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One Customer says:

"These machines were put in operation immediately upon arrival, have been producing ten hours per day every day since, and we have never experienced a bit of trouble with same." We know you will appreciate what this means in any shop, and believe this is the sort of machine you are looking for. We consider the machine the finest in its line on the market to-day, and believe an installation would save money for you in the cost of your production.

Our illustrated bulletin will interest you, giving detailed information.

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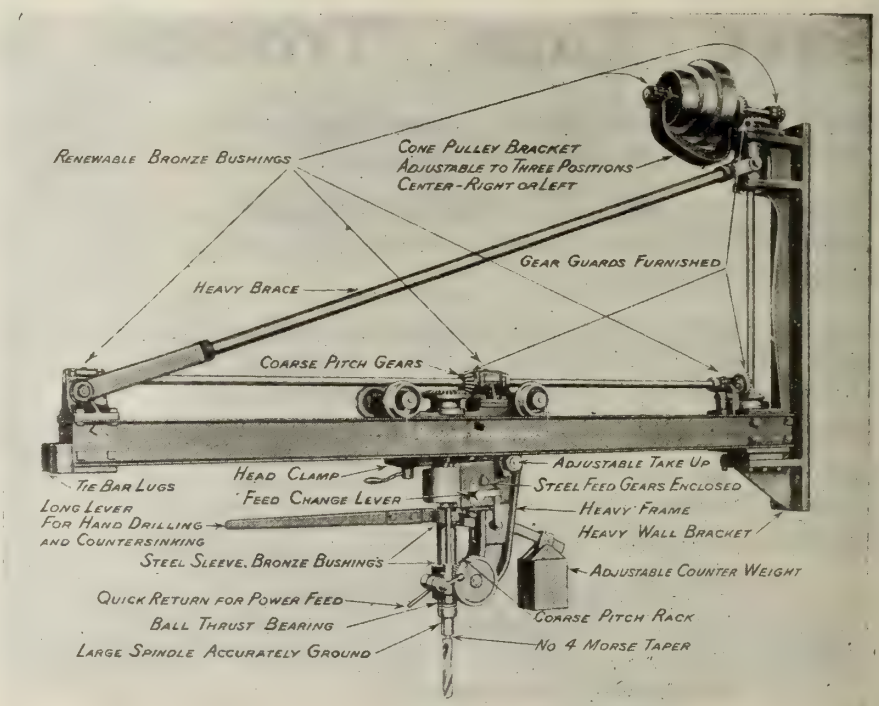
Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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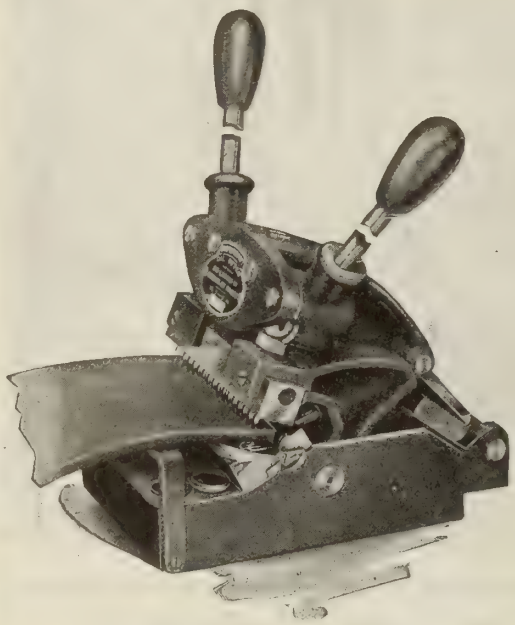
Clipper
Clipper Belt Lacer Co.

An International Service To Industry



Year after year the simplicity and economy and effectiveness of the Clipper Belt Lacer have commended it to more plant managers, until now it is a recognized international service to industry.

It took the test of a period of extraordinary production to demonstrate to the industrial world its unlimited possibilities. Whatever the demands, in a hundred thousand plants in all countries during recent strenuous manufacturing days, the Clipper met the call with amazing speed and efficiency. The old slow methods of lacing broken belts are too expensive for any plant.

The Clipper Belt Lacer
Laces a Belt in Three Minutes

It not only does the job quickly but does it well. It repairs a belt permanently—makes it stronger than before the break.

The Clipper lacing tool is so simple that shop workmen use it with ease. No experts required. No delays. No shut-downs. The cost of repairing a joint with the Clipper is small.

Many plants have increased the efficiency of Clipper Belt Lacing Service by keeping Clipper tools convenient to every battery of machines for emergency use when a belt breaks.

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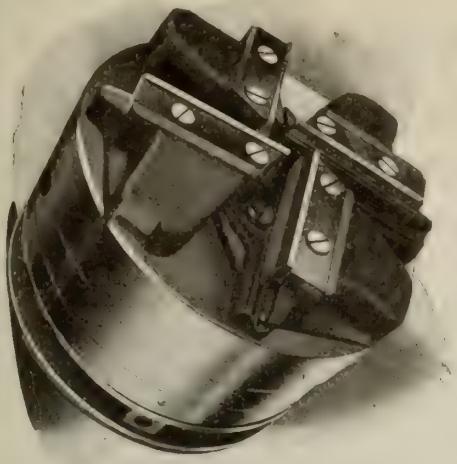
The Clipper Belt Lacer is recommended with confidence to manufacturers who have had unsatisfactory belt lacing. The Clipper goes to them on free trial and is backed by a permanent guarantee.

Mill supply houses everywhere sell the Clipper. European trade supplied through London, England, office, No. 10 Norfolk St. Distributors in all parts of the world

Clipper Belt Lacer Company
GRAND RAPIDS, MICHIGAN, U. S. A.



Sure, We'll Be There

Spaces 131 and 133 Machinery Hall
Young's Million Dollar Pier
Atlantic City, N.J.
June 18th to 25th

The Landis Machine Company will exhibit their line of Bolt and Pipe Threading Machines at the M.M. & M.C.B. Convention at Atlantic City, June 18th to 25th.

Daily demonstrations will be given with a 2" Double Bolt Threading Machine and a 4" Pipe Threading and Cutting Machine. There will also be shown Stationary Die Heads, Chaser Grinder and the **NEW AUTOMATIC DIE HEAD.**

You are cordially invited to visit their booth, Spaces 131 and 133, and investigate the Landis Die. It will be worth while to those interested in thread cutting.

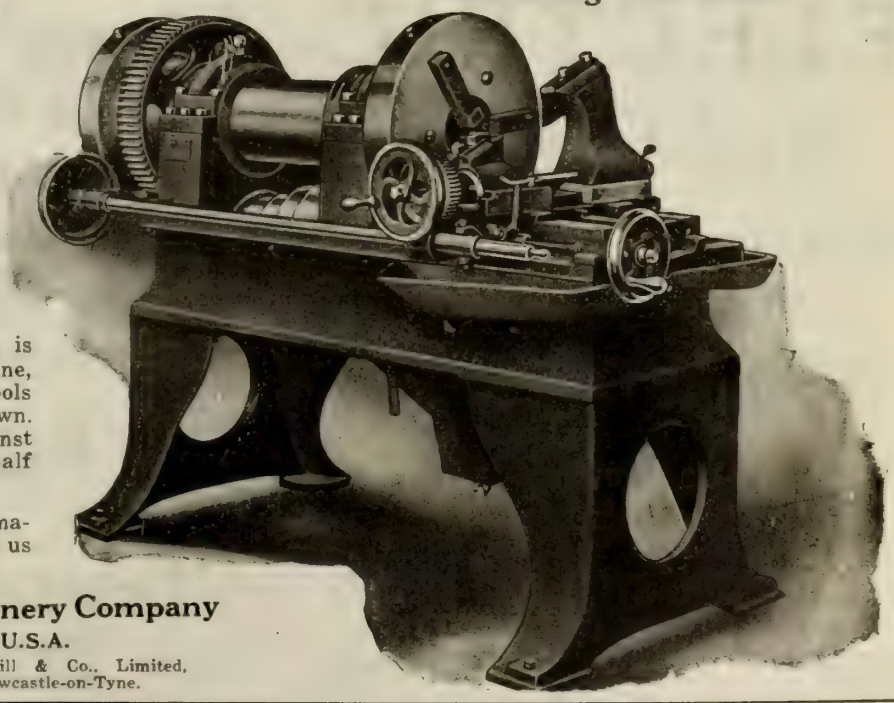
LANDIS MACHINE COMPANY

WAYNESBORO, PA.

Cut Your Cutting-off Costs in HALF

HURLBUT'S

Patent Cutting-off and Centering Machines



TO say that the Hurlbut, Rogers Cutting-Off and Centering Machine will **double your production** and **cut your costs in half** may seem like a broad claim. But this is just what this machine will do compared with any ordinary machine of its kind.

Hurlbut, Rogers speed and efficiency is easily explained. Instead of only one, it is equipped with two cutting-off tools —one cutting up and the other down. In this way they hold the work against each other and finish a job in just half the time and do twice the work.

You can't afford to be without this machine. It saves real money. Let us tell you more about it. Write!

The Hurlbut, Rogers Machinery Company

South Sudbury, Mass., U.S.A.

Foreign Agents—England: Chas. Churchill & Co., Limited, London, Manchester, Glasgow and Newcastle-on-Tyne.

Williams' "Vulcan" Drop-Forged Safety Lathe Dogs

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PROVIDE safety for the operator and increased profit for the manufacturer—safety that is sure and unqualified, because automatic; increased profit, because, with all fear of danger eliminated, the operator is free to devote his attention to *production* only. That is one of their strong points.

They are built for a lifetime of hard, continuous service for they are the result of nearly half a century of experience in designing and making *Superior* drop-forged tools. Bent and Straight Tail patterns, with 1 or 2 screws, 16 sizes, 3/8" to 6", maximum capacities.

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J. H. Williams & Co.

"The Drop-Forging People"

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Agents for Manitoba, Saskatchewan, British Columbia and Alberta.

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"We make it up with Oakite and it costs just one-fourth of what our old cutting oil used to cost.

"With this Oakite cutting compound we get a finer cut, our tools keep cooler and do not have to be sharpened so often—and the work does not rust.

"And say, the men like it fine! It keeps their clothes and hands cleaner and does not make sores on their arms like the old oil did."

OAKITE MANUFACTURED BY OAKLEY CHEMICAL CO. 44 THAMES STREET · NEW YORK

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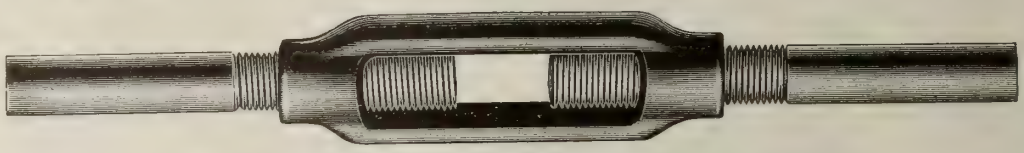

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Prompt Service

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We can help you decide their proper application to your product. Help you—because we not only originated the die-casting process but have had 27 years' continuous experience and study in perfecting it.

Many times we have overcome problems which have baffled others.

Ask for a representative to call, or send sample of blue print for recommendation and estimate. Booklet "C" will be sent upon request.

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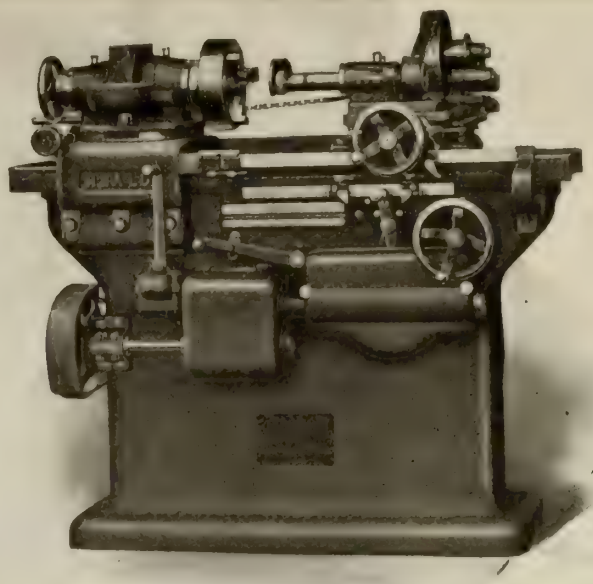
746 GIFFORD STREET, SYRACUSE, NEW YORK, U.S.A.

A REAL INTERNAL GRINDER



A few of the features:

FLEXIBLE IDLER WHEEL DRIVE greatly increases the life of the bearings.

AUTOMATIC WHEEL GUARD absolutely protects the operator when chucking or gauging the work.

HEAD STOCK is very massive and has swivel adjustment. Notice it is connected directly to the base, absorbing all vibration.

TABLE AND WORK SPEEDS are instantly available.

WHEELHEADS are made up in units and are instantly interchangeable. Correct spindle speed is obtained as the spindle pulley is part of the unit.

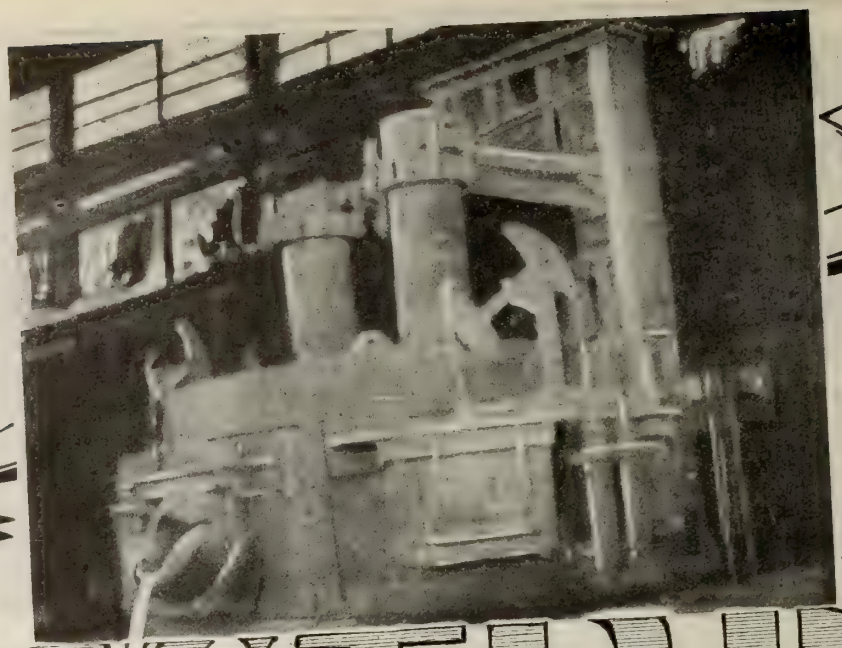
WHILE IT IS PRIMARILY A PRODUCTION MACHINE, LARGE OR SMALL HOLES, ANGLES AND CURVED SURFACES ARE SIMPLE GRINDING OPERATIONS WITH A HEALD No. 70.

Below is shown an awkwardly-shaped cylinder being ground at the Bourke Machine Co., Detroit, Michigan. All that was necessary was to center and strap it to a standard face plate.

If you have an internal grinding job, Heald has a machine to do it. Write us for literature. We maintain a service department for you exclusively—use it.

THE HEALD MACHINE COMPANY

Worcester Massachusetts



ELECTRITE

High Speed Steel

SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art; Electric Furnaces—entirely infallible, automatically regulated, delivering the same result time after time.

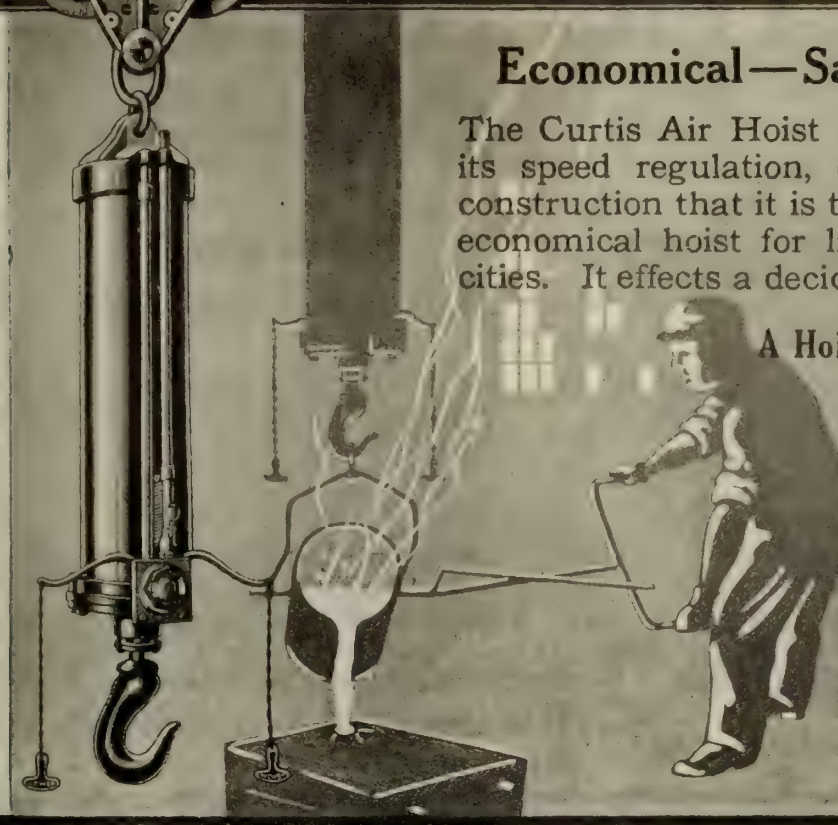
Uranium—This rare element, cousin to Radium, effects a profound change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.
LATROBE, PENN.

URANIUM

CURTIS *Air Hoists*



Economical—Safe—Dependable

The Curtis Air Hoist has been so perfected in its speed regulation, design and mechanical construction that it is the simplest, safest, most economical hoist for light and medium capacities. It effects a decided saving in man power.

A Hoist to Meet Your Needs

CURTIS AIR HOISTS have been successfully adapted to meet a wide variety of needs in hundreds of the leading industrial plants throughout America.

Our Engineering Department is at your service, ready to study any special conditions you have to meet and recommend suitable equipment. Illustrated descriptive literature and full information on request.

Curtis Pneumatic Machinery Co.
1585 Kienlen Ave., St. Louis, Mo.
Branch Office—532-A Hudson Terminal, N.Y.C.

CANADIAN MADE CANADIAN MADE

Electric and Hand Traveling Cranes

Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons

Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.

Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.

Type D Electric Hoists —½ to 10 Tons.

Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

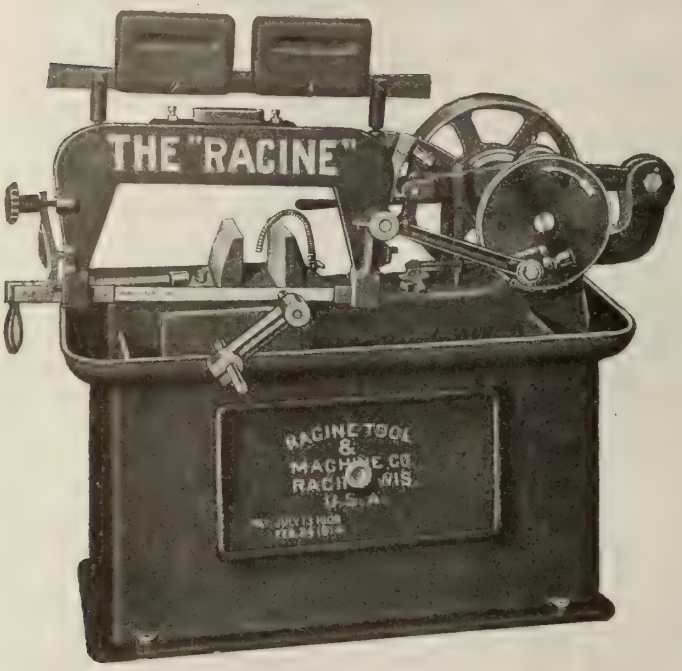
Northern Crane Works, Limited

Walkerville, Ontario, Canada

Standard the World over

"THE RACINE"

HIGH SPEED METAL CUTTING MACHINE



Reduces Blade Expense

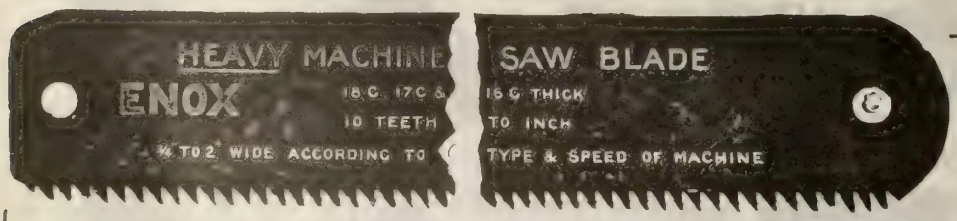
Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

Use "Racine" H. S. Tungsten Power Blades

Racine Tool & Machine Co.

Melbourne Ave., RACINE, WIS., U.S.A.



ENOX

Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

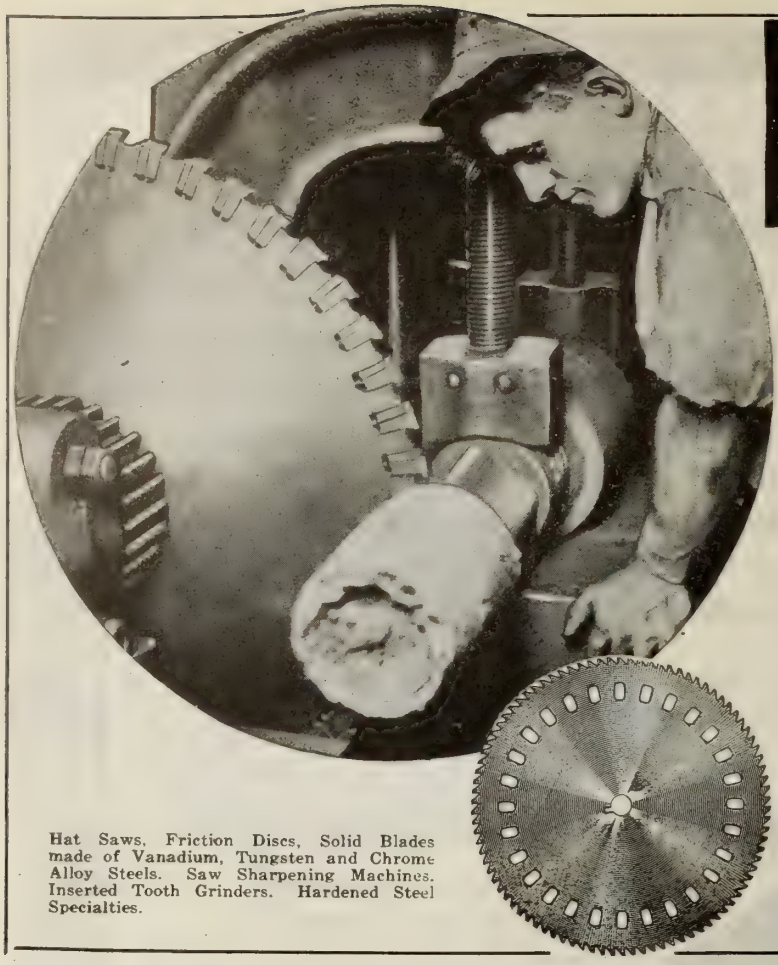
46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.

Starrett Tools
Are known to mechanics as the best tools for precision measurements that mechanical skill can produce or that money can buy. The accuracy, simplicity and sterling quality of the Starrett Micrometer has won it a place in the personal kit of almost every machinist.
A copy of catalog No. 213 descriptive of 2,100 kinds and sizes of tools will be sent you free on request.
THE L. S. STARRETT CO.
The World's Greatest Toolmakers
Mfrs. of Hack Saws Unexcelled
Athol, Mass.
42-943
STARRETT
TOOLS



HUNTER
Duplex Saws

The selection of many of the best and largest companies in the country for cutting ingots, bars, forgings, castings, rails and structural shapes.

Their fast cutting qualities mean a saving of time and power, plus increased production.

Teeth are accurately formed, ground and set for highest speed and greatest endurance. Made in sizes up to 90 in. in diameter.

Write for price list and full particulars

Hat Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Grinders. Hardened Steel Specialties.

HUNTER SAW & MACHINE CO.
Pittsburgh, Pa.

"STERLING"
HACK SAW BLADES

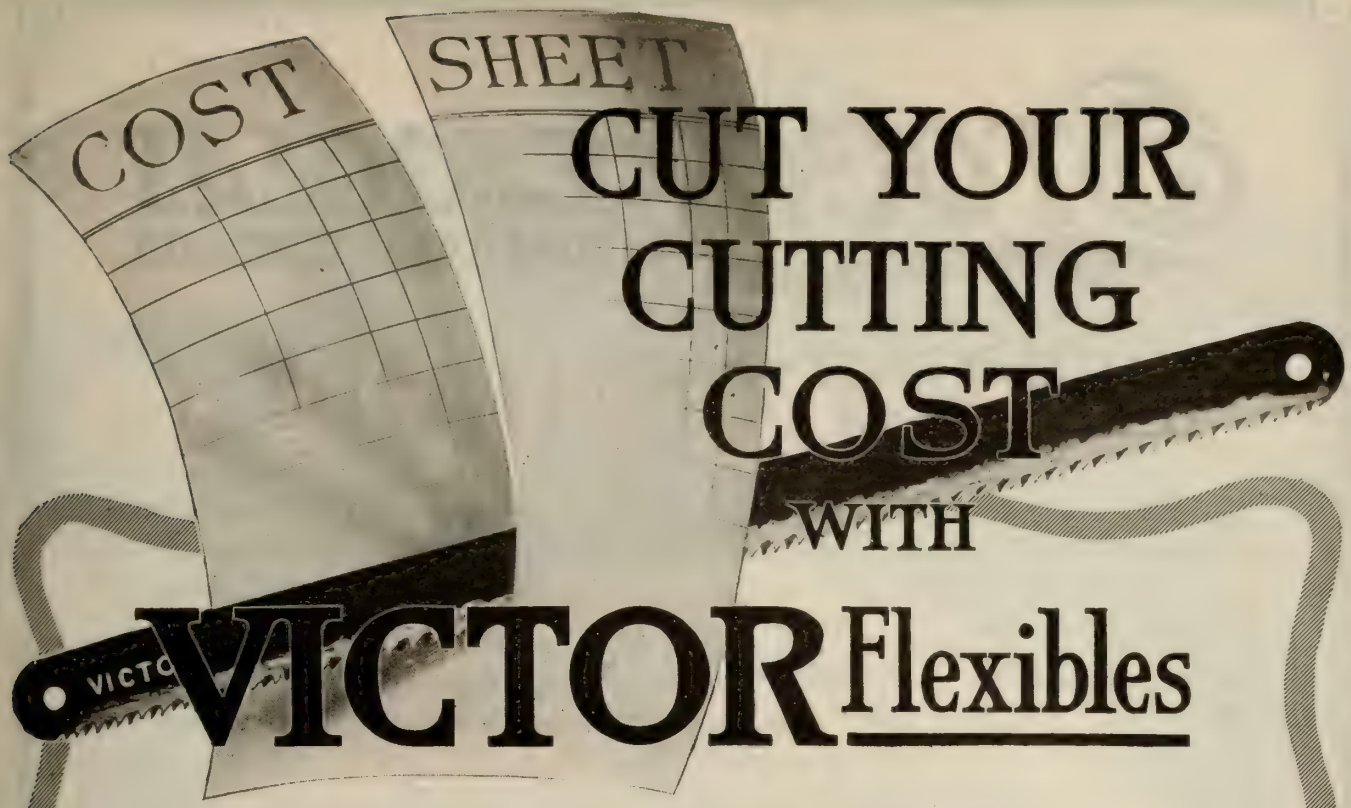
A brand once adopted, difficult to replace.

REASONS—High quality of material used, mechanical construction, and special heat treatment.

RESULTS—Economy, which means satisfied customers.

Write for Information and Prices

DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A.



CUT YOUR CUTTING COST WITH VICTOR Flexibles

The high cost of tools should emphasize more than ever the importance of quality.

The high cost of hack saw blades ought to drive every hand blade user over to the saw that does not break in ordinary hand work.

VICTOR FLEXIBLE HACK SAW BLADES have exactly the same cutting power as the finest All-Hard on the market, and that they cannot be broken in use except by intentional abuse is an undisputable fact—which will represent a saving from twenty-five percent to thirty-three and one-third percent in breakage alone.

Seventy-five percent of the All-Hard blades used in hand frames break before they are worn out. Watch the All-Hard blades in your own shop and see the enormous amount of breakage—then use VICTOR FLEXIBLES and note the economy.

VICTOR SAW WORKS LTD - HAMILTON, CANADA

STOCO "CELOGLAS" SHATTER-PROOF LENS

SAFETY GOGGLES

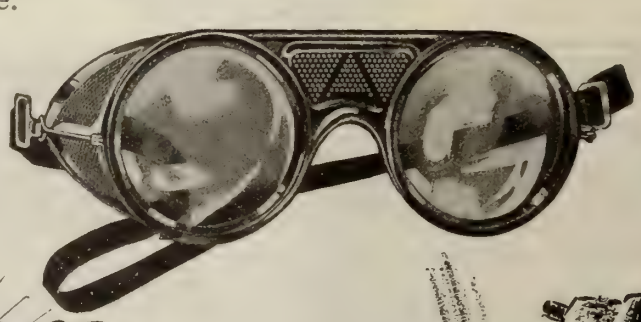
ADEQUATE eye protection not on ly preserves eyesight under hazardous conditions, but also makes your men better workmen. The man who is constantly dodging, or fearing eye injury, is not a competent workman.

Stoco safety goggles with Celoglas shatter-proof lenses are the best possible eye protection. The frame itself is light in weight and comfortable, but very strong. Celoglas lenses, even when fractured, will not leave the frame or pieces fly into the eyes of the wearer.

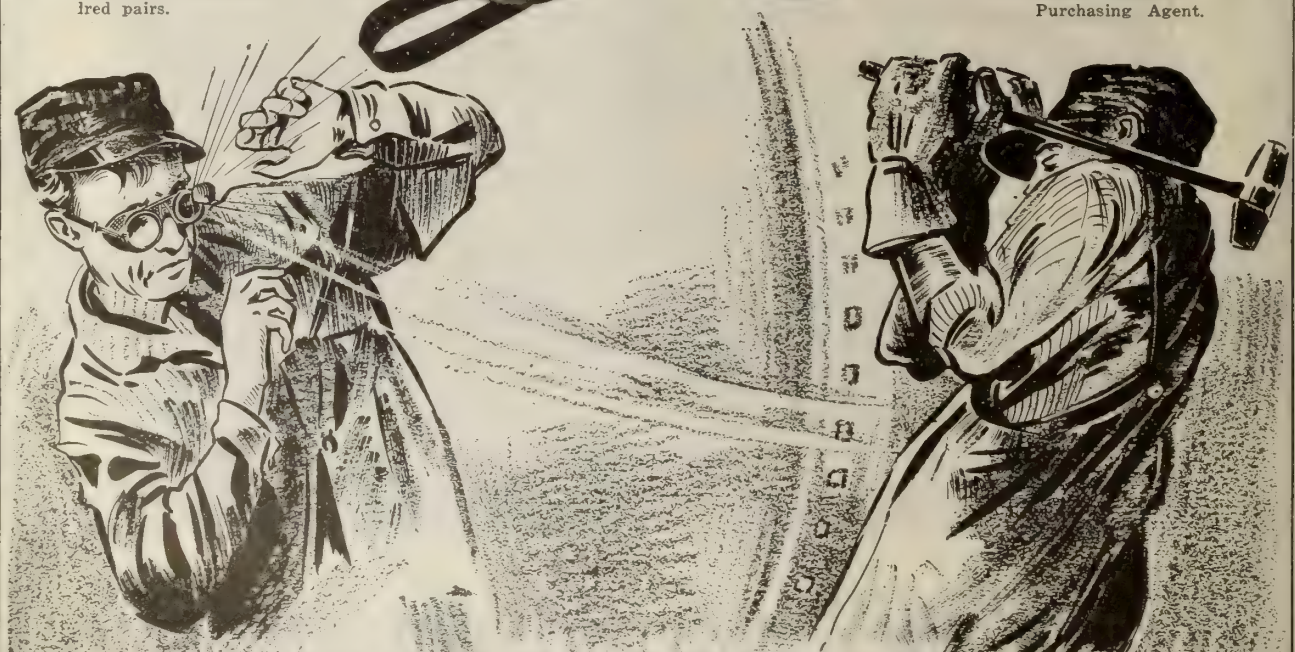
Made with elastic headbands as illustrated or with easy cable ear-bows at the same price.

Stoco safety goggles with Celoglas lenses, $150 per hundred pairs.

With regular heavy weight optical glass lenses, $115 per hundred pairs.



You are invited to test the Stoco goggles without expense or obligation. A sample will be sent free on request to any Superintendent, Safety Engineer or Purchasing Agent.



STANDARD OPTICAL CO.
GENEVA, N.Y.

BROWN'S

Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting. Extruded shapes.

Guaranteed Ingot Metals—Yellow, Red and Composition Ingots.
We are Purchasers of Copper Bearing Material.

Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

MALLEABLE AND CAST IRON PIPE FITTINGS

M

The Brand That Has The Quality

"Quality" and "Reliability" are two essentials demanded of *Cast Iron* and *Malleable Fittings*, by all sanitary and heating engineers.

Time and money are lost by improperly made fittings. All our cast iron and malleable fittings are properly recessed and every fitting bears the above trade-mark of quality.

We make a complete and full line of both flanged and threaded fittings from ⅛-inch up, and can make deliveries from stock, both standard and extra heavy.

When ordering from your jobber be sure you buy—"the brand that has the quality." They are different. A trial order will convince.

International Malleable Iron Company, Limited

Guelph, Ontario, Canada

Spot-Facing 20,400 Holes a Day

That is the output of this NATCO Multi-Driller. The proof is in the plant of the Lincoln Motor Co., Detroit, where many of these NATCO No. 32 machines are being used on Liberty Crank Cases. The NATCO shown above is in the act of spot-facing 68 holes of two sizes—50 holes 25/64 inch diameter and 18 holes 9/32 inch diameter.

A few weeks ago we showed how the NATCO No. 30 drilled 71 holes of varying diameters into the upper half of these Liberty Motor Crank Cases. The exclusive NATCO patented feature—**Independent Change of Speed for each Spindle**—provides the proper speed for each cutting tool and makes possible the drilling, reaming, tapping, spotfacing, etc., of many different sized holes in one operation.

NATCO Multi-Drillers are built in sizes suitable for every purpose—from 2 spindle types to machines containing 72 spindles.

LET US MAKE YOU PRODUCTION ESTIMATES

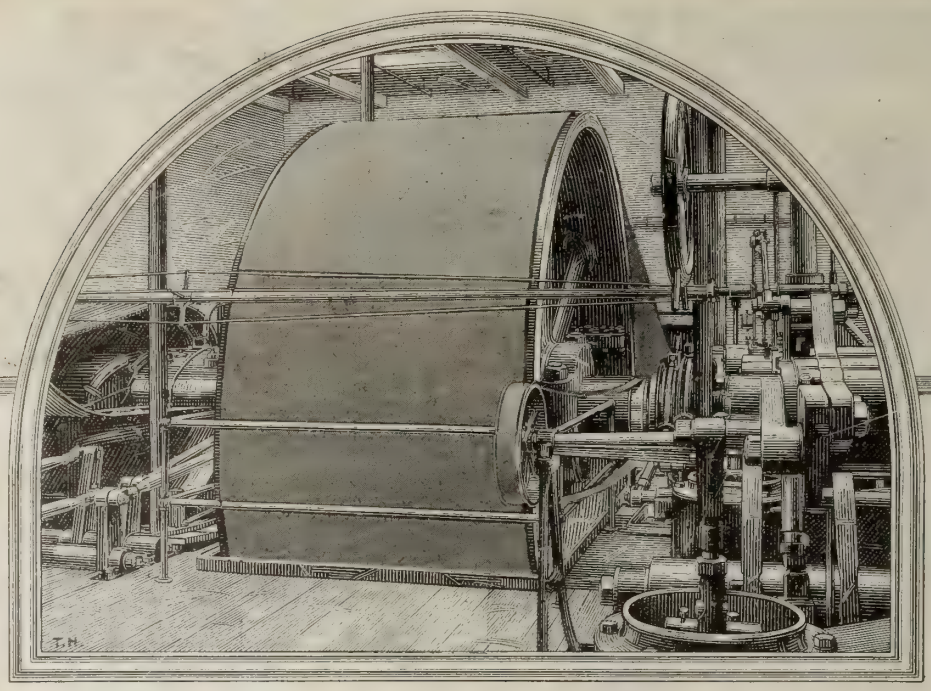
The National Automatic Tool Co.
Richmond Indiana, U. S. A.

NATCO

Foreign Agents:
Allied Machinery Co. of America, Italy, Spain, Portugal and Switzerland.
Aux Forges De Vulcain, France.

Foreign Agents;
Burton, Griffiths & Co., British Isles.
E. Isbecque & Co., Belgium;

CANADIAN AGENTS
The A.R. WILLIAMS MACHINERY COMPANY, LIMITED
TORONTO, MONTREAL, WINNIPEG, VANCOUVER, HALIFAX, ST JOHN, N.B. BUFFALO.



This is an 80-inch 3-ply Heart Brand Belt in a Massachusetts paper mill. It began its service in 1911. It carries 1,100 horse-power. The cost of transmitting a horse-power a week is $.0045.

The Test of Adaptability

For some materials there is no substitute. Such, for instance, is leather for belting. Its superiority for all the major requirements is recognized by transmission experts. The belt shown above, for instance, was transferred from one drive to another—lengthened by splicing, and cut down 2 inches in width—an adaptation that is possible only with leather.

The advantages of leather for transmission are developed to their maximum in Graton & Knight Standardized Series Leather Belts. They are that rare thing in business—a highest-quality line enjoying the largest sales. Do you know of any other brand in any highly competitive field that combines highest grade with biggest sale? Talk that over in your transmission conferences.

Write for booklet on standardization as applied to belting

THE GRATON & KNIGHT MFG. COMPANY

Worcester, Mass., U.S.A.

Oak Leather Tanners, Makers of Leather Belting, Lace Leather, Packings, and Specialties

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Canadian Graton & Knight, Ltd., Montreal. Canadian Representatives: The Canadian Fairbanks-Morse Co., Ltd., St. John, Montreal, Ottawa, Toronto, Hamilton, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria.

GRATON AND KNIGHT

GRATON & KNIGHT

Standardized Series

LEATHER BELTING

Tanned by us for belting use

Nichrome Castings for Heat Treatment

At 1800 degrees Fahrenheit

Cast Nichrome Carbonizing Boxes Give Thousands of Hours of Service

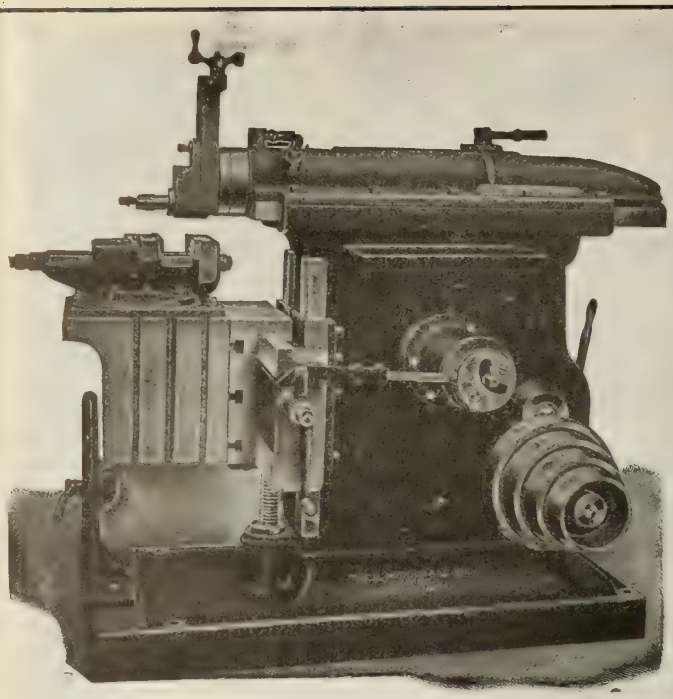
Case hardening is easy, reliable, and economical because CAST NICHROME containers are

NON-CRACKING
NON-GROWING
NON-SCALING
NON-WARPING

Their heat conductivity is high, and their life is guaranteed.

CANADIAN DRIVER-HARRIS CO., Ltd.
WALKERVILLE, ONT.
CANADA
CHICAGO
HARRISON, N. J.
MANCHESTER
ENGLAND

Manufactured under Henderson Patents



McDougall SHAPERS

Combine the best features of all machines which have hitherto been placed upon the market, and nothing has been included, except those points which experience has shown to be essential.

An examination of the construction will reveal features that make for increased production, ease of operation and accuracy.

Write for descriptive literature.

The R. McDougall Company Limited

Manufacturers

GALT, ONTARIO, CANADA

ARE-MAC-DEE IS A GUARANTEE

MacKINNON STEEL CO., LTD.

Engineers, Manufacturers and Erectors of Steel Structures

Industrial Bridges, Buildings, Towers, Smoke Flues and Stacks, Chutes, Coal Bins, Ore Bins, Tanks, Cranes, Engine Houses, Grain Elevators, Derricks.

Structural Steel and Steel Plate Work, and a combination of the two lines.

Prompt Deliveries Assured.

MacKINNON STEEL CO., LIMITED

Sherbrooke, Quebec

Montreal Office: 404 New Birks Building

Swedish Steel & Importing Co., Limited

Montreal
New York

Toronto
Denver

Direct representatives of foremost Swedish mills: makers of

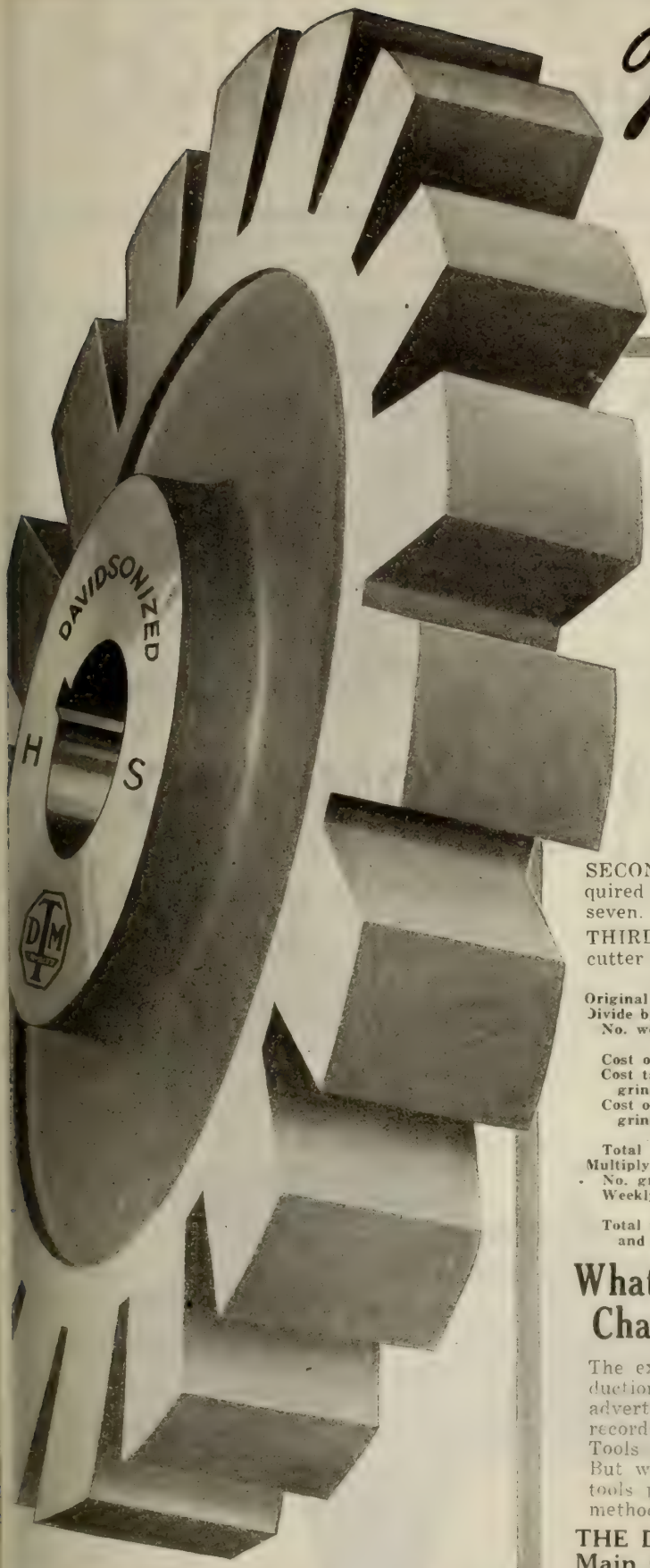
Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

What's the Percentage?



DTM CORP

HERE'S a simple little problem in tool costs, with a great big answer when applied to your own conditions.

FIRST—read this report on a Davidsonized Milling Cutter, from one of the best-known plants (name on request):

"The man on the machine where the cutter was tested says that it is the best cutter he ever had. He says it stood up for 19 hours without stopping and then could have been put into perfect shape with a little oil stone. The best they get out of their own cutters is between 10 and 11 hours.
"The material was cast steel, full of sand holes and chilled spots; the feed, ⅝-110-40."

SECOND—Consider that for every four grindings required by the Davidsonized Tool, their own tool required seven.

THIRD—Apply the same comparison to some milling cutter you are now using.

Your own tool.	Davidsonized tool
Original Cost of Tool....$.....	(Assume to be same as opposite) .....$.....
Divide by	
No. weeks of life	(75% more than opposite) .....
Cost of Tool per week..$.....	$.....
Cost take-down time per grinding	
Cost of grinding time per grinding	(Same as opposite).....$.....
	(Same as opposite).....$.....
Total cost per gr.....$.....	
Multiply by—	(Same as opposite).....$.....
No. grindings per wk...$.....	
Weekly cost of grinding	(4-7 of opposite) .....$....
Total weekly cost of tool and grinding .....$.....	$.....

What's the Percentage of Saving by Changing to Davidsonized Tools?

The example cited takes no account of the faster production made possible by Davidsonized Tools. In later advertisements we will cite more instances of actual records proving the extraordinary ability of Davidsonized Tools to cut production costs as well as tool costs. But why wait? Consult us now, and find what these tools produced by the new and revolutionary Davidson method can do for **you.**

THE DAVIDSON TOOL MFG. CORPORATION
Main Office : 118-122 Maiden Lane, New York
Works: 56-62 North 6th Street, Brooklyn, N. Y.

SPECIAL SERVICE

To Concerns Who Make Their Own Tools.

We will supply Davidsonized High Speed Steel Blanks, in the semi-finished state, hardened and finished within grinding sze (about .015 to .020 stock to be removed from working surfaces). This service enable the user to obtain these tools of unequaled quality at a cost which compares favorably with that of tools made from the solid bar.

THERE IS "A REASON WHY"

When Germany signed the Armistice, Walcott Lathe Company accepted cancellations of orders for Lathes amounting to hundreds of thousands of dollars. Not one cent of damage from the United States Government or anyone else was claimed on account of the cancellation.

YOU SAY, WHY

Because Walcott Lathes are standard equipment throughout. They are built and designed for manufacturing purposes in sizes to meet every requirement of your shop. Thus, we have had a constant increasing demand for Walcott Lathes for the past thirty-eight years, not from one section of the country, but from all over the world. Our business is good, and our plant is running full time, not a man idle.

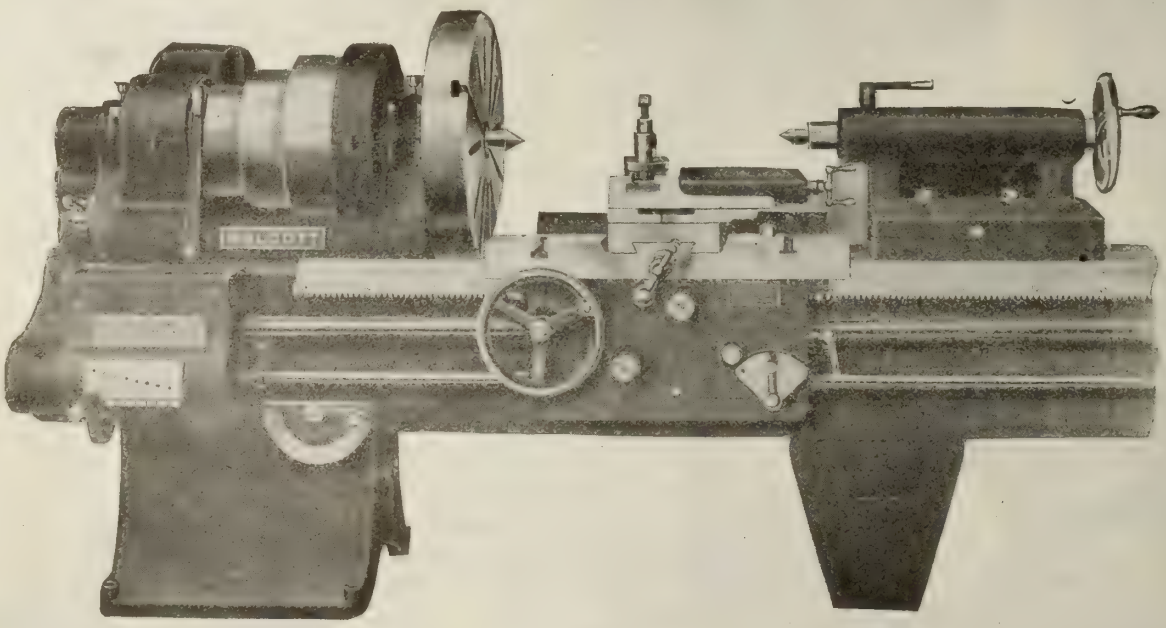
If you are interested in new Lathes, specify the WALCOTT, and you will find by their many advantages "The Reason Why."

WALCOTT LATHE COMPANY

Engine Lathes

140 Calhoun Street - JACKSON, MICHIGAN

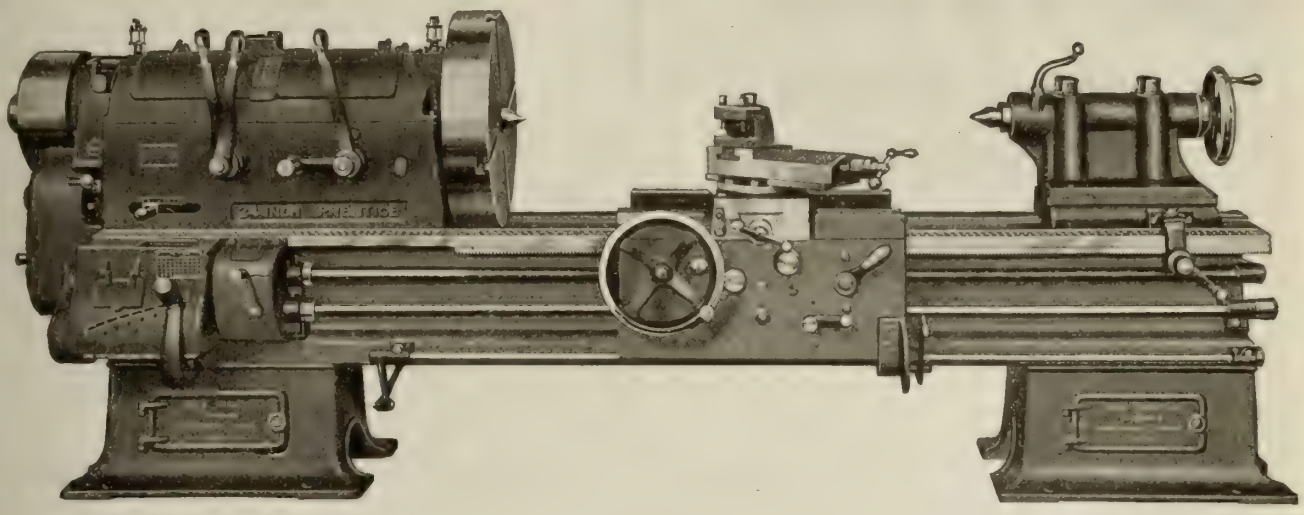
AGENTS:—Hill, Clark & Co., Chicago, Ill.. Frevert Machinery Co., New York City, N.Y. W. E. Shipley Machy. Co., Phildelphia, Pa. National Supply Co., Toledo, Ohio. Motch & Merryweather Machinery Co., Pittsburgh. H. A. Smith Machinery Co., Syracuse, N.Y. Wm. E Duff, York, Pa. Wm. E. Duff, Jacksonville, Fla. Brown-McDonald Machy. Co., St. Louis, Mo. Smith-Booth-Usher Co., Los Angeles, Calif. Hendrie-Bolthoff Mfg. Co. & Sup. Co., Denver, Col. Gordon & Finkbeiner, Portland, Ore. Northern Machinery Co., Minneapolis, Minn. Brownell Machinery Co., Providence, R.I. Chas. A. Strelinger Co., Detroit, Mich. Marshall & Huschart Machinery Co., Indianapolis, Ind. Fenwick, Freres & Co., Paris, France. Buck & Hickman, Ltd., London, England. Parke & Lacey Co., Sydney, N.S.W. Standard Machy. & Supplies, Ltd., Montreal, Que. Canadian Fairbanks-Morse Co., Ltd., Toronto, Ont.



REED-PRENTICE COMPANY

R-P

WORCESTER MASS. U.S.A.



WORTH WHILE THINKING OVER

"PRENTICE" GEARED HEAD LATHES APPEAL MOST STRONGLY TO THE THINKER. TO THE MAN WHO "JUST WANTS A LATHE" ALMOST ANY LATHE WILL SATISFY.

REED-PRENTICE MACHINE TOOLS WILL MEET YOUR MOST EXACTING STANDARDS OF ACCURACY—BUT, FURTHERMORE, GEARED HEAD "PRENTICE" LATHES WILL TURN OUT MORE WORK, WITH LESS EFFORT IN GENERAL PRODUCTION, THAN YOU CAN OTHERWISE ACCOMPLISH.

THE REASON FOR THIS IS THAT SPINDLE SPEEDS, FEEDS AND SCREW CHANGES CAN BE MADE INSTANTLY WITH SAFETY TO BOTH MACHINE AND OPERATOR.

YOUR INCREASED EARNINGS DUE TO THE RAPIDITY WITH WHICH THESE LATHES CAN BE MANIPULATED WILL BE CONSIDERABLE WHEN VIEWED OVER A YEAR'S TIME.

WE WILL BE GLAD TO GIVE YOU AMPLE PROOF OF OUR CLAIM.

CANADIAN FAIRBANKS-MORSE CO., ETD.
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES.

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 47A

Correct Work Speeds For Internal Grinding

The correct speed at which the work should rotate depends upon a good many details, such as the type of the machine used, the finish required, the condition of the work—that is, whether hard or soft—and the diameter of the hole as compared to the diameter of the wheel.

There is one point, however, of considerable importance and that is that the work should not run at the same speed for grinding a 3″ hole that it would for grinding a 1″ hole. Operators are apt to be very careless with regard to this point and seem to have an inclination to run the machine at the highest speed, irrespective of whether they are working on a small hole, say 1″ in diameter, or whether they are grinding a hole which is 2″, 3″ or 4″ in diameter.

The higher surface speed of the work having the large hole tends to break down the work face of the wheel and, consequently, the wheel then appears too soft, and to wear down too easily, whereas the difficulty is simply that the work rotates at too high a speed and if the speed of rotation is cut down so that the surface speed corresponds to that prevailing with the small hole, the action of the wheel will then correspond more nearly to the action of a wheel of similar grade on the small hole.

If instead of slowing down the work speed, a wheel of harder grade were selected, which does not cut as freely as the softer one would, then the time required for grinding will be increased and be actually longer than the time required with the softer wheel and a more moderate speed of the work.

Alundum wheels of the vitrified process are recommended for the internal grinding of hard and soft steel. For cast iron, semi-steel, brass and bronze, use Crystolon wheels.

NORTON COMPANY

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B. Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT.

NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 11 NO JEFFERSON ST.

NORTON

MARK YOUR PRODUCTS THE "MATTHEWS" WAY

"Matthews-made" steel stamps and lettering dies make easily read and durable marks on all classes of products. Matthews Champion Type Holders—for flat and convex surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years' experience.

Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

Canadian Fairbanks-Morse Co., Limited

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

IMPERIAL CARBIDE

For Welding Cutting and Lighting

HIGHEST GAS YIELD IMPERIAL CARBIDE MADE IN CANADA

Manufactured by

Union Carbide Co. of Canada, Ltd.

Head Office: Dominion Bank Bldg. TORONTO, ONT.

Works: WELLAND ONT.

Large Stocks maintained at convenient distributing centres throughout Canada

Grinding a Pull Back Ram for a 3000 Ton Hydraulic Press

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GIS

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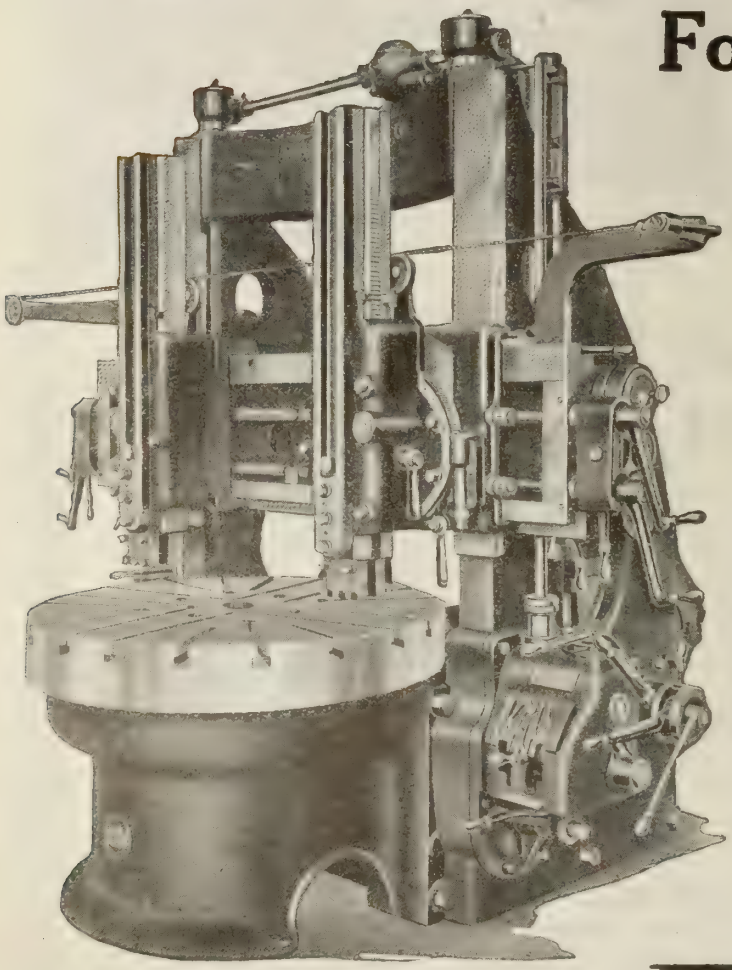

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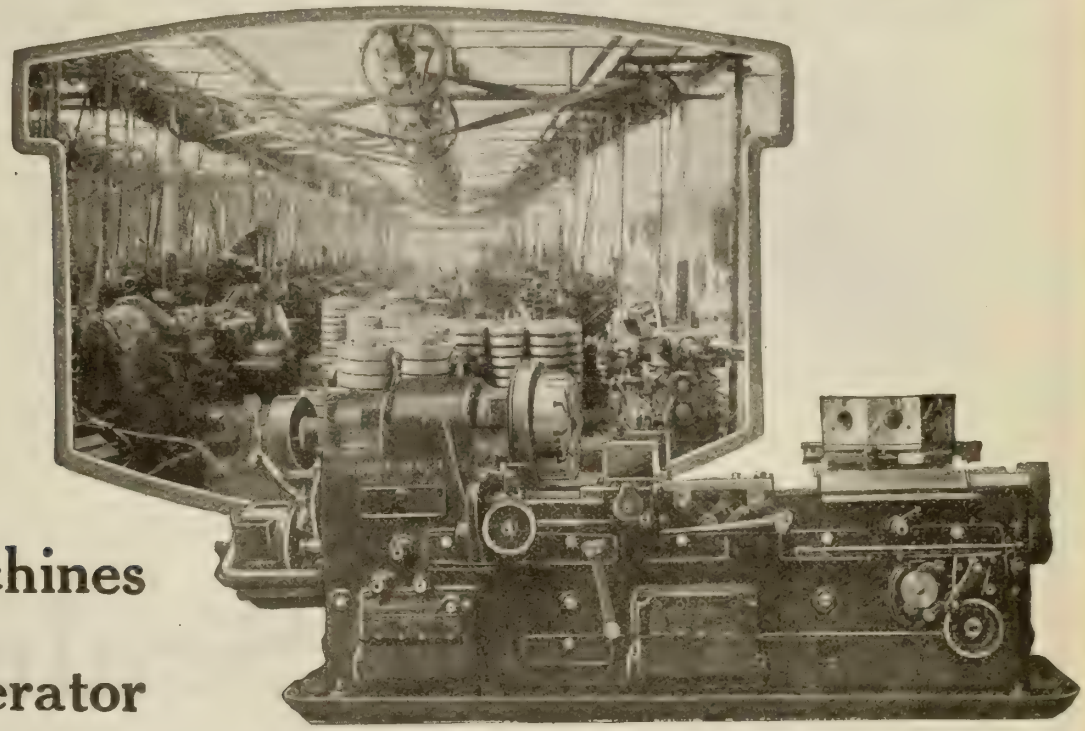

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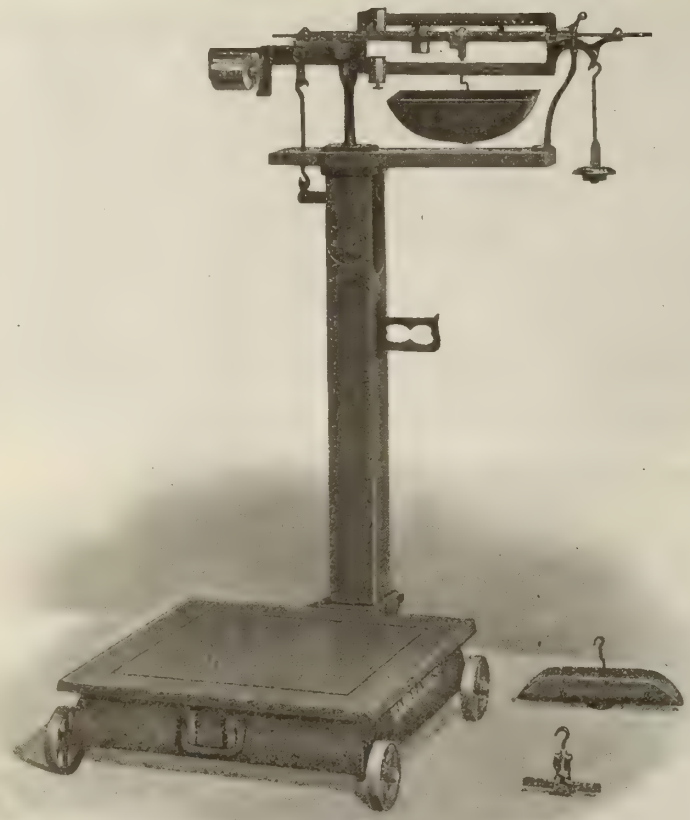

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CANADIAN MACHINERY AND MANUFACTURING NEWS

Volume XXI. No. 23. June 5, 1919

Making Steel in Canada

GREAT Ore Deposits in the Eastern Section of Canada — The Various Things That Enter into the Making of Our Steel—The First of a Series of Articles.

THE purpose of these articles is to describe accurately and in simple, non-technical language, the various steps and processes by which the finished steel product is produced. By finished steel product we mean the product of the steel mills, such as billets, bars, rails, structural beams and angles, steel plate, rods, wire, etc.

During the past four years many persons, both male and female, who previously had had nothing whatever to do with the iron and steel industry came in contact chiefly with the materials used in munition work, and many of them were led to ask questions concerning the materials they handled.

Their questions would be founded on the various terms they heard used from day to day. They would ask the difference between iron and steel, the meaning of "high carbon," "low carbon," and why steel, high in sulphur, should be looked upon as such a dangerous quantity.

They would ask what is a blooming mill, how do mills work, from whence came the forgings, the round bars, and why they had to be rolled, why they could not be made direct from the blast furnace, and what was the difference between open hearth steel and Bessemer steel, and what was the meaning of the duplex process, etc., etc.

It is with the intention of bringing information to such inquiring minds, and of shedding more light to those who are better acquainted with one process, but not with the whole, that these articles are written.

Of the importance of steel little need be said. Steel and civilization go hand in hand. Take steel from our modern life and we return at once to the ages of barbarism. Transportation systems would break down, education, without printing, would be very nigh impossible, and printing without steel could not be effected.

At a meeting of an agricultural society, held not long ago, one of the leading men made the statement that civilization was dependent upon agriculture, but he forgot to state that without the steel industry modern methods could not be employed with regard to that most important industry. Right here let us give credit to the coal industry upon which even the steel business to-day is dependent.

Practices in Canadian Plants

We are not concerned just now with the historical side of the iron and steel industry—deeply interesting though that study is—we are going to deal with modern methods and in particular with the methods as practised in Canadian plants. The war has put the iron and steel industry in Canada on a basis that could not have been obtained in ten years of peace. Companies that doubted their own ability, that doubted the energy and enterprise of their men, have been forced because of war conditions to venture their all, and to take steps, sometimes chances, that otherwise they would not have dared to take,—and let it be here recorded that in the majority of instances the results have absolutely justified the means.

Our subject is a large one. We will try to handle it in a manner as to be interesting as well as instructive. As far as possible we will describe the various processes in their correct order or sequence.

We must first have raw materials. The most important are—iron ore, coke, and limestone.

Iron Ore the Basic Material

Iron ore is the basis of all iron and steel products. Iron itself is one of the most common elements in nature. It has been stated that between four and five per cent. of

the earth's crust is composed of this element in one form or another.

Iron is seldom, or never, found in its pure condition. It is usually found as an oxide of iron. By an oxide we mean that an affinity has taken place between the native iron and oxygen, resulting in an oxide of iron, or to put it crudely—iron rust. The iron ore will contain anywhere from twenty-five to seventy-five per cent. of iron.

Iron ores may be divided roughly into four principal different kinds: Magnetite, Hematite, Limonite, and Siderite.

Magnetite ore is so named because of its magnetic properties. It is one of the purest ores known. There are some magnetite deposits worked in the United States, but the largest deposits at present in operation are situated in Norway and Sweden.

Hematite ore is generally of a reddish color. Good hematite ore will run between sixty and seventy per cent. iron. It is particularly suited to blast furnace operation, as it contains very little moisture, and what moisture it contains can be readily driven off at a low temperature. A large percentage of the ore mined and used in the United States is of this variety, and practically all of the ore used by the large steel companies in the Eastern Provinces of Canada is hematite ore.

Limonite ore is of a brownish to reddish-black color. It runs between fifty-five to sixty per cent. iron.

Siderite ore is of a light gray color. It contains between forty and fifty-five per cent. iron, and has a high moisture content. Siderite ore usually requires a previous treatment, such as roasting, before reducing in the blast furnace. A large deposit of siderite ore is at present being worked by the Algoma Steel Company, near Michipicoten, Ontario.

Not Much Iron Ore Mined

Iron ore has been found and mined in New Brunswick, Nova Scotia, Quebec, Ontario and British Columbia. The output of iron ore in New Brunswick never amounted to very much. Nova Scotia has produced as large as 100,000 tons in one year, but of late has dwindled down to almost nothing. Quebec never produced more than 22,000 tons per year, and in 1916 produced only about 3,000 tons. Ontario, starting with a very small amount, has increased its shipments to 400,000 tons per year. British Columbia has not produced any ore since 1907. The total amount of ore produced in Canada in 1916 was about 600,000 tons, and yet compare this small tonnage of ore produced with the fact that in 1913 (before war conditions) Canada imported from other countries iron and steel products to the value of $145,226,972.00. At an average value of fifty dollars per ton this would mean nearly 3,000,000 tons of steel, or five times the tonnage of ore the country produces.

Although Canada herself produces so little iron ore at the present time, her sister colony, Newfoundland, is much more favorably situated.

Newfoundland is a rocky, rugged island, to the east of Canada. It has been called "the Norway of Canada." The coast is formed of high cliffs, rocky promontories, and deep gorges. The whole aspect of the country suggests the upheaval of nature, which usually results in mineral deposits of great value. The people of this island for very many years did not realize the value of deposits. They are an honest, simple folk, and earn their living by fishing, and some farming in the interior. A story that has often been told, and will bear repeating, will illustrate the knowledge of the general people upon mineralogy, etc.

An Englishman, touring probably, visited Newfoundland. One morning he took a stroll along the coast, and stopped to discuss the weather, etc., with one of the natives, who happened along. The following conversation ensued:

Englishman.—"Pretty rocky coast you have around here. Has it always been like this?"

Fisherman.—"Yessir, yessir, — allays been like dis since I recommember."

Englishman.—"Hm! Probably so. But there's been an earthquake or some great upheaval of nature sometime or other?"

Fisherman.—"Nossir, nossir, — not whilst we been here."

Englishman.—Getting rather wrathy at the contradiction, and wishing to get some information on the subject, —"But, my dear man, you're wrong! Do you mean to tell me that there has never been an earthquake here? I am sure there has!"

Fisherman.—By this time doubting his own knowledge, scratched his head, and replied,—"Well sir, now I come to think on't, sir, I do believe you're right, sir. I did hear tell that Cap'n Skipp'r Jones caught one in his nets the other night. Yes, sir, he did!"

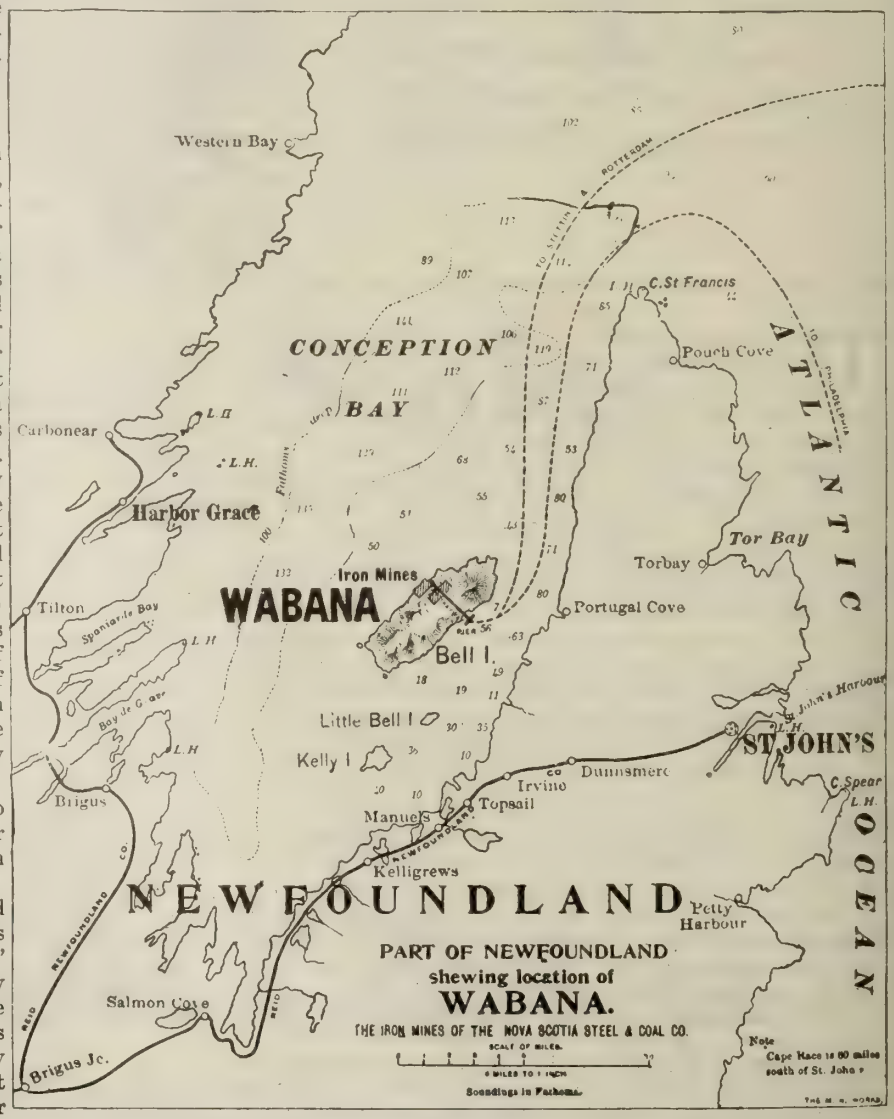


FIG. 2- LOCATION OF ISLAND AND WORKINGS.

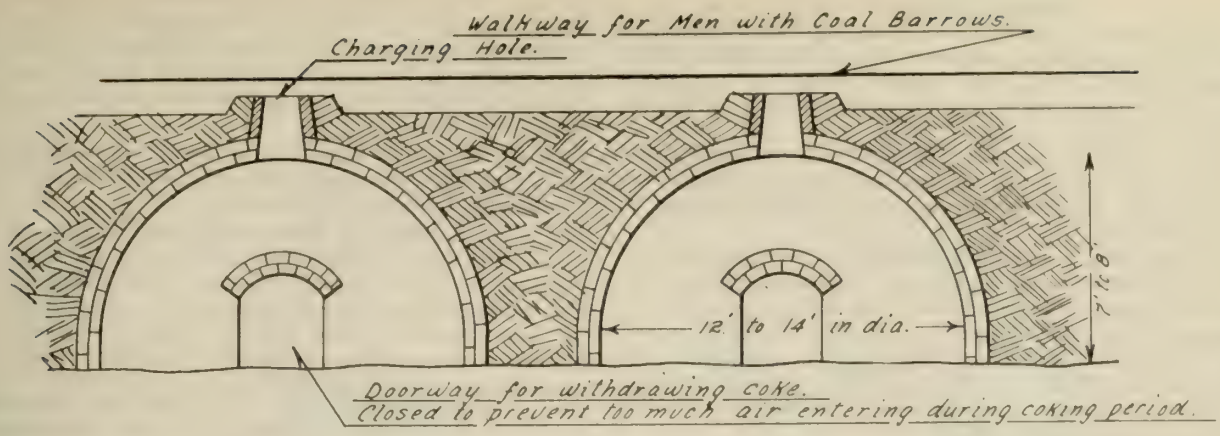


FIG. 4—BEE HIVE COKE OVENS.

Where the Big Output is Located

On the eastern shore of this island there is a deep inlet, known as Concepcion Bay. Up the bay there is an island, known as Belle Isle, so called from a peculiarly shaped rock situated at one end. But for this island, one of the most valuable and important deposits of iron in the world would have remained unknown, for its northern shore forms a suitable place for the outcropping of the ore beds to expose themselves. The mine has been named "Wabana." This is an Indian word, the literal translation of which is "the easternmost place on the continent," the real word being "Waban," meaning "light," and "Woban," meaning "daylight."

See Fig. 1 and 2 for the location of island and the workings.

The outcrop of hematite ore on the shores of the island does not seem to have attracted very much attention until 1893, when the mining rights were purchased by the Nova Scotia Steel & Coal Company, Ltd., from Messrs. Butler, of Topsail, Newfoundland. This company, whose history is closely interwoven with the history of the steel industry of Canada, commenced at once to develop their holdings on the island, and on Christmas Day, 1895, the first shipment of ore was made to the company's blast furnace, then stationed at Ferrona Junction, Pictou County, Nova Scotia. Since this day the Wabana Mines have been in continuous operation and approximately 17,000,000 tons of ore have been extracted. Some idea of the tremendous amount of ore available in this deposit may be realized when we remember that Mr. James P. Howley, F.G.S., the director of the Newfoundland Geographical Service, stated that the Wabana basin contained in his opinion, 3,635,000,000 tons of ore. This deposit, the pioneer work connected with which was undertaken by the "Scotia" Company, was afterwards sub-divided to enable the Dominion Iron & Steel Company, which was formed in 1899, to have a share.

In the early years the ore was mined by simply attacking the outcroppings, as in an ordinary stone quarry. As time went on and the amount of "cover" over the deposit became greater, due to the dip of the seams, stripping was resorted to. Later on still tunnels and shafts were sunk, extending to two or three miles under the waters of the bay. The ore is mined by what is known as the room and pillar system. That is to say, at various distances along the main tunnel, headings are driven off at right angles. Off these headings rooms are opened parallel to the main tunnel. The rooms are located about 35 feet apart and are 15 feet wide, and are thus separated by a solid pillar, 20 feet in thickness. Every 40 feet this pillar is broken through, connecting the rooms together. The ore is loaded into cars and by means of a haulage system conveyed to the surface. At the surface the necessary plant is situated for crushing and loading into other cars, by means of which it is transported to the other side of the island, where the storage docks and shipping piers are situated. Few people have any idea of the loading facilities which have been developed by the companies concerned at Wabana. Ore has been loaded at the rate of 2 200 tons per hour through a single chute, and on occasions when two chutes could be used simultaneously, 12,500 tons have been loaded in 3½ hours.

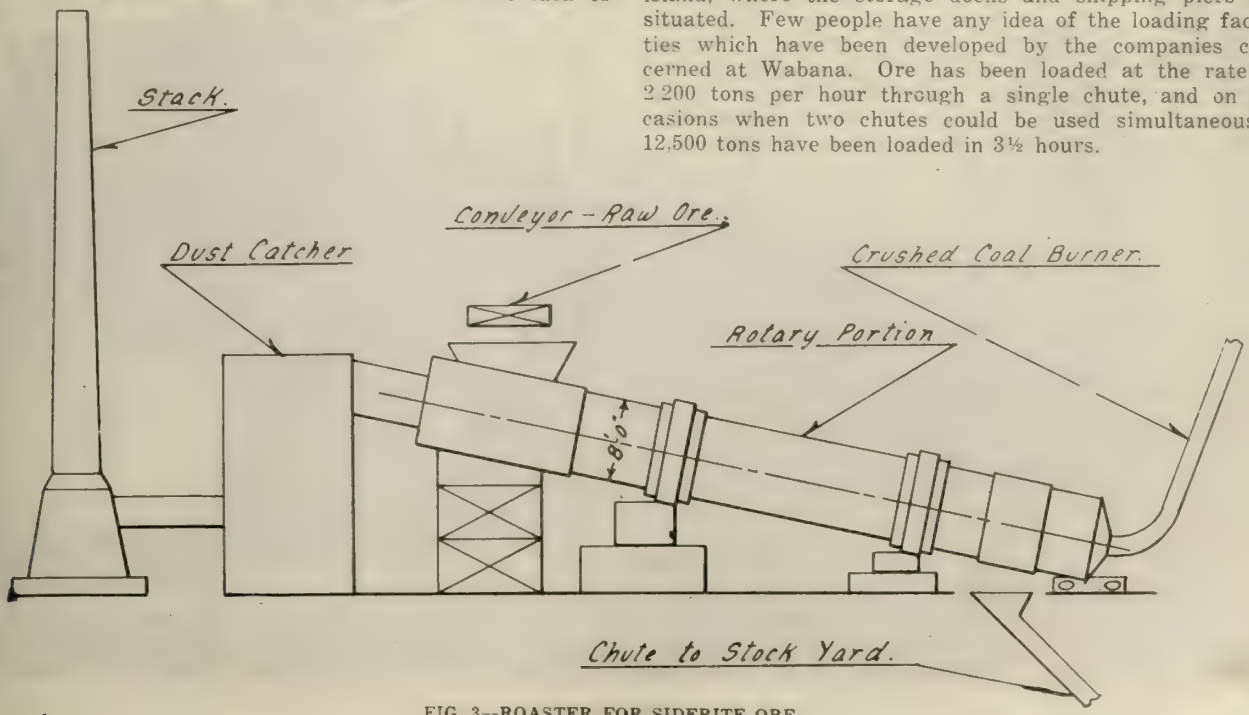


FIG. 3—ROASTER FOR SIDERITE ORE.

Shipping The Iron Ore

In the case of the Dominion Iron and Steel Company, the ore is conveyed by steamers direct to Sydney, Nova Scotia, 412 miles from the island. Here it is unloaded by modern unloading machines and conveyed by means of cars to the stock pile.

In the case of the Nova Scotia Steel and Coal Company, the ore boats are unloaded at North Sydney, and the ore taken by means of cars to the blast furnaces at Sydney Mines.

Coming back to Canada,—it must be remembered that the vast deposits just previously described belong entirely to Newfoundland—we find that the only deposits at present being worked to any large extent are the "Helen" and "Magpie" Mines near Michipicoten, Ontario. The ore from the "Helen" mine is of the magnetite variety, but high in sulphur. The ore from the "Magpie" mine is of the siderite variety. It contains about thirty-four per cent. metallic iron content.

In order to reduce the bulk of the material to be handled in the blast furnace, and to drive off some of the other objectionable ingredients, this ore is roasted.

The roasting process consists in passing the ore through an inclined rotary kiln, about eight feet diameter, and one hundred and twenty-five feet long. The kilns are fired with pulverized coal. The roasted ore passes out from the kiln to a stockyard where it is handled by overhead cranes, into cars and sent to the blast furnace. The diagram Fig. 3 will assist to make clear this process.

Other Canadian Ore Deposits

There are many other ore deposits in Canada, but, owing to the nature of the ore and their situation they are not at present widely worked. If the reader desires a more detailed description of the iron ore occurrences in Canada, he should send to the Department of Mines, Ottawa, for some of the publications that are available on the subject.

The difficulty with regard to smelting low grade high sulphurous ores is one of the problems that confronts the steel works engineer of the future. Some one of the rising generation is going to attack the problem and find the solution—it should be a Canadian, trained in one of our own schools.

We have also to learn how to use our low grade coals and to consider the possibilities of peat as a fuel, and a producer of important by-products.

Up to this time we have simply been taking ore as a single substance. Let us now look at it a little closer and see what it is composed of. There is, first of all, the iron, and the oxygen, which has taken such a strong affinity to it. This we have called oxide of iron. The oxygen has got to be divorced from it so that the pure metallic iron can become available. There is also a number of other earthy substances, such as silica, alumina, phosphoric acid, lime, manganese, sulphur. All these substances are known by the name of "gangue." They have to be gotten rid of before the iron can be used for industrial purposes. When the nature of the ore demands it, some are expelled by roasting, but in the majority of cases the work is done in the blast furnace.

Let us examine some of these impurities a little closer, and see what they really are:

Silica is a portion of the earth's crust, a species of sand. If allowed to continue in the metal it causes planes of weakness, and the product would be unreliable.

Sulphur is one of the worst impurities that the steel maker has to contend with. It causes what is known as "red-shortness," that is to say, the material is brittle when at red heat. High sulphur billets, instead of being ductile, and rolling with ease into various shaped bars, frequently break and crumble. Sulphur is usually limited to .05 per cent. in good grades of steel.

Phosphorus produces what is known as "cold-shortness." This is the very opposite to "red-shortness," and

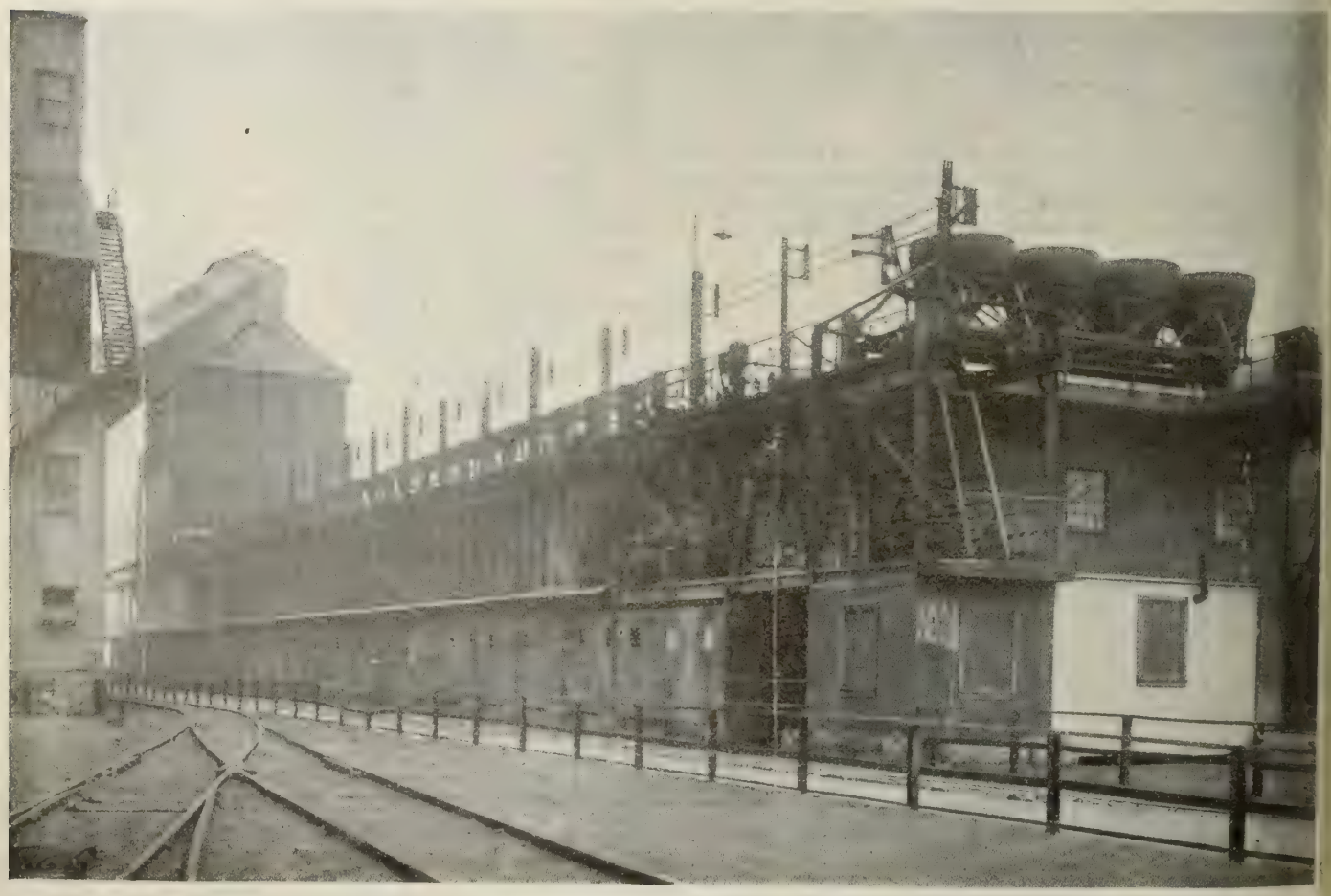


FIG. 6.

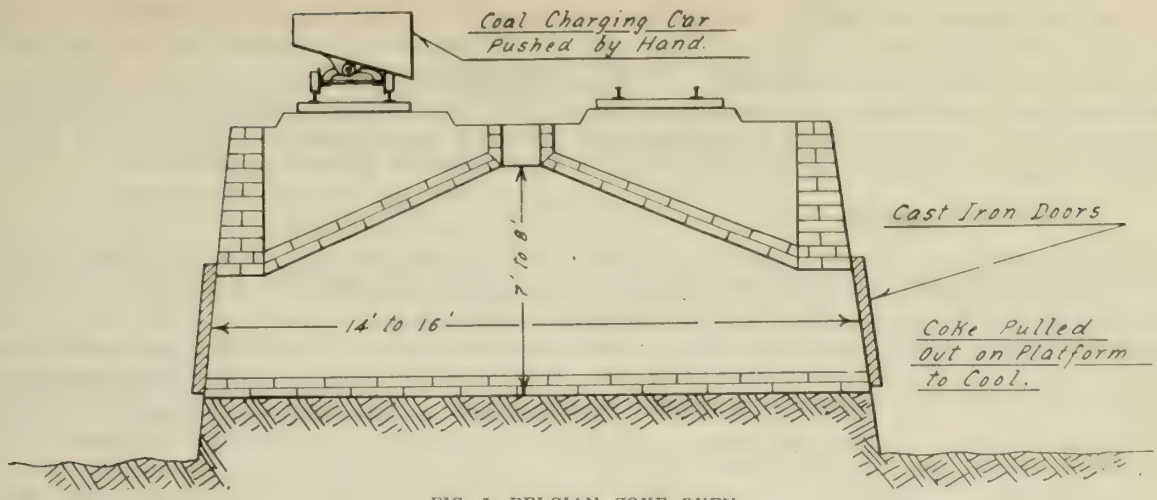


FIG. 5—BELGIAN COKE OVEN.

means that while the material can be worked when hot, yet is to a certain extent very brittle when cold.

Manganese is desirable as it strengthens and adds a certain wearing quality to the steel up to a certain point. Above that point, however, it produces a brittleness. In ordinary steel it is kept down to .03 per cent. or .05 per cent.

We have not touched in the above on the subject of carbon. The amount of carbon in the blast furnace product varies from 2½ to 3½ per cent., and in determining the ultimate use and strength of the finished product a few points difference in the carbon content makes a vast difference.

As we are only dealing with ore, the subject of carbon, sulphur, phosphorus, manganese, etc., will be left now until we again consider them in their proper places.

Having now mined our ore, crushed it, delivered it to the steamer, unloaded and transported it to the stock pile at the blast furnace, we will consider briefly coke and lime before describing the blast furnace.

Coke

Charcoal and coal were both used for blast furnace fuel in the early days, but for modern furnaces of large capacity whole districts would have to be laid waste to provide charcoal for a single year's service.

For a few small furnaces, working on special iron, charcoal is still preferred, on account of its freedom from impurities.

Coal packs too tightly in the furnace stack and prevents the blast and gases from passing upward. Some furnaces are working on a mixture of coke and anthracite coal.

The ideal fuel for a furnace must be free from foreign matter, fairly open in structure, to allow of gas passage, and strong to stand the weight of sixty to eighty feet of ore and fuel. Good coke is the answer, but never yet have I heard a furnace superintendent speak of the coke he received as good.

All Coal Will Not Coke

To make coke you must have coal, and coal of the right kind. All coal will not coke—just why no one seems to know exactly.

Coking consists of heating the coal and thus driving off the volatile or gas portion, the residue consisting chiefly of carbon, ash, a little sulphur, and is termed coke.

As a general rule, 2 000 pounds of coal will make 1,400 pounds of coke, that is to say, 30 per cent. volatile is driven off.

Now let us consider what happens to coal when it is heated in any kind of coke oven.

First, like most other substances, heat causes expansion, then the coal softens, and it becomes a tarry mass, gas forms and passes upward, causing passages in this substance, and as the gas passes away it hardens, leaving a hard open grained material.

Coke is made in ovens. The crudest type is the Beehive. (See Fig. 4). One oven helps to heat the other as they are charged alternately.

These ovens were in many cases charged by hand and coke pulled out by hand and quenched by hand, then forked into cars by hand, and if you wish to know what hard work is—try forking coke for eight hours.

The next step was the Belgian oven. (See Fig. 5). Charged by an overhead car or lorry in most cases but still pulled by hand, but from both sides. Due to shape more heat was obtained from adjoining ovens, and less time and heat was lost in charging and taking out the finished coke.

FIG. 8—ANOTHER VIEW OF THE PLANT.

The next form of oven was built by many firms, it was a step in the right direction, but not quite far enough. The oven was charged by machinery—a pusher was introduced, and some of the gas was used to heat the ovens, but still the valuable surplus gas was allowed to be burned or wasted without giving up its by-products.

The Modern Coking Plant

A modern coke plant is a beautiful sight for an engineer to look upon. He sees the coal coming by rail or water, passing over silent running conveyor to the storage bin, taken from the bin with the regularity of clockwork and fed to the ovens without the touch of men's hands. He sees a machine take off a heavy oven door with the same care as a mother handles her child, the pusher with its ram, fifty to sixty feet long, pushes out seven to eight tons of red hot coke into a waiting car, the car under its own power starts off for a gigantic shower bath, and then spills the coke onto an inspection bed before the eye of the man who has planned to make these machines obey his will.

From the bed it slides onto belts and over screens to the cars.

The whole picture is one of power and regularity of movement, and one who has seen the wasted energy of olden methods, only ten years ago, cannot fail to marvel at the progress. (See Figs. 6, 7 and 8).

The early ovens produced four tons of coke in ninety-six hours, a modern oven will produce eight tons in sixteen hours.

Nothing has been said of by-products. In the modern plant every cubic foot of gas is passed through coolers, absorbers, etc., to extract the sulphates, benzols, tars, etc.

In many cases the products pay for the coal and the coke is obtained free.

But with all this we have no business. Our subject is steel, and our only use for coke is to melt the ore. We have described the process roughly so that the reader may know from whence the coke comes.

The most modern plant in Canada is located at Sydney, N.S., but both the Steel Company of Canada at Hamilton, and the Algoma Steel Corporation at the Soo, have good plants.

We now have our ore and coke, what more is required? Limestone. We said there were earthy matters with the ore, they must be caused to become liquid and float on top of the iron at the bottom of the furnace (the hearth it is called), so that it may be drained away.

A certain amount of crushed limestone renders this possible, and the foreign matter or gangue combine with the limestone and form a fluid slag.

There is, of course, a chemical reason for this, but we are concerned only with materials now.

Limestone is obtained from quarries in the usual manner—drilling and blasting, crushed, and conveyed to cars.

Now, we have all our materials, the proportions vary with the nature of each, say, 20,000 pounds of ore; 10,000 pounds of coke; 5,000 pounds of limestone.

We will next consider in more detail the largest piece of mechanical apparatus known—a modern blast furnace.

Credit must be given for some of the information with regard to Wabana to a book published by the N. S. S. & Coal Co.

To be continued.

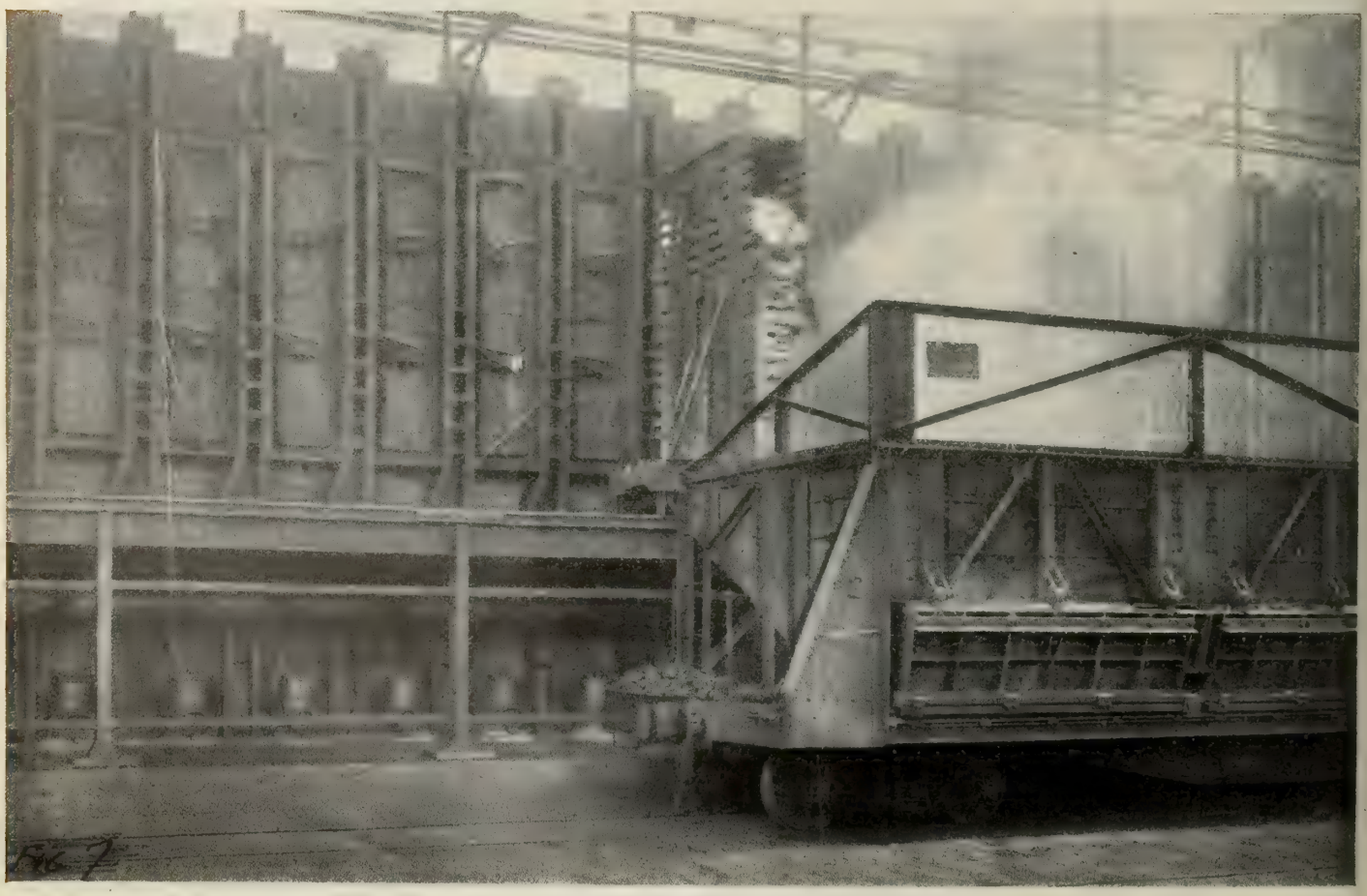


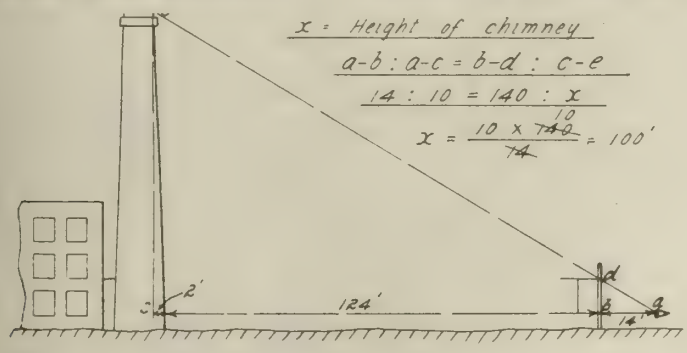
FIG. 7—DISCHARGING COKE INTO THE CAR PRIOR TO COOLING.

Shop Arithmetic Proportion and Ratio

Sixth of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinists' Trade—The Present Article Goes Still Further Into the Subject as Above Mentioned

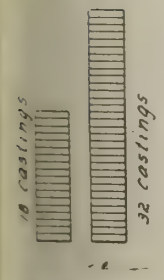
By J. H. RODGERS

BEFORE proceeding further with the subject of ratio and proportion it might be well to give a few practical examples that will demonstrate the alue of this important section of mathmatics. Suppose it is desired to find he approximate height of a chimney for he purpose of determining the draft onditions under which a furnace is oprating. By the rule set forth in the revious lesson it was shown that the elative length of lines can be readily ound by the principles involved in the olution of right triangles. To more learly indicate the method of procedure he sketch below is given. At a meaured distance (say 120 feet) from the ase of the stack, place a staff vertically n the ground, and at any suitable disance from this rod a man may get a ight line to the top of the chimney, nd with the various guide points, will e able to calculate the height of the tack. As seen in the sketch the right riangle is formed by the horizontal line t the height of the eye, the vertical line f the stack and the oblique sight line. The known ratio is the distance of the nan from the staff to the height of that ortion included between the sight lines; hat is, 8:6. Then with the distance rom the staff to the stack known, the nknown term, the height of the chimey, may be found by the proportion:



Adding the height below the horizontal sight line the total height of the chimney would be 96+5=101 feet.

If 100 lbs. of metal is used to make 18 castings, what quantity would be required to make 32 castings of the same design? Representing the unknown quantity by X the proportion becomes:

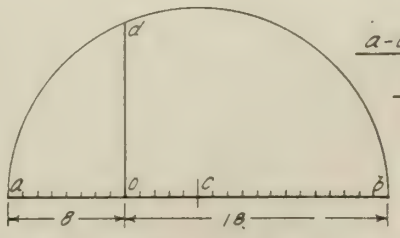


18 : 32 = 100 : X

$$X = \frac{32 \times 100}{18} = \frac{1600}{9} = 177.8$$

A proportion that is sometimes required in solving shop problems is that of mean proportion: that is, where one value is to the second as the second is to the third. In other words, the two mean terms are of the same value, as: a:b=b:c or 2:4=4:8. When it is desired to find a mean proportion between two numbers it is found by extracting the square root of the sum of the two known values. For instance, the mean proportion between the two numbers 8 and 18 could be calculated thus: X equalling the unknown term.

Further explanation will be given in the instruction on involution and evolution.



A mean proportion may be graphically determined by a simple geometrical figure. Using the above proportion as an example, and taking a unit of ¼ inch

With c as a centre and a radius c-a, describe the semicircle as shown.

From the juncture of the two initial as the base value of the numbers given,

8 : X = X : 18 or X x X = 8 x 18 or

$X^2 = 8 \times 18 = 144$ and

$X = \sqrt{144} = 12$

Proof 8 : X = X : 18 8 : 12 = 12 : 18

8 x 18 = 12 x 12 = 144.

draw a straight line, a-b, equal to the sum of the two given terms and bisect (divide equally in two) at the point C. lines, or the point o, erect a line perpendicular to the line a-b, intersecting the semicircle at the point d. Then the line o-d will be a mean proportion between the two given values 8 and 18, and will be found by measurement to be 12 units in length.

a-o : o-d = o-d : o-b

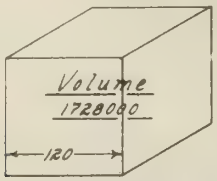
8 : 12 = 12 : 18

As the elements of ratio and proportion will be considered continually throughout the course, we will not dwell on the subject at this time, but sufficient has been said to give one a fairly clear conception of the fundamental application as it affects shop problems, and a little thought will enable anyone to apply it whenever the necessity arises.

Involution and Evolution

An element that is extensively used in mathematical calculations is that of finding certain powers and roots of numbers, the processes respectively called involution and evolution. The power of a number may be found by simply multiplying the number by itself the required number of times; for instance, the second power (square) of a number is found by multiplying the number by itself, once. The third power (cube) by multiplying the number by itself, twice,

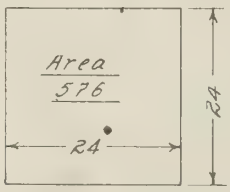
etc. The square of 3 would be 3x3=9. The cube of three would be 3x3x3=27. The fifth power would be 3x3x3x3x3=243. The cube of 120 would be:



$$120 \times 120 \times 120 = 1728000$$

$$\begin{array}{r} 120 \\ 120 \\ \hline 14400 \\ 120 \\ \hline 1728000 \end{array}$$

In nearly all engineering text-books brevity is the keynote of the contents. Rules and methods are invariably given in the form of symbols, characters and formulae for the convenience and ready reference of the readers, so that he is able to grasp the intended meaning without the long preamble of words and phrases. This, however, while being of vital importance to the experienced man, technically, is frequently very confusing to the young mechanic or student who has, for many reasons, been unable or perhaps unwilling to take the trouble to study the actual meaning and application of some of these apparently complex expressions. A little later we will endeavor to make clear the purpose of some of the various symbols and formulae that are often met with in technical and trade papers, and too frequently passed over by many readers as beyond their understanding. Very often a rule of phrase can be expressed by the use of a letter or figure placed in a relative position to the primary number. In working on involution the expression "the square of 9" would be abbreviated to 9^2, the small figure 2 called the exponent, placed to the upper right of the prime number. The square of 48 would be expressed:



$$24^2 = 24 \times 24 = 576$$

$$\begin{array}{r} 24 \\ 24 \\ \hline 96 \\ 48 \\ \hline 576 \end{array}$$

The principle of raising a number to a certain power is the same irrespective of the character of the number. Suppose the fraction ⅜ is to be cubed, the solution would be: ⅜=⅜x⅜x⅜=27-512.

The expression ⅜ is placed in brackets to signify that the fraction is to be cubed. If the expression was ⅜, it would imply that the 3 was to be cubed, and the product divided by 8, so that care must be exercised in reading and expressing the figures. In the complex fraction:

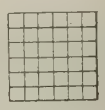
$$\left(\frac{\frac{1}{2} \text{ of } 6}{3(6-1)}\right)^2$$

it is seen that the final result of the division is to be squared. In work of this description the easiest way is to simplify the problem by a process of calculations treating each section separately, gradually eliminating the brackets, always commencing with the smallest. The solution of the above would be:

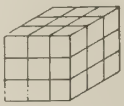
$$\left(\frac{\frac{1}{2} \text{ of } 6}{3(6-1)}\right)^2 = \left(\frac{\frac{1}{2} \text{ of } 6}{3 \times 5}\right)^2 = \left(\frac{3}{15}\right)^2 = \left(\frac{1}{5}\right)^2 = \frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$$

The reverse of involution, or the process of finding the root of a number that is considered a power, is called evolution. The square root of a number is the number that, when used twice as a factor, will produce that number. Thus, 5 is the square root of 25, because 5x5=25. The cube root of a number is the number that, when used three times as a factor, will produce the number. Thus, 4 is the cube root of 64, because 4x4x4=64. When the root of a number is to be extracted it is generally indicated by the radical sign (√) placed before the number, and a small number placed above the left of the sign indicating the root required. When used alone this sign implies that the square root is desired, and seldom is the index 2 used in calculations. A few examples will assist in showing the use of the sign:

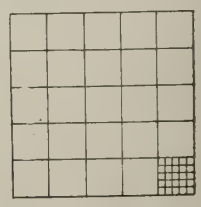
$\sqrt{4} = 2$ as $2 \times 2 = 4$



$\sqrt{36} = 6$ as $6 \times 6 = 36$



$\sqrt[3]{27} = 3$ as $3 \times 3 \times 3 = 27$

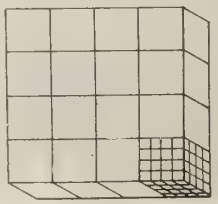


$\sqrt[4]{625} = 5$ as

$5^4 = 5^2 \times 5^2$

$5^4 = 5 \times 5 \times 5 \times 5 =$

625



$\sqrt[6]{4096} = 4$ as $4^6 = 4096$

$4^6 = 4^3 \times 4^2 = 4096$

In involution or the raising of a number to a certain power, the process is on of simple multiplication, but in findin the roots of numbers the calculation involved are more complex but compara tively easy once the method is under stood, and as engineering practice re quires a knowledge of root extraction brief treatise may be of value to th younger element.

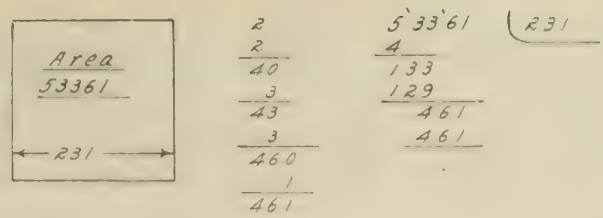
In evolution it should be remembere that the number of figures in the roo will depend upon the power of the num ber. The square root will contain hal the number of figures; the cube roo one third the number of figures, etc In other words the largest number tha can be written with one figure is 9 an the square of it is 81, two figures. Th largest number expressed with two fig ures is 99 and the square of it is 9801 four figures. Therefore, in extractin the square root of a number it is genera practice to divide the number into pe iods, each period having two figure commencing from the unit or right han figure. Suppose we wish to find th square root of 53,361, the work woul be performed as on page 575.

In explanation of the above it will b seen that the number is divided into thre periods, signifying that the root wil have three figures. The first detail i to find a number whose square is equa to or less than the number represented b the first period (5). This is found to b 2, and this will be the first figure of th root and is placed to the right of th number, as in ordinary division. Thi number 2 is likewise placed to the ex treme left, and the product of the tw placed beneath the first period of th number. Subtract the 4 from the 5 an bring down the two figures in the nex period. Add the first figure of the roo to the left hand column, obtaining 4 an multiplying this by 10 by annexing cipher. This last result will be the tria divisor. Trying this into the new divi dend (133) it is seen that it will go

imes; this will be the second figure of he root. Add this to the trial divisor nd obtain 43 as the true divisor. Mul-iply this by the second figure of the oot and place the result beneath the ividend 133 and subtract. Bring down e figures in the next period and obtain 61 for the next dividend. Add the cond figure of the root to the left hand lumn and annex a cipher, obtaining e trial divisor (460). The trial gives for the next figure of the root, which, hen added to the left hand column, gives e true divisor, 461, and this placed be-w the dividend completes the work, iving a result of 231 for the square root 53,361.

From a little study it will be noticed at, apart from the increasing number figures involved as the work pro-resses, the cycle of operations is the me for each period, finding the figure the root by division, multiplying and btracting and adding the next period r a new dividend, adding the last found gure of the root to the left hand col-mn and annexing a cipher for a new ial divisor, and repeat.

Extracting the roots of decimals is actically the same as for whole num-rs, the periods of two figures each be-g always struck off from the decimal int. When ciphers appear care should taken not to destroy the value of the mbers.



WHY DO PROPELLERS CORRODE?

For a long time it has been a mystery why steamship propellers, especially those of fast vessels, become pitted over a portion of their surface. At first it was thought that the metal was corroded by the action of the sea-water, but a more satisfactory explanation has been found by a sub-committee formed in 1915 by the British Board of Invention and Research. Every high-speed propeller produces what is called "cavitation" in the water; roughly speaking, it bores holes in the water. Violent eddies are apt to form in the cavitated region, especially if the propeller is revolving in water disturbed by the action of other propellers or by portions of the stern frame, and these eddies are liable to collapse suddenly, throwing the water against the propeller with a hammer-like action. Calculations made by the sub-committee showed that the weight of the blow might be several tons, or even hundreds of tons per square inch. Little wonder, therefore, that holes are knocked in even the toughest phosphor bronze. Confirmation of this theory is supplied by the fact that on a fast cruiser the bearings close to the propeller resound with a deafening noise like a million pneumatic riveters. Now that British science has discovered the cause of this phenomenon, British engineering will not be slow to work out some means of removing the trouble, which can be done partly by alterations in design and partly by adopting slower propeller speeds to reduce cavitation.

New Hydro Rates. — The Ontario Hydro Commission have issued the new rates which give a reduction in power and street lighting rates, but none on domestic lighting. A further effort is being made to effect a reduction on the domestic lighting rates as well as the industrial.

GENERAL VIEW OF THE GUN MOUNTING SHOP AT MESSRS. VICKERS, LTD., SHEFFIELD, ENGLAND.

The Use of Jigs, Tools and Special Machines

Being an Article on Jigs, Tools and Special Machines, With Their Relation to the Production of Standardized Parts. A Study of This Article Will Prove Well Worth While

By H. C. ARMITAGE*

(Continued from May 22nd issue)

Scheme for Large Production

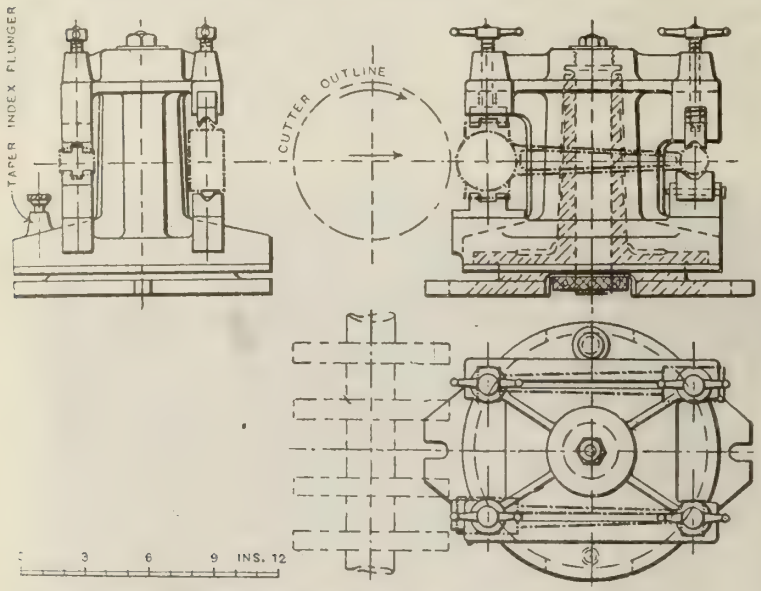
THE jigs which are now to be described have for their object the production of an average of 20 rods per hour and will represent in their construction the nearest it is possible to get to continuous cutting without the aid of special machines, and using standard machine tools.

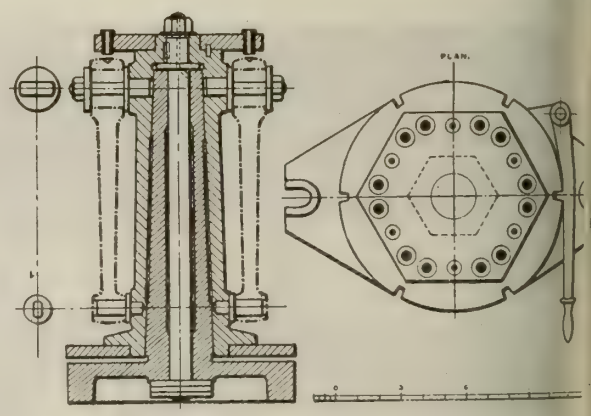
Mill Both Ends of Connecting Rod (Fig. 11)

There are four cutters used with this jig, and it should be noticed that the method applies whether the small boss of the connecting-rod is wider or narrower than the large end. The cutters are fed up to the rods in the same way as in the jig described in the smaller scheme, and after having taken the cut, it is indexed round through 180 deg. The general disadvantage of jigs of this type is that very exact workmanship is required in order to achieve accurate results, as a small inaccuracy in their alignment is magnified in the work. Owing to the height of the work above the machine table, a special construction has been arranged to obtain the necessary stiffness. The base-plate is built up in the form of an internal taper-sleeve, inside the indexing portion, which takes the entire thrust of the cutters. Clamping in position is effected by means of a "tommy bar" in the base of the structure. Additional support is given by the annular slide strip which goes right round the revolving portion. To obtain the maximum production, two jigs would be mounted upon the table of one machine, with the cutters in between the two jigs. It would mean alternate directions of feed for the table, and in one case the cutters would have to cut upwards; with the stiff construction shown, it should, however, be possible to obtain accurate work. One jig would be loaded whilst the cutters were at work on the opposite fixture, but it is questionable whether a jig of this type is preferable to three or four jigs which could split the operations up into their simplest parts. By doing this, th would be no approach to continuous c ting, but the actual time of operat would be very much reduced.

Drill Small End of Connecting R (Fig. 12)

This jig will drill four connecti rods at once, with the minimum trouble in placing them in the t While they are being drilled on one s of it four other connecting rods are ing loaded on the other side. In so drilling machines it is possible to m the table lengthways to fixed stops that the screw and hand wheel which here embodied in the jig will not t be necessary. It will be observed t the bushes are moved up and down i very rigid guide by means of a l handle which will be sprung do against a latch at the end of the han This form of construction is better quicker than the screw-down bush. spring in the lever should be suffic to hold the handle up to the latch.





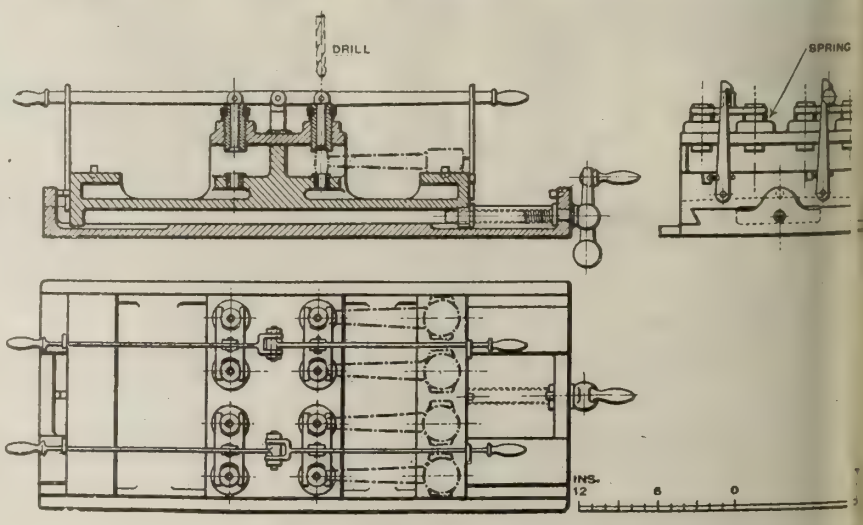


FIG. 11—LEFT UPPER. DUPLEX JIG FOR ROUGH MILLING RODS.
FIG. 12—LOWER RIGHT. JIG FOR MULTIPLE FOUR SPINDLE DRILLING.
FIG. 13—UPPER RIGHT. DRILLING JIG FOR BOLT HOLES.

*Paper read before the Institution of Mechanical Engineering.

the illustration the holes are perhaps shown closer together than would be practicable, but this makes no difference to the essential design of the jig.

Drill Large End of Connecting Rod

This jig is practically the same in design as the previous one, except that the connecting rods would be positioned from the small hole. These two last-named jigs represent the nearest that can be obtained to continuous drilling without the aid of special machine tools, but each of them will keep one man per machine fully occupied in loading and unloading one jig.

Drill Bolt Holes and Centre End of Connecting Rod (Fig. 13, above)

This jig is intended for use in a multiple spindle drilling machine, and there should be at least four drilling spindles and two centering spindles at work at once to effect any economy. The jig will be indexed round by hand, and the sleeve support construction is again worthy of note.

Mill Sides of Connecting Rod

This operation will have to be done in practically the same manner as the one shown in the last scheme, but it is possible that economy might be effected by putting six or eight rods in a line, and running a facing cutter across them at the full width of the surface between the bosses. There would, however, be difficulties in giving an adequate support to the middle of the connecting rod, without complicated construction. Separate carriers to be loaded whilst the cut is in progress should be provided.

Finish Boring Large Hole

The remaining operations are the same as in the first scheme, except that the finish boring should be done on a heavy gap bed-turret lathe of the "Gisholt" type. Also the finish boring for white-metalling will require an equally substantial machine in order to get the swing necessary, but would have a disadvantage in rendering back-gear useless on account of the speed required. There is one method however in connection with the finished boring that might result in economy, and that would be to bore the connecting rods on a drilling machine by means of a single inserted tool piloted boring bar, then changing the bar, putting in a recessing tool holder and finishing off with a reamer. The accuracy of the finished boring is not of vital importance when the connecting rod has to be white metalled, and if the finish is slightly rough it will make the white metal hold even better. The practice is not to be recommended if turret lathes are available.

Scheme for Maximum Production

In this scheme it is proposed to investigate the possibilities of continuous cutting with special machine tools and the lay-out is given in Table V.

Mill Ends of Connecting Rod

There are two vertical spindles, and the internal cutters will move in the smallest circle possible. The machine will not have to be stopped for loading,

Operation No.	Description of Operation.	Fig. No. of Jig.	Time Req. Minutes per Piece.	Type of Machine.	No. of Mach.	Labor Cost per Piece. d
1	Heat treatment	...	..	.....	..	...
2	File burrs, etc.	...	..	.....	..	..
3	Continuous mill both ends of rod	Becker miller	1	2-spindle circular miller	1)	
4	Continuous drill both ends of rod	14	1	4-spindle auto drill	1)	0.2
5	Broach small end	...	½	Broaching	1	0.1
6	Continuous drill and centre	15	1	2-spindle double drill	1-2 head)	
7	Continuous mill sides of rod	16	1	Duplex continuous miller	1)	0.2
8	Mill across top of bolt holes	...	5	Horizontal miller	5	0.9
9	Mill sides of bolt faces	17	2	Duplex vertical miller	2	0.4
10	Part cap	...	5	Horizontal miller	5	0.9
11	Finish bore large end	...	20	Turret lathe	20	3.3
12	Run white metal in large end	...	..	.....	..	...
13	Finish bore white metal in large end	...	10	Turret lathe	10	1.7

and there will be a continuous production from the machine. Unfortunately, when continuous cutting is adopted, there are several disadvantages, the principle one being that of getting the cutter to stand up effectively to the work. A machine of this description is usually more powerful in strength and feed than can reasonably be expected from the cutters. Also since the best of cutters will become dull in four to five hours, there is a considerable waste of time in changing them, and several spare sets must be kept in readiness. Assuming that the machine tool turns out connecting rods at the rate of 60 per hour, and that there is a stoppage of work for 30 minutes at the very least, to change cutters, it means a loss of about 40 connecting rods during that time. Considering that this will take place twice a day, it makes a very serious drawback. There is usually a similar trouble experienced in holding the pieces in continuous milling, as in multiple-operation machines. In the engravings, on this page, there are shown illustrations of a Becker double spindle continuous miller set up on connecting rods, where the design of jig employed is decidedly ingenious. The Becker Co. claim that they can mill up to 90 connecting rods per hour, but the output must depend mainly on the degree to which the rods have been previously annealed and pickled to remove scale.

Continuous Drill Both Ends of Connecting Rod (Fig. 14.)

This figure shows in outline a four-spindle drilling machine and no pretense is made that the machine is proportioned correctly. Upon the table there are four pairs of connecting rods. The saddle feeds down to drill the holes, the cut is automatically released, then it traverses upward quickly to clear the work. In the meantime, the tables indexes round a quarter of a turn, and two more rods are brought into position for drilling. The saddle again feeds downwards, and by this cycle of operations, continuous drilling is very economically obtained. It should be

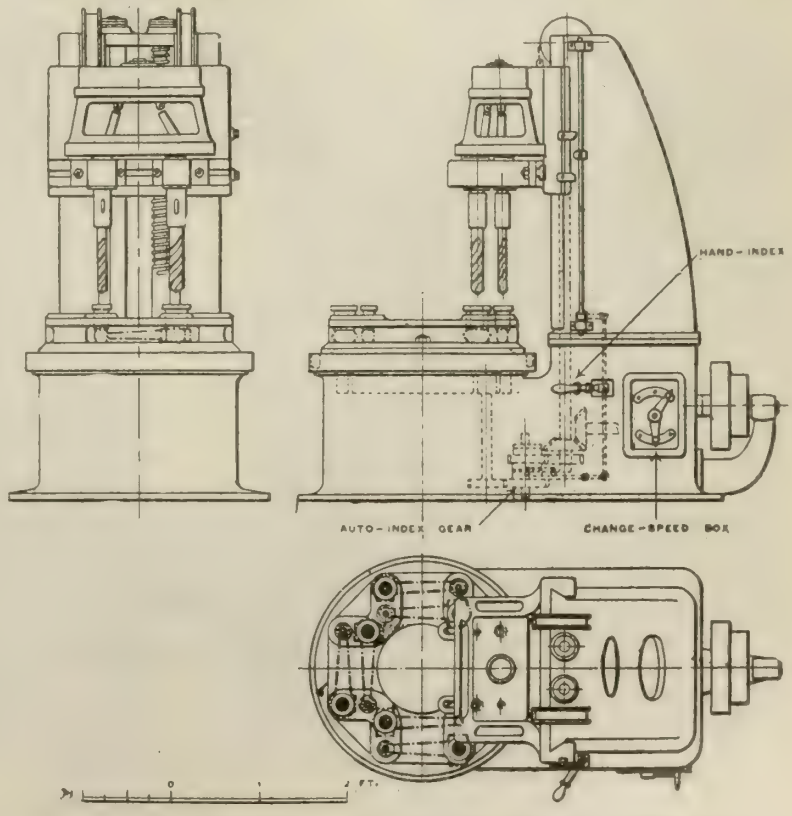


FIG. 14—FOUR SPINDLE AUTOMATIC DRILLER FOR EIGHT RODS.

quite possible for one man to mind two or even three machines of this type, and this is where the real economy of highly specialized machine tools come in, otherwise there are few advantages worth mention. It is worth noting that a machine of this type can be used for any number of similar jobs, and should therefore not be any loss or even stand idle in a manufacturing works, which has connecting rods of any description to make. It is very surprising indeed to notice that few of the larger type of machine tools automatically index the work into position. Possibly a really first-class and powerful index mechanism has to be designed, although the principle is fairly well established in automatic screw machines and gear cutters.

Continuous Drill Bolt Holes and Centre Rods (Fig. 15)

This machine is practically identical in principle with the one previously described, except that the spindles are horizontal. The indexing will be for a larger number of rods, and the spindles, saddles and index motion are driven by means of an electric motor. In practice it will be found very likely that another head can be placed on the other side of the machine, thereby getting double the output. It would be necessary, however, to drive the drills in the saddle from the same motor.

Continuous Mill Sides of Rod (Fig. 16)

In this machine, of which a plan only is shown in the drawing, there are two substantial face-milling heads. The connecting rods are arranged radially on a circular frame, which is driven around at the correct feeding speed. The whole machine is driven by an electric motor, and the rods are loaded in on the opposite side of the machine while revolving. There is a doubtful economy, however, in continuous milling of this description, as the rods would have to be spaced some considerable distance apart. For instance, if the metal between them is only 1¼ in. and the rods themselves ¾ in. wide, it means that a cut has to be taken over 2 in. in order to mill ¾ in. Supposing that the rate of feed is 1 in. per minute, it will be seen that the effective continuous milling feed obtained is only ¾ per minute. This is true of any continuous milling operation, and it is doubtful whether the application shown is worth the results obtained. In this machine some support would have to be given in the middle of the connecting rod to prevent excessive chattering. Compressed air operated clamps and jig stops will prove very useful in this respect, and will greatly reduce the time in fixing the work.

Milling Across Bolt Hole Bosses and Faces

It is practically impossible to "continuous mill" across the top of the bolt holes, except by a profiling motion, and this will necessitate a complicated machine. For milling the sides of the bolt faces a duplex vertical spindle milling machine would be very effective, and almost continuous milling action could be obtained with very little trouble. The diagram of this is shown in Fig. 17. It is strange why this type of machine is not more popular, as it undoubtedly has a very wide field of usefulness for any description of rods, or repetition work which requires milling at both ends.

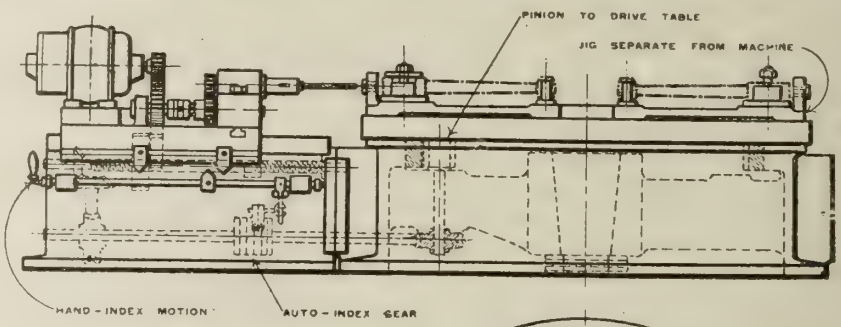
Finish Boring on Special Machines

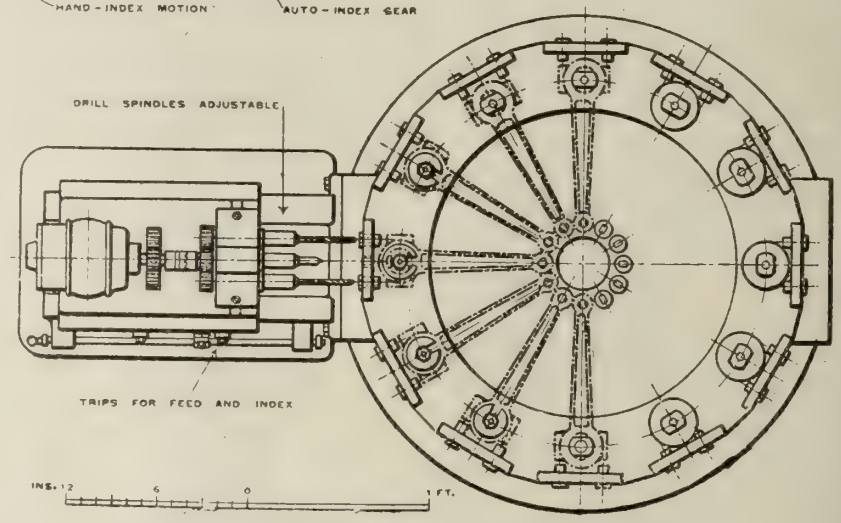
There is little to be gained by building a special machine tool for finishing boring the large end, and up to the present date nothing better than the turret lathe has been found. So far as the author knows there has been no effective method yet devised for obtaining accurate continuous boring action, because this can only be obtained by revolving the tool. It is the universal practice to revolve the work where its size permits and feed the tool. If it were possible to obtain accurate results by means of a revolving cutting tool, combined with a turret, continuous action would be easily obtainable.

Comparative Results Between the Three Schemes

By totalling up the machine tool values, expenditure in jigs, and the labor costs, the following results are obtained, in spite of the fact that a connecting rod does not lend itself exceptionally well to manufacture by special machine tools (see Table VI).

The figures are somewhat startling and show that an approximate trebling of production reduces the manufacturing cost in each case by about one-half. Other charges (which have not been shown), such as management, power, establishment, etc., will be practically the same in each case. By referring to the operation tables it will be seen that in each scheme the same finishing methods are





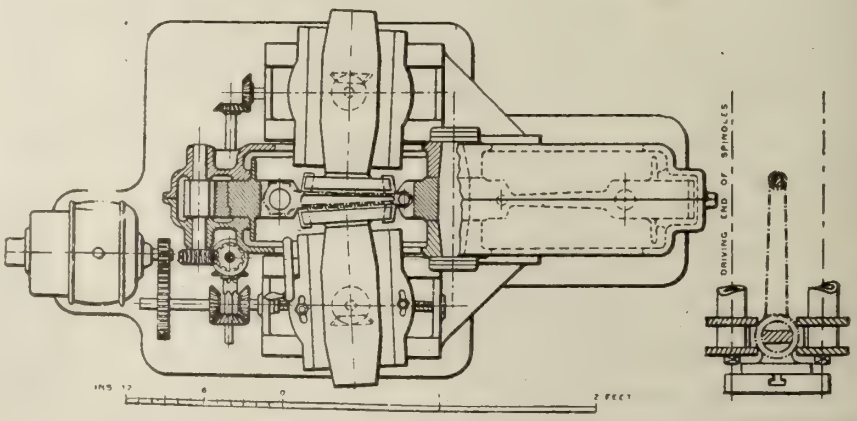


FIG. 15—CONTINUOUS DRILLING MACHINE FOR BOLT HOLES.
FIG. 16—CONTINUOUS MILLING MACHINE FOR SIDES OF CONNECTING ROD.
FIG. 17—DIAGRAM SHOWING DUPLEX VERTICAL MILLER FOR FACING BOLT HOLES.

to be employed, namely, the turret lathe. Where, in the small production lay-out, two lathes are required there will be 20 necessary to cope with the largest output. The great economy shown, therefore, will be tremendously accentuated if special finishing machines could be employed. Under each scheme a properly balanced plant has been assumed. If there is an output of less than the maximum per week the working costs will be increased, as part of the machines would be idle.

TABLE VI.

	Small Production	Large Production	Maximum Production
Weekly output	300	1,000	3,000
A Total number of machine tools involved	16	33	47
B Operator's wages (say 10d. per hour), per one rod	25.9d.	14.5d.	7.7d.
C Setters-up wages (say 1s. 8d. per hour), per one rod	18.0d.	6.0d.	0.25d.
D Total approximate value of jig required	225l.	855l.	1,260l.
E Total approximate value of machine tools	2,400l.	5,850l.	9,200l.
F Weekly cost of plant upkeep, say, 10 per cent. depreciation, 5 per cent. interest on capital	7.9l.	20.1l.	29.4l.
G. Plant cost per rod.	6.3d.	4.8d.	2.3d.
H. Total cost of rod. (Sum of B.C.G.)...	50.2d.	25.3d.	10.25d.

Figures for the wearing tools (that is, milling cutters, drills, broaches, etc.), costs have not been added, as they will be almost proportionate to the output. There is sure to be a slight reduction per connecting rod in the large productions, for by manufacturing or buying in large quantities they should be obtained at much lower prices. The figures have been set out in the form of a curve in Fig. 18.

Lines of Future Development

In conclusion, a few notes must be added regarding the future developments of tools for interchangeable and repetition production. The war has only thoroughly awakened us to the huge possibilities of accurately working to standardized dimensions and given limits for component parts. It is doubtful, though possible, that, before the war there was an English motor car built with absolutely interchangeable parts. It is a certainty that motor cars not built on interchangeable lines will cost such a price after the war that the maker will not find a market for them. This will apply to everything of a similar nature, and since standard ships are now an accomplished fact, standardized houses, motor cars, auto carriers, typewriters and domestic machinery may be expected in this country. This being granted, the importance of special and precision tools will be enormously increased. Reliable and standard limit systems both of first degree for manufacturing and of a second degree for tools, to suit modern methods, and for all classes of work, must be framed, from the experience gained in the use of the several existing systems, all of which are far from perfect. Further, skilled labor will be very scarce, and since our industrial success depends upon an abundance of special tools, improved and quicker means must be devised for making them. During the war we have learnt how to make screw-gauges almost on repetition lines. Surely the same concentration might be exerted upon precise methods of locating and boring holes for jigs or other precision work. Imagine, for instance, an optical measuring or spacing device, and a method of boring holes to within half a thousandth limit in the centre distance without revolving the work. This is again the plea for a means of accurate machining with a revolving tool, for having once obtained accurate precision cutting by a revolving tool, a jig-bush hole boring machine with micrometer and vernier settings to bore in several planes at once, and capable of being set up in a few minutes, would soon be a feature of every tool-room. Again, there is considerable scope for investigation in the methods of hardening high-speed and tool steels without deformation of the

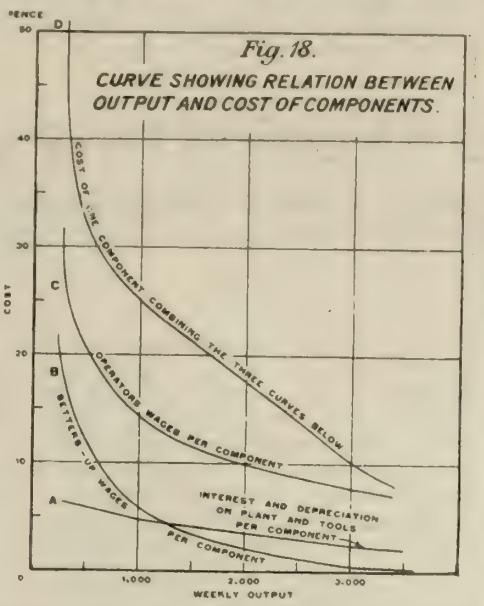
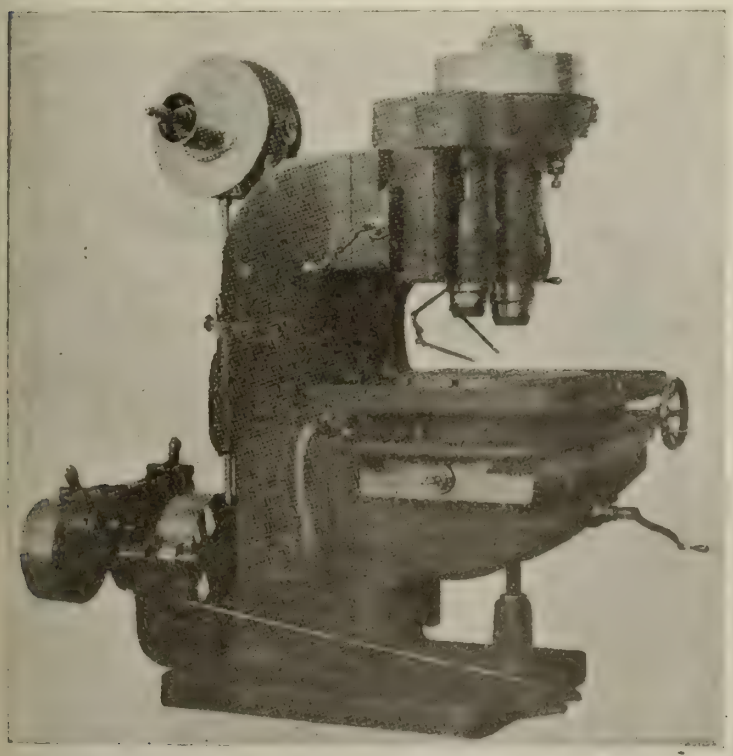
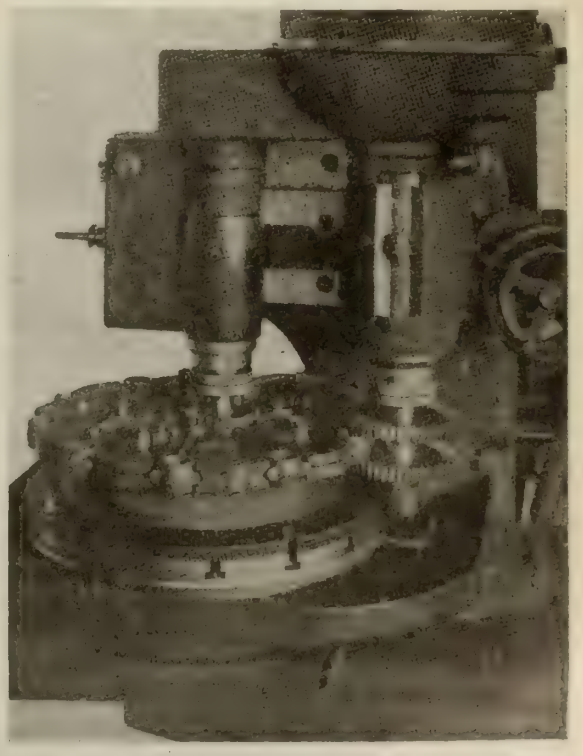


FIG. 18 DIAGRAM CURVE OF OUTPUT AND COSTS.



GENERAL VIEW OF BECKER DOUBLE SPINDLE CONTINUOUS MILLER.



VIEW SHOWING THIS MACHINE MILLING [illegible] CONNECTING RODS.

metal. It is safe to state that if steel-makers do not produce non-shrinking and non-warping steels, progress can only be obtained by greater perfection of the grinding machine and its wheels, and extending considerably the use of formed wheels.

One of the greatest manufacturing troubles now experienced on aero engine parts is in the nickel-steel case-hardened parts. Several heat treatments are usually necessary, and even then, after hardening, the component usually twists and distorts out of shape or increases in size. This will undoubtedly develop grinding processes rapidly and considerable ingenuity has to be given to the order in which operations are to be performed between carbonizing and quenching the piece.

The whole tendency of tool design is in the direction of more "fool-proof" jigs, therefore making more complex and larger jigs necessary. If this can be done with a degree of standardized tool parts, and with easier methods of producing precision work, to avoid trial and error settings when building the tools, there need be no fear for the development and increase of engineering production for the next few years to replace war wastage.

The Portable Electric Oven and its Uses

An Article Describing the Uses of These Ovens, Together With Interesting Photographs of the Same

By B.S.B.

IT is a well-known fact that many concerns have small pieces of work completed in different parts of their factory which have to be dried, japanned or enamelled before going on to the next stage of manufacture or assembly. Where production is small these pieces are usually taken to a special department, treated and then put back into the cycle of manufacture. This necessitates extra carting and hauling, loss of time, and is inconvenient. In other words, it is not an efficient or scientific method of handling the work.

Fig. 1 shows a portable electrically heated oven used for drying fibre and japanning small parts at the Philadelphia Switch Factory, Philadelphia, Pa.

The oven is 1 ft. 6 in. wide, 1 ft. 6 in. high and 5 ft. long, with a heating chamber 10 in. high underneath the floor of the oven. General Electric heaters totalling 4.72 kw. are installed in this heating chamber, and are controlled by means of snap switches, Figure 2, so that four heats are obtainable, drawing 4.72, 3.94, 3.37 and 2.95 kw. respectively. The heating equipment, in this case, is designed for operation on a direct current circuit at 250 volts.

Fibre strips are dried in the oven at a temperature ranging from 200° to 250° F. By means of the snap switches it is possible, after the work has been brought up to the desired temperature, to provide just enough heat to take care of the losses due to radiation and ventilation, the oven, therefore, requiring little attention. (However, automatic temperature control, in most cases, is desirable, as it gives a more positive and flexible temperature regulation.)

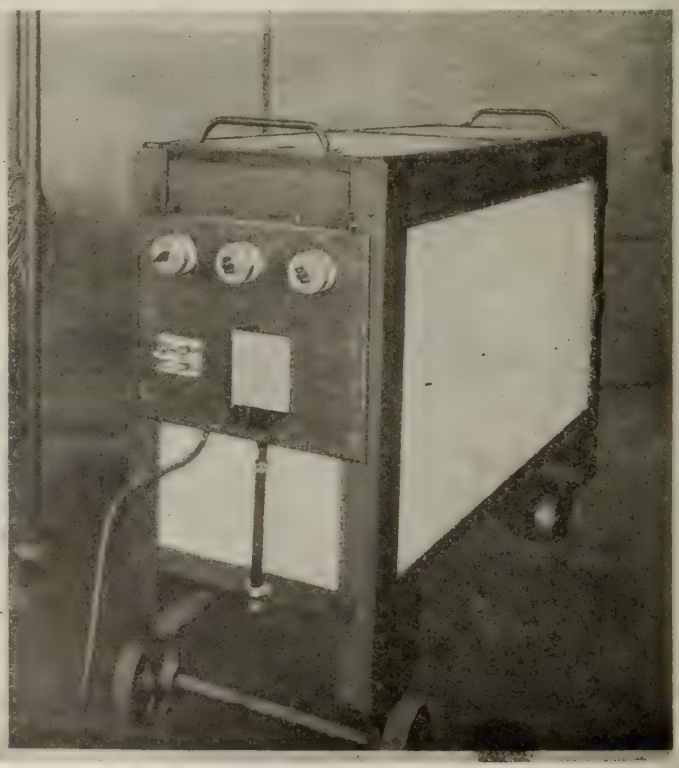
For fibre drying the electric oven is the best. If the temperature rises too high, as is liable to be the case in a gas, steam or oil heated oven, the fibre becomes dry and brittle and is hard to work with. Electrically generated heat with the consequent close control of temperature provide ideal working conditions.

This oven is provided with ventilation, so that it is adaptable to japan baking and enamelling. It is sometimes used for impregnating small coils with waterproofing and insulating material.

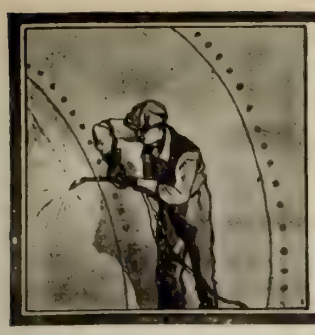
The portability of this oven has time and again proved to be a great convenience and saving. One man can easily push it around from one room to another, and elevators make it equally useful on any floor in the building.

It is, of course, conceivable that gas, oil or steam could be used to heat this oven, but it is not practical. The difference between connecting up gas or steam pipes, carrying tanks of oil and compressed air along with the oven and merely connecting up the oven by means of a set of electric wires is obvious.

FRONT VIEW OF PORTABLE FIBRE DRYING OVEN.



REAR VIEW OF PORTABLE FIBRE DRYING OVEN.



WELDING AND CUTTING

Welding Performed on Cylindrical Bodies

An Article Covering the Welding of Seams, Also the Welding of Head and Bottom Into Cylindrical Bodies

By ERNEST SCHWARTZ*

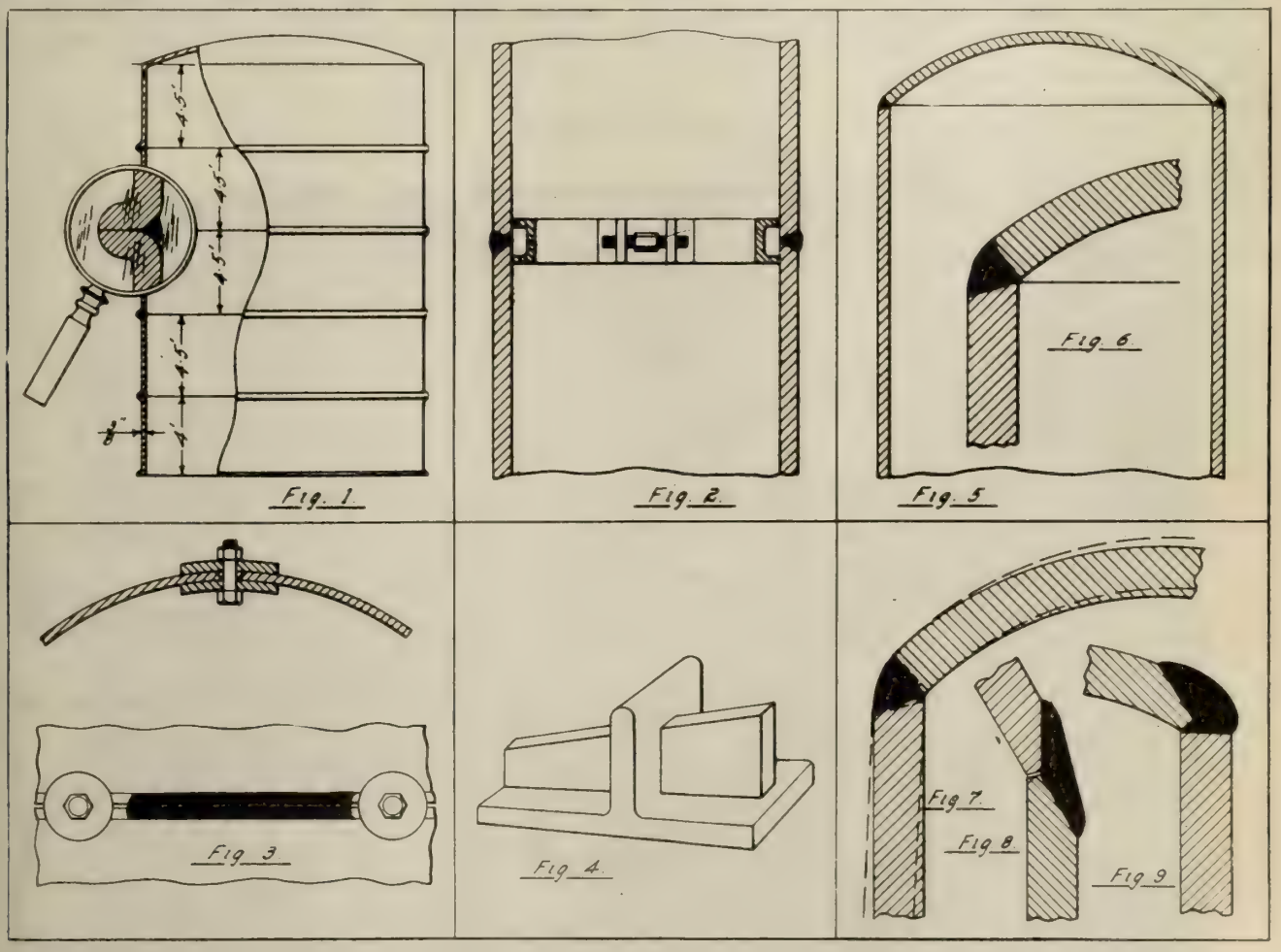
Welding of Seams

IF sections of cylindrical hollow bodies are to be connected together, a welding can be successfully produced on light gauged material by first beading the edges and then welding. In Fig. 1 a larger body is shown, which was produced in such a manner. If cylindrical bodies are of heavier gauge material, it is recommended to span the edges of the two sections from the inside by means of a U-shaped ring, which operation is clearly shown in Fig. 2. The expansion of the said ring is operated in the easiest way by the following construction of the device:

The trustends of the ring carry flaps, in which a feed screw is located, which has in its centre a hexagon screw head, by means of which is effected the expansion of the tension ring.

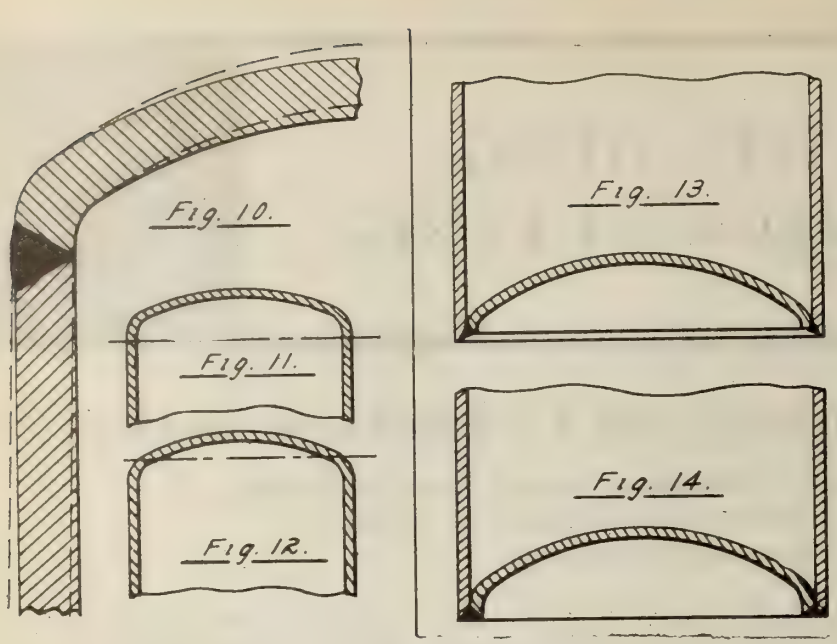
On welding operations of this kind it is advantageous that the edges of the metal do not touch each other, to give enough play for expansion due to the heat.

An advisable assistance in producing a good welding job is the way in which the edges of the sections to be welded are held together, and is shown in Fig. 3. Washers are placed in certain intervals, about 8 inches, to the full length of the seam to be welded, in which case the bolts will secure the space necessary for expansion of metals. The welding



FIGS. 1 TO 9.

*NOTE.—Owing to a typographical error, the heading as above was used on another article run in this section. The heading in last issue should have read, "Repairs to Boilers and Engines by Welding."



FIGS. 10 TO 14.

is then performed in the free spaces between the washers. After this preliminary operation, washers and bolts are removed and the remaining spaces welded. Another very suitable device is shown in Fig. 4, and consists of short pieces of T-iron, in which a slot is cut to accommodate a flat-iron wedge. The sections to be welded are held between the lower leg of the T-iron and the wedge, and are clamped firmly together. This small device can be easily removed by knocking the wedge out with a hammer.

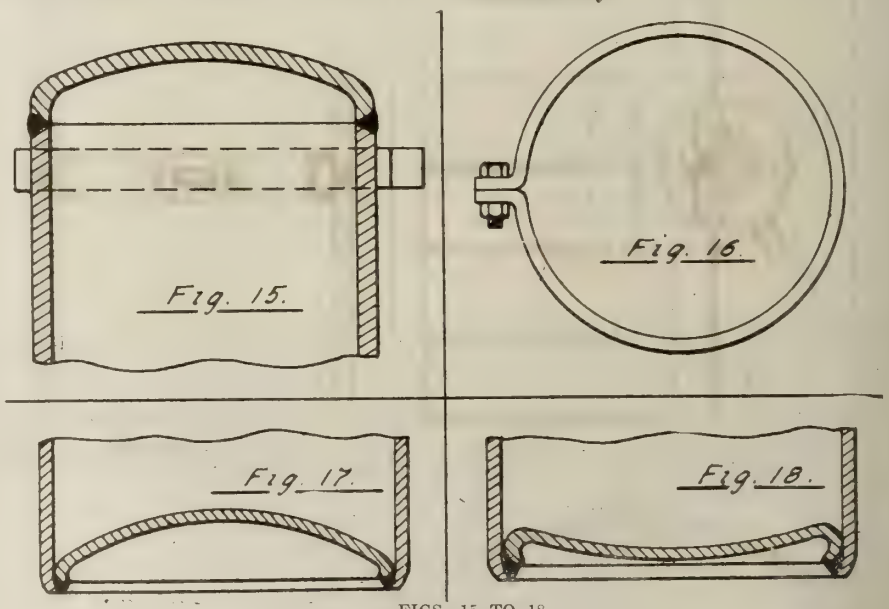
Welding The Head and Bottom Into Cylindrical Bodies

In the beginning of the autogenous welding industry they were looking for the simplest process in the manufacturing of receptacles of circular shape, to connect the head and bottom to the cylinder wall. These parts, for instance, would be placed in such a way on the cylinder that the edges to be welded came between the cover and the cylinder wall. This kind of welding a seam showed many disadvantages in regard to the strength of the weld. For such receptacles, if they are not subject to inner pressure, a seam of the kind shown in Figs. 5 and 6 will prove satisfactory. On vessels which are subjected to inner pressures, a connection of this kind cannot be found correct and free of objections in accordance with the present rules of design. If a hollow body has to stand big inner pressure it will have the tendency to expand not only at the cylinder walls, but also at the head, in which case the cylindrical vessel will be inclined to take the spherical form. The welding on pieces of this kind is performed from the outside, hence the edges of the cylinder and its head, which are held together by a different binding material, will be the weakest part of the whole body. The stress at this particular part is far bigger than at any other part of the sheet metal. At a welding connection of this kind various stresses will occur in the material of the welded seam as shown in Fig. 7. A weighty inner pressure, which will always cause a change, will lead to the fact that from the inside a pulling force or tension and from the outside a pressure will be caused at the welding seam. This uneven distribution of forces will lead in course of time to the formation of cracks, which will tear always further by continuous working, until the entire head will tear off.

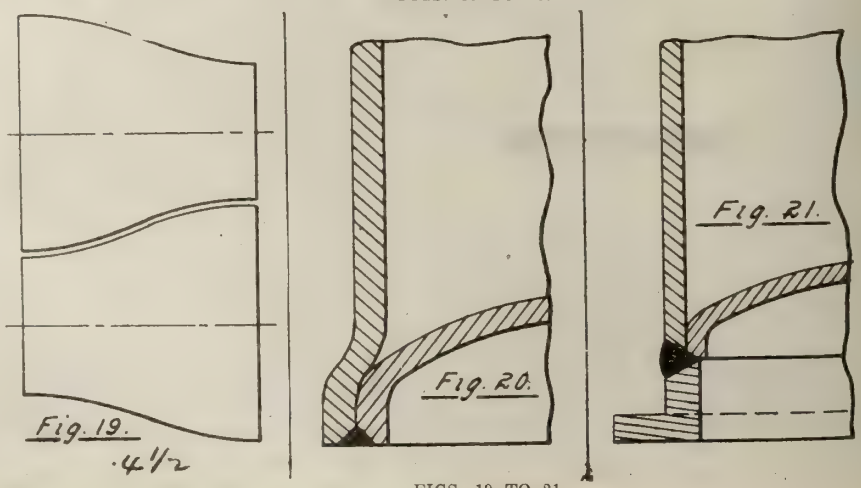
Two incorrect welds are shown in Figs. 8 and 9. In these instances, the operator doing the job only melted the top layer of the welding material without going through the entire depth of the same. On these spots, which are exposed to an inner pressure, the parts of the material not connected by welding will lead to fracture.

The correct way of welding the head to the cylinder is shown in Fig. 10. The biggest stress is then not in the welded seam, but is uniformly distributed over a certain portion, shown in Fig. 11. Another kind of the execution of such a job is illustrated in Fig. 12. The cylindrical wall is heated with a torch or any other means and then shaped with a hammer or beading machine to fit the form of the head. In this case the head has to be cut smaller, to fit over the beaded opening. After bevelling the edges the welding is performed from the outside.

In welding the bottom into the cylinder, the edges of the bottom will be extended slightly over the edge of the body, Fig. 13. In Fig. 14 is shown another way of doing this particular job satisfactorily.



FIGS. 15 TO 18.



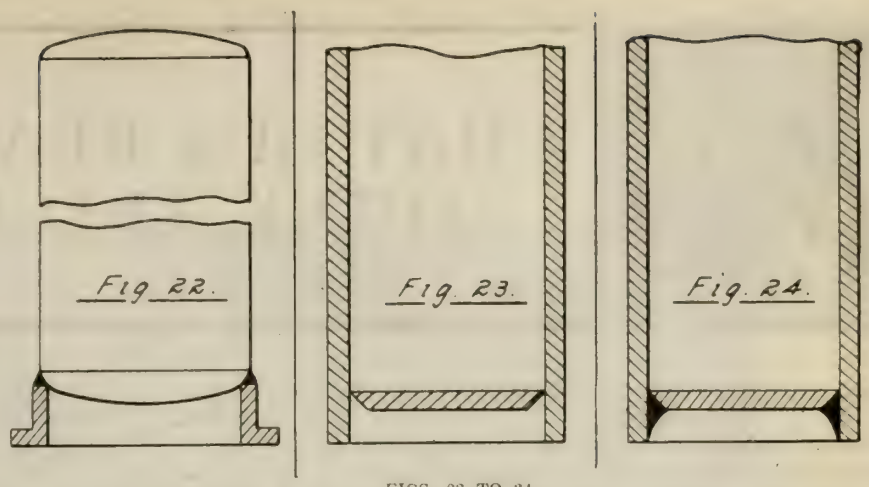
FIGS. 19 TO 21.

To give the cylinder more strength while performing the welding, a heavy ring is fastened below the welded seam, Fig. 15, by which the heat in the metal is stopped from distributing over a section which is near the welded seam. The easiest way of making a ring of this kind is shown in Fig. 16.

Figs. 17 and 18 illustrate the welding of bottoms into cylindrical receptacles, which show extraordinary advantages in regard to resistance to corrosion, which usually affects the welded seam on account of the free location. After heating the cylinder wall and the previously inserted bottom, both parts are beaded to the inside, so that the cylinder wall can resist to an inner pressure.

The profile roll, Fig. 19, is used in shaping the lower cylinder end, making a wide rim to fit the bottom part, shown in figure 20. If it is necessary to attach to the bottom a ring of angle iron, the latter can be welded to the cylinder wall in the way shown in Fig. 21. These rings prove advisable for the reason that the welded seam does not come in contact with the moisture on the floor of the room, which will avoid corrosion. Fig. 22 shows a modified application of the above described foot ring.

The ends of cylindrical bodies of smaller diameter, such as pipes, can be supplied with a cover in a manner shown in Figs. 23 and 24. A piece of heavy gauge metal is cut to fit the inside diameter of the pipe and is then welded.



FIGS. 22 TO 24.

In welding performances of this kind on work of cylindrical character, the fundamental principles described above will prove of distinct value to the welder.

PURIFYING CRUDE GLYCERINE

By L. P.

Crude glycerine is purified by esterizing it in the known way, with an organic acid, whose glycerinester is insoluble in water, either in the absolute absence of water or in the presence of condensing media, following which is the ester in purified and split, and finally, in the glycerine water obtained, as the case may be, either concentrated or distilled. It is not rare that crude glycerine contains such quantities of inorganic and organic impurities that the direct distillation of glycerine becomes impossible. If, e.g., fats strongly decomposed have been used in the preparation of glycerine, and make the latter impure in so high a degree that a distillation is absolutely excluded. The percentage of albuminous substances makes the distillation, further, either very difficult or totally impossible. The process here given makes the refining of glycerine also in those cases possible.

ROLLING RAILROAD TYRES AT MESSRS. VICKERS, LTD., SHEFFIELD, ENGLAND.

WHAT OUR READERS THINK AND DO

NEW FORMULA FOR STUB GEARS

By Ernest Bell

Editor's Note: Before going on to the description of this formula let us quote a portion of the letter which came with this suggestion for our "Made by Our Readers' Section."

"I am sending in a little formula which I think is original as I have worked it out myself. I hope I have made myself quite clear. This is my first attempt at writing for your paper, although I have been taking CANADIAN MACHINERY for some considerable time."

Our reason for quoting this letter is two-fold, first to call readers' attention to the fact that this formula is, as far as the author knows, original. If this contributor can supply some original idea, why not other readers follow suit and send us in their work? Then again it was his first attempt, still his first has been successful. Again we can only repeat, "Try your luck." We should like to hear from readers as to their opinion of the formula to follow.

FORMULA FOR GEARS HAVING 20° ANGLE PRESSURE

This is for a stub tooth gear. A gear having 16 teeth 4-5 pitch (written thus according to Fellows gear system). Proceed as follows: Lay off the pitch

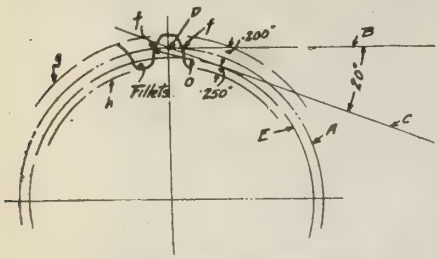


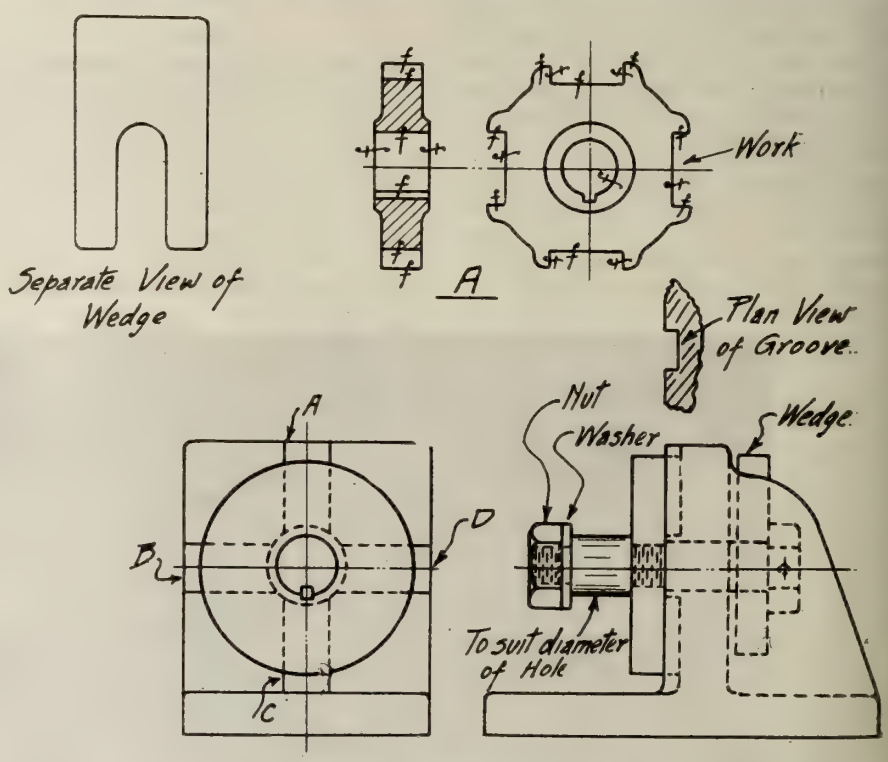
CHART SHOWING THE IDEA.

circle A having a diameter of 4 in. Draw a horizontal line B tangent to pitch circle. Make an angle of 20° from the horizontal line and draw a line C intersecting the vertical centre line and pitch circle at D; scribe a circle tangent to the line C which is called the base circle E; now lay off the width of the tooth on the pitch circle ff, also draw the addendum g, .200 in. above pitch circle and the root .250 in. below pitch circle. Now proceed to draw the teeth profiles, taking ¼ in. of the radius of the pitch circle and placing the needle of the compass upon the base circle at O. For fillets at root of teeth take 1-7 of the opening on the addendum. This can be used to advantage and is very near to being accurate.

FOUR-STOP SHAPER JIG

By J. H. Moore

A shaper jig very much out of the ordinary run is shown in the accompanying illustration. The style of work done on this jig is shown clearly at A, while the general assembly is clearly seen in the other two views given.



GENERAL VIEW OF THE JIG.

Briefly, the procedure is as follows:

The main spindle of the jig is of course made the same diameter as the hole through the work. The piece is now placed on the same and tightened up by means of the nut and washer shown. The first portion of work is now shaped to size, after which the wedge is withdrawn and the work revolved 90 degrees. The slots A, B, C and D provide the stopping points. This procedure is carried out until the work is completed.

A jig of this nature is easily adaptable to many other styles of work, and the reduction in production cost is indeed a big feature with a fixture such as described.

WRINKLES FOR FILE USERS

By M. E.

Here are a few practical wrinkles for file users. A new file should always be used with a light pressure on the work until the needle-like points of the teeth are worn away. After this a greater pressure may be used with much less danger of breaking off the teeth at their base. It often happens in the case of new files that half their wearing property is diminished by a few careless strokes when first applied to the work. A new file should not be used on the chilled and gritty skin of castings, or on a weld where borax or any vitreous flux has been employed. A worn file should first be used on the rough, gritty or oxidized surface, and thus pave the way for more efficient work with a new, sharp file. Again, in filing steel, better results can be generally obtained by using files of a grade not coarser than "second cut," finer grades being employed according to the finish or delicacy of the work under manipulation. Lastly, there is the reminder that the best results cannot be expected from a file if used on brass when it has been supplied for use on iron or steel.

PHOTOGRAPHY AS AN AID TO JOB SHOP WORK

By DONALD A. HAMPSON

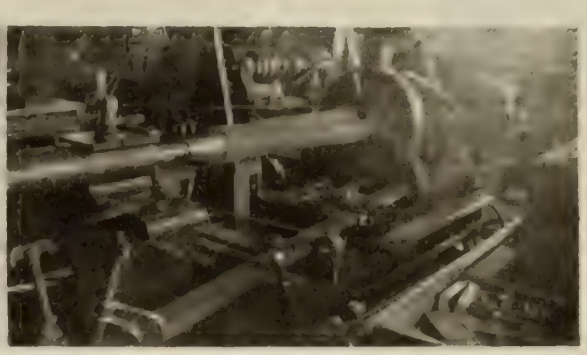
In the good old days, the bewhiskered machinist with a trail of tobacco juice meandering from each corner of his mouth would have laughed at the suggestion that photography in any form would be a help to him in his work. But "times have changed." And the camera is a worthy helper—in the job shop, too. The two photos accompanying are offered in evidence of that statement.

One shows how a "pin" for a well driller was threaded. Well tool work is extremely interesting; the parts themselves are made in specialty shops either in oil sections or mid continent manufacturing regions and so few machinists have seen much of the work. Repairs are often sent to the factory instead of getting the work done locally, because very few small shops have threading and forging facilities for such work. But the way one shop set up to do a hurry job of turning and threading the taper end of a pin is shown. It was entirely an arrangement of parts gathered up—and it did the work very nicely. Strange to relate, the same job came up a while later and here the photo helped—the man who had set up and done the job had departed, but the new man had no trouble in repeating, with the aid of the photo, which tells the story so clearly.

Then there was the case of the cone which had to be re-bored. Here again, the same kind of a job came up a year later and a new man was put on the work—aided by the photo. The wood block steady rest, the big end in the chuck, parts held on by C-clamps—all these details are shown with the most truthful clearness.

As a preventive to cross work and a saving of foremen's time, the photo is hard to beat. Every once in a while they come in wonderfully useful in some legal matter—the story a photo tells is accepted without taking of oaths. And the equipment need not be expensive either.

Incidentally, the second photo shows the wood steady rest—a valuable helper on job work. The cylinder shown is 25 in. in diameter at the large end and had to be supported in a rest when reversed for boring that end. But who ever heard of a 25 in. capacity rest on a 28 in. lathe? The photo shows that the top piece of wood at the small end is bandsawed out to two curves; one of them is that of the large end and in it the cylinder rests when reversed.



ILLUSTRATIONS PROVING THAT IT PAYS TO TAKE A PHOTOGRAPH OF YOUR MACHINE SET UP.

GETTING OIL IN ENGLAND

By L. P.

The Government has decided to explore Great Britain for oil. There is no reason why our battleships should not be steaming on oil fuel got from beneath our own soil, nor is there any reason why some of our motor cars should not be driven by petrol from under the roads they run upon.

In the past we have been too careless of the wealth that lies under our feet, petrol, lamp oil, fuel oil from overseas were sold here so cheaply that no one was prepared to risk money in drilling for oil in England. But the war has changed the entire position, and petroleum has become so precious that if it exists under England, it must be searched for and got.

That it does so exist has been proved on many occasions during the last century or two. At Clowne, near Chesterfield, there was a flow of 700 to 1,000 gallons daily. Dr. James Young, the founder of the Scottish shale industry, manufactured products 70 years ago from a flow of oil at Alfreton, Derbyshire. A flow at Coalport, mentioned in 1836 by Dr. Prestwich, is stated to have formerly yielded 1,000 gallons a week.

But the most important discovery of recent years was made at Kelham, near Newark in August, 1911. A bore hole was put down there and obtained true petroleum at a depth of about 2,440 feet. The oil sand or rock that gave the oil, was about 13 feet thick, and the bore holes passed right through it. From this bore hole, five to eight gallons of oil flowed to the surface for many months, and was described by our principal authority, Sir Boverton Redwood, as a true petroleum.

Any qualified person who has examined a sample of the oil will agree with him. Provided enough of this oil could be obtained there is no reason why it should not be piped straight away to say, Hull, where a warship could take it on board as oil fuel, just in the state it came from the well.

But there is one remarkable thing about the Kelham oil. Nearly all crude petroleum in its virgin state contains petrol. The Kelham oil contains none. It is incomplete. There is reason to believe it did once contain petrol, if so where has that petrol gone?

The answer is the petrol has become separated from the heavier part of the oil. Where shall we find the complete natural oil with its petrol intact, as contrasted with the Kelham oil? Obviously not above the Kelham oil or the bore holes would have passed through it. Therefort it is said we ought to find it below the Kelham oil—possibly a thousand feet lower. This is a surmise and cannot be said to be a certainty.

Some of us have for years past been urging the Government to drill for oil. We have not predicted with absolute certainty that they will get oil here or get it there. What we have said is that it is worth while making the experiment and finding out whether in these critical times we can depend upon a supply of petrol or lubricating oils, and of liquid fuel, without bringing these from overseas.

The Government has wisely determined to search for oil in England. They have a good chance of being successful.

MAKING BLUEPRINTS FROM PRINTED PAGES

By HARRY O. GARLAND

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Paper sheets that are printed on one side only can be used for making blueprints, just as are tracings, if they are first given a coat of typewriter oil. By wiping the oil on them with a cloth, the paper is rendered transparent by the oil. If the printed sheet that it is desired to reproduce is printed on both sides, it will probably be necessary to erase the printing on one side to get a clear copy of that on the other.

Another method of blueprinting from printed paper sheets is to soak the sheet in gasoline, which renders it temporarily transparent, so that it can be used for making a blueprint just as can a tracing. Ultimately, however, the gasoline will evaporate, leaving the sheet just as it was before the soaking process.

DEVELOPMENTS IN SHOP EQUIPMENT

RELIEVING MACHINE FOR HOBS AND CUTTERS

The machine illustrated in Figs. 1 and 2 is built by the T. C. M. Manufacturing Co. of Harrison, N. J., for the relieving of hobs of any design as well as formed cutters. The machine is also capable of performing many operations usually performed on the ordinary lathe, but its higher cost in some measure make this inadvisable.

This machine is especially suitable for relieving the particular form of hob which has been found most suitable for the cutting of heavy worm-gears complete at one pass of the hob. Such a hob is tapered at one end and the threads on this tapered section have a gradually increasing lead, although the lead of the threads on the cylindrical section of the hob are of uniform lead.

Evidently the problem of relieving the teeth of a hob of this special form is considerably complicated by the tapered section on which there is a thread of variable lead; the problem is further complicated by the fact that the gashes in the hob are cut at an unusually steep angle. The relieving operation is divided into three steps, the first of which is to start at the small end of the tapered section and relieve one side of the teeth on the taper; next, gears are changed and the relieving operation is continued by relieving the other side of the teeth on the taper; and at this point the swivel base on which the relieving attachment is carried must be set around to provide for working along the straight or cylindrical portion of the hob. The reason for changing gears when relieving opposite sides of the teeth on the taper is that, owing to the increasing lead of the thread on this portion of the hob, a start must be made with change-gears which are suitable for a number of threads per inch which is less than the number the work actually has. After relieving one side of the teeth on the taper the gears are changed to give a setting corresponding to a number of threads per inch which is greater than the actual number per inch. The result is that the relieving operation is started with an arrangement of gearing which retards the movement of the tool to compensate for the gradual thickening of the thread, due to its increased lead, while the remainder of the relieving on the tapered portion of the hob is performed with gearing which provides for doing the work with an accelerated movement of the tool that also takes care of the thickening of the thread.

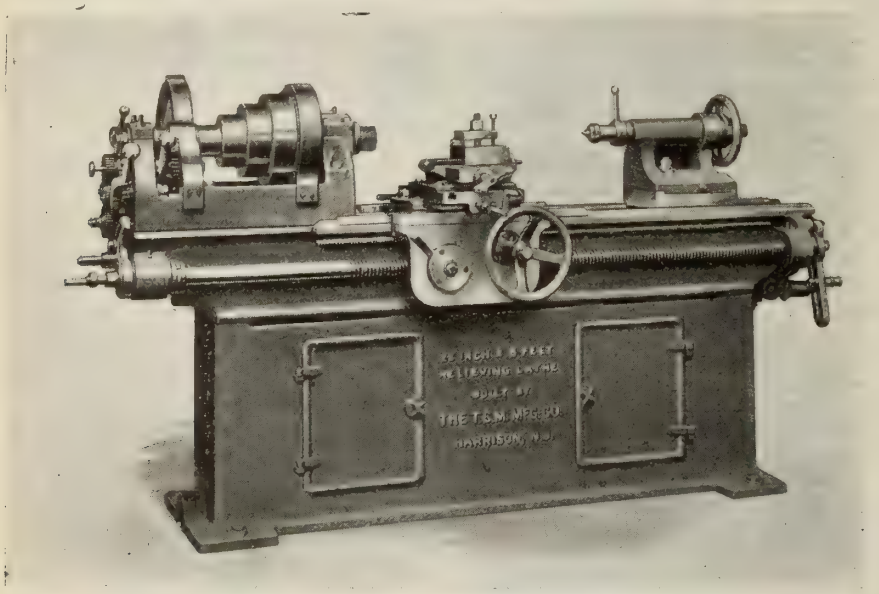

FIG. 1—MACHINE FOR RELIEVING HOBS, ETC.

Reference has also been made to the necessity of providing for the effect of the steep angle of the gashes, and this is done by employing an arrangement of differential gearing to govern the timing of successive strokes of the relieving attachment. When relieving the teeth of ordinary hobs and similar work with gashes parallel to the axis, it is merely necessary to time the strokes of the attachment so that the tool comes into engagement with successive teeth. But with a hob having spiral gashes with the spiral cut at a steep angle, it will be apparent that the uniform timing for the relieving attachment could not be employed. It is necessary to so regulate the rotation of the work and the oscillating movement of the relieving attachment that the necessary correction will be made for the effect of the angular gashes.

This machine is similar to a standard engine lathe, the work being carried between centres and the relieving attachment supported on a carriage of somewhat the usual design. It is obvious, however, that this machine is provided with a number of interesting features of design which will make it of rather exceptional interest to machine-tool designers. Probably there is no better means of explaining the method of operation than to present a description of the way in which power is transmitted through the various mechanisms from the cone pulley on the headstock. When the machine is used for relieving hobs it is almost universally the practice to drive the spindle through the back-gears, but, owing to the coarse lead of the hob threads it is required to have a considerable difference in the speed of rotation between the lead-screw and the spindle. This result could be obtained through an ordinary train of gears, but in order to simplify the design it was decided to provide two gears, one secured to the spindle and the other to the cone pulley with a clutch between the two, so that either the spindle gear or the cone gear could be employed for driving. The clutch is controlled by a push-rod at the end of which there is a small knob which will be seen opposite the upper gear at the left-hand end of the machine in Fig. 1. The initial speed depends upon whether the spindle gear or cone pulley gear is engaged by the clutch, but, regardless of this selection power is transmitted to gears carried by a horizontal shaft located under the headstock and thence through change-gears at the left-hand end of the machine to the lead-screw. The change-gears may be adjusted in the usual way to provide for relieving the teeth of hobs of any given number of threads per inch.

Located at the right-hand end of the lead-screw it will be seen that there is a train of gears A, Fig. 2, which trans-

mit motion from the screw through a pair of bevel gears B and C to a worm-shaft D that drives a worm-wheel. This wheel is the outer member of a differential which regulates the timing of the relieving attachment to compensate for the spiral angle of the gashes in the manner to which reference has already been made. Power is transmitted to the other side of the differential gear through a train of spur gears, located at the left-hand end of the machine, which drive shaft E. At the right-hand end of this shaft there will be seen three bevel gears, F. G, and H, the last of which is inside the differential. Bevel gear H is carried at the left-hand end of shaft I, which is in line with shaft E. From shaft I, power is transmitted through spur gears to a horizontal shaft, J, carried by bearings inside the bed of the machine, and through this shaft the drive is through bevel gears K and L to a vertical shaft, M, on the upper end of which there is a cam, N, that fits into a cam box in the cross-slide on which the relieving tool is carried. By adjusting the change-gears on shafts I and J, the required number of strokes may be obtained for the relieving tool, while adjustment to compensate for the spiral angle of the gashes is effected by the differential movement.

In Fig. 1 it will be seen that there is a small crank handle midway between the crank on the cross-slide and the hand-wheel on the apron. The purpose of this crank is to provide for releasing the compression of two springs which hold the cross-slide in contact with the cam N that provides the oscillating movement to the relieving attachment. By simply operating this master control lever, the oscillating movement is stopped while the carriage is being run back to the starting point, or while other similar adjustments of the machine are being made. Independent adjustment of the tension of each of these springs is furnished by means of two screws which will be seen at each side of the master control lever. Another valuable feature of the design is the provision of means for locking the differential movement, in order to adapt the machine for relieving hobs with straight gashes or for relieving milling cutters and other similar work. In this connection attention is called to the fact that the relieving attachment is supported on a swivel saddle so that the tool may be set at any required angle with the work. This adjustment covers a range of 180 degrees, thus enabling the machine to be employed for any work coming within the extremes of relieving straight gashed hobs or milling cutters up to the relieving of the side teeth on face mills.

Specifications for T.M.C. Relieving Machine

Swing over bed, 21 in., over carriage. 14 in. Maximum distance centre to centre, 39 in. Hole through spindle, 1 1-8 in. Back gear ratio, 16 to 1.

Range of threads which can be cut, 1-32 in. to 49 in. lead.

Change speed gears provided, or leads 36 gears, for flutes 10, for spirals 18 gears.

Gears driving relieving cam all hardened nickel steel.

Set of six hardened and ground tool steel relieving cams, giving relief from .040 in. to .280.

All spindles of alloy steel heat treated.

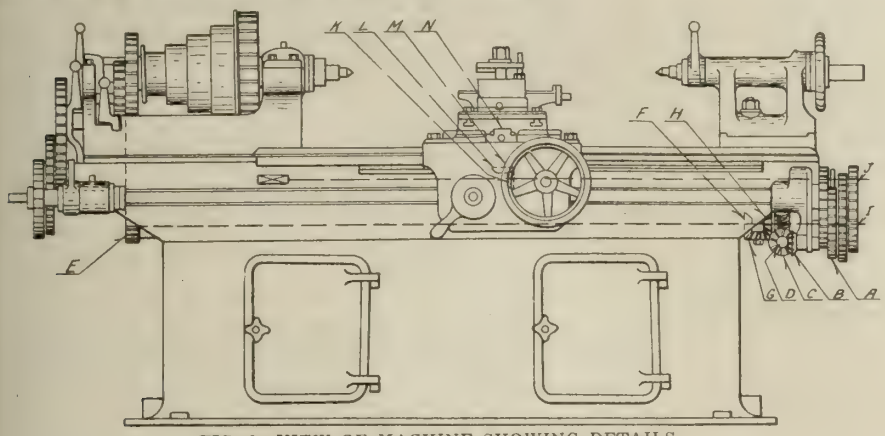

FIG. 2—VIEW OF MACHINE SHOWING DETAILS.

Lead screw of high carbon heat treated steel ½ in. pitch, correct to .001 in. in any foot of length.

Machine fitted with one work arbor, chuck plate and centres. Attachment for relieving spirally fluted thread milling cutters can be supplied if desired at a small extra cost.

Weight of machine 5,000 lbs. approximate. Overall dimensions; length 118 in., width 32 in., height 55 in.

Shipping weight, boxed for export, 5,350 lbs. Shipping space, boxed for export, 124 in. x 38 in. x 62 in.

FOR HEATING RIVETS

The Canadian Blower & Forge Co., Kitchener, are sending out particulars of a "Buffalo" oil burning rivet forge.

This forge consists essentially of a welded steel oil tank, on which is mounted a head or fire chamber.

Air is supplied by means of a single connection which furnishes pressure for the oil supply as well as air for the atomizer. The tank is tested under an air pressure of 100 lbs.

The fire chamber consists of a steel plate housing with cast iron top and bottom plates, held together by means of three screw bolts.

The lining is a 2-inch specially-moulde dfire brick, of the best quality of refractory metal obtainable. The bottom is strengthened by increasing thickness to 2 1-2 inches.

Temperature is under perfect control, and it is impossible to burn rivets even when left in the forge for long periods at a time. This insures clean, uniform rivets, free from the objectionable coating of oxide, or from dirt or ashes.

Report on test made on 12 inch diam. oil rivet forge:

12 3-4 x2 1-2 rivets, 7 minutes.
12 5-8x2 rivets, 4 1-2 minutes.
12 1-2x2 rivets, 3 minutes.
12 1-2x1 rivets, 2 1-2 minutes.

These rivets were heated to a driving heat in the time noted above. Oil consumed 1 3-4 pints.

As the same size burner is used in the 8 inch forge, the above test will apply to that forge also.

Below is a tabulation of the total number of rivets possible to heat at one time:

12 inch forge: 24 rivets, 3-4x2 1-2; 30 rivets, 5-8x2; 35 rivets, 1-2x2; 50 rivets, 1-2x1.

8 inch forge: 16 rivets, 3-4x2 1-2; 20 rivets, 5-8x2; 24 rivets, 1-2x2; 35 rivets, 1-2x1.

ELECTRIC SUPER-SUBMARINES

Designs for a new type of super-submarine have been elaborated by Captain Norman Wood, R.A.F., who recently read two papers on the subject before the Institute of Marine Engineers in London. Previous to his connection with the Royal Air Force, Captain Wood was engaged on submarine work and had practical experience of the deficiencies which exist in the design of even the latest vessels. On the surface, submarines are driven by Diesel oil engines; under water they are driven by electricity from storage batteries which must be charged when the vessel is on the surface. These conditions are usually met by arranging the following chain: (1) Diesel engine; (2) clutch; (3) electric motor; (4) clutch; (5) propeller shaft. It is not difficult to see that this equipment involves a complex series of operations at critical times as, for instance, when the vessel is caught by enemy searchlight when the batteries are being charged. Captain Wood proposes to simplify the transition from engine drive to motor drive (or vice versa), by adopting an all-electric drive, using, in a 1,200-ton boat, two oil engines to drive electric generators supplying current to electric motors fixed on propeller shafts. He anticipates a big development of submersible ships, both naval and mercantile, on the ground that the growth of air power will render submersion the only means of escape from aerial attack. From this standpoint sea power will include air power and submarine power as well as strength in ships of the old type.

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The Value of a Dollar

THE vice-president of one of the big trust companies in New York is authority for the statement that the solution of the problem of high prices seems to lie in multiplying production rather than in attempting to curtail consumption and to lower wages.

Fred Gardner, a boiler maker of Fort William, speaking to the Industrial Relations Commission, said, "We don't want more wages, for as soon as wages go up, up goes the price of our grub pile."

The chances are that this Fort William man is getting dangerously close to the real situation.

A dollar in our money has as changeable a value as the currency of Mexico. The trouble is that we do not believe it.

If we could take our dollar bill to-day and across the face of it stamp "52 cents" we might realize the situation more accurately.

All through the war we heard that prices would become normal when the necessity of supporting an army abroad was removed. People were led to expect a certain amount of relief.

It has not come, and there are few prospects of it coming.

Rents stay up, fuel is higher, clothing, boots, etc., are on peak levels, while food shows an actual increase.

The Dominion Government has appointed a commission of inquiry to find out why costs are high. This commission is composed of members of the Dominion House, and sooner or later they will want the votes of the people. Little has ever been accomplished in this country by the appointment of a commission. It is one thing to appoint a commission, and quite another to get action from any of its findings.

People do not mind spending their money if they are securing something worth while. But they do want to get back to the point where they can spend their money and get something more tangible than 52 cents' worth of goods and 48 cents in hand-outs to a long line of handlers who have managed to crowd in between producer and consumer.

Speculating or Gambling?

SOME people do not seem to grasp the real meaning of the difference between speculation and gambling.

When a person sits in at a game of cards, takes his chance at getting good or bad, puts his money up and wins or loses, that is gambling. When he takes a set of dice and rolls them around in an effort to turn up spots, that is gambling.

When a chap goes into a brokerage concern, puts his money on Hole in the Ground Mine Co., sits there and watches the ticker tape to see if his gamble—beg pardon, speculation is going to go up and make him, or go down and break him—well that's speculation.

Don't you see where the difference comes in? It is very clear. One is gambling and the other is speculation. A gambler is a sinner in the eyes of the law—the speculator is a citizen in good standing. So if you must do some fool thing, why not speculate instead of gamble?

The Future of the File

A WELL-KNOWN Canadian firm, making files, has sent out word with its shipment that a file is a fine tool, and as such should be protected from rough usage. The notice even goes on to claim that better results can be secured from a well-preserved file.

As a matter of fact, this manufacturer is right, but we hate to believe him. The general acceptance is that a file is a utility tool, and that it can stand hard usage. Therefore, it is the duty of the man who gets a file to give it hard usage.

Ever use a file as a hammer? Not as a sledge, perhaps, but just as something handy at the time.

Ever pry the lids off cans with a file? Sure. Great thing for all such odd jobs.

Ever use the tang end of a file to dig a hole in a brick? Handy for this sort of work.

Ever turn over a heap of tools to find the file you want away at the bottom, where everything else in the box has had a chance to have a kick at it? Own up now, you have.

Most people have had about as much regard for a file as they have for a crow bar. Its cutting edge is regarded about the same as the family razor that shoots father's whiskers, pares mother's corns and when no person's looking sharpens the youngsters' lead pencils. The file is sort of a family instrument. Every house has one in the kitchen table drawer—that is every well-regulated household. And there are more hanged things done with and to that family file than ever happened in a bang-up three-ring circus. It pulls corks out of a bottle, it hammers tacks, it sits around on call when the carpet is being laid on the back stairs, and it comes into active service when the old man is wondering why under the sun the elbow from the kitchen range will not slide into the stove pipe hole like a reamed out cylinder and piston. It is the family file that crawls in beside that stubborn pipe and stays there too while the old man administers the final heave that puts the smoke stack in action.

Well, to be sure there may be better times on ahead for the file. It surely has had a whale of a time in its day, and when the day is over it generally gets its whiskers shaved off and does service as a screw driver, a chisel, a scraper, a centre punch, a drift or what not.

This process of education may do much. Certain if it does anything at all it must be for the better. It may even be that in years to come the file will get decent treatment in the shop and occupy, in the home, the place on the piano that is now given over to a picture of John Henry, taken in the suit he wore when sticking the point of a bayonet into the breeches of one Fritz.

Metric Be Tinkered

I'VE read an awful heap of stuff 'bout metric system laws, and words of queer and curious sounds they agitate my jaws. They speak of kilograms and stuff, of centimetres. too, until the atmosphere burns out and everything looks blue.

They say we have been taught all wrong on how to measure junk, and that the system what we use is plain unvarnished bunk.

When I was young, 'twas long ago, we hastened off to school. and there into our mind was burned the 12-inch measurin' rule. And when we wished to speak of things about their width or height, the usin' of the inch and foot seemed altogether right.

We juggled then. by heck, we did, with yards and rods and chains, these things did much in days gone by to rear our childish brains.

A dollar is a hundred cents, there ain't no doubt of that, and folks what argue otherwise is whisperin' through their hat.

And yet they come and tell us now that all these things be wrong, that we should dance and tune our harp unto the metric song—that we should take our yards and feet, likewise our inches, too, and toss them all into the can and grab off something new.

I do not love these changing times, with all their notions strange, they camp beyond my mental grasp and dwell beyond my range. They make it powerful hard for folks what's built like me and you, to keep our balance through the day and know just what to do.

Why can't them meddlers take some task that really is worth while, some job that measures not a foot, but stretches out a mile. I'd like to rise up from my seat and ask that metric group, to tackle now the price of bread, of beefsteak and of soup. Yes, let them work and show to me how pork and beans and hash can come again and rest within the limits of my cash, and let 'em reckon out at once about the cuts of pie, what's slivered now to sink within the corner of your eye. These things, my friends, are worthy tasks, to me that is a cinch, more worthy far than tryin' to chase our yard and foot and inch!—ARK.

WHAT'S become of the shop joker who used to be sending the apprentice out to look for a left-hand monkey wrench and a flat-faced hammer?

* * *

THE garrison in Montreal could not fire a salute on the King's birthday because they had no ammunition. However, as long as the Ottawa House stays in session the country shall not lack for explosions or the fear of them.

* * *

THERE are some folks who really have something to say, while again, there are quite a heap who simply have to say something.

* * *

A PENNSYLVANIA peanut and fruit stand man left an estate of $30,000. The man who stows away a nickel's worth of peanuts in his vest pocket will be willing to believe this.

* * *

ON A Detroit street a doctor, undertaker and tombstone maker have their establishments side by side. As the efficiency man in the machine shop would say, the sequence of operations is admirably arranged.

* * *

A TRACTOR was being demonstrated at Richmond, Mich., when it became unmanageable and ran through a drug store. Being of the caterpillar type, there was doubtless something in the drug store to meet its case.

* * *

PINCH-BACK coats are going out of style, and the high price of ham and eggs keep on attending to the pinch in front.

Repeated Expressions of Successful Men

By DONALD A. HAMPSON

"I DON'T WANT A MAN IN MY SHOP WHO KNOWS ANYTHING." A manufacturer of hack saws who was making his factory independent of skilled workmen by the use of full automatic machinery—and he did it, too.

"MY FRIEND, THERE IS NO SUCH THING AS LUCK IN THE HARDENING GAME." A superintendent of punch and die departments to a workman who cracked an expensive drop forging die because he hadn't properly preheated it.

"WHAT'S THE USE OF PAYING SHANNON? HE'LL ONLY PUT THE MONEY IN THE BANK!" A factory owner of the sport variety who depended on a faithful executive to keep the business going. Shannon finally quit to get a year's back pay, something which had a sobering effect on Mr. Sport.

"IT'S NOT THE MACHINES YOU HAVE, IT'S THE MEN." So said a superintendent of a shop in New York City making the only steam specialty of its kind that would meet U.S. Navy requirements. This was before the war and there had hardly been a new machine in the plant in ten years, but they had good tools and appliances AND the men had been a lifetime on the job, hustled, took a personal interest in the shop, and earned big money. The product was good all the way through and it was an honor to be a member of the staff.

"WHEN YOU'RE RUNNING THIS DEPARTMENT, YOU CAN DO IT THAT WAY—UNTIL THEN MY WAY GOES." A department head who encouraged suggestions but, as he was responsible for the work, wanted to authorize any changes before having them carried out.

"THE MAN WHO NEVER CHANGED HIS MIND NEVER DID ANYTHING." An executive who did the unexpected, even to reversing his decision. But his schemes, though radical, were good, the best proof of that being that after his death, his designs were left unchanged in the face of all the latest improvements offered in competition.

THE Dominion Government is likely to give assistance to the municipalities that want to go into the cold storage business. What's the trouble? Is the Government afraid to lay hands on the cold storage plants already in existence? Or is it just another way of shoving the thing along to the municipalities because Ottawa lacks backbone to settle it?

Submarine Indemnities

AT an international conference of transport workers held in Amsterdam recently the Belgian delegate introduced the following motion:

The International Conference of Transport Workers, taking into consideration that approximately twenty-two thousand seamen of all nationalities have been murdered in consequence of submarine warfare, appeals to the German Government to grant full indemnity to the families of these murdered seamen. The report says that the German delegates expressed approval of this motion.

MARKET DEVELOPMENTS

A More Hopeful View Taken of the Market

Indications Are That Business is on Eve of Development as Soon as Labor Troubles Are Settled—Buying for May Made the Records for That Month Very Satisfactory

AN increasing number of firms can be found which state frankly that they consider business as being on a good footing, and in good shape to take advantage of the expansion which they feel certain is coming very quickly. This does not refer to dealers in Canadian centres alone, but to American concerns in the steel and iron trade. One of the largest of these mills has a circular letter out, which is mailed to many in the Canadian trade. It speaks unreservedly of favorable developments which have already set in in the steel market, among which increased buying is the best.

Warehouses handling steel and iron products report that May was a particularly good month. There were many sales and they were good ones, and in many cases they indicated a belief in the future and an acceptance of present market values as being fair and liable to hold for some time to come.

The machinery trade is finding that it is harder to get immediate delivery on purchases made now. Many of the makers of machine tools are actually behind on deliveries, and this indicates large buying and bookings.

Dealers in supplies state that list prices still hold, but it is not necessary to go very far to find that there is a great deal of elasticity in the market. For instance, there are certain lines which some dealers are selling at 45 per cent. on the list, while others are selling at ten and five off. There is considerable competition now, and "Get the business" is once more finding its way into the rules of the market.

Scrap prices for the first time in some weeks have taken a turn for the better, especially in coppers. Red brass is also more in demand, due, it is said, to large buyings of the American roads for car bearings. But the scrap metal market can stand a lot of improvement yet before it is in a healthy state. Indications are that the trend for higher copper is going to continue.

MONTREAL BELIEVES THAT THERE WILL BE BETTER TRADING SOON

Special to CANADIAN MACHINERY.

MONTREAL, Que., June 5.—Everything points to a betterment of the industrial conditions in the near future, and this feeling appears to be prevalent throughout all trade circles. Activity generally shows little increase, but the impression seems to be that the inquiries that are coming in will shortly be followed by substantial business, and of a character that will create greater confidence in those that have been holding off reconstruction enterprises, due to the unsettled state of conditions generally. The strike situation is still a factor to influence business, but their appears to be a more hopeful tone as to the ultimate settlement of some of the difficulties that are now confronted by the different parties.

Steel activity continues steady, but the dealers here anticipate a better business within the next few weeks. The general metal situation is unchanged and the improvement of the past few weeks has fallen off a little, but the volume passing is still sufficient to maintain the interest of the trade, and the hope is expressed that steady business of increasing volume will be a feature of activities in the near future.

The machine tool business is again occupying an important position in the general activities of the markets and the increasing demand does not appear to be of a transient character, as reports from dealers appear to emphasize the growing demand that is coming in for all classes of equipment. In many instances users of tools are beginning to find that delivery is becoming more uncertain and that some lines are hard to get under several months. Prices on many new lines have shown no material drop for some time, and the supposition is that declines will be less in evidence from now on. Scrap is again quiet after a week of slightly increased activity.

Better Feeling Slowly Developing

Apart from the fact that the steel market has become an open one, entirely free from the restrictions that were imposed during the war, the conditions that exist to-day are virtually the same as those prevailing during the last weeks under Government supervision. Little improvement has developed in the operation of the mills, and in many instances these are closed down or working at low capacity. Despite this condition, however, there is the feeling that the trade generally is beginning to realize the impractibility of much lower prices on many of the regular lines of steel commodities. This is having the effect of renewing the confidence of the consumer to the extent that inquiries are coming in for advanced delivery, not in great volume, but sufficient to indicate that the early future may see a partial return to the old activity. The quiet months, however, are now approaching and any material increase in the regu'ar demand will probably not be fully felt until the fall period. One of the factors that has prevented the actual condition of the market becoming known is that, so far, no really large order has been placed for domestic requirements, and until this does happen, operations on a competitive basis cannot be expected. When worth-while business does loom up it will show just what can be done in the way of other than paper readjustments of steel prices.

The local trading has been comparatively good, but not exceedingly heavy. Plate sales have been about normal and

a slight increase in boiler tubes is announced, but on the whole the business reported remains about the same. Dealers here have reduced the quotations on their plates, the decline being about ½ cent per lb. Plates, ½ and up, are now $4.50, and the smaller sizes $4.90 per hundred. Checkered floor plates are now 6½ for the heavy sizes and 6¼ for the smaller sizes.

Scrap Again Develops Weakness

Following the brief activity that was evident in the market a week ago, the situation has again resumed its quiet condition with the movement of old material of a small volume. However, the better feeling that prevails appears to be general throughout the trade, and most dealers are looking forward to a return of more regular and increased business. There is still that atmosphere of doubt that has characterized the situation during the past months, but the contention is still advanced that improved conditions will eventually follow the signing of the peace terms. Whether this is the real reason for the reserved attitude of the average consumer, or that other circumstances combine to make the market one of exceptional dullness, it is difficult to determine, but the fact remains that consumers are not buying any material that they do not require for immediate needs. Dealers are not surprised at the reaction that has taken place during the past week, and some anticipated that the stronger tone would possibly be followed by a decline, and this has happened this week and the prices quoted indicated the weaker tone of the market. Heavy copper and wire are down ½ cent, the quotations being 13½ cents per lb. Compositions have declined a similar amount and the price quoted is 12½ cents per lb. Yellow brass turnings at 6¼c show a decline of ¾ cent per lb. Nearly all the steel scraps have declined; wrought iron axles, rails, malleable scrap, wrought pipe, and cast borings are all down $3.00 per ton. Machine cast iron, car wheel, and steel axles, show a decline of $2.00 per ton. Boiler plate has been reduced from $11 to $10, the latter being the current quotation.

IMPROVEMENT NOTED IN TRADE CONDITIONS

Feeling Grows That Business Will Boom When Labor Troubles are Adjusted

It is not necessary that a person should be much of an optimist in order to see that conditions in the markets are improving. Dealers who have for the past six months been more or less doubtful are now coming to the point where they are willing to admit that they have come through the time since the signing of the armistice in good shape and are now on the verge of more and bigger business than they have touched since the war programme was at its height.

This feeling is not confined to any particular line. It is general, and in spite of all the strike and labor troubles it persists in making itself felt in many places.

General Buying Now

Machinery dealers have figured on a lot of business, much of it of a general nature. It should be placed shortly. A lot of business is coming into the market for the wood-working dealers, and sales of good, new equipment for these shops is frequent and liberal. The making of adjustments on account of war contracts does not finish up quickly. Several of these claims have been adjusted but many more are still "in the process," and apparently there are no short cuts to the finished deal. When this business is finally disposed of several firms will be able to go ahead much better than at present, and they will also be able to clean out their old war plants.

From reports that one hears around the machine and supply houses there must be a fairly liberal spread on some of the prices that are being quoted for supplies and small tools. For instance, it has come out that in some cases certain cutters are being sold at 45 on the list, while other dealers are selling them at ten off, while at least one place geos one better and makes the discount ten and five off. The lists look the same when they are handed out or spoken of, but when one has an order in his pocket large enough to look interesting it does not take very long to find out that there is quite a good deal of elasticity in the quotations.

Scrap Market is Stronger

For the first time in many weeks dealers in the scrap metal trade report that there is a change in their business, and that change is for the better. As mentioned in these columns before the trend of copper is upward. This is emphasized now in the way of higher prices for crucible and heavy copper and copper wire, while certain of the brasses are up slightly. Dealers are willing to stay with their prediction that the close of the year is going to see a much stronger market for coppers. It has been some months since dealers were willing to mark up higher figures for anything in the line of scrap, but this week more than half a dozen alterations were made all in the same direction.

No special reason can be assigned for the improvement in brass and copper. It is known that the United States has been buying large quantities of red brass for bearing boxes, and this might have the effect of lending some strength to the situation. But copper is undoubtedly going better now and will improve its position.

Yards are not taking in much material from war shops now, although there is considerable of this to be disposed of. The price for this class of stuff is not very tempting at the moment, in fact it is lower than some months ago. It is necessary before using it to separate the iron from steel, and break the former into cupola sizes. Dealers are paying about $11 for this material now, the price being based on f.o.b. the plant where it is being taken from, and the loading is generally looked after by the firm making the sale.

The quotations for wrought pipe are still very low, and the metal is really worth more, but just at the moment there is no market for it.

May Was a Good Month

Dealers in steel and iron in all its various branches have no complaints at all regarding the business they did during the month just closed. There was heavy buying all through.

One of the Toronto firms has received a letter from the La Belle Iron Works at Steubenville, Ohio, and it shows very plainly the confidence that is felt by this concern. It is well worth reproducing.

While we may be wrong, it is our impression that conditions are very much better than they have been, and the start may be made for the good times attending the reconstruction period which everybody thinks we are sooner or later going to have.

We have received a good many jolts since the armistice was signed, but have recovered from all of them, and it is now commencing to look as if in all lines of trade, which includes merchants and manufacturers, that they are impatiently waiting for the moment when it would be advisable to go ahead. One of these days the country will wake up and find that the move has started, if this has

POINTS IN WEEK'S MARKETING NOTES

By reason of increased bookings United States Steel Corporation is increasing its bookings.

—

For the first time in many months dealers are making increases in the scrap metal quotations. They anticipate that copper will be much stronger by the end of the year.

—

Warehouse interests handling iron, steel, tubes, sheets, plate, etc., report that the month of May was a good one for business.

—

One report has it that one firm sells cutters at 45 on the list, while another dealer is handling them out at 10 and 5 off.

—

Several large undertakings are seriously interfered with by reason of the strike, and they may be abandoned entirely.

—

Those who were looking for another cut for steel in June have withdrawn their predictions.

—

Deliveries on machine tools are now running behind in many lines.

—

Montreal warehouses make plate prices the same as Toronto, the ¼ in. being quoted at 4.50.

not already happened, and we are reasonably optimistic for the immediate future, which is an entirely different feeling than we have been able to entertain for several months.

There are many more inquiries for sheets and kindred products. The automobile industry is going ahead at a lively rate, and much more steel will be used for this purpose during the last six months of 1919 than the first six months. We have opportunities, as a matter of fact, to quote on all kinds of tonnage for this purpose.

In our lap-weld department of the tube works we are operating in full, and the best promise that can be made today, of all sizes, 3 in. and larger, would be from six to eight weeks.

The steel industry is in a snarl with the Railroad Administration, who are large buyers, ordinarily, and maybe not much can be expected from this source, regardless of prices, until financial arrangements have been made. A man without any money in his pocket usually makes more noise than the fellow who is able to pay, and I think that the Railroad Administration have been taken a little bit too seriously. As a result of the snarl, it is our impression that steel manufacturers, generally, have made up their minds that present prices were close enough to cost, any way, so what would be the use of cutting?

Just in this connection we can say to you frankly that the majority of consumers of steel products throughout the country do not appreciate the advance in the cost of manufacture between today's rates and those in effect during the early part of 1915, when we were at the low point.

We were interested here in noting a recommendation that was made by Mr. Hines, that prices should be based on a differential between raw material and finished material equivalent to an advance of 50 per cent. over the average differential between these products that had prevailed during fifteen or sixteen years prior to the war. Just to check up, we made a comparison of conversion costs between April, May and June, 1915 and at the present time, with the result that the actual cost of conversion now is from two and a half to three times greater than in 1915. That would mean that instead of the differential being increased by 50 per cent. that it should be increased from 250 to 300 per cent. As a matter of fact, some lines are being sold at cost to-day, and as one of the producers of steel who might compare favorably with the average of low cost concerns, can say to you that there is not much room left for further cutting. This is more than true when operations are at 50 per cent. to 75 per cent. of capacity. The only thing that would have a decided influence on present prices would be reductions in labor and that in our opinion is some distance away.

Yours truly,
LA BELLE IRON WORKS.

"GREATLY IMPROVED" IS THE REPORT ON THE PITTSBURGH STEEL MARKET

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., June 5.—The increased rate of buying of steel products already reported is receiving more attention and on all hands it is being said that the market situation is greatly improved. In new shipping orders, and in specifications or shipping orders against contracts, the Steel Corporation had a tonnage in May equal to about 75 per cent. of its capacity, while its actual shipments were probably in the neighborhood of 60 per cent. This in itself would not mean that the statement of unfilled obligations, to be made public June 10, will show an increase, for that statement includes tonnage merely sold under contract, much of the actual business received in May being in specifications against contracts which stood on books as unfilled obligations at the close of April. By reason of the increased bookings the Steel Corporation is increasing its production along some lines. The independent producers have also been in receipt of considerably more business, but in their case the business is chiefly in the form of new orders, as they had relatively few contract obligations.

Steel mill operations probably averaged about 60 per cent. of capacity at the beginning of May, dropping to about 55 per cent. by the middle of the month. Since then there does not seem to have been any decrease and there may be a slight increase this month.

Summer Usually Dull

No one, except perhaps a few ultra-optimistic among the producers, contend that the improvement recently inaugurated represents the actual beginning of a full-fledged buying movement such as would set the steel industry to operating at capacity and cause prices soon to begin moving upwards. About the most that is claimed is that the continued decline in demand, with its weakening influence upon prices, has ended, and that whatever changes occur in future will be for the better. For there to be a full all-around demand for steel it would be necessary that there be large orders for steel for construction purposes, such orders being but little in evidence, and that there should be a fair volume of railroad buying, while, as a matter of fact, there is practically none. The 200,000 tons of rails bought about ten days ago do not count for much, and there does not seem to be anything else definitely in sight, at least until the railroads are returned to their owners at the end of this year.

July and August are always very dull months in the steel market, unless conditions are altogether exceptional. This improvement in the market, therefore, is going to be submitted to a crucial test in less than four weeks, and its behaviour then will no doubt throw considerable light upon its prospects. To illustrate this point, in the summer of 1915 there was much activity, as the foundation for the great war boom in the steel industry was being laid, while in 1916, when the steel trade was going strong at full speed, there was not only a summer dullness, but the dullness began in June. Correspondingly, the market began picking up in August, not waiting for September.

Price Cutting

Even the steel producers who insist that they are adhering strictly to the price schedule of March 21 in all particulars admit that there is considerable shading of prices by some of their competitors, but this shading is usually only a couple of dollars a ton, four dollars a ton being an altogether extreme case. Such cutting, however, is not altogether unfavorable to market stability in general, because it furnishes a proof, formerly lacking, that there is business to be attracted at approximately the present prices. When the reductions of $5 to $7 a ton were made in March it was thought that if those cuts did not produce a reasonable amount of business, further and still larger cuts would have to be made. Now such extensive reductions are regarded as altogether improbable. Recent predictions that there would be another general reduction in June, following those of December and March, have been withdrawn.

Divergent Conclusions

As formerly, altogether divergent conclusions can be reached from practically the same facts. The facts are substantially that buyers are very conservative, purchasing only what they know they must have early deliveries only, and seeking price guarantees even at that, investment buying not being into the market to any extent, as large construction jobs are conspicuous by their absence, and there is practically no railroad steel being bought. The conditions for a good, strong, broad market are practically all absent. Construction work is usually assumed to absorb half or more than half the steel output when it is at normal rate and it is stated everywhere that ordinarily the railroads take a large part of the steel made, estimates of the railroad proportion of the total steel made in a good year ranging from 20 to 35 per cent. Obviously then the steel situation is very bad. Viewing matters from another angle the conclusion must be diametrically opposite. The steel mills have not averaged less than about a 55 per cent. operation, and earlier in the year when conditions were still more unsettled they ran at much higher rates than that. Orders are being received at more than 55 per cent. If the irreducible minimum of buying is so high then when all the other buyers now absent from the market come in there must be a very heavy demand indeed. Some time there is going to be construction buying as many large projects are on the boards, simply deferred, and there must be heavy railroad buying some time or the

country is going to tread the path of having hardly any railroad facilities at all in a few years.

For "the long pull" at any rate one cannot possibly avoid being very sanguine as to the American steel trade. As to prices, and "price readjustment," the idea six months ago was that there would have to be great reductions, as the war-time steel prices averaged 111 per cent. above the ten-year pre-war average. During the intervening six months the steel situation and prospects have been helped not so much by what has gone on within the trade, though the December and March reductions brought prices to only 81 per cent. above the pre-war average, as by what has occurred or has failed to occur, outside the steel market. Other commodities, in general, have come down but little, and it is now admitted that they are not going to come down to any extent. The inflation is to be more or less permanent. The deflation will proceed slowly, with many stoppages. The latest Dun and Bradstreet index numbers, based on a wide range of commodities, show prices approximately double the pre-war average. When commodities in general are not coming down there is no particular reason why steel should be an exception.

Pig iron remains practically at the March 21 prices. There are some irregularities, but there have been no outright declines of any consequence, and none are expected now, with so many furnaces out of blast.

The Connellsville coke market shows a stiffening tone. Coke operators are thinking of higher prices for second half furnace coke than they would have entertained three weeks ago. The furnaces will hardly agree, and if they do not, the purchases will be made from month to month instead of for the half year.

BIG EXPANSION OF AUTO BUSINESS

Very Large Plant Now Planned on the River Front at Port Huron

Special to CANADIAN MACHINERY.

NEW YORK, June 5.—Although machine-tool orders were somewhat fewer in number during the past week than the week before, the general tone of conditions shows a steady improvement. The lull last week was partly due, no doubt, to the double holiday at the end of the week. As Memorial Day fell on Friday, many manufacturing plants declared a double holiday, shutting down Thursday night until Monday morning.

A satisfactory development in machine-tool trade is the growing demand for tools from general manufacturers, the demand during recent months having been quite largely from companies in the automotive field. One of the large buyers last week was the Standard Oil Co., of New Jersey, which placed orders aggregating about $300,000 for a repair shop at Bayway, N.J. The Federal Shipbuilding Co., Kearny, N.J., continues to buy and the American Shell Co., Paterson, N.J., formerly a war plant, will manufacture centrifugal extractors and electric motors for washing machines, and has received bids on a list of equipment, which will be bought within a week or two.

The automobile industry continues to expand to keep pace with the remarkable demand for passenger cars. The Studebaker Corporation, South Bend, Ind., announces that it will expend $8,500,000 this year for expansion of facilities and a new and large automobile plant is to be built at Port Huron, Mich., by C. L. Wills and John R. Lee, both formerly connected in official capacities with the Ford Motor Co., Detroit. The Port Huron plant will build a 6-cylinder car which Mr. Wills has designed. The site selected at Port Huron has a three-mile frontage on the St. Clair River and a plant will be built for the entire production. Arrangements are being made to bring iron ore from the Lake Superior mines to the plant by boat, and a blast furnace therefore will be a part of the new plant. Mr. Wills was chief engineer of the Ford company, having been with the Ford organization for 18 years. He resigned a few months ago. Mr. Lee was in charge of the social welfore, profit sharing and bonus departments of the Ford Motor Co. A part of the site at Port Huron will be used for the construction of a model workman's village.

The Bethlehem Steel Co. will build a valve manufacturing plant at Redington, Pa., and is in the market for equipment to machine the valves. A foundry will also be built.

BUYING MOVEMENT IS STARTING IN BIG WAY IN PIG IRON MARKET

FROM the various centres of the pig iron trade come encouraging reports. It would seem as though the long-awaited buying movement was actually arriving. Following are the reports by districts:—

Cleveland.—Enquiries for foundry iron in lots of 500 to 1,000 tons are numerous, and at least one enquiry for over 1,000 tons has appeared. A number of sales have been made for last half delivery, and some orders for malleable have also been taken, amounting to about 4,000 tons, for last half. Some furnaces are piling a small portion of their output.

Boston.—A better demand for iron is apparent from industrial consumers, notably textile machine and machine tool makers. While most of the sales are still in small lots, the total makes up a respectable amount. One firm reports sales during the week of approximately 4,000 tons.

New York.—Both enquiries and actual business have shown an improvement during the past week. Numerous sales have been made for third quarter and last half. Although prices have not advanced, the tone is very firm, and with the better demand for future business, it may be said that the lowest levels have been reached. Charcoal iron is quoted at $36.50 for prompt shipment, and $29.25 for last half.

Cincinnati.—There has been a good enquiry from outside melters. Prices are firmer generally. There has been no demand for malleable or basic iron, but high silicon iron is still in request. Opinion inclines towards higher prices for the last half requirements.

St. Louis.—Southern furnaces are quoting No. 2 foundry at $30 per ton, which is a reduction of $2.25. This represents freight absorption to meet northern competition. Enquiries are good, and a fair number of sales in carload lots are reported.

Birmingham.—While most makers are quoting iron for last half delivery at the prices named in the last Washington conference, some furnaces are absorbing the freight rates when in competition with Northern makers. Further curtailment of production will take place next week.

Philadelphia.—While a fair amount of business is reported, the improvement noticed recently was not fully maintained. There is not much demand for future delivery apparent, neither are makers looking very hard for this class of business. Standard low phosphorus is quoted at $40 per ton, with a good supply. Prices on foundry are lower, with quotations showing a wide range.

Pittsburgh.—There is a fair demand for foundry iron in this district. The Standard Mfg. Co. is looking for 2,000 tons for June delivery, and some orders have been booked for third quarter. Actual sales have been mostly in small lots, although one sale of 3,500 tons has been noticed. There have been a few transactions in bessemer grades, and with the improvement in the ingot mold business, expectations for this class are good.

Buffalo.—Numerous enquiries and a better actual business turnover has created rumors of higher prices. Enquiries during the week amount to well over 20,000 tons. The fact that the price of ore is fixed, and coke at its lowest limit, would tend to make higher prices for pig iron necessary. There has been no increase in production.

Chicago.—The indications are that a buying movement for last half requirements cannot be long delayed. There has been some buying in a small way already, and enquiries for lots up to 1,000 tons are frequent. One indication that more iron will soon be required is the increased demand shown lately for foundry coke. With production curtailed and shipments going through freely, the amount of iron piled will not be sufficient to affect the market.

First Soldier (in restaurant): "How's your egg, Bill?"

Second Soldier: "I'll match you to see who goes back for the gas masks."—Jersey Journal.

Up to Canadians to Get After the Business

Lloyd Harris Puts the Case Squarely Up to Canadians—There's Lots of Business to be Had, But It Requires Courage and Resource to Handle the Situation

THAT there was plenty of business to be secured, and that it was good business, was what Lloyd Harris, chairman of the Canadian Mission in London, Eng., told the Toronto Board of Trade on Tuesday. He also made it very plain that it was up to the manufacturers to go out and secure it, and at the same time make certain that they would be able to handle it satisfactorily. His mission had no intention of making of itself a glorified commercial traveller, but they were at all times willing to meet all the representatives of Canadian firms, and tell them where to go and what to do.

"When I arrived in England conditions were awful. The people of Canada know nothing of the enormity of the effort and sacrifice of the British. The people were on rations, and they did not have enough to eat, nor enough fuel to keep warm."

Timber needs were enormous and they would continue so for some years to come. There had been very little work done in the way of construction during the war, and a large quantity of timber is required for road work. For at least three or four years Britain will take all the timber she can get. Mr. Harris had gone to the Timber Control, and had been offered large contracts for this country provided the financing could be arranged. This had been done and very large orders had been placed both in Eastern and Western Canada.

"The matter of import licenses bothered us for some time," stated Mr. Harris. "Through some flaw in the wording of the regulations a joker had actually been inserted to the effect that the country could not allow imports from Canada. It was a case where the father did not want to know his own child. It was difficult at first to convince the authorities that the clause was really there, but now the British markets are open to all Canadian imports, and I doubt if Canadians realize what that really means to them."

Everything that is produced in this country is wanted. The British manufacturing world has not got started yet owing to labor conditions and the trouble in securing raw materials. There is practically nothing that can be produced in the Canadian industrial world that cannot find a market in Britain right now. Many Canadian manufacturers who have been over have found this to be the case and they have returned to this country with large orders for their shops.

The Condition of France

"We had thought France would require a lot of material, and so she does. We travelled all over that country, and I never saw such a state of affairs," continued the speaker. "Railway bridges and tracks were blown up and wrecked by the mile. All this has to be repaired and rebuilt, and France has a big work ahead of her." Against this Mr. Harris pointed out the problem that France had to face in an economic and industrial way. France had a big debt, she had a large army to demobilize, and it all meant that she had a big financial burden. It is a fact that the country for some years to come will have to raise four billion dollars annually to meet her obligations, while before the war the amount needed was equal to one billion. France, to a great extent, must prevent imports, she must use her own men and her own material, and with her we can have no quarrel for pursuing such a policy. Conditions in Belgium are different, and that country will recover quickly, as the country is small and compact. The openings for trade in these two countries are limited at present, and the Canadian Mission, after finding this to be the case, had turned its attention to Rumania, Serbia, Greece, Poland and the Czecho-Slovaks. Poland is being reborn. It is an industrial country and the people want nothing so badly as to go to work. They are not Bolsheviks, and very little is needed to enable them to start. Their great want is clothing and raw materials. The need for clothing is so pronounced that men in the army have only one shirt, and from wearing these garments so long typhus was getting a start in the country and there had been thousands of deaths. The Bolsheviks are on one side and the Germans on the other, and that country needs help and needs it quickly.

The Rumanian Situation

"The principal industries in Rumania are agricultural and the production of petroleum. The Germans," stated Mr. Harris, "destroyed practically all the rolling stock of that country. They got between five and six hundred locomotives in one place and lit the fires under the boilers with no water in them. Oil is burned entirely for fuel. In this way they practically destroyed all the motive power of the Rumanian roads. Not only this, but the Germans took away all the agricultural implements so that this year it is doubtful if the country will be able to feed herself. Rumania needs everything. If we could finance the business we could get enough right there to keep all our factories going. We could sell them locomotives, agricultural implements, and clothing. There is lots of business there, but the question now is that of financing. They have no standing in the matter of credit, and it may be that we will have to go back to the Indian custom of barter in order to open up trade. They have huge quantities of oil which they could send us, and oil is very much in demand at present. In Southern Russia there is a situation that is somewhat similar, and we could get from that country in exchange for our produce, manganese ore, hides, tobacco, iron ore and petroleum.

Up to the Manufacturers

"I don't think the Government should be asked to go into the matter of credits on this sort of business. I can put you in touch with the proper people to deal with. It is up to the manufacturers and the bankers. If the people here are going to make a careful study of the export business they must show a great deal of resourcefulness. Things have been going along so easy here for the past five years that we have not been building up any real selling organizations. The war business came without much effort on our part."

Greece the Big Chance

Greece, according to Mr. Harris, was in a great condition. Her land had not been much damaged by the war and she had a great amount of shipping, on which a lot of money had been made during the war. Her credit is all right and there are times when the exchange rate is in her favor. Premier Venezelos has wonderful ambitions for his country, which has been lying dormant for many years. Greece, with the new territory which will be added, will have a population of between twelve and thirteen million people, and the new land that is being added is agricultural. They do not produce a great deal in Greece outside of currants and nuts, but they have good deposits of certain minerals. Greece is the gateway to the Balkans, and the Greeks are real merchants. "I met Premier Venezelos a good many times," continued Mr. Harris, "and, after finding out the real conditions I suggested to him that they should make Canada the workshop for Greece. He was impressed with the suggestion, so much so that Greece is going to send a purchasing mission here to buy for a syndicate which will represent practically the whole nation. Mr. Venezelos also told me that the Greeks had to be well fed, and as one of their chief articles of diet is bread, we made a bargain whereby Greece will take one million bushels of Canadian wheat a month for twelve months."

Canada must find a market for her agricultural products as well as for her manufactured goods. The people of Britain are not going to buy as much as formerly from Canada because the people there have not the buying power now, so that this country must build up new

Continued on page 80

A Complete Line 8 in. to 50 in. Swing
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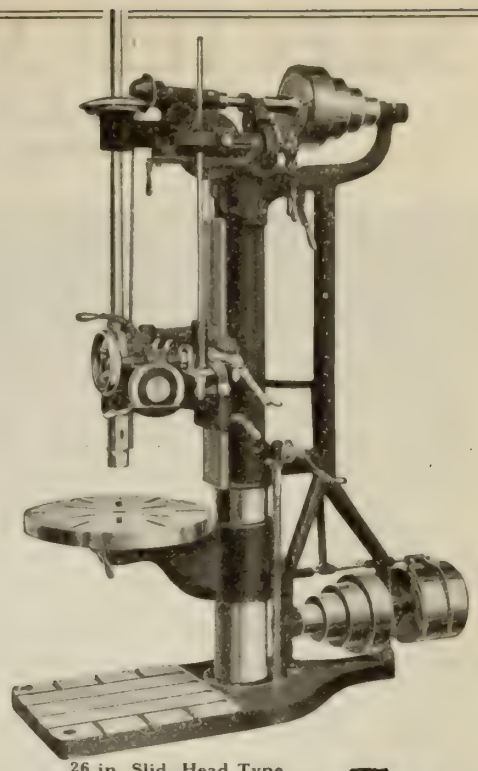

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STEEL, any kind of **welding** on parts of large or small machines, tanks, digesters, boilers, shafts, brackets, etc.
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SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$19 50	$18 50
Electro copper	18 50	17 50
Castings, copper	18 50	17 00
Tin	58 00	55 00
Spelter	8 50	8 25
Lead	6 50	7 50
Antimony	9 00	8 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

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WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$11 50	$11 25
Copper, crucible	14 00	14 00
Copper, heavy	13 50	14 00
Copper wire	13 50	14 00
No. 1 machine composition	12 50	13 00
New brass cuttings	9 25	9 00
Red brass turnings	8 00	9 00
Yellow brass turnings	6 25	6 50
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	5 00	5 00
Heavy lead	4 00	4 00
Tea lead	3 00	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	17 00	15 00
Rails	12 00	11 00
Malleable scrap	12 00	12 00
No. 1 machine cast iron	15 00	15 00
Pipe wrought	6 00	5 00
Car wheels	20 00	18 00
Steel axles	20 00	20 00
Mach. shop turnings	5 50	5 00
Stove plate	12 00	10 00
Cast boring	5 50	8 00

BOLTS, NUTS AND SCREWS

	Per Cent
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 70
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

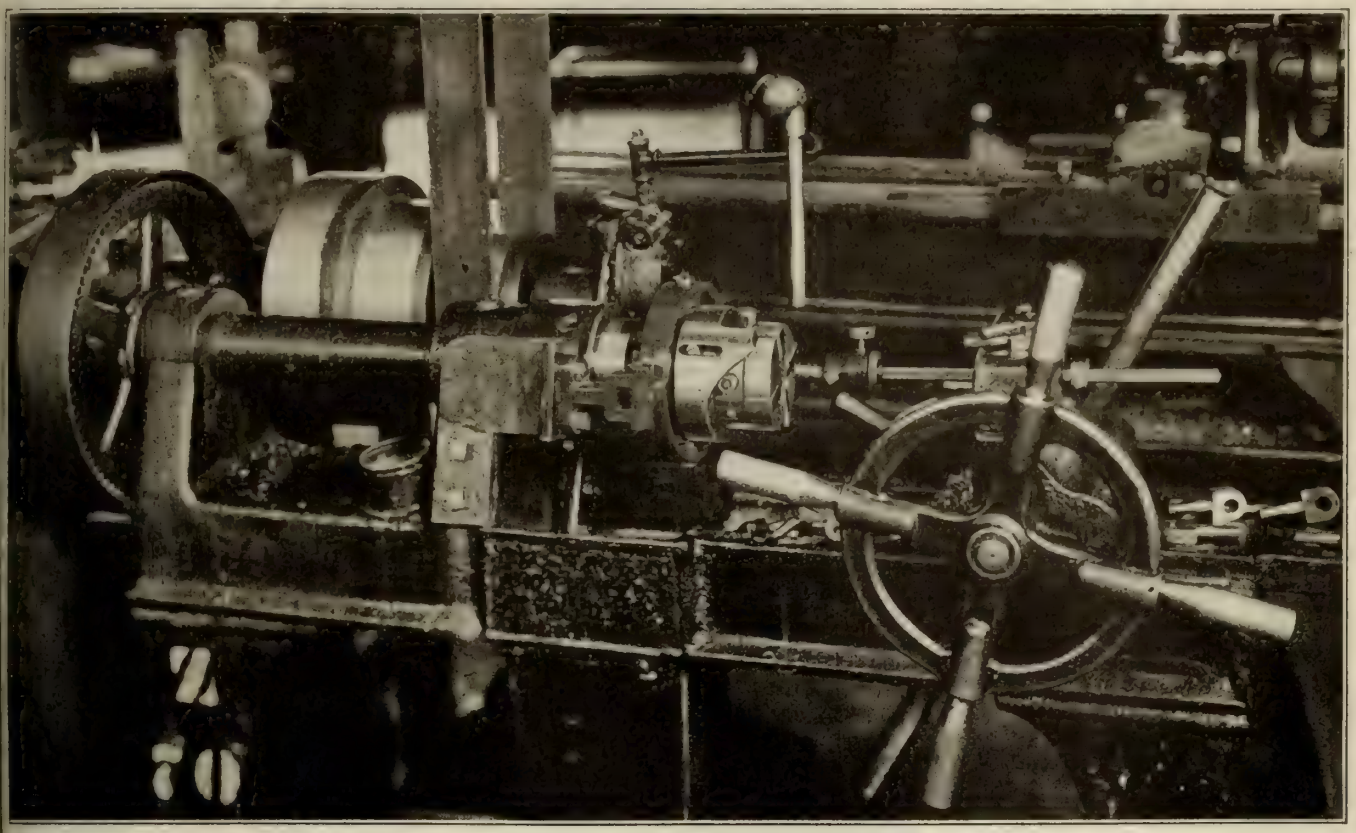
ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

BROUGHT UP TO DATE



This old Bolt Cutter has been turned into an up-to-date Threading Machine by the application of a Geometric Die Head.

The Connecticut Telephone Company removed from this Bolt Cutter the solid die head with which it was equipped, and put in its place a Geometric Self-opening Die Head of the type regularly furnished on the Geometric Threading Machine.

Thread is 7-16" diameter, 14 U.S.S., about 1" long, on switchboard terminals of a high class copper casting.

The best part of it is, that besides getting clean, sharp threads, they have increased the work about six times over what was being accomplished with a solid die head.

Has any threading operation been given the right chance unless a Geometric figures in it?

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal.
The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 5%
At warehouse ..... list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	.....
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 30
Brass sheets, 24 gauge and heavier, base	$0 38

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

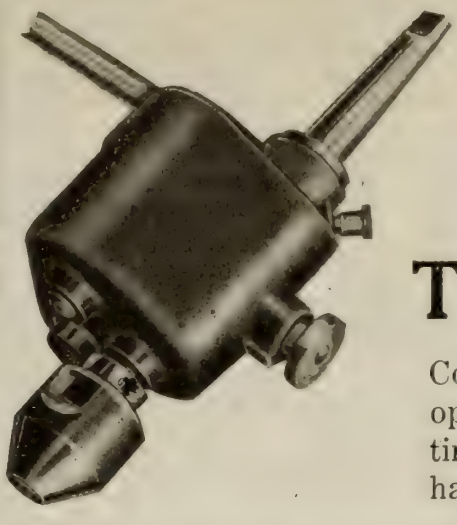
Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	.
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated

Aikenhead's
Wahlstrom
Attachment



will make
a deep cut
in your
Tapping Cost

Controlled by the average operator, it will tap 10 times more than an expert hand-tapper.

Its mechanically obtained **oscillating movement** imitates hand-tapping—and it actually reduced tap breakage.

Its quality construction means a long lasting good service. Nothing about this attachment can get out of order. Takes taps of all sizes up to ½ inch, and is attachable to every type of drill press.

Order one on trial. Your money promptly refunded if you are not satisfied.

Send for Bulletin.

AIKENHEAD HARDWARE, LIMITED
17 TEMPERANCE ST., TORONTO

Buy from Aikenhead's stock of

Bolt Stocks, Taps & Dies

It comprises the very best lines that is possible for us to secure. Call on us to supply your needs and you are sure to get the best of service and satisfaction.

Send for Bulletin.

AIKENHEAD HARDWARE, LIMITED
17 TEMPERANCE ST., TORONTO

markets and new connections. Mr. Harris made it very plain that the Canadian manufacturers should be prepared to meet the situation. "If the Greek mission comes," he said, "and finds that your goods and prices are right, and agrees to buy, how are you going to meet the situation? We have no shipping. Our job is to sell a billion dollars' worth of Canadian goods a year. We can get them to the seaboard and there we are stuck. But if we have 25,000 tons of Greek shipping coming here every month for wheat we may be able to slip something else into those boats."

Other Markets Open

According to the Canadian Trade Commissioner there are other markets open if the Canadians will get after them. There is Australia and South Africa, and neither of them drawing as heavily as before on the British market. Then there is Scandinavia, Denmark, Holland and Spain. These countries are all in good shape. "But bear in mind," continued the speaker, "that the trade mission is no glorified commercial traveller. We find out what the representatives of Canadian firms have when they come to us, and we are willing to direct him to where he can sell to the best advantage. And if you are going to send any person out to look for business in new markets send some person who knows your business technically. Never mind at the start if he is a salesman or not. All these countries require goods peculiar to their own requirements. The heads of concerns should go themselves, or some of their best technical men. Go into this field as though you were going to make it something permanent. Study it and find out what is wanted. Canada has the greatest reputation in Europe of any nation. That reputation has been made chiefly by the men who went to the front, and it was made by reason of the fact that all the smaller nations feel that the Canadians went although they didn't have to do it. Now they think that the reason we want to open business with them is because we want to help them. It is impossible without visiting these little states to know the amount of political intrigue that goes on to get domination in trade matters. Germany dominated the Balkans in a way that was remarkable. Other nations are out now after the same sort of domination. If we can take hold and give these people the necessary credits we can have the trade and along with it the finest goodwill in the world. The soldiers have done their part, and now it is up to the commercial men and the bankers to maintain the reputation made by the men at the front."

In concluding his address, Mr. Harris referred to the discouraging conditions that had awaited him in Canada. This, he said, should be the happiest country in the world, and we should have the most efficient labor in the world. By the time the reports of what is going on in this country get back to Europe it will appear that we are as bad off as they are in Russia. "I hope," he concluded, "that capital and labor will be big enough to get together and settle this trouble. Capital cannot always have its own way, and labor cannot always have its own way. We must be big enough to get down to a basis where we can compromise. We need men with vision, breadth of thought, and then we will have no fear of the future."

Metric System Would Save Year in School

By Metricus

READING in CANADIAN MACHINERY for May 22 a discussion on the pros and cons of the metric system, has induced me to write, briefly perhaps, on the same subject, with the aim of starting a discussion tending towards the bringing out of the different shades of opinion held by Canadian engineers and manufacturers on this most interesting topic.

It is idle to suppose that our English system(?) of weights and measures will for long exist in its present cumbersome form, and it seems to me that the present time of flux and change in all things long established would be a most opportune time for either the rationalizing of our English system of weights and measures or the adoption outright of the metric system.

The disadvantages of the inch and all its multiples and fractions as a means of measurement in the machine shop, in the factory, in surveying, and in all else of an engineering nature are only too obvious. The fractional parts of an inch are at best very difficult to work with when compared with the ease and facility that goes with the manipulation of the millimeter and its smaller decimal parts. No one will think of expressing to close limits required to-day in machine shop practice as so many fractional parts of an inch, and why adhere to the cumbersome sixty-fourth and thirty-second for rougher work?

The advocates of the inch, etc., may counter to the above statement that this in itself is no argument for the metric system, and that where required it is easy enough to employ decimal points of inch measurements. This in itself is sound logic, but the advantages of a decimal system do not end here. It is in the conversion of inches into feet, yards and higher units that inconvenience is encountered. Many other English units of measurement are more honored by neglect than observance; the rod, the chain, the pole and furlong are all forgotten by most of us since having graduated from the schools of our youth.

We all remember the agony and mental effort required to learn, 12 inches equals one foot, 3 feet equals 1 yard, 5½ yards equals one rod, 320 rods equals one mile, and similar relations telling us what a hand is, what a knot is, a fathom, a chain and how many links it has and what they are. By the way, I obtained this table from a public school arithmetic in the possession of the younger members of the home circle and I must confess that many of the names are Greek to me. Nor do I see any indication as to how long a furlong is.

When it comes to square measure, the equivalent table is confusion worse confounded. Aside from the confusion arising through the squares of arbitrary numbers necessary in expressing equivalent areas another unit, the acre, is introduced and we still have square rods, square links and square chains, also quarter sections.

Cubic measurement again is still more complicated, for while cubic inches, feet and yards are expressed in a comparatively simple manner, and have a number of other tables all dealing with volume and all with no direct relation to the others. Dry measure and liquid measure both introduce excessive complications into man's existence and the writer to-day is unable to remember just how many quarts of liquid refreshment there are in the various sized barrels seen on the brewer's wagon. Possibly this information will become increasingly useless however, and the only reason why the old wine measure will exist is because it is still the standard measure of volume in the United States, much to our confusion in matters pertaining to hydraulics.

An instance in illustration of this fact may be related in the experiences of a milk dealer not many miles from Toronto. A glib salesman from one of the glass companies across the border sold him some thousands of milk bottles and of course they were made to the U.S. gallon. This fact was not discovered(?) until the milk inspector confiscated the whole lot, much to the discomfiture of the milk dealer, and to the expense of his pocket book, in more ways than one.

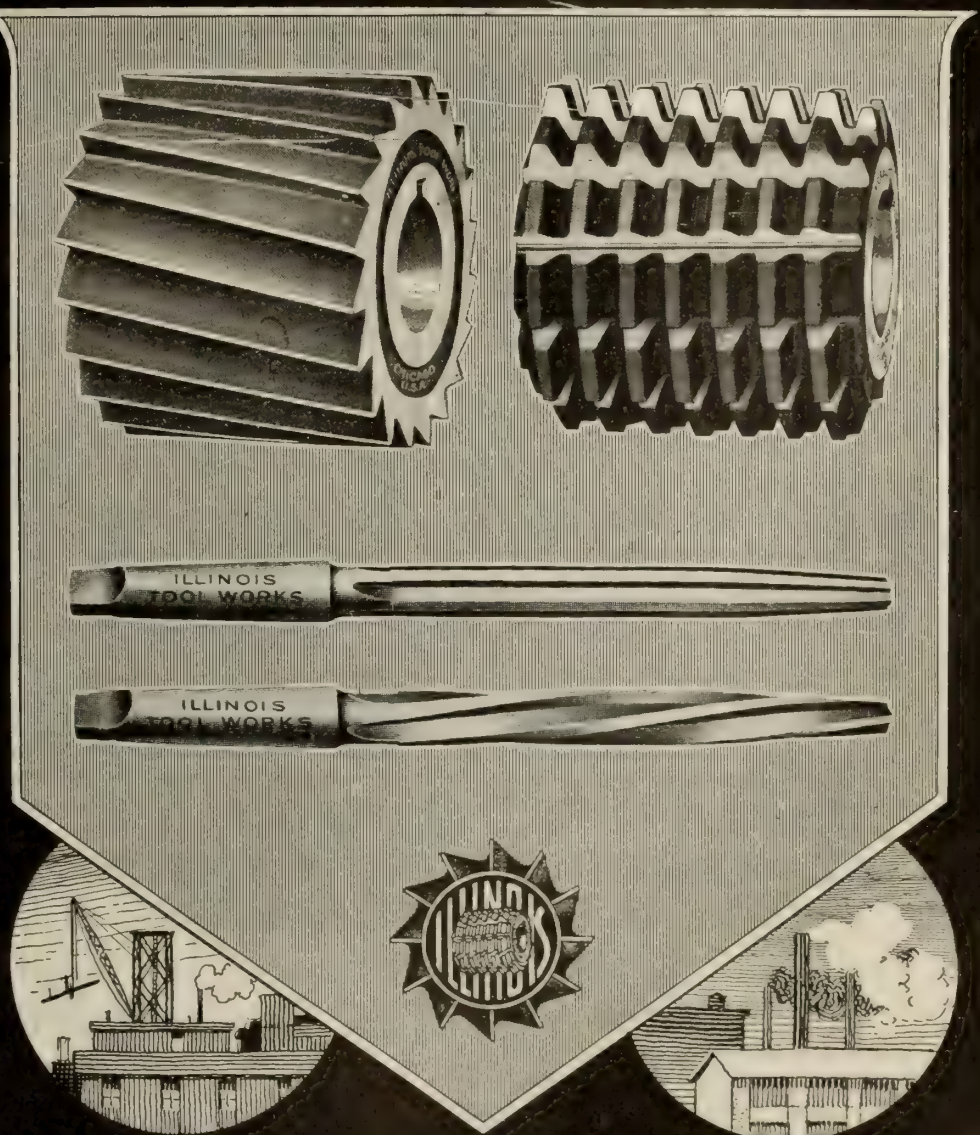
This is perhaps wandering far afield from a discussion of the merits of the metric system in commerce and industry, but it is sufficient illustration of some of the inconveniences we have to put up with, and is illustrative of the waste of time which occurs in the schooling of the younger generations.

By the proper education of youth in the metric system it has been estimated that about a year of school life might be saved to the earlier starting in industry of the schoolboy or to his advantage in the obtaining of further technical education, something which he admittedly needs.

ILLINOIS

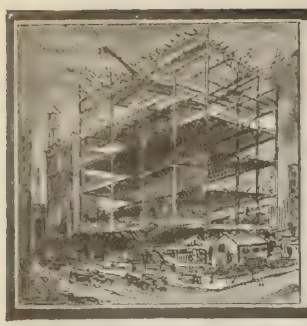
CUTTERS
HOBS
REAMERS

NONE BETTER CAN BE MADE



ILLINOIS TOOL WORKS
CHICAGO

Detroit Store: 997 Woodward Avenue, Represented by A. C. Towne, Inc., Buffalo. New York Office: 141-145 West 36th Street. Lewis G. Henes, Monadnock Bldg., San Francisco, and Title Insurance Bldg., Los Angeles.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

INCORPORATIONS

The Donald Shipping Company, Ltd., capital stock of $30,000 in 300 shares of $100 each, has been formed to carry on a general shipping and merchandising business. Head office in Montreal.

The Mount Royal Rubber Company, Montreal, has been formed with a capital of $500,000 in 5,000 shares of $100 each. The company will manufacture rubber boots, shoes and rubber goods generally. D. Lorne McGibbon is one of the incorporators.

The Ontario Abrasive Wheels, Ltd., has been incorporated with headquarters at Prescott, Ont. The capital will be $30,000, divided into 300 shares of $100 each. The company will manufacture and deal in all kinds of abrasive wheels and stones.

The British Wrecking and Salvage Company, Ltd., has been incorporated with a capital stock of $2,000,000 in twenty thousand shares of one hundred dollars each. The head office will be in Montreal, and the chief objects of the company will be to carry on a wrecking and salvaging business in all its branches.

The Spardon Electrical Products Company, Limited, has been incorporated with a capital stock of $50,000, divided into 500 shares of $100 each, to manufacture electrical and mechanical signals, and signal systems of every description. The head office will be in Ottawa.

MARINE

Portland Me.—The building of schooners in this district is still a live industry, and the price of hulls is still rising. The expected drop following the war has not yet materialized, and in spite of the numbers launched, there is a demand for more. New vessels receive charters as soon as they are ready for sea.

San Francisco.—The Pacific American Steamship Association was formed here recently, combining all the American shipping interests on the Pacific coast with the exception of the lumber carriers. Captain Robert Dollar was elected president, and A. F. Haines of Seattle, vice-president.

Ottawa.—The pulp and paper manufacturers have approached the Dominion Government with a view to having two of the new Government freighters turned over to them. The idea is to establish a bi-monthly service, the vessels obtaining their cargo at the various pulp and paper mills on the St. Lawrence.

Victoria.—The "Western Knight," an 8,800-ton steamship, built by the Ames Shipbuilding Company, has had to discontinue her voyage to Japan and return to Seattle on account of springing a leak. No details are known, but it is probable that a plate has sprung. The leak must be a bad one to make it necessary to discontinue the voyage.

Ottawa.—The Minister of Marine at a meeting with the Canadian Marine and Labor Federation, told them that the Government could not pay war prices for future ships. He expected to bring his further shipbuilding programme before the House very shortly. He thought the prices should be from $15 to $20 per ton less than war rates.

Port Arthur.—The C.P.R. steamer Assiniboia took off the crew of the lake steamer Schlesinger, which was in a sinking condition 35 miles off Passage Island, and sank soon after the crew had been transferred. She was owned by the Massey Steamship Company of Superior, Wis., and was a 3,500-ton boat. She had a cargo of 2,000 tons of coal, and her sinking was the result of a leak.

London, Eng.—An effort to arrange a direct steamship service from Montreal to Scandinavian ports is being made by some Montreal manufacturers, and the question is to be taken up with Sir Robert Borden on his return to Ottawa. H. A. Vineberg, a Montreal man who has just returned from Norway and Sweden, says there are good opportunities for trade between Canada and those countries.

Kingston. — The Collingwood Shipbuilding Company has made an agreement with its employees giving them an eight-hour day and an increase in wages. For mechanics the minimum wage is 75 cents an hour, helpers to 47½ cents an hour, painters are to receive not less than 45 cents an hour, while the pay for all other workmen will be raised proportionately.

Welland.—The yard of the British American Shipbuilding Company at Welland has been closed down till further notice. The company offered the striking employees a 44-hour week and a 10 per cent. increase, which was refused. The company then notified the men that they would be compelled to close down the works, as they could not meet the demands of the men and still build ships profitably.

Vancouver.—Suit has been brought against three shipbuilding firms, the Northern Construction Company, the Pacific Construction Company of Coquitlam, and the New Westminster Construction and Engineering Company, by Raymond Van Hemelryck. The latter is a Belgian shipowner who placed contracts for sixteen 3,200-ton wooden steamers with the firms, and is now suing for the return of monies paid on the uncompleted contracts.

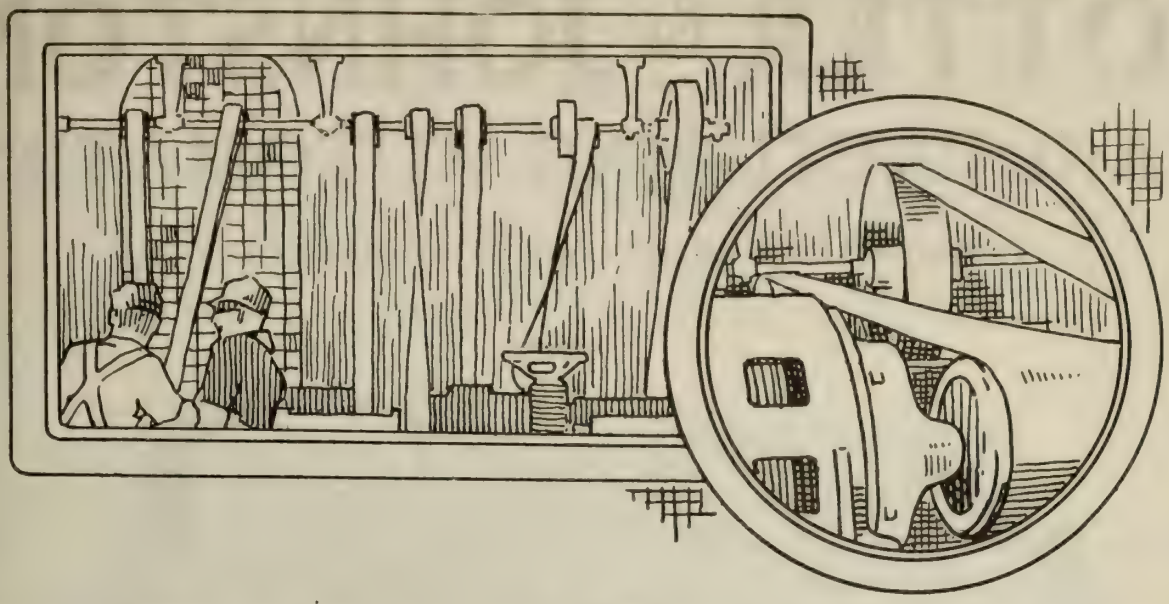
St. Catharines.—The Burma, a wooden barge, struck the pier on the west side of Port Dalhousie harbor entrance and sank shortly after. The pier was damaged where the barge struck it. Navigation will not be interfered with.

Toronto.—The "Concretia," the first concrete ship to be seen in Toronto, was a visitor here recently. She was built at Montreal last year, and completed at Prescott. She is 120 feet long by 11 feet 3 inches deep, and can make about eight knots an hour.

Vancouver.—The wooden steamers being built in British Columbia will perhaps be taken over by Sir James Ball, the British Columbia commissioner, for the transportation of the 75,000,000 feet of lumber to the United Kingdom. There is nothing definite known in this connection, but it is understood that the probability of such an arrangement that enabled Sir James to make the announcement that he had the necessary tonnage to move half the order in the next six months.

Victoria.—Bayly Hipkins, vice-president and manager for the North-West district of the Foundation Company, on a recent visit here, made the interesting announcement that the material for the completion of the twenty French ships under contract at the Victoria yard had all been purchased. The Ogden Point plant pleased Mr. Hipkins by the organization displayed, and he expressed himself as confident that the outfitting department would be able to catch and keep up with the construction department.

London.—At the annual meeting of the Cunard Steamship Co. some interesting figures were given. The company lost forty-five ships of a total tonnage of 389,353 tons. They carried during the war 900,000 troops and 10,000,000 tons cargo. The company's engine shop at Bootle on the Mersey was turned into



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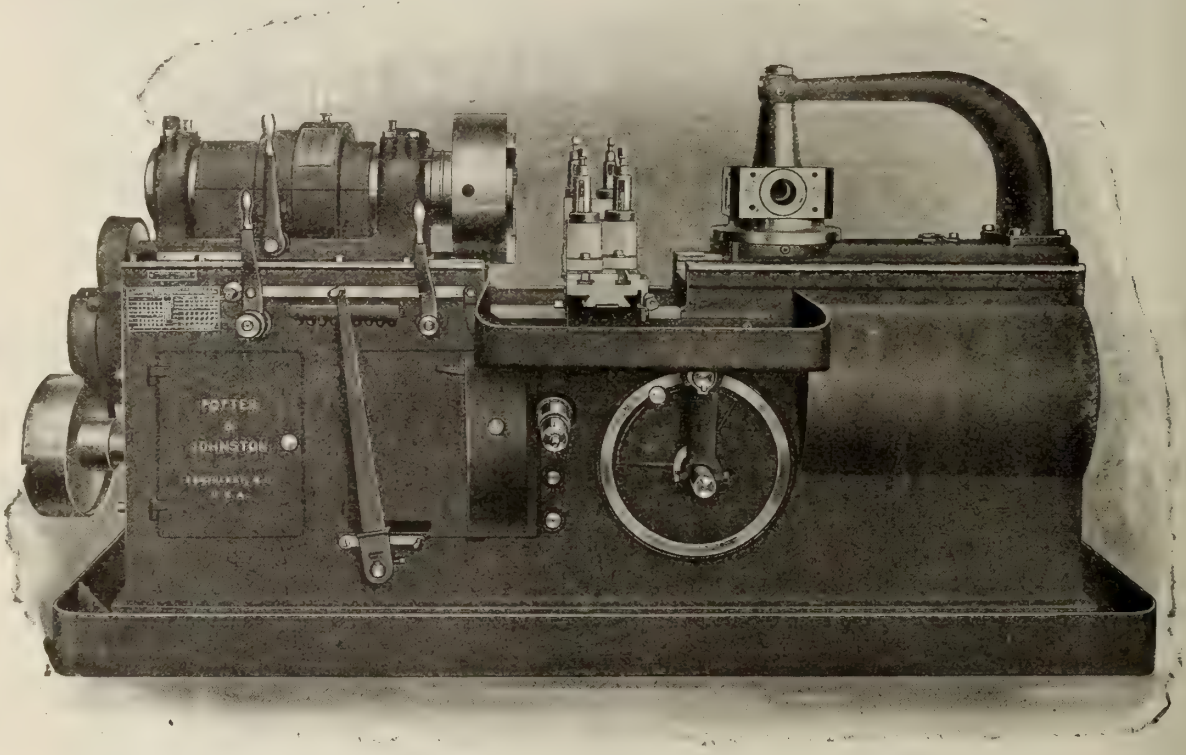

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a shell shop, employing 1,000 people, of whom 90 per cent. were women. Over 400,000 shells were turned out here. The company's assets were $75,000,000, and they own or control 558,380 tons gross register, and have 426,800 under construction.

Quebec.—The Minister of Marine, Mr. C. C. Ballantyne, made a visit of inspection here recently. He went first to the yard of the Davey Shipbuilding Co., Lauzon, where two 5,100-ton steamers of the Canadian Government's programme are building, and expressed himself as being well satisfied with the progress made. The minister then visited the Port of Quebec and the Louise Docks, and also inspected the proposed site for the new Government cold storage plant. The minister is taking this question up with the Minister of Finance, and if funds are available the plant will be included in the estimates for the present year.

Detroit.—The "Lake Gravity," built at the Detroit Shipbuilding Company yards sailed recently for Hamburg direct. She sailed under sealed orders but her destination was more or less of an open secret. She carried a cargo of United States merchandise to the German port.

St. John, N.B.—The "War Moncton" was launched from the yard of Messrs Grant & Horne recently. She is a wooden steamer of 2,800 tons built for the Imperial Munitions Board, and is a sister ship to the "War Fundy" launched last year. The "War Moncton" has been seven months on the stocks, and was launched with boilers installed. The engines will be installed by the Union Foundry

PERSONAL

Drummond and McCall, iron and steel merchants, of Montreal, are now located in their new offices on the fifth floor of the Mark Fisher Building.

R. McLeah has been appointed steam engineering expert with the Montreal General Tool Co., Canadian manufacturers for the Talbot Contra-flow steam boilers and Uniflow engines.

TENDERS

The Department of Railways and Canals are calling for tenders to be marked "Tender for rebuilding lower entrance pier lock No. 25" on the Galops Canal. Tenders will be received up till Wednesday, June 4. Plans and specifications can be seen at the Department in Ottawa, or at the office of the superintending engineer, Cornwall, Ont.

The Department of Public Works is calling for tenders for the construction of medical officer's residence, pump house, and vocational building, Dalton Sanitarium, North Wiltshire, P.E.I. Tenders must be addressed to the Secretary, Department of Public Works, and must be received by June 5. Plans and specifications can be obtained at the office of the Chief Architect, Department of Public Works, Ottawa, and Superintendent of Military Hospitals, Charlottetown, P.E.I.

The Board of Education of Toronto want tenders for all trades required in the erection of new school buildings at Glengrove Avenue and Glenholme Avenue. Specifications and all necessary information can be obtained from the architect, D. R. Franklin, 2 College Street, Toronto.

TRADE GOSSIP

New Factory for Oshawa.—A factory, which will employ about 100 men, will be erected in Oshawa by the Ontario Steel Products Co., Ltd.

New Reception Home.—The City of Toronto will shortly erect a new reception home. This was decided at a recent meeting of the Board of Control.

Windsor Gets New Industry.—A $250,000 factory will be erected at Windsor, and employ about 100 hands. It will be the home of the Champion Spark Plug Company.

New Steel Company.—A company has been formed with offices at Calgary, Alta., with a capital of $2,000,000. It will be known as the Canadian Western Steel Corporation, Ltd.

Hamilton Gets New Factory.—The Hoover Suction and Sweeper Co., of Dayton, Ohio, are building a three-storey factory in Hamilton, Ont., for their Canadian headquarters.

Big Marine Orders.—Orders for marine forgings, sufficient to keep the plant going full for several months, have been received by the Canada Forge Co. This is a good indication of the revival of the steel business, which has been slack since the armistice.

Eight-Hour Day.—The Curtiss Aeroplane and Motors, Ltd., commencing June 2nd, will give their men an eight-hour day with 9 hours' pay. The plan was explained to the men at the noon hour, and was received with much evident satisfaction on their part.

Settling Up War Contracts.—In a special report by Benedict Arnold, U. S. Assistant Secretary, the statement was made that the work of settling up contracts which were terminated or curtailed by the armistice was about 75 per cent. completed.

The Vancouver Dry Dock.—H. H. Stevens, M.P.P. for Vancouver Centre, and S. J. Crowe, Burrard, B.C., have notified the Vancouver Board of Trade that if no private company could be found to undertake the building of a dry dock, the Harbor Board would themselves take it up.

Sell Food at Cost.—"The Cleveland Milling Machine Company have opened an employees' restaurant, in which it will sell food at cost price. This restaurant was designed with the view of accommodating three hundred (300) people and has the most up-to-date kitchen facilities to prepare regular, as well as short order meals.

Hydro Buys Thorold Plant. — Mr. James Battle of Thorold has disposed of his electric power and transformer plant to the Hydro-Electric Power Commission. The price was $100,000 in four per cent. bonds. It is likely that the town will take over the plant. Mr. Battle had a 26-year contract with the Ontario Power Company.

C.P.R. Depot at Moose Jaw.—The Canadian Pacific Railway is going to build a new depot in Moose Jaw at a cost of $250,000, according to an announcement made by E. W. Beatty, the president of the road, on a recent visit. The Building will be of stone and will be located in direct proximity to the present depot. Work will be started this year.

Brampton Veterans Organize.—A joint stock company has been formed by the G.W.V.A. to be called either Peel Veterans, Ltd., or Brampton Veterans, Ltd., with a capital of $50,000, with headquarters at Brampton. The object of the company is to erect a three-storey building with three stores on the ground floor, offices above, and club rooms above that.

Tug was Lost.—The marine tug Albert C., fitted out by the St. Lawrence Welding Co., for harbor and ship repair work, which was thrown ashore on the Dartmouth side of the Halifax Harbor, was so badly smashed that she has been abandoned by the owners; she was fully insured. It is the intention of the company to replace the tug by a special electric welding outfit mounted on a truck for marine service.

Arnprior Mills Extend. — A large amount of new machinery has been purchased and has arrived at the plant of the Kenwood Mills, Ltd., Arnprior. Mr. H. M. Ashby, executive manager for Huyck & Sons, Albany, and the Kenwood Mills, Ltd. Arnprior, stated that the Canadian field look so promising that he expected the Arnprior Mills to be larger eventually than the plant in Albany, which covers several acres and employs hundreds of hands.

British Industries Fair.—The British Industries Fair, to be held in London, Glasgow and Birmingham in 1920, will be open for the exhibits of any Canadian company not controlled by foreign capital. The fair will open on February 23 and close on March 5. At the last fair, orders for $10,000,000 of goods were placed. The British Trade Commissioner, F. W. Field is making arrangements for Ontario manufacturers, and information can be obtained from him.

Government to Build Roads.—Mr. W. A. Maclean, the Deputy Minister of Highways, has stated that most of the work on the provincial roads this season will be done by day labor. Tenders for the work were called for originally with a view of doing it by contract, but when the tenders were opened it was found that the prices were 50 per cent. higher than expected. Under the circumstances and in view of the fact that the contract would extend over a long period, it was decided to do the work over again.

Service to Newfoundland.—The Department of Trade and Commerce has announced that they have entered into

ntract with the Gulf of St. Lawrence ipping and Trading Company, 147 ountain Hill, Quebec, P.Q., for a steam-ip service between Montreal, Quebec, Q.; Charlottetown, P.E.I.; Sydney, B.; and St. John's, Newfoundland. Two ips per month will be made in each rection, the service to commence about e end of May and continue until the se of navigation in the present year. e steamer is a 1,500-2,500 gross ton pe with a speed of ten knots. It has commodation for fifty first class, irty second class and forty third class ssengers. In view of the present dif-ulties in securing a proper service to wfoundland, the inauguration of this rvice will undoubtedly be of great as-stance.

Buy Coal Now.—The Canadian Manu-ctures' Association are sending out e following circular in regard to bitu-inous coal: As in the past two years, e again urge our members, in order avoid congestion at the frontier in e fall and winter, to put in their sea-n's requirements of bituminous coal the summer months. Another factor ich points to the wisdom of early tion is that, as a result of shortage the labor supply, production of bitu-inous mines shows a marked falling . They are now running about 7,-0,000 tons per week, as compared with 000,000 tons per week during the war. is condition leads to the belief that duction is less than concurrent con-sption, the difference being accounted by the use of reserve stocks, accumu-d at the instance of fuel administra-ns.

ompany Reorganized.—The recent re-anization of the St. Lawrence Weld-g Co., of Montreal, places the control the company in the hands of W. H ry and A. M. Barry, president and eral manager respectively; F. E. Fox g appointed a director and secretary-asurer. L. E. Moulton is also a ector of the new firm. The nt here has been enlarged and ell-equipped machine shop added arry out the complete repairs of all ded work. A staff of boiler makers is, likewise, a part of the new organization. Every class of welding work is carried on and the firm make a specialty of oxy-actylene and electric welding repairs. They have recently purchased a new portable electric equipment for operations between Halifax and Montreal. During the present season a brisk business has been carried on, considerable repairs having been performed to the troop ships entering Halifax.

The University of Illinois, Engineering Experiment Station, have issued bulletin number 108 dealing with the analysis of statically indeterminate structures by the slope deflection

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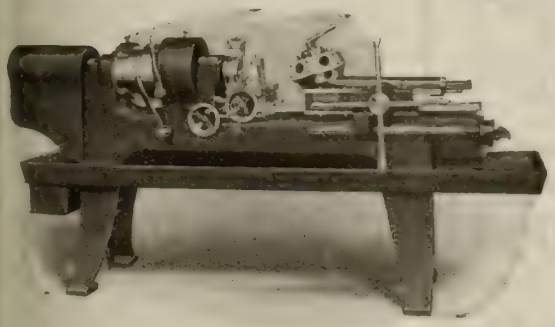

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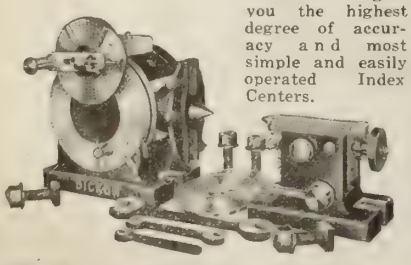

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method. This bulletin has been compiled by W. N. Wilson, F. E. Richart and Camillo Weiss. Frames composed of rectangular elements must in general be designed with stiff connections between the members at the joints, in order that loads may be carried. These connections must be capable of transferring not only direct axial tensile and compressive forces, but also bending moments.

It follows that frames made up of rectangular elements are usually statically indeterminate; that is, the stresses in them can be found only by taking into account the relative stiffness and deformations of the various numbers. The common use of rectangular frames in engineering structures makes it highly desirable that the most convenient methods of analyzing their stresses should be developed. This bulletin describes the methods used and presents the formulas derived.

Open Montreal Office.—The International Machinery and Supply Co., Ltd., incorporated in March of this year, has recently opened offices at 371 St. James St., Montreal. They will carry on a general engineering supply business in railway, industrial and marine activities. W. J. Carrigan is the managing director of the company, and J. T. Dohm has been appointed general sales manager. Mr. Carrigan started his engineering career with the old McGregor Gourlay firm of Galt about 15 years ago. After serving with this firm for two years he engaged with the engineering firm of White & Son, of London, for four years. He then wandered around a bit gathering experience in such places as Guelph, Peterborough, Smiths Falls, and Harton. He finally associated himself with the Canadian Steel Foundries in their Welland plant, remaining there for five years. He resigned his position last November and this spring was appointed to his present position. He is likewise president of the Canadian Chadwick Metal Company of Hamilton, Ont. J. T. Dohm was travelling representative for the Dupont Engineering Company for seven years, and in 1907 joined the staff of the White Motor Cars, of Chicago and Cleveland, as traveling representative of the School of Instruction. After three years with this firm he became associated with the Johns Manville Co., of Milwaukee, and was assigned to Western Canada. He then joined the Garlock Company and served with them for about two years, resigning when the American Company absorbed the Canadian Company. After serving for some time as Western Canada representative of the Willis Motor Company, he was appointed as manager of the Toronto branch of the Canuck Supply Co., remaining with this firm for three years. He resigned from this position to associate himself with the International Machinery and Supply Co., as general sales manager.

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Manager: "And did it take half an hour to find it?"

Messenger: "Please, sir, I had to wait till the man went away."—Pearson's Weekly.

SCRAP METAL MARK ET MAY BE NOW

THE feeling is that the scrap market is on the eve of better days, although generally speaking, there is no improvement yet apparent. Following are reports from various U.S. points:—

St. Louis.—With a greater interest being shown in the market, some grades have advanced from 50 cents to $1.50 per ton. Steel scrap is in fair demand while cast iron is in good demand in small lots.

Boston.—It is generally expected that the next movement in the scrap market will be for the better, and that the present low level will not be reached again. Inquiries are very light, with some small sales of steel scrap reported. Heavy melting is at $11.50.

New York.—Scrap business is practically hung up in this district, and a good many people think that there is still some time to wait for an improvement. Dealers have their stocks pretty well down, and are able to wait for better days.

Pittsburgh. — Business is practically confined to the dealers, and prices are generally nominal. Heavy melting steel is quoted at $16 delivered, but it is thought that any appreciable activity in this grade would result in an advance. Machine shop turnings and cast iron borings are inactive.

Buffalo.—The market here is expecting something to happen almost any time. While there is almost no real business doing, the interest shown is keen, and a buying movement should develop very shortly.

Cleveland.—Most of the scrap is being held out of the market by yard interests, who are holding it for better prices. There is a scarcity of scrap due to low production, and a good portion of what is available has been thrown down by the yards. $20 steel in a few months is freely predicted by dealers.

Chicago.—Dealers feeling that buyers must come out before very long, are quoting prices 50 cents to $1 per ton over last week's lists. Railroad offerings are bringing higher prices, and are freely offered, about 9,000 tons altogether, coming out this week.

Philadelphia.—Although scrap prices are low, consumers have a fair supply on hand, and have still some to receive on old contracts, so are not likely to buy. Government is asking for bids on small forgings, plugs and billets. Machine shop turnings are quoted at $10.50 to $11.

Cincinnati.—Consumers evidently feeling that the bottom of the market has been reached, are more inclined to consider buying for future requirements. Selling is generally better.

Birmingham.—There is no business reported, the tendency of both buyers and sellers being to wait. There has been some business in cast and heavy melting steel.

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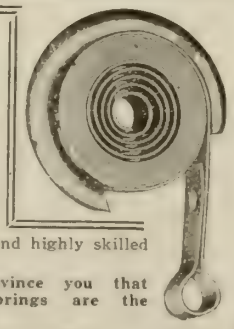

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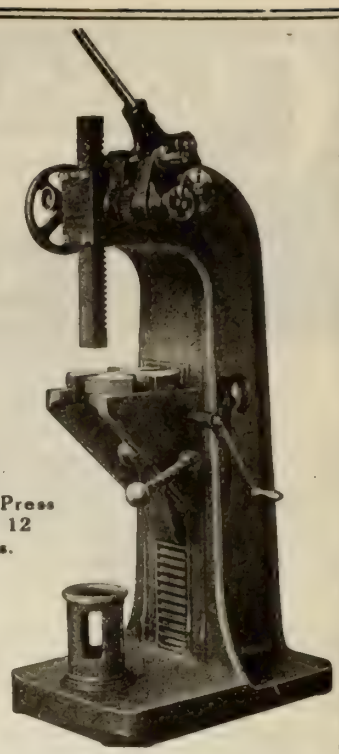

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I HAVE A PATENT ON AN ELEVATING OR lifting truck and would like very much to make arrangements to organize a company in Canada to make and sell them, or to arrange with some firm to make and sell them on a royalty basis, or would consider an out and out sale. Address Box 608, Canadian Machinery. (c25m)

CANADIAN MACHINERY wants articles on shop practice, new devices, new ideas. We want stories of how repair jobs have been done and how you have developed new kinks to help your work along. CANADIAN MACHINERY pays for material of this nature and our contributors find it well worth their while.

WANTED

1—"Used" Plate Punch and Shear 36" gap, capacity 7/8" hole in 7/8" plate

—also—

1—"Used" Air Compressor, steam actuated — compound steam—simple air —12" x 12" cylinder.

Both machines must be modern in design and in good operating condition. Offers with full details, price and shipping point, will be considered.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, - Nova Scotia

For Sale

New and Slightly Used Machinery and Tools

1", 1½", 1⅝", 1¾", Turret Screw Machines.
No. 1, and No. 2 B.G. Automatic Tapping Machines.
⅜" 4-Spindle Acme Automatic Screw Machines.
Floor and Bench Drill—Presses.
Small Floor and Bench Punch Presses.
Burke Millers.
High Speed and Carbon Twist Drills.

Particulars on application to

ST. CATHARINES MACHINERY CO., LIMITED
ST. CATHARINES, - ONTARIO

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works
Allentown, Pa., U.S.A.

"Ask the Man Who Owns One"

Lodge and Shipley Lathes

Three Step Cone or Selective Gear Drive

DELIVERIES

14 Inch—2 Weeks
16 " —Stock
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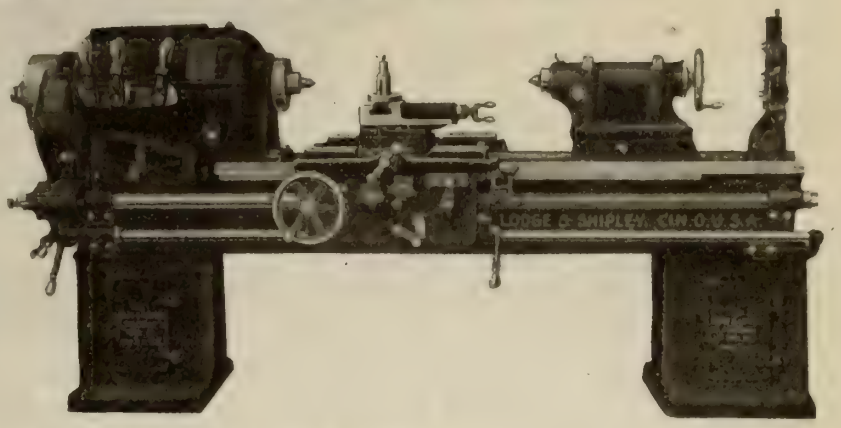

Write for our new prices

Garlock-Walker Machinery Company, Limited

32 Front Street West

MONTREAL TORONTO WINNIPEG

"EVERYTHING IN METAL AND WOOD WORKING MACHINERY"

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY

Classified Advertising Section

143-153 University Avenue TORONTO, ONT.

MACGOVERN & COMPANY INCORPORATED POWER MACHINERY

In Stock for Immediate Delivery

Turbo-Generator Units
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Air Compressors

Separate Published Stock Lists for above apparatus. Staff of Engineering Specialists with three overhauling plants to SOLVE YOUR POWER PROBLEMS.

Buyers and Sellers of New and Used Machinery
Send us details of used plant for sale

MacGovern & Company, Inc.

285 Beaver Hall Hill - - Montreal

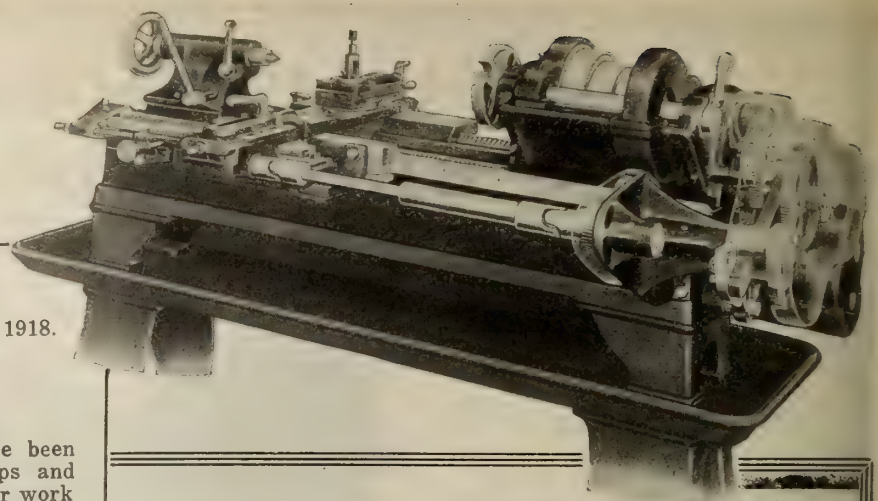
Offices: New York, Pittsburg, St. Louis.
Plants: Brooklyn, N.Y.; Lincoln, N.J., and Linden, N.J.

A Continent-Wide Service.

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th, 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
JAW/C" By J. A. Walton

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

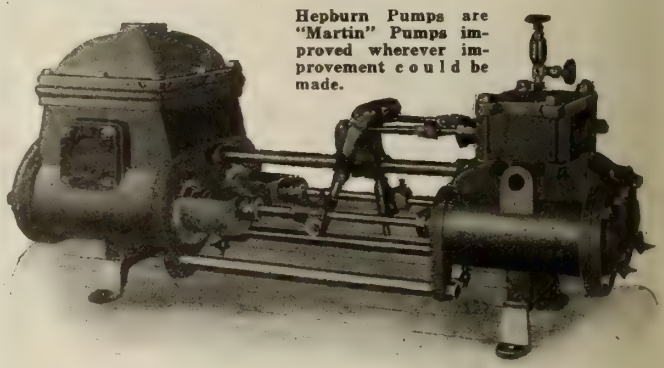
ADVERTISING to be successful does not necessarily have to produce a basketful of inquiries every day.

The best advertising is the kind that leaves an indelible, ineffaceable impression of the goods advertised on the minds of the greatest possible number of probable buyers, present and future.

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED
18-60 Van Horne Street Toronto, Ontario

Where Carborundum Products Go

THE GREAT
STUDEBAKER PLANT
SOUTH BEND, IND.

FOR generations the name Studebaker has been among the pre-eminent. Back in the days of the red-wheeled buggy and the dashing spring wagon Studebaker began growing.

And now in this age of the luxurious motor are heard not only the rumble of the wheels of Studebaker vehicles, but the throb of Studebaker motors in all quarters of the globe.

Back of the Studebaker products is a tremendously big organization and one of their great plants is at South Bend.

For the many and varied grinding operations in this plant they have learned to depend upon

Carborundum and Aloxite Grinding Wheels

Carborundum Wheels are grinding all of the grey iron automobile castings.

The carriage and buggy forgings are ground with Aloxite Wheels.

Aloxite Wheels are in the tool rooms grinding the tools and the dies.

Aloxite Wheels are in the woodworking departments gumming the big band and circular saws.

In the steel spring department Aloxite Wheels surface grind the springs after tempering.

And the Carborundum Service Department sees to it that Studebaker always get the right wheel in the right place—wheels that always cut clean and fast—that help to keep up production and uphold the Studebaker standards of workmanship.

Carborundum Service can be of this same real service in your plant.

THE CARBORUNDUM COMPANY

NIAGARA FALLS, N. Y.

NEW YORK CHICAGO BOSTON PHILADELPHIA CLEVELAND CINCINNATI PITTSBURGH
GRAND RAPIDS MILWAUKEE

The "PINK" Line Logging Tools and Handles

MADE-IN-CANADA Products---Headquarters for British Empire for all Lumbering Tools

In every lumber camp in Canada you'll find PINK'S famous lumbering tools. They are the favorites there and have won the esteem of all woodsmen through their superior merit. They are world-renowned and are extensively used in Australia, New Zealand and other countries where the lumbering industry thrives.

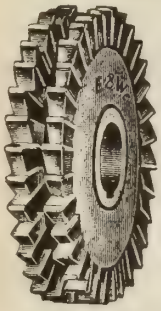
EXPORTERS TO EUROPE

We export the same good quality of lumbering tools that have made PINK'S TOOLS a by-word in the matter of good tools in all Canadian lumber camps. Enquiries cordially solicited.

Thomas Pink Co., Limited
PEMBROKE, ONT., CANADA

Elliott & Whitehall Machine & Tool Co.
GALT, ONTARIO, CANADA

MILLING CUTTERS AND SMALL TOOLS



We manufacture the following tools, etc.

Standard and Special Milling Cutters of all descriptions, Gear Cutters, Hand Reamers, Shell Reamers, Chucking Reamers and Taper Pin Reamers, Lathe Mandrels and Arbors, Metal Stamping Dies, Gauges, Jigs and Fixtures, Etc.

All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

ASK FOR OUR NEW CATALOGUE No. 10.

WELDING APPARATUS AND . . . SUPPLIES

The REGO 100% Efficient Welding Torch

Saves Oxygen Eliminates Flash-Back Better Welding

Write to us for anything and everything you need.

WELDING & SUPPLIES COMPANY
C. ROYER, Manager 1142 Ontario Street East, MONTREAL

TOOLS, DIES and GAUGES

Manufacturers of UNIVERSAL CYLINDER RE-BORING TOOLS.

Windsor Machine & Tool Works
Windsor, Ont.

SERVICE OUR SLOGAN

Prompt Delivery. Reliable Workmanship.

TRY US FOR

Centrifugal Pumps, Reciprocating Pumps for sand, water or wet shock.

Special Machinery of All Kinds.

PATTERNS CASTINGS FORGINGS

Submit us your problems. We would like to convince you.

VICTORIA FOUNDRY CO., LIMITED
OTTAWA - CANADA

SPECIAL MACHINERY

Built to Order

Also gauges, punches, jigs, dies, small tools, etc.
Prompt Service.
Moderate cost.
Send Blueprints for estimate.

MADE IN BR·EN·Co CANADA

Brown Engineering Corporation
LIMITED, TORONTO
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TOOLS & STAMPINGS

We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.

PAT. APPLD FOR

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DIAMOND TOOLS
FOR TRUEING GRINDING WHEELS

QUALITY SERVICE SATISFACTION
INDUSTRIAL GEMS

The GENERAL SUPPLY COMPANY of CANADA, Limited
OTTAWA TORONTO MONTREAL WINNIPEG VANCOUVER
356 Spark St. 38 Toronto St. 408 McGill Bldg. 85 Water St. 906 Vancouver Block
Sole Canadian Agents for
THE JOYCE-KOEBEL COMPANY, INC.
NEW YORK Formerly Geo. A. Joyce Co., Ltd. LONDON

This space, small though it is, is capable of producing big results if used continuously and judiciously.

Presswork

We take contract work—and turn it out quickly and accurately. We have facilities for:

Drawing
Piercing
Forming
Blanking

in all kinds of sheet metal. If you have any work of this kind let us quote you prices.

Henry Hope & Sons
of Canada, Limited
Peterborough

Steeled for Service

Steel in all its vital parts, gears, chains, hooks and guide, makes a Ford Tribloc durable and ready to meet the hardest lifting service you can give it.

The Tribloc works with high efficiency—eighty per cent. of the power applied to the hand chain is converted into lifting energy. An eighty-two pound pull of one man will lift a ton.

The Loop Hand Chain Guide, a patented improvement in chain hoist design, prevents "gagging" of the hand chain and injury to the block and makes a Tribloc safe, secure, reliable when working at any speed.

Ford Triblocs are made in all sizes from ¼ to 40 tons and are sold with a 5-year written guarantee.

Ford Chain Block & Mfg. Co.

Second and Diamond Sts., Philadelphia, Pa.

OVER-SEAS REPRESENTATIVE
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
120 BROADWAY, NEW YORK, U.S.A.

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GENUINE EMERY

Sizes 180, 160, 140, 120, 110, 100, 90, 80, 70, 60, 54, 46
40, 36, 30, 24, 20, 18, 16, 14, 12, 10, 9, 8. hole.

EMERY FLOUR AND WASHED FLOUR

EMERY
GLASS
FLINT
GARNET
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PAPER AND CLOTH

IN
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DISCS, BANDS,
STRIPS and
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Philadelphia GEAR Works

VINE STREET PHILADELPHIA, PA.

Spur, Bevel, Spiral, Herringbone and Intermittent

GEARS and PINIONS

Made in all kinds of metals, rawhide and fibre

SOCKET WHEELS
MADE TO ORDER

DISTRIBUTORS OF
DIAMOND CHAINS

For Power Transmission, Machinery and Motor Trucks, Motor-Cycles and Bicycles.

We ship gears to all parts of Canada. Write us when you want good gears, good service, good prices.

Get our Catalogue: "All About Gears."

BEVEL
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WRIGHT HOIST

Will Solve Your Lifting Problems

In mines, mills, foundries and industrial plants, on sugar plantations, in office and commercial buildings, on board ships, in fact, wherever there is lifting of any kind (up to 30 tons) to be done. Wright Hoists serve with that inimitable service which has made the name a synonym for satisfaction.

Let us tell you the cost of a Wright Hoist for your work and show you how it will save that cost many times over.

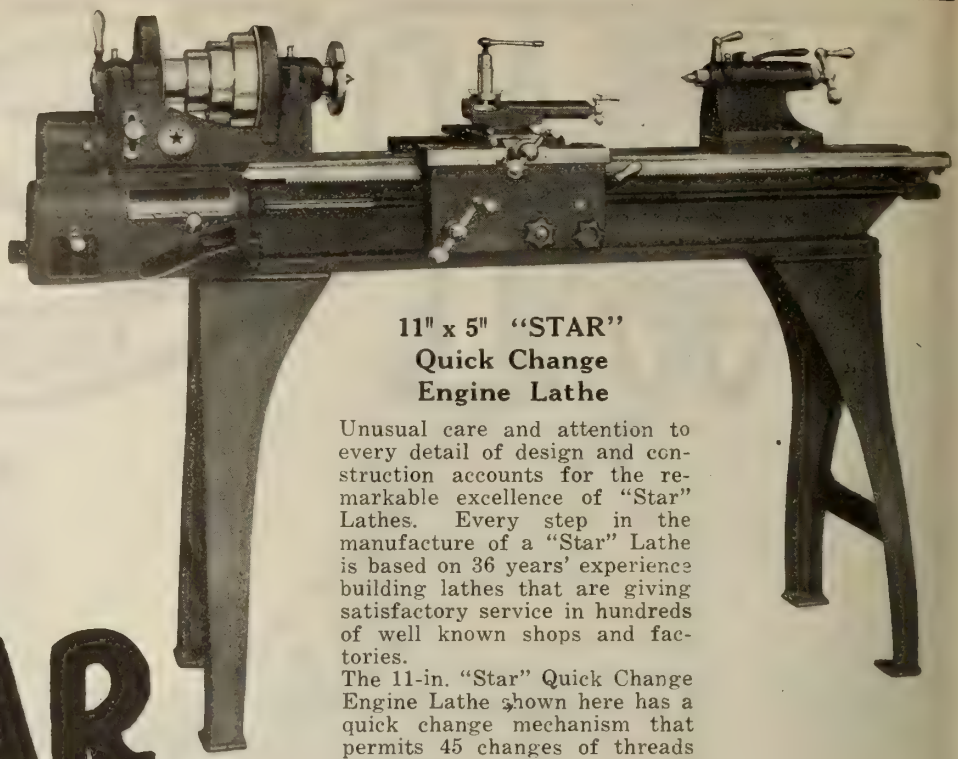
WRIGHT MANUFACTURING COMPANY

LISBON, OHIO

Canadian Distributors:
A. R. Williams Machinery Co., Ltd., Toronto
Williams & Wilson, Limited, Montreal

For Light, Accurate Commercial Work Experimental Shops Manual Training

You cannot find a more desirable Machine Tool than the ___



11" x 5" "STAR" Quick Change Engine Lathe

Unusual care and attention to every detail of design and construction accounts for the remarkable excellence of "Star" Lathes. Every step in the manufacture of a "Star" Lathe is based on 36 years' experience building lathes that are giving satisfactory service in hundreds of well known shops and factories.

The 11-in. "Star" Quick Change Engine Lathe shown here has a quick change mechanism that permits 45 changes of threads and feeds.

Write for catalogue giving full particulars on our 9-in., 11-in., 12-in., and 13-in. swing sizes.

STAR LATHE

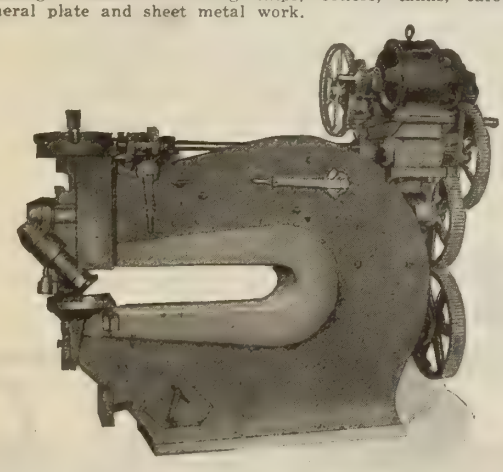
The Seneca Falls Mfg. Company, Inc.
366 W. Falls St., SENECA FALLS, N.Y.

H. COLLIER SMITH
"QUICKWORK"
Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

Write for Catalogue

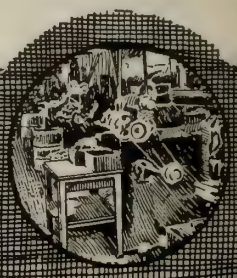
THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

SPECIAL TOOLS

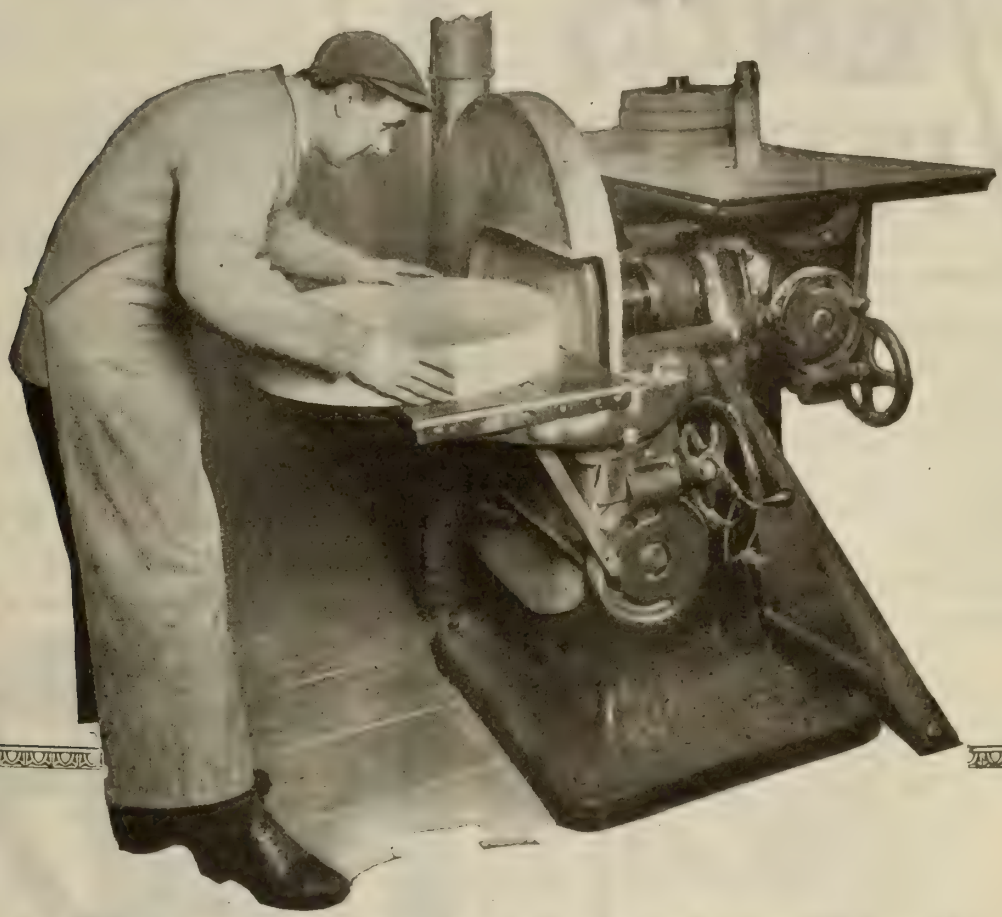
Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products

Consult us on your machine problems

Toronto Tool Company
516 Richmond St. West Phone Adel. 1181



"Oliver" Vertical Spindle and Disk Sanders



"Squaring the Circle"

It is impossible, mathematically, to reduce a square to the circular form.

Nevertheless, this No. 34 Sander, installed two years ago by the Standard Ship Building Corporation, has ground ventilator covers and other curved ship parts with mathematical precision.

In an Oliver Wood Working Machine what cannot be figured as a **process** may often be appreciated as a **result.**

Oliver Machinery Company

GRAND RAPIDS, MICH.

BRANCH OFFICES: New York, Salt Lake City, St. Louis, Los Angeles, Phoenix, Chicago, San Francisco, Manchester, England, Paris, France

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ENGINEERS and Architects buy VENUS pencils for themselves and for their staffs because the VENUS is always dependable in quality and grading. VENUS Pencil perfection means pencil accuracy, pencil efficiency and pencil economy.

17 black degrees and 3 copying

For bold heavy lines,
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For clean fine lines,
2H - 3H - 4H - 5H - 6H

For delicate thin lines, maps, charts,
7H - 8H - 9H

Special 14c. Offer

Send 14 cents for three trial samples mentioning degrees. After you find how perfect VENUS Pencils are, buy them at any dealer.

American Lead Pencil Co.

238 Fifth Avenue, New York

and Clapton, London, England

"CANADIAN"

ACCURATE work demands accurate and efficient tools.

The Canadian No. 5 has some features worth considering.

Eight speeds, three power feeds—also hand and lever feeds.

The twist of a knurled knob changes instantly plain drive to back geared drive—no tools to get lost or bother with.

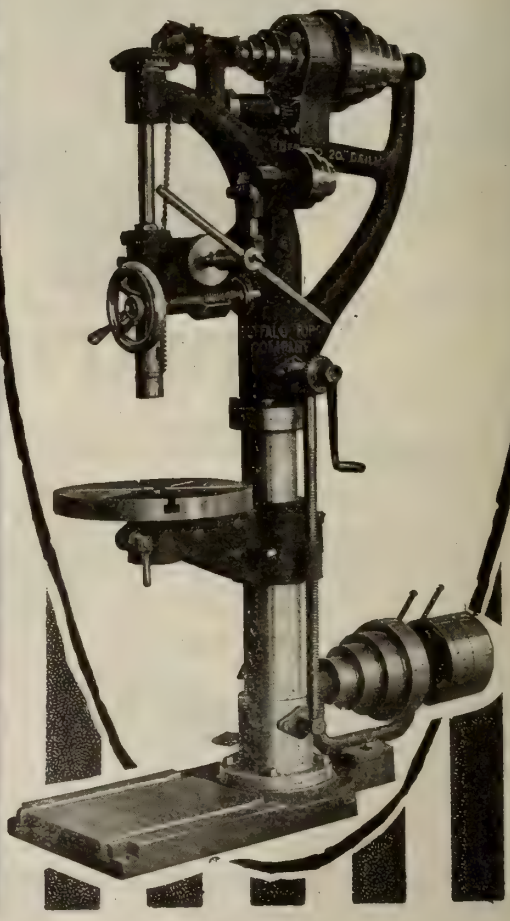
An adjustable automatic trip throws out power feed when piece has been drilled to required depth.

Split adjustable bearings, ball bearing graduated spindle—but then there are so many features — for complete description write for literature.

Circular 1199-16 describes the whole Canadian Upright Series

Canadian Blower & Forge Co., Limited

Kitchener, Ontario



The Works behind the Label -

We never reach heights above our habitual thinking. It is the atmosphere we create for ourselves in thought that permeates and perfects what we do. The knowledge born of long experience that our product is the high speed steel par excellence fills the atmosphere of our plant with an ideal that every operative breathes. "Red Cut *is* the best and, therefore, it ***shall*** be the best" is the driving force that makes.

"Red Cut Superior"

THE NATIONALLY KNOWN—FIRST QUALITY

HIGH SPEED STEEL

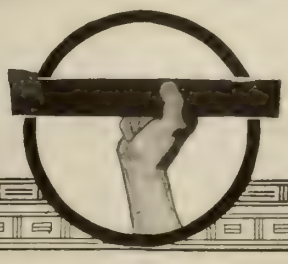
THE BEST FOR ALL MACHINE WORK

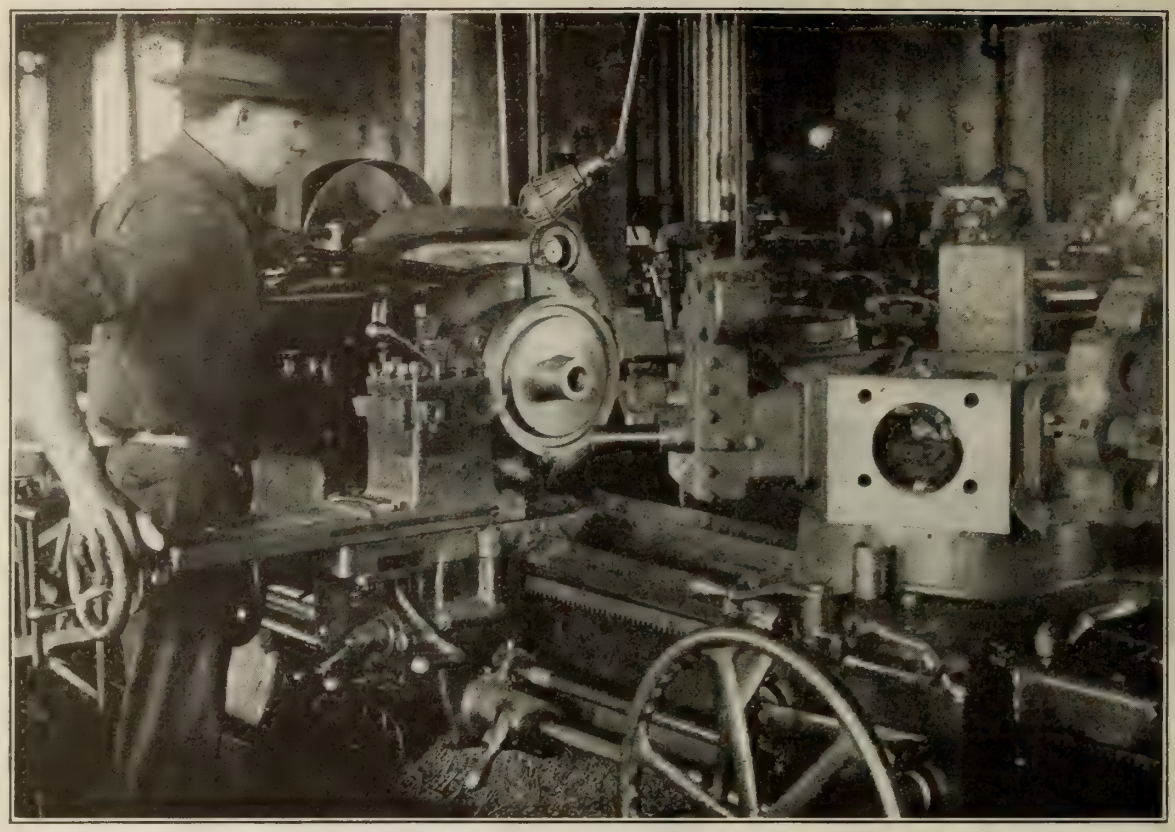
VANADIUM-ALLOYS STEEL CO.

General Sales Offices: Pittsburgh, Pa. Works: Latrobe, Pa.

BRANCH OFFICES:

BUFFALO	CHICAGO	NEW YORK	TORONTO
BOSTON	CINCINNATI	PHILADELPHIA	
CLEVELAND	DETROIT	PITTSBURGH	MONTREAL





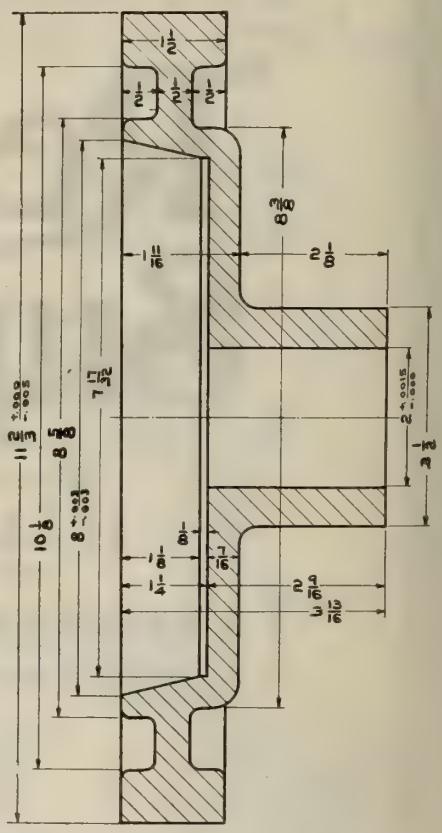
Universal Hollow Hexagon Turret Lathes

Rapid and accurate production is naturally expected when the Universal Hollow Hexagon Turret Lathe is installed for gear work. The carriage usually faces while the turret bores and turns both hub and rim.

Best for Gear Production

This cast iron friction gear blank is being finished on a No. 3-A Universal Hollow Hexagon Turret Lathe first because the accuracy possible on the machine is well within the limits specified, and second, the production of 13 per 10 hours is greater than had previously been possible on any other machinte tested. Being adapted to gear production up to 17 inches in diameter, bronze, cast iron, cast steel or forged steel, this machine has won great popularity with practically all the large gear producers.

Our Engineering Department is ready to tell you what this machine can do for you. Send us your blue prints.



2-A—Bar Capacity 2½" x 29" or 3¼" x 29"
Maximum Swing 16½".

3-A—Bar Capacity 3½" x 44" or 4½" x 44"
Maximum Swing 21½".

THE WARNER & SWASEY COMPANY

CLEVELAND, OHIO, U.S.A.

New York Office—Singer Building. **Boston Office**—Oliver Building. **Buffalo Office**—Iroquois Building.
Detroit Office—Ford Building. **Chicago Office and Show Rooms**—618-622 Washington Blvd.

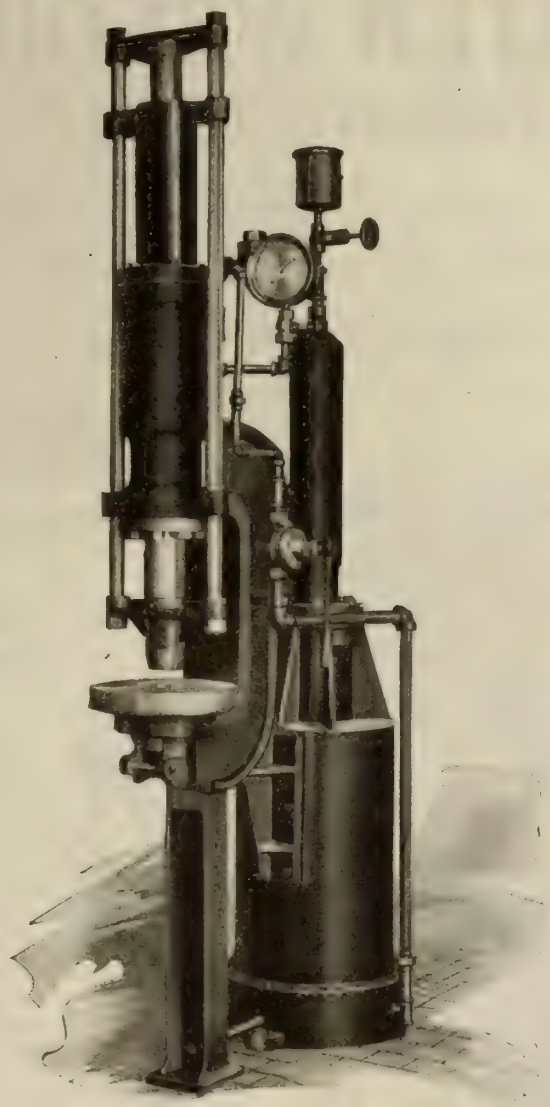
FOREIGN AGENTS: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Allied Machinery Company, Paris and Turin. Van Rietschoten & Houwens, Rotterdam. Yamatake & Co., Tokio. Benson Brothers, Sydney and Melbourne. A. Asher Smith, Sydney. A. R. Williams Machinery Co., Ltd., Toronto, St. John, Winnipeg and Vancouver. Williams & Wilson, Ltd., Montreal.

ORIGINALITY

is Characteristic Always of

"METALWOOD"

DESIGNS and DEVELOPMENTS



The "Metalwood" line of these Quick Operating Hydro-Pneumatic Presses comprises a variety of styles, types and sizes.

By performance through a period of years, these presses have established themselves in a wide range of industries as standard tools for light straightening, broaching, forcing and assembly operations.

The "R-149" style press of 20-ton capacity shown here is described in our bulletin B-47.

METALWOOD MANUFACTURING CO.

High Speed Hydraulic and Hydro-Pneumatic Machinery

DETROIT, MICHIGAN

EXCLUSIVE SALES REPRESENTATIVES:

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

OXY-ACETYLENE

Thermit and Electric Welding

BY

THE CARTER WELDING CO.

OF TORONTO, LIMITED

Oldest, Best Equipped, and Most Experienced
Welding Company in Canada

WRITE US ABOUT YOUR OXYGEN SUPPLY

TELEPHONES :
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PERRIN
FOR
RELIABILITY

Hydraulic
Screw
and
Filter
Presses

Made in Canada

Hydraulic Truck Tire Press

WILLIAM PERRIN LIMITED
TORONTO

A Thorough Investigation Proves the "ALBANY" Drill Press

a well designed and constructed tool-room machine with many distinctive features. Among them: rapidity in changing speeds, drills and chucks, and in starting and stopping the spindle. An exceptionally good point is the micrometer depth gauge — which constantly registers the depth of the hole as it is drilled.

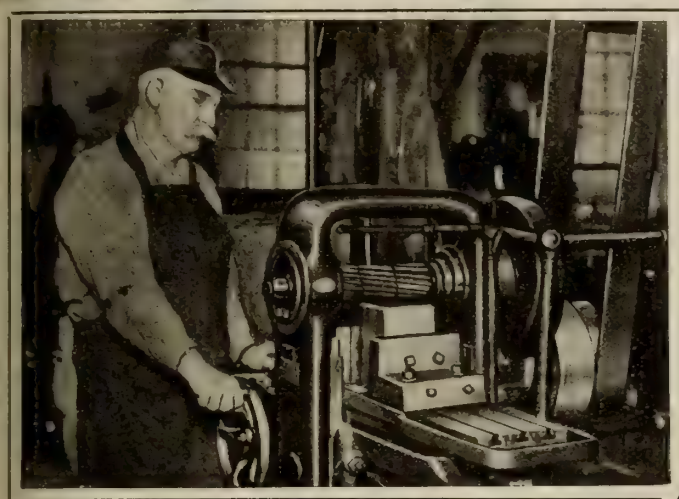
The greenest operator can't go wrong with the "Albany." All parts are fully guaranteed.

Details in Folder

Albany Hardware Specialty Mfg. Co.

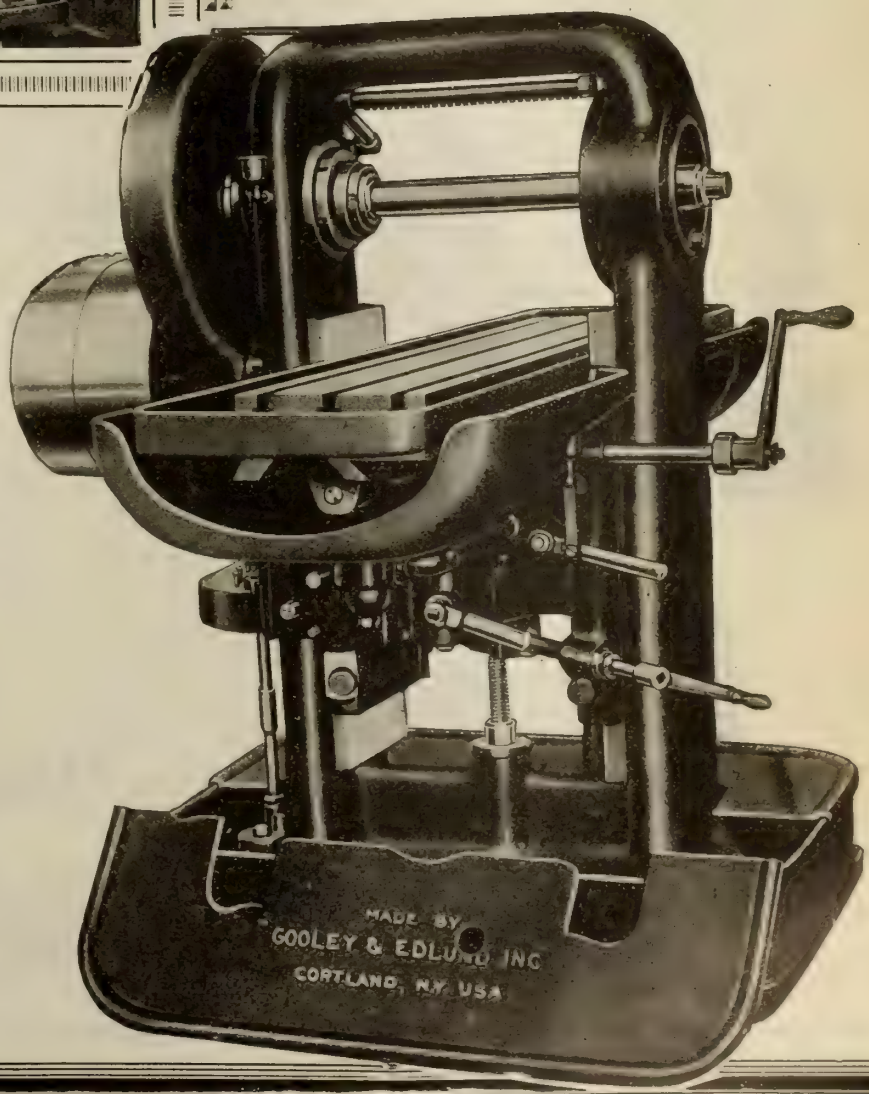
Albany, Winsconsin, U.S.A.

BRIGGS



MILLER

Keeps Five Die Sinkers Going



HERE you see the Briggs Miller Squaring Die Blocks, and it is working so fast it keeps five die sinkers going.

Some are new, squared from the rough; some are old, annealed, cut down and made over; some are oblong, some square, in sizes up to 9 inches. This Briggs Miller has been squaring blocks for four years; has never given any trouble. When cutters get dull the operator has another gang ready to go on with the work Unusual rigidity accounts for Briggs' higher efficiency.

Don't you think you could use this tool to advantage in your shop? Write for the details.

Gooley & Edlund, Inc.

Cortland, N.Y., U.S.A.

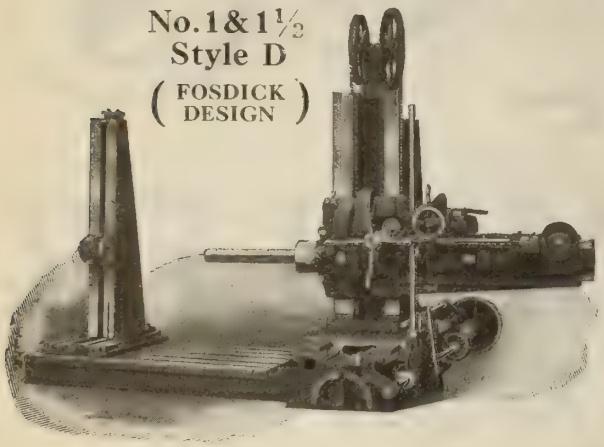
Williams & Wilson, Ltd., Montreal

FOREIGN AGENTS:—Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia and Barcelona; C. W. Burton Griffiths & Co., London, Manchester and Glasgow; Andrews & George Co., Tokyo, Japan.

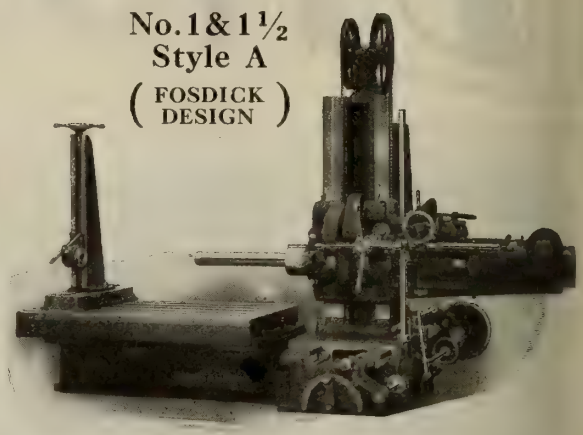
G Boring, Drilling & and Milling L

Machines

No. 1 & 1½ Style D (FOSDICK DESIGN)



No. 1 & 1½ Style A (FOSDICK DESIGN)

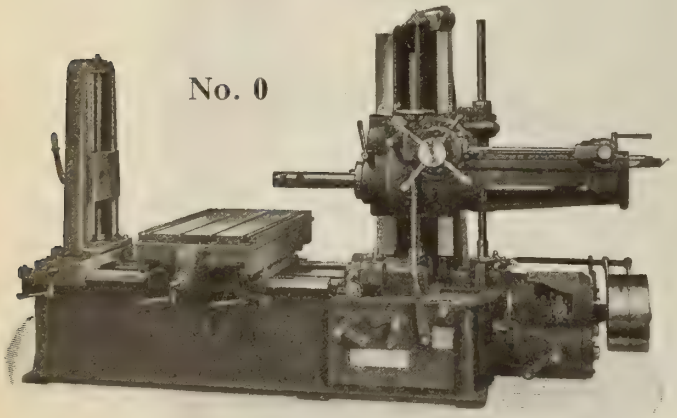


SPECIFICATIONS:

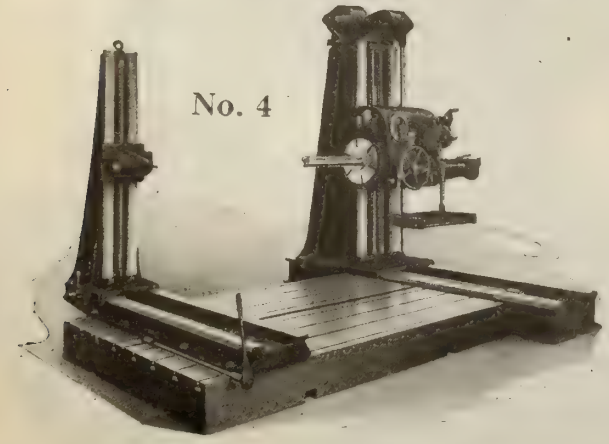
Size of Machine	No. 1	No. 1½
Diameter of spindle	3½"	4"
Morse Taper No.	5	6
Traverse of spindle	28"	30"
Vertical adjustment of head	36"	54"
Horizontal adjustment of column	36"	62"
Maximum, work bed to centre of spindle (Style A)	44"	62"
Maximum, work bed to centre of spindle (Style D)	58"	76"
Size of work bed	42" x 72"	42" x 120"

Size of Machine	No. 1	No. 1½
Speeds (4 to 255 R.P.M. geometrical progression)	12	12
Feeds, in all directions (.007 in. to ¼ in. per revolution)	8	8
Motor horse power	7½	10
Floor space	9' x 15'	11' x 19"
Total height of machine	8' 9"	10' 3"
Net weight (Style A machine)	16,000 lbs.	21,000 lbs.
Net weight (Style D machine)	15,000 lbs.	19,500 lbs.

No. 0



No. 4



Don't let the handling of those awkward, unwieldy pieces cause you trouble and keep down production and profit.

G. & L. Machines are the master of the situation.

Their convenience, simplicity, easy control and great accuracy will prove invaluable to your plant.

Let us put some interesting facts before you. Write for full particulars.

NO. "4" FOR BIG WORK

Diameter of spindle	5
Size of hole in spindle	No. 6 Morse
Size of floor plate	8' x 12"
Floor space required	16' x 24' 6"
Weight	50,000 lbs.

NO. "0" FOR PRECISION WORK

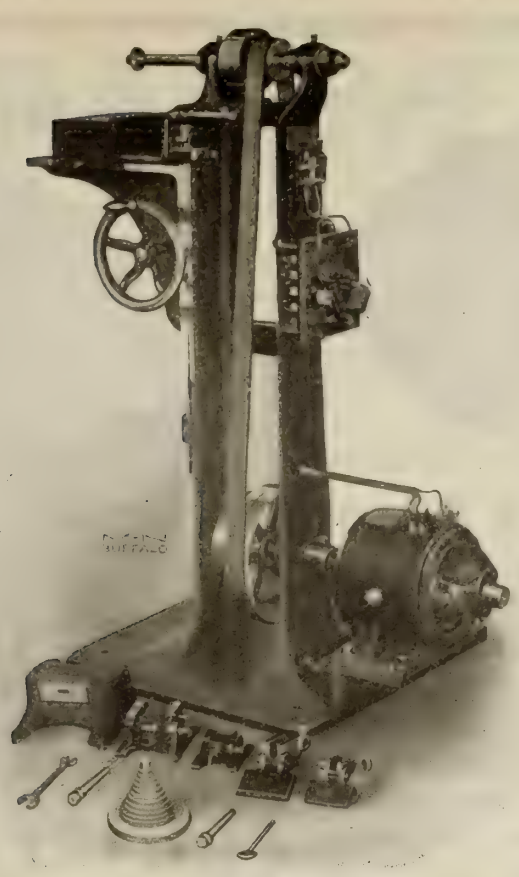
Diameter of spindle bar	3⅛ in.
Spindle bored to fit Morse Taper No.	5
Longitudinal travel of spindle	26 in.
Vertical adjustment of head on column	25½ in.
Size of table	24 in. x 50 in.
Traverse travel of table	30 in.
Longitudinal travel of table	32 in.
Approximate net weight	9,500 lbs.

Drop us a line for detailed information and catalogue.

Giddings & Lewis Manufacturing Company

Fond Du Lac, Wis.

FOREIGN AGENTS:—Canadian Fairbanks-Morse Co., Toronto, Montreal, Winnipeg, Vancouver; Fenwick, Freres & Co., Paris, Lyons, Liege, Zurich; Burton-Griffiths & Co., England; Wynmalen & Hausmann, Rotterdam; R. L. Scrutton & Co., Limited, Sydney, Australia; Rylander & Asplund, Stockholm; Wilh. Sonesson & Co., Malmo; Gustav Nielsen, Christiania.



The "MODERN" Die Chaser Grinder

Let Your Die Troubles End Right Here

Why let Die Trouble stand between you and maximum production?
In the

Modern Die Chaser Grinder

you will have a machine that does away with die trouble—because its output is **marvellously eccentric.**

Made for belt drive or a complete motor-driven unit. Special attachments for grinding Spring Dies, Pipe Dies, Reamers, Taps, Hobs, Spiral and End Mills, Milling Cutters, etc.; can be furnished with the regular equipment.

For Fast Accurate Work

Bulletin C. G. will give you full details. We would also be pleased to send you full particulars re **"Modern" Self-Contained Grinding Machines.** Tools splendidly adapted to meet the present demand for large production.

Modern Tool Company

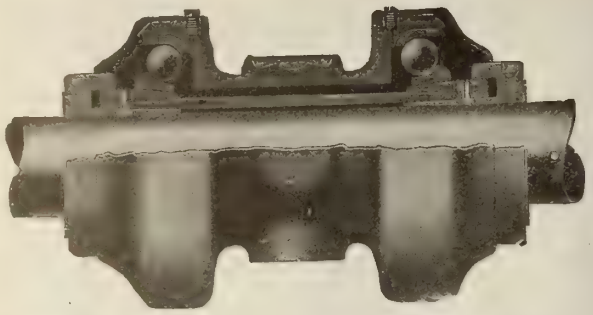
Main Office and Works: State and Peach Streets, Erie, Pa., U.S.A

Canadian Agents: Rudel Machinery Co., Toronto and Montreal

New York Office: - 50 Church Street
Chicago Office: - 32 N. Clinton Street

F. Wesley Parker, Resident Engineer and Export Agent, 2 Rector Street

CLEANLINESS CAPACITY



EFFICIENCY DURABILITY

A Time Tried and Proven Economy Bearing Primarily Built for Line Shafting

THE ESTEEM in which CHAPMAN DOUBLE BALL BEARINGS are held is born of a certain and intimate knowledge of their superiority in actual service and power saving ability, an estimation which is highest among over 4,000 plants using them.

A Few of the Many Well Known Plants Using Chapman Double Ball Bearings

Pierce-Arrow Motor Car Co.....Buffalo, N.Y.
Bethlehem Steel Co.....South Bethlehem, Pa.
Ford Motor Co.....Walkerville, Ont.
International Harvester Co.....Hamilton, Ont.
Goodyear Tire & Rubber Co...Bowmanville, Ont.
Canadian Rand Co.....Sherbrooke, Que.

Chapman Double Ball Bearings are built so as to fit any hanger frame.
They reduce power costs 15% to 40%.
They are entirely drip proof.
They are dust and dirt proof.
Require lubrication once a year.
They increase production.

Send for Catalog No. 3-B and Proof

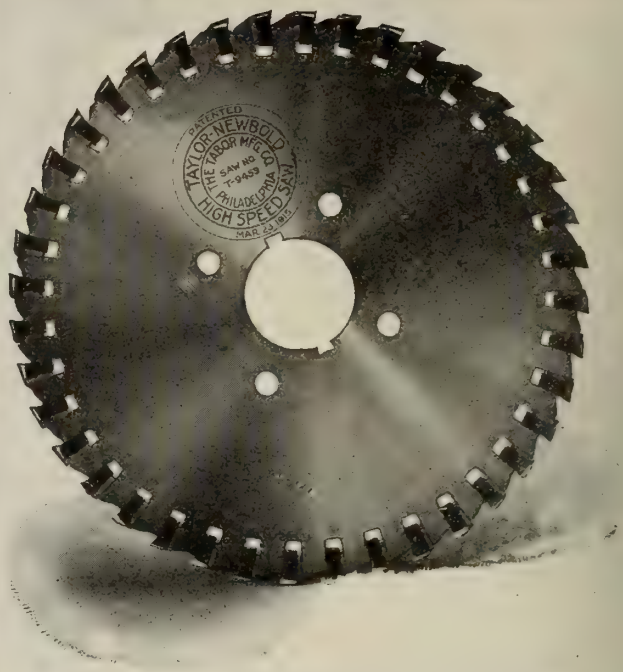
The Chapman Double Ball Bearing Co., Limited

339 Sorauren Ave., Toronto, Canada
408 Shaughnessy Bldg., Montreal, Que.

The Transmission Ball Bearing Co., Inc.
1050 Military Road, Buffalo, N.Y.

New York, Cleveland, Chicago, Philadelphia, Cambridge, Mass.

THE IMPROVED
TAYLOR-NEWBOLD



INSERTED TOOTH COLD SAW
WRITE FOR BULLETIN T-S

Tabor Mfg. Co., Philadelphia, Pa., U.S.A.

The Hammer With The Human Stroke

HEADS RIVETS COLD

Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:—

A rivet a second, sizes up to 3/16".
A rivet in two seconds, size ¼" to ⅜".
A rivet in three seconds, size 7/16" to ⅝".

And on special order we build machines to handle rivets up to 1½" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the **High Speed Riveting Hammer** does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

and

Let us shoulder your riveting problems.
Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.
ROCHESTER, N.Y.

TRANSVEYORS

Did It!

Castings by the hundreds—yes, by thousands—all easily, rapidly and efficiently transferable with the Transveyor.

Not on the floor, but on wooden platforms, or, as illustrated, on skids made instantly mobile by elevating the Transveyor under the loaded skid—that is Transveyor transfer.

Despatching and storing material the Transveyor Way, promotes system, saves time and labor through the elimination of rehandling; reduces "overhead" cost.

Any business with a floor under it can beneficially apply Transveyors. Our latest machinery bulletin is yours for the asking. To what address shall we send it?

COWAN TRUCK COMPANY
15 Water Street, HOLYOKE, MASS.
Canadian Agent:
R. B. SMILEY
120 Glenholme Ave., Toronto, Ontario, Canada

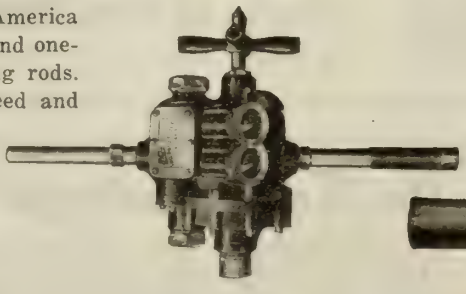
Thor

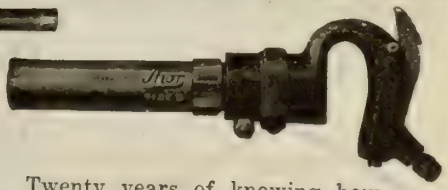
Pneumatic DRILLS and Hammers

There is a Thor Tool made especially for your work. Try it—and watch it save you time and labor and increase your production.

No. 32-L Reversible Compound Piston Air Drill driving 3-8 inch studs in Motor Crank cases.

Thor are the only air drills made in America having Corliss valves, roller bearings, and one-piece pressed Vanadium steel connecting rods. Also equipped with telescopic screw-feed and removable crank chamber plate.





Twenty years of knowing how built into each Thor Tool you buy.

For full particulars write—

INDEPENDENT PNEUMATIC TOOL COMPANY
334 St. James St., Montreal, Que.
Toronto : 32 Front St. W. Winnipeg : 123 Bannatyne Ave. E. Vancouver : 1142 Homer St.

Cuts Costs Increases Production ---*it is a Rockford Machine*

This powerful machine is made to drive high-speed drills up to 3" diameter, for drilling and boring tools up to 8" in diameter, for boring out cored holes in cast iron.

It has a lateral and vertical adjustment of the head that permits the spindle to operate anywhere on a surface 18" high by 36" wide.

Sufficiently accurate for the finest jig work.

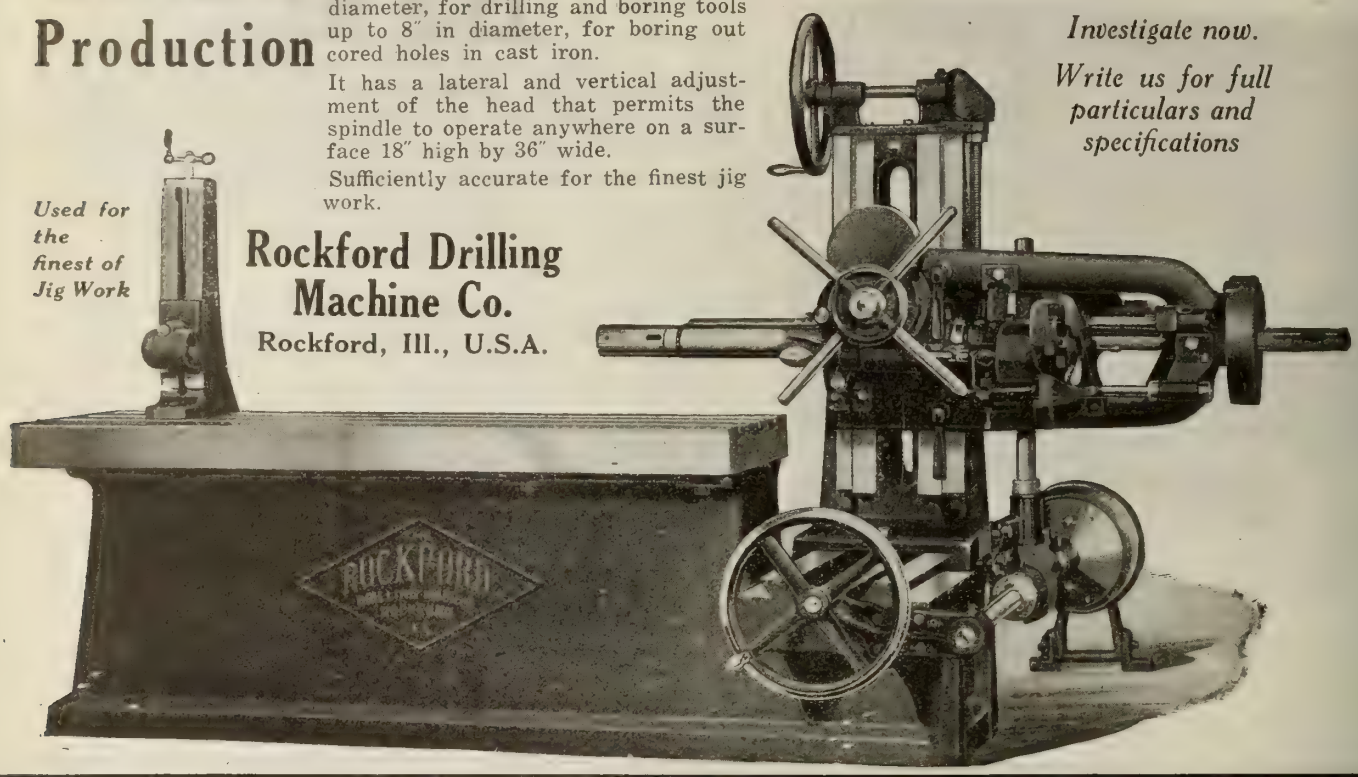
Investigate now.

Write us for full particulars and specifications

Used for the finest of Jig Work

Rockford Drilling Machine Co.

Rockford, Ill., U.S.A.



POWER -- BENDERS

THREE NEW MODELS

"Wonder" Pipe Bending Machines (pat.)

Electrically operated to bend from 1/8" to 20". Send for printed matter. We also manufacture TEN other sizes, hand operated benders.

American Pipe Bending Machine Company

52 Pearl Street Boston, Mass., U.S.A.

THE

TRADE K-T MARK

FOUNDRY

GALT - ONT.

Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. We can advise you and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

—ASK US

Oxy-Acetylene Welding and Cutting

Cutting ⅜ inch Sheet Steel Piling (including lock joints 2¼ inches thick) by the Prest-O-Lite Process.

One Man Does the Work of Two In Less Time, At Less Cost

This illustration shows one man, with a Prest-O-Lite blow-pipe, cutting ⅜-inch sheet steel piling, used in the construction of the protection piers of a large drawbridge. This one man handled the entire job, cutting an average of seven feet of piling per hour—an enormous saving over the old slow and costly method of sawing, which required the services of two men.

Prest-O-Lite PROCESS

offers splendid opportunities for substantial savings in manufacturing, construction and repair work.

Prest-O-Lite Oxy-Acetylene welding and cutting is opening the way to construction and repair operations which cannot be performed by any other process.

Employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders, for emty ones. Provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene. Any average workman who understands metals can learn the process quickly and easily. There is practically no line of metal manufacturing or repairing in which oxy-acetylene welding has not already established itself firmly as standard routine method.

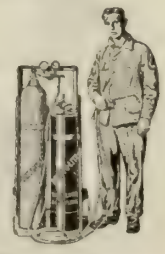
Write for valuable illustrated literature and data on work others are doing by Prest-O-Lite welding process. It may point out ways to solve your problems.

Address Dept. C-107.

Prest-O-Lite Company of Canada, Limited

PREST-O-LITE BUILDING
Corner Elm St. and Centre Ave.
TORONTO

Plants at: Toronto, Ont., Merritton, Ont. Shawinigan Falls, P.Q. St. Boniface, Man.



World's Largest Makers of Dissolved Acetylene

Your Money's Worth

Never again will the Canadian Nation and People be the same careless improvident spenders of "ante bellum" days. "EFFICIENCY" and "GET YOUR MONEY'S WORTH" will be the popular motto and the successful machine shop manager must be able to see the advantage of making one pound of High Speed Tool Steel do the same work as ten pounds in forged tools; in other words he must and will

USE ARMSTRONG TOOL HOLDERS

No heavy "stub-ends" to throw away. No time lost with men at the grinder while lathes stand idle. No stock of heavy sizes of steel to carry, and the blacksmith as a tool-dresser is eliminated entirely.

Armstrong Tools are great favorites with the men—a good thing to consider from a production standpoint.

Our Catalogue is of handy pocket size and will be mailed to you upon request

ARMSTRONG BROS. TOOL CO.
STRONG "THE TOOL HOLDER PEOPLE" STRONG
306 N. FRANCISCO AVE. CHICAGO, U.S.A.

ANGULAR GRIT

Saves Labor
Saves Time
Saves Costs

One ton of Angular Grit equal carloads of sand

Quicker and Better

ANGULAR GRIT offers you the most advanced and economical method of cleaning castings, etc. Its angular and irregular cutting points clean raw castings and forgings more thoroughly and with greater speed than either sand or shot.

ANGULAR GRIT dispenses with sand bins and sand dryers, and there is no dust nuisance where it is used.

If you are using sand, think of the labor you can save by adopting ANGULAR GRIT in its place.

Used for all kinds of cleaning operations—best materials for cleaning shells. Prove its superiority by giving it a trial.

Pittsburgh Crushed Steel Co.
Established 1888
Pittsburgh, Pa., U.S.A.

Canadian Representatives:
Williams and Wilson Ltd., Montreal, P.Q.

Dull Files, Dull Workmen

You cannot get the best out of men working with dull tools

The personal satisfaction they get out of working with sharp, well balanced tools makes for contentment.

It is better to throw away a dull file and buy a new one than to "economize" by keeping the dull file in use.

"Famous Five" Files give maximum returns because the steel in them is accurately cut and properly hardened.

Order them. They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

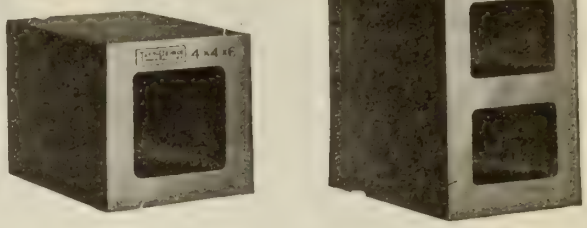
Made in Canada by

Standard Gages, Parallels, Angle Irons V Blocks, Etc., Carried in Stock

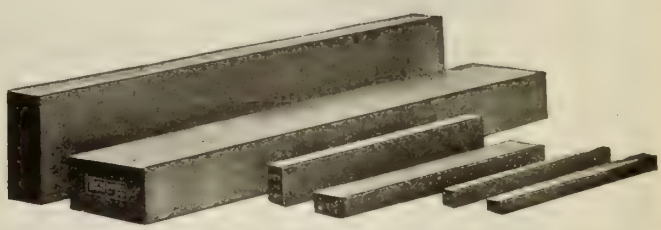
"Specials" Designed and Made by our Specialists

The Taft-Pierce line of standardized tool room accessories is comprehensive —includes a wide variety of close limit equipment necessary for tool room operation—and saves time and trouble all along the line.

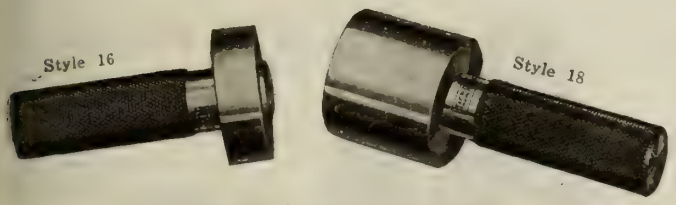
Cast-iron Box Parallels
Style 160



Universal Right-angle Irons Style



Steel Parallels
Style 150



Single-end Internal Limit Gages

Besides regular equipment — Standard Gages, Parallels, Angle Irons, V Blocks, etc., we have standardized certain "specials," designated by our tool specialists, notably Taft-Peirce Plug Gages—a flexible system of handles with interchangeable gages in all sizes from ¼ to 3 inches.

We carry these tools in stock and can make shipments promptly on most orders. Exactly duplications on re-orders assured. Ask for Catalogue 104-E.

Adjustable External
Limit Gage
Style 32

TAFT-PEIRCE
Woonsocket, R.I., U.S.A.

NEW YORK, Woolworth Building DETROIT, Majestic Building

WILLIAMS & WILSON, LIMITED
MONTREAL AND QUEBEC

CONSOLIDATED

All the energy of America's most modern machine shop and foundry is concentrated upon one product.

—

CONSOLIDATED POWER PRESSES

CONSOLIDATED

For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

—

CONSOLIDATED POWER PRESSES

CONSOLIDATED PRESS CO.

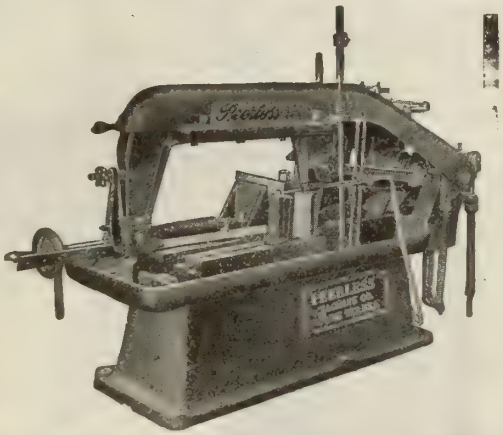
HASTINGS - MICHIGAN

U. S. A.

Peerless HIGH SPEED

The New Standard of Production

Why Not Cut Off Stock From 50 to 100% Faster?



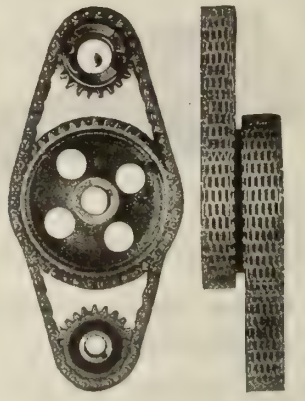
Is there any reason why you should not profit by the superior speed, accuracy and capacity of the Peerless, as well as others? Why you should not do more work with the same number of machines, or the same work with fewer machines? Why you, also, should not save in room, in operating expense and in costly material?

We will prove to you what the Peerless is doing in some of the largest plants in the country, or will let you prove its superiority in your own plant. A machine is ready for you to try, and if after 30 days' use you want to let it go, you may ship it back at our cost for freight both ways.

Write us about it—now.

PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN



War Record Not Made Public

The "Whitney" Special Quality "Type M" Chains

made a great showing during the war years 1916-17 and 1918.

Our tests and demonstrations were made on prominent 8-cylinder motors in service on a large number of cars in the State of Connecticut.

During this long period not a single "Whitney" Chain or Sprocket had to be replaced and the condition of every Drive has been pronounced remarkable.

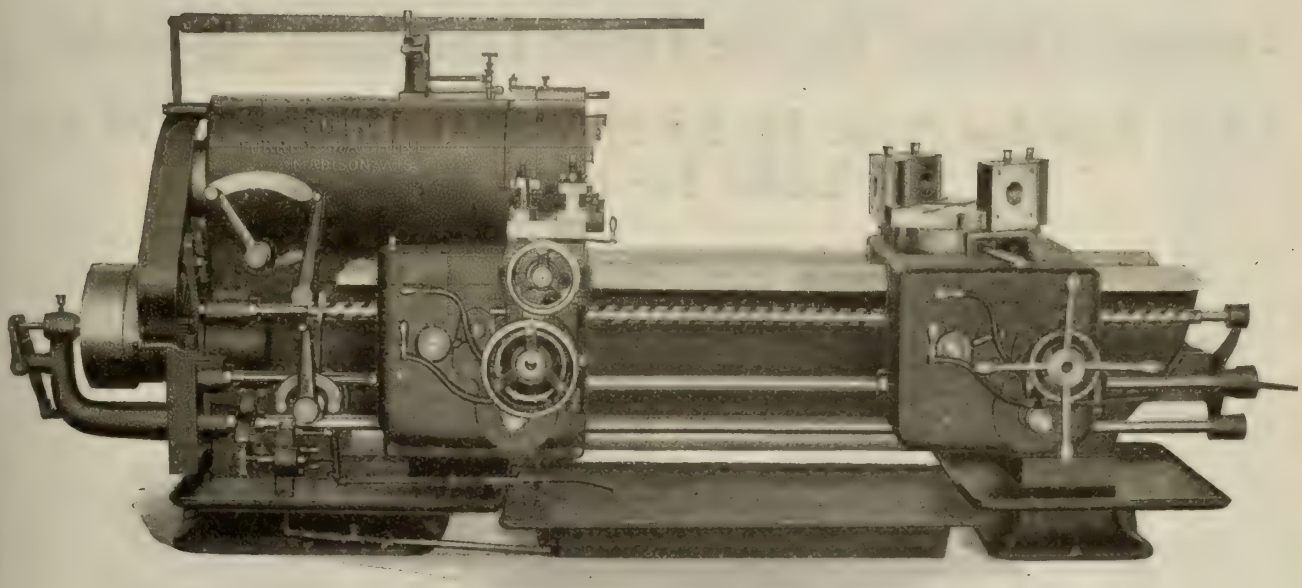
One Drive recently examined had given over 35,000 miles' service and both Chains and Sprockets were in such perfect condition that they appeared good for more than double that record (Sprockets having no adjustment).

The links of this SPECIAL CHAIN have finished faces and reamed holes, and the smooth faces do not damage the Sprocket teeth.

Our war contracts were such that we did not announce this SPECIAL CHAIN until after the conflict was over.

THE WHITNEY MFG. CO.,
Hartford, Connecticut

STEINLE



Another reason why the Steinle 24" Full Swing Side Carriage Turret Lathe is ahead of all others in the economical and accurate production of many classes of work.

The Massive High Powered
Quick Change Speed Headstock

The headstock housing is cast integral with the bed, this design insuring rigidity and permanence of alignment. This headstock is of box section entirely closed on front, top and bottom and also on the back with the exception of an opening left for assembling purposes and for which a suitable cover is provided. This design and the distribution of metal are arranged with a view of securing rigidity and also with the idea of absorbing all vibration due to heavy wide faced cuts and shock or jar incidental to intermittent or uneven cuts, all of which it successfully accomplishes. The thirty spindle speeds are substantially divided into three groups as follows:

First train of gearing: 10 spindle speeds corresponding to open belt speeds.

Second train of gearing: 10 spindle speeds corresponding to back gear speeds.

Third train of gearing: 10 spindle speeds corresponding to face gear or triple gear ratio. In reality the first train is back geared; the second double back geared; and the third quadruple geared. All of these gear ratios are high, resulting in great leverage in the application of power to the spindle. The amount of power consumed in transmission is small, almost negligible in fact, with the result that the machine can be operated at very low power cost, the same amount of power being delivered to the spindle at all speeds but varying in the amount of torque according to the different gear ratios, the amount of torque increasing with the corresponding decrease in spindle speed.

All gear ratios and speed changes are controlled by conveniently located levers.

There are more good reasons why the Steinle 24" Full Swing Side Carriage Turret Lathe is ahead of all others in the economical and accurate production of many classes of work. We will give these reasons in future advertisements in this journal. Watch for them. They will be interesting to you.

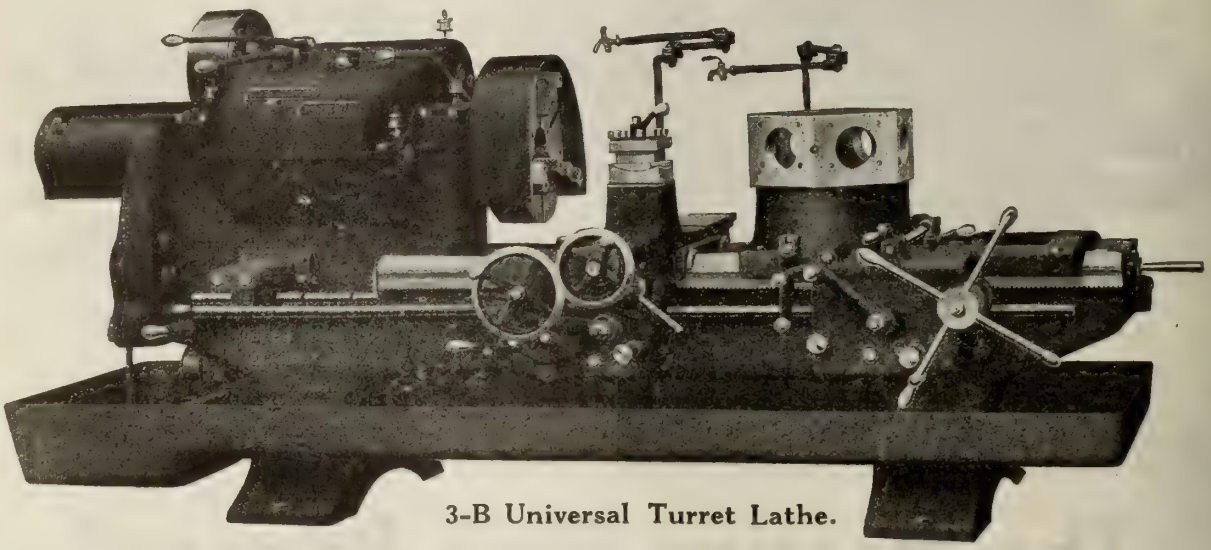
STEINLE TURRET MACHINE CO.

MADISON - - WISCONSIN, U.S.A.

ANNOUNCEMENT

Another Addition To The Foster Line Makes Its Debut

A Very Rigid Test Proves The 3-B UNIVERSAL TURRET LATHE An Easy Leader For Heavy Work.



3-B Universal Turret Lathe.

The 3-B Universal Turret Lathe, the most recent addition to the large Foster line of Screw Machines and Turret Lathes, is similar in design throughout to the now well-known 2-B Universal Turret Lathe. The only fundamental point of difference between the two machines being that of size. The machine is of the combination type and is capable of handling bar and chucking work up to its capacity with equal efficiency. The bar capacity through the automatic chuck is 4½″ and the bore of the spindle 5⅛″. For chucking work the machine is regularly equipped with an 18″ three-jaw scroll chuck. The swing over the cross-slide is 18¾″ and over carriage 26″. The efficient turning length of the hexagon turret is 40″.

Rigidity has been the watchword throughout in designing this machine. The carriage bridges across the ways of the bed. The bed itself is made of heavy box construction.

The driving pulley is capable of receiving from the belt up to 12 H.P. This power is transmitted through a large diameter friction clutch and three nests of sliding gears to the spindle. The 12 speed changes, ranging from 8 to 218 R.P.M., are instantly obtainable by means of the shifter levers mounted on top of the head.

One of the many strong points, of special value on a large size machine, is the location of the feed changes in the aprons of the two tool-carrying units. These changes are instantly obtainable and no time is wasted by walking to the end of the machine to change the feed. The feed changes are 12 in number and range from .0055″ to .150″ for the longitudinal feeds and from .0029″ to .080″ for the cross-feeds.

This is only touching a few of the high spots of the many strong features of this machine.

Watch this space in the future issues for further particulars, or write for our 3-B catalogue.

THE FOSTER LINE

No. 1-B UNIVERSAL TURRET LATHE
Bar Cap. 2″ — Swing over Carriage, 14″ over Cross Slide, 8″

No. 2-B UNIVERSAL TURRET LATHE
Bar Cap. 3¼″ — Swing over Carriage, 20″ over Cross Slide, 13½″

No. 3-B UNIVERSAL TURRET LATHE
Bar Cap. 4½″ — Swing over Carriage, 26″ over Cross Slide, 18¾″

No. O PLAIN HEAD SCREW MACHINE
Bar Cap. 5/16″ — 10″ Swing

No. 1 PLAIN HEAD SCREW MACHINE
Bar Cap. 11/16″ — 11″ Swing

No. 2 PLAIN AND FRICTION HEAD SCREW MACHINES
Bar Cap. 1 1/16″ — 13″ Swing

No. 3 PLAIN, FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1 5/16″ — 14½″ Swing

No. 4 FRICTION HEAD SCREW MACHINE
Bar Cap. 1 7/16″ — 17¼″ Swing

No. 5 FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1 13/16″ — 17¼″ Swing

Nos. 6, 7, 8, 9, 10 FRICTION HEAD SCREW MACHINES
Bar Cap. 2 5/16″; 2 3/4″; 2 15/16″; 2 13/16″; 3 1/16″ resp. — 20″ Swing

No. 2 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1 1/16″ — 14″ Swing

No. 2 FRICTION SET-OVER TURRET LATHE
Bar Cap. 1 1/16″ — 14″ Swing

No. 3 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1 5/16″ — 16″ Swing

No. 3 FRICTION HEAD SET-OVER TURRET LATHE
Bar Cap. 1 5/16″ — 16″ Swing

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Manufactured under the Holden & Morgan Patents

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WE ARE GENERAL AND SPECIAL TOOL MAKERS

Let us quote you on your requirements, and have your tools made as you want them made.

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The cut shows a 26-in. Barnes Sliding Head All Geared Drill equipped with Kelly Multiple Cylinder Tools.

Kelly Combination semi-finishing and finishing tools suitably piloted with hardened and ground "STRIP" pilots machine the three cylinder block to ACCURATE SIZE and FINISH.

ADJUSTABLE and REPLACEABLE high speed steel or stellite blades make the UP-KEEP cost on Kelly Tools a minor item.

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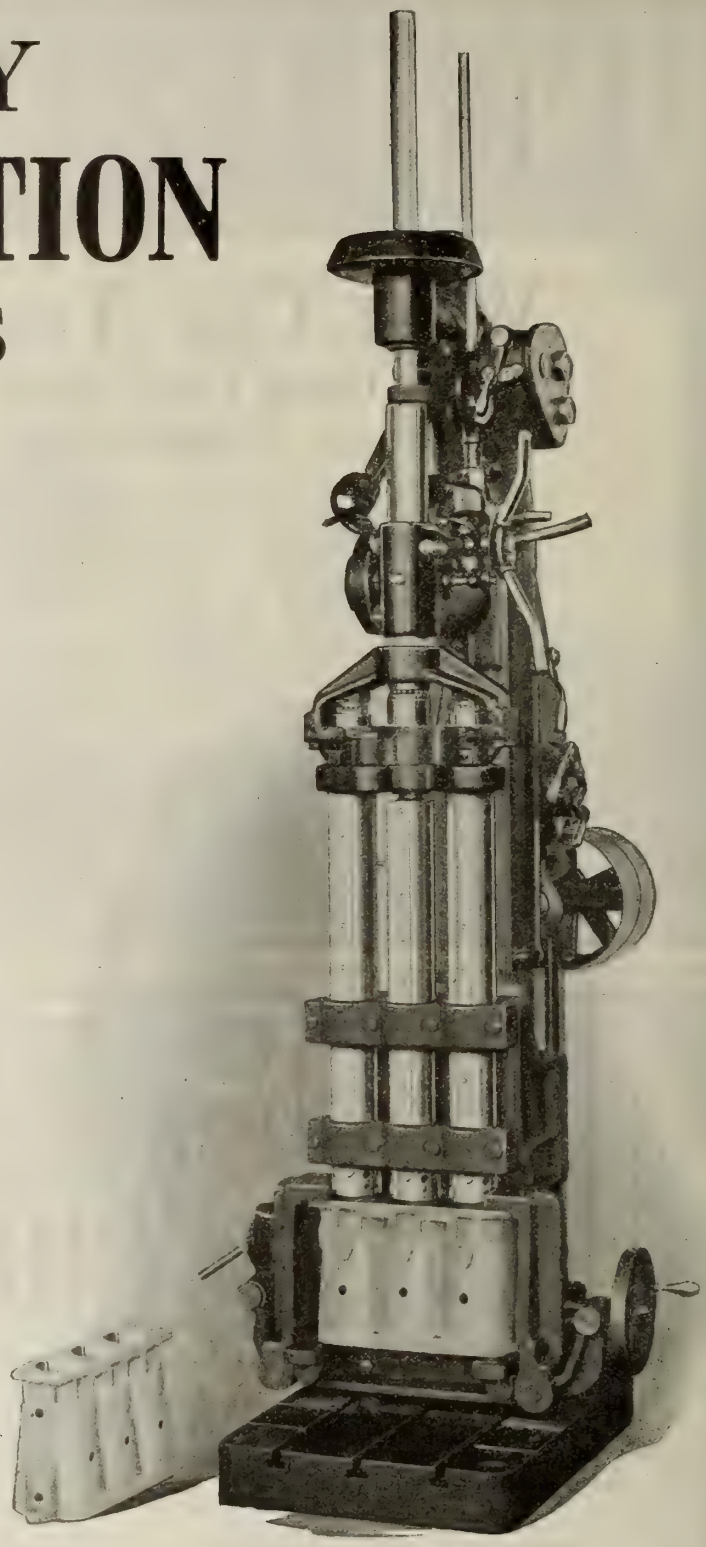

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CLEVELAND, OHIO, U.S.A.

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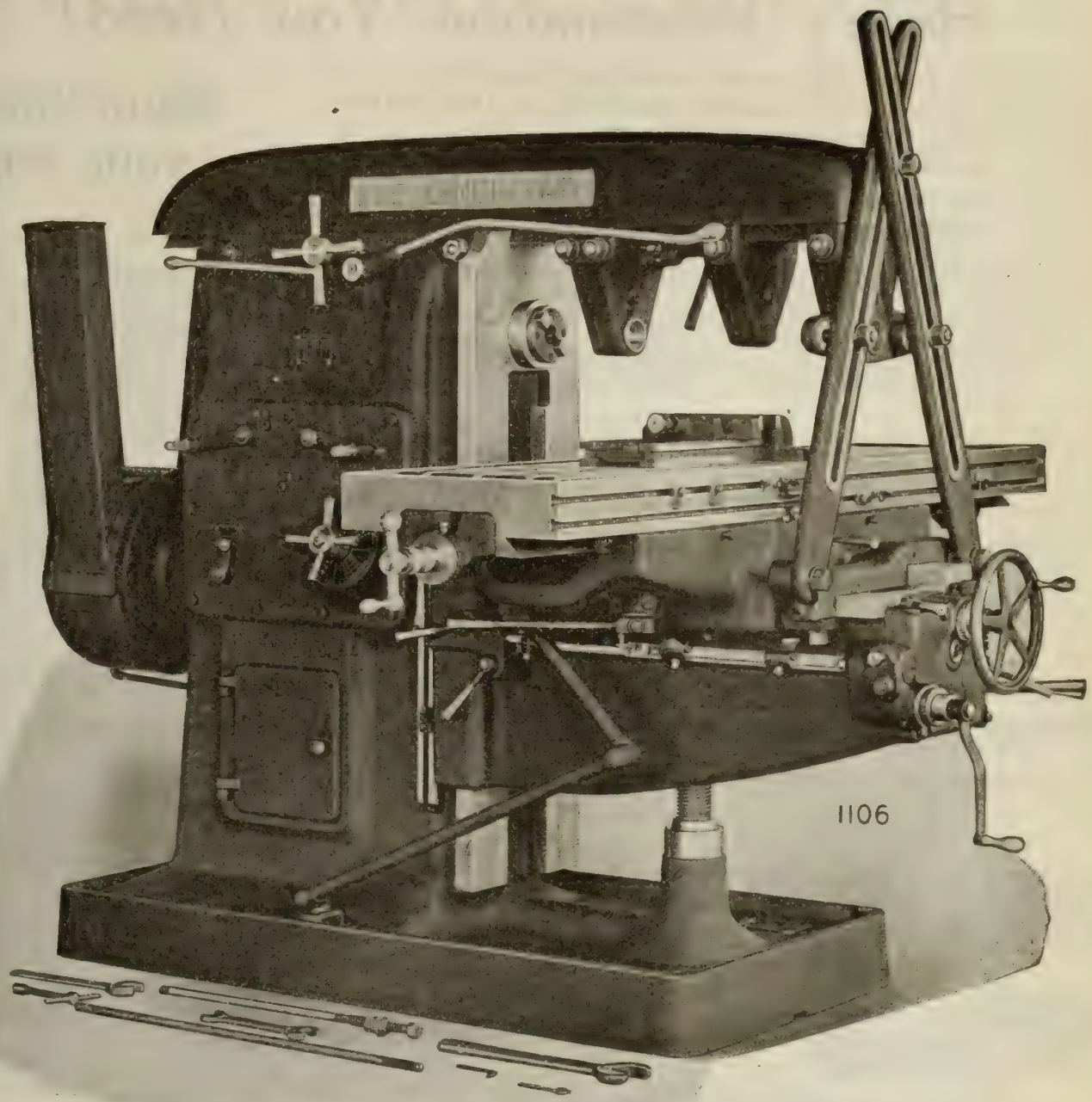

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Sixteen Big Productive Features

Intermittent Feed with Power Quick Traverse, Rectangular Overarm, Square Gibbed Narrow Guides, Feed Changes made in Front of Machine, Individual Feed Control Levers at Front of Machine. Individual Feed Control Levers at Side of Machine for Control from behind the Table. Automatic Lubrication, for Mechanism in Column, Centralized Oiling for other Mechanism, six Stations, Stream Lubrication for Cutters and Work, Sliding Gears for Speed and Feed Changes, Safety Couplings for both Feed and Quick Traverse, Main Starting Lever, Controlled from Front or Rear, Automatic Brake for Spindle Stop, Cincinnati Flanged Spindle End, No. 14 Taper Hole in Spindle for large Arbors, Spindle Reverse in Machine.

The Cincinnati Milling Machine Company

CINCINNATI, OHIO

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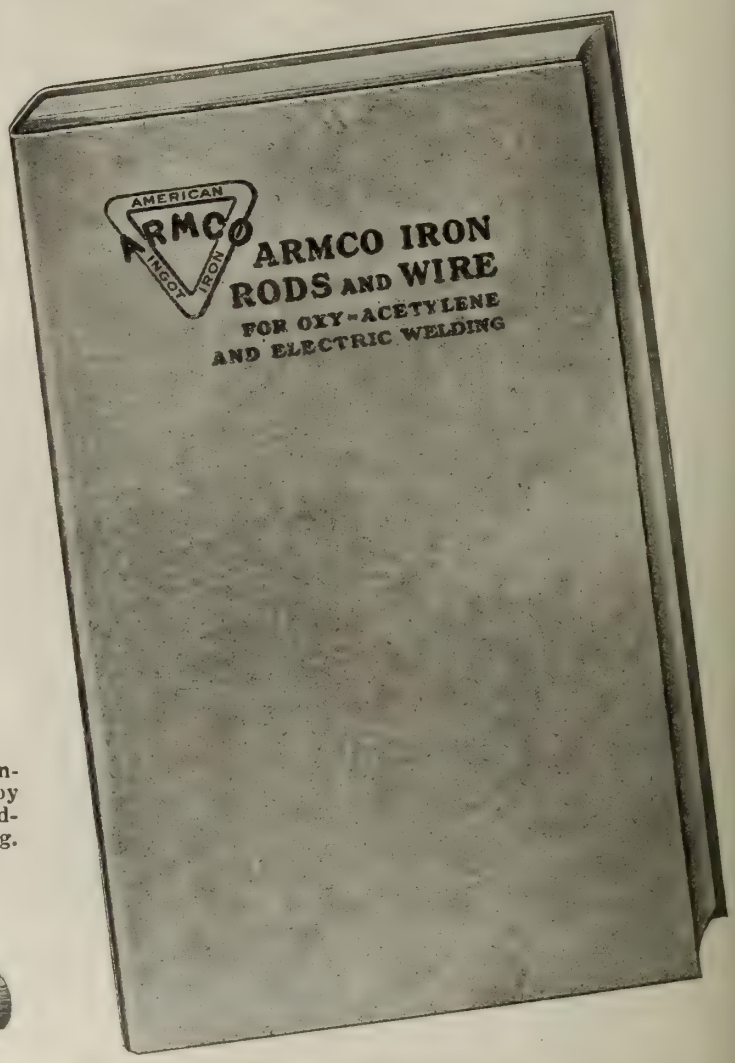
Miscellaneous useful data including tables of wire gauges, conversion of temperatures from Fahrenheit to Centigrade, properties of elements and metal compositions, decimal equivalents, metric conversion tables, definitions of electrical units, mensuration factors.

If you are a consulting, designing or managing engineer, shop superintendent or foreman, your free copy is ready for mailing on request, and the engineering advice of our welding specialists is also free for the asking.



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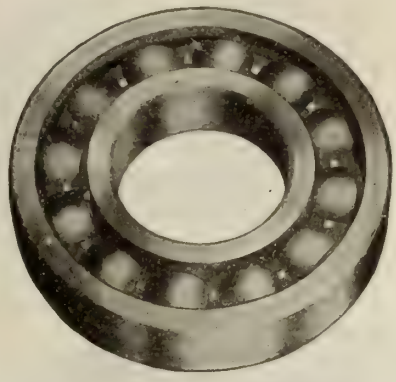
All standard sizes, annular and thrust bearings. Shipped from stock. Quotations on special bearings given promptly.



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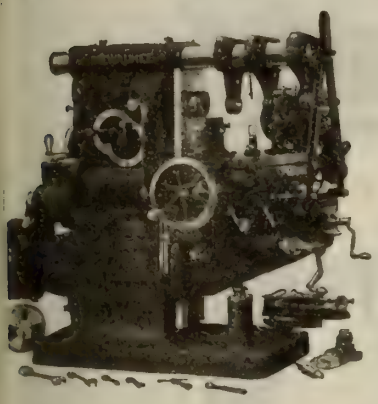

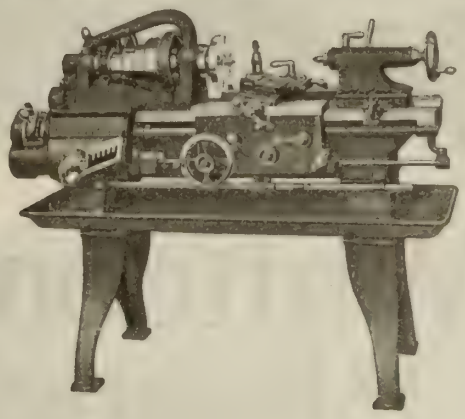

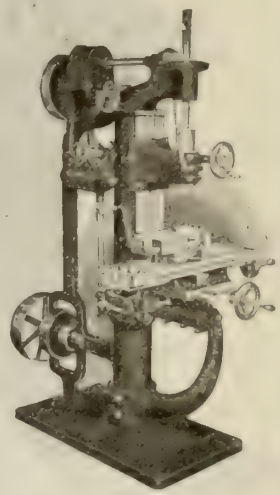

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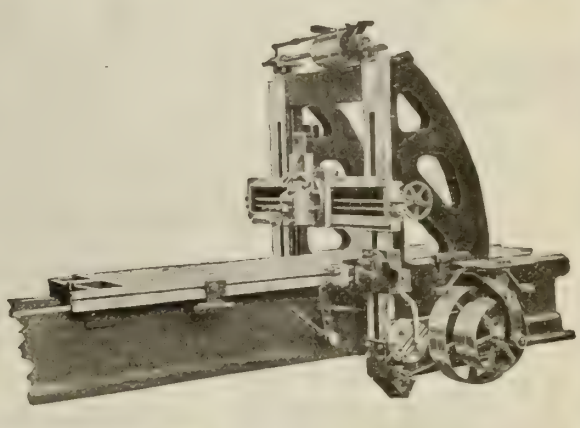

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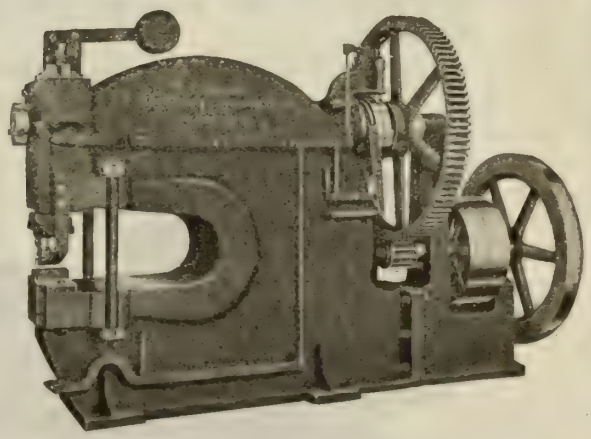

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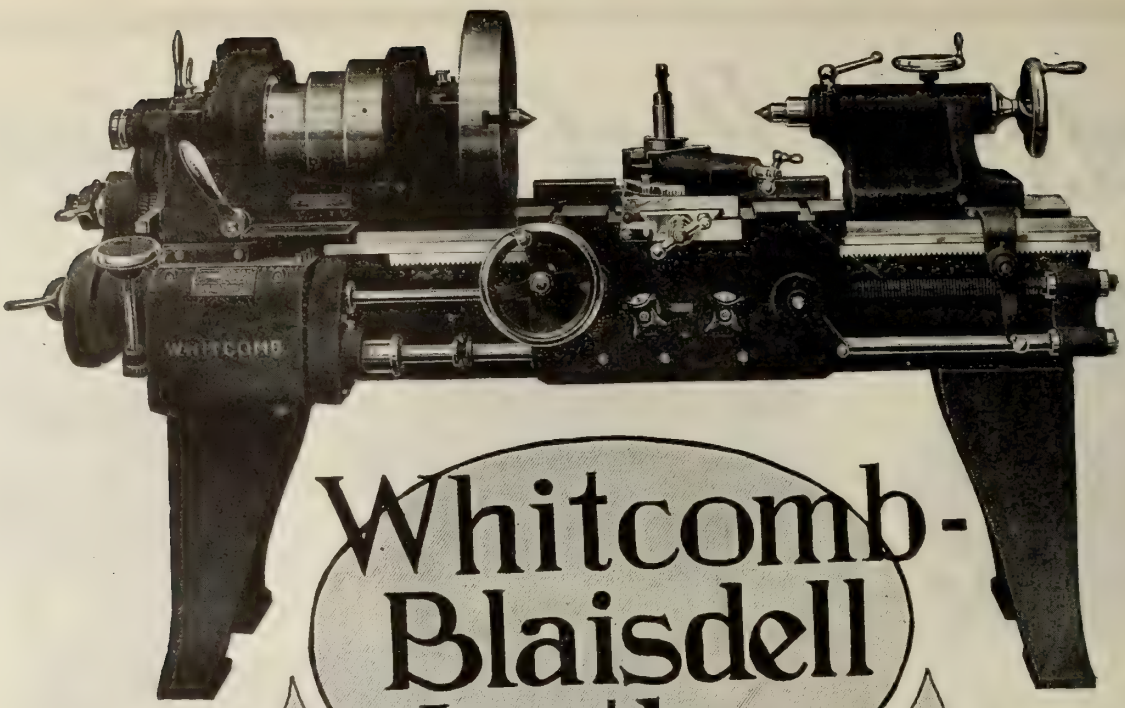

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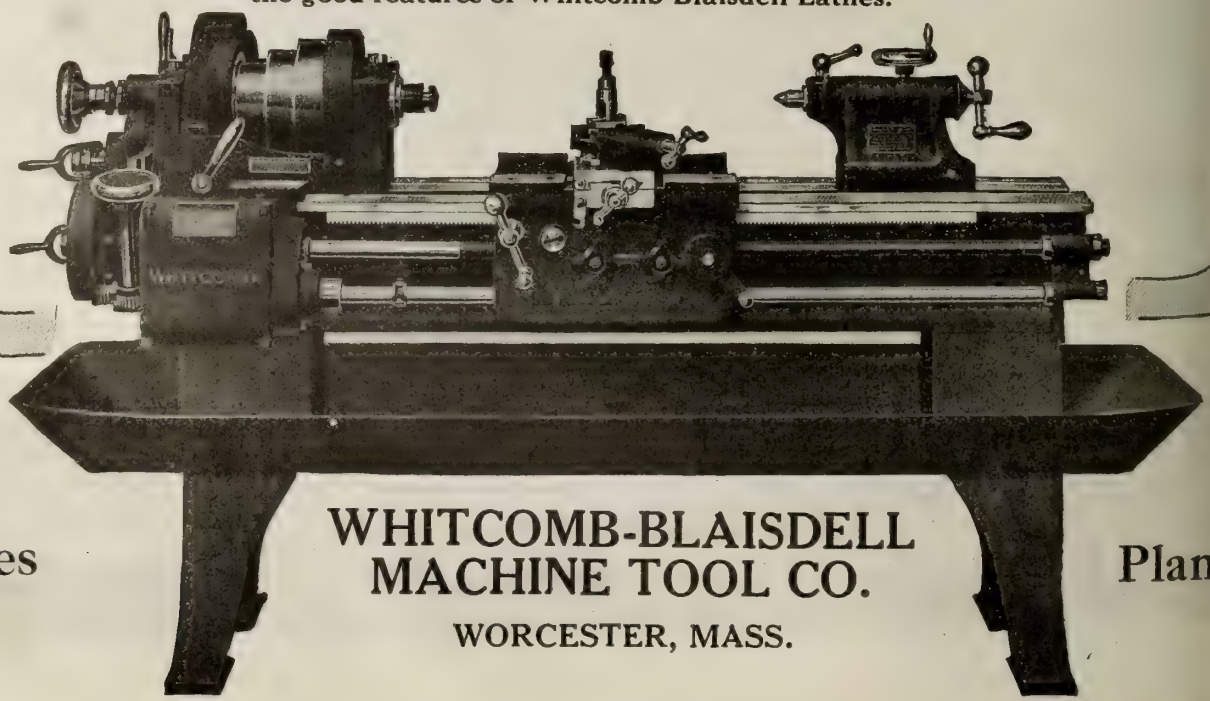
POWERFUL, WELL-BALANCED MACHINES THAT ARE LIGHT-RUNNING AND ADAPTED TO ALL CLASSES OF **RAPID MANUFACTURING.**

Every feature of the W-B Lathe of to-day has been considered from the viewpoint of greatest utility. Materials used embody toughness and durability. Our tests must prove great wearing quality and strength before any material is selected.

The product of an organization that has for sixty years been distinguished for the superior design, workmanship and material of its product.

Write for our latest catalog describing all of the good features of Whitcomb-Blaisdell Lathes.



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THAT GIVES
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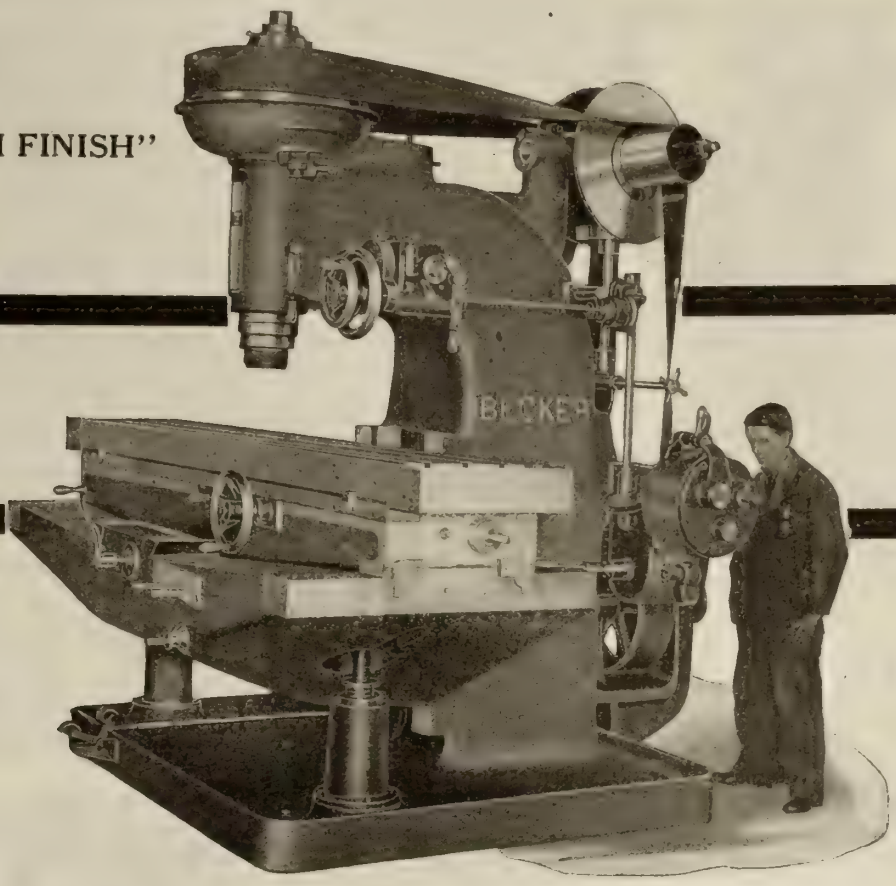


BECKER MODEL D1 MILLER

Especially designed for heavy work where absolute accuracy is a necessity. The powerful knee, operating on twin elevating screws controlled by a single operating handle, or lever, if power feed is desired, keeps the work rigid and well supported even when working at the extreme traverse. Its wide surface offers a range that is exceptional even for a "BECKER."

The work is held permanently aligned with the spindle by means of the Patented Becker Gibbing which distributes the strain along the entire bearing surface of the column instead of concentrating it at one or two points.

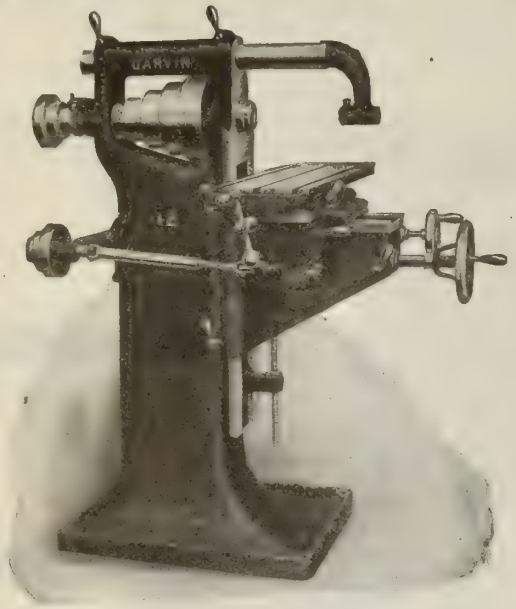
Circular 0-601 describes the Model D-1 in detail—Write for it NOW.

BECKER MILLING MACHINE COMPANY

DETROIT HYDE PARK, BOSTON, MASS. INDIANAPOLIS

Rudd-Belnap Machinery Company, Limited, 137 McGill St., Montreal, Que.
A. R. Williams Machinery Company, Limited, 64 Front St. W., Toronto, Ont.

GARVIN



No. 12 Plain Milling Machine-Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....**18 x 6 x 15 in.**

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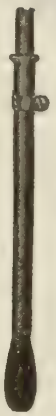
Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

Every Emery Wheel With Its Own Dresser



Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"**—the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
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Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

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Wood Screw Making Machinery

Works Founded 1858

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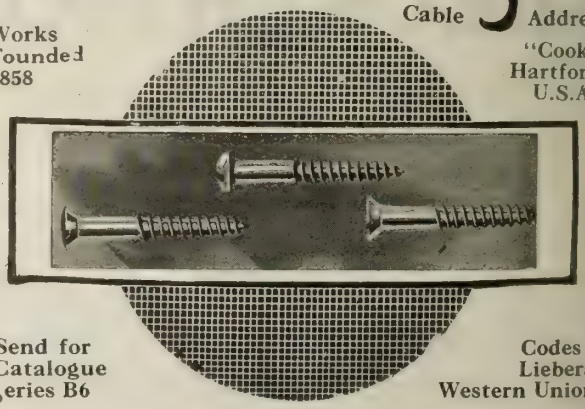

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Codes: Liebers Western Union

Complete plant equipment for making screws of types shown above. All machinery automatic. The almost universal use of our machinery proves its worth.

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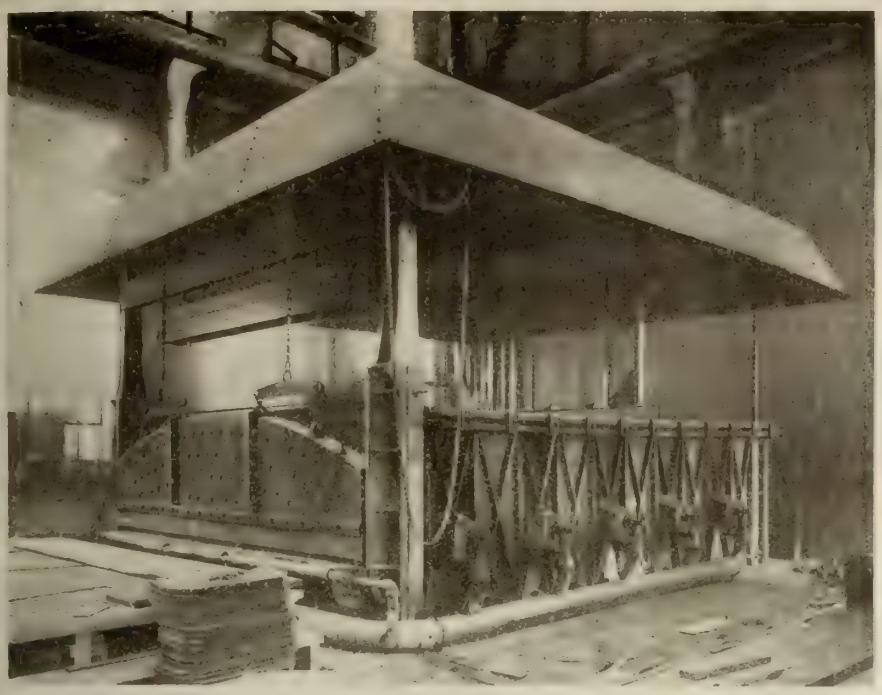

Any Size

Illustration shows a Plate Heating Furnace installed in the plant of Canadian Vickers Ltd., Montreal.

Your proposition, if out of the ordinary, would be bettered by our co-operation. Get in touch with us.

Mechanical Engineering Co., Ltd.

Room 308, Bank of Toronto Bldg., Montreal

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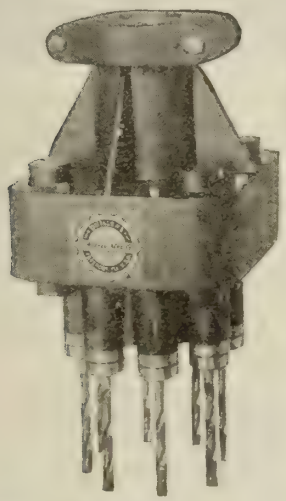
2 Minutes or 20?



This Is The Vital Question

Do you drill ten holes in the time it takes for one? The Hoefer Auxiliary Head equips any driller so as to accomplish this big saving in time. It speeds up production in drilling tremendously. Not only do you save the drilling time, but also the time now lost in shifting the jigs and raising and lowering the spindle for the extra holes.

Hoefer Auxiliary Heads are made in any multiple, arranged in any manner, from 2 up. They are made by expert tool makers and unqualifiedly guaranteed to handle accurately the work for which they are designed.

Investigate now—every day you use a single drill where the multiple may be used you are paying for an auxiliary head through increased costs, but not securing its benefits.

Write for catalog. Send a blueprint of some of your work for estimate of time and cost.

THE HŒFER Mfg. Co., Freeport, Ill.

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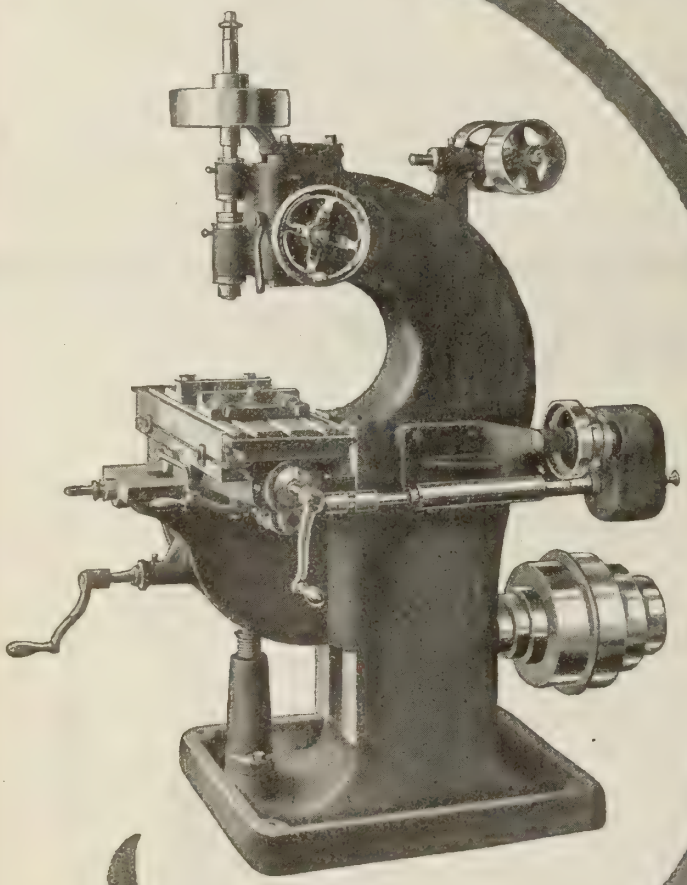
BRISTOL

Bristol Vertical Milling Machine

A Tool of Large Capacity



Ball Bearings are used at the most important points making it a free running tool, which, combined with its being a belt-driven machine, makes it capable of turning out work on which an extra smooth finish is desired.

The longtitudal table feed is controlled by the gear change box which gives six different feeds for each change of spindle speed. A stop to gauge with micrometer adjustment is used on the head to regulate the depth of cuts.

Learn all about its production capacity.

Write for bulletin giving fullest particulars.

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
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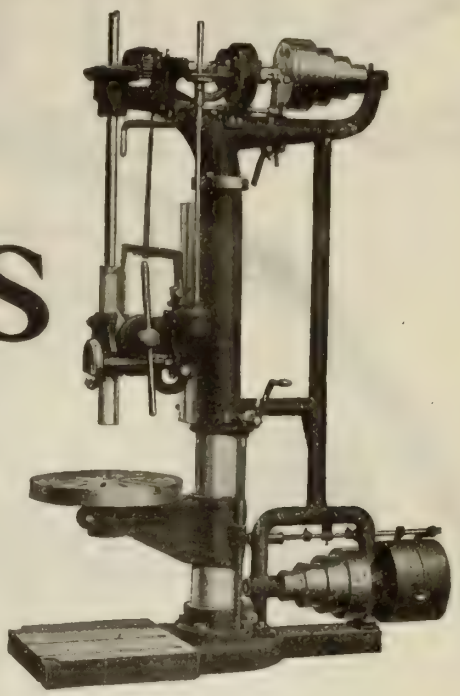
Meet the keen competition of peace times by putting into your shop faster, stronger and more accurate upright drilling machines. Sixty-four years' drill building experience is back of these perfected

Silver Drills



The 25" Silver Drill has eight spindle speeds and six positive geared feeds. The 20" Silver Drill is built in four distinct styles with round or square base. Furnished singly or in gangs of 2, 3 or 4 spindles.

Write for further facts.

SILVER Salem, Ohio U.S.A.

The Silver Mfg. Co.

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SALEM OHIO

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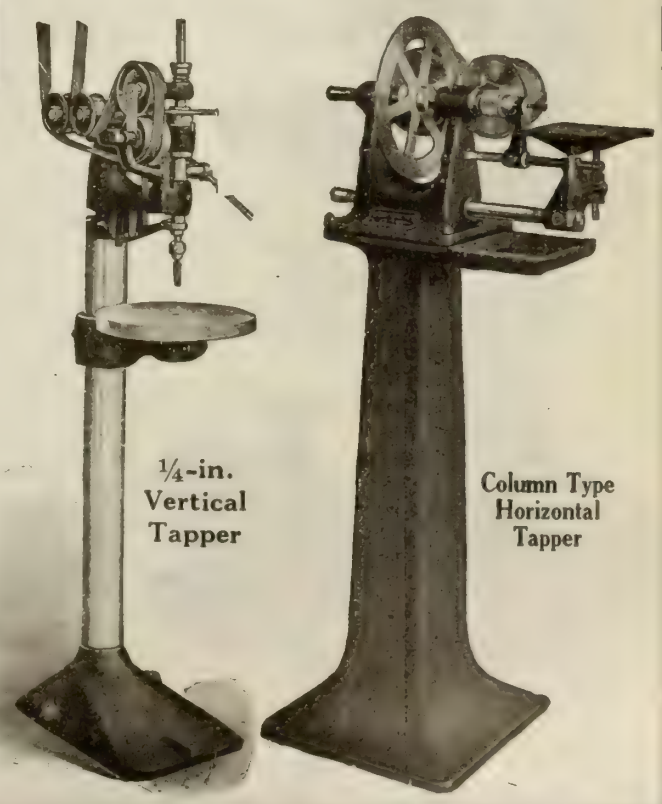
RICKERT-SHAFER TAPPERS

Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on ⅝-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.



¼-in. Vertical Tapper

Column Type Horizontal Tapper

Write for specifications

The Rickert-Shafer Co.

ERIE, PA., U.S.A.

FRED HERBERT, Foreign Agent, Coventry, England.

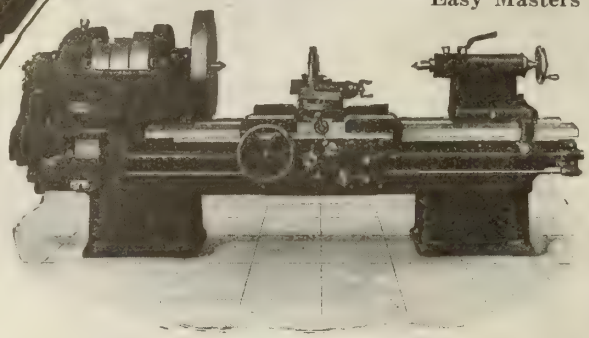
SIDNEY

For SERVICE

Heavy Duty Lathes

The 25-inch Heavy Duty Quick Change Sidney shown below is the last word in lathe construction. Every possible improvement will be found in this late model. Bed lengths available are 10, 12, 14, 16, 18 and 20 feet. Also built with a 27-inch swing.

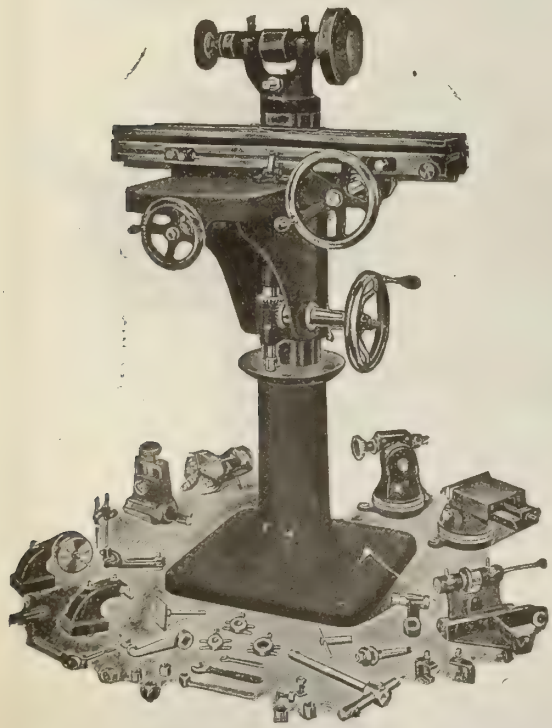
Easy Masters of Big Jobs



Regardless of the severity of work, dependence put on Sidney Lathes has never been misplaced. The Sidney line has made good—with a vengeance. New Bulletin just issued on 25-inch machine. Write to-day!

The Sidney Tool Company
SIDNEY, OHIO

CANADIAN AGENTS:
The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.



The Greenfield Universal Grinder

For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

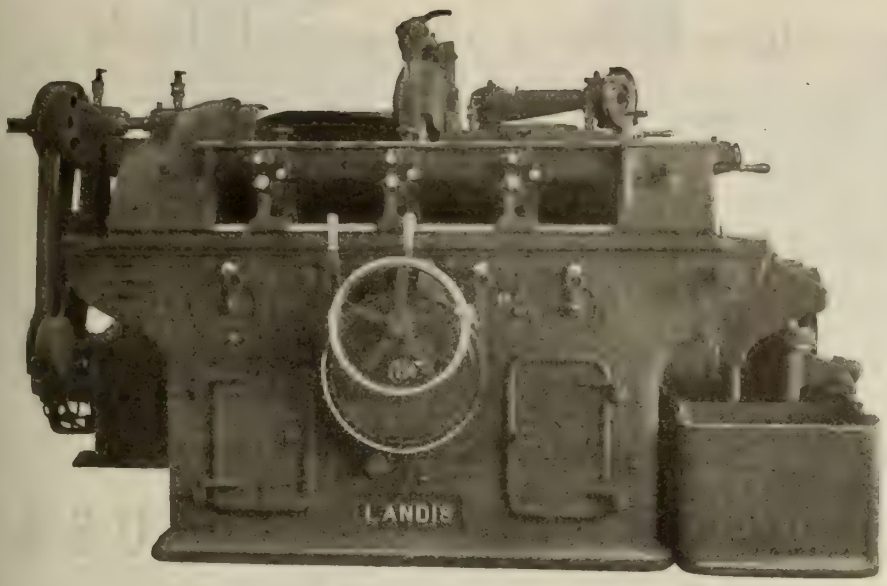
These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

Greenfield Machine Company,
GREENFIELD, MASS., U.S.A.

LANDIS

Self-contained Plain Grinding Machine



No matter how excessive the tool-load may be, there can be no variation of the degree of accuracy because the work is held stationary —and "the wheel travels."

In addition the Landis is compactly and rigidly built to avoid any chatter.

A study of the machine will convince you of its many advantages and its fool-proofness. The built - in, labor-saving features insure big production.

Let us send you our catalog.

LANDIS TOOL CO., Waynesboro, Penn.

50 Church Street, New York City

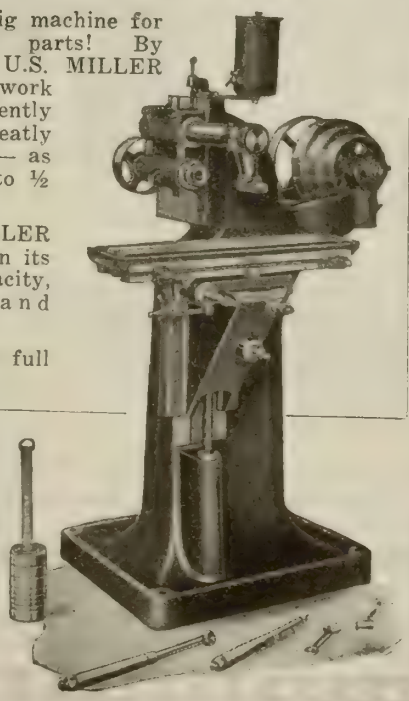
U.S. MILLER

Reduce Your Milling Costs ⅓ to ½

Don't use a big machine for milling small parts! By adopting the U.S. MILLER you can do the work just as efficiently and at a greatly reduced cost — as much as 1/3 to ½ lower.

The U.S. MILLER stands alone in its class for capacity, accuracy and speed.

Write for the full details.



United States Machine Tool Co.
CINCINNATI
Ohio U.S.A.

Rivet Speed

One every second is a speed which this Grant Rivet machine will keep up definitely, in any degree of tightness or looseness desired. Each rivet is finished with perfectly shaped head, polished and with no hammer marks showing.

We claim this is the only machine manufactured that will accomplish this feat. Our claims are unchallenged. By writing for our catalogues you may obtain full information regarding the ability of this machine.

We are rivet machine specialists. Get in touch with us.

Grant Man'fg. & Machine Company

Holland Avenue - - Bridgeport, Conn., U.S.A

THE BEST GEARED HEAD LATHE MADE

Best in Simplicity : Best in Rigidity : Best in Number of Speeds

We have for Immediate Delivery 18" Geared Heads

10 Speeds (not as in most makes)
Only 4 Levers for all changes
All Gears of Steel
All Geared Heads Ball Bearing
No Over Hang

ARE NOT THESE ATTRACTIVE TO YOU ?

IMMEDIATE DELIVERY ALSO --- Cone Head 18" by 8' and 10', 24" by 12' and 16'. Quick delivery any other lengths.

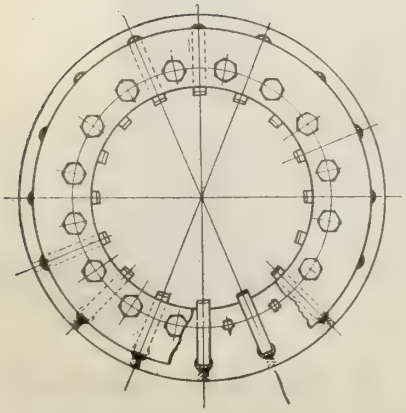
IMMEDIATE DELIVERY---14" and 16" Cone Head.

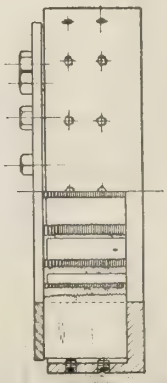
THE CISCO MACHINE TOOL CO., Cincinnati, U.S.A.

Builders of 14" - 16" - 18" - 24" - Lathes (Engine or Tool Room)
Cone Drive, Motor Drive, Geared Head, Motor Drive Geared Head

The Lathe with the Pull : The Lathe of Simplified Accuracy

SMALLEY
GENERAL THREAD MILLER





Cuts Quality Milling Costs

Smalley-General Thread Miller reduces costs, increases output and improves the accuracy of the finished product. Accompanying blue-prints and time studies show results that should interest you.

MACHINE—Smalley General Thread Miller No. 1.
PIECE MILLED—Chasers for 8" pipe die. Two sets milled at one time.
THREAD—Diameter, 8½"; length, 3⅝"; 8 pitch, Briggs, Ltd.
TIME STUDY—

	Min.	Sec.
Inserting jig in chuck		30
Champfering for leading threads	5	
Milling roughing cut	13	
Finishing cut	8	
Removing jig from chuck		30
TOTAL TIME	27 minutes	

for two sets of chasers or 13½ minutes per set.
MILLING FEED—Roughing cut, 2" per minute. Finishing cut, 3" per minute.
MATERIAL—Rex A Tool Steel.
NOTE—Jig was arranged so as to hold two sets of chasers. Chuck was an air collet.

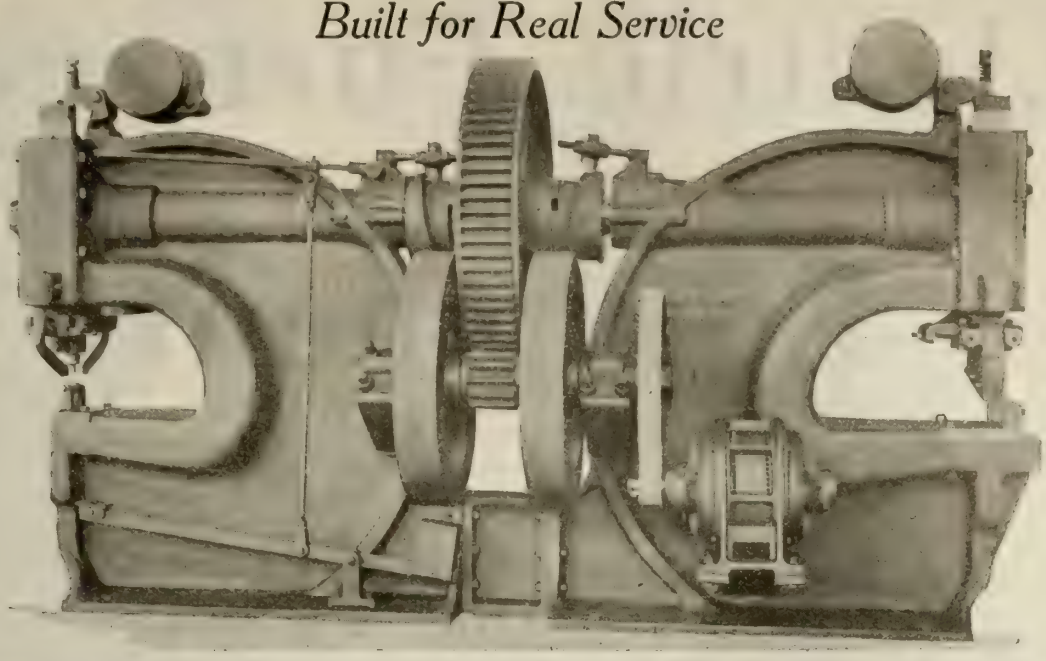
Consult us on every phase of thread milling. We will show you how to cut the costs.

Smalley General Company, Inc.
Bay City, Michigan

Canadian Agents: Rudel-Belnap Co., Ltd., Montreal and Toronto

WICKES' Heavy Duty Double Punch

Built for Real Service

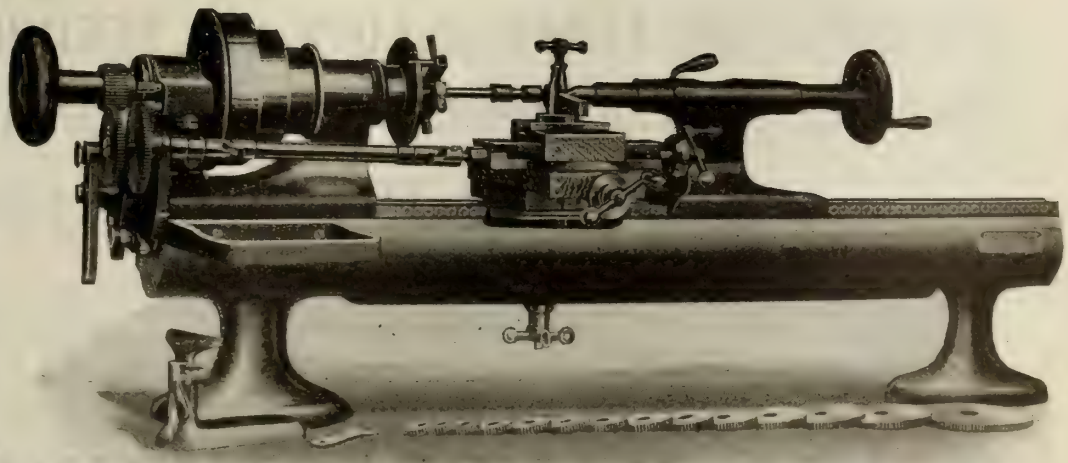


We also manufacture High Grade Horizontal and Vertical Rolls, Angle Rolls, Single Punches, Shears, Spruce Cutters, Radial Wall Drills or Counter-sinking Machines, Flanging Clamps and Heavy Duty Engine Lathes. *Ask for Catalogue.*

WICKES BROS., SAGINAW, MICH., U.S.A.

CATARACT BENCH LATHES AND ATTACHMENTS

Cataract Bench Lathes are finely constructed precision tools, with responsive controls, simple adjustments and numerous convenient attachments adapting them to a wide variety of work. **Study this illustration.** Note the base, the circular bed, the sliding tool post, massive head stock (indicating strength), range of gears, special tailstock, arrangement of gears.



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ELECTRODE WINCHES
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MAGNETIC BREAKS
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ELECTRIC FURNACES
FOR SMELTING FERRO ALLOYS AND REFINING STEEL
PORTABLE ELECTRIC HOISTS, MONO RAIL HOISTS,
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"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

Heat Under Accurate Control

Here is an important factor in the heat treatment of metals. An intense heat, rapidly developed, and always under accurate control of the operator, are features that distinguish

BELLEVUE FURNACES

These tool forges are particularly adapted for the requirements of the small machine shop for annealing and tempering dies, cutters, reamers, etc.

Combustion is perfect and no flames come in contact with material. Built to stand the highest temperature. Doors are properly counterbalanced. In every way BELLEVUE FURNACES meet with the demand for durability, efficiency and convenience.

Let us advise you about your heat-treating problems.

Bellevue Industrial Furnace Company
Julius C. Hinz, President
703 Bellevue Ave. - Detroit, Mich.

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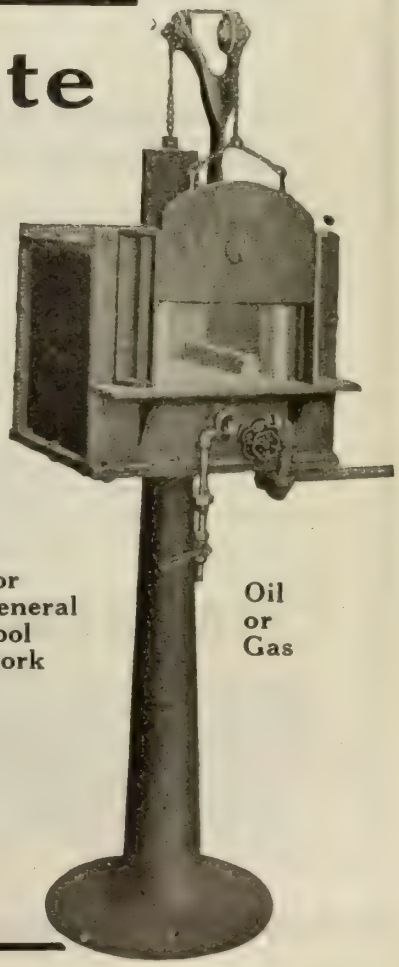

For General Tool Work

Oil or Gas

Photographic Copying
The PHOTOSTAT

(Trade Mark Registered)

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"Practically all orders were previously held up three or four days by our drafting department while copies of the intricate drawings of ordered tools were being made. Now with the Photostat, only 15 or 20 minutes are required to make the three copies, exact duplicates of the original, which the factory needs to turn out the order. By eliminating this needless delay we are able to provide better service for our customers, and attract new prospects because of prompt deliveries."

This cut shows a PHOTOSTAT on which a large drawing has just been copied in less than a minute.

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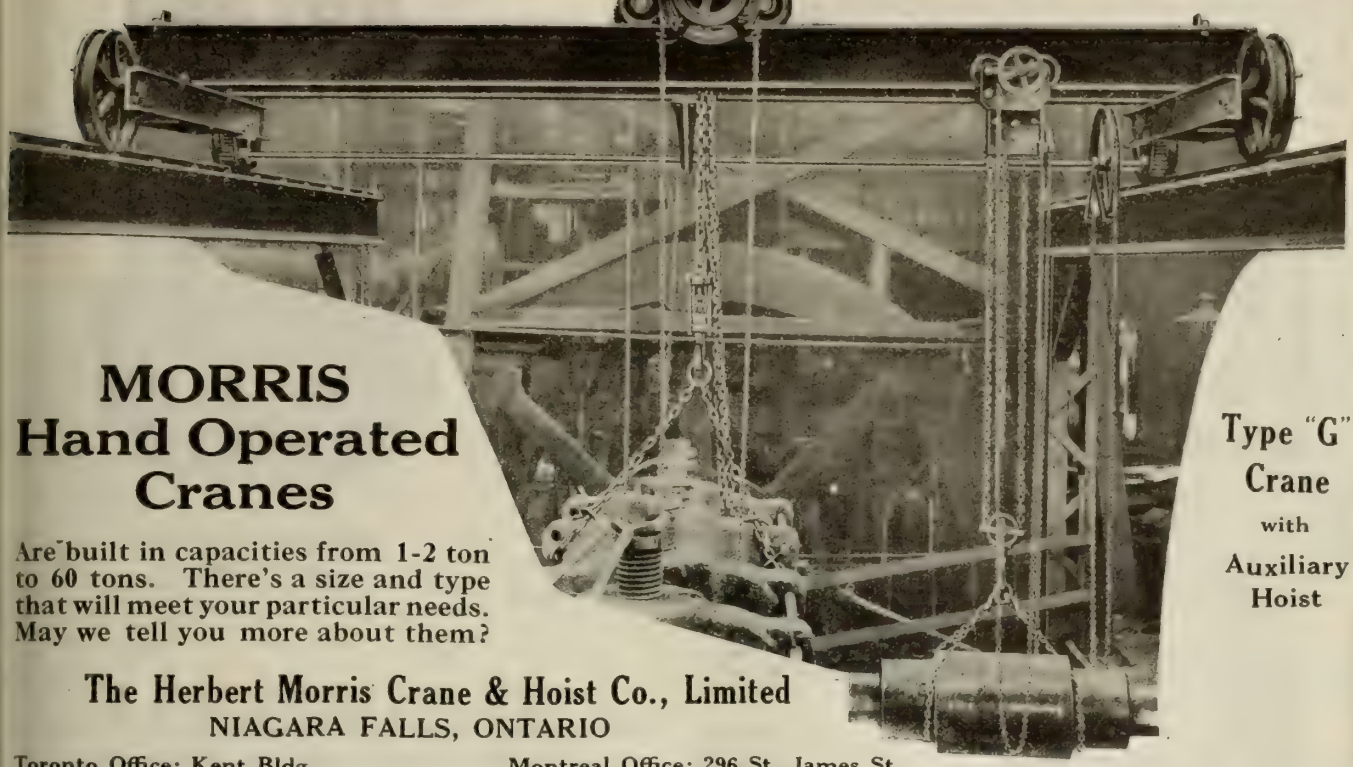

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Are built in capacities from 1-2 ton to 60 tons. There's a size and type that will meet your particular needs. May we tell you more about them?

Type "G" Crane with Auxiliary Hoist

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NIAGARA FALLS, ONTARIO

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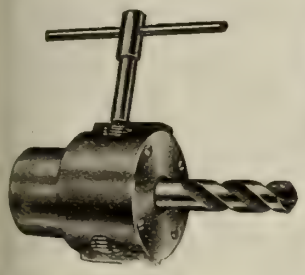
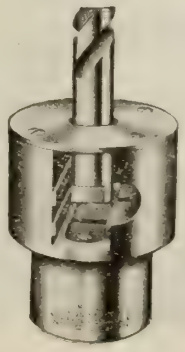


UNION

POSITIVE DRIVE DRILL CHUCKS

The Union Drill Chuck is made in seven sizes (0 to 2 inches) with PATENT TRANSVERSE SLOT—so that drills with tenons can be inserted (see illustration). The shank of drill should be squared on two sides to enter the TRANSVERSE SLOT, giving a positive rotation to the drill independently of the jaws, permitting the jaws to centre and align the drill accurately. The drill is held absolutely true and will not slip under the hardest strain. This type of chuck will be found to give the best of results on all classes of work from HIGH SPEED drilling to the hard BLACKSMITH and GENERAL REPAIR work.



UNION Manufacturing Co.
New Britain, Conn.

New York Office 26 Cortland St.

Makers of a complete line of chucks.

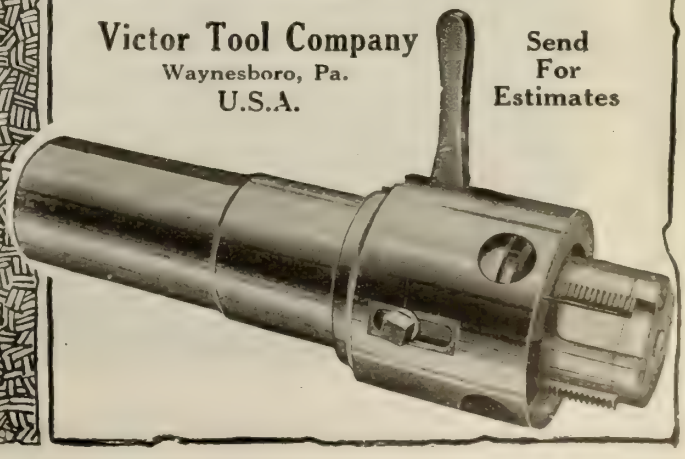
We wanted something original—this is what we got

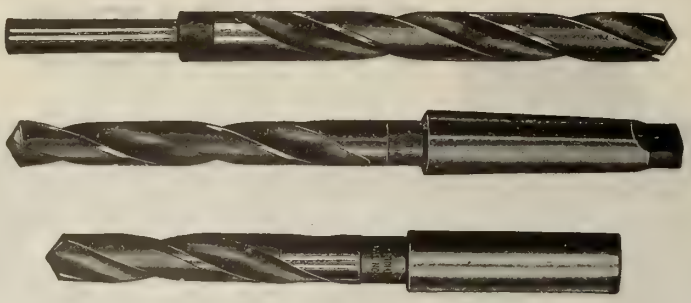
"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
U.S.A.

Send For Estimates

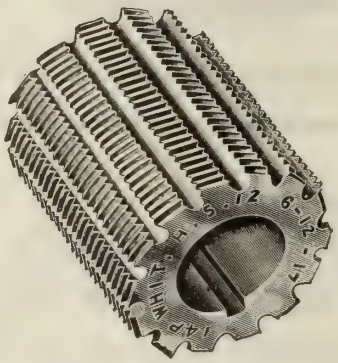




(*Carbon and High Speed Steel*)

BUTTERFIELD

TWIST DRILLS, GEAR AND MILLING CUTTERS

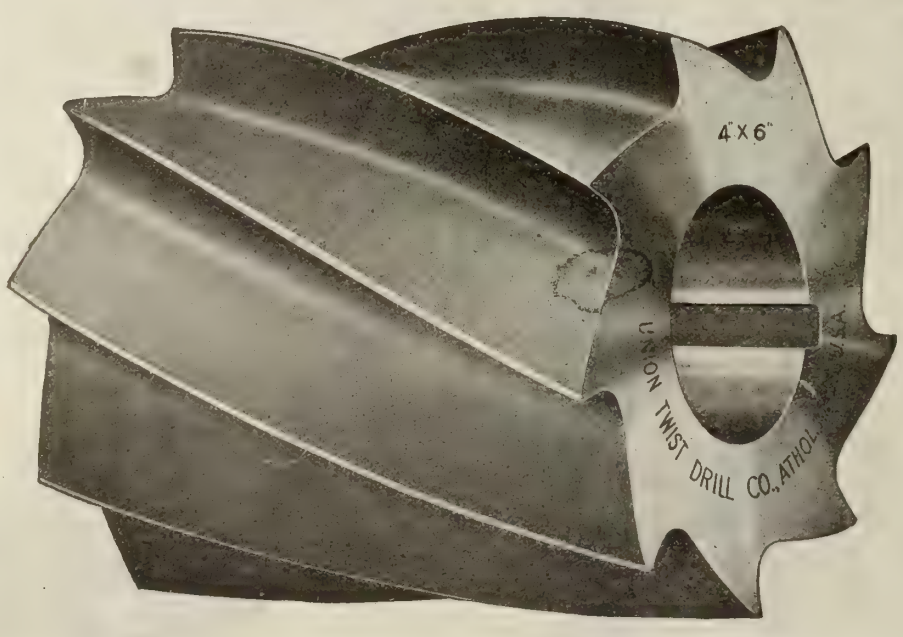


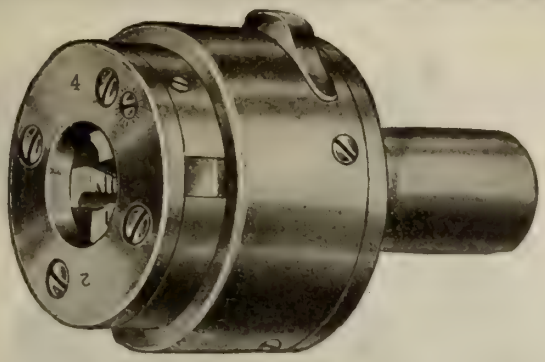
Their ability to serve accurately and long equals that of Butterfield Taps, Dies and Reamers—the sincere praise of a thousand users wouldn't be a better recommendation.

They are the happy result of a great combination of specially trained men and the finest special machinery.

OUR COMPLETE LINE OF DRILLS AND CUTTERS ARE FULLY DESCRIBED IN OUR CATALOG A. Be sure to send for a copy.

Butterfield & Co., Inc., Rock Island, P.Q.
Toronto Office: 220 King Street West





H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.

New Haven, Conn., U.S.A.

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We've been Manufacturing

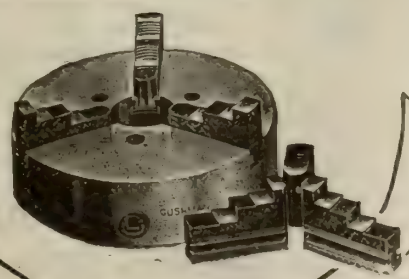
Nothing but Chucks and Their Accessories

FOR NEARLY 60 YEARS

AND OUR PRODUCTS SHOW IT

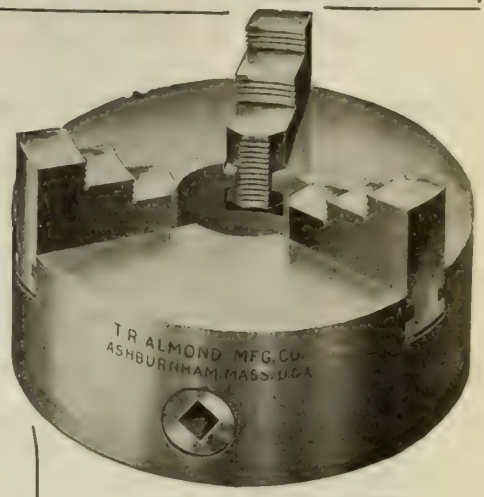
Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.
Cushman Chuck Co., Hartford, Conn., U.S.A.

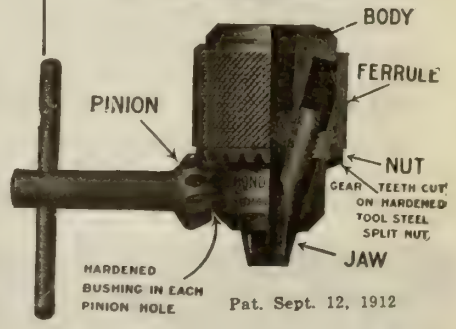


ALMOND CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".



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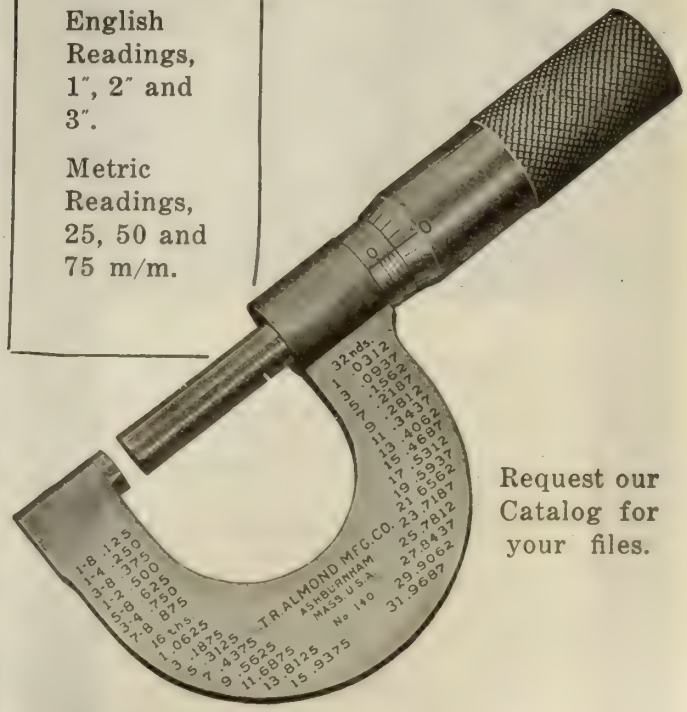
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



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T. R. ALMOND MFG. CO.

6 Maple Avenue, Ashburnham, Mass.

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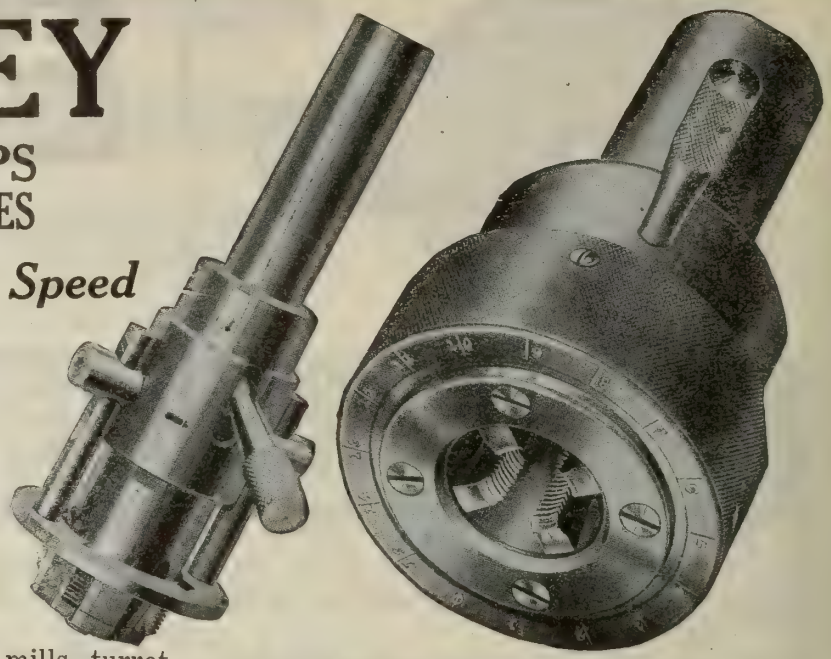
COLLAPSING TAPS and SELF-OPENING DIES

Promote Accuracy and Speed

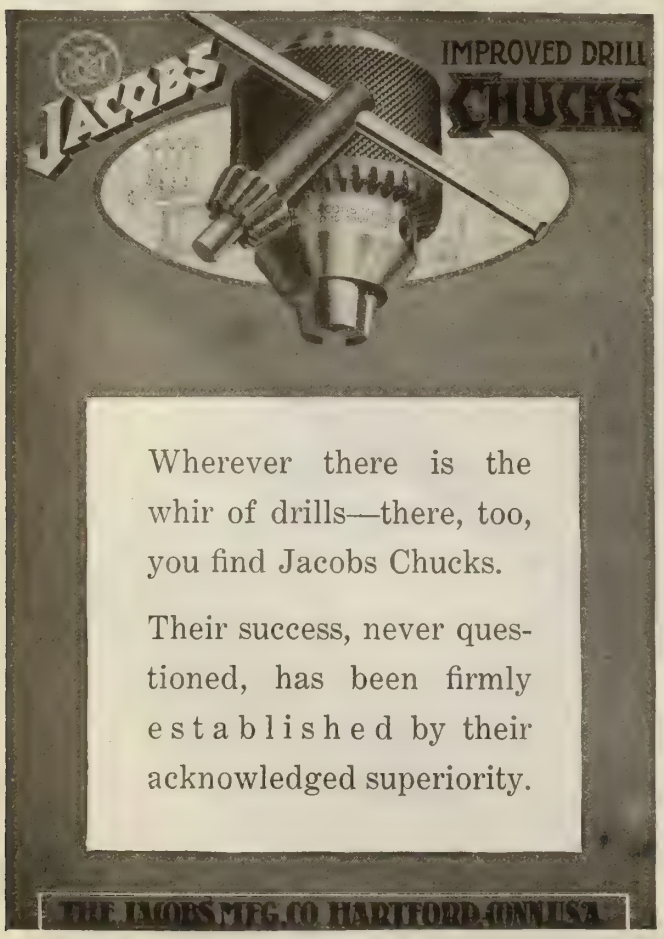


MURCHEY Collapsing Taps and Self-Opening Dies are cleared free from the thread instantly, preventing all danger of stripping, besides cutting time for production in half. **Thus you are sure of greater accuracy and greater production.** Murchey Tools are speeding production in all parts of the country on tapping machines, drill presses, monitor machines, boring mills, turret lathes, and on all other machines to which taps or dies may be attached.

Let us know the class of work you are handling and we will show you how to increase your production 50 per cent. without running up the cost.

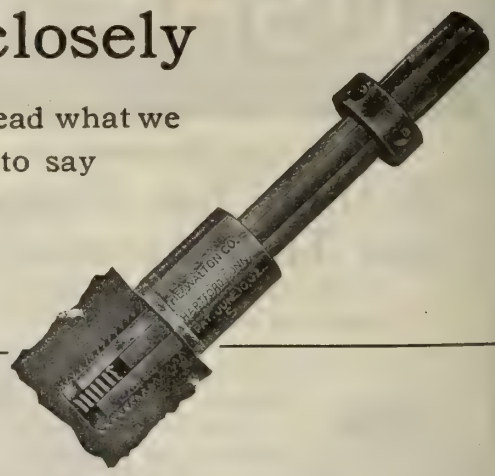
Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.



Look at this again —closely

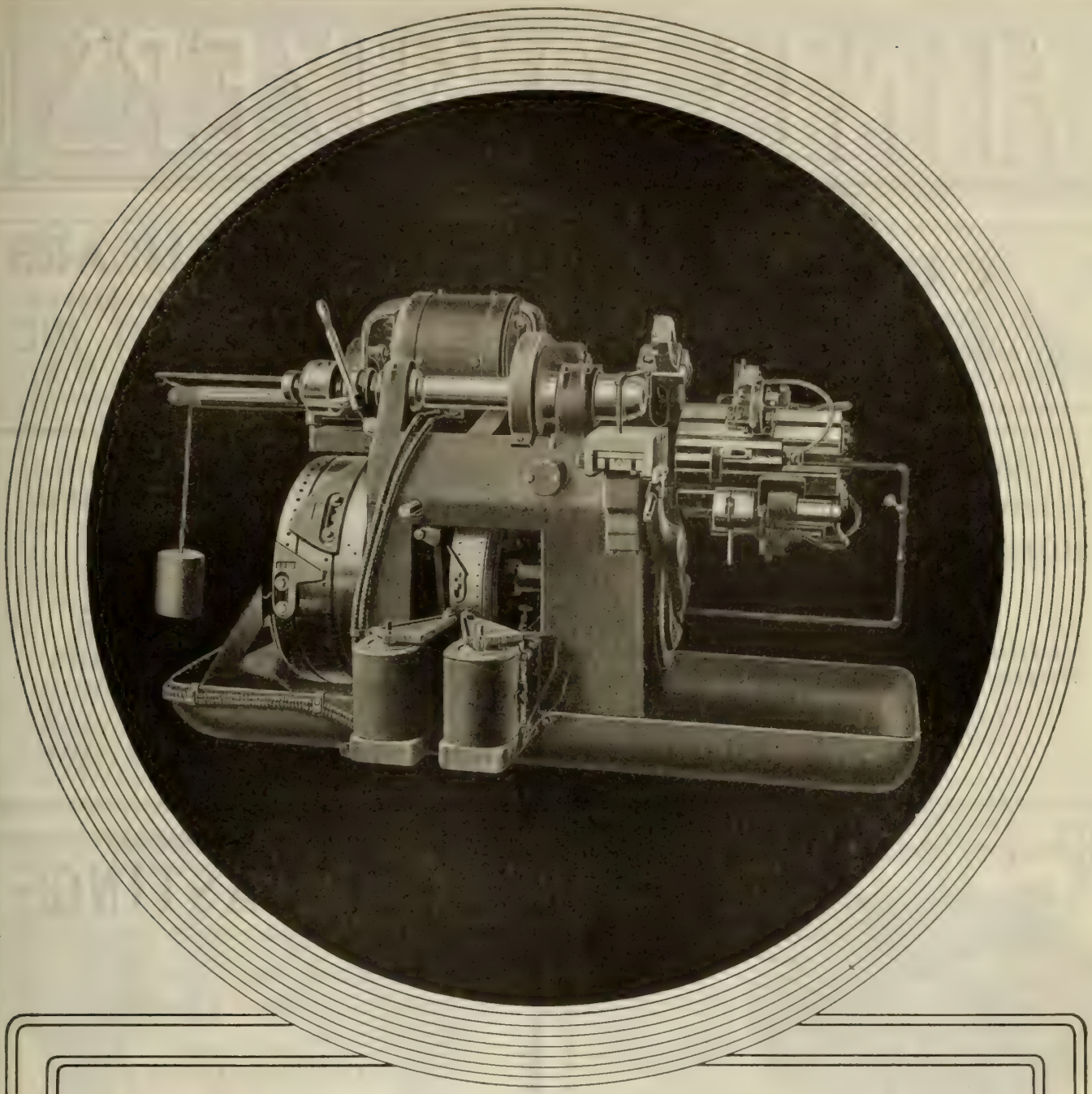
and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company

Hartford, Conn.



Let's be specific:

A comparison of two different Turret Lathe jobs for accuracy or for output, merely on heresay or opinion has often resulted in a new attitude when the real figures were known.

Gridley Automatic Turret Lathes stand or fall by their specific performance on *your* work in your shop. May we quote you *specifically?*

Capacities 2¼-5".

THE NATIONAL ACME COMPANY

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ALSO
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Machine Work Wanted for Lathes, Shaper, Milling Machine and Planer, etc.

Quotations given on all classes of work. Wrought Iron Pipe Bends made to order, ¼ to 8". Pipe Cut and Threaded, ⅛ to 12".

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BRISTOL'S
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are unique in their extreme simplicity of construction. The continuous night and day records obtained with these recorders show the actual pressure maintained throughout the twenty-four hours.

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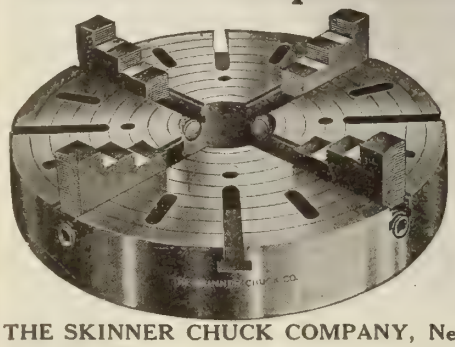
Skinner Independent Chucks



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IRON OR STEEL BODY

The last word in chuck construction.

Wide jaws; hardened steel thrust bearings; adjusting screws of large diameter, threaded full length; jaws ground after hardening, etc.

Write us to-day for prices.

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STEEL CASTINGS

ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.

PROMPT DELIVERY

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FOR GENERAL FORGING

Save Fuel, Time and Labor. Cut Forging Costs in two.

BELT OR MOTOR DRIVEN

BEAUDRY & COMPANY, Inc.
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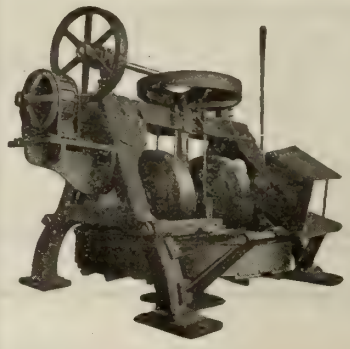
Canadian Steel Foundries Need Frost Improved Sand Mills



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Heavy Mullers
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago

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Our line comprises Diamond Pointed Tools for every industrial purpose. We are also equipped to furnish promptly special Diamond Pointed Tools of every variety. Quality products.

ORDER FROM ST. CATHARINES if more convenient. Complete stock — quick service. Goods submitted on memorandum to responsible firms.

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Combined Jaw and Friction. Friction only.
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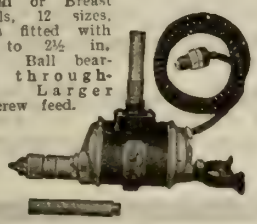

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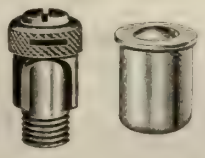

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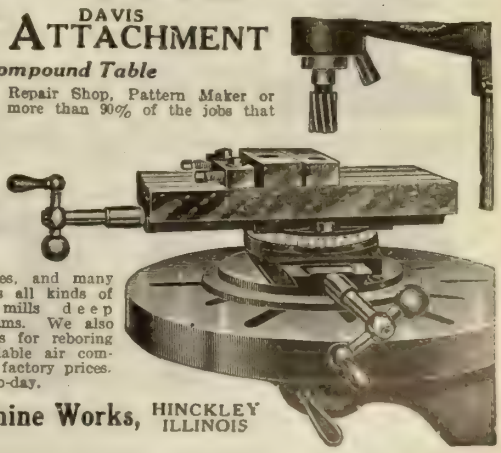

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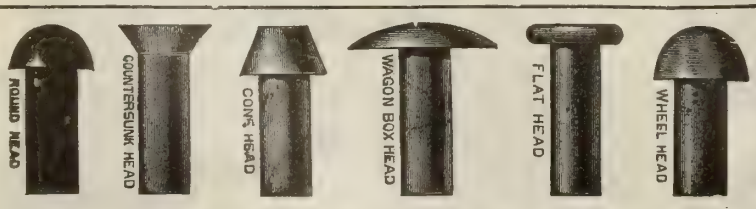

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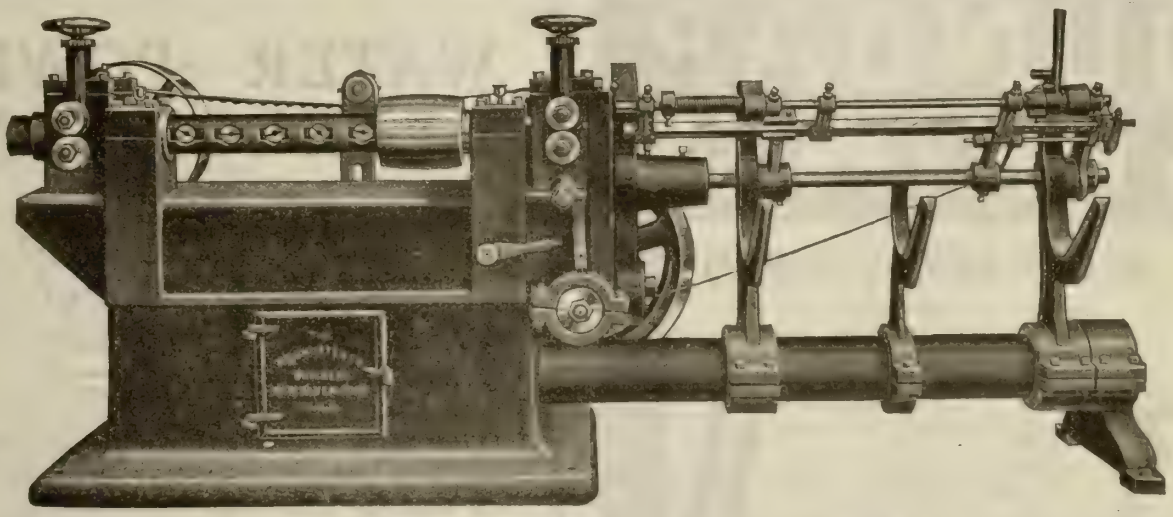

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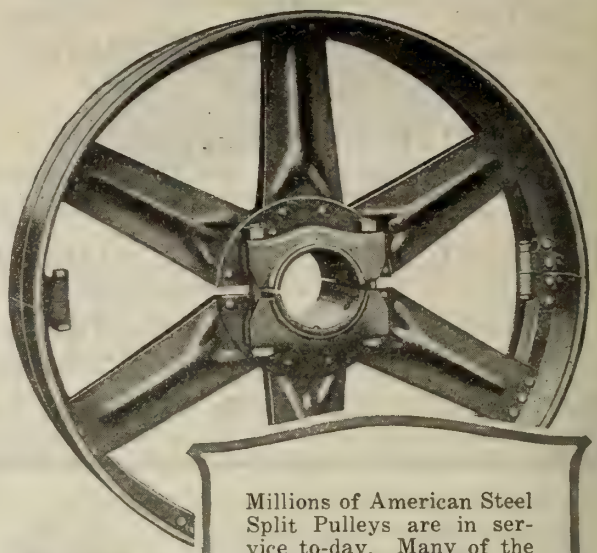

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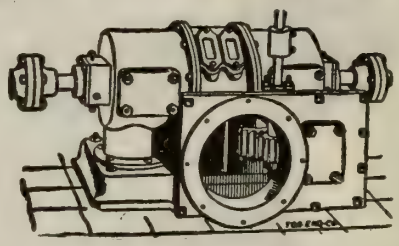

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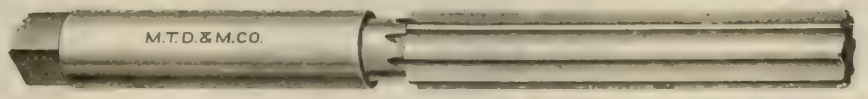

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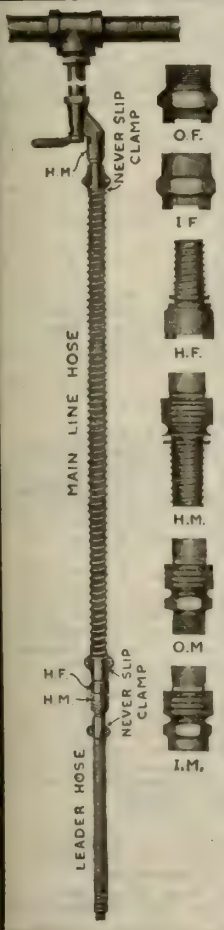

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Made in same sizes as Bowes Couplings

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Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

DIES, THREADING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston, Mass.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES, BOLT, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

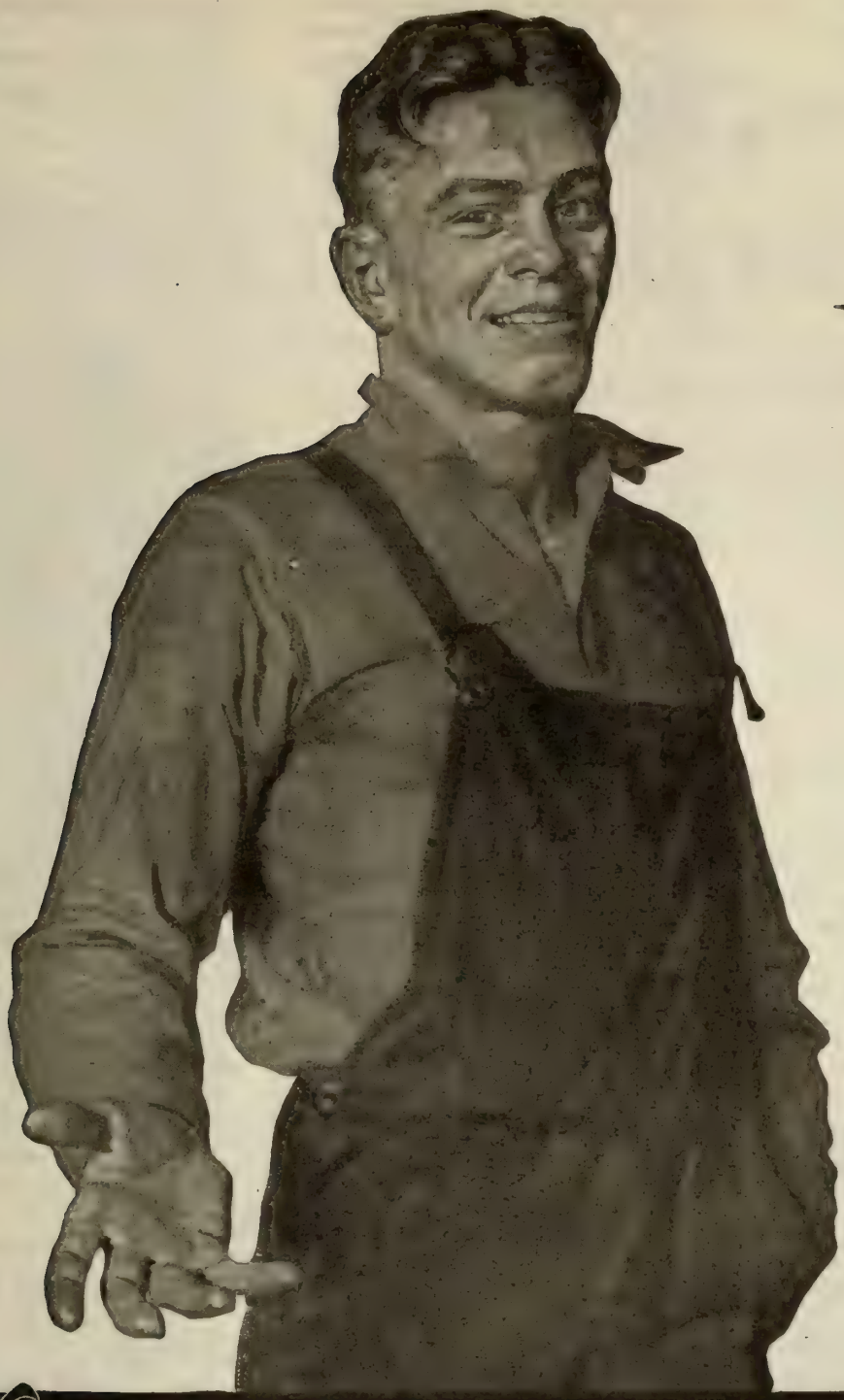
DIE FILING MACHINES
Oliver Machinery Co., Grand Rapids, Mich.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.



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Murchey Machine & Tool Co., Detroit, Mich.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

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Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Ltd., Montreal.

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Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

DRAWING
Henry Hope & Sons of Canada, Ltd., Peterboro.

DRESSERS, GRINDING AND EMERY WHEEL
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Ford-Smith Mach Co., Hamilton, Ont.
Wheel-Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal, Que.

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W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp, Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILL RODS
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

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Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
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Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.

DRILLING MACHINES RADIAL AND TURRETT
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Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

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Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio
Williams & Wilson, Limited, Montreal, Que.

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John Bertram & Sons Co., Dundas.
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Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

DRILLING MACHINES, WALL RADIAL
Lynd-Farquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

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Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

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Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

ELECTRIC FURNACES
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General Steel Co., Milwaukee, Wis.

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Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, CARBON
John Morrow Screw & Nut Co., Ingersoll, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

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Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
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Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
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Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
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The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRIVING TOOLS
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Sheldons, Ltd., Galt, Ont.

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MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
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DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

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Sheldons, Ltd., Galt, Ont.

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Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELECTRICAL RESISTANCE MATERIALS, NICHROME, KROMORE, CHROMAX, CLIMAX, NICKEL, SILVER, ADVANCE
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
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Can. Matthews Gravity Carrier Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMBOSSING PRESSES
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EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Wheel Trueing Tool Co., Windsor, Ont.

END MILLS
John Morrow Screw & Nut Co., Ingersoll, Ont.

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Canadian Fairbanks-Morse Co., Montreal.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE LATHES
Oliver Machinery Co., Grand Rapids, Mich.

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Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn

EXTRA TOOL STEEL
J. F. A. Comstedt, New York City, N.Y.

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Can. Foundries & Forgings, Ltd., Welland, Ont.
United Brass & Lead, Ltd., Toronto.

EYE PROTECTORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

FENCE, IRON AND FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

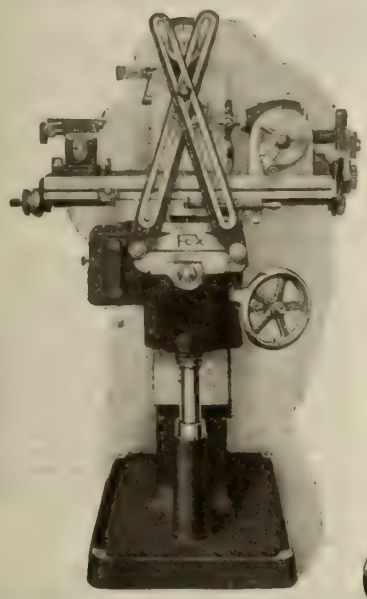
FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.

TRADE **FOX** MARK
REGISTERED

MILLING MACHINES

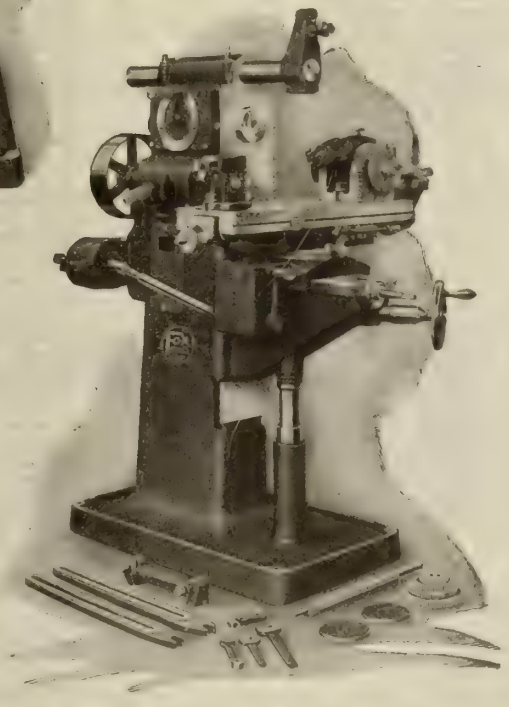
FOR

Rapid Production of Motor Parts



The **demand** for increased production **requires tools** of **great strength** and **durability**; the Fox 2-A Universal Milling Machine illustrated has met this demand, and is being used wherever extreme accuracy and quantity production are required.

The machine has a universal table, spiral cutting attachment, 10″ Dividing Head with 6″ Universal Chuck, making it a machine **especially adapted for Tool Room Work.**



The **United States Government** used this machine in its various **repair shops** for **Aeroplane Motors.**

You should be using this tool to help the production of parts necessary for reconstruction.

Specifications—No. 2-A Miller.

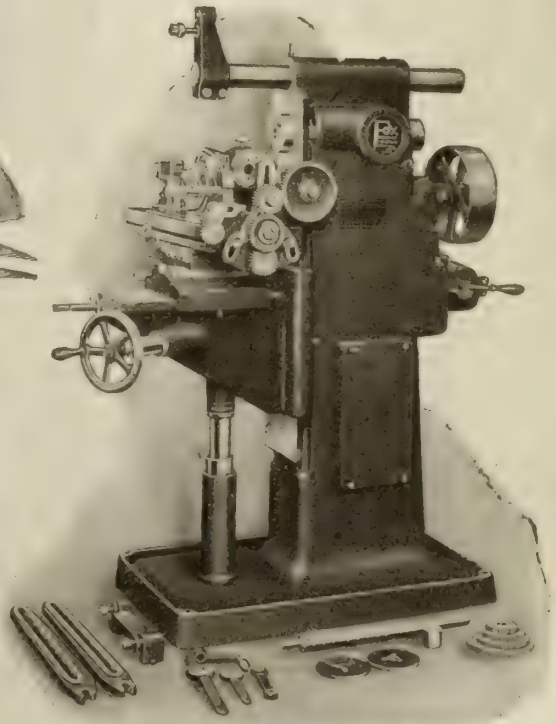
Spindle speeds 12
From 21 to 423 r.p.m.

Table feeds 6
From .317″ to 2.79″ per min.

Table .....8½ x 27″
Long. feed (power) 26″.
Vertical feed (hand) 13″.
Trans. feed (hand) 8½″.

Drive...Single pulley 10 x 3″ running 250 r.p.m.

Gears — Hardened steel.
Weight .....1,500 lbs.



We build this same machine with a plain table, omitting the spiral cutting attachment and Dividing Head.

Our No. 1 type machine has a four-step cone drive, and while being a lighter machine is a "bear" for work. This was proven by **the hundreds** of **them in** the **largest munitions plants.**

We also build the Fox Multiple Spindle Drilling Machines.

FOX MACHINE COMPANY

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Wm. Atkns & Co., Sheffield, Eng.
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Morrow Screw & Nut Co., John, Ingersoll, Ont.
Marshall, Son & Bunney, Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

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Canada Wire & Iron Goods Co., Hamilton, Ont

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Strong, Kennard & Nutt Co., Cleveland, Ohio.

FIRE BRICKS
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

FIRE EXTINGUISHERS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

FIXTURES
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Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

FLAT SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

FORGINGS, STEEL AND IRON
Can. Foundries & Forgings, Ltd., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N S

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE

FORGING AND WELDING
Victoria Foundry Co., Ottawa.
Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

FORGINGS, SPECIAL
Armstrong, Whitworth of Canada, Montreal, Que
Canada Foundries & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FORMING
Henry Hope & Sons of Canada, Ltd., Peterboro.

FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FOUNTAINS, DRINKING
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING
Can. Consolidated Rubber Co., Ltd., Montreal.

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Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Gilbert & Barker Mfg. Co., Springfield, Mass.

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Bellevue Furnace Co., Detroit, Mich.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical Engineering Co., Three Rivers, Que.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

FURNACES, BLAST
Belleview Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

FUSE BOXES, STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.

GAUGES, MANUFACTURERS, LIMIT, THREAD
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE TANKS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind

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Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

GAUGES, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
C. E. Johanson, Inc., Toronto, Ont.
Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, VACUUM AND PRESSURE
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GAGES, SNAP, THREAD AND CYLINDRICAL
C. E. Johanson, Inc., Toronto, Ont.

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Can. Steel Foundries, Ltd., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

GEARS, CHAIN
Morse Chain Co., Ithaca, New York.

GEARS, COMPENSATING
Morse Chain Co., Ithaca, New York.

GEARS, CUT, MORTISE, ANGLE, WORM
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
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Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Rice Lewis & Son, Toronto, Ont.

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Standard Optical Co., Geneva, N.Y.
Strong, Kenard & Nutt Co., Cleveland, Ohio
Willson & Co., Inc., T. A., Reading, Pa.
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Jones & Glassco, Montreal.
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Blake & Johnson Co., Waterbury, Conn.
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Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie., Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

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The Geo. F. Foss Mchy. & Supply Co., Montreal
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, DIE AND CHASER
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
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Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
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Wells Bros. of Can., Galt, Ont.
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Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
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Cincinnati Electrical Tool Co., Cincnnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Wisconsin Electric Co., Inc., Racine, Wis.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Bristol Machine Tool Co., Bristol, Conn.

GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
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Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Wing & Son, J. E., Hamilton, Ont.

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Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

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Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Reed-Prentice Co., Worcester, Mass.
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Norton Grinding Co., Worcester, Mass.
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Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
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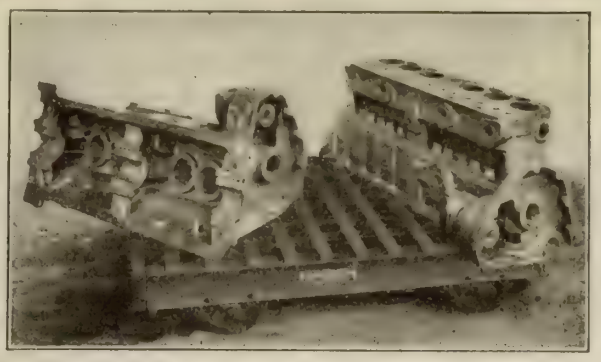

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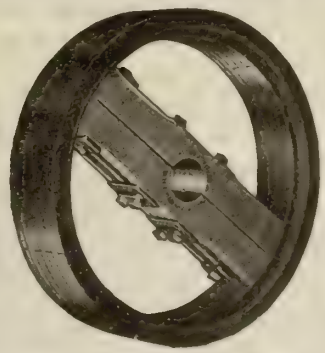

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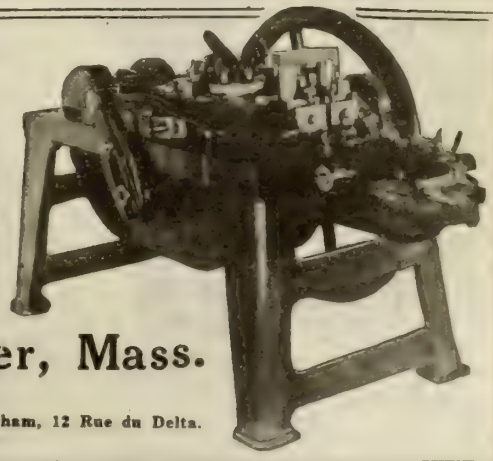

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Australia: Edwin Wood Pty. Ltd., Melbourne.

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Ford-Smith Mahcine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Norton Co., Worcester, Mass.

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Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.
Strong, Kennard & Nutt Co., Cleveland, Ohio.

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Wells Bros. of Can., Galt, Ont.

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Ford-Smith Machine Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
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Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
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Wilkinson & Kompass, Hamilton, Ont.
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Racine Tool & Mach. Co., Racine, Wis.
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Williams & Wilson, Ltd., Montreal, Que.
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Niles-Bement-Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Limited, Montreal, Que.

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West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited Montreal, Que.

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Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Matthews, Jas. H. & Co., Pittsburgh, Pa.

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Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston Mass.

HAMMERS, STEAM
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
Beaudry & Company, Inc., Boston, Mass.

HAND PLANERS
Oliver Machinery Co., Grand Rapids, Mich.

HAND LEATHERS OR PADS
Graton & Knight Mfg. Co., Montreal.

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Algoma Steel Corp., Sault Ste. Marie, Ont.
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Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

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Sheldons, Ltd., Galt, Ont.

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Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

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Illinois Tool Works, Chicago, Ill.

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HOBS
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Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
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Wells Bros. of Can., Galt, Ont.

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Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.

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Williams & Wilson, Ltd., Montreal, Que.

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Williams & Co., J. H., Brooklyn, N.Y.

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Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

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LATHES, BORING
Bridgeford Mach. Tool Wks., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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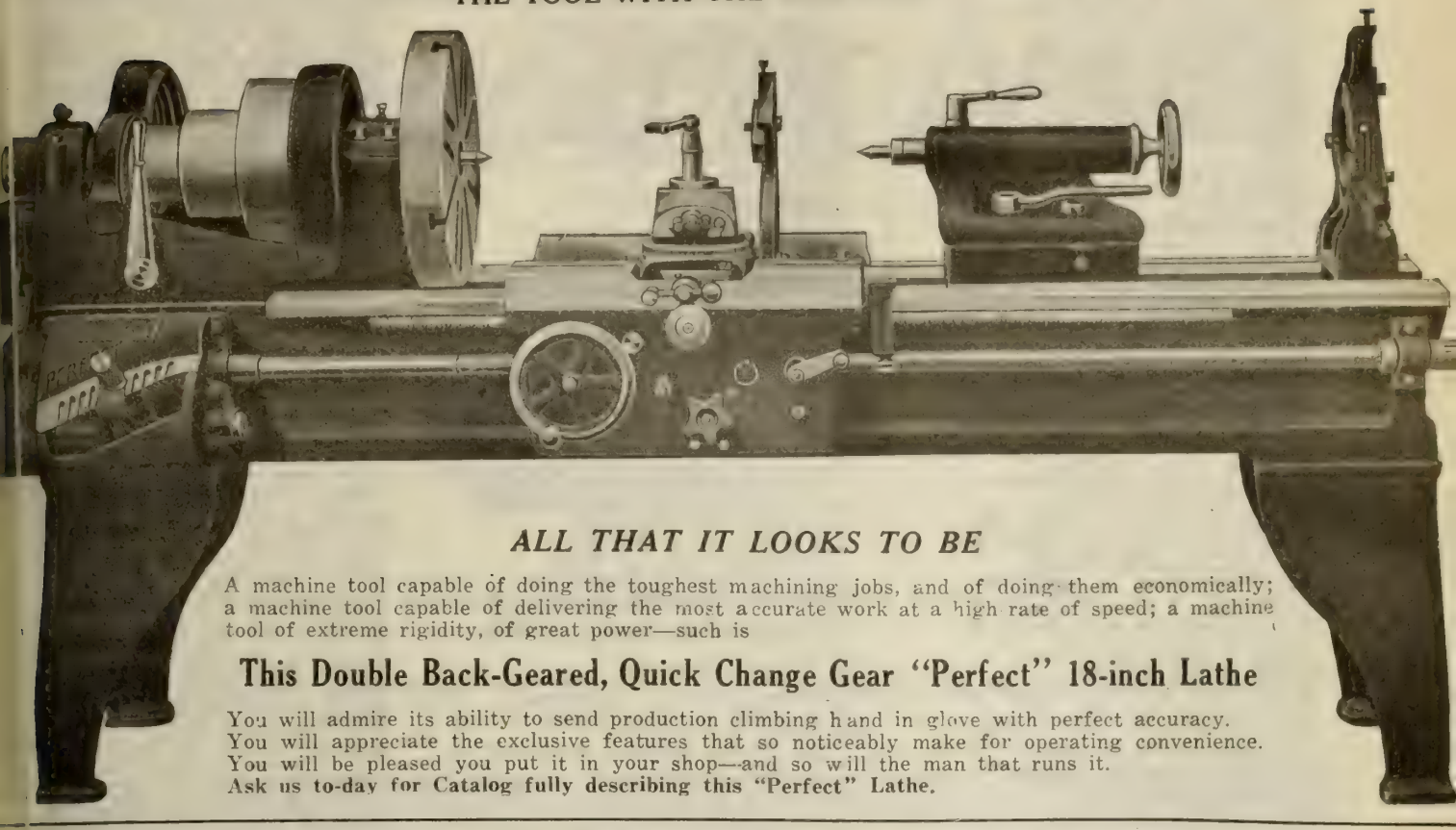

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Ford-Smith Mach. Co., Hamilton, Ont.
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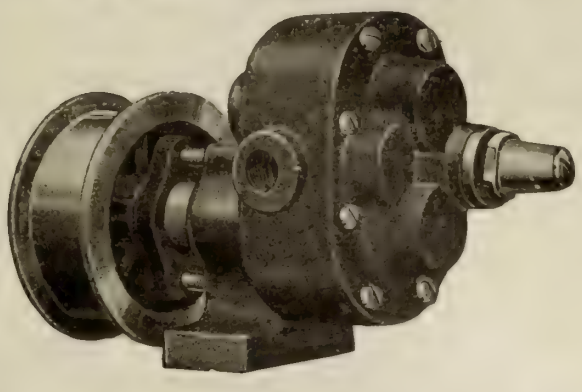

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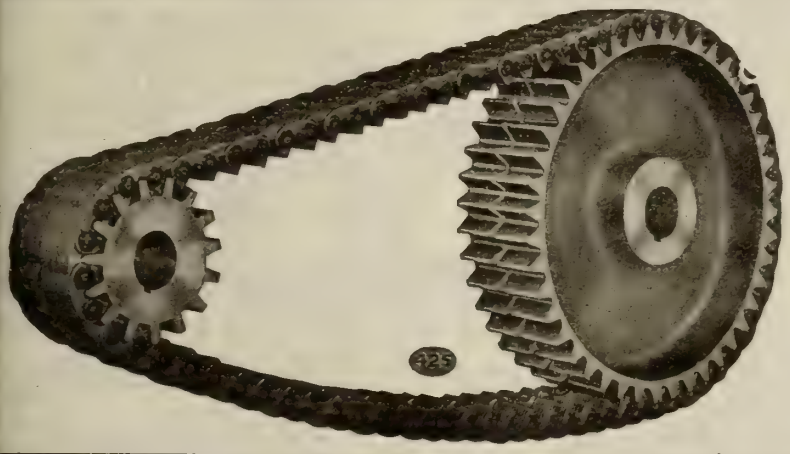

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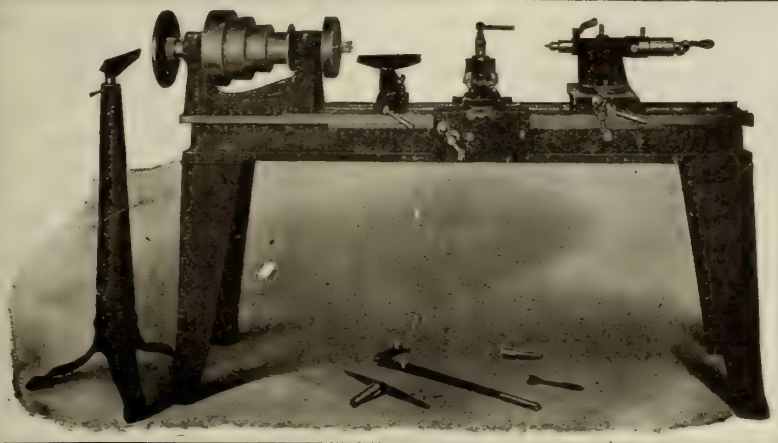

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Canada Wire & Iron Goods Co., Hamilton.
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Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.
PINS, TAPER
John Morrow Screw & Nut Co., Ingersoll, Ont.
PINS, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.
PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph, Ont.
PIPE CUTTING AND THREADING MACHINES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.
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Commercial Camera Co., Providence, R.I.
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Toronto Iron Works, Ltd., Toronto.
PIERCING
Oliver Machinery Co., Grand Rapids, Mich.
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Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
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Wells Bros. Co. of Canada, Galt, Ont.
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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
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Greenfield Tap & Die Corp., Greenfield, Mass.
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PIPE REAMERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE STOCKS
Greenfield Tap & Die Corp., Greenfield, Mass.
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Greenfield Tap & Die Corp., Greenfield, Mass.
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PIPE TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
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PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
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Canada Machinery Corp., Galt, Ont.
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Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
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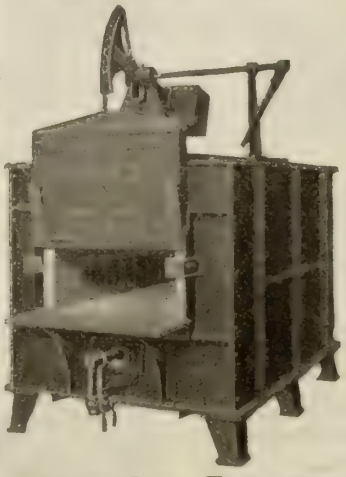

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Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

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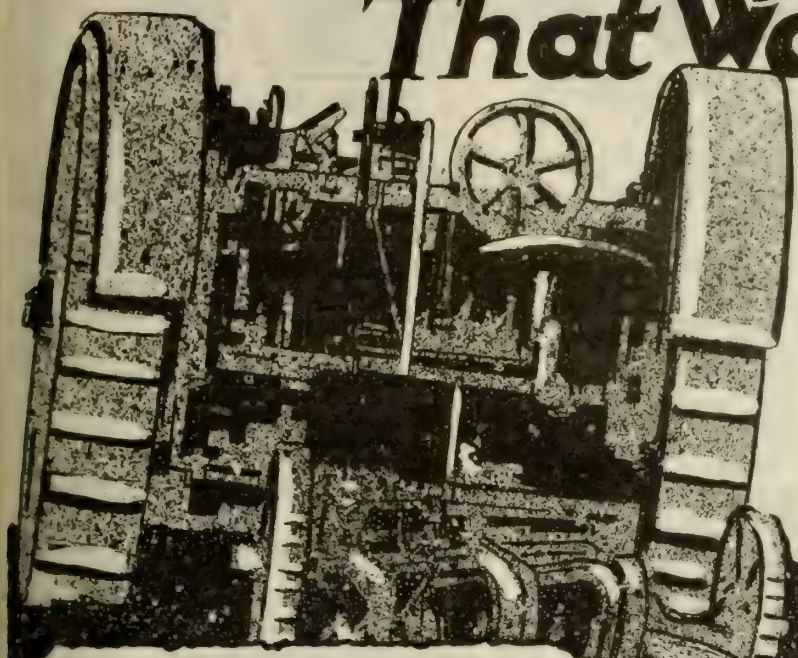

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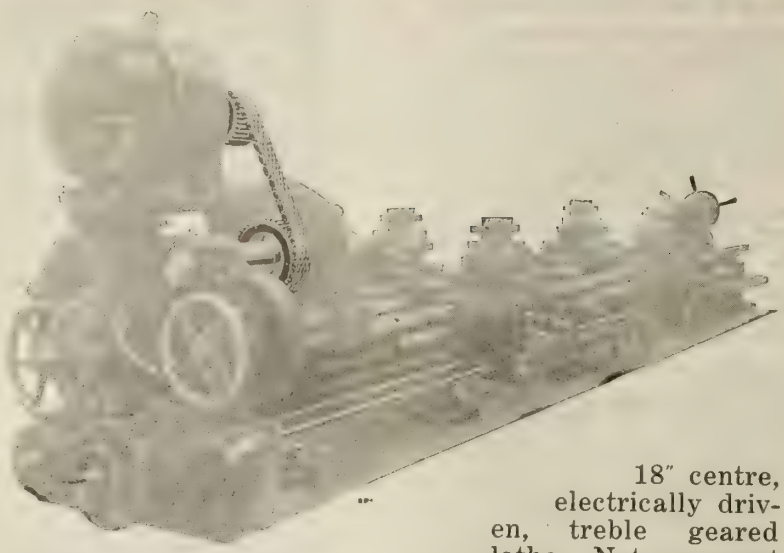

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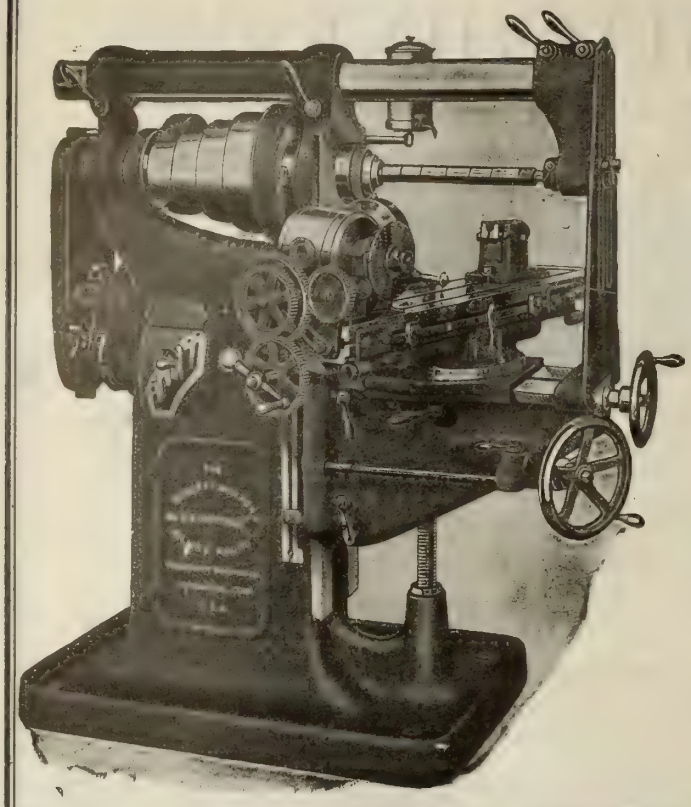

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QUALITY · Foss SERVICE

Foss

"Superior" Grinding Wheels

Fast and Cool Cutting

Durable and Uniform

Vitrified Silica or Semi-Vitrified and Elastic process.

Shapes: Dish or saucer wheels, cups and cylinders. Also special shapes for drill and tool grinders. All sizes, grits and grades, 3/8 in. diameter and up.

It is most important that the proper shape and quality of grinding wheel is used for every job.

"FOSS" Service gives special attention to using the right wheel in the right place. We have a large stock of shapes and qualities on hand for prompt shipment.

Tell us your needs and you'll get the wheel that will serve you best.

We are Representatives for the following lines:

TUNGSTEN SAW BLADES.
MOOR BROS. FILES.
GRAY PLANERS.
FRASER GRINDERS.
MUELLER RADIAL DRILLS AND LATHES.
SYDNEY ENGINE LATHES.
CINCINNATI ELECTRIC DRILLS AND GRINDERS.
ELMIRA WOOD SPLIT PULLEYS
STANDARD BOLT CUTTERS.
RACINE MACHINE SAWS.
McARTHUR BELTINGS.
WALLACE BENCH PLANER.
KEMPSMITH MILLING MACHINES
SEBASTIAN LATHES.
MONARCH LATHES.
CHAMPION TOOLS.
SILVERS DRILLS.
SWEETLAND CHUCKS.
SMITH & MILLS SHAPERS
and many others.

The Geo. F. Foss Machinery & Supply Co., Limited

305 St. James Street Montreal, Que.

MACHINERY AND MILL SUPPLIES

QUALITY · Foss SERVICE

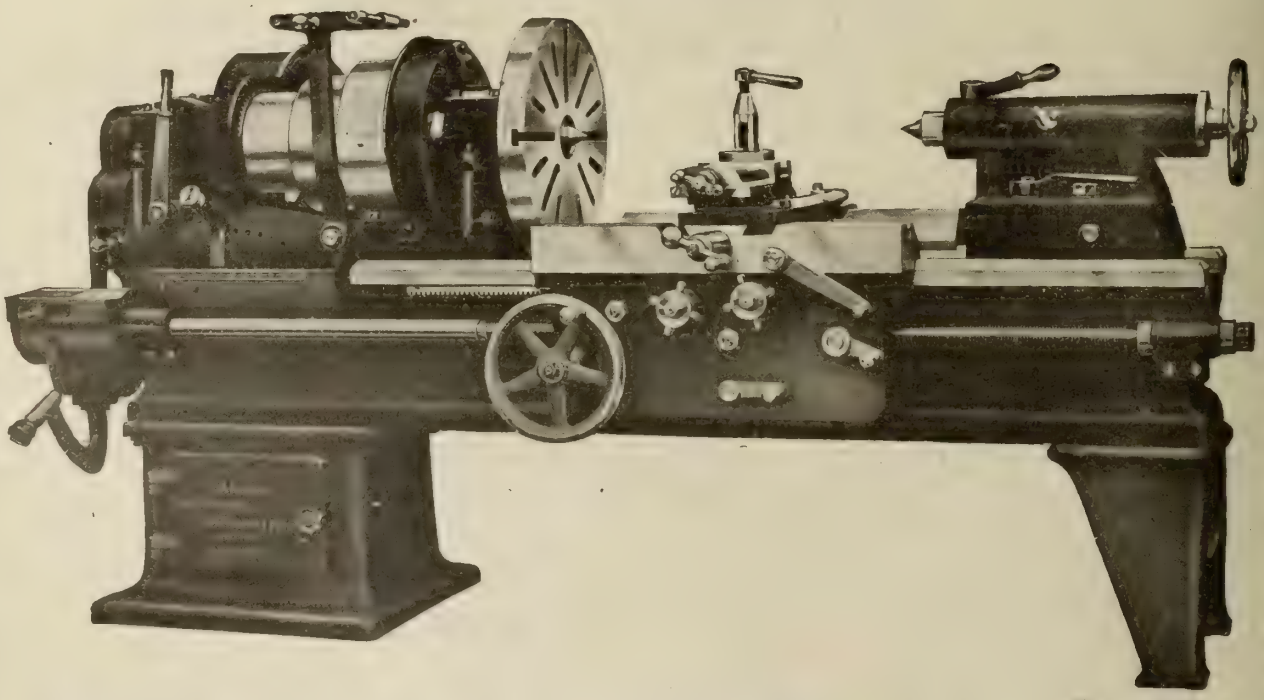
FOUR FEATURES OF THE C.M.C. HEADSTOCK, on quick change geared lathes.

(1) The three step cone double back geared drive permitting the use of extra wide belts and resulting in a strong drive combined with ample number of spindle speeds.

(2) The quick change gear mechanism which enables the operator to cut practically all the threads in every-day use without calculation or removal of gears.

(3) Our improved belt shifter which besides saving time forms a safety device preventing injury to the operator.

(4) Split phosphor bronze bearings with extra large oil chambers fed through large holes fitted with instantly removable plugs. No squirting with small oil cans through minute oil holes.



CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: Brock Avenue Subway

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXI. No. 24. Publication Office: Toronto, June 12, 1919 Subscription Price $3.00 per Year

Nine out of twenty-six shop operations are inspections

THAT'S why you can count on the performance of every S K F Ball Bearing. From the rigid examination of raw materials to the final inspection of the finished bearing—all through the making of SKF Ball Bearings there is a constant checking up and affirming.

From a manufacturing standpoint all this is necessary for economical production. Yet in a broader sense, it must mean longer and better service from every S K F bearing you use.

CANADIAN SKF COMPANY LIMITED
47 King St. W.
TORONTO, ONTARIO
412 St. James St. W.
MONTREAL, QUE.

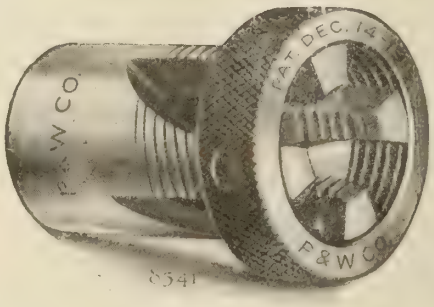
SKF

BALL BEARINGS

SMALL TOOLS

Taper Thread Adjusting Collar

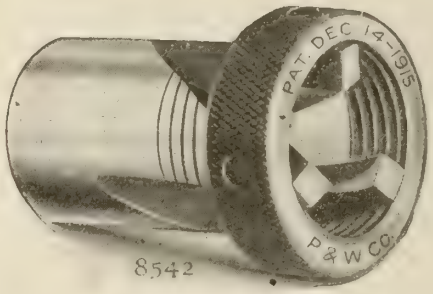
Insures Uniform Concentric Adjustment



Spring Screw Die

P. & W.

Spring Screw Dies and Hollow Mills



Hollow Mill

Advantages of the Taper Thread Adjusting Collar

Ease and delicacy of adjustment to FINE LIMITS are secured without trouble and loss of time.

All lands or prongs of the die or hollow mill are adjusted in or out exactly the same amount by merely turning the collar, thus giving rise to the term CONCENTRIC ADJUSTMENT.

This concentric adjustment results in each land or cutting edge doing its proper share of work, and as a perfect circle is always maintained, accurate results are assured.

By having the bearings always on the point, there is no tearing while backing off, and the correct amount of clearance is obtained.

Write for 4-page descriptive Circular giving size and dimensions.

Precision Machine Tools, Standards & Gauges

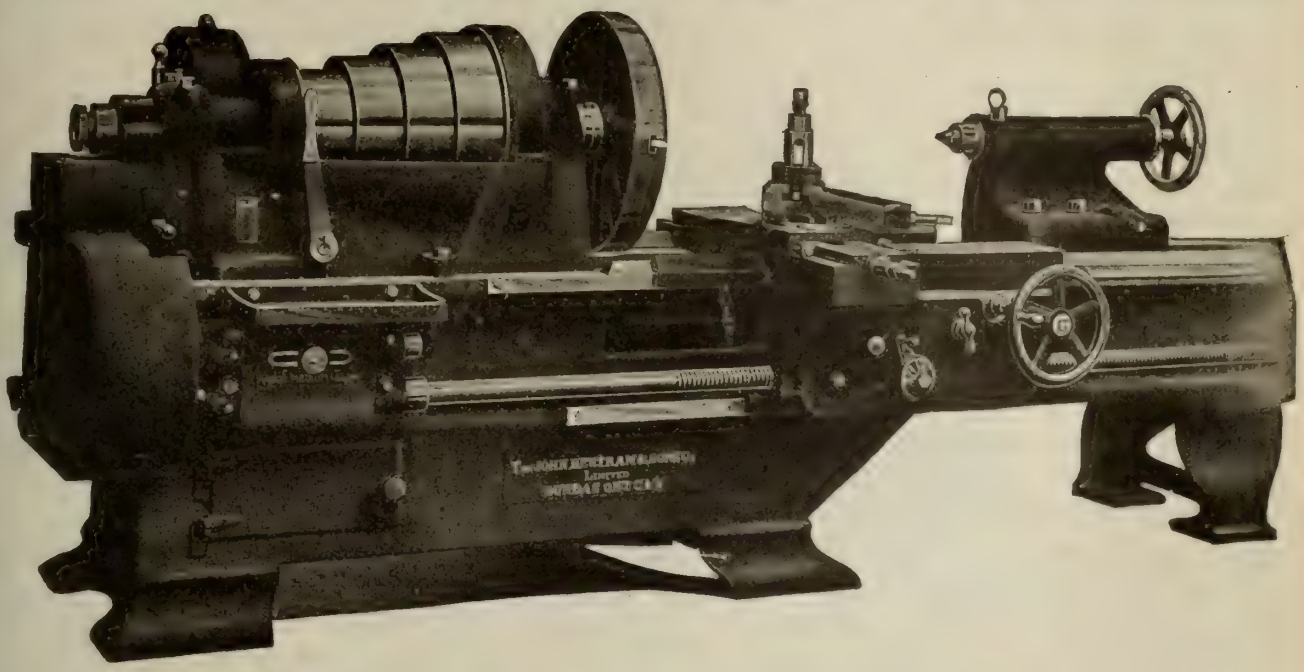
PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe

26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons Co., Limited

MISCELLANEOUS DEPARTMENT

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO JUNE 12, 1919

Canada is fast getting back to a Peace Time Basis

In spite of labor trouble and unrest there have been Encouraging Developments in the past few weeks

When the war was on there were many who predicted that Canada would prosper after the war. Their predictions are coming true. Their optimism has been justified.

Canada is rapidly bridging the period of reconstruction, and even before some of us expect it business will be booming.

Machinery dealers and manufacturers report an abundance of inquiries and a good volume of business.

Buyers who, during the war, either had no occasion to buy new tools or were frightened out of the market by war-time prices are now coming into the market heavily.

Much building is going on. Agriculture will be carried on on an ever-increasing scale. New concerns are coming into the field.

Many lines of merchandise, the stocks of which ran low in war days, are now being made, raw material being available.

Other developments are interesting and tend to improve the general situation.

Several of the largest American firms in the past six weeks have been most active in seeking suitable locations for branch plants. Some have already settled upon the location of their Canadian plants. Their coming to Canada means that we will not only have a direct and immediate addition to our industrial resources, but there will be many and far-reaching advantages of an indirect nature.

Taking it by and large business is vastly better than even the biggest optimist anticipated.

A big buying movement is under way. A few days ago we were advised by an officer of a certain company that orders had just been placed for over $150,000 worth of machine tools and other equipment. No one knew anything about this big business developing until the contracts were placed. Their plans were kept secret as long as possible. It is the same with other concerns. Their buying will be done quietly so that their plans will not become public property sooner than necessary.

This is where CANADIAN MACHINERY comes in. This is where advertising operates. The officer of the company referred to is a regular reader of CANADIAN MACHINERY. This paper has influenced the buying of millions of dollars' worth of equipment. It will continue to exert this influence in the months to come.

Re-establishment and Industrial Expansion Number July 31st

In order to give advertisers a special opportunity to present a complete and convincing sales message, in order to ginger up those who may be hanging back and instil optimism, confidence and courage into those who have been afraid to follow the example of the far-sighted confident leaders, we will publish on July 31st a **Big Re-establishment and Industrial Expansion Number.**

Those who know CANADIAN MACHINERY will appreciate the significance of this announcement. Our Feature Numbers, or Specials, as some call them, always have a real reason, from the readers' and advertisers' viewpoint, for existing, and have proved their value time and time again. It is significant that the bulk of the advertising in our record-breaking Annual Review Number (Dec. 28, 1918) was for firms using regular space with us or who had been represented in previous feature numbers.

Rates and further information furnished on request.

Canadian Machinery and Manufacturing News

143 University Avenue, Toronto

Canadian Machinery and Manufacturing News, June 12th, 1919. Vol. 21, No. 24. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.

BY-PRODUCT COKE
SULPHATE
of AMMONIA

"HAMILTON" PIG IRON

Basic Malleable Foundry

STEEL & IRON BARS
OPEN HEARTH
STEEL SHEETS

FORGINGS

Car Axles
Shape and Drop Forgings
Carriage and Automobile Hardware

POLE LINE HARDWARE

(Black and Galvanized)

Pole Steps
Cross Arm Braces
Guy Clamps
Guy Rods

SCREWS

Steel, Brass and Bronze
Wood and Machine Screws

NAILS, SPIKES & RIVETS

Wire
Cut
Boat and Horse Shoe Nails
Railway
Pressed and Drift Spikes
Tacks
Shoe Nails
Steel and Copper Rivets
Burrs

Purchase the Products of Canadian Mills

TO uphold the Glory we have jointly earned—to honor our noble dead—to comfort the wounded, and extend to the men returned the hand of prosperous welcome, we must cast aside all forebodings and face the future with unbounded courage and confidence and, without a shadow of doubt, declare to the World that this Nation, which was so quickly and successfully transformed to a War basis, can be depended upon to revert to Peace conditions with equal success. The buyer and seller must recognize their duty to the Nation and co-operate fully to the end that all products that can be produced in Canada by Canadian workmen shall not be purchased elsewhere.

OUR Duty is plain; Canada with Canadian labor and capital can produce, manufacture and distribute products sufficient to keep the wheels of industry turning to the limit. The song of Prosperity and Happiness should ring out all over the land. Let us sincerely pledge to the extent of our needs, to purchase materials produced in Canada by Canadian Workmen, and the result of our efforts will return to us the Blessings of a Prosperous and Happy Nation.

THE
STEEL COMPANY OF CANADA
LIMITED

HAMILTON MONTREAL

RAILROAD TRACK MATERIAL

Angle Bars
Track Bolts
Tie Plates
Tie Rods
Spikes

WROUGHT PIPE

Black Pipe
Galvanized Pipe
Nipples
Couplings

LEAD PRODUCTS

Lead Pipe
White Lead
Shot
Putty

WIRE

Steel & Brass
Copper & Bronze
Heavy and Fine
Bright Annealed
Coppered
Galvanized and Tinned
Stranded
Steel and Copper Cable
Clothes Line
Staples
Barb Wire
Woven Wire
Fencing
Fence Gates

Bars
Blooms
Billets

Wire
Wire Rods
Sheets
Horse Shoes

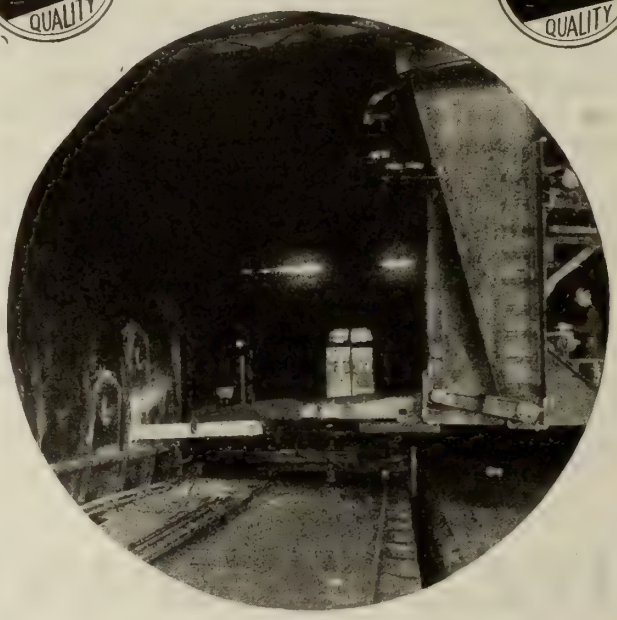
Angles
Channels
Plow Beams

ALGOMA STEEL CORPORATION, LTD.

SAULT STE. MARIE, ONTARIO

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL
STEEL
MERCHANT
BARS
CONCRETE
REINFORCING
BARS
IRON, BRASS
AND BRONZE
CASTINGS

MARK OF ALGOMA O.H. QUALITY



Charging and Withdrawing Crane

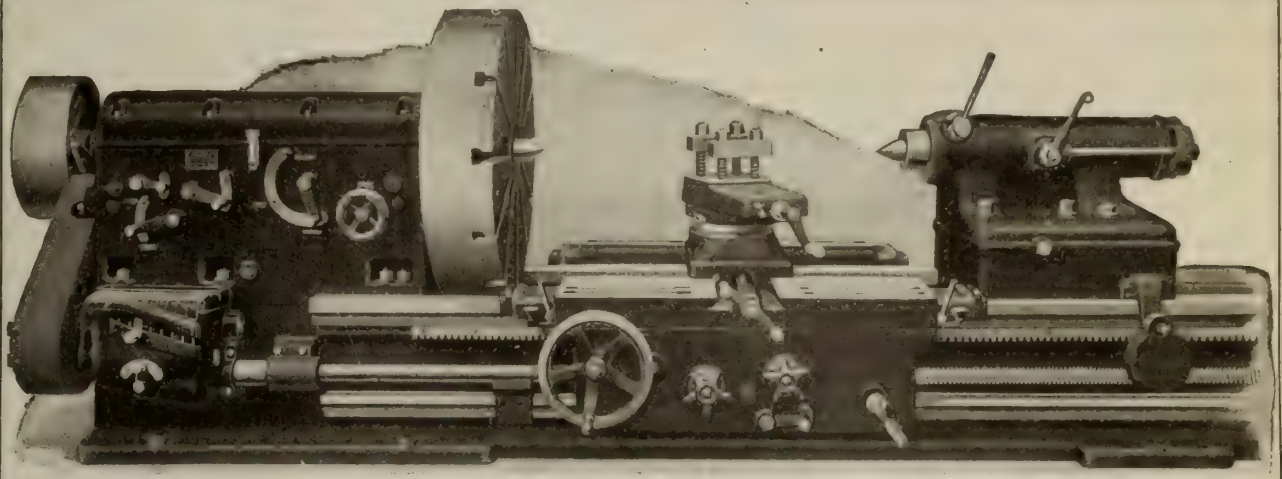
Sulphuric Acid. *Nitre Cake*

MARK OF ALGOMA O.H. QUALITY

STEEL
RAILS
Open Hearth Quality
(All Sections from 12 lbs
to 100 lbs per yard)
SPLICE
BARS
STEEL
TIE PLATES
PIG IRON
BASIC, FOUNDRY-
BESSEMER
SULPHATE OF
AMMONIA

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

BRIDGEFORD



VALUE

Not the price you pay, but the years of service you get, determines a lathe's cost. The production you get and economy of operation and maintenance are determining factors.

You might buy a lathe at an extremely low price and in doing so pay dearly each month you run it. On the other hand, if you invest a little more money in a Bridgeford lathe you reduce cost of production and eliminate expensive repairs.

Distribute the difference in cost between a real machine built for service and one built to sell at a price and figure out how many times you would pay the difference in what it might appear you have saved.

Just one point for your consideration—Bridgeford Lathes have* all steel gears. *There are numerous other features you should know about.

Send for our Catalogue.

BRIDGEFORD MACHINE TOOL WORKS 161 Winton Road Rochester, N.Y.

Manufacturers of Heavy Duty Lathes for more than 20 years

BRIDGEFORD

JENCKES PRODUCTS

For Mining and Industrial Plants

As successors to the Jenckes Machine Co., Limited, in the ownership and operation of the "Jenckes Plant," Sherbrooke, Que., we are continuing and extending their various lines of manufacture, such as: Pulp Mill Machinery, Hoisting Engines, Electric Hoists, Steel Plate and Structural Work, etc.

You will promptly receive interesting estimates if you will send us your specifications when in the market for new equipment or additions to present plant. Please address our nearest branch.

Canadian Ingersoll-Rand Company Limited

Sydney | Sherbrooke, Winnipeg | Montreal, Nelson | Toronto, Vancouver | Cobalt

E&M

ELECTRIC

Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
WELLAND ONTARIO

GS

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

WILT

HIGH SPEED AND CARBON TWIST DRILLS, REAMERS AND MILLING CUTTERS

Quality Tools a Vital Necessity

Where there's a WILT---There's the Way"

Equip your plant with modern tools of the best quality. It is the vital necessity of the day to manufacturers. Competition of the present and in the future demands it.

For your drilling, reaming and milling cutter operations, choose *WILT High Speed and Carbon Drills, Reamers and Milling Cutters.* As compared with any ordinary tool they cut faster, more accurately, require less power, require less re-grinding and give longer service—and they cost no more than ordinary tools.

Put them to the test---you'll find them best.

Wilt Twist Drill Company

OF CANADA, LIMITED

Walkerville ∴ Ontario

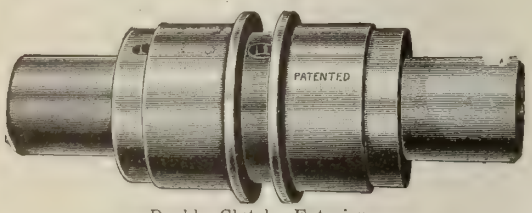
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England

THE JOHNSON FRICTION CLUTCH

In the "Snyder" and a Host of Other Drill Presses

We feel justified in saying that Johnson Friction Clutches are in use wherever efficient drilling machines are manufactured.

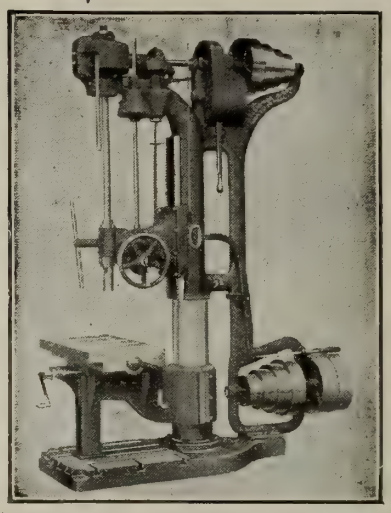
Everyday sees new names added to our long list of machines which have Johnson Friction Clutches in their design. This wouldn't be so if there wasn't something a little better than ordinary about Johnson Friction Clutches. A simple request for information about your own proposition will bring surprising details and prices.



Double Clutch—Exterior.

Write us for our Yellow Data Sheets

HERE



Courtesy of J. E. Snyder & Co., Worcester, Mass.

AGENTS: CANADA—Williams & Wilson, 84 Inspector St., Montreal; The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Swedish Steel & Importing Co., Limited

Montreal
New York

Toronto
Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

WOLFRA

MADE IN THE U.S.A.

HIGH SPEED STEEL

TRADE MARK

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO. ESTABLISHED 1900
Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company MONTREAL QUE.

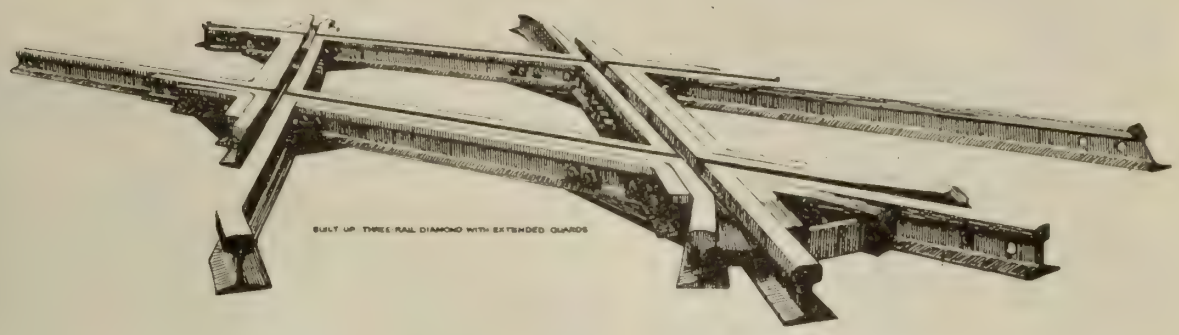
Strong in the Neck

TRACKWORK

OF ALL KINDS FOR STEAM AND ELECTRIC RAILWAYS

Built-up, Hard-Centre and Solid Manganese-Steel

Manufacturers of Balkwill Articulated Cast Manganese Crossings



CANADIAN STEEL FOUNDRIES LIMITED

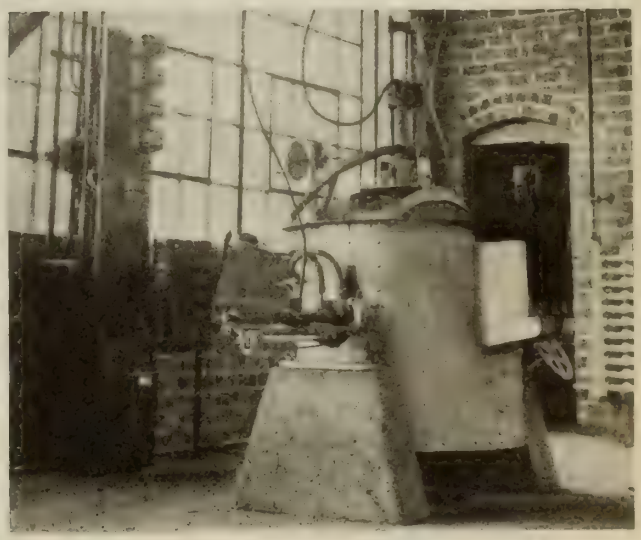
Transportation Building, Montreal

Electrite Uranium High Speed Steel

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.
LATROBE, PA.



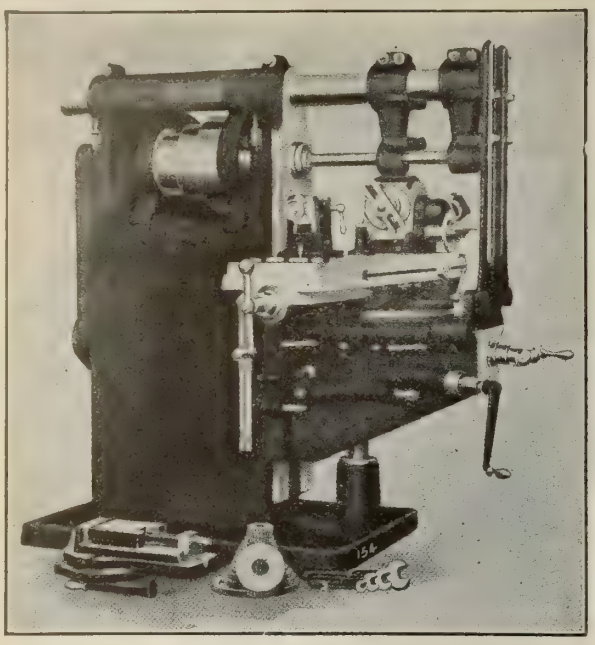
Rennerfelt Electric Arc Furnace

Built in capacities from 100 lbs. to 6 gross tons

Melting and Refining Steel, Cast Iron, Ferro-Manganese, Copper, Nickel, Aluminum and various Non-ferrous Alloys.

Hamilton & Hansell, Inc.

Park Row Bldg., New York City



No. 2 Full Universal

FORD-SMITH MILLERS

The Miller of high-grade construction—fast, accurate, and durable.

Adapted for Heavy Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

The Ford-Smith Machine Co., Ltd.

Manufacturers of Milling Machines, Grinders, Disc Grinders, Polishers and Special Machinery

Hamilton, Canada

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

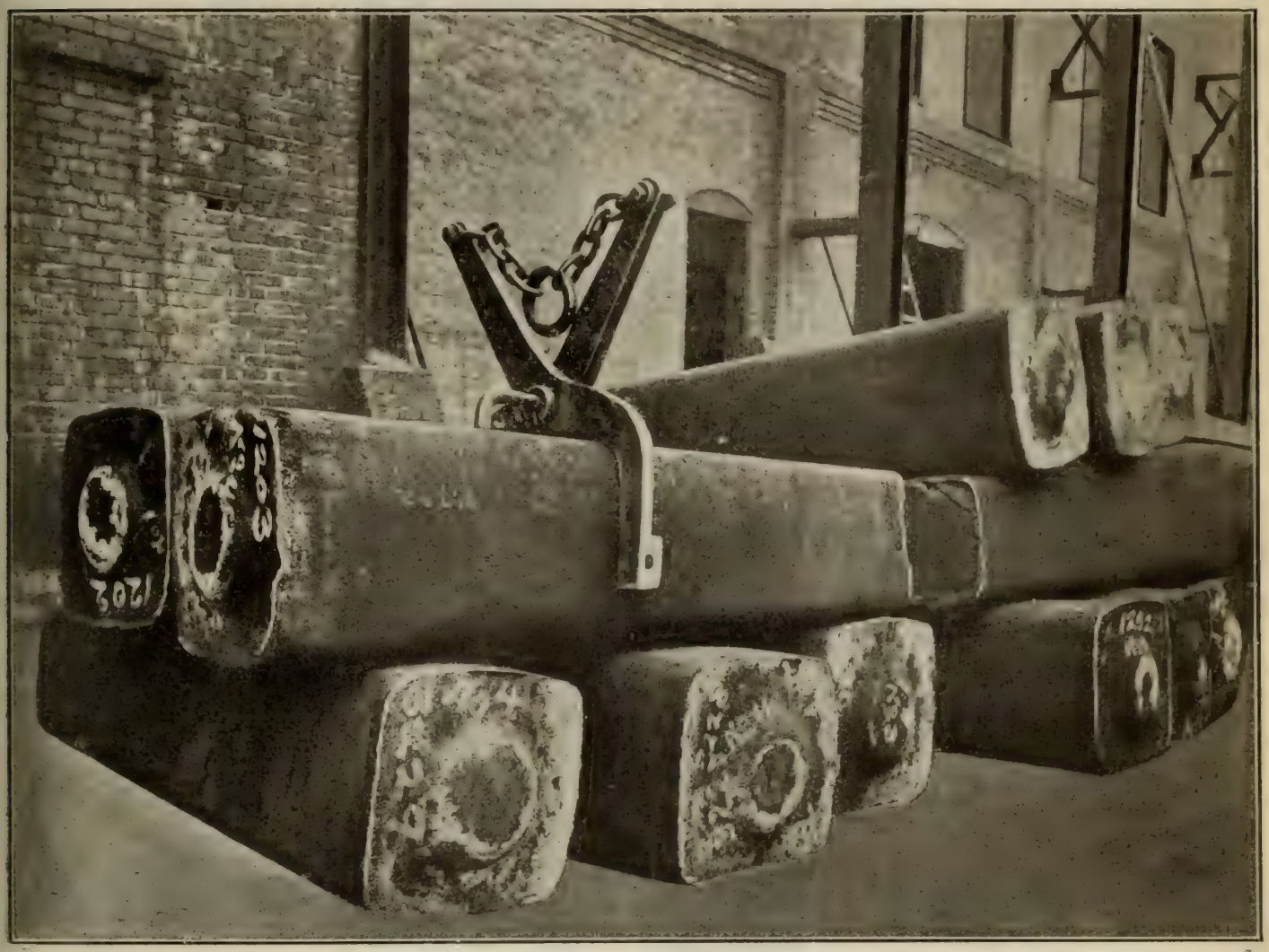
Marshalltown Mfg. Co.

Marshalltown, Iowa
U. S. A.

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada



THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally Known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

VANADIUM-ALLOYS STEEL COMPANY

Gen'l Offices: Pittsburgh, Pa.
Works: Latrobe, Pa.

BRANCH OFFICES:

TORONTO BUFFALO CLEVELAND CINCINNATI
MONTREAL BOSTON CHICAGO DETROIT
NEW YORK PHILADELPHIA PITTSBURGH

Protexal Protective Clothing

Made of fire, water, and acid-proof material. A garment for every need.

Sleeves and trouser legs fitted with extra snap fasteners—permitting their being tightly fastened about wrist and ankle—no buttons to rip off—no gaping garments to catch in machinery, thus reducing accidents to a minimum, EVERY GARMENT GUARANTEED.

Protexal Clothing Insures Absolute Safety

Suits (one and two piece); Leggins (with or without flare); Mittens, Gloves, Apron, Masks, Helmets.

Conserve Man-Power Wit Protexal Clothing

We recommend Suit No. "F." Leggins No. "F." Gloves No. "F."

The Strong Kennard & Nutt Co.

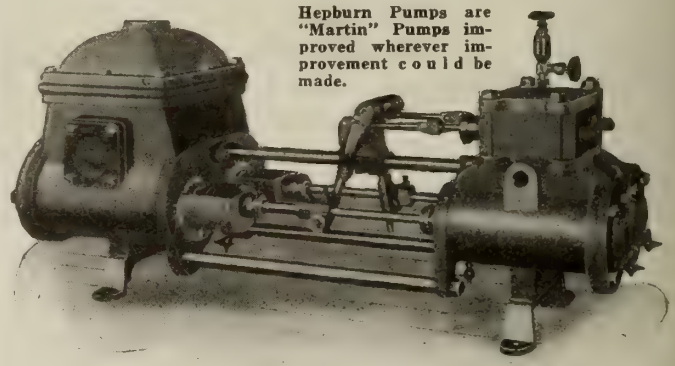
Safety and First Aid Equipment

2044 E. 9th St. Cleveland, O.

Wear Adjustable Goggles for Eye Protection

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

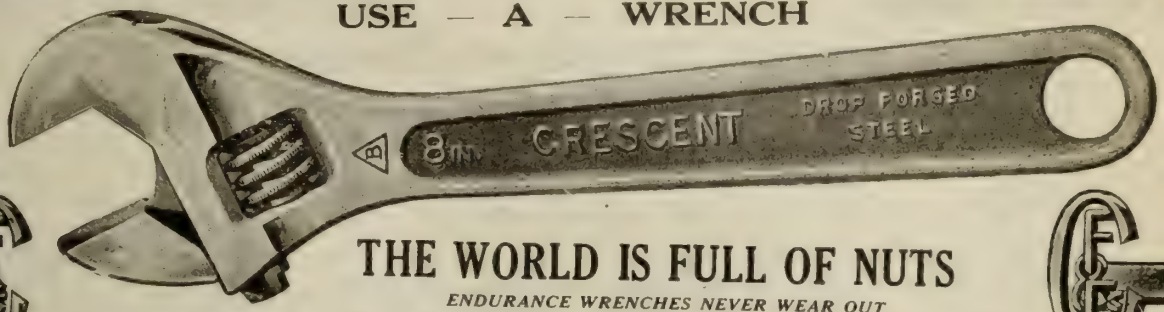
JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario

CANADA
FOUNDRIES & FORGINGS
LIMITED

DON'T RATTLE

USE — A — WRENCH



THE WORLD IS FULL OF NUTS

ENDURANCE WRENCHES NEVER WEAR OUT

CANADIAN BILLINGS & SPENCER PLANT - Welland, Canada

Crucible

AND

Open Hearth Steel

Tool Steel

"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.

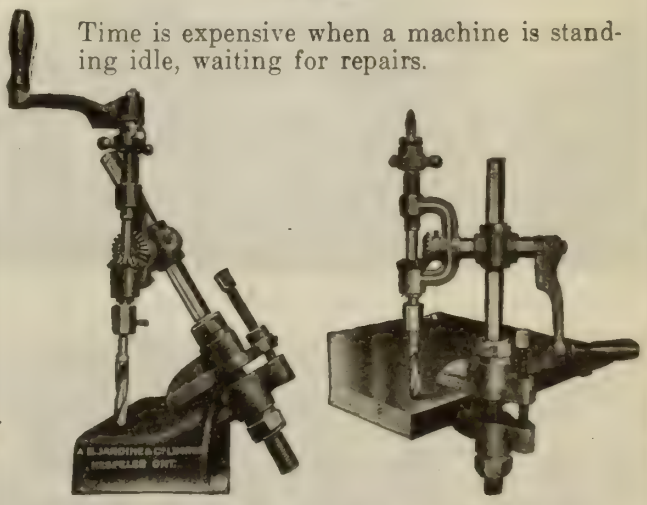
1856

Frankford, Phila.
New York Office 217 Broadway

RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.

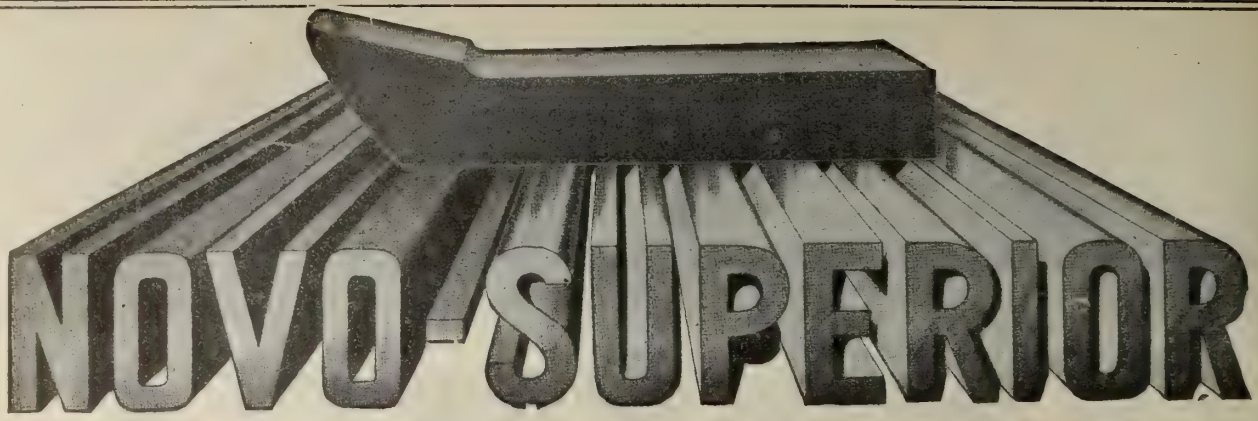


On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
Music Wire for Springs, Steel Balls.
Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws for wood and for hot or cold metal cutting
Machine Knives for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James St., Montreal, P.Q.

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents:
CLEVELAND
Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL | 79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

HIGH SPEED STEEL EVOLUTION

IT is now a fallacy to regard Tungsten High Speed Steel as the most efficient Tool material for High Duty Service. For machining at highest speeds with heaviest feeds far better results are rendered by the

COMO

(Cobalt-Molybdenum)

SUPER HIGH SPEED STEEL

(Patent applied for Autumn, 1918)

In reconstructing plants, to obtain the highest point of efficiency and to equalise the increased production costs, it will pay to scrap stocks of "18 and 14% Tungsten" High Speed Steel, or Tools made therefrom and replace with its "Master material"

Como Super High Speed Steel

The composition of the newly-developed alloy, owing to the greater harmony of its ingredients, ensures considerably more uniformity in its manufacture than is possible with high speed steel with Tungsten.

The hardening of Como Super High Speed Steel is more definite and certain.

Whilst after several months testing and comparing rival brands of Tungsten high speed steel only trifling differences of efficiency are often found, the greater utility of Como super high speed steel becomes apparent after a few hours' testing.

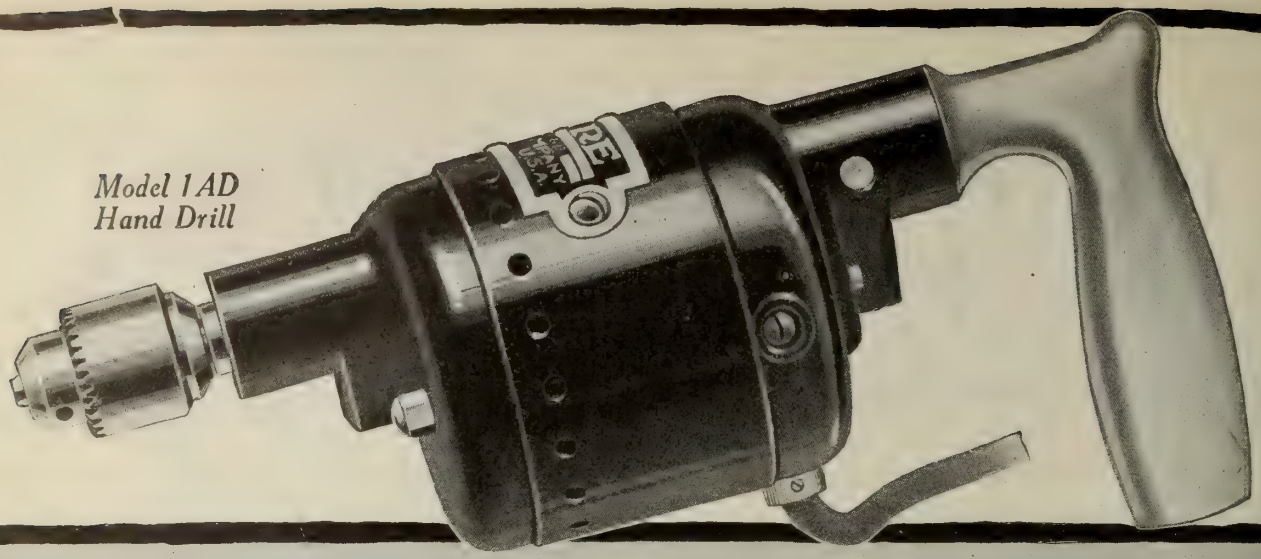
Como Super High Speed Steel machines exceptionally soft. Its specific gravity is 10 per cent. lighter than Tungsten High Speed Steel, consequently, whilst a given weight of Tungsten High Speed Steel produces 1000 tools, the same weight of Como will produce 100 tools more.

Manufactured under license by:

Darwin & Milner, Ltd.,
SHEFFIELD
Brand: "DARWIN 505" (Como Patent)

Sybry, Searls & Co., Ltd.
SHEFFIELD
Brand: "TRIPLE ULTI SSIMUS" (Como Patent)

Also Makers of COBALTCROM Patent Air-Hardening Steel in Bars and Form Castings for Milling Cutters, Press Tools, Dies, Taps, Reamers, Gauges, etc. COBALTCROM High Speed Power Hacksaw Blades. FIREX Triple Life Air-Hardening Steel, the new super service material for Chisels, Cold Sets, Smiths' Tools, Dies, Mining Tools, etc.



Model 1AD Hand Drill

MODEL 1AD Hand Drill

Length—10 inches.

Weight—4¾ pounds.

Capacity—Steel, brass, aluminum and alloys, 0 to $\frac{3}{16}$ inches.

Motor—Universal, operates on either direct or alternating current. Diameter of motor 3⅜ inches.

Spindle—Offset from center $\frac{25}{32}$ inches.

Drive—Helical gears.

Handle — Aluminum. Complete with 10 foot cord, plug, switch and chuck. Jacobs chucks used as regular equipment.

MODEL 2AD Sensitive Drill

Height—18 ins. **Weight** 18 lbs.

Stroke—3¼ ins. **Feed**—Rack and pinion. Helical gear drive.

Capacity—Steel, brass aluminum and alloys, 0 to $\frac{3}{16}$ inch. Drills to center of 7½ inch piece.

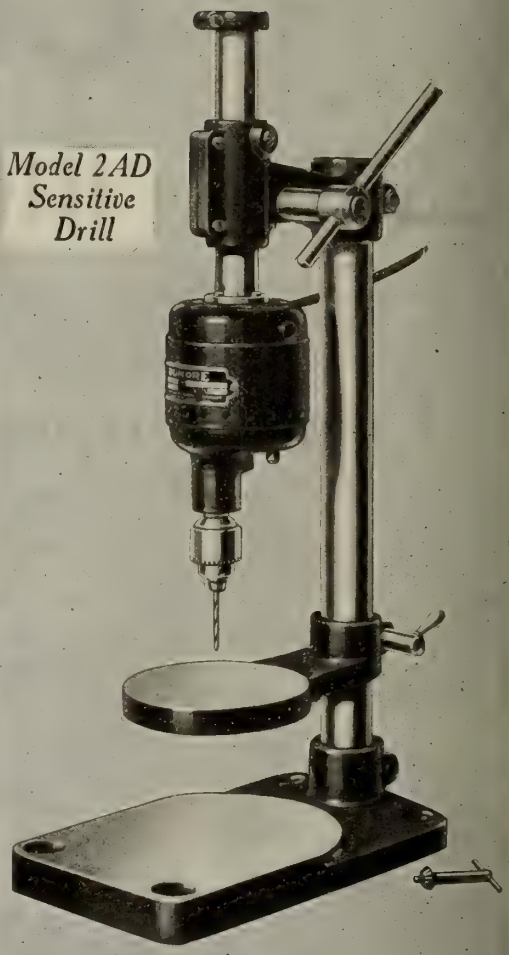
Motor — Universal, operates on either direct or alternating current. **Diameter**—3⅜ inches.

Spindle—Offset from center $\frac{25}{32}$ inches.

Thrust—Ball bearing.

Table — Adjustable, may be raised, lowered or swung entirely out of the way. Complete with 10 foot cord, plug, switch and chuck. Jacobs chucks used as regular equipment.

Wisconsin Electric Company
2912 Street, Racine, Wisconsin



Model 2AD Sensitive Drill

DUMORE GEARED ELECTRIC DRILLS

"Yes, Tom, you're right. The DUMORE grinder will mean better dies and gauges for us. I'll order one today."

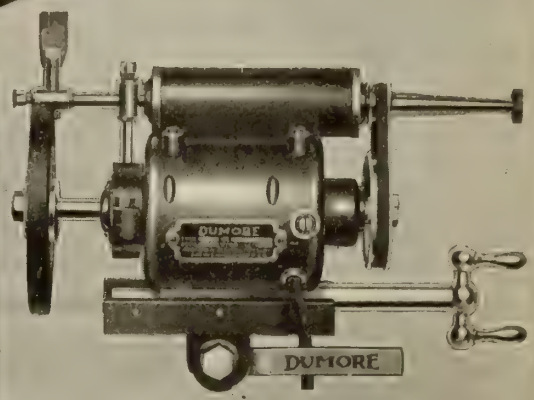
TO every shop making its own gauges, jigs or dies the DUMORE grinder has real significance. If you are looking for less trouble and greater accuracy in your grinding of hardened tools you will find the means right here.

Chatter-marks, taper and bell-mouth are eliminated through the use of a DUMORE. And the two reasons for this lie in the high spindle speed and dynamic balance of the armature. Even small wheels are thus given the correct cutting speed without a possibility of vibration. The DUMORE grinder is light and portable—easily carried from one part of a shop to the other and quickly set up on a lathe, shaper or milling-machine.

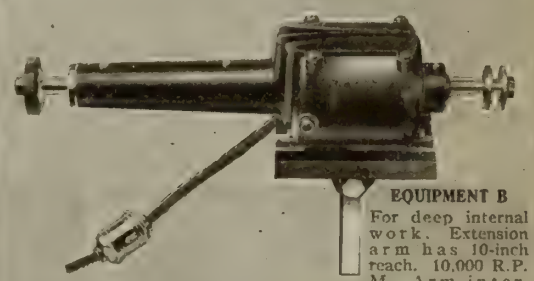
If you would improve your tool grinding standards—if you would obtain absolutely accurate results in shortest time, you should install a DUMORE. Ask your jobber to show the tool, or write us today for illustrated literature.

WISCONSIN ELECTRIC CO.

2912 16th Street RACINE, WIS.



EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches. 30,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.



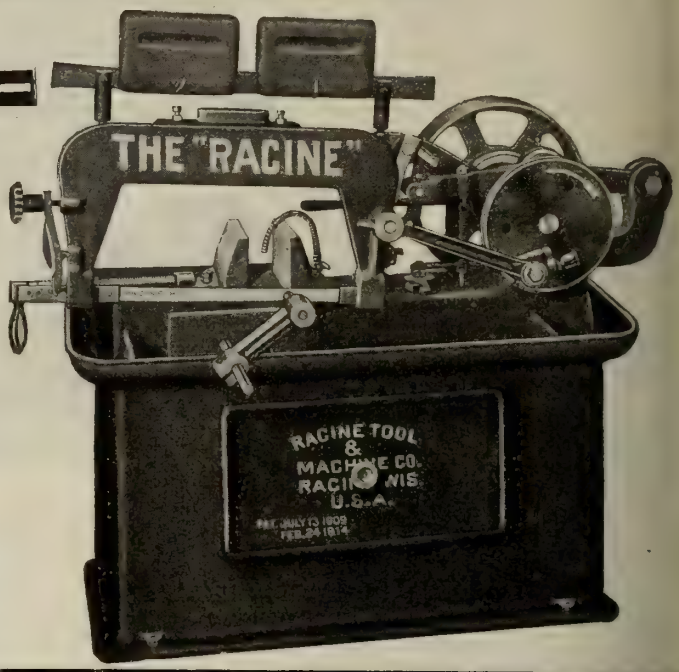
EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.

DUMORE HIGH SPEED GRINDERS

"THE RACINE"

High Speed Metal Cutting Machine

Standard the World Over



This is the only machine in the World that has an ABSOLUTELY POSITIVE AUTOMATIC LIFTING DEVICE, a feature secured by patents. Another feature is the rigid saw frame guide. These two assets combine to give long life to the cutting blades and save a lot of money.

"THE RACINE" minimizes wastage, cuts accurately and with great speed. Then they are easy and cheap to operate. These features are appreciated by the best shops everywhere and that's why "THE RACINE" sets the "Standard the World Over." Write for full particulars.

Use "RACINE" H.S. Tungsten-Power Blades.

RACINE TOOL & MACHINE COMPANY

Melbourne Ave. ∴ RACINE, WIS., U.S.A.

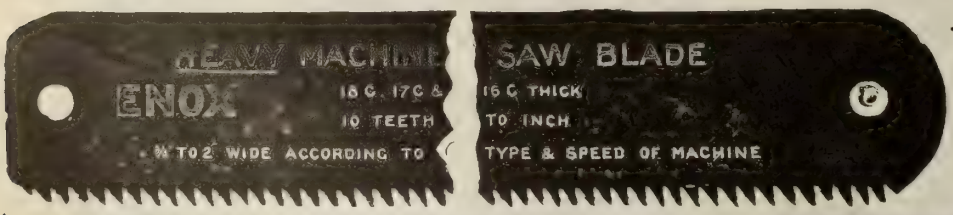
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

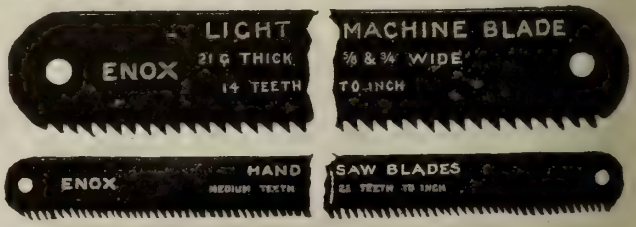
ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST



AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Makers:

FRY'S (LONDON) LIMITED

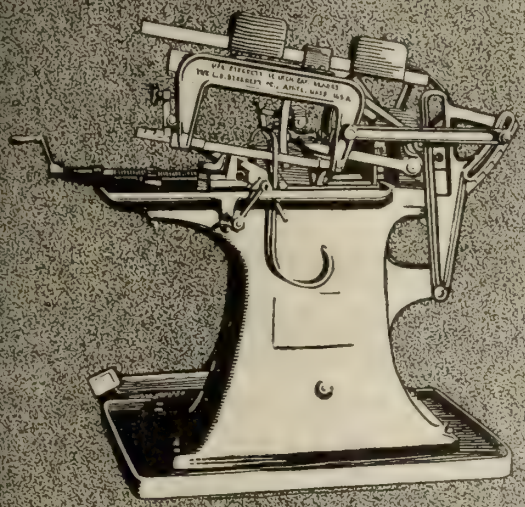
AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.



Starrett Hack Saws

Not merely **a** hack saw, but **the** hack saw that lowers the cutting cost.

Whether it's pipe, structural steel or cast iron, hand saw or power machine, Starret blades cut quicker and last longer.

Lowest cutting costs are easiest to get when the Starrett Hack Saw Chart is followed.

A copy of the chart and catalog No. 213 will be sent free upon request.

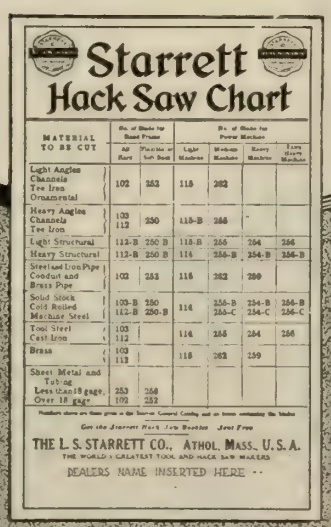
The L. S. STARRETT CO.

The World's Greatest Toolmakers

Manufacturers of Hack Saws Unexcelled.

ALTHOL, MASS.

42-944



Starrett Hack Saw Chart

MATERIAL TO BE CUT	No. of Blade for Hand Frame: All Hard	No. of Blade for Hand Frame: Particles of Soft Dust	No. of Blade for Power Machine: Light Machine	No. of Blade for Power Machine: Medium Machine	No. of Blade for Power Machine: Heavy Machine	No. of Blade for Power Machine: Very Heavy Machine
Light Angles Channels Tee Iron Ornamental	102	253	118	262		
Heavy Angles Channels Tee Iron	103 112	250	118-B	266		
Light Structural	112-B	250 B	118-B	255	254	256
Heavy Structural	112-B	250 B	114	256-B	254-B	256-B
Steel and Iron Pipe Conduit and Brass Pipe	102	253	118	262	259	
Solid Stock Cold Rolled Machine Steel	103-B 112-B	250 250-B	114	256-B 256-C	254-B 254-C	256-B 256-C
Tool Steel Cast Iron	103 112		114	255	254	256
Brass	103 113		118	262	259	
Sheet Metal and Tubing Less than 18 gage. Over 18 gage	253 102	256 252				

Numbers above are those given in the Starrett General Catalog and are hence continuing the blades

Get the Starrett Hack Saw Booklet Sent Free

THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.

THE WORLD'S GREATEST TOOL AND HACK SAW MAKERS

DEALERS NAME INSERTED HERE --

STARRETT HACK SAWS CUT QUICKER & LAST LONGER

"WACO"

High Speed Steel

REGISTERED

"WACO"

TRADE MARKS

"Double Waco" Quality—for Quick Production Work.

"Turtle Brand"—High-class Tool Steels, Files and Drills.

Wortle Plates for Wire Drawers.

MANUFACTURED BY

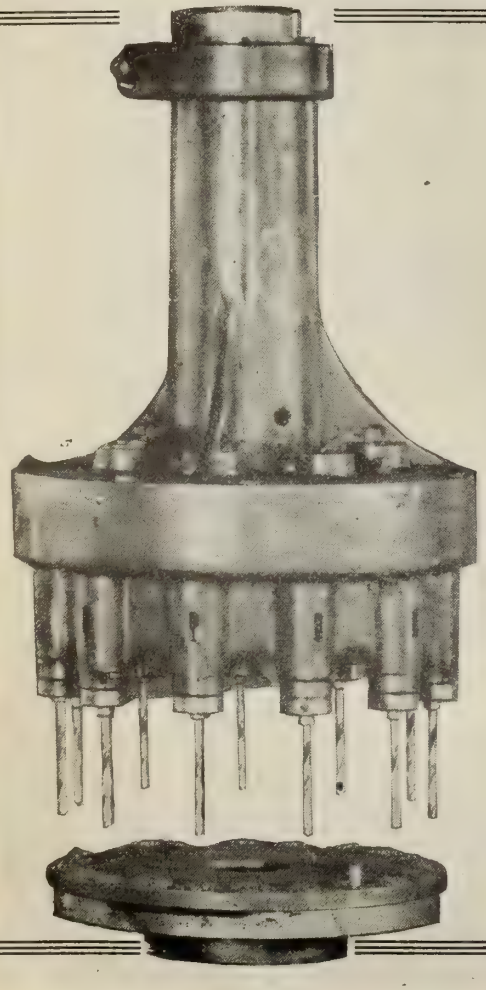
WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada:

MARSHALL, SON & BUNNEY

39 Richmond Street East - - - TORONTO, ONT



SPEED UP THE WORK

Rising costs are knocking the bottom out of profits these days! Materials and labor are up. No chance to reduce them. But you can speed up your work. The Hoefer Manufacturing Company has a proposition that will cut your drilling cost. Not guesswork, either, but on a basis proved by experience.

By using Hoefer Auxiliary Heads you can drill ten, twelve or more holes in the same time as one. Not only do you save the drilling time, but also the time lost shifting the jigs and raising and lowering the spindle for the extra holes.

360 manufacturers, 99 distinct lines of business—probably some of your competitors—employ Hoefer Auxiliary Heads to increase profits. They say the Hoefer Auxiliary Heads pay for themselves in 30 to 60 days.

Hoefer Auxiliary Heads are made in any multiple, arranged in any manner, from 2 up. Made by expert toolmakers and guaranteed to handle accurately the work for which they are designed.

Investigate now. Stop the leakage of dollars due to the use of single drills. Write for catalog and send blueprint of some of your work for estimate of time and cost.

The Hoefer Mfg. Co., Freeport, Ill.

621 Washington Blvd., Phone Haymarket 2408, Chicago, Illinois; 1113 Citizens' Bldg., Phone Main 795, Cleveland, Ohio; 708 Empire Bldg., Phone Court 1911 or 1912, Pittsburgh, Pa.; 602 Kerr Bldg., Phone Cherry 2884, Detroit, Mich.; 30 Church Street, Phone Cortland 1615, New York City; Badger-Packard Mchy. Co., Milwaukee, Wisconsin; National Supply Co., Toledo, Ohio.

The Canadian Fairbanks-Morse Company, Limited

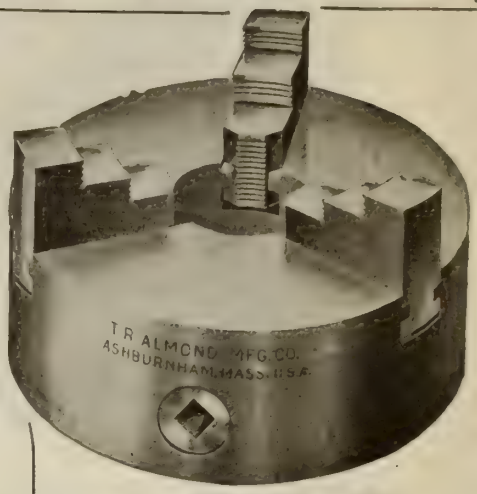
"Canada's Departmental House for Mechanical Goods"

Halifax St. John Quebec Montreal Ottawa Toronto Hamilton Windsor Winnipeg Saskatoon Calgary Vancouver Victoria

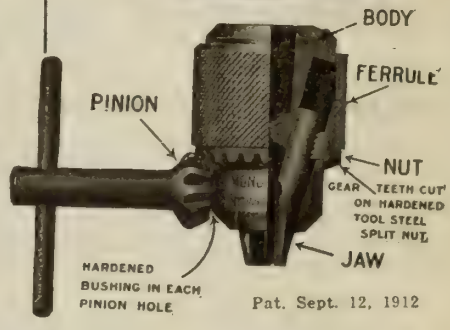
HŒFER Auxiliary Heads

ALMOND CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".

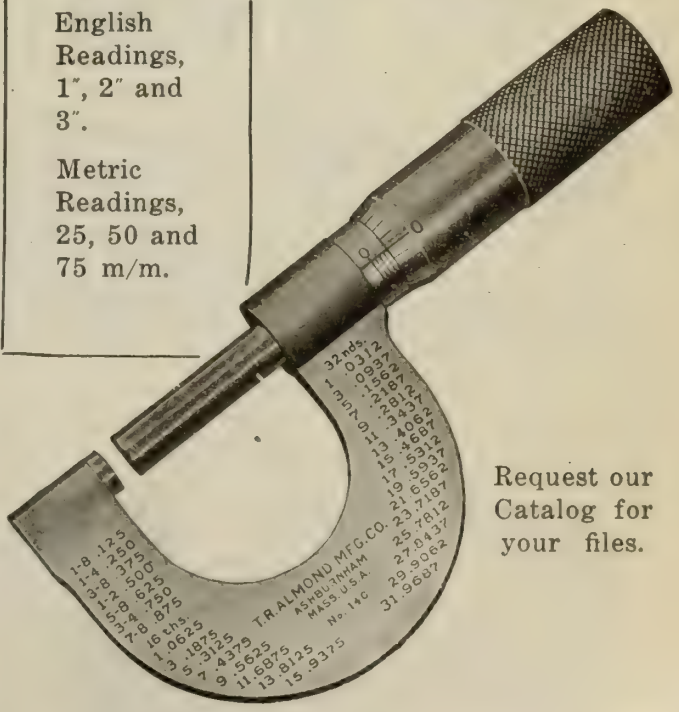


Pat. Sept. 12, 1912

Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.

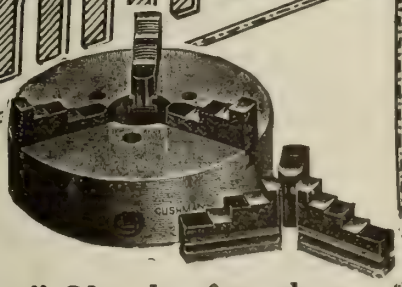


Request our Catalog for your files.

T. R. ALMOND MFG. CO.

6 Maple Avenue, Ashburnham, Mass.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

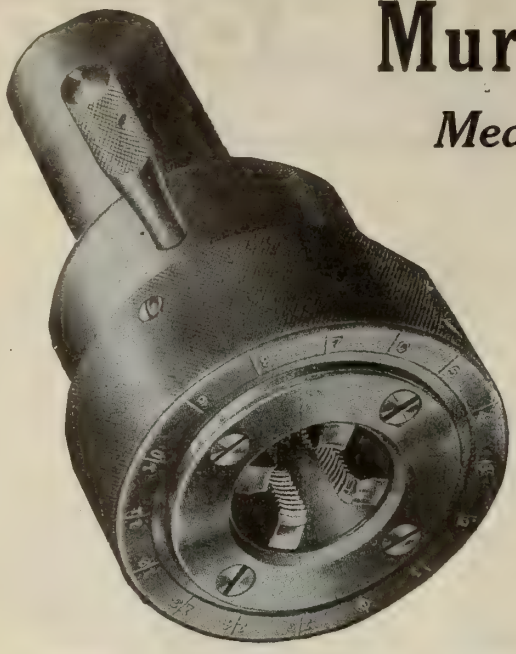
And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

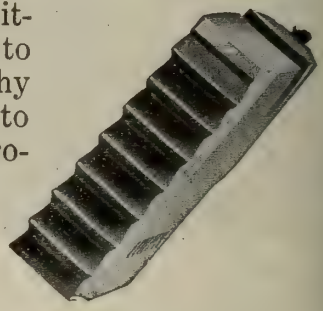
CHUCKS



Murchey Chasers

Mean Quick Deliveries

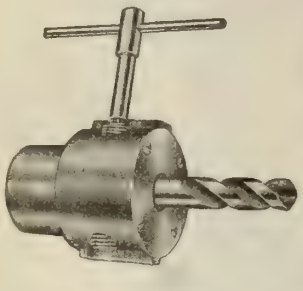
Murchey Tools will cut your tapping and threading costs. **They will boost production 50%.** Another important feature is Murchey's **Quick Deliveries on Chasers.** This is a Murchey specialty. No waiting! We get your chasers to you when you want them. Why not use Murchey Tools to speed up your threading production?



Send for a Murchey Tap or Die on approval and give it a trial. You will then secure actual proof of its value to you.

Murchey Machine & Tool Company, Detroit, Mich.

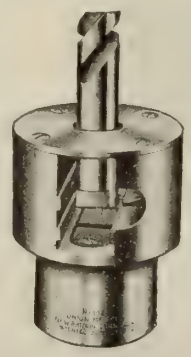
THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.



UNION

POSITIVE DRIVE DRILL CHUCKS

The Union Drill Chuck is made in seven sizes (0 to 2 inches) with PATENT TRANSVERSE SLOT—so that drills with tenons can be inserted (see illustration). The shank of drill should be squared on two sides to enter the TRANSVERSE SLOT, giving a positive rotation to the drill independently of the jaws, permitting the jaws to centre and align the drill accurately. The drill is held absolutely true and will not slip under the hardest strain. This type of chuck will be found to give the best of results on all classes of work from HIGH SPEED drilling to the hard BLACKSMITH and GENERAL REPAIR work.



UNION Manufacturing Co.
New Britain, Conn.

New York Office 26 Cortland St.

Makers of a complete line of chucks.

H & G

Die Head Cuts

Perfect Threads

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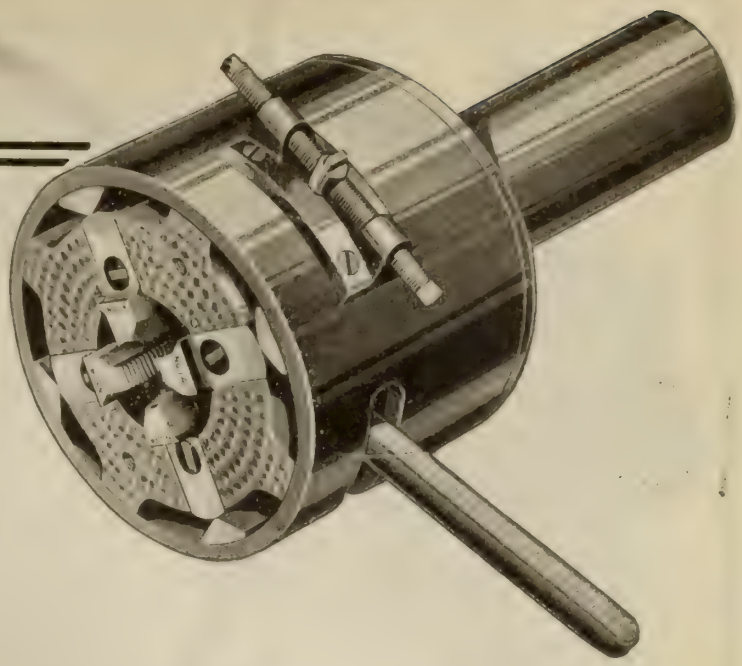

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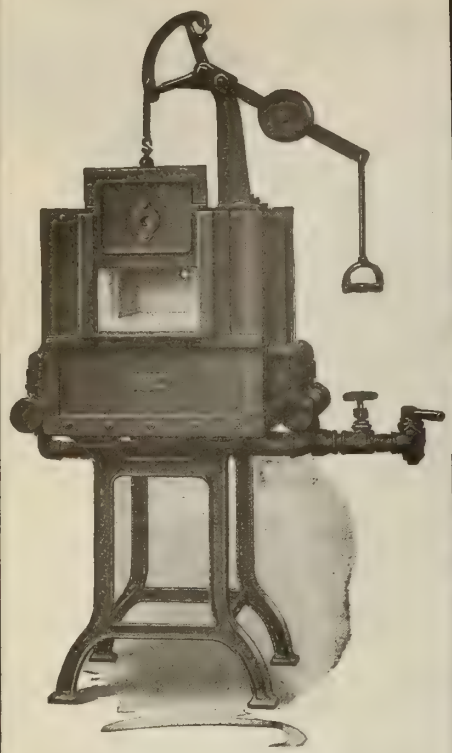

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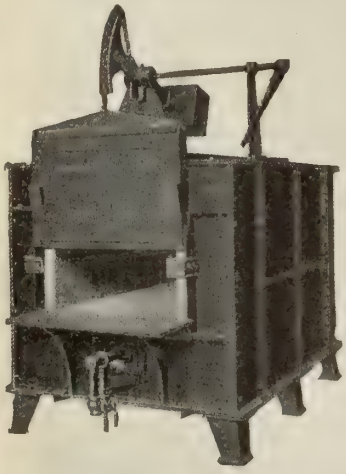

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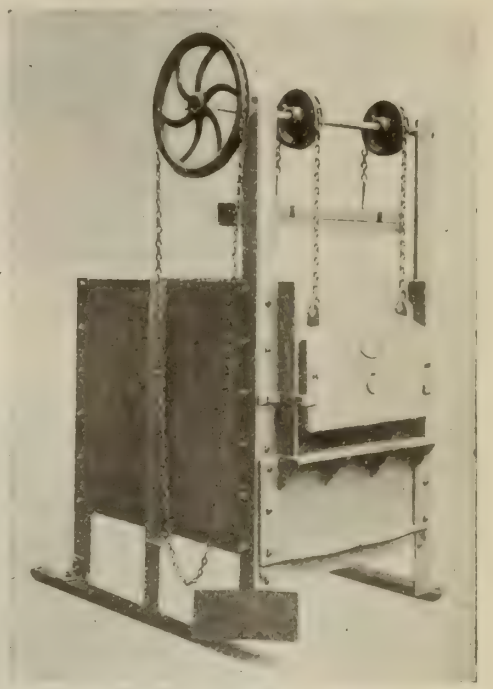

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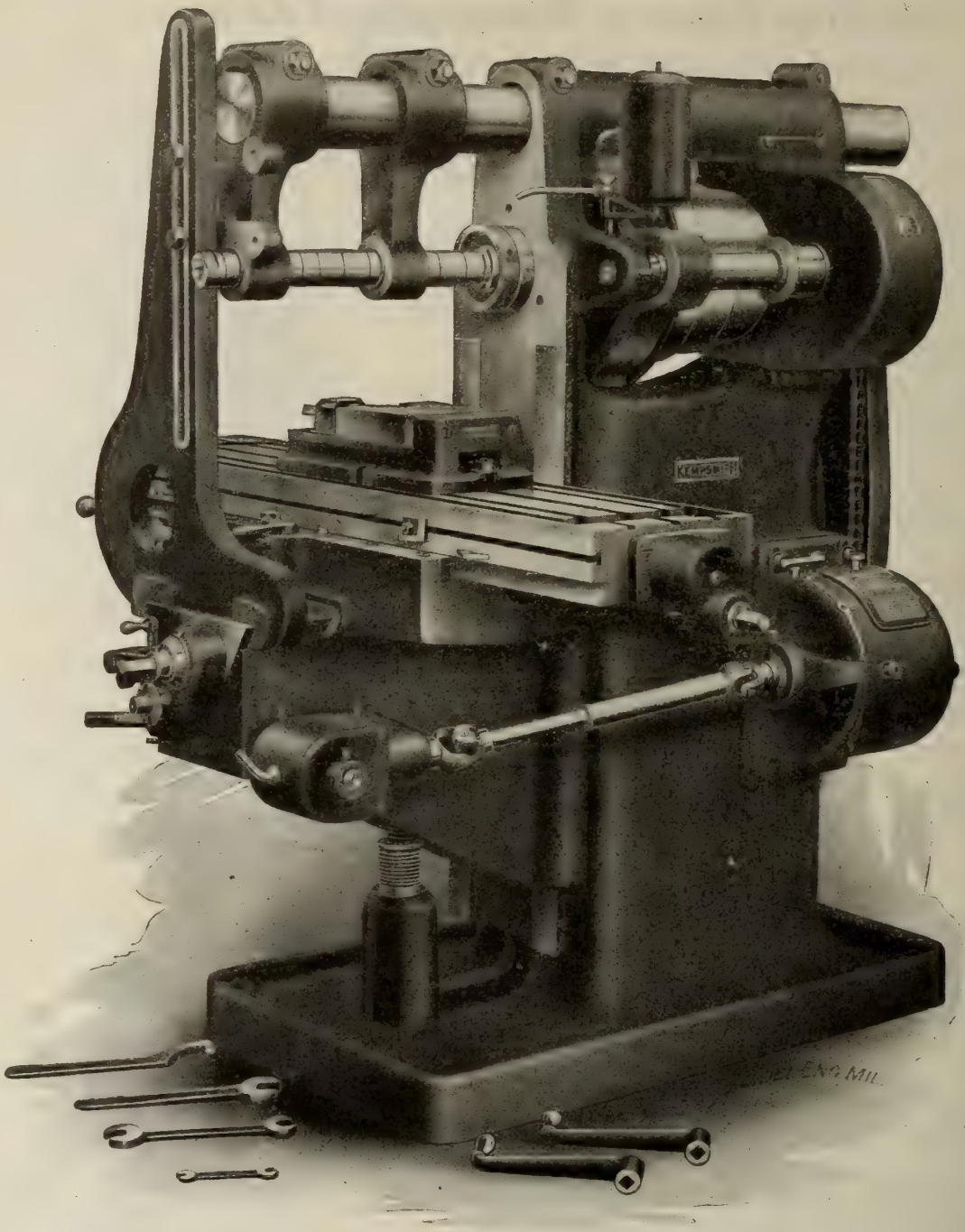

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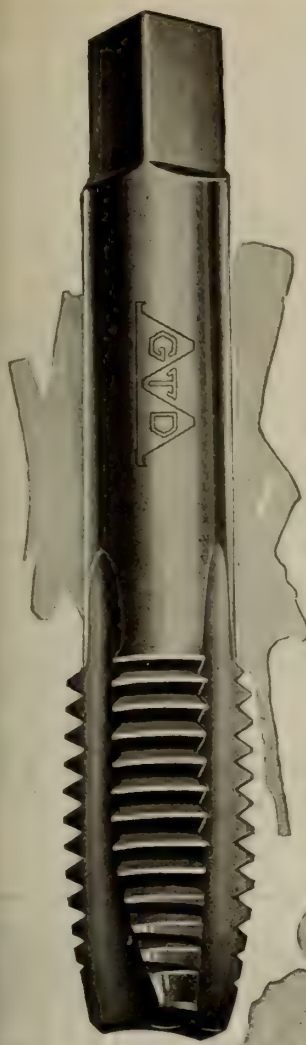

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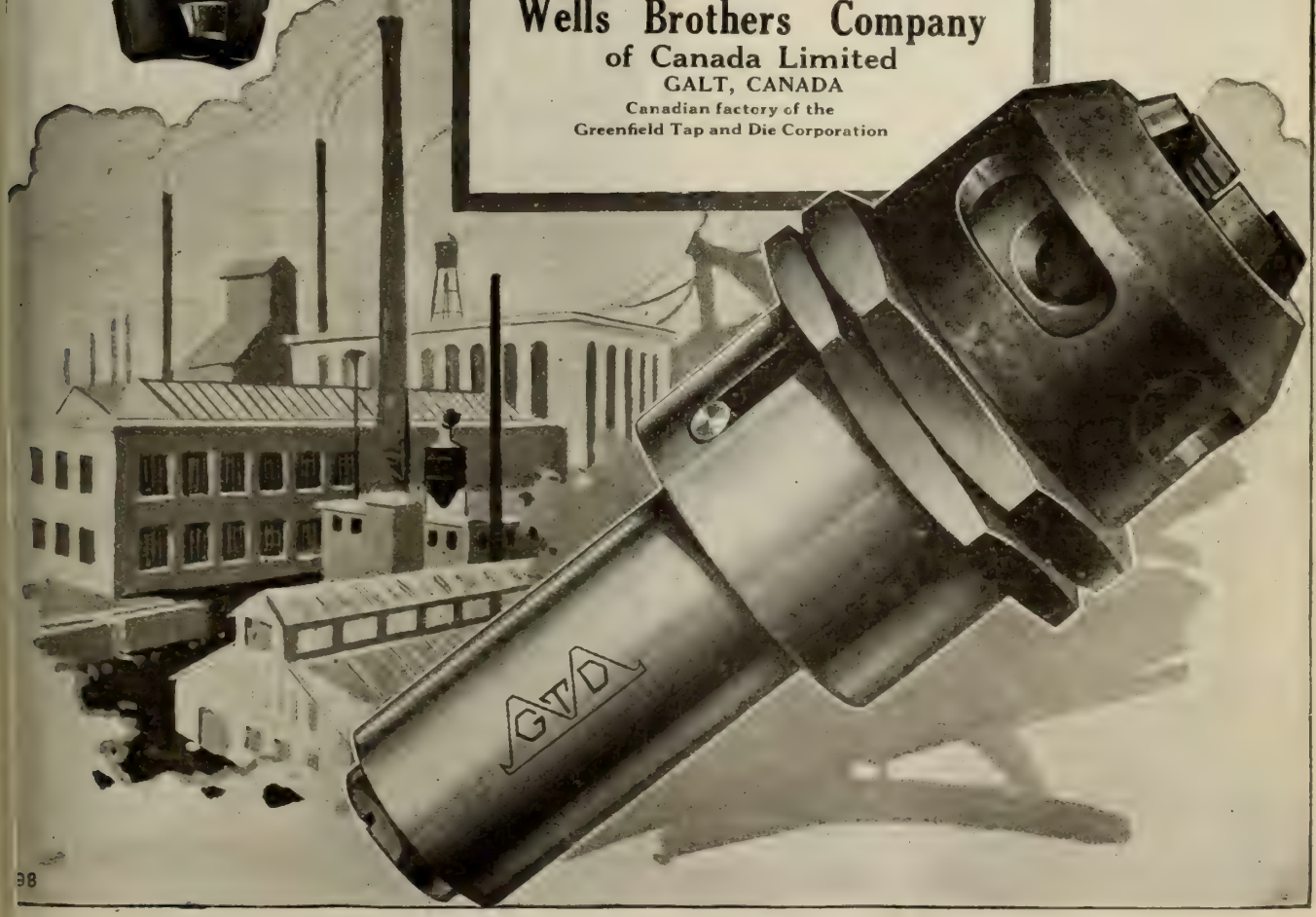

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No. 48A

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The amount left, of course, will vary according to the diameter and length of the holes to be ground and whether the work is hardened or unhardend, and also in the case of the cylinder grinding machine somewhat upon how nearly square the boring is with the surface where the cylinder is clamped against the jig for holding it.

In a general way, on bushings and gears that can be readily chucked, .008 to .010 of an inch is desirable. On automobile cylinders with two or more holes in a single casting, it is usually desirable to leave anywhere from .010″ to .015″, according to the quality of the boring.

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With the modern internal grinding machine, however, this is not true, and it is now considered wiser to leave a liberal amount of stock, as this reduces somewhat the accuracy required in chucking the pieces.

If, however, the work is accurately machined and the chucking fixture is one that is not only accurate to begin with but will remain accurate so that the holes run quite true, then the amount of stock to be removed can be reduced to advantage and a considerable saving in time effected.

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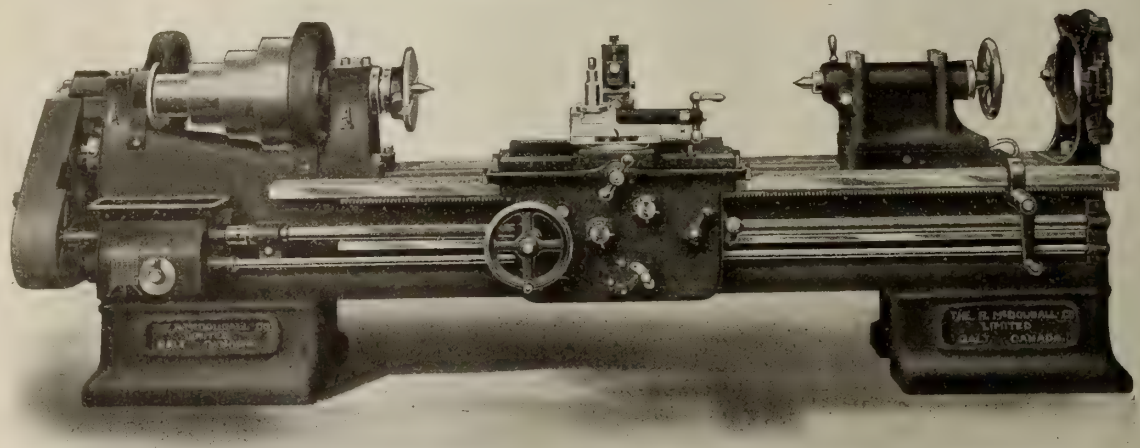

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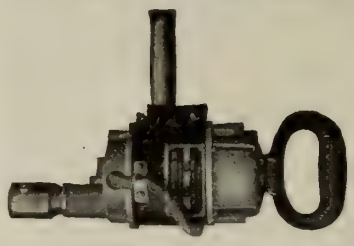

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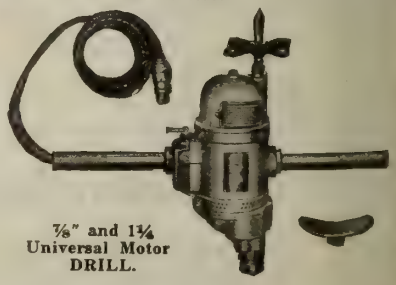

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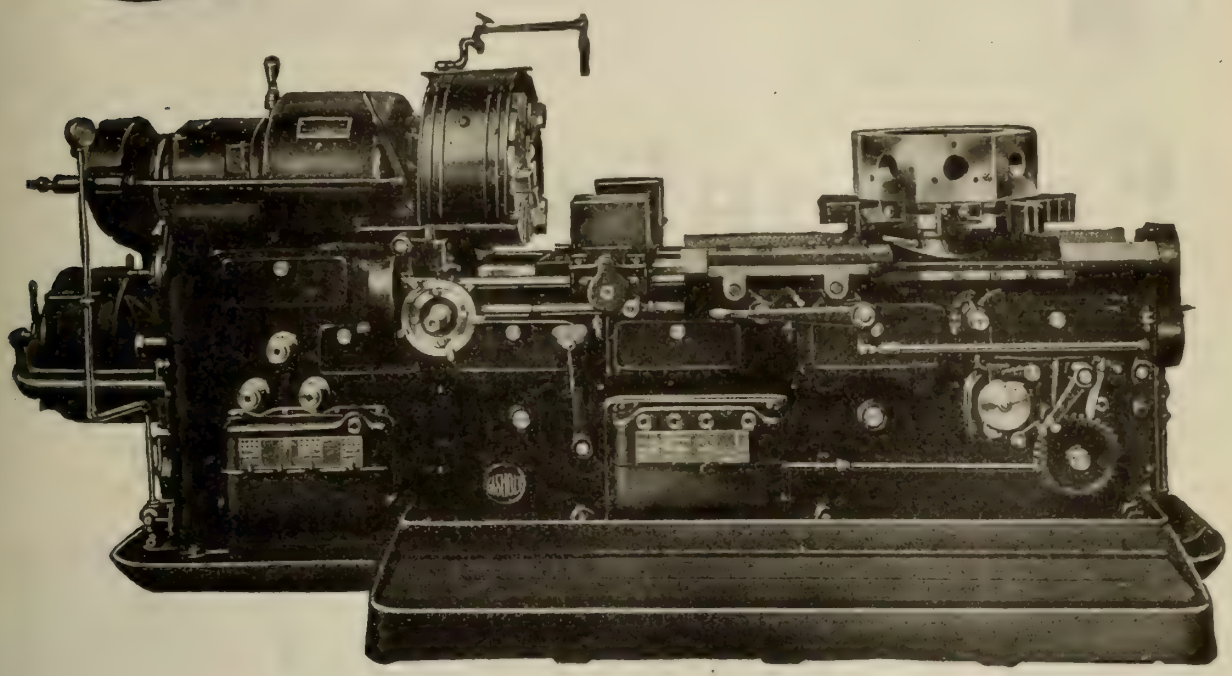

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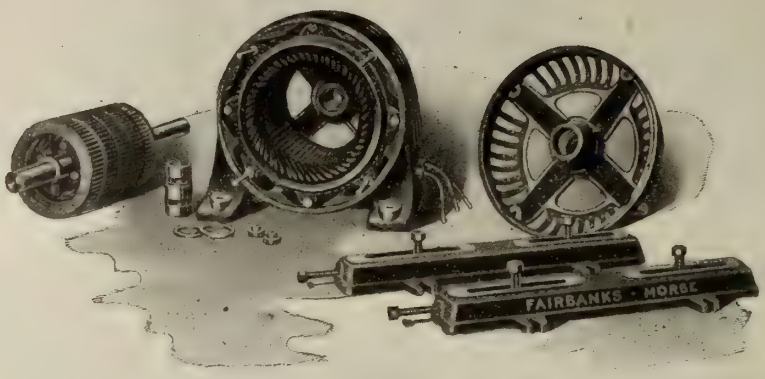

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CANADIAN MACHINERY AND MANUFACTURING NEWS

Volume XXI. No. 24. June 12, 1919

Manufacturing the Banner Hosiery Machine, Pt. V

A Conclusion of the Previous Articles on This Subject. Further Operations, Together With Photographs, Are Described in Detail, the Machining of the Cylinder Being Followed Up Throughout

By ROBERT MAWSON

IN this article will be described the various operations followed by the Hemphill Manufacturing Co., when machining the cylinder for a hosiery machine. The cylinder is very important, perhaps the most important element used in the machine.

It must be machined absolutely correct in every particular, further it must also be manufactured from the finest material for the purpose, and the operations followed to produce it, must be such that the piece is made interchangeable, and, as a matter of business, in an extensive productive manner.

The cylinders now being manufactured at this plant are made from a special steel forging. This method of manufacture was made necessary during the war, as this was the only way in which the special grade of steel found necessary for the work could be obtained.

The steel must be very tough, machined with a smooth finish, and also take the proper temper during the hardening process without too much danger of cracking. The advantage of this will be shown in this article as the operations on a cylinder are somewhat lengthy and costly.

During the war period it was found impossible to obtain a steel possessing the correct analysis in any other way than in the form of forgings. It is now the intention, however, to make the cylinders from a special steel, of the correct grade, made in the form of seamless tubing, which will permit them being machined more quickly and at less

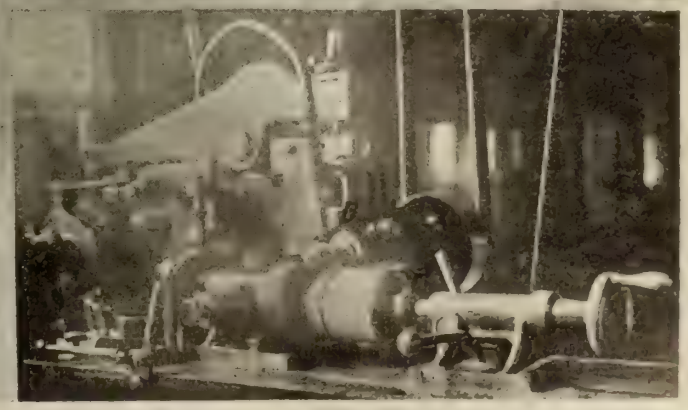


FIG. 1—UPPER LEFT—FIRST OPERATION OF CYLINDER.
FIG. 3—LOWER LEFT—CUTTING SLOTS ON A WHITTON.

FIG. 2—UPPER RIGHT SECOND OPERATION OF CYLINDER
FIG. 4—LOWER RIGHT—CUTTING SLOTS ON A BILTON.

expense, as only a small amount will have to be removed from the inside and outside surfaces of this tubing.

The illustration, Fig. 1, shows the first operation in machining the cylinder. The cylinder blank forging is held in the special chuck as shown, the 6 set screws being adjusted until the piece runs concentric in the hole of the chuck. These screws are then tightened so that they hold the cylinder firmly for the machining operation. The chuck is held on the face plate of a Jones & Lamson automatic by means of these set screws.

These tapped holes may be observed through the flange of the chuck. The outside of the chuck is turned to the correct diameter to suit a corresponding recess in the face plate of the machine. The hole of the cylinder blank is then bored out to a plug gauge. One of the finished bored cylinders may be observed at the right of the chuck fixture.

Second Operation on Cylinder

The illustration, Fig. 2, is the second operation when machining the cylinders. The fixture used and shown in the half tone is held on a Jones & Lamson automatic by means of three screws tapping into the threaded holes shown in the flange. To obtain the necessary concentricity for the running of the fixture when attached to the machine the outside turned diameter fits into a corresponding receiving recess as previously noted.

The cylinder is located by fitting over a plug which is made about five thousandths of an inch smaller in diameter than the previously bored hole, which is 3.500 inch, in other words the plug is 3.495 in diameter. Three slots are cut in a longitudinal manner from the end for about three-quarters the total length of the plug. A plate is fastened at the outer end, as shown, to prevent dirt entering these slots.

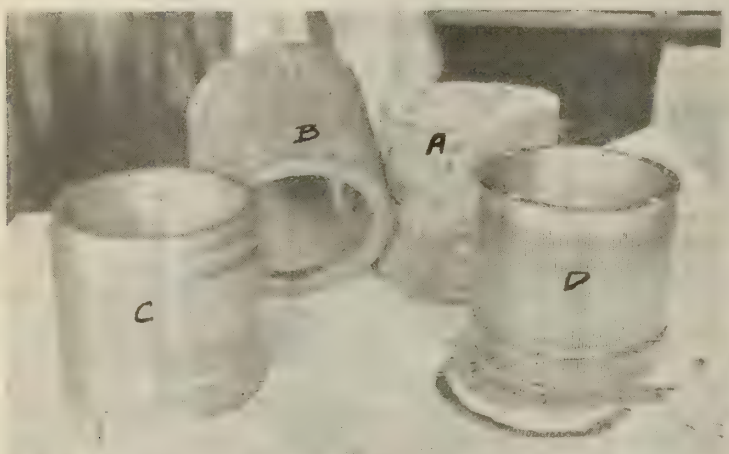
In the centre of the plug is screwed a taper pin with an included angle of 10 degrees. After the cylinder has been slid over the plug the tapered pin is forced upward by means of the nut shown at the upper end of the fixture. This action spreads out the three sections of the plug, thus gripping and holding the cylinder firmly in position. The outside is then machined and groove-cut on its periphery, the various tools being held in the turret of the automatic. One of the finished machined cylinders after the second operation is shown at the right of the illustration.

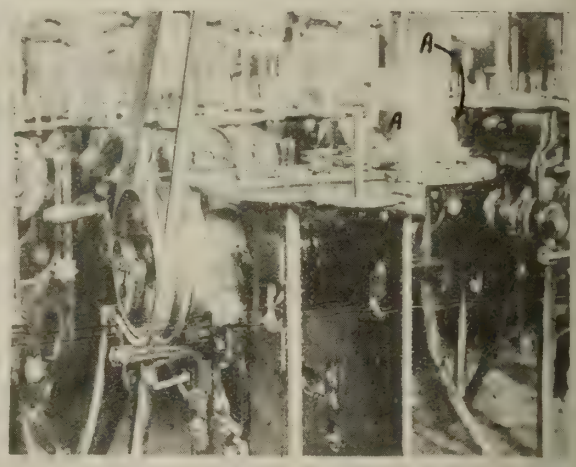
Cutting Slots on Cylinder

At this plant two types of machines are employed for cutting the needle slots in the cylinder. The half tone, Fig. 3, shows a Whiton machine set up for cutting the cylinders.

The piece is located by an expansion arbor which fits inside the finished bored hole. By tightening the large nut shown on top of the cylinder the jaws of the arbor are expanded and the piece held securely in position. The saw, which is .028 in. thick, may be observed in front of the cylinder.

The revolving saw, after being set to obtain the correct depth of cut, is fed up and down automatically by the machine. After it has passed down, and thus machined a slot, the table of the machine is fed back by means of a cam to the next position. These various positions are determined by means of a train of gears placed at the far end of the machine. During this change of position of the cylinder the head which holds the cutter also elevates, thus placing the cutting saw ready for machining the next slot. It will be seen, therefore, that the machine is automatic in its action, the operator being called upon to only place the cylinder in position on the arbor and secure the piece as noted. The matter of setting the saw for depth is only necessary to be done when starting on any certain lot of one diameter and number of slots or gauge. The cylinder here shown on the machine is 3½ in. diameter, and is machined with 220 slots. At this factory cylinders are made from 2 in. to 5¼ in. in diameter and ranging in number of slots from 140 to 280, depending on the size of stocking desired and thickness of yarn used. This includes infants' and adults' hose and from the rough heavy goods to the very





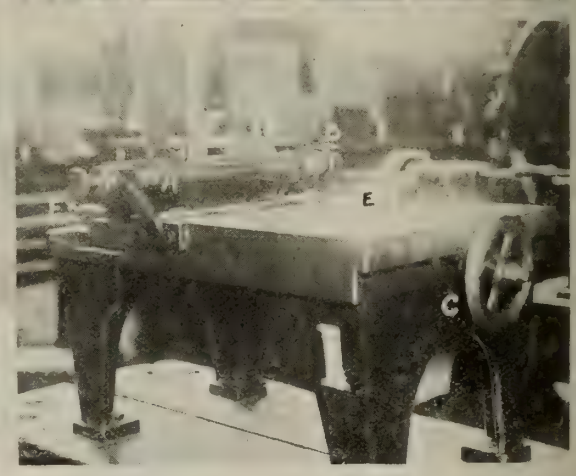


FIG. 5—UPPER LEFT—SEQUENCE OF OPERATIONS ON CYLINDER
FIG. 7—LOWER LEFT—MACHINING SLOTS IN STITCH RINGS.
FIG. 6—UPPER RIGHT—LIMBERING UP CYLINDERS AND NEEDLES.
FIG. 8—LOWER RIGHT—GRINDING SAWS FOR CUTTING STITCH RINGS.

fine gauze-like hosiery made of the highest grade of silk. The other type of machine used is a Bilton, and is illustrated in Fig. 4.

The cylinder is again located and held in a similar manner by means of an expansion arbor, A. It will be seen, however, that this machine has an advantage that the arbor is supported on the outer end by means of a tail stock. The machine also operates somewhat differently. In the first place it will be observed that the cylinder is held in a horizontal position; the former machine carried the piece in a vertical manner. With this machine the revolving saw is carried along the cylinder by means of the head, B. After the saw has passed over the length of cylinder the head is raised by means of a cam arrangement clear of the cylinder, and returned to the rear end, ready for machining the next slot. While the saw is being raised the cylinder is revolved to the next position, the indexing being again performed by means of gearing.

It will be seen, therefore, that this, like the former type of machine, is fully automatic. The cylinder here being machined is of the same diameter and number of slots as that already noted which was on the previous machine.

Sequence of Operations on Cylinder

The next picture, Fig. 5, shows the sequence of operations followed when manufacturing the cylinder. At A is shown the rough forging as received at the plant, B is a forging after it has been bored and faced, C a finished turned piece and D a completed cylinder. When manufacturing the cylinder after it has been slotted as illustrated by Figs. 3 and 4, it is hardened and then ground all over on the outside and also the bored hole. This is necessary so that the correct sizes are maintained.

A simple yet necessary operation follows the grinding, which is as follows: An operator takes the cylinder and removes the burrs along the edge of the slots by passing each slot along a revolving angular milling cutter. If this was not done the burrs or feathered edges on the slots would tend to cut the yarn during the knitting operation.

The cylinder is then given a careful and rigid inspection, covering every operation followed in its manufacture, and if found correct the part is ready for assembling on the machine.

Before being assembled on a machine the cylinder is fitted with a set of needles and limbered up. This is done so that the various needles will operate in their respective slots freely. To obtain this result the cylinder is assembled with two special cams which raise and lower each needle every revolution of the cylinder.

In the half tone, Fig. 6, is shown one of the cylinder mechanisms being limbered. At A may be observed the special cams referred to, attached to the cylinder, and the needles, some raised and others in their lower position, may be observed. The cylinder is revolved by the pulley shown at the left of the machine, the motion being transferred through open gears which can be seen under the frame. After each machine is found to operate with the desired freedom the special cams are removed and the proper attachments assembled on the cylinder.

Machining Slots in Stitch Rings

The Illustration, Fig. 7, shows a Standard Manufacturing Co. machine used to machine the slots in the stitch rings. These parts are made of bronze and have been previously bored and turned all over to size. The ring is placed on an expanding arbor in the centre of the fixture. A screw in the plug is then tightened which expands four movable segments, thus holding the ring in position.

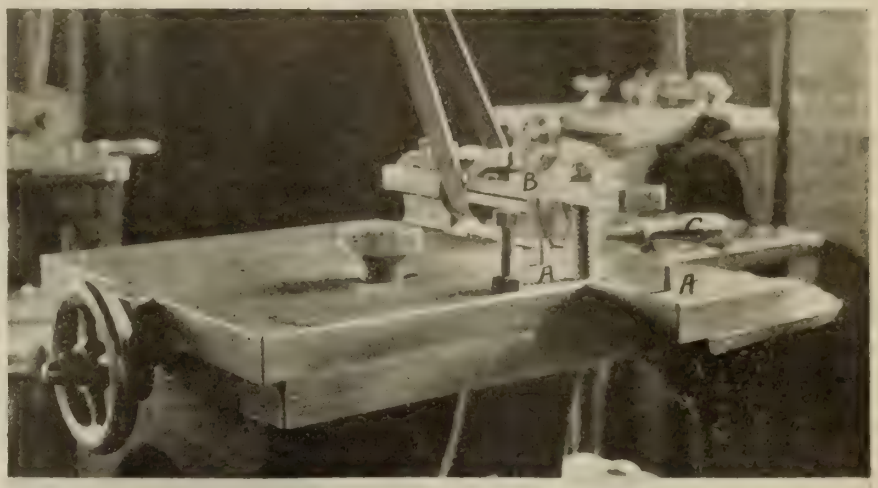
The machine operates automatically, feeding the saw down into the work to the correct depth, which may be adjusted when necessary by the operator.

In the ring shown in the machine 220 slots are machined and the ring diameter is 3 inches. An interesting feature of the machining operation is the using of an old saw which has been ground so that the teeth have been removed, and placed touching the cutting saw on the arbor.

The purpose of this old saw is to act as a guide and support for the cutting saw. The old saw sets down into the last slot which has been machined as the new slot is being cut, and not only guides for position but supports the saw, and it is found that the saw does not break as easily by using this method. Every operator who has had the experience of grinding either a milling cutter or machinist slitting saw knows that after it has been ground and put into service again some of the teeth will remove more material than others.

In other words the cutting edges are not perfectly concentric with the hole. This can be accounted for by the fact that either the arbor on which they are ground is not a perfect fit or that the arbor itself is not absolutely true.

FIG. 9—GRINDING CUTTERS FOR SLOTTING CYLINDERS.



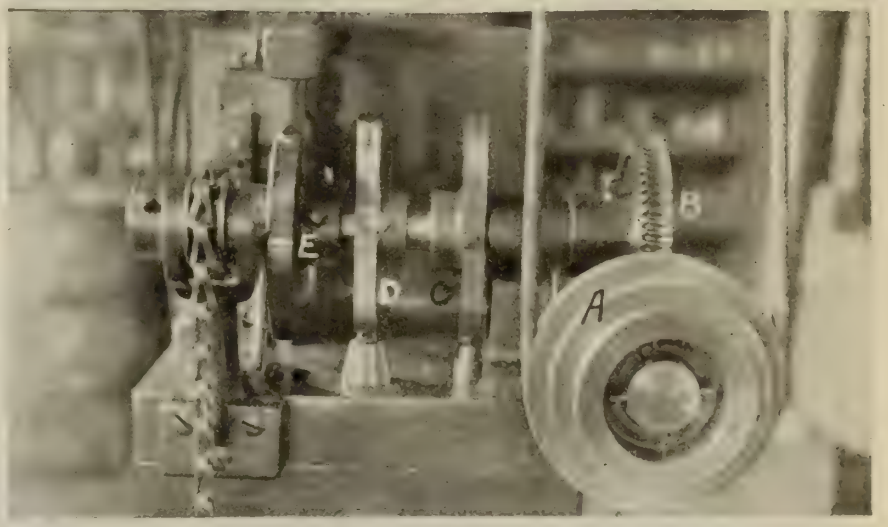


FIG. 10—VIEW OF CAMS ON STITCH RING MACHINE.

To overcome this trouble the Hemphill Co. have designed the special machine shown in Fig. 8 for guiding the stitch ring saws. When a saw requires grinding the arbor and saw are removed from the machine without disturbing its location and held between the centres A and B. The handwheel C, which is graduated to read in thousandths of an inch, is employed to feed the table and, therefore, the saw arbor against the grinding wheel, D. When the correct position of table has been obtained it is locked by means of a screw operated with the knob, E. At the rear of the saw is a

stop plate so that the tooth on the saw being ground is held in the correct position for grinding. The revolving wheel is caused to travel past the saw by means of the handle, E, which oscillates the slide on which the grinding wheel and driving pulley are mounted.

By the use of this special machine all the cutting edges are ground concentric with the arbor as it is in a similar position to that which it occupies when on the machine for cutting the stitch rings.

By referring to Fig. 3 it will be seen that a different method is used for holding the slotting cutter for cylinders than that which is employed for the stitch ring machine. On the machine for cutting the cylinders it will be observed that the cutter is attached to a dovetailed slide which is held by gibs to the machine. It is obvious, therefore, that the grinding machine last described could not be used for the cylinder saws.

The machine used for these saws is illustrated in Fig. 9. After the slide with the saw intact has been removed from the cylinder cutting machine it is located on the grinding machine by means of the two pins, A, which fit into reamed holes in the slide.

The clamp, B, is then tightened onto the top of the slide and holds it securely on the machine. The grinding operation is then performed in a manner similar to that described for the previous machine. The handle which is used to move the revolving grinding wheel may be seen at C.

The other features on the machine can be readily followed by referring to the description given for the last machine. It might be added that the slide is also located on the cylinder cutting machine by means of two pins fitting in the reamed holes noted so that the same relative position is maintained both when grinding and cutting the cylinders.

Referring to Fig. 7 it will be seen that a front view is shown of the stitch ring slotting machine. These machines as made by the builders make one slot in the ring for each revolution of the driving shaft.

In other words each revolution of the shaft feeds the cutter into the ring and out again ready for the indexing of the ring for the next position. The motion for each of these functions is by means of cams operated by the main driving shaft.

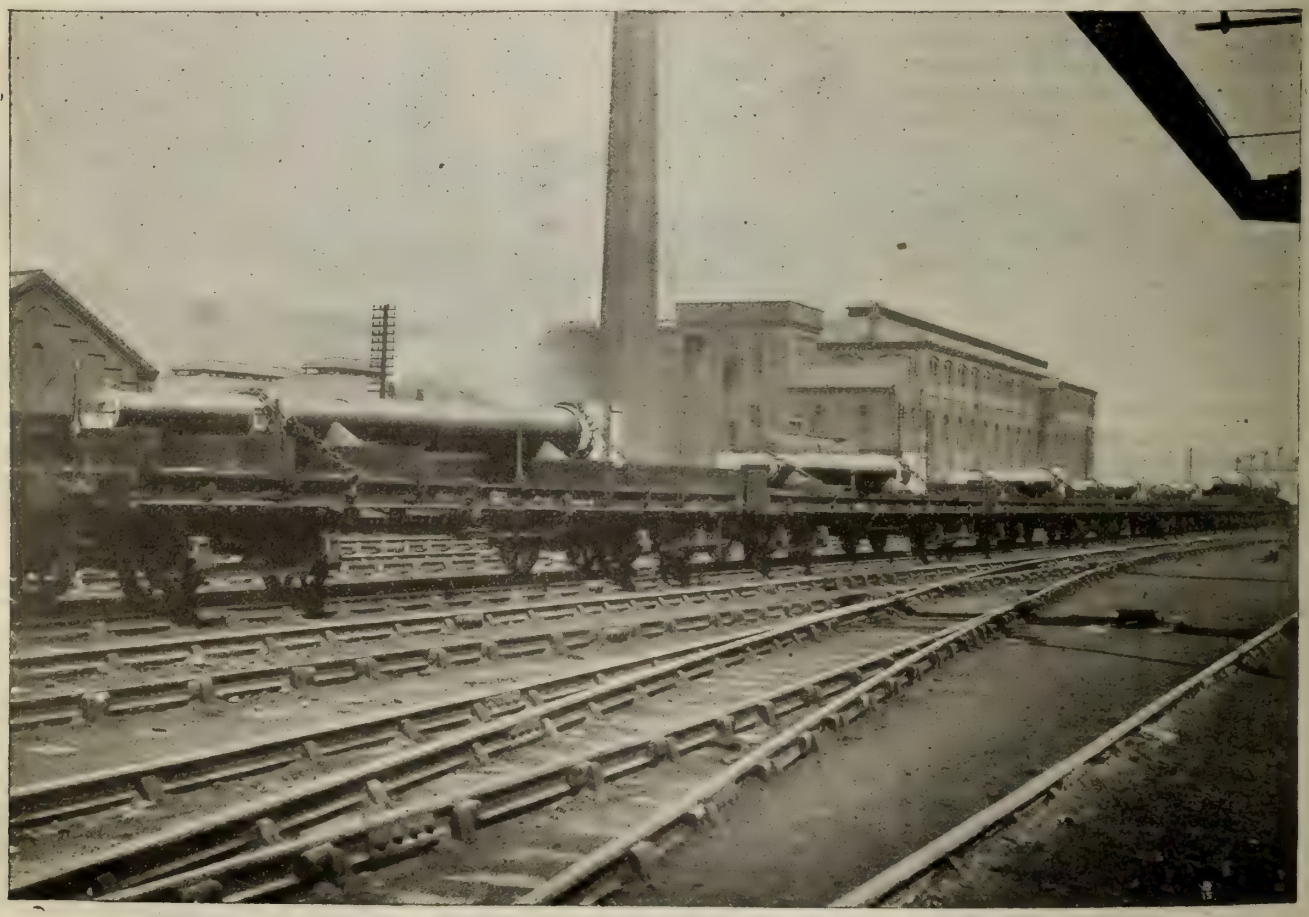
In the half tone, Fig. 10, is shown a rear view of the stitch ring cutting machine, the particular feature being the driving mechanism. It will be observed that the machine is operated by means of the grooved pulley, A, permitting three speeds, the power being transmitted from the overhead shaft through the belt shown. The pulley revolves a worm which is in mesh with the worm wheel, B.

This wheel is fastened by means of a set screw and key to the horizontal shaft of the machine. Mounted on the shaft are three cams, C, D and E. The functions of cams C and D are to index the stitch ring for the cutting operations, and also to operate a positive stop so that the ring will only index one space at any one indexing. The third cam, E, operates a plunger which in turn raises and lowers the head which carries the slotting saw.

This mechanism may be seen better if both Figs. 7 and 10 are analyzed together. This raising and lowering the head and saw machines the slot in the ring to the proper depth. It is obvious that the timing of the cams must be in the correct sequence, namely: index the ring, bring the same to a positive stop and then machine slot in ring. As was intimated, the machines, as originally made, performed one cycle of these motions or functions for each revolution of the horizontal shaft. The cams were what might be called single lobe.

These have been changed on all the machines used at the plant and the double lobe cams substituted as illustrated. By this change the output per machine is now practically double what it was with the old type of cams. This point is mentioned to show that often a slight change on what may be known as standard machine tools will produce better results or increased production, and should be an incentive to any plant to make such changes when the modification will warrant the improvement.

It does not throw any discredit on the maker of the machine, as his knowledge of the possibilities may be somewhat limited, but the user seeing them in operation day after day is called upon to make every machine as highly efficient as he possibly can, and therefore reap the reward from the improved condition under which it operates.



TRAINLOAD OF GUNS FOR ITALIAN GOVERNMENT IN THE YARDS OF MESSRS. VICKERS, LTD., SHEFFIELD, ENGLAND.

The Electric Furnace and the Non-Ferrous Metals

The Following Paper Was Read by the Author Before the Cleveland Engineering Society on March 11. The Utility of the Electric Furnace for the Melting of Non-Ferrous Metals and Their Alloys is Clearly Developed

By E. F. COLLINS, General Electric Co.

OF all the non-ferrous metals, copper has been known to and has been used by the human race from the remotest periods.

Its alloy with tin (bronze) was the first metallic alloy in common use by man, and so extensive was its employment at an early stage in prehistoric times that the epoch is known in archaeology as the "bronze age." Metallic relics of this age are still abundant.

Copper in nature is as widely distributed as iron, and occurs in all soils, minerals, waters, and ores. It occurs not infrequently in the native form, sometimes in very great masses, as on the south shore of Lake Superior, where pieces weighing 150 tons have sometimes been found.

Copper unites really with almost all other metals, and large numbers of these alloys are of the greatest importance in the arts. Indeed, copper is equally, if not more, valuable as a constituent element of alloys than as a pure metal.

The primary alloys in which it is a leading element are first, brass; second, bronze; third, German or nickel silver.

Zinc, as a component of brass had currency in metallurgy long before it had an identity as a separate metal. Pliny speaks of a mineral or clay that could be used with copper in the furnace to make "aurichalum" (a copper alloy or brass). Stahl, as late as 1702, quotes formulae for brass, which included zinc ore or salts.

It is not known who discovered and isolated zinc, but we do know that zinc smelting was practised in England from about 1730.

So much the more important non-ferrous metals. Mankind, in the early days formed these metals into useful or ornamental devices largely, if not entirely through the agency of heat. Hence, the development of the furnace became necessary as the agency to be used for the melting of their metals and alloys. Due to the fact that they possess peculiar characteristics while in the molten state and while melting and forging, there has been continued effort from the earliest times to improve this most important heating device to meet the requirements.

The earliest furnaces for melting were probably the charcoal forges, and following this all classes of fuel-fired furnaces have been utilized with varying degrees of success, until we come to-day to the electric furnace as the latest type that is asking for the opportunity to demonstrate to the non-ferrous metal founder that it is free from many of the physical chemical and economic handicaps inherent in the "brass furnace" of the past.

Requirements for Economical Brass Melting

Satisfactory and economical melting of non-ferrous metals and alloys requires a furnace of the following specifications:

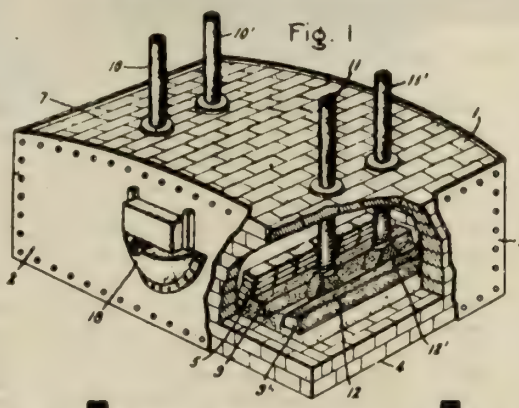
(a) Freedom from oxidation of metals or alloys while in the furnace, in fact deoxidation of metals or alloys in some degree is usually advantageous.

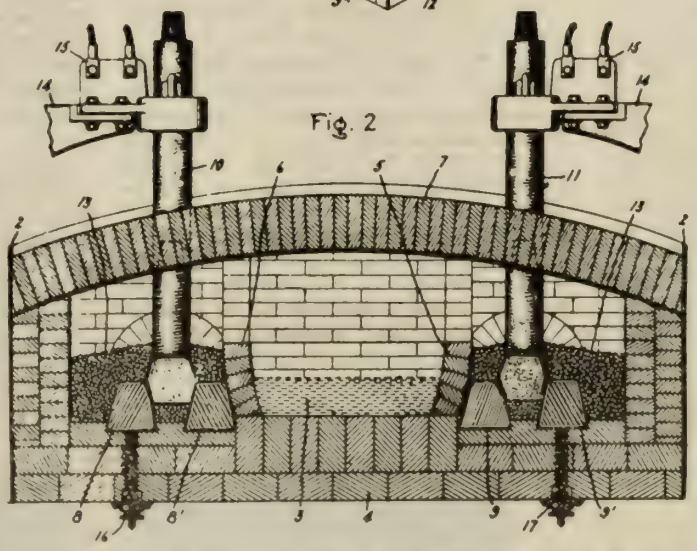
(b) Freedom from volatilization of metals should exist subsequent to their liquidfication and while in the molten state, to prevent loss of metal in the form of escaping vapor which usually oxidizes upon its escape from furnace to air, when the furnace atmosphere is neutral or reducing, i.e., free from oxygen.

(c) Freedom from slags during melting, which slags come from over-heated linings, dirt from scrap, oxides from metals, etc. This allows of dry skimming (during melting) of dirt, sand, and other impurities, without entrained metal in form of shot in the fused slag, that must subsequently be crushed and metal reclaimed by a more or less elaborate process. The furnace should not require the maintenance of an elaborate and expensive reclaiming plant. In other words impurities should float on the top of the bath in the furnace, in dry powdered form so that they may be skimmed from the surface of the bath. The furnace should allow of the use of sal ammoniac or other flux to aid in cleaning the metal while molten in the furnace, but it should not regularly require the use of such a flux to give perfect metal; neither should the bath require charcoal covering while melting or subsequently while held in furnace.

(d) Uniformity of the alloy and the absence of segregation should exist when the furnace charge has reached the pouring stage. i.e., test bars should show uniform physical characteristics throughout their length, and an alligator surface if you please, a perfect fracture, and satisfactory crystallation and lack of segregation under microscopic examination.

(e) Furnace linings and atmosphere must be free from sulphur in the slightest degree, and the furnace atmosphere controllable as regards oxygen when melting copper and many rich alloys rich in copper in order to produce satisfactory foundry castings of sound metal, since copper greedily absorbs sulphur and oxide when hot which give rise to trouble on cooling. In fact furnace melting chambers should be free from contaminating influences, coupled with a controllable atmosphere with respect to oxygen, in which case electrolytic cathodes, free from salts of the electrolytic bath may be melted down and be poured "at pitch" without "rabbling and poling," thus eliminating the use of the present-day reverberatory copper refin-





FIGS. 1 AND 2—SECTIONAL VIEWS OF BRASS MELTING FURNACE.

FIG. 3—INSTALLATION OF BRASS MELTING FURNACE.

ing furnace and permitting the making of brass directly from cathode copper as well as cathode zinc, thus saving one refining operation on copper and one melting or "pigging" operation on zinc.

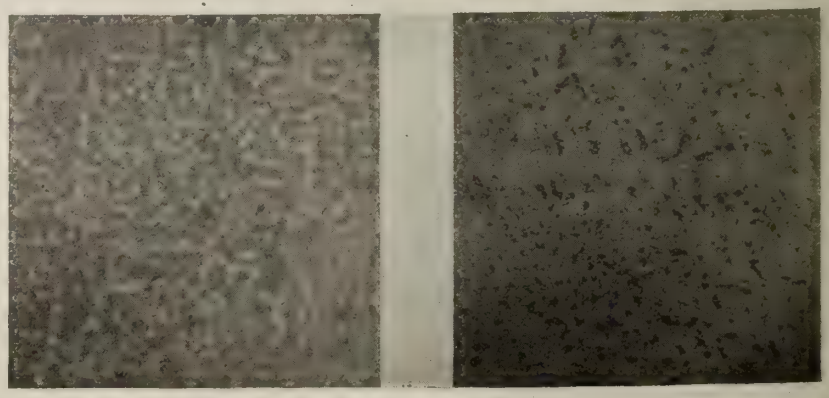
(f) Large capacity furnaces which do not involve the use of, and handling of crucibles are desirable where local conditions will permit. Large furnaces promote economy, due to higher thermal efficiency, save floor space in proportion to metal melted, save in labor, save in cost of lining per ton metal melted, especially when compared to crucible cost, their storage, drying and tempering, spill from broken crucibles, etc. To be sure where metal is melted in large furnaces, pre-heated hand ladles or crucibles are used to transfer metal to molds, especially where small foundry castings are being made, and it is important that these ladles or crucibles be well and properly pre-heated before using, especially when pouring small parts such as ½ in. brass valves, etc., in order to get satisfactory work, but the burden of the pre-heated crucible is eliminated several times over by the many advantages coupled with the use of the non-crucible tilting furnace above ordinary crucible capacities.

Refractories

Furnace linings should in the main be built from commercial refractories of moderate cost at all times available, such as standard fire brick and shapes, with limited use of special refractories where the results justify their usage, rather than use special refractories, which can be procured only at high price and with more or less difficulty and uncertainty. If the foundry man or melter will make repairs upon his linings at least once every two weeks, and when in severe service once each week, his lining cost will be much less than when special high-priced refractories are used and repairs and inspection of linings are less frequent. The refractoriness of linings should be such that it will not fuse or slag perceptibly at melting temperatures. Their inner surface should be glazed over at temperatures above the metal melting zone; this guards against slag formation during the melting process, assuming that no chemical reaction occurs between metal and hearth to reduce the fusion point of refractory. As an illustration the presence of lead in brass melting, fluxes refractories at temperatures at which they are immune in contact with the same bath free from lead.

(g) The melting chamber should be arranged so that its atmosphere may be reducing, neutral or oxidizing for certain metals and alloys, i.e., to repeat, its oxygen should be controlled. A certain flow of gas through the furnace may be required at times and at others a "dead" or "still" atmosphere is absolutely necessary. No advantage, however, is secured in attempting to hermetically seal the furnace unless some process of distillation is attempted. Hence, if doors are made to enter the furnace it is only necessary that they close in such a manner and are of such construction as to prevent an undue loss of heat and circulation of gases in the furnaces when they are closed. A single small opening in the furnace such as is required for stirring the bath or pouring may produce a sort of breathing of furnace when the vent is open, but loss of heat or metal is not appreciable if the furnace is being properly manipulated.

(h) Shallow bath promotes a more uniform and rapid melting and freedom from segregation than the deep bath. The source of heat should be a uniform mild "soaking" heat, and its temperature gradient above the bath should be moderate. This is due to a large absorbing surface, the bath takes in a large quantity of heat at a low heat potential. This transfer of heat to the metal is accomplished most successfully by radiation to the top of the bath and conduction to the bottom. Should the source of heat be only slightly higher than the charge when the fusing point of metal is reached, the metal may be held for an indefinite period within that zone of temperature above the fusing point in which vapor tensions are not sufficiently high to cause appreciable loss of metal from volatilization. In other words, if the source of heat is such that its temperature lies in the temperature zone safely below the destructive distillation point of the metal, then the bath can in no manner exceed it. A safe way in securing this heat control is to limit the temperature of the heat source by means of a pyrometer. Pyrometers are available at present, that live a satisfactory period in certain brass furnaces, which make their use entirely practical. It follows from the above that furnace design should be such as to allow of the source of heat being held at any temperature desired, just as one may vary the heat in a carbon filament carrying electric current, as against the same power expended in a carbon electric arc, i.e., the electric filament may have its temperature fixed at any point up to about 3,000 deg. C., whereas the carbon arc has a temperature of 3,000 deg. C. (approx.) which changes little with the size or power of the arc so long as the arc continues to burn. Likewise an efficient powdered coal flame or fuel oil flame is inherently a high temperature source, unsuited to best results in melting volatile metals and brasses. This is evidenced by the fact that brass alloys cannot be held in the oil furnace without

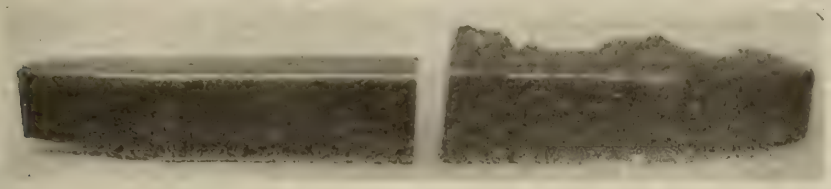


MICRO-PHOTOGRAPHS SHOWING POROSITY IN SAND CASTING DUE TO RELEASE OF ABSORBED GASES WHEN METAL FREEZES.

marked deterioration and loss of metal after it is ready to pour.

(i) Dependability and continuity of operation.

(j) Heat distribution should be fixed and if possible automatically controlled, i.e., heat received by radiation as related to that received by conduction should be such as to secure uniform heat of bath. If any variation in the ratio of heat radiated to top of bath and that conducted to bottom is permissible, this variation should allow of reduction of radiant heat at top of bath at once as the fusing temperature is reached for subsequently, due to the fact that when bath is liquid its bottom convected heat will give uniformity of temperature to the bath.



WIRE BAR AT PITCH.
CU—99.87
O— .084
S— .0022
CONDUCTIVITY NO. 12 WIRE 99.3
TENSILE STRENGTH NO. 12 WIRE 65207.
ELONGATION.

CU WIRE BAR (SULPHUR ASBORPTION)
SAME METAL FROM FURNACE AS NO. 1.
SULPHUR ABSORBED FROM POURING CRUCIBLE.

COPPER WIRE BAR SHOWING EFFECT OF GAS ABSORPTION.

FIG. 5—EFFECTS OF SULPHUR ON COPPER.

Electric Brass Melting Furnace

The foregoing sets forth more or less in detail the requirements for economy in melting brass alloys. It is now desired to consider the characteristics of the electric furnace and see how completely the electric furnace overcomes the obstacles met within the fuel-fired furnaces for melting non-ferrous metals and their alloys.

Classification of Electric Furnaces

Class 1

Furnaces in which heat is developed by the passage of current through a solid, laminated or granular conducting medium or resistor.

(A) The conducting medium may consist of material that is to be treated.

(B) The heat developed in the "resistor" is transferred to the charge by conduction or radiation, or both; a wall may or may not intervene between "resistor" and charge.

(C) A readily controllable amount of heat is generated between a fixed and movable carbon electrode, their distance apart being maintained such that the granular carbon lying between the faces gives rise to many chains of series and multiple contact or resistance arcs, enveloping adjacent electrode faces.

Class II

Furnaces in which heat is developed by the flow of current through a liquid or solid conductor.

A.—Electrolytic.

B.—Non-electrolytic.

Class III

Furnaces in which heat is developed by flow of current through gas or air.

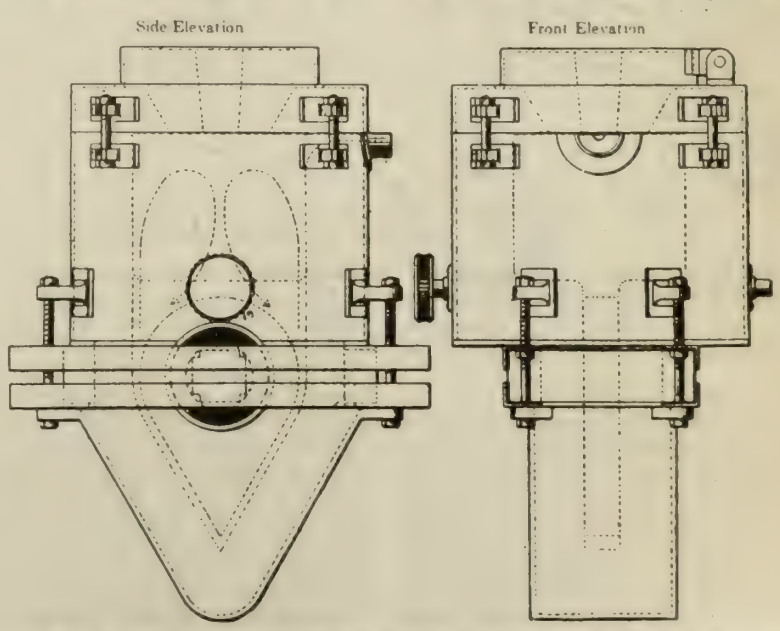
(A) Arc furnaces in which arcs play between two or more electrodes near the material to be heated or between on or more carbon electrodes and the charge to be heated.

In the making of brass, furnaces lying in each of the three classes have been tried out. Furnaces lying in Class 1 and 2 lend themselves readily to the generation and control of a mild "soaking" heat such as is required for melting volatile alloys. As illustration the common resistance furnace lies in Class 1, and the induction furnace in Class 2. Furnaces in Class 3 generate too intense and burning a heat to be used with even questionable success in melting volatile alloys without the use of much unnecessary manipulation and watchfulness, requiring much skill. Control of the electric arcs in atmospheres high or low in volatile gases, freedom from surging, and low power factor and high metal loss are some of the serious problems confronting the man who would melt volatile alloys in the Class 3 arc furnace. Their employment had best be left for steel.

The speaker has had several years' experience with furnaces falling in Class 1 and Type C of the above classification, and it is upon experience gained from many tests as well as from its commercial operation in the foundry that the basis of this paper rests. I hope my hearers will, therefore, pardon me if I describe somewhat in detail the design and construction of this type of furnace and point out to you why it is suited to melting the non-ferrous metals and their alloys.

Description and Design of Furnace

This furnace is shown in section in Fig. 2. It will be noticed that it consists essentially of a refractory lined case, within which are located in the same chamber the heating units lying on either side of the melting hearth (3). The source of heat is (13) and lies in a duct separated from the bath by carborundum walls 5 and 6. This duct is fitted with cross electrodes 9, Fig. 1, and with wearing blocks, 12 under each of two vertical electrodes projecting through the arched roof. These cross electrodes in bottom of dust as well as the wearing blocks between them and vertical elec-



FRONT AND SIDE ELEVATION DIAGRAM OF AN INDUCTION TYPE FURNACE.

trodes, are carbon. The whole duct is filled with granular coke to the height of bridge wall 5 and 6 on either side of hearth. Neutral electrodes 16 and 17 make contact with cross electrodes 8 and 9. These neutral electrodes are for the sake of automatic control as will be seen later. The vertical electrode carries a water-cooled ring where it emerges from the top arch, a cable clamp for electrode (15) Fig. 2 is also water-cooled. The two vertical electrodes (11) are terminals of one phase, while those marked 10 are terminals of another. In other words the furnace is inherently two-phase. By multiplying the two phases, however, it may be operated single-phase, or by using Scott transformer connections it may operate from a three-phase source. The phase voltage most satisfactory has been found to be 60 to 70 volts.

tween electrode 12 and wearing block 11 is held to correspond to one-half the phase voltage, i.e., 30 to 40 volts. A rheostat on the control panel allows for the setting of the control for any current value required, and when once set for a given value, this value is held until the rheostat position is changed by the furnace operator. Hence the power input is automatically held constant and is subdivided equally between the vertical electrodes. Starting with a cold furnace, heat is generated first in the granular carbon separator lying under the bottom face of the vertical electrodes. This immediately becomes incandescent by virtue of current carried by the carbon granules and is also heat generated in a multitude of contact arcs enveloping the lower end of vertical electrode. Heat is at once taken from this source by the granular coke in trench and its whole surface be-

throwing the heat received from the incandescent coke ducts on either side of the hearth uniformly on the hearth or bath. This heat is very uniform and what is called a mild "soaking heat," and hence lends itself well to the melting of brass or volatile metals, especially is this a fact since a part of heat supplied is supplied to the bath from the bottom and sides.

To enumerate briefly some characteristics of the above described furnace which make it essentially suited to melting non-ferrous metals and their alloys, we have the following: (1) Temperature of heat generating source controllable at will. (2) Heat generated is of the mild "soaking" type, uniformly distributed, and any workable temperature gradient may be maintained between the charge and heat source. (3) Heat is received by the charge from above, on

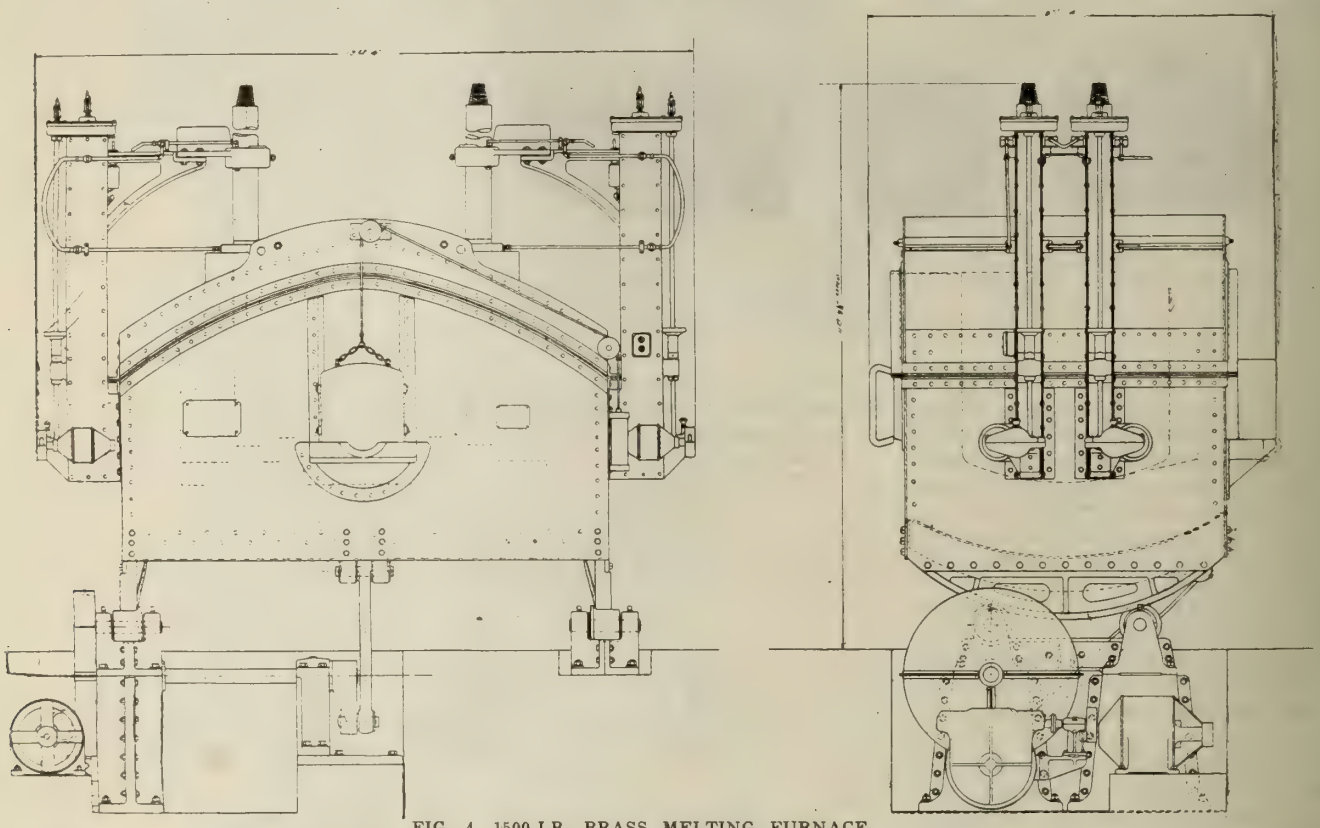


FIG. 4—1500-LB. BRASS MELTING FURNACE.

By reference to Fig. 1 the detail arrangement of the electrodes, etc., in the resistor duct is evident. The operation of the furnace in generating heat is as follows:

When current is supplied to the vertical electrodes of phases, it flows through the vertical electrodes 10 and 11 through a short space filled with granular carbon to the wearing block (12), Fig. 1, into the cross electrodes (9) into second wearing block (12) and out to line through the second granular coke strata and second vertical electrode. The value of the current is regulated automatically by varying the distance between the vertical electrodes and the wearing block. In other words by means of a current controlled relay the distance between 11′ and 12′ is governed, also by means of a voltage-controlled relay connected to the neutral bottom electrodes and vertical electrode 11, the distance be-

comes heated to the desired point. The surface of the granular carbon radiates heat to the arched roof, and the body of granular carbon and wearing block with cross electrodes, conduct heat to the furnace walls and to the sides and bottom of hearth with which they are in contact. Furthermore, as the furnace becomes heated a certain amount of current flows from the vertical electrode 11′ to vertical electrode 11 directly through the granular coke in a way similar to the simple carbon resistance furnace. This heat may be as much as 30 per cent. of that developed locally at each vertical electrode as above described through contact arcs and resistance. This heat is largely radiated to the roof since it is generated largely in the upper surface of the coke body. In addition to serving as enclosing wall of the furnace the roof is so shaped that it acts as a highly efficient reflector,

sides and through bottom. (4) Bath is comparatively shallow and large surface is exposed to receive heat, (bath depth is approximately 6 in. in 1,500 lb. furnace.) (5) Furnace has normally a reducing atmosphere, which may readily be made neutral or oxidizing. (6) Automatic control of power, requiring little attendance. (7) Furnace atmosphere free from contaminating gases. (8) "Dead atmosphere" practically restrained from escape exists normally in furnace. (9) Temperature is controllable, so that slags do not form in melting brass. Hence simplicity of metal recovery from dirt skimmed from top of bath in furnace. (10) The furnace may be "forced," i.e., heat may be fed to metal as fast as it is absorbed and high rate of melting results with all its advantages and none of the disadvantages met with in dual fire furnaces.

(To be continued.)

Canadian Machinery Drafting Course, Part VI

In This the Last Portion on the Subject of Geometrical Drawing, We Go Still Further Into the Definitions of Geometrical Terms, Also Continue With Other Four Problems

By J. H. MOORE, Associate Editor Canadian Machinery

BEFORE proceeding with this, the last portion on the subject of geometrical drawing, let us review briefly where we left off in the other two parts published. We have so far gone through the definitions, from a straight line up to the discussions of quadrilateral figures, and have also completed twelve problems dealing with the preceding matter discussed in these two former parts, so now let us first continue with the geometrical definitions before entering any further actual problems.

Circles

We have so far not stated in defined terms what a circle actually is, so let us consider this point.

A circle is a plane figure bounded by a curved line called the circumference, every point of which is equidistant from a point within commonly called the center of the circle.

A circle in turn has other lines which can run through it, each having their proper name, so let us consider a few of these.

Referring to the chart at Fig. 1, we first see the circle itself, O being the center point. Fig. 2 shows certain added lines to the circle, each having their proper name, A being the diameter, B the radius, and C the tangent to that circle. From this we gather that—

The diameter of a circle is a straight line drawn through the center, terminating at both ends in the circumference.

The radius is a straight line joining the center with the circumference.

The tangent is a straight line which touches the circumference at only one point, called the point of contact.

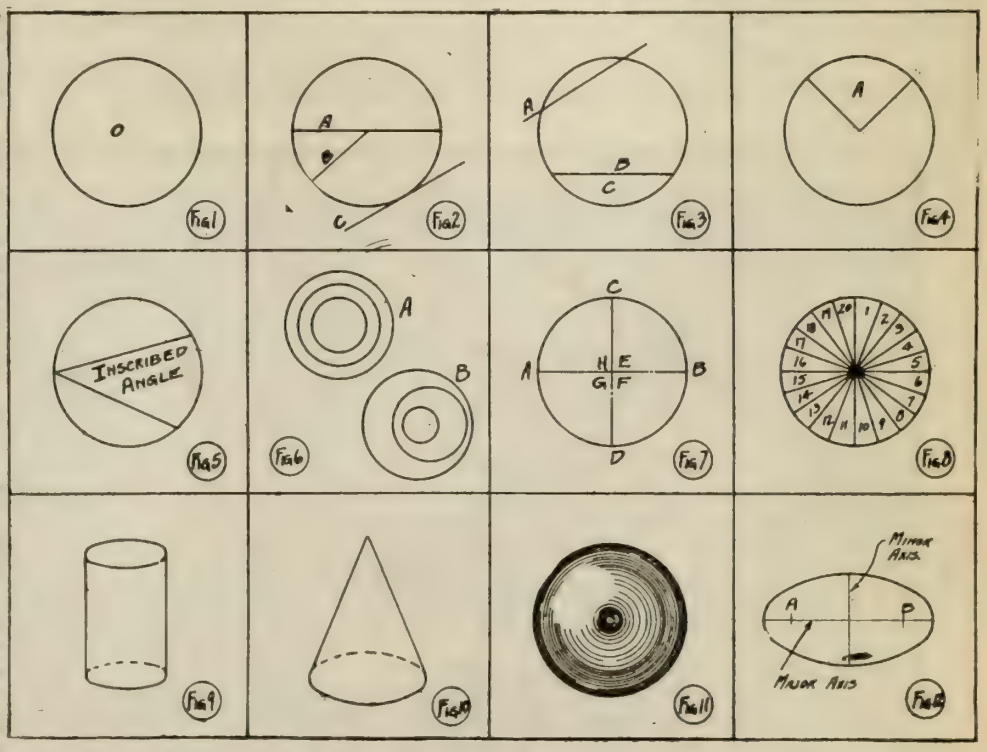
Fig. 3 carries us still further. Here we see a line A passing through two points on the circumference. This is known as a secant. The line B represents a chord of a circle, or a straight line which joins the extremities of an arc, but does not pass through the center of the circle. The space, or area C included between the arc and the chord line B, is called a segment of a circle.

Fig. 4 again shows some further terms. The space or area A is called a sector, that is, the area included between an arc and two radii drawn to the extremities of the arc.

Fig. 5 illustrates what is termed as an inscribed angle, that is, an angle whose vertex lies in the circumference, and whose sides are chords of a circle. Fig. 6 at A shows concentric circles, while at B are shown eccentric circles, the meaning of each term being self-apparent, namely, that concentric means having a common center, while eccentric means the very opposite.

The Measurement of Angles

Before passing on to the next figure let us for a moment consider what we know about angles. We have so far learned in this course regarding the triangles used, namely, the 30°-60°; also the 45°. On each of these there is one angle, which is termed a right angle, which as we all know, equals 90°. To go still further, we know that if we construct a circle as shown at Fig. 7, and draw diameter lines AB and CD at right angles, that we obtain the angles E, F, G and H, each equal in turn to 90°, or four times 90 or 360 degrees for the complete circle.



FIGS. 1 TO 12—FOLLOW THESE CLOSELY WITH THE TEXT.

Having established in the reader's mind this point clearly, let us pass on to Fig. 8. Here we see a circle divided into 20 parts. Each of these parts is equal; therefore we can take 360 and divide it by 20, which shows us that the angle in each separate sector is 18 degrees. We only point out this illustration to start the germ of the idea of angles into students' minds, for it is something which will very soon crop up in this course, when naturally we will go into the matter deeper. In the meantime students should remember that a circle has always 360 degrees, a semicircle (or half a circle) 180 degrees, and that the sum of the angles on any triangle must always equal 180 degrees.

Solids

We shall now consider solids. First, what is a solid?

A solid has three dimensions—length, breadth and thickness. (Readers will remember that plane figures had only two dimensions—length and breadth.) Solids are subdivided into classes, the more generally used of which are cylinders, cones and spheres. Fig. 9 shows a cylinder, Fig. 10 a cone, and Fig. 11 a sphere.

A cylinder is a solid having two equal parallel surfaces as bases, these being bounded by curved lines. The bases are usually circles, and such cylinders are called circular cylinders.

A right cylinder is one whose side is perpendicular to its bases. Fig. 9 illustrates a cylinder of this type.

A cone is a solid bounded by a conical surface and a plane which cuts the conical surface. The plane is called the base, the point which it tapers up to is called the vertex. The altitude of a cone is the perpendicular distance from the vertex to the base.

A sphere is a solid bounded entirely by a curved surface, every point of which is equidistant from the centre of the circle. A ball is a sphere, provided it

is entirely round. Fig. 11 represents clearly the construction of a sphere. The shading on this view is given merely to create the appearance of the ball being round.

Let us now give one more definition before starting on plate No. 6.

An ellipse (illustrated at Fig. 12) may be defined as follows:

An ellipse is a curve generated by a point moving in a plane, and in such a manner that the sum of the distances from the point to two fixed points shall always be constant.

The two fixed points are called foci (see Fig. 12 at A and B) and lie on the longest line that can be drawn through the ellipse. This line is called the major axis. The shortest line is called the minor axis, and is perpendicular to the major axis, at its center or middle point.

An ellipse can be easily constructed if its major and minor axis be known.

Let us now proceed with plate No. 6.

The dimensions as before are the same, 9x13 in. The size of the plate, 9½x13 in., the trimming lines. The 1 in. space at the bottom is marked off for the title, and the remaining space, 8x13 in., divided into four parts as shown.

Plate No. 6

Problem 1: To draw a line tangent to a circle at a given point on the circumference.

With O as a center, draw a circle 2½ in. diameter. Assume a point B on the circumference, and join B with O. Now construct a perpendicular to BO in the following manner: Produce the line BO to C. Choose any center D and describe a circle of such radius that it will cut through point B. Where this circle intersects with the line BOC call by the letter E. Join E and D, producing it out to F. From F draw a line to B, and produce the same out beyond the circle as shown. This line will be tangent to the circle first made.

Problem 2: To construct an egg-shaped oval: From a center O, with a radius of 1½ in., describe a circle. Through the center O draw AOB; also a line OC perpendicular to AOB, cutting the circumference of circle at C. Draw the straight lines AD at BE. With A and B as centers, and the distance AB as a radius, describe arcs terminating at F and G. With C as a center, and CF as a radius, describe the arc FG, when you now have the egg-shaped oval complete.

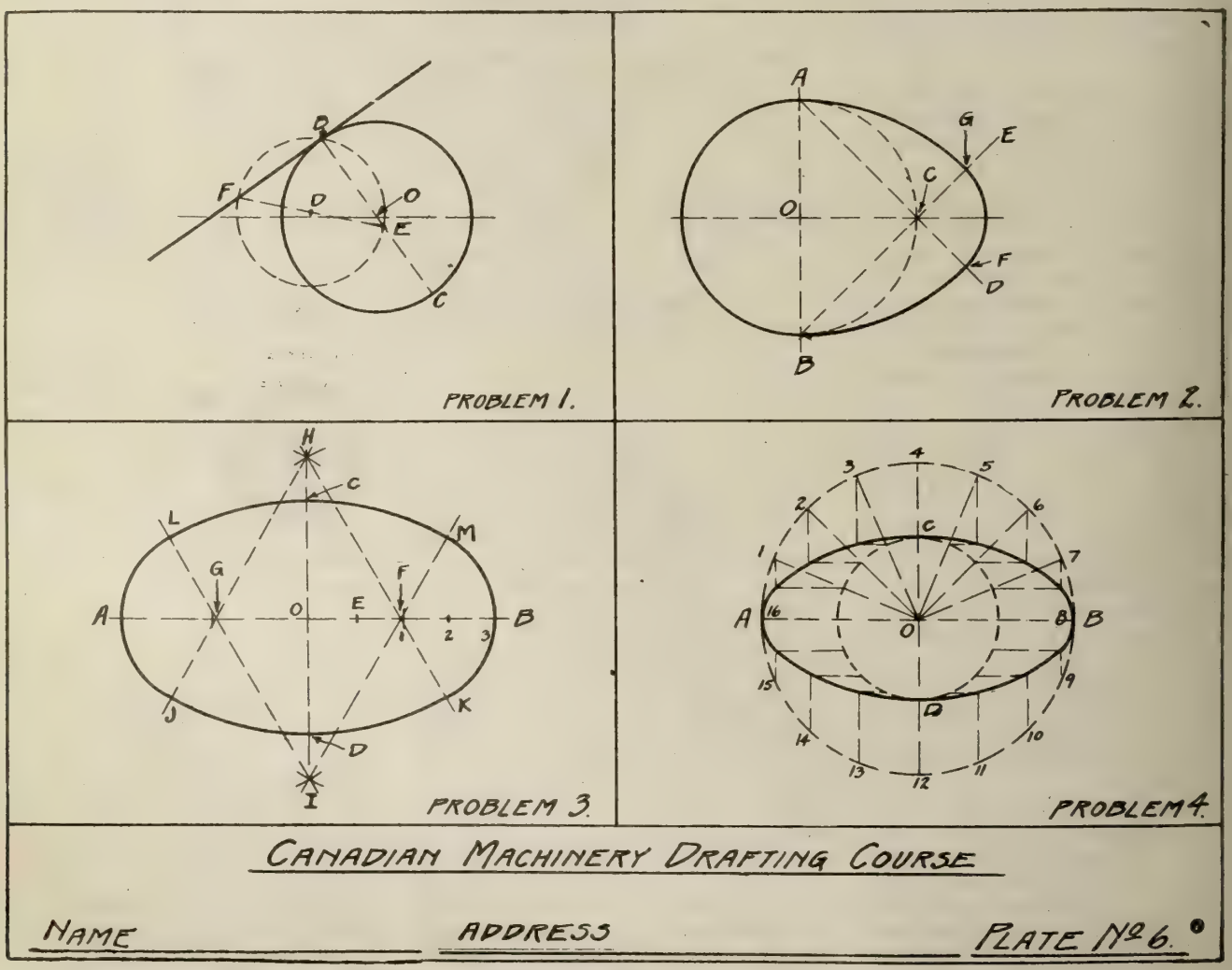
Problem 3: To draw an ellipse by circular arcs.

Such an ellipse is not a true ellipse, but suitable for many purposes.

Draw AB 4½ in. long, CD 3 in. long. On the major axis AB, make AE equal to CD, then divide EB into three equal parts. With O as a center and a radius equal to two of these divided parts, describe arcs cutting at F and G. With FG as a side, construct two equilateral triangles FGH and FGI, and continue these lines as shown. With H as a center, and a radius HD, describe the arc, cutting at J and K. Then with the same radius, but with I as a center, describe a similar arc, cutting at L and M. With A and B as centers, and a radius equal to the chord of the arcs AJ or BK, describe arcs, cutting AB near the points F and G. From these new points of intersection as centers, and with the same radius, describe the arcs JAL and KBM. Your ellipse is now complete, although, as said before, not absolutely accurate.

Problem 4: To construct an ellipse by the exact method, the diameters being given.

Let AB be the major axis 3½ in. long, CD the minor axis 2¼ in. long. With O as a center and OD as a radius, describe a circle. With O as a center, and OA as the radius, describe another circle. Divide each circle into a similar number of parts, the more parts, the more accurate the ellipse. For our purpose we



HERE IS PLATE NO. 6—LET US SEE YOUR WORK AS EARLY AS POSSIBLE.

will say 16. This is best done by dividing the larger circle into 16 parts, then drawing radial lines into the center as shown on the top portion of the drawing. Through these points of division on the inner circle draw horizontal lines and through the points of division on the larger circle draw vertical lines, the points of intersection being the points on the ellipse. Trace a curve through these points, placing an irregular curve on them in such a manner that its bounding points will pass through at least three intersection points. Be careful not to make your curve too flat. Then adjust your curve from time to time until the figure is completed. It requires considerable practice to draw a good curved line by this method, and readers would do well to practise this problem on a separate piece of paper before putting it on the plate. The neater the work, the better looking the curve, and a great deal depends on the student's taste and accuracy of eye.

Now having completed the third portion on geometrical drawing, we will in our next plate take up an entirely different subject, so keep your eye open for the next issue on this course, sending your work along as usual in the meantime. Have you secured a prize as yet? If not, why not this time?

Prize winners for Plate No. 3 will be announced in our next issue.

IMPORTANT NOTICE

It has been suggested that we discontinue our drafting series during the summer months, as owing to the hot weather our students may not feel inclined to work in the evenings.

So far our readers are responding admirably to this course, and we feel it would not be fair to discontinue this series without first placing the matter strictly up to the ones mostly concerned, namely, our students.

What do you think about it, students? Do you wish us to drop this series until the first of September, or will you plug along? If you will—we will.

Let us hear from every one interested in this course, for above all, we want to please.

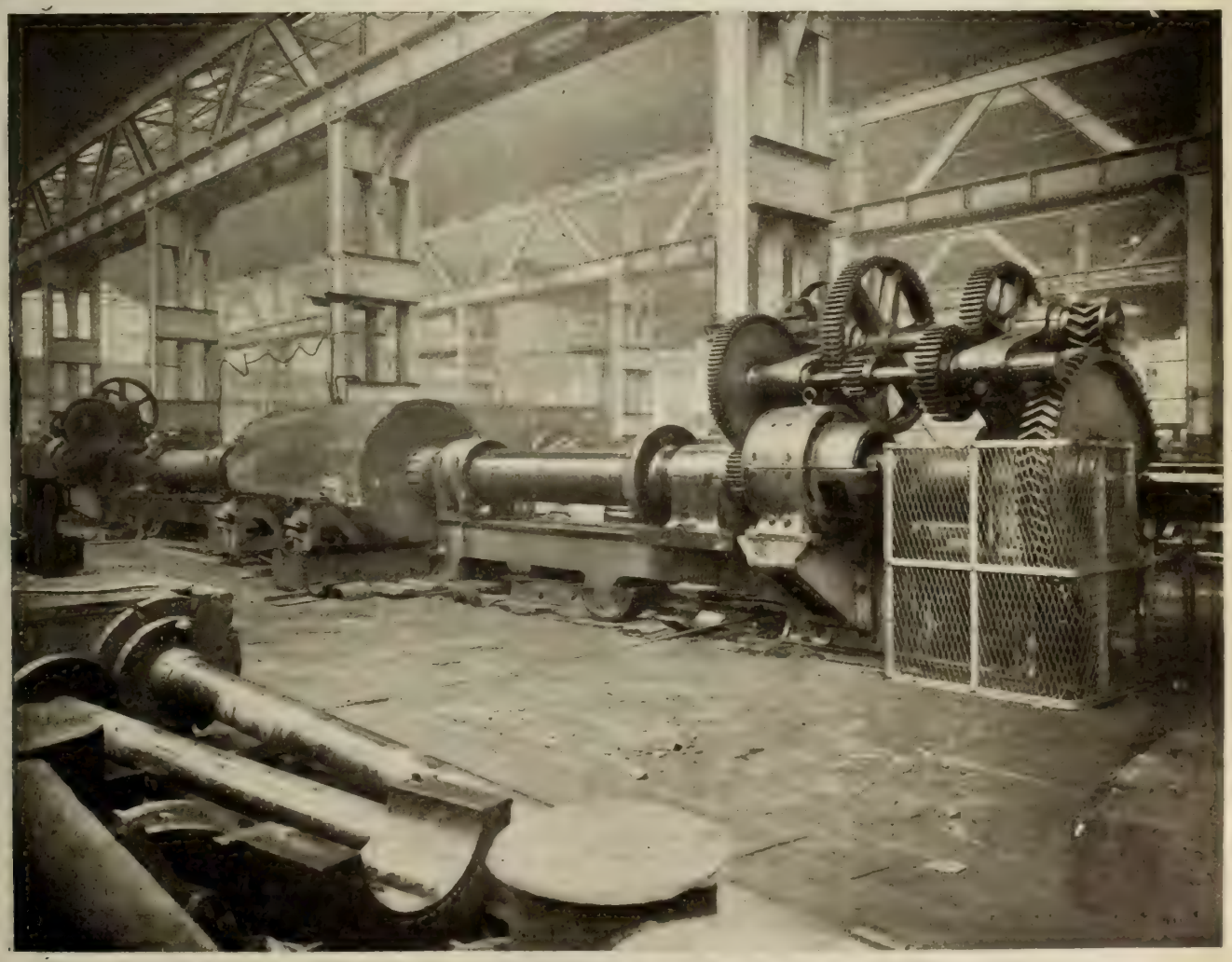
Tear off and send with drawing

Name .....

Address .....

Position .....

Firm's name.....



TREPANNING AN INGOT AT MESSRS. VICKERS, LTD., SHEFFIELD, ENGLAND.

WELDING AND CUTTING

Inspection of Metallic Electrode Arc Welds

An Article Relating to Determining the Character of Welded Joints, Touching on the Kerosene and Electrical Methods of Test, Together With Heat Treatment and Inspection

By O. S. ESCHOLZ, Research Engineer, Westinghouse Electric and Manufacturing Company

DETERMINING the character of welded joints is of prime importance, and the lack of a satisfactory method, more than any other factor, has been responsible for the hesitancy encountered among the engineering profession towards the extensive adoption of arc welding. To overcome this prejudicial attitude it is eminently desirable to shape our rapidly accumulating knowledge of operation into an acceptable method of inspection.

Manufactured apparatus is practically all accepted on the basis of complying with a process specification rigidly enforced in conjunction with the successful reaction to certain tests applied to the finished product. Riveting, it is commonly known, seriously impairs the strength of the joined plates, yet with proper layout and intelligent inspection, the completed structure possesses certain definite characteristics which do not require further verification. The inspector of a finished concrete structure is practically helpless. The weakest sort of construction may be concealed by a sound surface, quite possibly. With a careful supervision of the process, however, the physical properties of the completed structure can be reliably gauged to the extent that its use is justified even in ship construction. With this in view, it is satisfying to realize that electric arc welding is susceptible to even better control than either of these structural operations.

How to determine the character of a weld.

The four factors which determine the physical characteristics of the metallic electrode arc welds are: fusion, slag content, porosity and crystal structure.

Some of the other important methods that have been suggested and used for indicating these characteristics are:

(1) Examination of the weld by visual means to determine: (a) finish of the surface as an index to workmanship, (b) length of deposits, which indicates the frequency of breaking arc, and, therefore, the ability to control the arc, (c) uniformity of the deposits, as an indication of the faithfulness with which the filler metal is placed in position, (d) fusion of deposited metal to bottom of weld scarf as shown by appearance of under side of welded joint, (e) Predominance of surface porosity and slag.

(2) The edges of the deposited layers chipped with a cold chisel or calking tool to determine the relative adhesion of deposit.

(3) Penetration tests to indicate the linked unfused zones, slag pockets and porosity by: (a) x-ray penetration, (b) rate of gas penetration, (c) rate of liquid penetration.

(4) Electrical tests (as a result of incomplete fusion, slag inclusions and porosity), showing variations in: (a) electrical conductivity, (b) magnetic induction.

These tests if used to the best advantage would involve their application to each layer of deposited metal as well as to the finished weld. This, excepting in unusual instances, would not be required by commercial practice, in which a prescribing welding process is carried out.

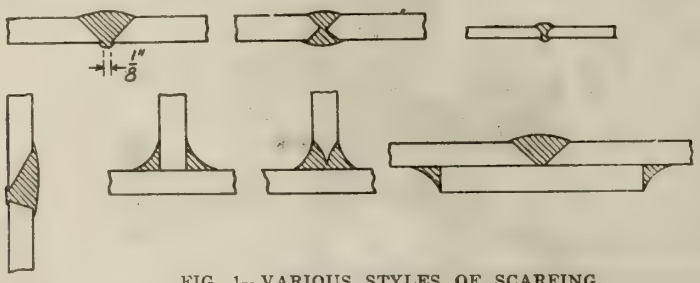


FIG. 1—VARIOUS STYLES OF SCARFING.

Of the above methods the visual examination is of more importance than generally admitted. Together with it, the chipping and calking tests are of particular usefulness. The latter test serves to indicate gross neglect by the operator of the cardinal welding principles, due to the fact that only a very poor joint will respond to the tests.

The most reliable indication of the soundness of the weld is offered by the penetration tests. Obviously the presence of unfused oxide surfaces, slag deposits and blow holes will offer a varying degree of penetration. Excellent results in the testing of small samples are made possible by the use of the x-ray. However, due to the nature of the apparatus, the amount of time required and the difficulty of manipulating and interpreting results, it can hardly be considered at the present time as a successful means to be used on the large scale production.

The rate that hydrogen or air leaks through a joint from pressure above atmospheric to atmospheric, or from atmospheric to partial vacuum can readily be determined by equipment which would be quite cumbersone, and the slight advantage over liquid penetration in time reduction is not of sufficient importance to warrant consideration for most welds.

Kerosene, of the various liquids that may be applied, has marked advantages, due to its availability, low volatility and high surface tension. Due to the latter characteristics kerosene sprayed on a weld surface is rapidly drawn into any capillaries produced by incomplete fusion between deposited metal and weld scarf, or between succeeding deposits, slag inclusions. gas pockets, etc., penetrating through the weld and showing the existence of an unsatisfactory structure by a stain on the emerging side. A bright red stain can be produced by dissolving suitable oil soluble dyes in the kerosene. By means of this test, the presence of faults have been found that could not not be detected with hydraulic pressure or other methods. By the kerosene pen-

FIG. 2 AND FIG. 3.

etration. a sequence of imperfect structures linked through the weld, which presents the greatest hazard in welded joints, could be immediately located. It must be borne in mind, however, that this method is not applicable to the detection of isolated slag or gas pockets, nor small disconnected unfused areas. It has been shown by various tests, however, that a weld may contain a considerable amount of distributed small imperfections, without affecting, to a great extent, its characteristics.

If a bad fault is betrayed by the kerosene test, it is advisable to burn out the metal with a carbon arc before rewelding under proper supervision. By the means of sand blast, steam, gasolene, etc., large quantities of kerosene are preferably removed. No difficulty, however, has been encountered on welding over a thin film of the liquid.

Electrical test methods by which the homogeneity of welds are determined, are still in the evolutionary stages. Obvious difficulties are yet to be overcome before the electrical test is feasible. Some of the difficulties are the elimination of the effect of contact differences, the influence of neighboring paths and fields, and the lack of practicable. portable instruments of sufficient sensitivity for the detection of slight variations in conductivity or magnetic field intensity. No simple tests are plausible, excepting those which involve subjecting the metal to excessive stresses, for determining the crystal structure. Control of this phase must be determined by the experience obtained from following a prescribed process.

The inspector of metallic arc electrode ing tests a more definite appraisal of the welds may consider that through the proper use of visual, chipping and penetrat- finished joint may be secured than is possible in either riveting or concrete construction. The operation may be still further safeguarded by requiring rigid adherence to a specified process.

Good results are assured if correct procedure is followed.

Haphazard welding can no sooner produce an acceptable product than hit-or-miss weaving will make a marketable cloth. It is only logical that all the steps in a manufacturing operation should regulate so as to obtain the best possible results. As it is, and most unfortunately, most welders consider themselves pioneers in an unknown art that requires the exercise of a peculiar temperament for its successful evolution. As the result, welding operators enshroud themselves in the hallow glow of an expert, do their work with a mysterious camouflage bewildering to the untutored. Once in a while, due to, we might say coincidences, these "experts" are successful in obtaining a good weld, but more often the good weld is attributable to the friction between slightly fused, plastered deposits.

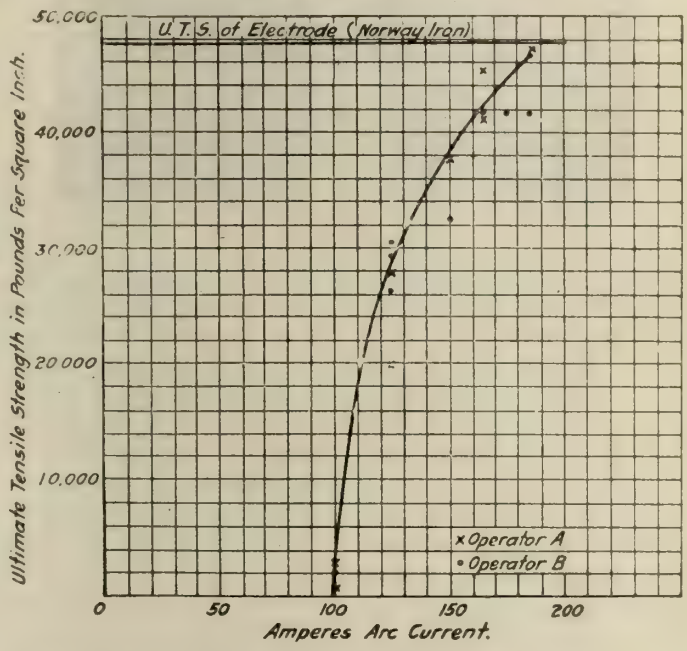


Fig. 5—Variation in Weld Strength With Change in Arc Current

FIG. 5—VARIATION IN WELD STRENGTH WITH CHANGE IN ARC CURRENT.

In common with all other operations, metallic electrode arc welding is really susceptible to analysis. Regardless of the metal welded with the arc, the cardinal steps are:

1. Preparation of weld.
2. Electrode selection.
3. Arc current adjustment.
4. Arc length maintenance.
5. Heat treatment.

Sufficient scarfing is involved in the preparation of the weld, as well as the separations of the weld slants, so that the entire surface is accessible to the operator with a minimum amount of filling required. When necessary to avoid distortion and internal stresses due to unequal expansion and contraction strains, the metal is preheated or placed

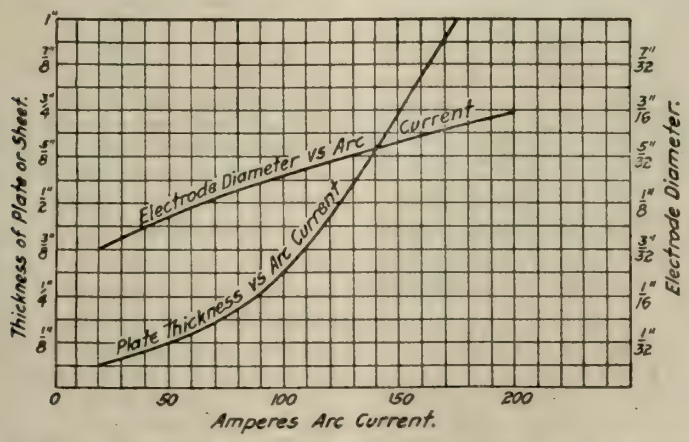


FIG. 4—CHART SHOWING APPROXIMATE ARC CURRENT AND ELECTRODE DIAMETERS FOR WELDING STEEL PLATE OF VARIOUS THICKNESS.

so as to permit the necessary movement to occur. Various types of scarfs in common use are shown in Fig. 1.

The electrode selection is determined by the mass, thickness and the constitution of the material to be welded. An electrode free from impurities and containing about 17 per cent. carbon and 5 per cent. manganese, has been found generally satisfactory for welding low and high carbon, as well as alloy steels. This electrode can also be used for cast iron and malleable iron welding, although more dependable results, having a higher degree of consistency and permitting machining of welded sections, can be obtained by brazing, using a copper aluminum iron alloy electrode with the aid of some simple flux. Successful results are obtained by brazing copper and brass with this electrode. The diameter of the electrode should be chosen with reference to the arc current used.

The Effect of Too Low Current Values

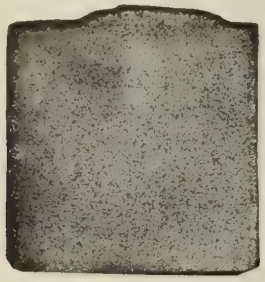
A great many concerns have attempted welding with too low an arc current, and the result has been a poorly fused deposit. This is due largely to the overheating characteristics of most electrode holders, on using current value, and thus leading the operator to come to the conclusion that the current used is in excess to the amount needed.

Fig. 2 shows a section through one-half of an exposed joint welded with the proper current, while Fig. 3 shows the effects of too low a current. The homogeneity and the good fusion of the one may be contrasted with the porosity and poor fusion of the latter. (These surfaces have been etched to show the character of the metal and the welded zone.)

The approximate values of arc current to be used for given thickness of mild steel plate, as well as the electrode diameter for a given arc current may be taken from the curve in Fig. 4. The variation in the strength of 1 inch square welded joints as the welding current is increased is shown in Fig. 5.

Notwithstanding that the electrode development is still in its infancy, the electrodes available are giving quite satisfactory results. However, considerable strides can yet be made (with its further evolution) in the ductility of welds, consistency in results, as well as in the ease of utilizing the process.

The maintenance of a short arc length is imperative. A non-porous, compact, homogeneous, fused deposit on a 1 inch square bar from a short arc is shown in Fig. 6, while in Fig. 7 is shown a porous, diffused deposit from a long arc. A short arc is usually maintained by a skillful operator, as the work is thereby expedited, less electrode material wasted, and a better weld obtained due to improved fusion, decreased slag content, and porosity. On observing the arc current and arc voltage by meter deflection or from the trace of recording instruments, the inspector has a continued record of the most important factors which effect weld strength, ductility, fusion, porosity, etc. By the use of a fixed series resistance and an automatic time lag reset switch across the arc to definitely fix both the arc current and the arc voltage, and thus placing these important factors entirely beyond the control of the welder and under the direction of the more competent supervisor.



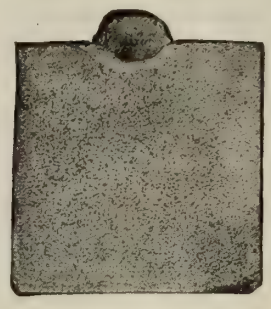


FIG. 6 AND FIG. 7

Heat Treatment and Inspection

The method of placing the deposited layers plays an important part on the internal strains and distortion obtained on contraction. It is possible that part of these strains could be relieved by preheating and annealing, as well as by the allowance made in preparation for the movement of the metal.

The heat treatment of a completed weld is not a necessity, particularly if it has been preheated for preparation and then subjected to partial annealing. A uniform annealing of the structure is desirable, even in the welding of the small sections of alloy and high carbon steels, if it is to be machined or subjected to heavy vibratory stresses.

The inspector, in addition to applying the above tests to the completed joint and effectively supervising the process, can readily assure himself of the competency of any operator by the submission of sample welds to ductility and tensile tests or by simply observing the surface exposed on cutting through the used zone, grinding its face and etching with a solution of 1 part concentrated nitric acid in 10 parts of water.

It is confidently assumed, in view of the many resources at the disposal of the welding inspector, that this method of obtaining joints will rapidly attain successful recognition as a dependable operation to be used in structural engineering.

HIGH GRADE MALLEABLE CASTINGS

According to a paper presented by Mr. J. G. Garrard, North-Western Malleable Iron Co., Milwaukee, Wis., to the American Foundrymen's convention, the idea that malleable iron castings should never be made with heavy sections, as they cannot be properly annealed, is still in the minds of men who have been using malleable castings for years. Every effort should be used to correct this impression and convince them that heavy sections can be thoroughly annealed. This false idea, coupled with poor design of patterns is the greatest difficulty the malleable foundryman has to contend with. When changing over from malleable cast iron to steel, the steel sections are always increased and ribs eliminated for the purpose of reducing shrinkage, whereas the failure of most malleable castings can be eliminated by changing the design. Abundant evidence is available to prove that good malleable castings can be used in place of steel.

There is more or less of a trick connected with making castings with heavy sections. First, one must get the metal high enough without too great a reduction in carbon, it being a known fact that carbon oxidizes much more rapidly than silicon and can be readily identified in the test piece by the short crystals. This condition with the silicon under 0.50 per cent. cannot possibly give good results. The metal, however, can be changed in the furnace with the addition of low-silicon pig iron to increase the carbon.

Gating with heavy shrinkers and close attention to the ribs on any particular casting is very important. Chills can and should be eliminated in most cases, as they do not correct the trouble, but simply drive the shrinkage from one place to another. The author's firm has experimented a great deal with their furnaces in reference to top blast, as it is his contention that excessive top blast not only causes more shrinkage, but produces unsound and weak castings.

His firm adopted a method of practically eliminating pressure on the top blast, and in doing this they do not have any trouble with high heats, as the firemen cannot force the heat to the extent of excess oxidization. The blast at the tuyures shows only two-thirds of an ounce, and the author believes this accounts for the following results:

	First iron		Last iron	
	Silicon	Tl. carbon	Silicon	Tl. carbon
Test No.	%	%	%	%
2	0.90	2.65	0.90	2.51
3	1.04	2.62	1.04	2.61
4	1.02	2.56	1.00	2.49
5	0.92	2.61	0.95	2.59
7	0.98	2.40	0.99	2.42

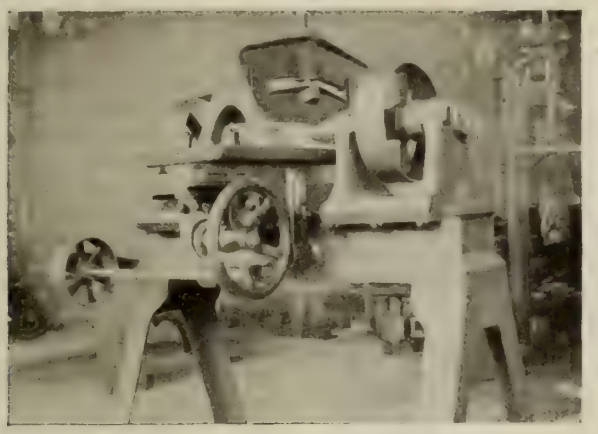
A furnace run to turn out uniform first and last iron, annealed with the use of pyrometers to insure the proper temperatures, is bound to give a tensile strength of 45,000 lbs. and over per sq. in., with an elongation of 7½ per cent. and over in 2 in. There has been a great deal of confidence placed in castings showing a deep skin. This skin is carbonless iron produced with strong packing which absorbs the carbon from the outside of the casting. Such a skin can be increased by more than one annealing, but it does not show any great advantage over the casting annealed without packing or in a straight cinder packing.

WHAT OUR READERS THINK AND DO

DUPLEX MILLING

By DONALD A. HAMPSON

THERE is one class of milling work that is but little known outside of a few shops, though it could be profitably applied in a great many more. It is called "duplex," or parallel, milling. It finds its application to work pieces which have parallel sides that can be finished by end mills. Naturally, the applications are in the field of manufacturing where large quantities of the same piece must be turned out economically.



HOME-MADE DUPLEX MILLER.

Duplex milling machines are also spoken of as "double head" millers, because they have two heads set opposed to each other, sometimes at the same fixed height and again set in the same vertical plane and adjustable up and down. A machine of the former class is shown in the photo. Occasionally milling on the periphery of the cutter is performed on the machines, but the great volume of the work is with face cutters, or end mills. The machine in the photo has spindles with long nose ends to enable the cutters to do very narrow work at times on the same fixtures that are used also for much wider work.

The machine shown is used by one manufacturer of very accurate parts and is made from his own design and patterns. As there were originally but six machines required, the design was not highly refined, though the machines did the work fully as well as commercial and more expensive machines on the market. How well is shown from the fact that the manufacturer has a country-wide reputation for accurate work and the accurate part is all done on these duplexes, which have been added to from time to time until there now is a battery of twenty. The few duplex millers on the market cost a little more than first-class plain millers of the latest type and the same table size, but, as shown in the photo, there was a saving of nearly three-quarters of the initial cost for machine tools. The first six machines have been in daily use for eighteen years—often fourteen hours a day—and have never cost a cent for repairs except re-babbitting the table nuts and today are turning out cast iron parts at competition speeds and within the required limits of "half a one above or below."

The fixtures required for duplex milling differ from regular work, but little except that there is no open side available for projecting parts as with plain mills. In the photo, an arch type of fixture with over-head screw clamp is shown. Where a string of parts is loaded or long slender pieces are cut, some such arrangement is necessary. In this case, castings 24 in. long and ½ in. x 1 in. are parallel milled the ½ in. way without trouble.

WOODEN SHIPS FROM OREGON

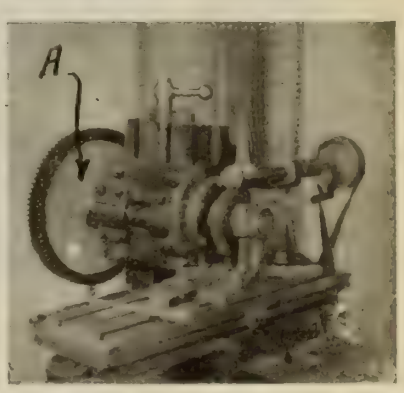
Nine wooden steamers launched during April in the Oregon district represented a total of 35,000 tons, deadweight. For the first four months of the year there have been 75,000 tons of wooden vessels floated. The tonnage of the entire fleet launched since February 17, 1918, when the first Government carrier left the ways, is 368,500 tons. It is estimated now that the last wooden ship will be off the ways in 60 days, which includes those ordered converted into barges. The completion of steamers is being expedited and there are a number of vessels ready, except for changing their wood rudder stocks for ones of steel.

GUARDING SPOKED WHEELS

By DONALD A. HAMPSON

After several accidents of the broken limb variety and one or two that were even more serious, insurance and state factory inspectors turned their attention to gears and pulleys that have spokes and are in an exposed location. If the spaces between the spokes are wide enough to admit a hand or a foot if accidentally thrust against the wheel, serious injuries are almost sure to result.

Wheels twelve inches in diameter or more are placed in the dangerous class. Plenty of these are found around machine shops—conspicuous among them being on planer type millers and the side gears of planers. Shop men recall many incidents where a misstep, a shock of some sort, a friendly nudge by another workman, have caused a loss of balance and a plunge of arm or foot into the danger zone.



SPECIAL WOOD PROTECTION GUARD FOR SPOKES OF GEARS, ETC.

A simple and effective method of guarding spokes is shown in photo A. Half-inch boards are circled out on the band saw, one put on each side of the wheel, and the two fastened together by wood screws. In addition to being a perfect guard, the boards are a sound deadener as well.

DEVELOPMENTS IN SHOP EQUIPMENT

The Ohio Tilted Rotary Milling Machine

A New, Continuous Production Milling Machine, Embodying Many Features of Merit, and Designed to Eliminate the Narrow Field Which so Far Has Handicapped Milling Machine Production

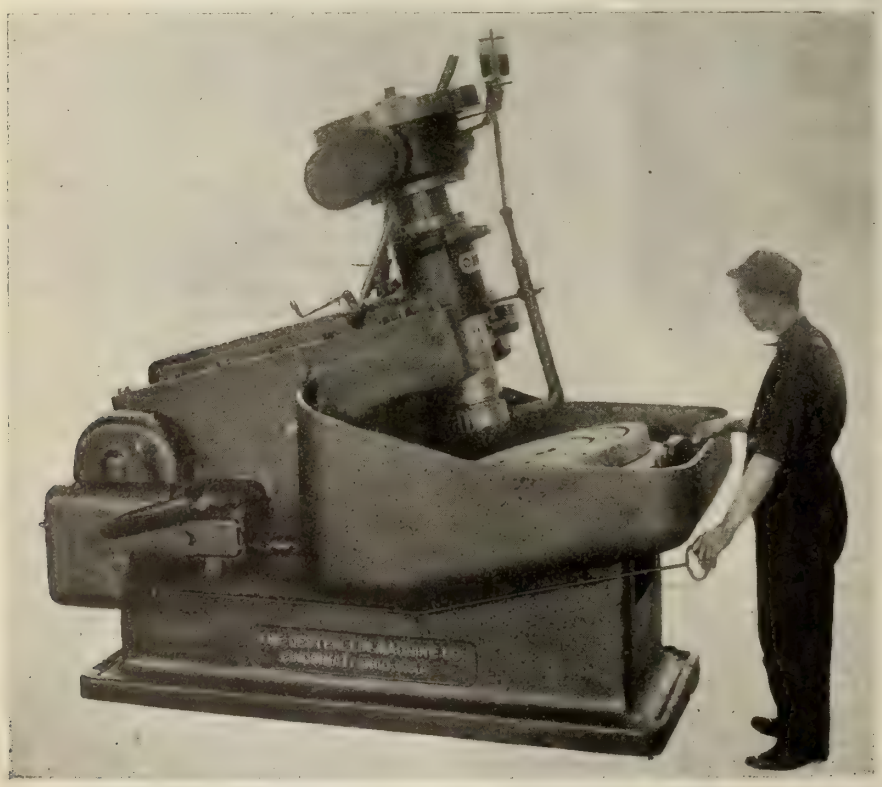
THE Ohio Tilted Rotary is a continuous production milling machine designed with a complete disregard for precedent, having only in mind the creating of a machine that is sufficiently rigid and powerful to overcome by elimination the features that have in the past established the limits of milling machine production.

There are certain recognized losses that have retarded production on milling machines. These may be classified as:

1. Idle time between cuts.
2. Lack of rigidity, due to the incorporation of too great a versatility in a single machine, at an expense of a multiplicity of parts.
3. Insufficient lubricant for cooling cutters.

These phases of the production ability of milling machines have been studied as separate problems and the features of construction and application of this machine can best be studied by analyzing the tool from these three standpoints:

The time spent returning a longitudinal feeding table, removing the finished work, clamping the new piece in the fixture and again bringing the cutter into position for cutting, is non-productive time, and by substituting continuous milling this time is converted into production time, with a consequent increase in the output per hour. This is accomplished on the Ohio Tilted Rotary by a rotary table to carry the work to the cutting position, and during the cutting operation, work is being replaced at the opposite side of the table.



GENERAL VIEW OF THE MACHINE

This continuous operation of the machine not only eliminates lost time, but also sets the pace for the loading operation and results in a uniform output over a given operating period.

The cutter can be held in a fixed position, and the table rotated continuously by automatic feed for continuous milling or the cutter may be reciprocated radially in combination with an intermittent motion of table controlled by an indexing mechanism. This indexing mechanism is capable of from 2 to 72 divisions and the table revolves rapidly between divisions so as to reduce idle time.

By feeding the cutter radially over the surface of the work the loss of time between milling surfaces is avoided on such jobs that cannot be compactly spaced. Other advantages gained are: the non-productive time of cutter approach is avoided; the cutter travels the shortest possible distance; two or more simple fixtures may be used instead of one large fixture; and the machine is practical when applied to small quantity lots.

RIGIDITY OF THE "OHIO TILTED ROTARY"

The rigidity of the Ohio Tilted Rotary is obtained by reducing the number of parts entering into its construction to the minimum and by the massive construction of these parts.

The body of the machine is cast in one piece. No bolts, elevating screws or gibs are subjected to the load of the cut. The general lines of the body are similar to a punch press or a shear. The working surface of the table and the cutter spindle are both contained in this massive casting, and the possibility of relative deformation under load of cutter and work is avoided.

The body of the machine is directly under the circular table. From the table bearing to the floor there is nothing to depreciate the anvil-like rigidity.

There is no overhang on any part of the machine, the ram bearings being extended in front so that even in the ad-

vanced position of the cutters the full length of the ram is effective.

A worm wheel of 28 in. pitch diameter, driven by a worm of 1¼ pitch and 4 in. diameter, drives the circular table. Through the 14 in. leverage of this worm wheel a powerful mechanical advantage is gained.

The worm wheel is located as close to the table surface as the taper table bearing will permit, and is bolted and pinned to the table at the extreme end of the bearing, the central stud merely serving as a means of aligning worm wheel and table. The table bearing comprises a surface of 475 sq. inches, and this surface is scraped to perfect contact.

The ram bearing comprises a total surface of 1,000 sq. inches, and three gibs provide for adjustment in all directions.

The spindle carries a No. 16 B. & S. taper and cutters are positively driven by means of a clutch in the end of the spindle. A fly-wheel is mounted on the upper end of the spindle. Its momentum imparts a steady motion to the cutter as it is driven through the work, and in connection with the massive construction of the entire machine, vibration that is so detrimental to the permanence of the cutting edge of tools is avoided.

Provision for Cooling Cutters

To prevent excessive temperature raise of the cutting tools and distortion of the work, a pump of 35 gallons per minute capacity is used. The coolant is raised under pressure several feet above the surface of the table and expanded into a large pipe so that it falls on the cutters and works under practically no pressure. This system prevents splashing that would be caused by a high velocity of the coolant, and the coolant is carried around by the revolving cutters so that a flow of lubricant is passing over the cutting edges during their idle travel.

The tilting table places the cutting position in a low pocket-like position, and a greater flow of lubricant may be used without splashing than would be possible on a horizontal table. The flow washes practically all the chips away from the work, the tilting table assisting in depositing them in the space provided in the base of the machine.

The tilting table makes it possible to use an auxiliary pan so that the cutters could be run entirely beneath the surface of the coolant, and the work emerges from the lubricant at the loading position. The "sub-surface" cutting is not supplied as regular equipment as the builders have not found that the system possesses sufficient advantage over the vast quantity of coolant available in the stream from the pump. Should "sub-surface" cooling enable the cutter to remove metal with greter rapidity the construction of the machine lends itself to the application of such a system. The lubricant drains from the chips into the base of the machine. This reservoir has a capacity of 60 gallons.

General Description of Machine

The machine is driven by a 4 in. belt over the pulley located on the side of the machine. It may be driven from a line or jack shaft or by a motor mounted on a special base plate located on top of the machine. Power for driving the spindle is transmitted from the pulley through mitre gears to an intermediate shaft. This shaft connects with the first change gear shaft in the speed box by means of a second pair of mitre gears. A single pair of change gears connect the first and second change gear shafts. "Pick-off" gears are used on the two shafts to vary the spindle speeds. A bevel pinion on the second change gear shaft meshes with a bevel gear on the spindle.

The intermediate shaft is splined at the upper end, and the pulley shaft and first intermediate shaft trunnion, to allow reciprocation of the ram.

The intermediate shaft is made in two sections, secured by a coupling. By uncoupling and turning the first change gear shaft through half a revolution, the opposite end of the upper half of the intermediate shaft couples with the lower section. This reverses the directions of rotation of the spindle, and allows the use of either right or left hand face mills as desired.

The "pick-off" change gears provide 30 spindle speeds, using 30 (15 pairs) change gears. Ball bearings are used on all practical applications throughout the driving mechanism.

The spindle is carried in a sleeve, on the upper end of which is attached the speed box casting. The lower spindle bearing is 4½ inches in diameter and runs in a phosphor bronze bushing. The upper spindle bearing is a radio-thrust ball bearing.

A clutch in the end of the spindle provides for positive driving of arbors, and the spindle is bored for a No. 16 B. & S. taper shank.

A flywheel weighing 250 pounds is mounted on the upper end of the spindle. The flywheel momentum prevents vibration of the cutter. Vibration in the cutter or the work causes a rubbing action on the cutting edge that results in undue wear and a tendency to crumble off the cutting edges. The flywheel eliminated the vibration caused by the back lash in the driving gears and causes the cutter to move smoothly into and through the cut.

The spindle sleeve is adjustable vertically by means of a graduated collar, engaging with a coarse thread on the spindle sleeve. The spindle sleeve is clamped firmly in the split barrel of the ram after adjustment.

The ram is fed radially over the surface of the table by means of a cam. The cam feeds the ram forward slowly during the cutting operation and allows it to drop back rapidly at the end of the stroke. The relative radial travel of the ram is made adjustable by means of a slide mounted under the ram. The slide is operated from the side of the ram by means of a ball crank lever and is clamped by means of a knurled knob. A double row ball bearing serves as a cam roller.

The pulley shaft extends through the machine and drives the feed box mechanism, and the operations of the feed box are controlled by a push rod extending along the side of the machine to within reach of the operator.

The cam shaft is driven by a worm and worm wheel in the feed box. A four gear feed change mechanism regulates the feed of the table when the continuous table motion is used or the rate of revolution of the cam when the indexing mechanism is used. The cutting feeds, therefore, are established by the ratio of these change gears. "Pick-off" gears are used for obtaining these ratios.

The entire indexing mechanism and cam may be omitted for a machine on which only the continuous feeding table is desired, or the indexing mechanism may be added to a continuous feeding machine at any time.

It should be noted that the feed change gears regulate the rate of travel of the ram and the throw of the cam regulates the length of travel of the ram.

The index mecahnism is capable of from 2 to 72 divisions and is timed by cams on the cam shaft worm wheel, actuating a system of cams and levers in the feed box.

A crank operated shaft is provided so that the feed mechanism may be operated by hand when setting up or trying out a job. A lever is also provided for tripping the index mechanism.

The cam is driven by jaw clutch teeth and may be quickly removed by withdrawing the cam shaft.

The rotary table is set at an angle of 150 and is 30 inches in diameter. It is driven by a hardened worm and a worm wheel. The worm is 4 in. in diameter, 1¼ in. pitch, and is equipped with ball thrust bearings, and the box that carries the worm is gibbed so as to provide a means of compensating for the wear of the worm and worm wheel.

Two circular and four radial tee slots provide means of clamping fixtures to the table.

The worm wheel is located as close to the working surface of the table as possible, and the rigid construction and powerful leverage results in a steady feeding motion.

A pump with 35 gallons per minute capacity is attached to the side of the machine, and is driven by a belt from the pulley shaft. The lubricant is raised under pressure to a distance above the machine and expanded in a large pipe before it falls on the cutter and work. The lubricant drains from the chips into the 60 gallon reservoir in the base of the machine.

The chips are deposited in a pocket provided in the base at the low end of the table, and may be shoveled out from an opening at the front of the machine.

A large central distribution oiler on the speed box provides for speed box and spindle requirements, and a similar oiler lubricates the pulley shaft. A central oiling point located at the top of the ram provides distribution to the ram slide and similar provisions are made for feed box mechanism and for the table bearings.

Material and Workmanship in the Ohio Tilted Rotary

The materials and workmanship entering into the building of Ohio Tilted Rotary millers are identical in quality with the present day line of cone head tool room milling machines and universal and cutter grinders that the Oesterlein Machine Co. have been building for the past 20 years.

Chilled table surfaces and ram bearings condense the strain of the metal and produce a wear-resisting surface that resembles steel in its texture.

Where ball bearings are not of practical application a bronze of double the hardness of usually accepted bearing bronze is used. This metal will scleroscope from 28 to 32 points, and spindles that have run for years of hard service on this metal show no perceptible traces of wear, and therefore, have maintained the accurate alignment that was built into them.

All gears used on the Ohio Tilted Rotary are of the Oesterlein everlasting type. These are made from low carbon hammered forgings, and go through four heat treating operations in producing a gear that will not show wear throughout the life of the machine. These gears are so hard on the outer skin that they resist the file, and so tough that the teeth may be hammered with a sledge without breaking. The worms that drive the table and cam shaft are hardened, as is also the index trip plates, index cams and plungers.

The table seat and table surface are faced from the spindle itself so as to assure their perfect right angle position with reference to the spindle. The 475 sq. inches of table bearing and the 1,000 sq. inches of ram bearing are accurately scraped to contact so that every inch of this surface assists in maintaining rigidity.

Wear of the worm wheel and ram bearing is provided for with accurately fitted gibs.

A fundamental feature that has to a large extent dominated the design of this machine has been the producing of a milling machine that will run at high speed with a minimum of losses.

Graphic wattmeter tests show that this has been accomplished. The machine running at high speed without cut consumes 1½ kw. of power, including the motor and the lubricant pump. The pump alone delivering full stream requires about ½ k.w. minimum parts, ball bearings, and careful workmanship are responsible for this attainment.

The Oesterlein Machine Co. have always been exponents of the truth of the formula, parts x use=troubles.

In the tilted rotary the factor "use" will be high due to the fact that it is a production machine. The factor "parts" has been reduced to a minimum. With a disregard for weight and expense they have fortified the absolutely necessary parts with maximum strength and workmanship.

Application of the Ohio Tilted Rotary

The mechanism necessary to provide for quick adjustment of the machine has been omitted, so that simplicity of construction and rigidity may be obtained. The machine is, therefore, a production miller, applicable in a practical way only to such jobs that by reason of the quantity justified the expenditure of the set up time.

The machine when used as an indexing machine permits the use of two or more simple fixtures instead of a large one-piece fixture, holding many pieces. This feature greatly broadens the field of application and reduces the expense of tooling. By feeding the cutter radially over the surface of the table, advantage is gained in that the table is indexing while the cutter drops back to the starting position, and the radial travel eliminates cutter approach and also the non-productive time spent in passing from one piece to another on the continuous feeding machine.

The indexing table in connection with a radially feeding cutter permits of dropping a cutter into the work and such operations as Woodruff Key-seating are applicable with the indexing system, whereas they are impossible on a continuous feeding machine.

Other applications of the machine when used indexing are: cutting a keyway along the length of shaft or stud; facing off bosses or other surfaces in a plane that is not accessible to a stationery cutter and a continuous rotary table feed; and the milling of small surfaces on large pieces, where the loss of idle continuous feeding time would more than off-set the gain of continuous loading.

The adaptability of both the continuous rotary and indexing combinations permits of the advantageous use of the machine in shops where several widely varying operations are performed, and the quality per piece is comparatively small. As an example of the above, in a shop producing 200 warehouse trucks per month, six pieces requiring nine operations entering into the construction of the machine may be performed on either the continuous feeding or the indexing combination of the Ohio Tilted Rotary. These six pieces, when run in 200 piece lots, will not keep the machine in operation full time, whereas, two standard type machines do not keep up to the output.

The advantage of the Ohio Tilted Rotary lies not only in that non-productive time is reduced to the minimum, but also in that the machine is sufficiently powerful to pull the slow speed high feed cuts that result in rapid and economical milling, and then when operating under heavy load there are no detrimental vibrations set up in the machine and the copious supply of lubrication keeps the cutters cool and the work free from distortion due to expansion.

The machine will be on exhibition at booth No. 145 at the Master Car Builders' convention at Atlantic City, June 17 to 25.

ORGANIZING INDUSTRY

By M. E.

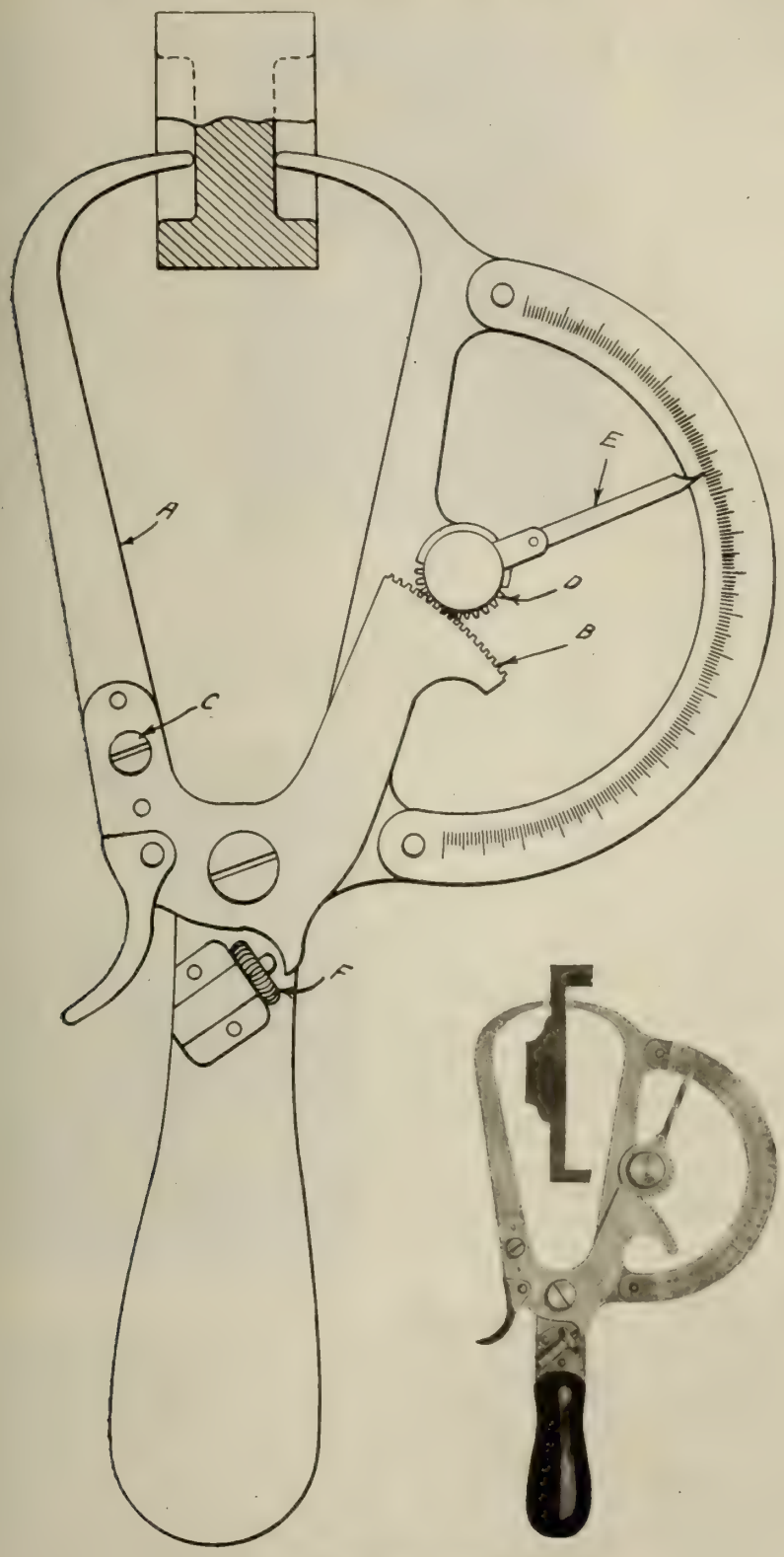
It is a curious fact that while in some respects the textile trades are among the best organized group of manufactures in Great Britain, this great industry has hitherto lacked the services of a powerful institute on the technical side. Hence the interest which has been manifested in the attempt which is now being made to raise the status of the Textile Institute to a level where it may worthily represent the great industry with which its activities are concerned. It is now eight years since the institute was formed, and although it has accomplished a good deal of useful work it would be idle to pretend that it has fulfilled the anticipations of its founders. A new policy is now, however, taking definite shape.

If the draft scheme of development which was recently approved by the council and formed the subject of discussion at the autumn conference at Bradford on Friday last is carried into effect, the desires of those who wish to see the institute occupy the position to which it is entitled should mature. A brief account of the scope and character of the new movement will, therefore, be of interest. The headquarters will doubtless remain at Manchester, but it is desired to substitute for the present offices a conveniently situated building commensurate with the magnitude of the industry, and which would form a rallying point for all movements connected with the advance of the textile industry on the technical side. It is particularly desired, among other reforms, to extend the scope and depth of the technology of the textile trades with special reference to the production and properties of raw materials to encourage invention and discovery by giving financial assistance where required, and by the aid of grants and premiums to promote research. Steps should also be taken to promote the standardization of tests to develop the institute as a centre of information on all matters relating to textiles through the operation of a bureau of inquiry, and to establish and develop an efficient library and reference collection of fabrics. Other matters which it is believed should receive consideration are the amendment of the Patent Laws, the foundation of lectures in scientific institutions, and generally to provide for the textile industry that liaison between the business and scientific minds now recognized as essential to the future progress of British trade.

It is a simple matter to anyone who is acquainted with the needs of textile trades to fill in a full programme of useful work from these skeleton plans. The first need is, of course, for the necessary measure of financial support, and it will be agreed that the minimum requirements of £50,000 now decided upon is not only a comparatively modest estimate of the cost of the work to be undertaken, but a sum there should be no difficulty in securing.

INDICATING CALIPERS

Difficulty has very frequently been experienced by mechanics in obtaining the dimensions of a section of material that is inaccessible in the ordinary way, and recourse has often been made in deducting one measurement from another to determine the value of the part in question. A type of caliper that is very serviceable for work of this character, and one that gives an immediate reading of the calipered part, is shown in the accompanying cut. In the operation of this indicating caliper the handle is gripped in the hand, the tool being supported by the first finger, the thumb being used for opening the legs. A small spring coiled in the pinion barrel closes the caliper points together. The leg A is secured to the opposite end of geared segment by means of a screw, C, and a couple of dowel pins. Different shaped legs can be attached for various classes of work. The geared segment meshes with a small pinion, D, that carries the indicating finger, E, the point of which travels through an arc of about 180 degrees. This semi-circle is graduated to read in hundredths for the two-inch size, and in sixty-fourths for the three-inch size. When the caliper points are in contact with the work the reading is automatically recorded on the graduations. Compensation for wear is provided for in suitable adjustment on the indicating finger. Provision is also made for locking the calipers in a definite position, by means of a small adjusting screw, F, located below the main joint. The tool is very convenient for many different kinds of work, and saves much of the figuring necessary with the old method. These calipers are made by the Indicating Caliper Co., and are distributed in Canada by the Williams & Wilson Co., of Inspector St., Montreal.



GENERAL VIEW OF THE CALIPER.

FROM LINER TO SEAPLANE CARRIER

Many a strange vessel sailed the seas under the British flag between 1914 and 1919, but few stranger than H.M. seaplane carrying ship "Argus." With a level platform extending from the bow to the stern, she looked like a portion of a dock wall which had been floated out to sea. The absence of funnels, masts, and the usual picturesque upper works, combined with "dazzle" painting on the hull (for the purpose of concealment) to render her anything like a thing of beauty, but from the engineering point of view she was a joy forever. She began existence as a first-class passenger and cargo steamer, but before her hull was finished the war broke out, and the Admiralty decided to finish her as a sea-plane carrier. The shelter deck was transformed into a hangar, with the workshops; and above it was erected the flying deck from which the planes could rise and on which they could land. Elaborate experiments were made to discover the structure best suited to prevent eddies which would disturb the planes on landing, and an ingenious system of horizontal funnels, discharging at the stern, had to be designed to carry the hot gases clear of the flying deck. The navigating bridge was placed under the flying deck and near the bow, but the charthouse was placed on a hydraulic lift, so that it could be raised clear of the flying deck in order to command an open view. Electric lifts were installed to raise the aeroplanes from the hangar to the flying deck, and at the stern and amidships, were placed electric cranes for hoisting planes from the water. At night the flying deck was illuminated to guide the pilots when landing. In every respect the ship was a complete success, and reflected great credit on the British engineers and shipbuilders who improvised her under the stress of war.

E. G. Buckwell, secretary and manager of sales of the Cleveland Twist Drill Co., sailed on the 12th for a three or four month tour of Europe for the investigation of trade conditions throughout England and the continent.

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Get Ready For This Trade

A MAN hardly needs to be an insane optimist to see that business conditions in this country are fundamentally sound.

Canada owes a war bill so big that we will be whittling away at it for years to come, and the whittling will be fairly thick and tolerably long.

The best thing that can happen to this country is that it shall be busy. A man out of a job can never discharge his obligations—neither can a country.

The settlement of the labor troubles will be the signal for busy days in Canada. Perhaps not all at once, but certainly in the very near future.

Here's what a firm with the standing of Foundries & Forgings, Ltd., Welland, say in an advertisement which covered half a page in the last issue of CANADIAN MACHINERY. It was under the caption, "A Solemn Warning."

> "A flood of business will overwhelm this country inside of two months. Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hesitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, 'Don't blame us because you didn't see this vision.'"

That was not given out as an interview by some official of the company as his personal opinion. The opinion is over the name and well-known lettering of the company's signature, and it carries collective weight on that account.

The advertisement is not bluff, because a company with its reputation at stake would not risk its reputation on a bluff.

Buying is going ahead on a better basis than at any time since the signing of the Armistice. This refers not only to Canadian, but to American business. When a firm like General Motors, Ltd., is satisfied to come into the steel market and place orders aggregating 350,000 tons, it is pretty conclusive evidence that the market is substantially right, and that buyers who place business now are not likely to be endangered later on by declining markets and consequent losses.

Prices have held in nearly all lines through the period of reconstruction, of the Armistice, and of strikes and lockouts. The day of the rising market may not be far distant. A pressing demand will do it, and that demand is on the road.

Cut Off Bread and Milk!

THE Dominion Government has served notice that the country is going to be rid of all Bolshevist agitators. If the enactment of the measure is as brave as the reading of the Government's bill on the matter, there should be some worth-while action.

Ousting the Bolshevist and the alien agitator will be a win for Canadian labor and Canadian capital. As things stand at present in Winnipeg it is mighty hard to tell where legitimate trades unionists leave off in their fight and where the Reds and foreigners commence.

One thing is certain—the very moment any man or any body of men rise up to say that bread and milk shall be cut off—that very moment the Government must rise in its might and put the boots to this sort of rascality.

Cutting off bread and milk isn't fair fighting. Trades unionists would not do that. It is hitting and hurting and weakening boys and girls, men, women and babes who have done nothing to offend. Even if they had, it is no reason why they should be starved.

Cutting off the necessities of life and seeking to create conditions that would be so insanitary that disease might follow has not yet been made a weapon of legitimate trade unionism, and those who value the future of this cause have a very big and a very serious duty right now to see that unionism never dirties its hands with this sort of business.

Canada is a mighty big country, but it is not big enough to accommodate the professional foreign agitator, or the man who cries, "Shut off the bread and milk." The Government of this country should smash that stuff every time it shows its ugly head.

Too Many Sardines!

SARDINE packers have had more notice of their business in print in the past few weeks than they ever received before. Something has happened and there are too many sardines in stock. So far the consumer has not seen prices flattened, although it used to be supposed that a surplus supply would sag the price.

The packers may have packed too many sardines, or the public appetite for the wee fish may have been dull and rather unresponsive, but whatever the reason, the packers are now appealing to the Government to come along and play truck horse and save the sardine packers some inconvenience or money, for there are many times when "inconvenience" is only a parlor way of saying "cash."

Now, is that what a Government gets elected for? Supposing the labor market gets glutted, what happens? Any person who has ever stood in line in front of an employment office knows. Anyone who has seen ten men after one position knows. The tendency is to force down prices.

Are sardines in a can any more worthy of consideration than men seeking to sell their power and ability to work?

A Government cannot be at the beck and call of every concern that gets too many sardines or anything else on hand. The more it attempts to tinker with the law of supply and demand the more it becomes involved and tangled.

THE Grahame-White Co., Ltd., aeronautical designers, constructors and engineers, of London, England, have issued what, in a commercial sense, really amounts to a catalogue of the various types of aircraft they are prepared to supply. The range takes in everything from the "roadster to the seven-passenger touring"—or, to be more correct, from the "Bantam" single-seater to the 24-seater passenger machine. Prices are not quoted definitely on account of possible changes in the cost of engines, but the spread is from $2,500 for the "Bantam" single-seater to about $100,000 for the 24-passenger craft.

Promotions and Changes Recorded in Montreal

W. A. Pitt, Inventor of Several Well-known Devices, is Now Master Car Builder at Grand Trunk Shops

Announcement has been made by the International Equipment Company, of Montreal, that Mr. W. J. Hyman has joined their staff as Sales Manager.

Mr. Hyman has been with the Car Department of the Grand Trunk Railway for a number of years and resigned his position as chief draftsman, Car Department, on June 1st, to join the International Equipment Co.

W. J. HYMAN
Sales Manager of International Equipment Co., Montreal.

W. A. PITT, recently promoted to the position of Master Car Builder at the Montreal shops of the Grand Trunk Railway, was born at Kilmarnock, Scotland, but came to Canada when he was still a boy and entered the services of the Grand Trunk motive power department. Later on he was transferred to the car department and at various times was promoted to machine shop foreman, mechanical and electrical foreman, and last year was appointed to the position of assistant car builder of the Montreal shops. In May of this year he was appointed to his present position of master car builder at Point St. Charles.

W. A. PITT
Promoted to position of Master Car Builder for G.T.R. shops at Montreal.

Mr. Pitt is widely known throughout railway circles, especially in the mechanical departments. He is the inventor of several mechanical devices and has developed a number of mechanical labor-saving devices and methods. One of these is the sanding appliance that is now in general use on nearly all Grand Trunk locomotives. A device that has received considerable attention from the hands of Mr. Pitt is the equipment developed for the electric lighting on individual cars. This, primarily, was attached to the truck frame, but the constant jar was very destructive to the mechanism, and it was due to the efforts of Mr. Pitt that the generator is now located on the under side of the coach platform, with special transmission connecting it to the car axle. The improvement resulted in much greater efficiency.

Mr. Pitt attributes his steady progress to close attention to business, and particularly to small details. He takes a personal interest in the younger boy and would advise that young mechanics apply themselves to their special duties, grasp every opportunity for increasing their knowledge by studying the changes and developments in their particular line and use their own initiative and resources to climb to the next rung upward that is ever within reach.

Mr. Pitt is of a genial disposition and has a very wide circle of friends in the machine supply circles.

"Off At Toronto"

"NOW see here, porter," said he briskly, "I want you to put me off at Hamilton. You know we get there at about six in the morning, and I may oversleep myself. But it is important that I get out. Here's a five-dollar gold piece. Now I may wake up hard, for I have been dining to-night and will probably feel rocky. Don't mind if I kick. Pay no attention if I am ugly. I want you to put me off at Hamilton!"

"Yes, sah," answered the sturdy Nubian, ramming the bright coin into his trousers pocket. "It shall be did, sah!"

The next morning the coin-giver was awakened by a stentorian voice calling :"Toronto! All change cars!"

"Toronto!" he exclaimed, sitting up. "Where's that ——— coon?"

Hastily slipping on his trousers, he went in search of the object of his wrath, and found him in the porter's closet, huddled up with his head in a bandage, his clothes torn, and his arm in a sling.

"Well," said the drummer, "you are a sight. Been in an accident? Why didn't you put me off at Hamilton?"

"Wha-at!" ejaculated the porter, jumping to his feet as his eyes bulged from his head. "Was you de gemman what guf me a five-dollah gold piece?"

"Of course I was, you idiot!"

"Well, den, befoah de Lawd, who was dat gemman I put off at Hamilton?"—*Belts.*

Common Sense Is Great Stuff

A STRIKE does not cause much surprise just now. In fact, the chap who hasn't struck or been struck is apt to be the centre of surprise.

Toronto had a strike of Collegiate pupils some weeks ago. The youngsters wanted to go to school at certain hours and quit at new stopping places. The head of the school said, "Nay, nay," and the rising generation quit. The lack of common sense there was on the part of the pupils.

Just now six pupils at another Toronto school are suspended. On one very hot day the lads took off their coats and proceeded to work in their shirt sleeves. The principal of the school heard of it, came, saw, gazed and fired.

The boys, out of respect to teachers and girl pupils, must not appear in their shirt sleeves!

They must sit there and boil in their coats at 90 and 95 in the shade!

If they didn't choose to boil and bubble with their jackets on they could get out and stay out until such time as they would return to the boiling and bubbling business.

Now, in these two strikes two things are apparently needed. In the first one, a few spankings, in the second one, a principal with some common sense.

Common sense is great stuff if you've got enough of it, but there's the deuce to pay when a person in authority has drawn a blank in the common-sense bin of his head.

MARKET DEVELOPMENTS

Prices Holding Now Without the "Fixing"

And the Trade Considers It Likely That This Will Continue—Plants Ready for New Lines as Soon as the Strike Problem is Settled—Deliveries on Some Machine Tools Not so Prompt Now

THE closing of the strike which has been in progress for some weeks now in Toronto and some other centres would assist in getting work under way in several places, where operations have been pending the outcome. Some factories, where the business of buying equipment and getting it in shape was in progress, were not seriously inconvenienced by the strike, as the millwrights were able to go ahead with their work without interfering with other operations in the shop. Now that the plant is in shape to go ahead, the strike is bothering operations and retarding production just at a time when it is needed.

There is somewhat of an emergency haste and character about much of the steel and iron business that is being placed now, as one dealer said, "They all want deliveries in about ten minutes." This is not the sort of business either the warehouses or mills like, as it does not help to create the reserve that means something approaching capacity production for the steel mills.

Deliveries on the larger types of general machines are slow, in fact the condition is not as favorable now as some weeks ago. This means that the firms making these machines have had plenty of orders and they have nothing in stock. This condition also tends to keep up the prices. In fact prices are now just about where they were during the war, and only a few recessions have been made.

The trade is inclined to the belief that the steel prices areare not going to sag. Support in the way of the fixed and recognized price has been withdrawn; but still the fixed price remains, minus the fixing. Conditions that would break the prices have been prevalent in number, but they have not done much mischief. Now the trade believes that if the steel schedule can withstand the bad months of July and August, a buying movement would carry with it a strengthened market. Canadians show considerable interest in the reported purchase of one large lot of plate at 2.50, against the prevailing price of 2.65. These concessions are not alarming, as they tend to appease those who did not like the fixed price.

Shipments of Canadian scrap metal are going to the States, but only on contract. Complaints are less frequent on grading and sorting, and this is taken to mean that conditions are better, because whenever there is a glut of material complaints are numerous. When the market is more anxious for materials the complaints decrease in ratio to the anxiety.

SIGNING OF PEACE WOULD DO MUCH TO HELP MONTREAL TRADE

Special to CANADIAN MACHINERY.

MONTREAL, Que., June 12.—Apart from the knowledge that certain expansion and activities are being temporarily deferred as a result of the delayed signing of the peace treaty, there is a growing impression that business is steadily, although perhaps slowly, returning to more settled conditions. Many strikes are still factors to depress the spirits of industrial leaders and others anticipating renewed enterprise, but the unrest of labor appears to be less pronounced, and hopes are entertained that an early adjustment of present difficulties will open the way for closer cooperation of industrial factions. Improvement in the steel business is slow but gradual. Local disturbances have resulted in a slight falling off in demand but this is only expected to be of a temporary nature. Steel mills and foundries are operating much below capacity, and the present strength is more than sufficient to supply the current demands, the consequences being that stocks are accumulating. The market in metals is not active but business is steady but light in volume. Some machinery dealers report a good business but the general activity is not pronounced. Scrap is quiet with little local interest.

Steel Business Quiet

No particular line of steel commodity features the week's movements, and business, on the whole, has been of a quiet nature, affected in no small way by the closing down of plants and factories, due to the existing labor troubles. In many instances these shut-downs and curtailments have reacted in other directions, with the result that equipment and supplies have been less in demand than a few weeks ago. The industrial atmosphere, apparently, is none too clear just now, and its influence on development is of a deteriorating character. Several large concerns here have voluntarily reduced their output about 50 per cent., the reason being the poor demand and the inadvisability of stocking up under the present high cost of production. Many, however, are far from despondent as they look forward in the anticipation that the summer will show a gradual return to normal business, or at least a more stable condition than that now prevailing.

Better Outlook Developing

Although the general activities in the machine tool business are not of a very heavy variety, the outlook for the early future begins to show promising possibilities. Like all other industries the signing of peace is the influencing factor, as dealers state this to be the point upon which present business is transacted. There is, of course, a steady general business of small volume, but ample to maintain the interest of the trade, and likewise give the impression that developments are in the making,

vidence of which may appear at almost ny time. The fact that difficulties of etting deliveries are on the increase nay be an influence in any buying movenent started in the near future.

Those who may be waiting the final utcome of world peace negotiations may e faced with the problem of securing quipment. Dealers here invariably reort a fair business with inquiries good. Movement of supplies continues satisfacory with prices well maintained.

Old Material Remains Quiet

Movement of old materials is still of he quiet order and the present demand hows no improvement over the past ew weeks. In a reserved way the inerest in the situation is still a feature f the market. but large sales are seldom eported, the bulk of the business now ransacted being for light and immediate onsumption. Many theories are adanced for the continued dullness, with he signing of peace the outstanding arument, but the question is such a comlex one that the main reason, if there is ne, is hidden by the many other cirumstances that combine to make the ntire situation one of uncertain definiion. As one dealer said: "We continue o do a general business but of no great olume. Inquiry unearths the apparent act that consumers are not carrying reat stocks. evidently impressed with he unsettled conditions that dominate he market. Coppers and brass scraps re moving freer than irons and steels ut general business is comparatively ight. We feel sure, however, that the igning of the peace treaty will be a ignal for increased industrial activity, nd such conditions will naturally have corresponding effect on old materials. Ve are looking forward to a good sumner's business." Price quotations are uite firm although nominal in many ases, but a fair indication of the existng market.

END OF THE STRIKE MUCH DESIRED NOW

Business Affected by Labor Trouble is Being in Some Cases Turned to Other Concerns

TORONTO.—The past week has been ather uneventful in the market situation. here is a growing feeling that a settleent of the metal trades strike must ome shortly. Work is being held up nd in some cases business that has been ounted on as firm has been transferred o other places which are not suffering rom the strike.

Not Much Improvement

The scrap market is not improving apidly, although there is a fair volume f business being done. The United tates market is perhaps taking a little ore material now than for some time ast. but even yet the great bulk of this s in the form of shipments on contracts at run into thousands of tons. The rap metal business is pretty well divid-d, and the lines are quite clear. There s the small pedlar, with his wagon, who ours the country. He in turn sells to e man who handles about five or ten ton lots, and the next dealer is the one who takes in car lots. The clearing house is the large dealer who will undertake a contract up around 50,000 tons, deliveries to be made on a definite schedule. It is not until this last named class gets busy that the whole procession can be said to be fully engaged.

One thing is noticeable, according to some of the larger dealers, and they take it as a sign of improvement. There is very little kicking about the shipments that are sent out now. When the market is barren kicks about quality and grading are absent. When scrap is a drug on the market there is a great increase in the kick crop. There is undoubtedly a better feeling in the market, one that looks for much better trading in the very near future.

Some 600 tons of the U.S. shell steel scrap which had been stored in Canadian yards, was sold during the past week to an American concern. The price was rather lower than generally expected would be secured for the material.

The Sale of Small Tools

"We are finding that small tools are not selling vary rapidly just now," stated one dealer to-day. "The strikes around here have tied up a good many of the plants that usually purchase small tools. These sales represent, in a great many cases, the day-to-day operations of the factory, and, of course, when the shops are not running and using the tools there is not the demand for replacement. That has been my experience in several places where strikes have been on. Shops that are putting in equipment can go ahead and put it in. In fact very often the millwrights get a better chance to do their work under strike conditions. There is one plant that I know of now that has been practically been put in shape while the men have been out on strike. The work has been done more rapidly than otherwise could have been thought of, and considerable buying has been going on all the time. Once that shop starts now production ought to come very quickly, because there has been time to plan for perfect operation sequence all through the works."

Deliveries on an increasingly large number of machine tools from United States points are showing signs of more space between bookings and fulfillments. There has been considerable buying by large corporations, and there is not yet a stock on hand in many points that would make quick delivery possible. This same feature, of course, has the effect of helping to sustain machine tools on the high level on which they been since the conclusion of the war. In fact, with the exception of ten or fifteen per cent. on some lines the war prices are still in effect.

Want Orders at Once

"Our biggest trouble just now," stated one of the iron and steel warehouse men to CANADIAN MACHINERY, "is that people who place business now want to get their deliveries in about ten minutes. The greatest part of the selling now is done on that basis. One would think that a great part of the business that is passing now was emergency work." Mills are in pretty fair shape just now to turn work out quickly, and another feature is the fact that they want the business.

It cannot be said that there is any evidence yet of a sag in the steel market. The trade is watching to see if anything further comes of the price at 2.50 f.o.b. Pittsburgh for steel plate. True, there have not been many price concessions in the ordinary way, but the trade wants to know how much the market is liable to bend if the good sized orders will do the bending. There is another very sensible way to look at it. Price control and the stability that goes with it has been removed from the steel market just about the time when the trying summer season is at hand, and the next few weeks may be quite a critical period in the steel market. because if there is going to be a fall it should come quickly, but it must be admitted there is little in sight to indicate that a fall is due.

It is contended, and with some force, that the concessions that have been made for some of the larger orders. serve two purposes. They encourage buyers to come into the market with large business. and they do something to clear away the dislike that so many purchasing agents have toward the fixed price. The opinion may prove to be wrong, but it is hard to figure out what is to be gained by a prospective purchaser stay-

POINTS IN WEEK'S MARKETING NOTES

New York market reports there are too many second-hand tools on the market now as they have been dumped from war shops more rapidly than the buying can absorb them.

—

Montreal feels that the actual signing of peace terms will be necessary to give the big stimulus needed to send trade along more briskly.

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The steel market points out that protection to price lists has been removed with no corresponding price drop as had been predicted by some. They follow this by holding that a buying rally now would bring a firmer price.

—

The United States market is taking Canadian shipments of scrap material with few objections now. Dealers look on this as a good sign. When the market is glutted with material complaints are numerous, but when good shipments are scarce, complaints are few.

—

Orders coming in now for steel and iron supplies are nearly all on emergency work. Buying for stock has fallen off again.

ing out of the market in the hopes of better prices later on. There has been enough in the last six months to flatten out the steel market, if it is due for a flattening out. There has been an endless amount of official tinkering, the unsigned peace terms, and strikes all over the land, and yet the price has remained, and there has been no chance of a panic.

It is a fact, however, that busines generally in metal working lines ha not taken the prompt step forward tha was expected. In steel lines trade ha shown a slight improvement, but ther is nothing yet approaching a real buy ing movement, and with the summe months now here it is doubtful if ther will be any great advance in steel busi ness before late in August, or early i September. To a certain extent, o course, the machine-tool trade and al metal working industries are affected b the activity, or lack of activity, of th steel trade.

MACHINE TOOL BUSINESS MODERATE NO RAILROAD BUYING

Special to CANADIAN MACHINERY.

NEW YORK, June 12.—A moderate amount of machine-tool business is being done, but the trade has lacked snap for the past two weeks. Business is spotty. One thing that is unquestionably affecting the sales of new tools is the immense quantity of second-hand tools now on the market. Offerings are being made from every direction by plants which are engaged in war work, and there is still much equipment to be put on the market by various Government departments, the Ordnance Bureau and Aircraft Bureau of the War Department and the Emergency Fleet Corporation. Buyers of tools are seeking whatever price advantage may be gained by buying slightly used tools, when such will answer their purpose. As an example, the Columbia Graphophone Co., Bridgeport, Conn., advertised for about 200 slightly used tools, mostly Brown & Sharpe Automatics and Warner & Swasey hand screw machines, and second-hand dealers have been scouring the country to find the desired equipment for that company. In addition, the Columbia Graphophone Co. recently bought several large lots of new tools.

Railroad buying has been practically nil so far, and this has been a disappointment to the machine-tool trade, which had hoped that the Railroad Administration would authorize quite large purchases. Doubtless this will be done as soon as the new Congress decides upon a railroad policy and appropriates funds for the use of the roads. One recent inquiry for about 25 tools from the Cumberland Valley Railroad has not been acted upon, and the presumption is that the road's purchasing department is waiting for funds.

Export business is only fair. The rate of exchange is undoubtedly holding back considerable business. This is the case so far as Belgian trade is concerned. A recent $50,000,000 loan to Belgium by New York bankers has not been expended because of a disadvantage in the exchange rate. A part of this sum was to have been used for equipment and material for the rehabilitation of certain Belgian industries.

England has been in this market lately for certain special machinery for plants that were damaged during the war by bombing. In the case of one large inquiry, American makers of such equipment as was desired were unable to give the deliveries asked for, so the business was placed in England.

Buying of machine tools in the Eastern markets has been done during the past week or ten days, principally by the Standard Oil Company of New Jersey; the American Shell Company, Paterson, N.J.; and the Federal Shipbuilding Company, Kearny, N.J. There has been a fair amount of business in small lots—that is one, two or three tools.

CRUCIAL TIME IS COMING TO TEST STRENGTH OF THE STEEL MARKET

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., June 12.—The improvement in the steel market, which began say May 10 or May 15, has held its own in the past week, but has hardly made any further progress, as relates to actual tonnages booked. The present rate of buying is about the same as for a couple of weeks preceding. It can hardly be said that steel prices are any firmer, but they are not noticeably weaker. There have been some slight declines in pig iron. With another week of better buying, however, there is a better general tone to the market, and men are more sanguine as to the future.

The steel market is about to be subjected to a crucial test. Except under very abnormal conditions, July and August are very dull months as to steel buying. When fundamental conditions are particularly strong, the market rides right through July and August, gaining rather than losing. That is what it did in 1915, as observed in last report. If the steel market should increase in activity as the midsummer period approaches, and during the midsummer period, it would be absolute proof not only that the recent increase in activity represents the incipient stages of a great market movement but also that the movement is to be a rapid one, producing full mill activity within a few months. Observation of the past few days, however, seems to indicate that the market is not going to do this. No further increase in buying is perceptible, and in July buying may taper off somewhat, the movement to be resumed in the Fall.

Pig Iron Production

Pig iron production in May was at the rate of about 25,000,000 tons a year. From March to April there was a decrease of about 17 per cent. in the rate of production, and from April to May there was another 17 per cent. decrease. Indications now are that decreases have stopped, a low point having been reached some time in May, with production now at 25,000,000 tons a year or more. This is 56 or 58 per cent. of capacity, depending on whether one takes capacity at 45,000,000 tons a year or 43,000,000 tons. A very close estimate of existing capacity cannot be made as the furnaces have not had a good chance to show precisely what they can do. For about three years, until nearly the end of 1918, the furnaces tried their utmost to make pig iron, but from late in 1916 until the end of the war there was a practically continuous coke shortage of varying amount, and much of the coke furnished was of poor quality, that in itself operating to decrease outputs at individual furnaces. Estimates of present capacity, therefore, must be based upon what the furnaces did in the fore part of 1916, plus allowance for the new furnaces since completed.

New Construction Appearing

The judgment of some iron and steel producers as to the future is seen by there being a number of new construction jobs just undertaken. For two or three months after the armistice was signed the iron and steel producers showed an indisposition even to make extensive repairs. They held that costs were too high and they were waiting for them to come down. Recently, however, there has been much repair work done, the producers concluding that there is not to be much decline in costs for quite a while. They have adopted the policy they were arguing their customers should adopt, that of not looking for any general deflation in prices. Now, in addition to much repair work, there is some new construction. There is the Weirton Steel Co., Weirton, W. Va., which has about 48 tin plate mills, distributed in three plants, also large mills producing hot and cold rolled strips, which has just undertaken the erection of a steel making plant of seven 100-ton basic open hearth furnaces to supply the finishing mills. The company had just about completed a blast furnace, which may be blown in shortly. Then there are three new cases of new construction of sheet mills. The Mansfield, Ohio, Sheet & Tin Plate Co. is adding four sheet mills to its plant. The recently incorporated Falcon Steel Co. will erect a six or eight mill sheet plant at Niles, Ohio, while another company is being formed to build a mill of about that size, and has already secured its site at Newton Falls, Ohio.

New construction like that just mentioned does not indicate that there is a belief that the country as a whole needs a larger steel industry. As to the Weirton steel plant, that means that the company desires to make its steel instead of buying steel for its finishing mills. As to the sheet mills, the steel industry needs some rounding out. No doubt there is too much plate rolling capacity, so many plate mills having been built during the war, while, on the other hand, there has been practically no new construction of sheet mills during the war, and when steel making capacity has increased 40 per cent. since 1914 one would naturally assume that there ought to be an increased demand for sheets.

Pig Iron Declines

There is a confused situation in pig iron as to prices, there being competition between districts that do not usually compete. Thus the Pittsburgh market is normally supplied by the valley and scattered Western Pennsylvania furnaces, as they have the lowest freights to Pittsburgh. Of late, however, Southern Ohio furnaces have been quoting for deliveries in the Pittsburgh district, as have furnaces on the Lake Erie front. Even Buffalo, it is stated, has made some efforts to get into the Pittsburgh market. To penetrate this market the remote furnaces must absorb large freights, and thus cut the prices that became effective March 21, even should the valley furnaces adhere to those prices, for the March 21 prices simply represent a reduction of so much per ton all around from the war control prices, and under the war control Ironton, valley, Buffalo, etc., furnaces all got the same price f.o.b. furnace. These furnaces that have been going far afield to get orders, and absorbing freights, have been making more or less effort to maintain the old prices as to their own local trade. Thus a furnace might insist upon a certain price at furnace, for a regular and nearby customer, and at the same time quote a price to a consumer far off that would mean a much lower realized price f.o.b. furnace. It is what in international trade is called "dumping." The valley market is moderately well maintained, but it is understood that while the regular price on basic iron is $25.75, valley, a price of $25 could be done. Foundry iron is holding up somewhat better than basic, but the regular price of $26.75 at furnace can be shaded in a number of districts. The Birmingham market has dropped to about $23.75, Birmingham, for silicon 1.75 to 2.25 per cent., with $1 advance for the higher silicon. The Standard Sanitary Manufacturing Co. has just bought 3,500 tons of Birmingham iron, for June and July delivery to its Louisville plant, at five cents under these figures.

Would the Metric System Save a Year in School?

An Answer to the Article Written by Metricus in our June 5th Issue, on the Metric System. Here We Have the English System Defended in Strong Terms by One Who Signs Himself

By Feet-and-Inches

ALTHOUGH by nature I am of a retiring disposition, still in this case in point, it is necessary that I crawl from my hermit shell and have my little say. The article by "Metricus" in your last week's CANADIAN MACHINERY is responsible for the whole affair, for here we read that by adopting the Metric System we would save ourselves a year's hard study at school. How, I wonder?

For readers' benefit who perhaps did not read this article spoken of, or who have forgotten some of the wild accusations, the writer will quote a few of the Strongest (?) and Choicest (?) claims by our good friend, Metricus, to prove his contention that the good old English system was a back number, and tottering even now on its last legs before tumbling with a heartrending thud. Here is his first accusation:

"It is idle to suppose that our English system (?) of weights and measures will for long exist in its present cumbersome form."

Listen to the next one: "The disadvantages of the inch and all its multiples and fractions as a means of measurement in the machine shop, in the factory, in surveying, and in all else of an engineering nature, are only too obvious."

Metricus next speaks of the cumbersome sixty-fourth of an inch.

Before going on to any further sweeping statements proving conclusively why we should toss our present system to the four winds, let us at least try to defend our weak and poor feet and inch method of measurement.

The first blow we received was the fact that our English system is about all in, and will not long exist in its present cumbersome form. Too bad, and yet we were told by Mr. Dale before the Society of Mechanical Engineers, that the English system had indeed reached a commanding position throughout the world. This gentleman spoken of did not merely say so, but proved his statement by means of a map which illustrated the commanding position he spoke of. On this map was shown conclusively what follows:

That in the British Empire and the United States, English weights and measures are established and fundamental.

That throughout the vast territory of Russia the linear measurements are based on the English inch.

That in China, English weights and measures are the recognized standards at the treaty ports, and Chinese measurements themselves are based on a unit approximating the English foot.

That in Japan the established system of linear measurements is based on the foot (shaku) of 11.93 English inches, used by artisans.

In China and Japan the metric system is also used, BUT local and English systems prevail and are closely identical.

Brazil, South America and Central America also use our almost hopeless, muddled (?) system.

Something must be very far wrong, for here we have all these various countries ignorant of the fact that they are using a poorly arranged system of measuring, and yet referring to Mr. Dale once more we find that he says on good authority, **"That the textile manufacturers object to a change to the metric system on the ground that the English standards are not only accepted throughout the world, but are intrinsically superior to the metric system."**

Metricus also speaks of the disadvantage of our English systems in our shops, factories, etc., etc. He also mentions the cumbersome (?) sixty-fourth of an inch.

Brother Mechanics, will you stand for such a slam on our trade? Are we all so short-sighted that the sixty-fourth of an inch has now faded away beyond our vision? Where are the mechanics who take a thousandth of an inch and handle it so accurately that even the thousandth has to exclaim, as it fits itself into place, "Well, that fellow sure can handle me down to a tee." But perhaps this type of mechanic, according to Metricus, is a thing of the past.

Metricus next tells us to look back to the agony of remembering that 12 inches equal one foot, 3 feet equal one yard, etc., etc. Personally the writer does not remember any such agony, but perhaps he is an exception.

Last but not least Metricus quotes, "It is estimated that about a year of school life might be saved if the youth was early educated in the Metric System."

Perchance it was Metricus himself in his idle moments, when he was worrying about 12 inches equalled one foot.

In conclusion the writer refers the readers to two things: First, a little rhyme by ARK, also in last week's CANADIAN MACHINERY. Whoever this ARK is, he has certainly hit

the spot, and it's a sure case of coincidence that both the article by Metricus and this rhyme should appear in the same issue. Personally I'd like to think that the rhyme was one prompted by the fact that ARK had read the Metricus article, and was rather riled at the idea of chewing the fat over such a trifle, when as he mentions, "Let them work and show to me how pork and beans and hash can come again and rest within the limits of my cash."

Readers will do well to read this on page 589 of the June 5th issue if they have not already done so.

They say that the body blow to any argument should come in at the finish. Be that as it may, the writer has held his knockout until the last, so with this fair warning to Metricus, who perhaps will read this article, let him prepare for the worst.

In Atlantic City, at their recent convention, the National Machine Tool Builders' Association passed the following resolution:

"That it be put on record that the members of the National Machine Tool Builders' Association are strongly opposed to the adoption of the Metric System."

If such a body of men interested in our country's welfare are opposed to and see the dangers of the metric system, what more need be said by the writer in defense of the good, old, well-established English system of measurement?

BELIEVE THAT SERBIA OFFERS A BIG OPENING FOR CANADIAN TRADE

The Canadian Trade Commission, Ottawa, sends the following:—

As a Canadian manufacturer you will be interested in knowing the official British attitude towards Siberian trade. The "Board of Trade Journal" (the organ of the British Department of Commerce) states that while the rate of exchange and rail and dock congestion are holding up business at present, the expansion of Siberian trade later is certain. It would appear that the flow is only stemmed; the consequent rush will be greater.

The Canadian Trade Commission recommends manufacturers in the Dominion to organize into industrial groups for this as for other foreign fields. The policy has already been tried with success in the case of European orders in a number of industries, but not nearly to the extent the commission is justified in believing both possible and profitable.

A partial list of goods reported in February to be required in Siberia via Vladivostok is given on the attached sheet.

The following announcement is also made by the "Board of Trade Journal":

"It is the policy of His Majesty's Government and the Allied Governments to discourage the exploitation of the Siberian population by the charging of excessive prices for necessaries, and they reserve the right to recommend in such cases the suspension of general licenses."

The Hon. Raymond E. Hubbard of the Siberian Supply Company remains at Vladivostok and will continue to act on behalf of Canadian commercial and industrial interests.

Yours faithfully,

THE CANADIAN TRADE COMMISSION,

Publicity Section.

List of Siberian Requirements

Textiles: Machinery to fit up 5 boot factories; outfits of bootmaking tools, 2,000; bootmaking machines, 500; mowers, 20,000; reaping attachments for mowers, 8,000; rakes, 20,000; reapers, 12,000; binders, 4,000; Lobogriki reapers, 12,000; grinders (for sharpening knives of harvesting machines), 12,000; harrows (smoothing), 27,000; harrows, disc, 500; harrows, springtooth, 500; harrows, zigzag, 4,000; broadcast seeders, 1,000; drills, row seed, 1,400; drills, disc, 2,000; tractors, 100; binder twine, 3,600 tons; scales, portable, 2,000; scales, stationary, 300; ploughs, Anglo-Bulgarian type, 40,000; ploughs, Rubsack type, 40,000; ploughs, disc pattern with seats, 10,000; sulky horse ploughs, 20,000; threshers (Ural horse), 4,000; winnowers, 20,000; wire netting, 455,000 ft.; zinc sieves, 30,000; chaffcutters, 1,500; haypresses, 30; wool carding machines, 300; belting (leather), 332,000 ft.; belting (camel hair), 360,000 ft.; separators, 16,000; colonist waggons, without bodies, 15,000; colonist waggons, with bodies, 500; light waggons, for town use, 500; crude oil motors, 3 to 12 h.p., 500; cultivators, for turning earth over young crops and spreading manure, 5,000; axes, 200,000; scythes, 300,000; sickles, 50,000; forks, without handles, 200,000; steel shovels, without handles, 100,000; saws, horizontal, 20,000; saws, for sawmills, 2,000; iron gearing for grinder, 5,000; hand, 3,500; foot, 1,500; lubricating oil, 3,600,000 lbs.; files and various carpenters tools, value $60,000.

Further information can be secured from the Canadian Trade Commission at Ottawa.

INCREASING EFFICIENCY

By Harrison Jenkins

It is a well-known fact that a well-lighted shop gets better results than the shop with poor light, yet, when a shop has unfortunately no direct good light they can make the best of it by aiding what light there is.

One well-known method is to paint all the walls and ceilings white, but this point can even be carried a stage further.

Why not, for instance, paint the throat of the boring mills white also? These parts are as a rule very dark. If painted white, any light will be reflected from them, just the same as the ceilings o walls.

Such a scheme would enable the ope ator of the machine to get better lig on his work and increase his efficiency.

The writer merely mentions a borin mili as a suggestive idea, for there a numerous other tools which could t treated in like manner with surprisin results.

SALVAGING INDUSTRIAL WASTE

H. J.

Emphasis is laid upon the importanc of salvaging industrial wastes as means of economizing materials, an various methods are discussed for re claiming scrap materials.

In large industrial concerns, th amount of scrap to be reclaimed ma amount to thousands of tons per annum and it is reasonable to lay down a spec ial shop to deal with this work. Th equipment of such a shop includes meta separators, shears, presses, cutting an bundling machines, reduction furnaces melting pots, miscellaneous tools an storage facilities.

Amongst the materials reclamation o which may be considered in this article there may be mentioned turnings, bor ings, and other scrap of all metals; oi in rags and turnings; foundry slags an wastes; building materials from altera tions and extensions, etc.; tools and too steel, bolts, nuts, washers, etc. Suit able sorting and preparation of all kind of scrap is a great factor in obtaining the best price for the material.

B. C. LUMBER FOR BRITAIN

A small experimental order for abou 2,000,000 feet of lumber has been place in British Columbia for the Englis market, according to an announcement made recently by Sir James Ball. He expressed the hope that this would be the prelude for an extensive business in B. C. lumber for British account.

GREECE NEEDS IMPLEMENTS

A strong demand exists for farm machinery and agricultural implements of all descriptions in Greece, while the considerable development anticipated in the mining industry will necessitate the importation of crushing machinery and plant, especially in connection with the magnesite industry.

SAILINGS TO ANTWERP

A joint service between Montreal and Antwerp has been arranged by the Canadian Pacific Ocean Services, Limited, and the Furness-Withy Company, Limited. The Glenspean will be the first vessel sailing in this service, about the end of this week.

NORWEGIAN BOAT LAUNCHED

The launching of the 1,500-ton wooden schooner Gunn at the Cholberg shipyards at Victoria, B.C., marks the practical completion of the first vessel constructed on the Pacific coast of the Dominion for Norwegian registry. Two additional ships of the same type are being built at the Cholberg yard. A representative gathering of Norwegians was present at the launching.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$19 50	$19 25
Electro copper	18 50	18 00
Castings, copper	18 50	18 00
Tin	58 00	55 00
Spelter	8 50	7 50
Lead	6 50	6 50
Antimony	9 00	9 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	.86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$11 50	$11 25
Copper, crucible	14 00	14 00
Copper, heavy	13 50	14 00
Copper wire	13 50	14 00
No. 1 machine composition	12 50	13 00
New brass cuttings	9 25	9 00
Red brass turnings	8 00	9 00
Yellow brass turnings	6 25	6 50
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	5 00	5 00
Heavy lead	4 00	4 00
Tea lead	3 00	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	17 00	15 00
Rails	12 00	11 00
Malleable scrap	12 00	12 00
No. 1 machine cast iron	15 00	15 00
Pipe wrought	6 00	5 00
Car wheels	20 00	18 00
Steel axles	20 00	20 00
Mach. shop turnings	5 50	5 00
Stove plate	12 00	10 00
Cast boring	5 50	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts. hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 81
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... **net**

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks..list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 5%
At warehouse ..... list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head.28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	.....
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 30
Brass sheets, 24 gauge and heavier, base	$0 38

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

Readers' Queries

Question.—What is a blue dip used for in silver-plating, and of what is it composed?

Answer.—A blue dip consists of a solution of bichloride of mercury, sal ammoniac, and water, or muriatic acid may be used in place of the sal ammoniac. The solution is employed by platers as a quickening dip for Britannia metal previous to placing the work in the striking solution. Its use facilitates the plating of Britannia metal with silver by forming an intermediate film which receives the silver and prevents failures durng subsequent burnishing treatment.

* * *

Question.—The company I am employed by have resorted to tumbling steel and brass articles preparatory to the plating and have installed some second-hand tumbling barrels which are to be used with steel balls and punchings. Can you furnish me with any information which will be helpful in getting the goods through this operation? I have had no experience with tumbling and it looks like a mountain before me. Please do not spare details.

Answer.—Large ball-burnishing barrels usually rotate at from 15 to 20 r.p.m. on your class of work, the exact speed must be determined by experiment on your part, but the above is correct for ordinary purposes. The usual custom is to use twice the bulk of balls or punchings as work being treated. That is, to each pack of work use two pecks of balls. The proportions must be varied with some classes of goods in order to obtain best results in shortest time. When finishing brass work use a piece of cyanide about the size of a hickory nut in the solution as it keeps the brass from discoloring. The lubricant may consist of any good pure soap or one of the mild cleaning compounds now on the market may be used. Fresh solution should be made for each load and sometimes it is necessary to use fresh solution to finish a load properly. Do not expect to tumble all grades of work in the same period of time, the process requires time, it is not expensive but cannot be hastened beyond certain limits. To separate the work from the balls, place a large pan under the barrel and within the pan place a sieve of sufficiently coarse mesh to allow the balls to fall through. Dump the contents of the barrel into the sieve and shake the ball through. Work which is to be plated will be of better finish if given a short treatment in clean solution following the regular treatment. Results depend on the speed of the barrel, manner of loading, nature of lubricant, time of treatment, and form of barrel. On some lines of work you may find it advisable to rough the work in sand and water and finish with balls in a wood-lined barrel. Use the skimmings from your cleaning solutions as a lubricant in the roughing barrel, thus reducing cost of the treatment and utilizing a waste.

* * *

Question.—Kindly publish a formula for a good arsenic black finish. I wish to use same on polished steel goods and as an oxidize for brass parts.

Answer.—To prepare an arsenic black solution of 15 gallons, dissolve 5¼ lbs. of sodium cyanide in a portion of the water; when cyanide is dissolved, heat the water to about 200 deg. Fahr., and in it dissolve 15 lbs. white arsenic and 12 ozs. of copper carbonate. Equip the solution with either cast brass or copper anodes and use a current tension of about 1 volt. A good deposit for polished surfaces may be produced in 5 minutes and will not require buffing. Exceptionally heavy deposits may be produced in 20 to 30 minutes and buffed to a high finish in the usual manner. The solution will prove very satisfactory for brass oxidizing or by using stronger current greyish effects may be obtained. The solution acts very uniformly and is easy to operate and simple to manage. The absence of acids facilitates both easy operation and management. In case the solution requires refreshing, add the three chemicals in exact proportions as given here and no trouble will follow. Owing to the tendency of decomposition in the case of cyanide it sometimes becomes necessary to make small additions quite frequently. The metal content should remain practically constant for month without additions. The Beaume density may safely vary from 6 deg. to 15 deg.

COLLINGWOOD SHIPBUILDING CO.

These yards at Collingwood have been, and are busy. The S. S. "Sequin" was in drydock with the S. S. "Lucknow." The "Canadian Warrior," built by the company, had her trial trip and made a satisfactory test, and is now in commission.

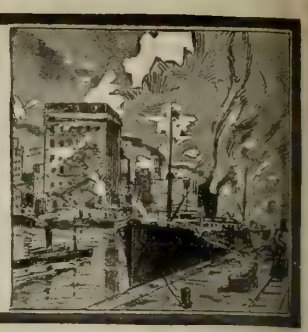
Current Events in Photograph

A FINE WAR CAPTURE

Submarine UC-97, 1918 model, which arrived at the port of Montreal, May 27, on its way to the Great Lakes. This submarine comes from New York and was towed in by the "Iroquois" and will make way to Detroit where it will be exposed for a few days. The UC was the means of getting numerous subscribers to the last Victory Loan held in New York. On the turret is the Imperial Eagle with two heads bearing the legend "Gott mitt uns."

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES



TENDERS

Proposals for an incinerator plant suitable for the City of Niagara will be received by the city clerk of that city up till June 16th.

Canadian National Railways are asking for tenders for the construction of the superstructure of a grain workhouse at Port Arthur, Ontario.

Board of Education, Simcoe, are asking for tenders for the erection of the new Simcoe North School, and also additions to the Simcoe South School.

The Separate School Board of Espanola, Ont., are asking for tenders for the supply and installation of a low pressure steam heating and ventilating system for a new school. The architect is C. F. Burden, Massey, Ont.

The Town of Dundas asks for tenders, to be delivered up to June 23rd, for the following: Sewage disposal works, sewage pumping station and force main, outfall sewer, sewage pumping machinery, sprinkler equipment, valves and piping, sanitary sewers, sewer pipes and specials.

C. P. and P. H. Mitchell are the consulting engineers for the new municipal power project for Parry Sound, Ont. Tenders are being asked for the construction and equipment of hydraulic turbines, generators, etc., to develop 1,700 H. P., including dam, intake, conduit, tail race, generating station, etc. Total estimated cost, $150,000.

The Department of Public Works is calling for tenders to be delivered not later than June 20th for the construction of 200 feet of the South Pier of Burlington Channel. Plans and specifications can be seen at the Department Offices, Ottawa; at the offices of the District Engineers, Equity Building, Toronto, and at the Post Office, Burlington.

Tenders for the repair of two points on the eastern and two on the western breakwaters at Port Colborne are being asked for by the Department of Public Works. All necessary information can be obtained from the Department of Public Works, Ottawa; District Engineers, Equity Building, Toronto; Shaughnessy Building, Montreal, and Post Office, Port Colborne.

The Department of Public Works are asking for tenders, to be addressed to the secretary, and delivered not later than July 2nd, for repairs to the east pier superstructure of the eastern entrance to Toronto harbor. Plans and all particulars can be obtained at the Department, Ottawa, or at the office of the District Engineer, Equity Building, Toronto.

MARINE

Ottawa.—The amount of $350,000 was included in the estimates for work on the Welland Canal. This is part of a total expenditure of $16,000,000 that will be devoted to the work of widening and deepening the Welland Canal. There was some opposition from the Hon. Rodolphe Lemieux based on the financial situation, but this was soon overcome and the item passed.

Lachine.—Returns from the Lachine Canal show that the traffic is resuming a normal activity, though not yet up to the pre-war quantities in every particular. The tonnage passed through shows a marked increase over the corresponding month last year, and the number of trips were 961 against 938 in the corresponding period last year. Cargo carried shows an increase of 24,116 tons, and grain an increase of nearly 3,000,000 bushels. Against this is a pronounced falling off in the amount of coal passing through, the decrease in soft coal being 1,300 tons, and in anthracite a decrease of 4,469 tons.

TRADE GOSSIP

R. T. Holman Ltd., Summerside, P.E.I., are at the present time planning an extensive addition to their plant, and would welcome new ideas in interior and exterior arrangement from those who make a specialty of this line.

The Wallace Machine Works, Ltd., has been incorporated with a capital stock of $9,900 to take over the business of the Sussex Manufacturing Company, Ltd., Sussex, N. B. Harry W. Wallace, Charles W. Upham and William Kelso are the men concerned.

L. W. Simms, St. John, has been appointed one of the vice-presidents of the Maritime Provinces branch of the Canadian Manufacturers' Association. Hon. W. F. Roberts has been elected a vice-president of the Canadian Public Health Association.

Mr. Lovell G. Mickles is retiring from the position of the Montreal Coal & Dock Co. and will devote his attention in the future to the F. F. Weaver Coal Co. and the newly organized North Eastern Coal & Export Corporation, of which he is president.

Niagara Falls Gas Plant.—The Niagara Falls Gas & Electric Light Company are to erect a modern gas plant to cost $200,000 on a four-acre site at 27th Street and Buffalo Avenue. The plant will be completed and ready for operation by January 1st, 1920.

Workmen's Council in Brantford.—In connection with the plans of the Massey-Harris Company for co-operation with the working forces in their employ, councils formed by men elected by the workmen have been formed. The management will also choose representatives to act with those of the men.

Company Gets Cash.—In connection with the suit taken by the Canada Car Co. against the American Car Co over munition contracts, a decision has been given in the American courts awarding the Canada Car and Foundry Co. the sum of $780,000. Both the U. S. and Canadian Governments have made final settlements with the company on outstanding munition accounts.

Electric Light for Barrington Passage: A company was incorporated at the recent session of the Nova Scotia Legislature for the purpose of developing power from the Barrington River to serve the villages of Barrington, Barrington Passage and Woods Harbor. The Naval Department has a large wireless station at Barrington Passage, which played an important part in the recent naval activities in this neighborhood.

Lloyd Harris Is Optimistic: The head of the Canadian Trade Commission has returned to Canada full of hope for the future trade of the Dominion. He says that Canada compares favorably in costs of production with Great Britain or any European country. Great opportunities for trade exist in the near East and the arrangement of a credit of $100,000,000 for Roumania would result in a permanent development of export trade.

Oshawa. — Oshawa endorsed the proposition of the Ontario Steel Products Co. of Canada, by voting them a fixed assessment for ten years, by a majority of 596 votes. This concern will erect modern factory buildings on the Rider property in the north-eastern section of the town, for the manufacture of automobiles, springs and axles, of which the huge McLaughlin and Chevrolet

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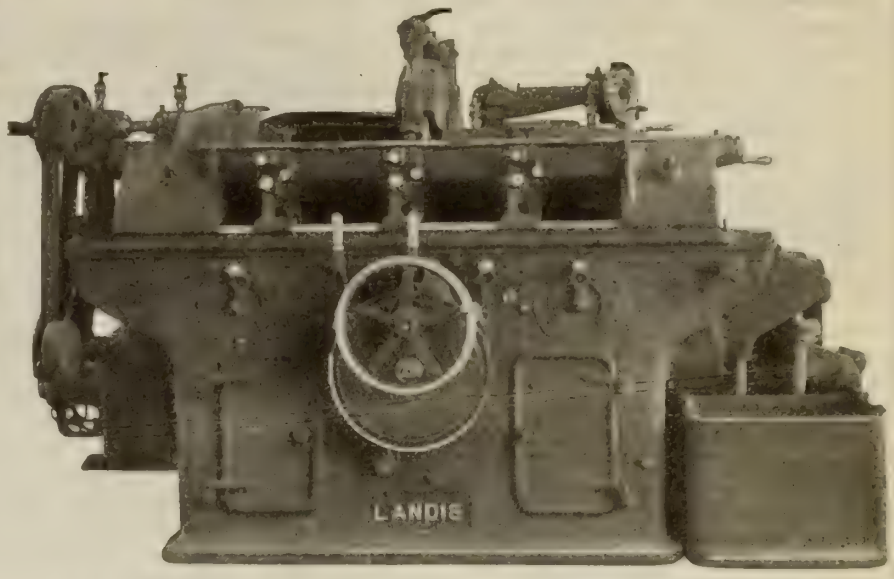

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plants will take almost the entire output. 150 men will be employed.

Canadian Manufacturers' Association: The Maritime Branch of the C. M. A. met in Halifax recently at the offices of the Board of Trade. A special showing of films relating to accident prevention was given at the Strand Theatre, followed by a luncheon at the Green Lantern. The importance of developing export trade was discussed. The chair was occupied by President C. D. Dennis, Canadian Car & Foundry Co., Amherst.

Sticking To It: Mr. J. C. Miller is taking a vacation of six months after fifty-two years' continuous service as treasurer of the firm of John Harrison & Sons, Owen Sound. Mr. Miller is not resigning his position, although he is now seventy-eight years of age. He has had charge of the financial end of the business for the last half century, and has taken an active part in the development of the business from its early inception to its present dimensions.

Agreement is Arrived At.—The Robb Engineering Works, of Amherst, N.S., have arrived at an agreement with their employees, under which the men get an eight-hour day, and a forty-eight-hour week. Time and a half for overtime, and double time for Sunday will be paid; also for holidays. These arrangements come into force after 30th August. From June 1st till Aug. 30th, a fifty-five-hour week will be worked, the pay to be the same as for the fifty-nine-hour week, at present in force.

Air Mail Service.—The company which maintains the air service from London to Paris has been awarded the rights by the Newfoundland Government to establish an air service across the Island, and to Montreal. The officials of the company think that mails can be carried from St. John's to Montreal in fifteen hours, whereas now it is a matter of five or six days, under the most favorable conditions, and in winter often fifteen or sixteen days.

New Mill Makes Progress: The development of water power, erection of buildings and installation of machinery for the new mill of the Kipawa Fibre Co. at Lumsden's Mills is proceeding rapidly. A dam has been built at Gordon Creek about 200 feet above the Ottawa River level, and an ultimate power development of 20,000 H. P. is expected here. Four thirty-ton digesters are in position, and about one-third of the buildings have been erected.

The Government of British Columbia have granted a sum of $2,000 to help cut the cost of conducting a demonstration of smelting iron ore by the electrical process. Mr. Fraser, of the Vancouver Magnetite Iron and Steel Smelting Company, and Mr. Fleet, an electrical engineer, were the gentlemen composing the delegation which interviewed the Government on the subject. The claim of Mr. Fleet is that in the furnace invented by him, a ton of pig iron can be produced at the cost of $13.55 a ton, and, eventually, to $11 a ton.

Victoria: Orders for lumber for delivery to Great Britain from British Columbia amount to nearly 100,000,000 ft. One order for 70,000,000 ft. was placed some time ago by British interests, and a further order is being delivered by means of demountable ships. These are practically huge power drive rafts, built of the lumber that is to be delivered. When they reach their destination they are disassembled. Sir James Ball, the British timber commissioner, is a firm believer in this method of transporting lumber.

Incendiaries at Regina: In a recent fire here three elevators and two coal sheds were burned to the ground, and the circumstances point to the fires being the work of incendiaries. It is said that some time ago a notice was found pinned to the door of one of the elevators, threatening trouble. The elevators were owned by the Saskatchewan, Western Prussia and Sterling Companies, and are a complete loss. The Gold Grain Companies' offices and sheds, containing 4,000 bushels grain and a large amount of coal, were also destroyed.

Power Plant Destroyed: The municipal power plant was destroyed by fire recently. The plant consists of Diesel and gas engines. According to one of the employees, a belt came off one of the engines immediately before the fire broke out, while another states that he heard a muffled explosion at the same time. The power house being one and a half miles from the city, there was some delay in getting the fire department to the scene, and the flames had got a firm hold by the time they arrived. The total damage is expected to amount to $60,000. The original value of the plant was $80,000.

New Fire Alarm System: The town of Sarnia is about to install a new and up-to-date fire alarm system. The Northern Electric Company is carrying out the contract. The switchboard at the central fire hall will handle four circuits at present and provision for extension is made. Storage batteries will be employed, charged through a motor generator operating on hydro-electric current. An automatic indicator will be installed, which will show the number of the box from which the alarm is rung in. The outside equipment will also be added to where needed, and the whole system put on a thoroughly modern and efficient basis.

NATIONAL STEEL CAR REFUSED THE OFFER

HAMILTON.—The offer of the American Car & Foundry Co. for the purchase of the National Steel Car Co., of this city, was rejected. Negotiations between these two large companies have been in progress for many months, and the deal was expected to be completed. After careful consideration the National Steel Car Co. decided to refuse the offer and Sir John Gibson announced that the deal was off. The failure of the transaction to go through will not affect the operations of the local plant, and business will be carried on as usual, said Sir John.

Numerous reasons were given why the National Steel Car shareholders declined to accept the offer. The American concern agreed to pay all bank liabilities and pay in full the shareholders according to the stock they held, but they were willing to pay this only from the profits. If the plant was not operated vigorously it would take twenty years, probably, to meet these demands, and the local company shareholders were not altogether in favor of this idea of payment.

Sir John Gibson stated that the shareholders were not assured that the plant would be operated as vigorously as it might be and failing to give this assurance negotiations were suspended. "They wanted too much of their own way in operating the plant, and we could not see our way clear to favor all their ideas," said Sir John.

The announcement came as something of a surprise. A week ago it was announced that it was only a matter of a few days when the American Car and Foundry would take over the local plant.

Hamilton will not be affected in any way by the decision of the National Steel Car Co. shareholders. The local paint will be operated as usual. It is in good running order, very busy, and has large orders.

AMERICAN WELDING SOCIETY

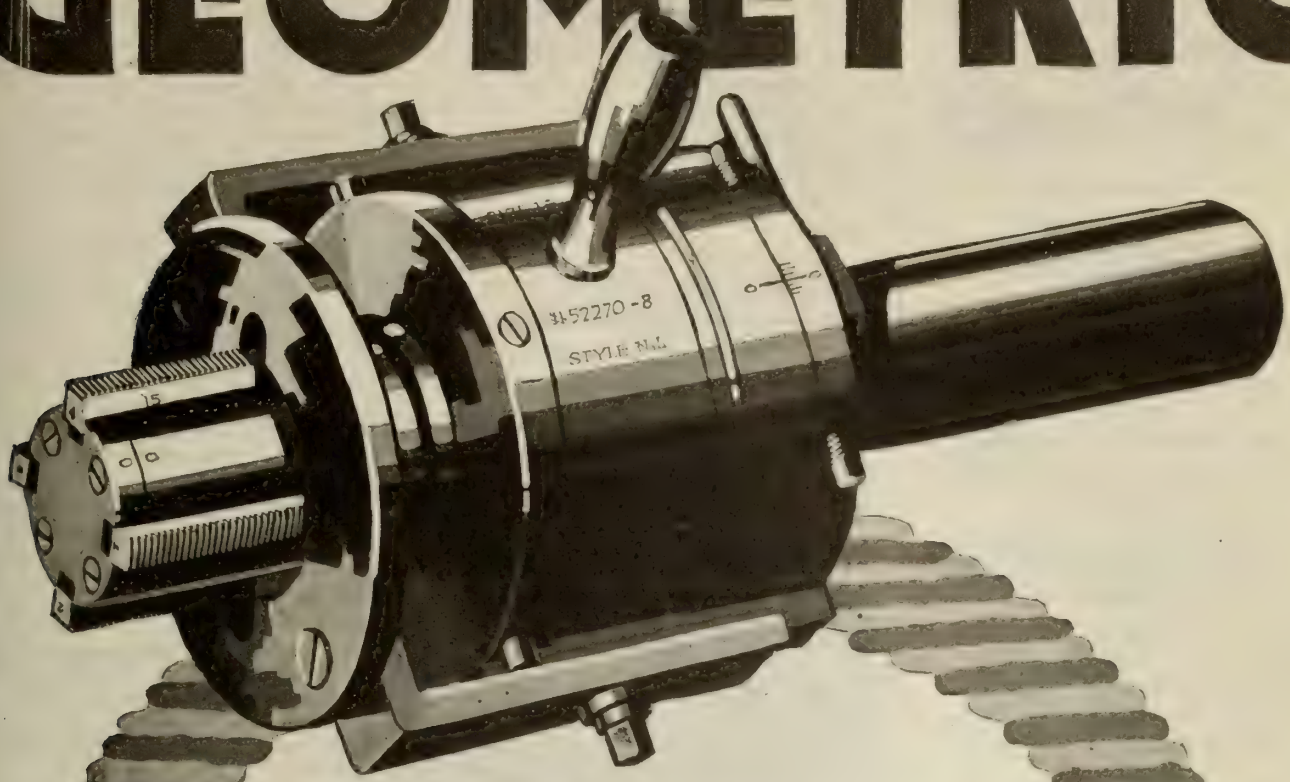
H. J.

Welding has attained such importance in the engineering world that a society is to be formed to secure its efficiency and promote its extension. The scope of this society will include all branches of the industry. Forge welding, electric resistance welding, electric spot-welding, electric arc-welding, gas welding, thermit welding, etc. Moreover the society will create and assist in maintaining a bureau of welding, which will be a separate organization designed to derive full advantage from the principle of co-operation in research and standardization. A temporary organization, with headquarters in New York, has issued an invitation to all interested in welding to become members of the society. In this society will be merged the welding committee of the Emergency Fleet Corporation and the National Welding Council.

OBITUARY

The death occurred at Pictou, N.S., of Capt. William Mackenzie, one of the old-time sailors, for which the Maritime Provinces have always been noted. The deceased was over seventy years of age, but seemed rugged and hearty, and his death, which occurred after only a few hours' illness, came as a surprise to his friends and relatives. Capt. MacKenzie had been at sea all his life, first in sailing vessels, and then in steam. At the time of his death he was in command of the dredge Northumberland at North Sydney, which vessel he had commanded since 1912.

GEOMETRIC



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MARINE

Montreal.—The War Convoy, an 8,800 ton steamer, has been purchased by Seattle interests for $1,500,000. She will load on the Pacific coast for United Kingdom and continental ports. The deal was put through in New York.

Vancouver.—The Tyndareus of the Blue Funnel Line is about to leave for Seattle, where she will load fifteen large size Baldwin locomotives and other railway material for Vladivostok. The Tyndareus is a 14,500 ton deadweight vessel.

Gananoque.—The two submarine chasers built at the Clayton Ship and Boat Building Co., known as Nos. 411 and 412, left for Chicago under their own power. They have been ready to sail for some time, but have been delayed waiting for compasses and other equipment.

Brockville.—The Soulanges Canal was the scene of a collision between the steamers Joyland and Robt. S. Rhodes, of the Hall Line. Both vessels were damaged and will have to be docked to ascertain the extent, and make repairs. The Joyland continued her voyage to Montreal and the Robert E. Rhodes went to Ogdensburg.

Victoria.—The Japanese are planning an extensive shipbuilding program for the immediate future. Among the vessels projected are several of 20,000 tons for the Nippon Yushon Kaisha. The first of these will be built in a British shipyard, and the following ones built in Japan, using the first as a model. Three vessels of about 6,000 tons for the passenger trade between Japan and Shanghai are also contemplated.

Brockville.—The steamer Compton, which went ashore on a shoal near Butternut Bay last Fall has been refloated. She was abandoned to the underwriters after going ashore, but later was purchased from the underwriters by her owners. The salvage operations were performed by Captain Hinckley, of Oswego, in about three weeks' time. The Compton was taken to Ogdensburg, where she will be hauled out at the shipyard and repaired.

Montreal.—The Canadian Ranger is on the Atlantic, making her initial voyage. She has a full cargo, and the freight earned will be $150,000 for the trip. The Canadian Ranger is the fourth of the Canada Government fleet of cargo vessels. A party of newspaper men were invited to make the trip from Quebec to Murray Bay on the vessel, and they spoke in high terms of the vessel and her crew. The Canadian Pioneer is now on a voyage to Buenos Aires, and the Canadian Warrior on a trip to the West Indies and Cuba, so that the Canadian flag is beginning to appear in the mercantile highways of the sea.

Ottawa.—The Department of Marine has issued a preliminary statement covering the number of vessels and their tonnage built in the Dominion of Canada during 1919. This is, of course, subject to revision. Of wooden craft there were 81 sailing vessels, of a total gross tonnage of 34,042, 43 steam vessels, total gross tonnage 86,479 and 18 internal combustion engine vessels with a total gross tonnage of 9,757. The number and class of steel ships built was as follows: steam driven, 79, with a total gross tonnage of 135,004. The total gross tonnage of wooden and steel vessels built is 265,282 tons, and the total deadweight tonnage is 424,451.

Cleveland.—The beginning of the annual ore movement is in sight. The grain that has been carried over the winter in steamer holds has now been cleaned out, and all these vessels are available for the movement of iron ore. Recent charters of space are of sufficient volume to move 100,000 tons, but at present there is not much business for outside vessels.

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Most of the business done by outside vessels is due to the Steel Corporation sending ore forward at a pretty good rate.

Victoria.—The contract for the lighthouse and lighthouse buildings for the Aga light on Barret Island has been let to Mr. Stockley, a Prince Rupert contractor. The new light will be a similar one to that at Ogden Point Breakwater, and will be electrically operated from a plant on a nearby point on shore.

Amherst.—The schooner William McL. Borden, named after one of the boys of Pugwash, who gave his life in France, was launched recently from the yard of the Cumberland Shipbuilding Co., Pugwash. The vessel has been sold to a firm in St. John's, Newfoundland.

St. John's, Nfld.—The steamer Neptune, with 300 fishermen on board, was reported to have broken her propeller shaft in the heavy ice off Belle Isle. The steamer Diana was sent to her assistance as soon as word was received, and will endeavor to tow her to port, or, failing that, will take off her crew.

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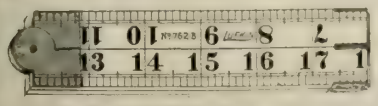
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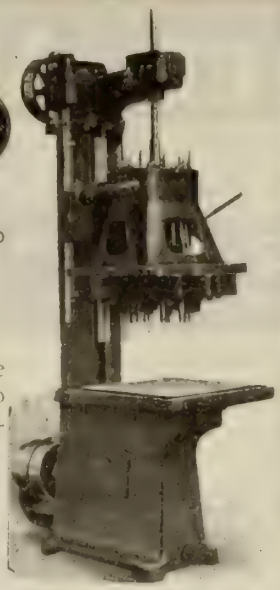
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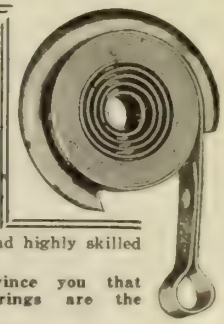
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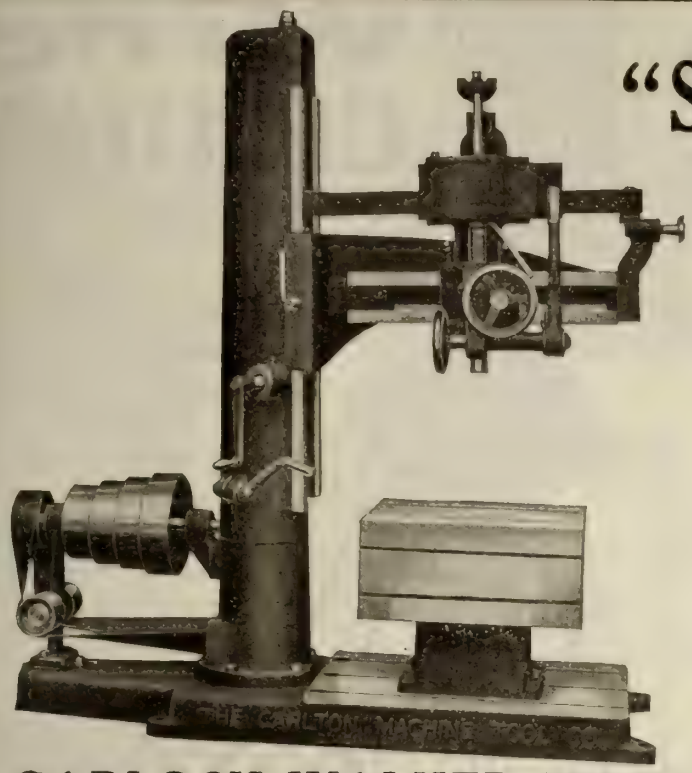

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This machine has driven a ½-inch, high-speed drill, running 900 revolutions per minute, through a 2-inch cast iron plate, at the rate of 25 inches per minute, with a feed of .028-inch per revolution of the spindle and drills of other sizes in proportion.

For quick, accurate, productive work.

GARLOCK-WALKER MACHINERY COMPANY, Limited

MONTREAL 32 Front Street West, TORONTO WINNIPEG

"EVERYTHING IN METAL AND WOOD WORKING MACHINERY"

FOR SALE

A 25" x 10' Heavy Duty LeBlond Lathe, double back friction quick change gears, large and small face plates, steady rest, complete with countershaft, in first class condition. Price, $800. Also the following new and used tools:

1—30" x 30" x 14' London Planer.
1—75 H.P. 2200 V. Westinghouse Motor.
6—Air Compressors.
1—B. & S. Surface Grinder.
1—350-lb. Nazel Hammer.
1—No. 3 Kempsmith Universal Milling Machine.

Also Transformers, Pulleys, Belting, Shafting, Hangers, Bearings, etc., all at reasonable prices.

Pembroke Iron Works, Limited
PEMBROKE, ONT.
(c25m)

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works
Allentown, Pa., U.S.A.

CANADIAN MACHINERY wants articles on shop practice, new devices, new ideas. We want stories of how repair jobs have been done and how you have developed new kinks to help your work along. CANADIAN MACHINERY pays for material of this nature and our contributors find it well worth their while.

Advertise It!

If you have Machinery which your plant has outgrown—advertise it. Or if you have a Factory Building which you have outgrown—advertise it. That is, advertise it in our Classified Advertising Section and SELL what you have for sale.

CANADIAN MACHINERY

CLASSIFIED ADVERTISING SECTION

143-153 UNIVERSITY AVENUE - - TORONTO, CANADA

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Springs *for* Every Use

We have been making springs of all kinds for 70 years. Let us advise you when in difficulty.

Tell us the purpose for which the spring is intended, and our experts will gladly co-operate to see that you get the design best suited to the purpose.

Dunbar Springs are thoroughly tested for **accuracy** and **quality.** Send us specifications, for estimates.

THE DUNBAR BROS. CO.
BRISTOL, CONN.

Wire Cloth

of every description

We make **Machinery Guards** of all kinds.

Metal Lockers for Clothes.

Overhead Wire Guards for Elevators.

Drop a line for full details.

Canada Wire & Iron Goods Company

Hamilton, Ontario

Eastern Representative:
H. E. O. Bull, 184 Mance St., Montreal, Que.

PARTIAL LIST OF TOOLS

2—60″ Bullard Vertical Boring Mills
1—60″ Niles Vertical Boring Mill
No. 4—B. & S. Plain Miller
1—36″ x 36″ x 8′ Gray Planer, two heads
No. 3—Cincinnati Universal Miller
5—No. 0 Steptoe Hand Millers
13″ x 5′ 6″ New Carroll-Jamieson Quick-Change Lathe
14″ x 6′ New Carroll-Jamieson Quick-Change Lathe
15″ x 6′ New Sidney D.B.G. Quick-Change Lathe, swing 17″
15″ x 8′ New Sidney D.B.G. Quick-Change Lathe, swing 17″
17″ x 8′ New National Quick-Change Lathe
3—17″ x 8′ New Sidney D.B.G. Quick-Change Lathe, swing 19″
17″ x 10′ New Sidney D.B.G. Quick-Change Lathe, swing 19″
18″ x 24″ New Rahn Larmon Lathe, D.B.G. Quick-Change
19″ x 10′ New Sidney D.B.G. Quick-Change Lathe, swing 21″
9—19″ x 8′ New Sidney D.B.G. Quick-Change Lathe, swing 21″
25″ x 14′ New Sidney D.B.G. Quick-Change Lathe, swing 27″
33″ x 14′ Putnam, arranged fo Motor Drive
6′ Western Radial Drill
5′ Bickford Single Pulley Drive Radial
100-lb. New Little Giant Hammer
50-lb. New Little Giant Belt Hammer
25-lb. New Little Giant Belt Hammer
30-ton Watson & Stillman Hydraulic Press

FRANK TOOMEY INC.
127 North Third Street PHILADELPHIA, P.A.

Used Material Offered Subject to Prior Sale

F.O.B. GUELPH

2—Libby Lathes 20″ Swing x 9′ Bed complete with Turret and Countershaft, each .....$ 750.00
1—McGregor Turret Lathe 24″ Swing x 10 ft. Bed with Countershaft, each 500.00
1—Bury Air Compressor 12 x 14″—Class M 330 Cubic Ft. per minute—Belt Driven..... 1,000.00
1—6 x 8 Perrin Accumulator with Unloader ... 300.00
3—Perrin Triplex Geared Pumps 1¼ x 5..... 200.00
1—West Tire Setter Geared Pump 150.00
1—Perrin Power Press used for 6″ Shell Nosing 250.00
1—No. 1 Lelland & Falconer Wet Tool Grinder 40.00
70—Wood Split Pulleys from 6″ to 40″ dia...50 and 25% off present Canadian Price List.
2—24 x 4 Press Steel Pulleys, each 3.50
56—7, 8, 10, 12 and 18″ Drop Hangers C.I. 2 7/16″ .....) Special Prices on Application
Sundry lot 2 7/16″ Shafting.....
1—No. 4 Acme Blower 40.00
1—Size 3-S Little David Chipping Hammer—made by Ingersoll-Rand, 3″ Stroke 13¼ Overall—13 lb. weight, 17 cubic ft. per minute, new 28.65
1—Type "B" Size No. 7 Riveter made by Keller Pneumatic Tool Co., will rivet up to ⅞″.. 30.00
Perring Accumulator with 28 tons of Iron on Platform 2,000 lbs. water pressure is raised.

Taylor-Forbes Company
Limited

Nichrome Castings for Heat Treatment

NICHROME CASTINGS
at 1800° F.

Economy dictates their use:
- Light weight
- Thin walls
- High heat conductivity

Efficiency dictates their use:
- Saving in fuel and labor
- Last thousands of hours
- Uniform high quality of final product

Manufactured under Henderson Patents

CANADIAN DRIVER-HARRIS CO., Ltd.

WESTERN OFFICE AND DEPOT CHICAGO 28 SO. JEFFERSON ST

WALKERVILLE, ONT. CANADA

AMERICAN OFFICE AND WORKS HARRISON, N. J.

BRITISH WORKS MANCHESTER ENGLAND

2

SPECIAL MACHINERY

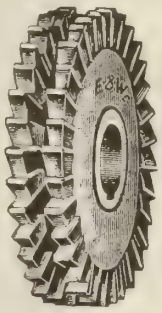
Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

Elliott & Whitehall Machine & Tool Co.

GALT, ONTARIO, CANADA

MILLING CUTTERS AND SMALL TOOLS



We manufacture the following tools, etc.

Standard and Special Milling Cutters of all descriptions, Gear Cutters, Hand Reamers, Shell Reamers, Chucking Reamers and Taper Pin Reamers, Lathe Mandrels and Arbors, Metal Stamping Dies, Gauges, Jigs and Fixtures, Etc.

All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

ASK FOR OUR NEW CATALOGUE No. 10.

Portable Welding

Electric, Thermit and Oxy-Acetylene

With trained and skilled mechanics always available for immediate dispatch in case of Breakdown in your Plant. We're always ready.

USE THE PHONE

We do the rest

THE

ST. LAWRENCE WELDING CO., Ltd.

A. M. BARRY, Managing Director

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FITCHBURG

Plain Cylindrical Grinders

Built by

Fitchburg Grinding Machine Co.

FITCHBURG, MASS., U.S.A.

WELDING APPARATUS AND . . . SUPPLIES

The REGO 100% Efficient Welding Torch

Saves Oxygen Eliminates Flash-Back Better Welding

Write to us for anything and everything you need.

WELDING & SUPPLIES COMPANY

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TOOLS, DIES and GAUGES

Manufacturers of UNIVERSAL CYLINDER RE-BORING TOOLS.

Windsor Machine & Tool Works

Windsor, Ont.

BATH Universal Manufacturing Grinders

built by

Universal Grinding Machine Company

Fitchburg, Mass. U. S. A.

SPECIALISTS

We specialize in three lines:
Cutters—Reamers—Drills.

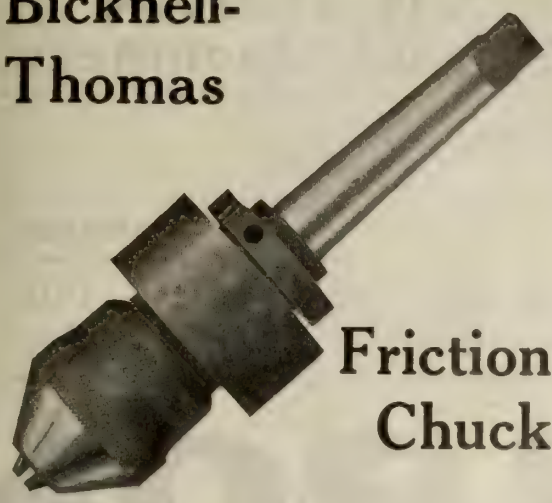
We have three selling points:
Quality—Service—Price.

The J. A. M. Taylor Tool Co.

318 Stair Building : TORONTO

Machine Shop Supplies

Bicknell-Thomas



Friction Chuck

not only prevents tap breakage but saves loss due to damaged parts and removing taps. It is the simplest Tapping Chuck made; it is the most efficient and fits any kind of machine. It can be used on multiple spindle drills or tapping machines, even when the spindles are close together.

Try one out on us. Write to-day for illustrated circular, describing same fully.

BICKNELL-THOMAS COMPANY
GREENFIELD, MASS., U.S.A.

ACCURACY

When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

THE
GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company Limited, 49 Common St., Montreal, Que.

Presswork

We take contract work—and turn it out quickly and accurately. We have facilities for:

Drawing
Piercing
Forming
Blanking

in all kinds of sheet metal. If you have any work of this kind let us quote you prices.

Henry Hope & Sons
of Canada, Limited
Peterborough

Grinding Wheels
for General Shop Work
Saw Gummers

"Brantford" for Quality

Sold Direct to the User—
This means Economy
to you
Brantford Emery Wheel Co.
Brantford, Ont

VICTORIA
Special Machinery

Designs
Patterns
Castings
Forgings

VICTORIA FOUNDRY CO., LTD.
OTTAWA :: CANADA

GREY IRON
Castings

Special Equipment Built to Specification
Steel Plate and Structural Steel Work
Quality and Prompt Service Double-Sure

WILLIAM HAMILTON
COMPANY, LIMITED,
Peterborough,
Ont.

The Court of Last Resort—The
Man at the Bench

Put It Up To Him

Give him a P.H. or Imperial File and one of any other make for comparison. We are willing to abide by his decision, for we know it to be true of P.H. and Imperial Files that

"They Cut Faster
and Wear Longer"

Ingersoll File Company, Limited
Ingersoll, Ontario

John Morrow Screw & Nut Co.
LIMITED
Ingersoll, Ontario
Sole Distributors

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

We are Growing

When our plans are completed, "HISCO" will be the largest plant of its kind in Canada.

Two big new electric furnaces are being added to our present large equipment. And cleaning and annealing department measuring 300′ x 100′ is about to be completed.

This will place us in a position to handle orders big and small with unequalled facility.

Specify "HISCO" Products

Quality and Service Guaranteed

Steel, Chrome, Manganese and Nickel Steel Castings

Annealed and Unannealed

Cement Mill and Mining Machinery Castings, Stamp Mills, Crushing Plants, Excavating Outfits, Steel Car Wheels, Locomotive Driving Wheels and Frames, etc.

GEARS Machine Moulded, any size up to 18 feet, without Patterns

HULL IRON & STEEL FOUNDRIES, LTD., HULL, QUE.

THE

TRADE K—T MARK

FOUNDRY

GALT - ONT.

Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. **We can advise you** and we have expert metal and wood patternmakers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

—ASK US

STEEL PLATE CONSTRUCTION

Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

We invite your inquiry.

THE

TORONTO IRON WORKS

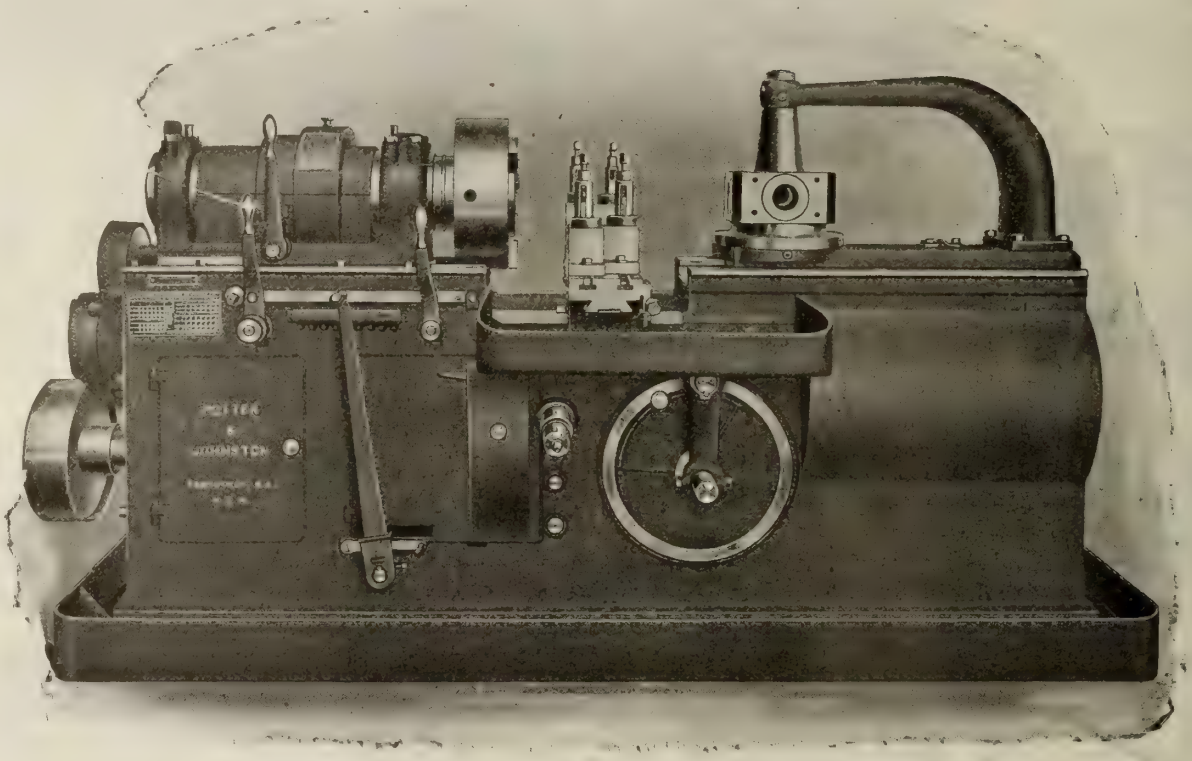
LIMITED

HEAD OFFICE: ROYAL BANK BLDG. TORONTO WORKS: CHERRY STREET

POTTER & JOHNSTON

MANUFACTURING AUTOMATICS

Increase the Output and Reduce the Cost



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.

Geared feed.

Auxiliary reaming and threading feed.

Cross slide.

Automatic back facer bar through spindle.

16-inch convertible two and three-jaw scroll chuck.

Spindle 5¾ inches diameter, hole 3½ inches diameter.

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

Catalog gives full particulars. ***Drop a card for it.***

Canadian Offices: POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office: 1501 Royal Bank Building, Toronto, Canada

Works and Warehouse: Galt, Ont., Canada

Do High Prices of Machine Tools Hinder Sales?

THE question asked of a considerable dealer in Toronto by THE FINANCIAL POST is answered by him in THE POST of March 8th, in part, as follows:

> "New lists that are coming out do not show concessions in prices. As long as firms can sell at the present prices there is not much chance for a lower level of values."

The rest of that article in THE POST is interesting, and here are some other extracts worth noting from POST items of this week:

Implement Manufacturers May Unite for Export Trade

"Representatives of the implement manufacturers have been at Ottawa in consultation with the Canadian Trade Commission to arrange for the pushing of their export business. What is likely to be proposed to them is that they should work in concert, and their orders abroad should be placed through a central selling body, the expenses of conducting which should be maintained by a pro rata tax on each member of the association. They will provide their own credits from a common fund, which can be created by contributions gauged according to the respective interests involved."

Steel Market Is Still Unsettled

Big American Interests Co-operating in Secretary Redfield's Plan

The talk of lower prices for steel continues in the market. It is a fact that the "set prices" of the war period have, in many ways, spoiled the trade for what has followed. When prices were fixed, buyers and sellers knew their ground for the coming three months. Not only so, but they were quite certain that when changes would be made they would not be radical, and would be in keeping with the cost of material and labor entering into the output.

Last week a number of prominent steel producers were meeting in New York, and according to the authorized version they "discovered" that George N. Peek, recently named by Secretary Redfield as chairman of "The Industrial Board of the Department of Commerce" was in town, and accordingly they invited him in to explain Secretary Redfield's plan for the deflation of war-time prices. Indications are that the steel producers are going to make a show of resisting the movement, but will gracefully yield at the last moment.—"The Financial Post," March 8, 1919.

Above is part of a front-page news item in THE POST of March 8th.

Latest Activities of Steel and Iron Using Interests

Stove Manufacturers Out For Export Trade

"The Canadian stove and enamelled ware manufacturers are making an aggressive effort to develop export business and to secure orders from Europe, Australia, New Zealand and South Africa. A. M. Smith, sales manager of the McClary Manufacturing Company, will, on behalf of the manufacturers, make a personal investigation of European prospects."

New Ship Repair Plant For Vancouver

"Seattle men propose to build at Vancouver, B.C., a steel dock of 25,000 tons, capable of handling the largest ships which make the Port of Vancouver. Embraced in the enterprise will be a shipbuilding and repair plant, the whole to cost in the neighborhood of $4,000,000."

New Iron Industries For Border Cities

"Plans are being made for the location of a large malleable iron corporation with extensive connections in the United States, on the Windsor industrial site. Negotiations to this end have been pending for considerable time. Altogether, 12 large manufacturing firms with headquarters across the border are negotiating for sites in the Border Cities."

Business Building News Items Appear Each Week in *The Financial Post*

The above are only a few of the many subjects of real profit-making interest to Canadian men of affairs which have been dealt with by expert writers and editors in THE POST of March 8th. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

The MacLean Publishing Co.,
143-153 University Ave., Toronto.

Send me THE FINANCIAL POST every week till further ordered. I will pay subscription price, $3.00 per year, on receipt of bill, or you may draw on me for this.

Name.....

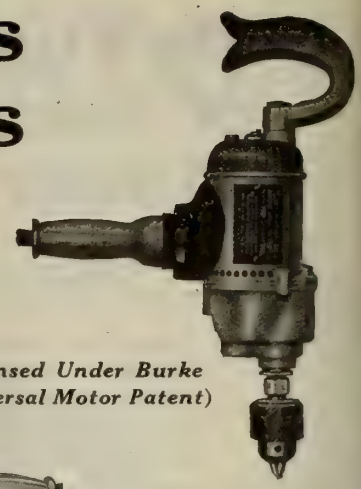
Address.....

Thor

Electric Drills and Grinders

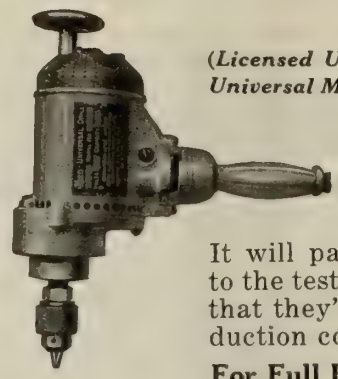
The only Electric Tools equipped throughout with ball and roller bearings.

Light, Powerful and Durable



(Licensed Under Burke Universal Motor Patent)

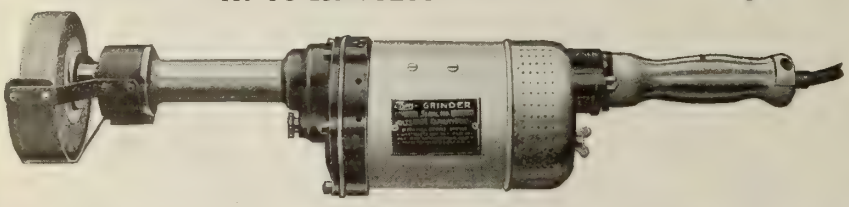
Thor Electric Tools have off-set spindles—which permit operating in close quarters—a variety of speeds, S K F Ball Bearings, four contact switches, D.C. or Universal Motors and several other features that make them the super-tools of the day. Jacobs Chucks used as Regular Equipment.



PORTABLE ELECTRIC GRINDER

Equipped with Universal Motor for Operating on Direct or Alternating Current

110 TO 250 VOLTS



It will pay you to put them to the test and let them prove that they'll reduce your production cost.

For Full Particulars Write—

Independent Pneumatic Tool Company

334 St. James St., MONTREAL

Toronto: 32 Front St. W. Winnipeg: 123 Ballantyne Ave. E
Vancouver: 1142 Homer St.

H. COLLIER SMITH

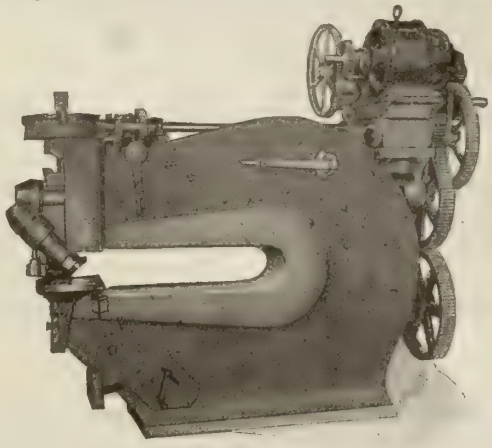
"QUICKWORK"

Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

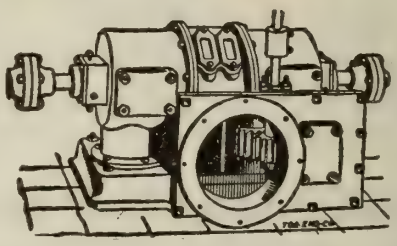
SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

Write for Catalogue

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

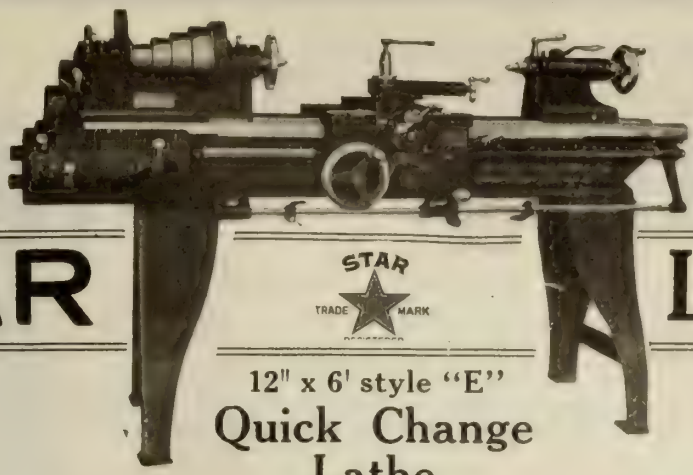
Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO



STAR Lathes

STAR TRADE MARK

12" x 6' style "E"

Quick Change Lathe

An Ideal Tool for Toolrooms, Scientific Instrument Shops, Experimental Departments and for Accurate Commercial Work.

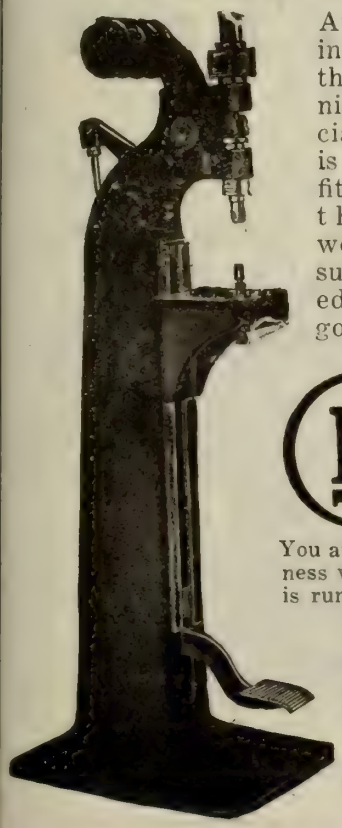
The 12" Star Lathe as shown above conforms in every way to the highest type of standard engine lathe practice and for rated capacity is unsurpassed.

Replace your larger and more expensive machines with "Star" Lathes and you'll automatically reduce your manufacturing costs. Try one "STAR" and you'll soon want more.

May we send our latest Catalogue and full particulars?

The SENECA FALLS MFG. CO., INC., 366 W. Fall St., Seneca Falls, N.Y.

No Skill Required



Anybody with ordinary intelligence can operate this Rotary Rivet Spinning Machine. No special skill is required. It is a tool that perfectly fits labor conditions as they exist to-day. A woman can operate as successfully as the skilled mechanic who has gone to the front.

The GRANT is noiseless

You are assured of perfect quietness wherever the Grant Rotary is running. And it spins a perfect polished rivet head every second without breaking or marring the casting. Rivets tight or loose. Write for details.

GRANT
Mfg. & Machine Co.
Bridgeport Conn.
U. S. A.

HEAVY DUTY FORGES

Canadian Forges are designed for the particular work they are required to do.

Our Catalogs 100 and 108-16 describe our full line—Write for a copy.

CANADIAN BLOWER & FORGE CO., LTD.
Kitchener, Ontario

Castings-Forgings

A FEW days lost in striving to ascertain where certain steel products can be obtained means money and prestige sacrificed—and a set-back to your policy of prompt delivery.

CUT delays to the minimum, and assure yourself of systematic co-operation by placing your orders for FORGINGS AND CASTINGS with us.

OUR equipment is as complete as a Foundries Equipment could be, our service organization Dominion-wide in scope, ever on the alert to give you practical, efficient service.

NO matter what your requirements be, we can supply you promptly. If service and quality count with you—we will eventually receive your enquiries.

DOMINION FOUNDRIES & STEEL, LIMITED

HAMILTON, CANADA

Free Tool Grinding Chart

Grind your cutting tools in exactly the right way to get best results—and you save time. That's obvious. It is precisely that that this Tool Grinding Chart enables you to do.

It has been adopted as standard by many firms that found it a long way better than guess work.

CANADIAN MACHINERY would like to see this Chart in every shop in the Dominion. Mail the coupon below for your copy to-day.

Shows at a glance Correct Clearance and Rake Angles for Cutting Tools

CANADIAN MACHINERY,
153 University Avenue, Toronto.

Please send me/us free, one of your tool grinding charts.

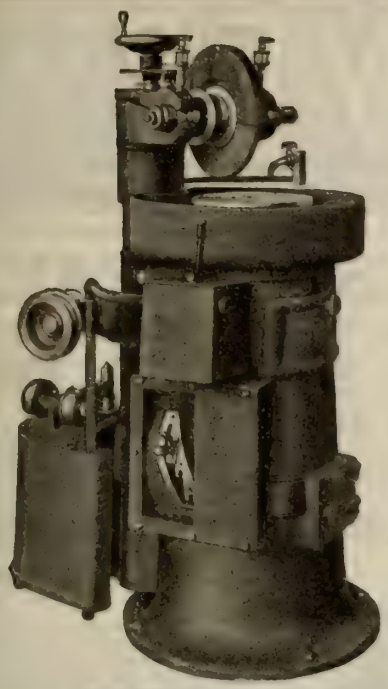
Signed.....

Firm Name.....

St. Address.....

City.....

Prov. .....



BRISTOOL

Bristol 12-inch Rotary Precision Surface Grinder

Built for rapid production on grinding work.

It handles work either singly or in multiples within the capacity of the chuck and not thicker than 6-in., and grinds within quarter thousand in. of manufacturing accuracy.

And it is built to last.

It is provided with exceptionally long bearings throughout, especially in the back column. This prevents the wear, which is very slight, from affecting the accuracy of the grinder. The Back Column is made to swivel four degrees, which allows concave or convex grinding.

Bristol Rotary Surface Grinders are made in several types and sizes and are regularly equipped with 8-in., 12-in., and 16-in. magnetic chucks, either belt or motor driven and for dry or wet grinding.

Our Bulletin describes the many good points fully. Send us your name and address and we'll gladly mail you one.

Grinds within .0004 in. of absolute Accuracy

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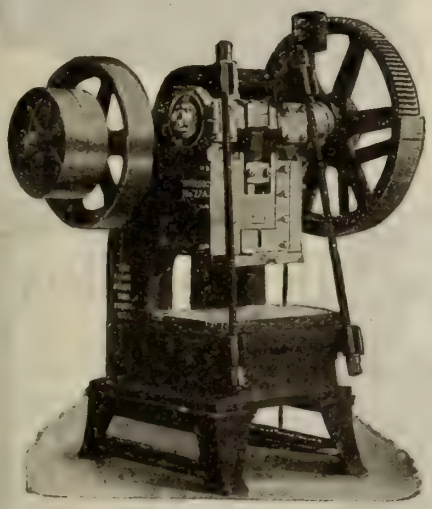

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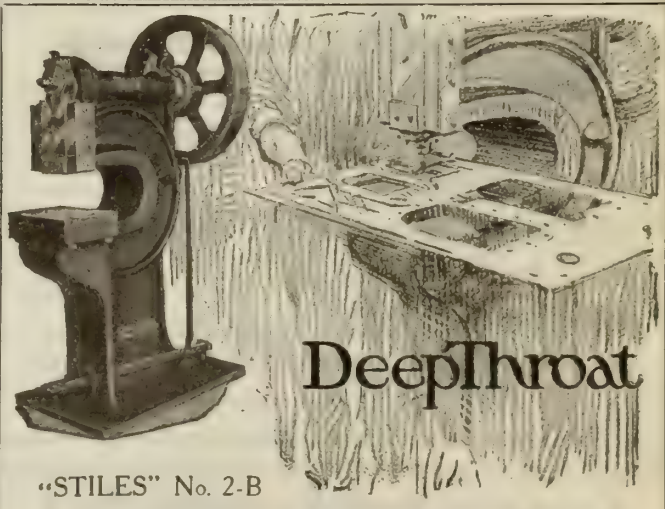

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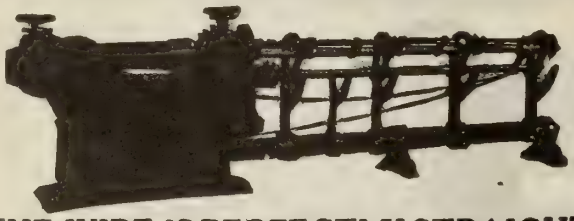

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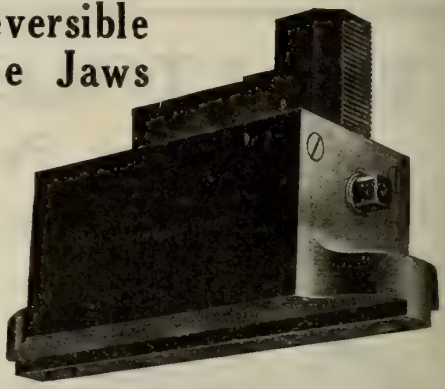

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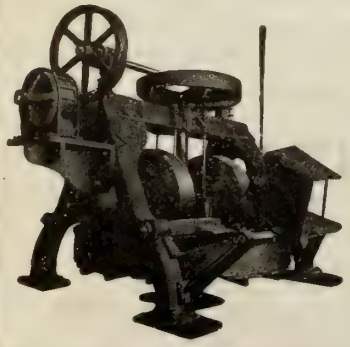

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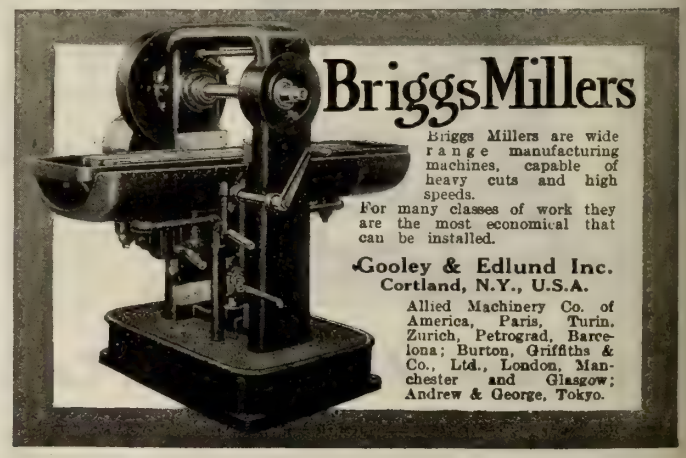

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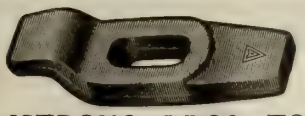

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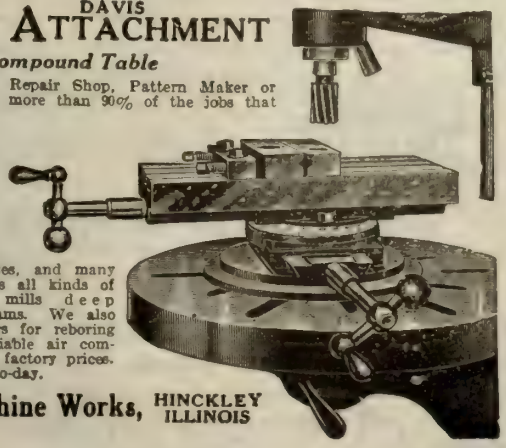

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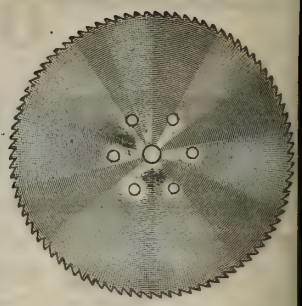

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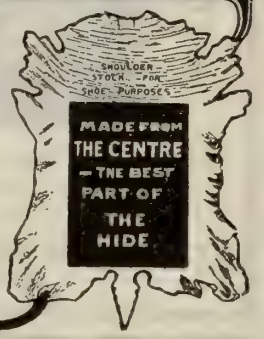

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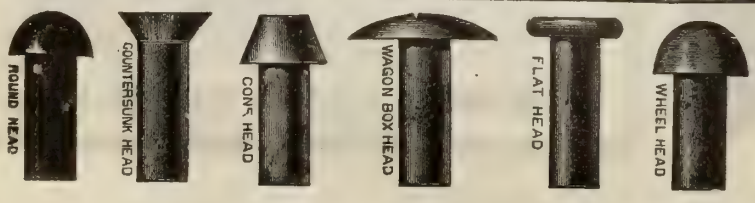

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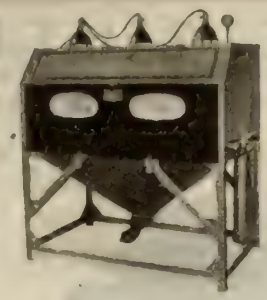

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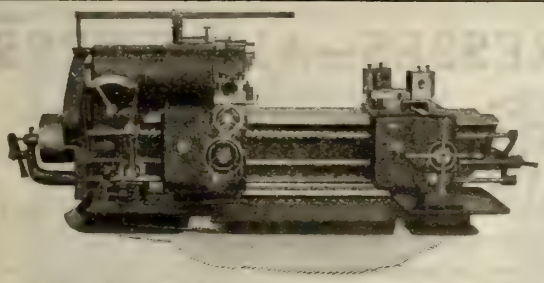

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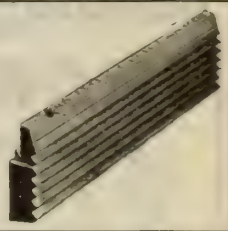

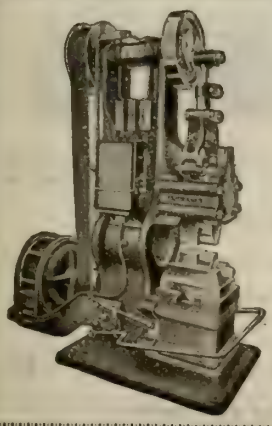

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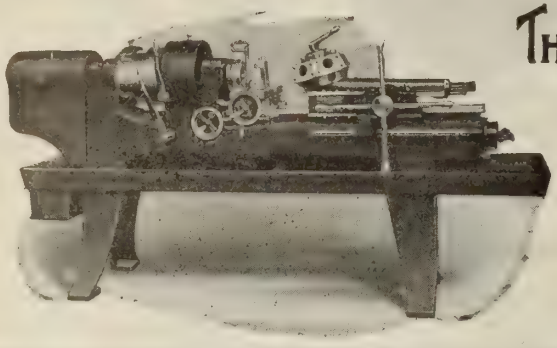

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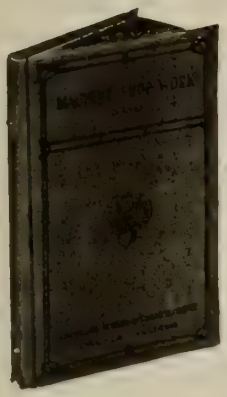

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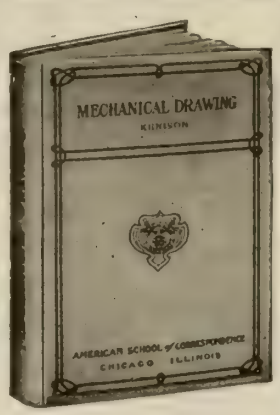

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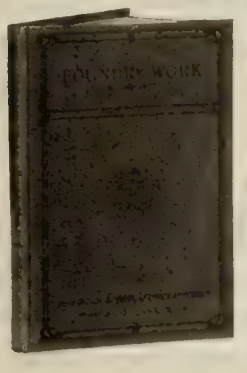

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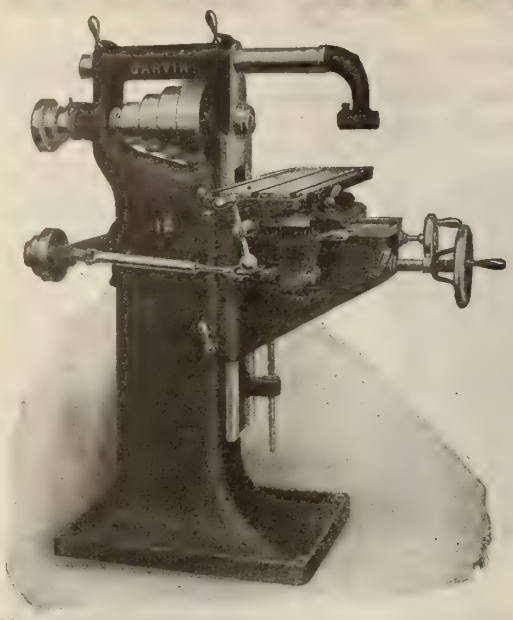

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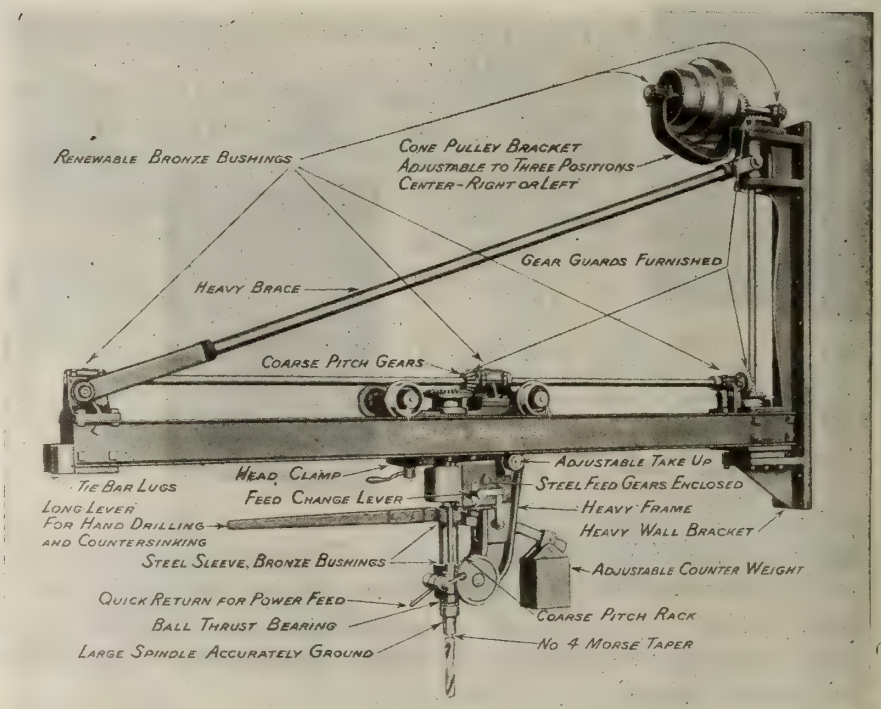
"These machines were put in operation immediately upon arrival, have been producing ten hours per day every day since, and we have never experienced a bit of trouble with same." We know you will appreciate what this means in any shop, and believe this is the sort of machine you are looking for. We consider the machine the finest in its line on the market to-day, and believe an installation would save money for you in the cost of your production.

Our illustrated bulletin will interest you, giving detailed information.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue BOSTON, MASS.

Canadian Machinery BUYERS DIRECTORY

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Canadian Fairbanks-Morse Co., Montreal.
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Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
Plewes Ltd., Winnipeg, Man.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Rice, Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

ACETYLENE
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACETYLENE GENERATORS
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACORN DIE AND HOLDERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

ACCUMULATORS, HYDRAULIC
Canadian Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

AIR COMPRESSORS
Darling Bros., Ltd., Montreal, Quebec.
Williams & Wilson, Limited, Montreal, Que.

AIR CYLINDERS
Smalley-General Co., Inc., Bay City, Mich.

AIR RECEIVERS
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.
Welding & Supplies Co., Montreal, Que.

AIR WASHERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

ALUMINUM
Canada Metal Co., Toronto.
United Brass & Lead, Ltd., Toronto.
Tallman Brass & Metal Co., Hamilton
Williams & Wilson, Limited, Montreal, Que.

ALLOY, STEEL
Armstrong, Whitworth, of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal Que.
Firth & Sons, Thos. Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hawkridge Bros. Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ARBORS
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Co., Walkerville, Ont.
Sheldons Ltd., Galt, Ont.
Pangborn Corporation, Hagerstown, Md.

AUTOGENOUS WELDING AND CUTTING PLANTS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

AUTOMATIC MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Natonal Acme. Co., Cleveland, O., and Windsor.
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto, Can.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

AUTOMATIC METAL CUTTING-OFF MACHINES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.

AUTO SHEET METAL MACHINERY
Quickwork Co., St. Marys, Ohio.

AUXILIARY HEADS
Hoefer Mfg. Co., Freeport, Ill.

BABBITT METAL
Canada Metal Co., Ltd., Toronto, Ont.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

BAND SAWS
Oliver Machinery Co., Grand Rapids, Mich.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto
The Gray Ball Bearing Co., Ltd., Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Rochester Ball Bearing Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BALLS, STEEL
The Gray Ball Bearing Co., Ltd., Toronto.
Boker & Co., Inc., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BALLS BURNISHING
The Gray Ball Bearing Co., Ltd., Toronto.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Katie Foundry, Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y
Williams & Wilson, Limited, Montreal, Que.

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie, Ont.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BEADING MACHINES
Quickwork Co., St. Marys, Ohio.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT-LACING MACHINES, HOOKS AND PINS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

BELT HOOKS, WIRE
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

BELTING, CONVEYOR
Can. Consolidated Rubber Co., Ltd., Montreal.
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BELTING, FRICTION AND SURFACE
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal, Que.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.

BELTING, WOVEN
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENDING ROLLS (PLUTE & AUGH)
Wickes Bros., Saginaw, Mich.

BENDING MACHINERY
Bertram & Sons Co., John, Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BLASTING MACHINES, SAND
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio
Williams & Wilson, Limited, Montreal, Que.

BILLET MARKERS
Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste. Marie, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLACKSMITH WORK
James Ballantyne, Montreal.
The Thos. Pink Co., Ltd., Pembroke, Ont.

BLANKING
Henry Hope & Sons of Canada, Ltd., Peterboro.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BLOW PIPES AND REGULATORS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont
Welding & Supplies Co., Montreal, Que.

BLUE PRINTING MACHINERY
Commercial Camera Co., Province, R.I.
Mulliner-Edlund Tool Co., Syracuse, N.Y.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que
Joyce, Koebel & Co., Inc., New York.

BOLT CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, On
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BOLTS, STAY
John Morrow Screw & Nut Co., Ingersoll, Ont.

BOLTS, SPRING SHAKLE
Can. Winkley Co., Ltd., Windsor, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll.

BOLTS, PATCH
John Morrow Screw & Nut Co., Ingersoll, Ont.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto.

BOLT THREADING MACHINERY
Jardine & Co., Ltd., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto
Canadian Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis
Gisholt Machine Co., Madison, Wis.
Hoefer Mfg. Co., Freeport, Ill.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Oliver Machinery Co., Grand Rapids, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland, Ohio.

BRAKEBAND LINING CUTTERS
Peck, Stow & Wilcox Co., Southington, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland, Ont.

BRASS AND COPPER BARS, RODS

BRAKES, CORNICE
Peck, Stow & Wilcox Co., Southington, Conn.

AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.
Tallman Brass & Metal Co., Hamilton, Ont.

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co. Inc., Toronto, Ont.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BRICKS, FIRE
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

BRIDGES, RAILWAY AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.

BRONZE, COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville, Ont.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananogue, Ont.

BUSHINGS, BRONZE
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.

CALIPERS
Peck, Stow & Wilcox Co., Southington, Conn.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CALKS, BOOT
Lufkin Rule Co. of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co. Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBONIZING BOXES
Can. Driver-Harris Co., Ltd., Walkerville, Ont.
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal.

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Sheldons, Limited, Galt, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
Brockville Foundry Co., Brockville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland, Ont.

CARRIERS

COUPLING BOLTS
John Morrow Screw & Nut Co., Ingersoll, Ont.
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton
United Brass & Lead Ltd., Toronto.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Sheldons, Limited, Galt, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
International Malleable Iron Co., Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAINS, AGRICULTURAL
Morse Chain Co., Ithaca, New York.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

CHAINS, AUTOMOBILE ENGINE
Morse Chain Co., Ithaca, New York.

CHAINS, BICYCLE
Morse Chain Co., Ithaca, New York.

CHAINS, BLOCK
Morse Chain Co., Ithaca, New York.

CHAINS, DRIVE
Morse Chain Co., Ithaca, New York.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, New York.

CHAINS, SPROCKET WHEEL
Morse Chain Co., Ithaca, New York.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 418 Stair Bldg., Toronto, Ont

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL AND TAP
Swedish Gage Co., New York, N.Y.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
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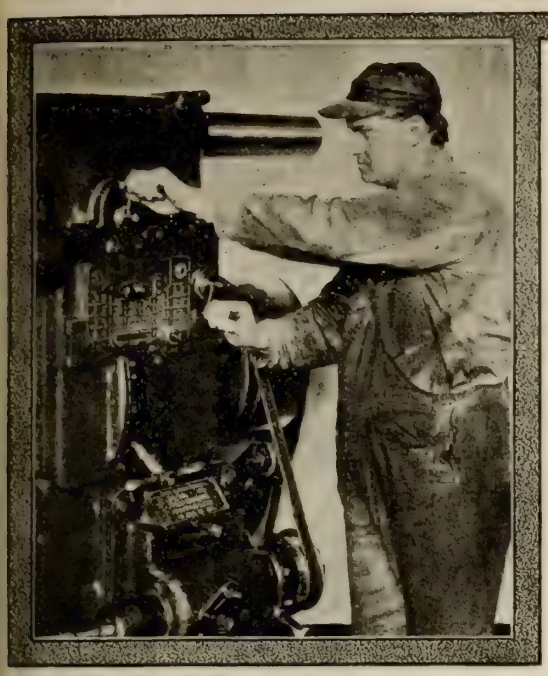


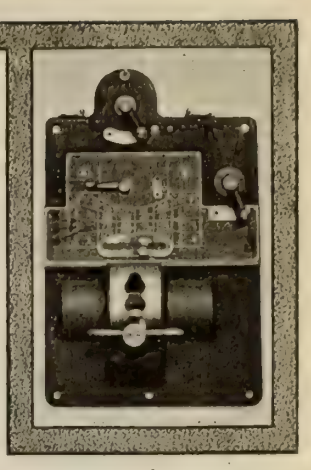
The feeds are obtained by the same method as the speeds with the exception that there are only levers to change on the feed plate.

This added feature is worthy of your consideration when purchasing.

He Can't Go Wrong When Its Pictured

Getting The Correct Speed and Feed Is a Simple Matter On

Brown & Sharpe Milling Machines



Obtaining the correct speed and feed has ceased to be a matter of guesswork.

The Improved Graphic Index Plates have solved the difficulty.

To illustrate: The operator desires to obtain a speed of 116 r.p.m. spindle running direct. The diagram of the cutters in the upper corner shows the direction.

With the tumbler gear out all that is necessary is to slide the index knob under the column containing the correct speed and then follow the diagram which shows the relative positions of all the levers.

There is no guess work—everything is pictorially shown eliminating all chances of obtaining the wrong speed or feed.

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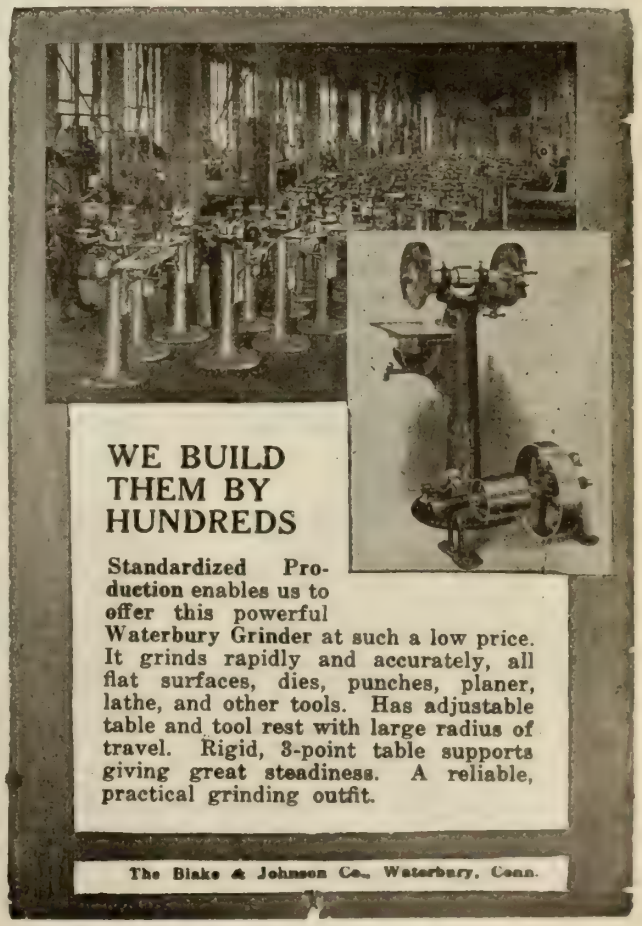
Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rodel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.



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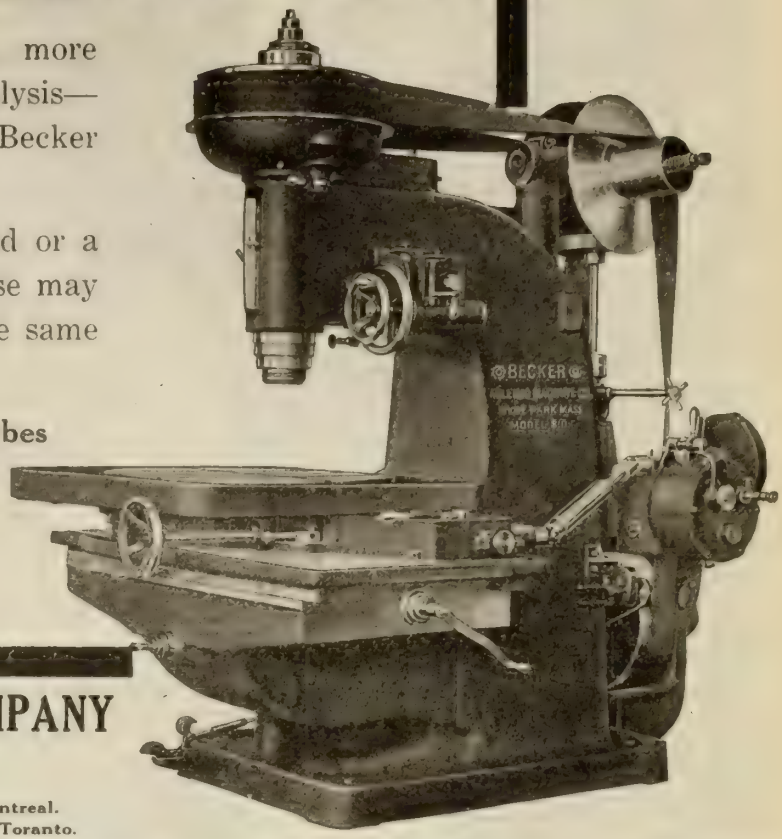

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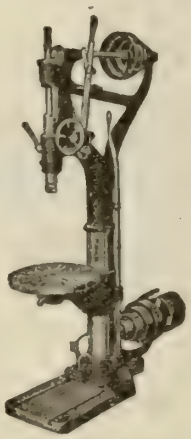

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Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

DRILLS, BLACKSMITH AND BIT STOCK
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Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, CARBON
John Morrow Screw & Nut Co., Ingersoll, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont

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Cleveland Pneumatic Tool Co. of Canada, Toronto
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Morse Twist Drill & Mch. Co., New Bedford, Mass
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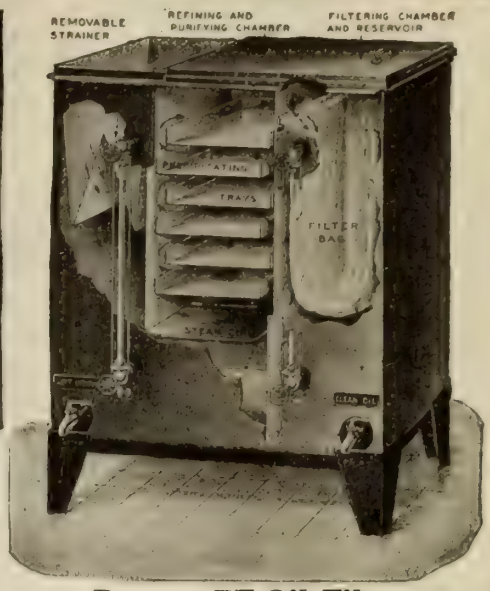

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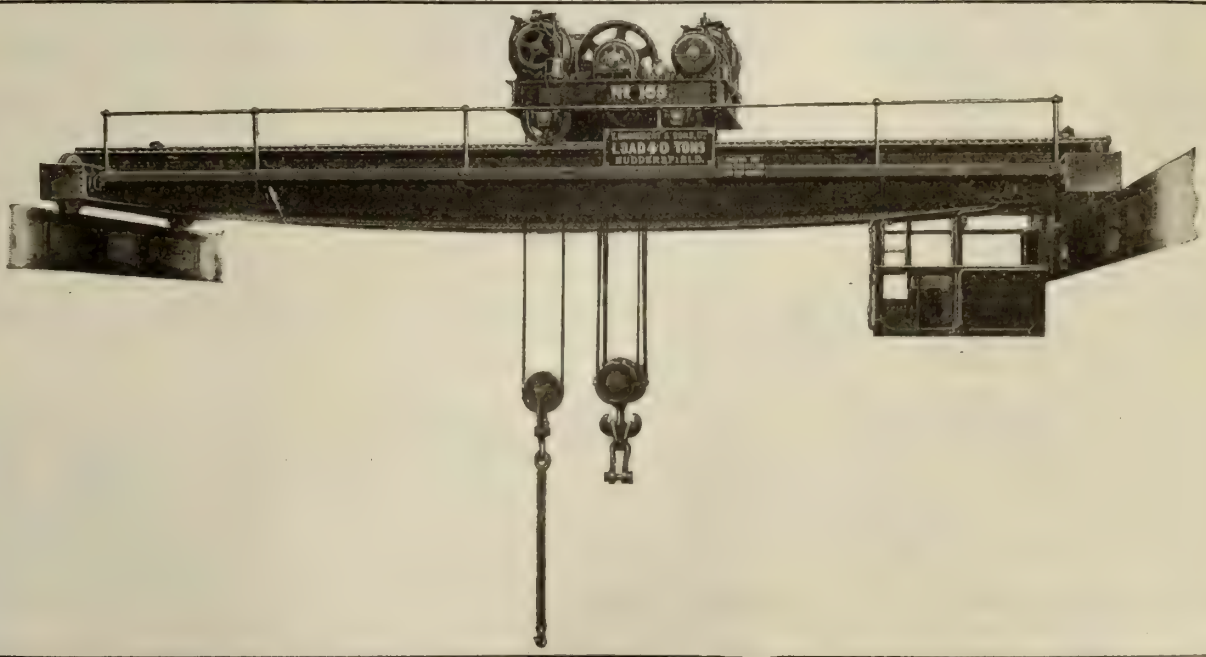

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Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
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Williams & Wilson, Ltd., Montreal, Que.
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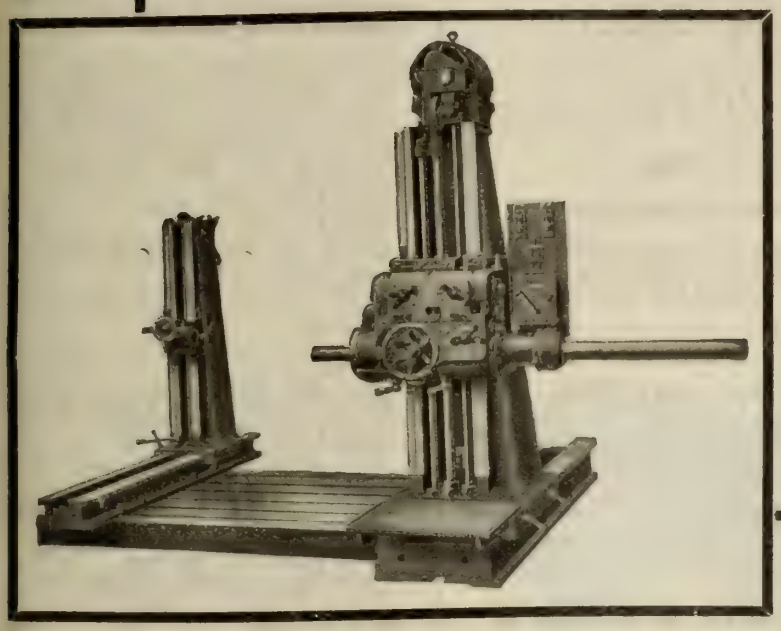

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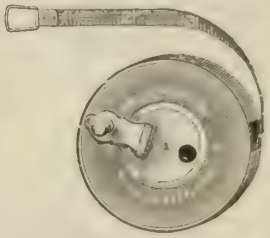

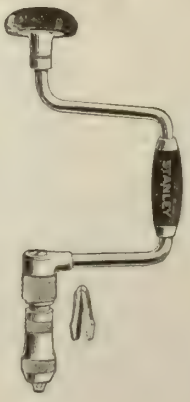

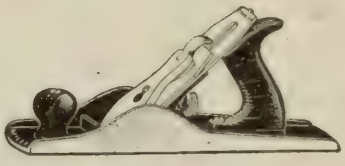

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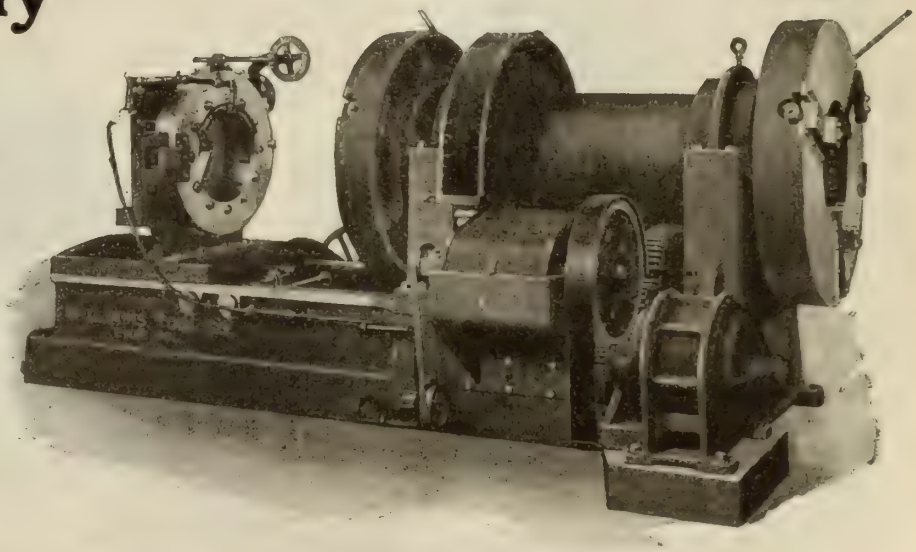

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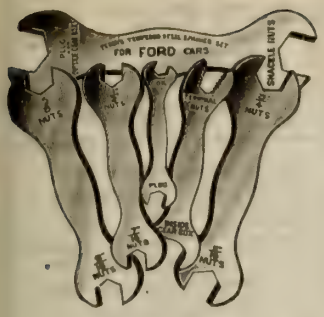

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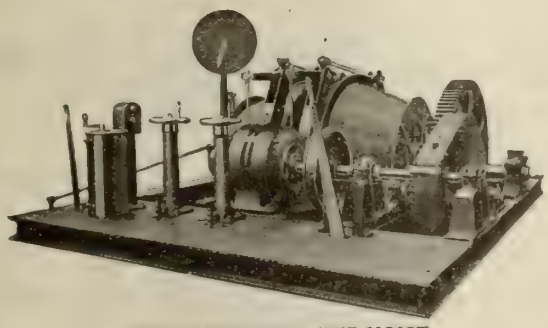

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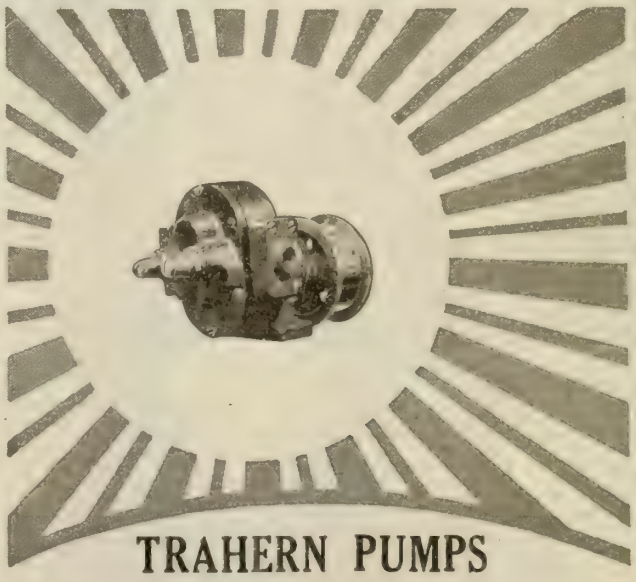

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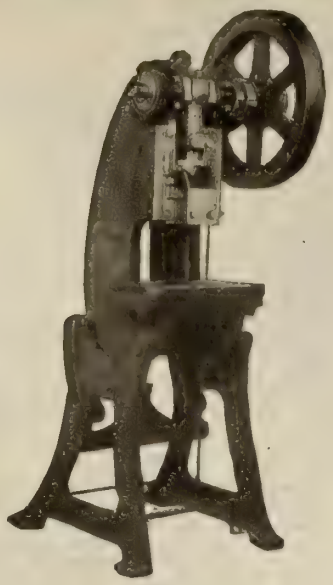

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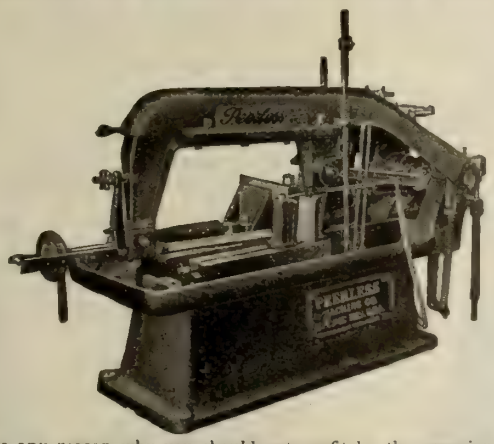

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WHEN YOU INSTAL A ROCHESTER HELVE HAMMER
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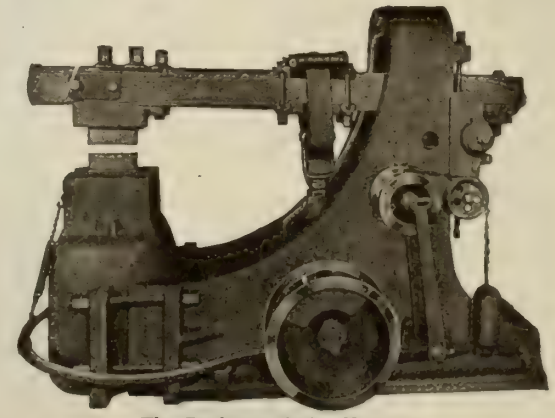

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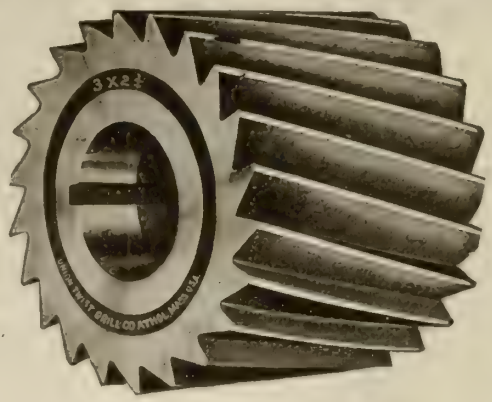

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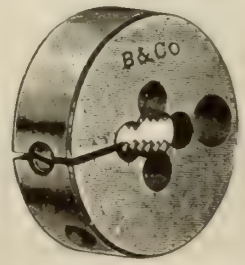

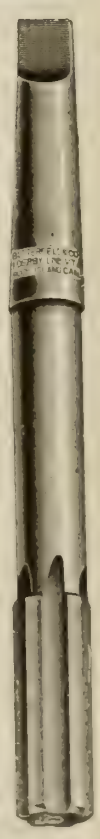

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Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo
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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
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Why Did We Let Trotzky Go?

THERE was a time when Canada had it in her power to end the war. In the early days of the Russian Revolution a bushy-haired German was taken off a boat at Halifax and interned at Amherst, N.S. He pretended to be a Russian but was known to be in German pay—on his way to push the revolution—British and American Intelligence Officers so informed our authorities. But pressure was brought to bear and the man was finally released. He got to Europe and became the most sinister figure among the Bolsheviki. Largely as a result of his work, Russia dropped out of the war and Germany was able to fight on for eighteen months. That man was Leon Trotzky. His real name was Braunstein.

Why was Trotzky allowed to leave Canada?

Colonel MacLean discusses this question in the June issue of MACLEAN'S MAGAZINE. He tells the story of Trotzky's activities, of his arrest and subsequent release in full detail, tracing the threads of a strange intrigue from Germany to Washington, and Washington to Ottawa. It is a gripping story, the most important inside story of the war.

Other National Features of This Issue

"Victory Stuff" By Robert W. Service.

"Solving the Problem of the Arctic" By Vilhjalmur Stefansson.

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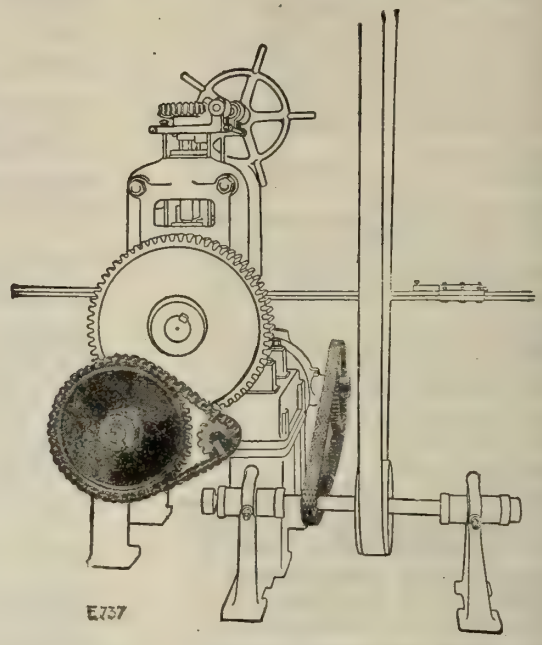

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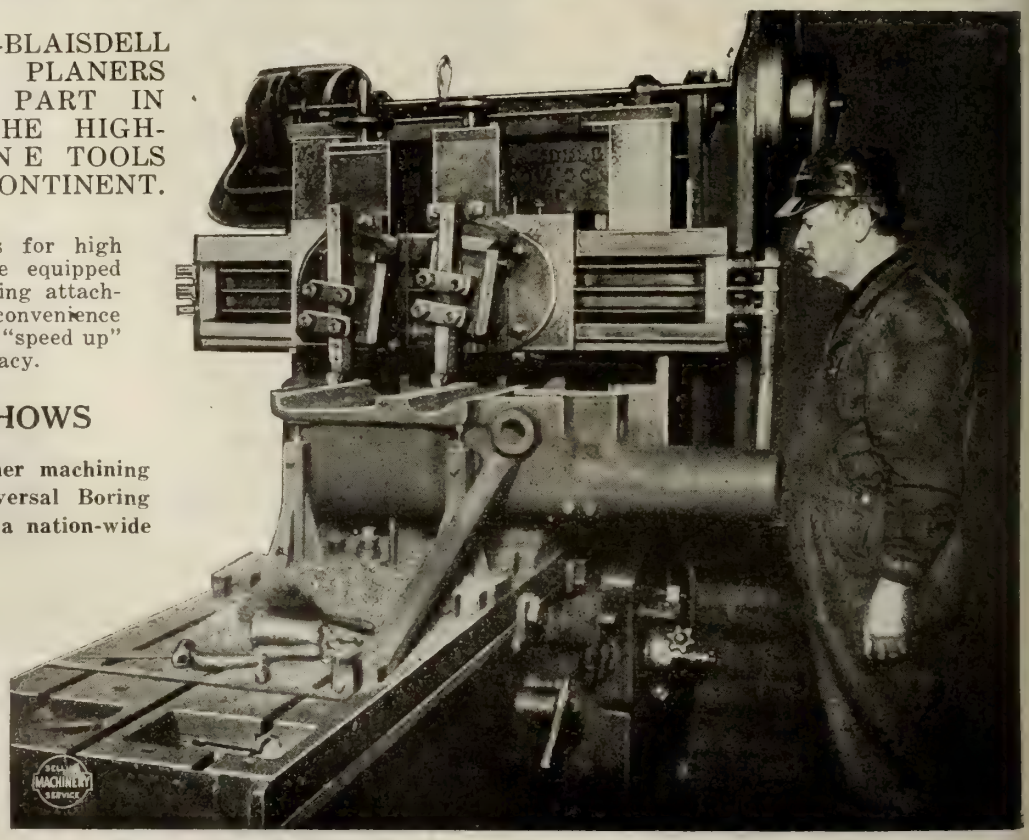

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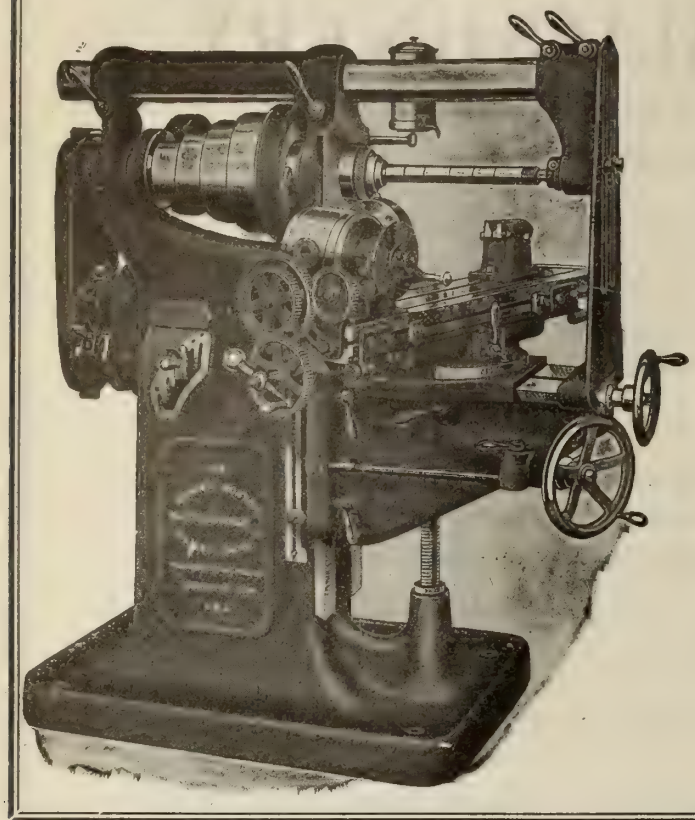

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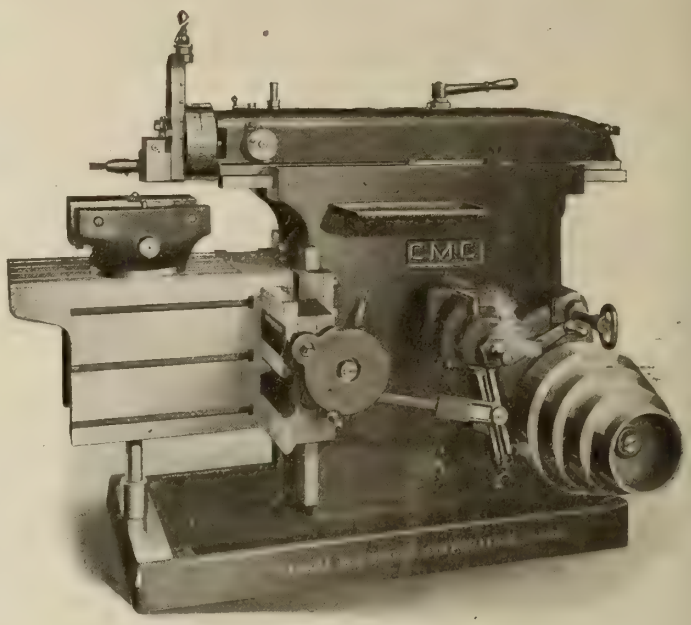

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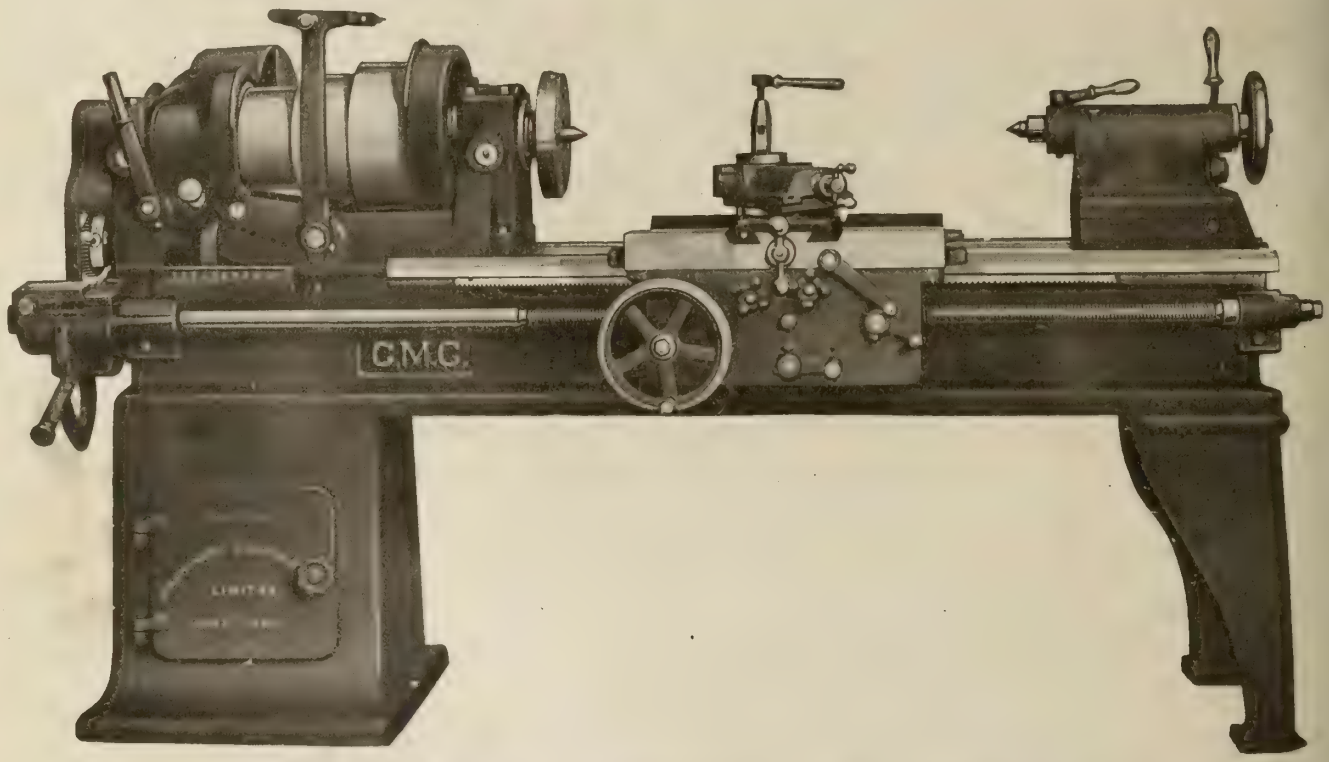

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THE BEST FOR ALL MACHINE WORK

VANADIUM-ALLOYS STEEL CO.

General Sales Offices: Pittsburgh, Pa. Works: Latrobe, Pa.

BRANCH OFFICES:

BUFFALO
BOSTON
CLEVELAND

CHICAGO
CINCINNATI
DETROIT

NEW YORK
PHILADELPHIA
PITTSBURGH

TORONTO
MONTREAL

SMALL TOOLS

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

P. & W. Die-Stock Dies

These dies are practically solid when in use and can be adjusted 1-32 in. larger or smaller. The chasers can be quickly removed for the purpose of renewal or sharpening. Standard sizes furnished include U. S. Standard, Whitworth Standard, S. A. E. Standard and "V" form, all right hand; also special right-hand Briggs Standard taper pipe thread.

The Pratt & Whitney policy of highest quality materials, together with the necessary refinement and accuracy, is maintained.

PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS

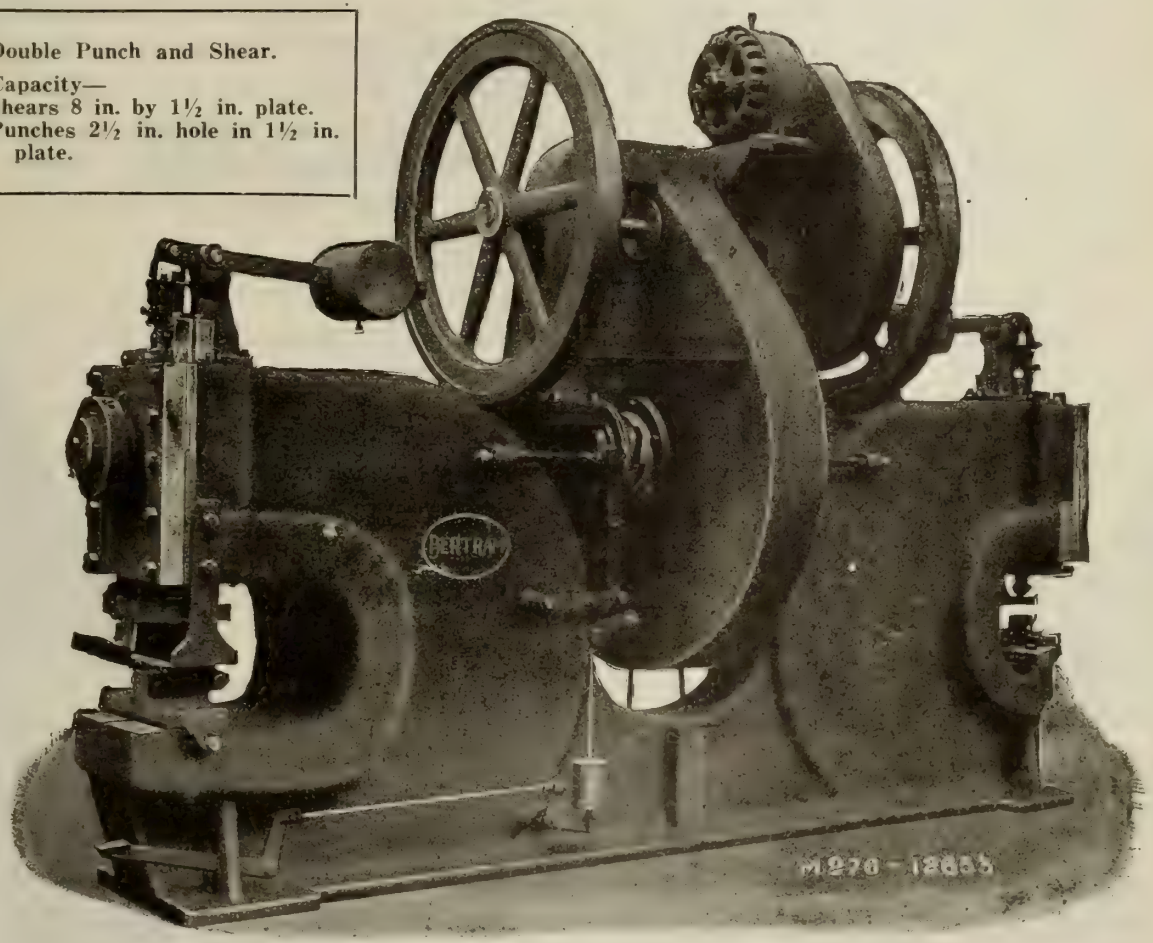
For Structural, Bridge and Shipbuilding Plants

Modern in design and built for heavy service, our line embraces a varied equipment of Punches, Shears, Bending and Straightening Rolls, Coping Machines, Rotary and Plate Planers.

The assistance and advice of our engineers are yours for the asking.

Double Punch and Shear.

Capacity—
Shears 8 in. by 1½ in. plate.
Punches 2½ in. hole in 1½ in. plate.



The John Bertram & Sons Co., Limited

DUNDAS, ONTARIO, CANADA

MONTREAL 723 Drummond Bldg. | TORONTO 1002 C.P.R. Bldg. | VANCOUVER 609 Bank of Ottawa Bldg. | WINNIPEG 1205 McArthur Bldg.

The Publisher's Page

TORONTO JUNE 19, 1919

A SOLEMN WARNING

"A SOLEMN WARNING" is the headline of an advertisement recently published in CANADIAN MACHINERY for one of the best-known of our Canadian manufacturers, the Canada Foundries and Forgings, Limited. The text of the advertisement follows:

"A flood of business will overwhelm this country inside of two months, Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hestitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, 'Don't blame us because you didn't see this vision.'"

There are many manufacturers who feel and realize that Canada is on the verge of a period of wonderful industrial growth. They are preparing for it. Surprising developments have taken place since the signing of the armistice. A little courage, a little vision, a little thought, a little co-operation, a lot of organizing and hard work will bring to this country a degree of prosperity scarcely dreamed of.

Lloyd Harris, head of the Canadian Trade Commission, brings a reassuring message as to the possibilities of developing export trade. To secure our share requires the prompt action which we feel sure will be forthcoming.

Preparedness is needed. Preparedness in the shop and preparedness in the office and in the field. We believe in it ourselves. We believe Canada and Canadian industry will grow and are building a large extension to our present building in anticipation of requiring additional room in a very short time.

Sound advertising is the soundest kind of preparedness for your business as well as the other fellow's. The advertising you do to-day will bear fruit in the months to come.

Canadian Machinery and Manufacturing News, June 19th, 1919. Vol. 21, No. 25. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.

Quality Service

THERE IS NO ARGUMENT

When you are assured

QUALITY
SERVICE
PRICE

and One Hundred Cents Worth of Value
for Every Dollar You Spend

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar is Worth One Hundred Cents in Canada

THE
STEEL COMPANY OF CANADA
LIMITED
HAMILTON MONTREAL

Algoma Steel Corporation LIMITED

Sault Ste. Marie, Ontario.

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

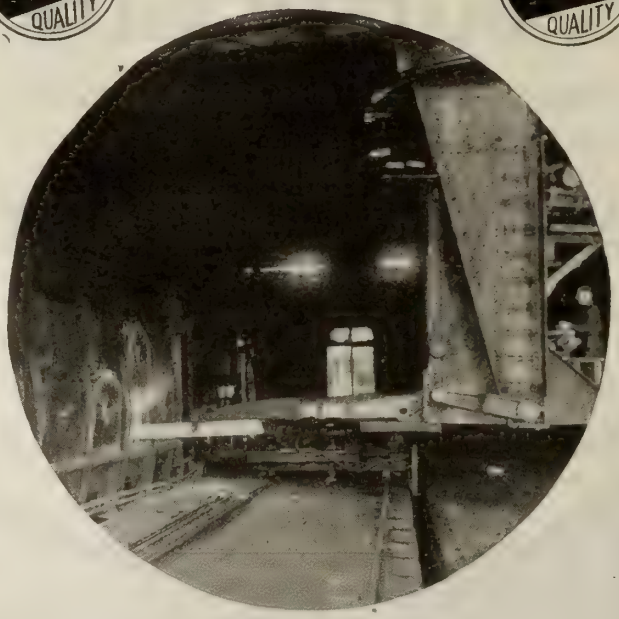
SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

MARK OF ALGOMA O.H. QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

BLOOMS, BILLETS, SLABS,

STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

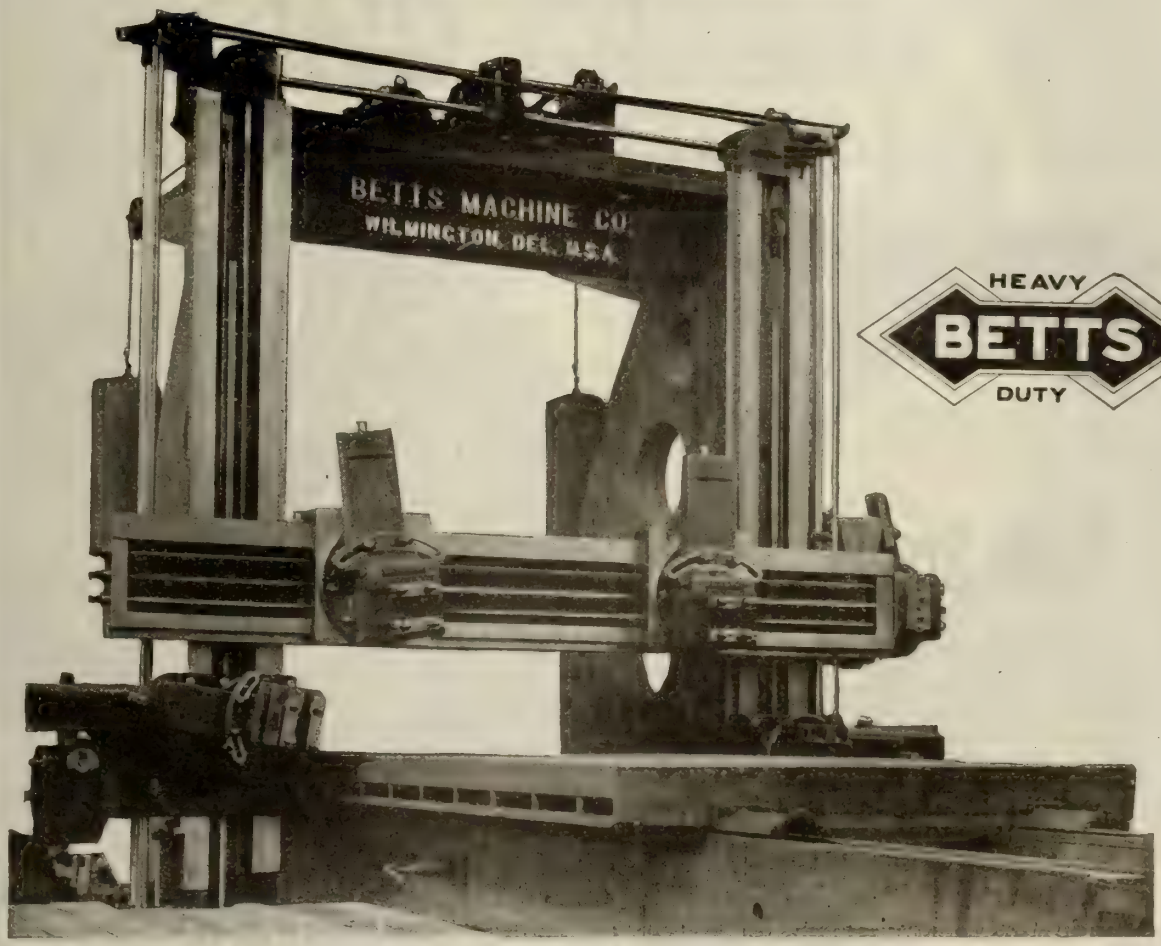
BETTS

Betts Leadership in Heavy Duty Machine Tools

In every commercial field there is a leader—a trail blazer—a pace setter. In the heavy duty machine tool field, Betts has earned the leadership. For 58 years Betts' tools have set the pace and blazed the trail to greater production and machine tool efficiency.

The number of tools in operation in the world's largest locomotive works, railroad shops, steel mills, shipyards, forge shops, electrical shops, etc., is convincing evidence of Betts' leadership in the heavy duty machine tool field.

Let us tell you more about Betts tools.



HEAVY BETTS DUTY

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.

MODERN EQUIPMENT

For Mining and Industrial Plants

As successors to the Jenckes Machine Co., Limited, in the ownership and operation of the "Jenckes Plant," Sherbrooke, Que., we are continuing and extending their various lines of manufacture, such as: Pulp Mill Machinery, Hoisting Engines, Electric Hoists, Steel Plate and Structural Work, etc.

You will promptly receive interesting estimates if you will send us your specifications when in the market for new equipment or additions to present plant. Please address our nearest branch.

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS

PROMPT SHIPMENTS from large stock

WILT

"Where there's a WILT—there's the Way"

HIGH SPEED AND CARBON TWIST DRILLS

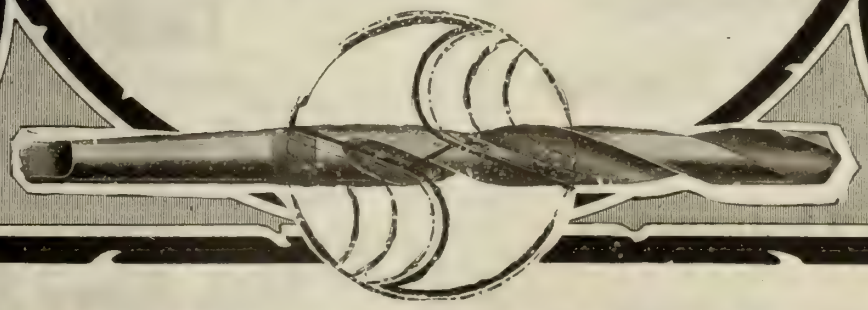
Unusual Drills Backed by Unusual Policies

Every superintendent should investigate the unusual qualities of

WILT TWIST DRILLS

The "WILT" has stood the test of all conditions—it is here to stay—its popularity among the mechanics makes that a certainty.

Investigate "WILT DRILLS" and you'll buy no others



WILT TWIST DRILL CO.
OF CANADA, LIMITED

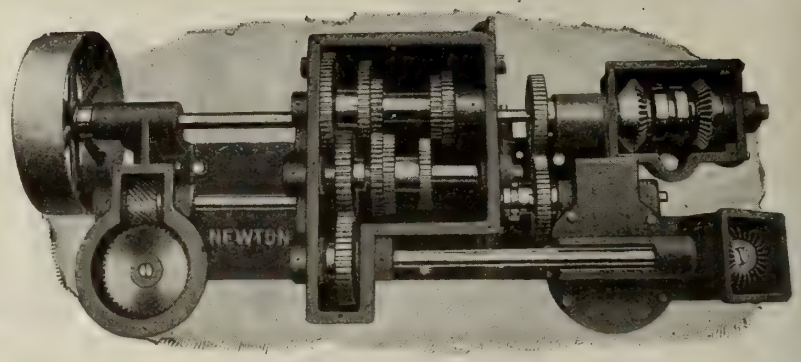
WALKERVILLE ∴ ∴ ∴ ∴ ONTARIO

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, E C. 2, London, England

THE JOHNSON FRICTION CLUTCH

OVER THERE

is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.

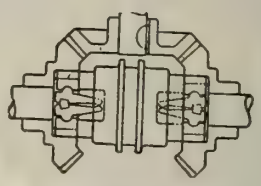


Courtesy of Newton Machine Tool Works, Philadelphia, Pa.

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads., note the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are your requirements?

Our booklet, "Clutches as Applied in Machine Building," and Yellow Data Sheets are free.



Double Clutch in Nest of Gears.

AGENTS: CANADA—Williams & Wilson, 84 Inspector St., Montreal; The Canadian Fairbanks-Morse Co., Limited, Montreal and Branches. ENGLAND—The Efandem Co., Limited, 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth St., Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

E&M

ELECTRIC

Steel Castings

High Grade STEEL Castings

Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

GS

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

Milwaukee, Wisconsin

DETROIT - 823 Dime Bank Building

TRACKWORK

OF ALL KINDS FOR STEAM AND ELECTRIC RAILWAYS

Built-up, Hard-Centre and Solid Manganese-Steel

Manufacturers of Balkwill Articulated Cast Manganese Crossings

CANADIAN STEEL FOUNDRIES LIMITED

Transportation Building, Montreal

Electrite Uranium High Speed Steel

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

MacKINNON STEEL CO., LTD.

Engineers, Manufacturers and Erectors of Steel Structures

Industrial Bridges, Buildings, Towers, Smoke Flues and Stacks, Chutes, Coal Bins, Ore Bins, Tanks, Cranes, Engine Houses, Grain Elevators, Derricks.

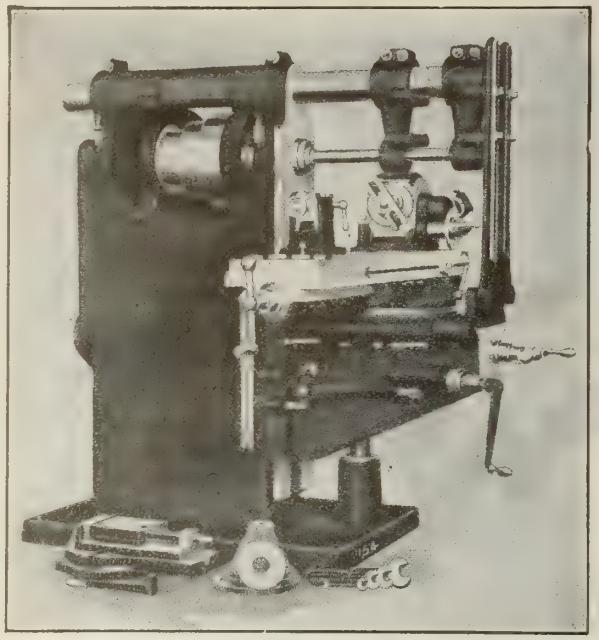
Structural Steel and Steel Plate Work, and a combination of the two lines.

Prompt Deliveries Assured.

MacKINNON STEEL CO., LIMITED

Sherbrooke, Quebec

Montreal Office: 404 New Birks Building



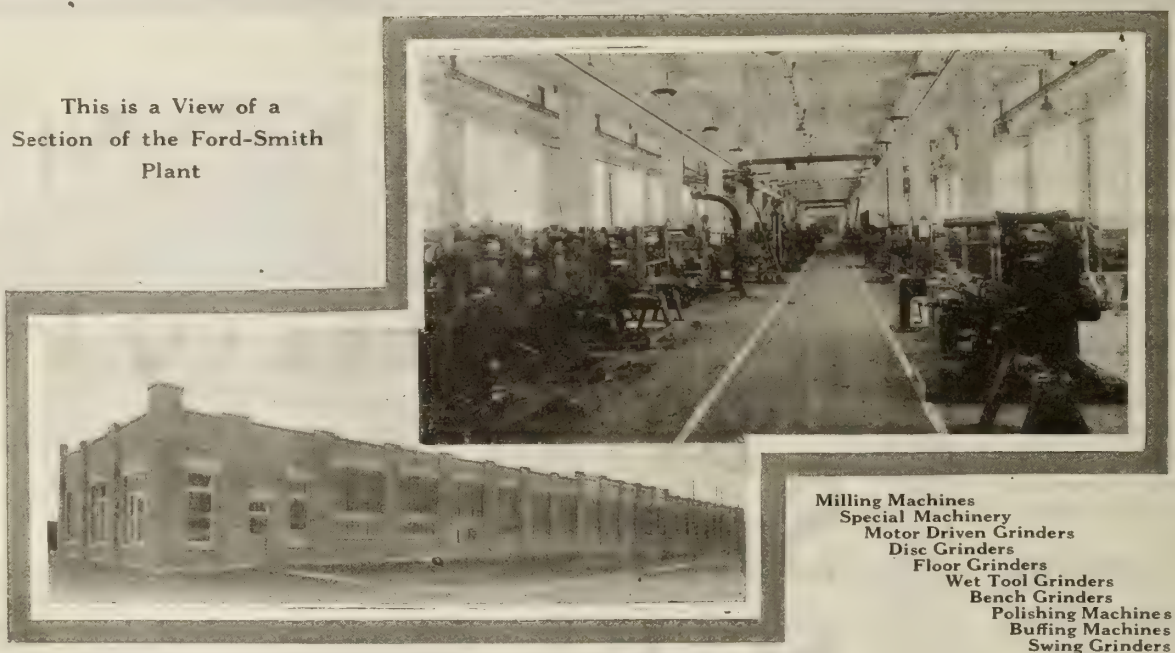
No. 2 Full Universal

FORD-SMITH MILLERS

WILL REDUCE YOUR MILLING COSTS

There are many other good points. *Ford-Smith Millers are great producers, easy to operate, accurate, and built entirely in accord with the high standards of construction that the* Ford-Smith Machine Co., Limited, has always maintained.

This is a View of a Section of the Ford-Smith Plant



Milling Machines
Special Machinery
Motor Driven Grinders
Disc Grinders
Floor Grinders
Wet Tool Grinders
Bench Grinders
Polishing Machines
Buffing Machines
Swing Grinders

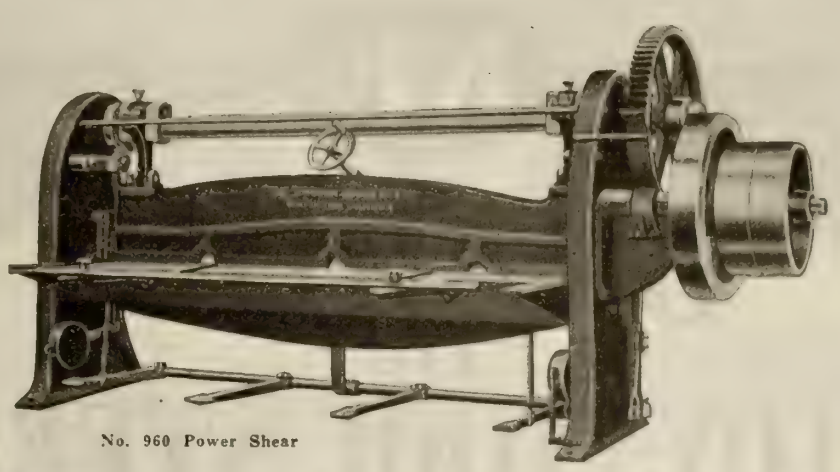
Manufactured in Canada by

THE FORD-SMITH MACHINE CO., Limited

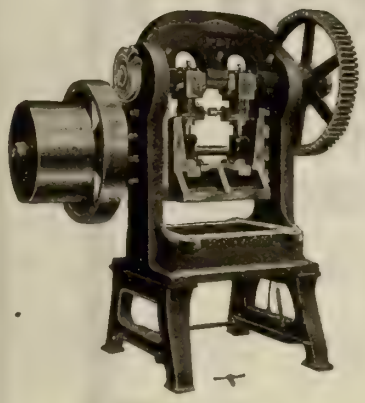
HAMILTON, CANADA

Foreign Agents: W. E. Storey, 3 Arundel St., LONDON, ENGLAND
Gollin & Co., MELBOURNE, AUSTRALIA

Stood The Test



No. 960 Power Shear



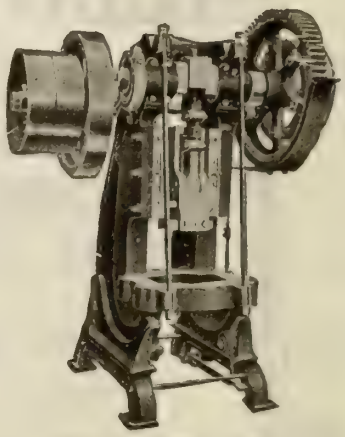
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

Inexperienced help and 24 hours' daily service will test the best machines.

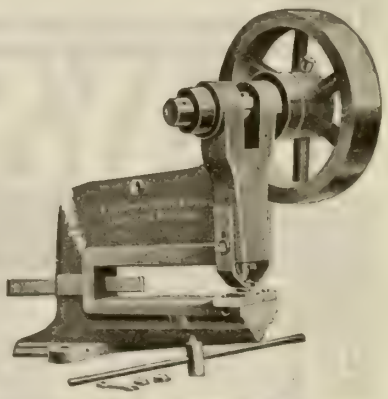
Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press

No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

BRITAIN'S BEST

KE

BRANDS OF ALLOY & TOOL STEELS

In Billets, Bars, Sheets, Hot and Cold Rolled Strips, Cold Drawn Cast Steel, Wire and Drill Rods

HIGH GRADE STEEL FOR ALL PURPOSES

KE KELOCK

Principal Trade Marks

KAYSER ELLISON & Co LTD

ESTABLISHED 1825 SHEFFIELD, ENG.

Complete Stock - Montreal Warehouse

RALPH B. NORTON

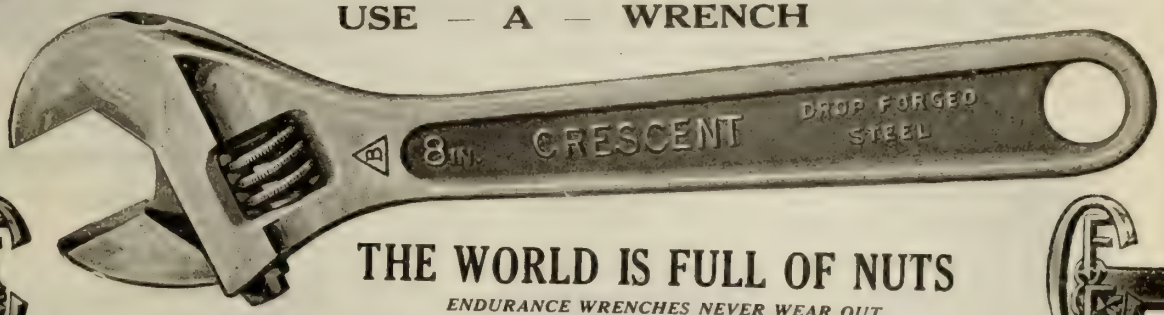
Agent

126 Craig St. West Montreal, Que.

CANADA
FOUNDRIES & FORGINGS
LIMITED

DON'T RATTLE

USE — A — WRENCH



THE WORLD IS FULL OF NUTS

ENDURANCE WRENCHES NEVER WEAR OUT

CANADIAN BILLINGS & SPENCER PLANT - Welland, Canada

Drill Steel Opportunity

25 Tons 1⅛" Cruciform Section Solid Drill Steel.

25 Tons 1¼" Cruciform Section Solid Drill Steel.

Will receive bids on lot or any portion. Above Steel for immediate delivery. Guaranteed quality.

ARMSTRONG WHITWORTH
OF CANADA, LIMITED

Head Office :
298-300 St. James Street,
Montreal

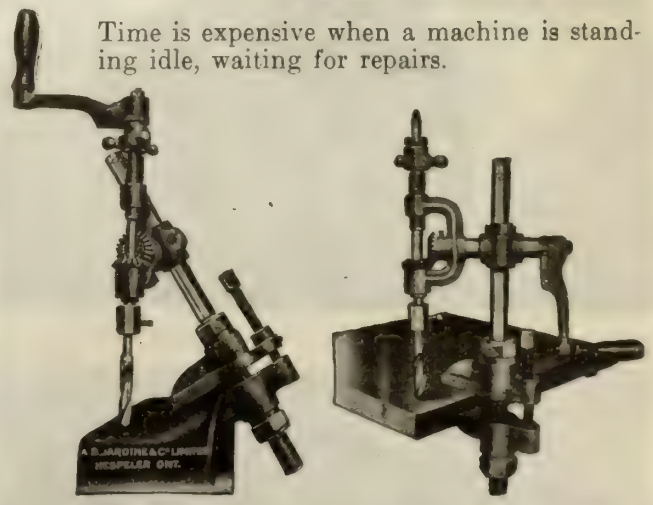
Works :
Longueuil, Que.

Branches :

126 Wellington St. W. TORONTO
27 King William St. HAMILTON
McArthur Building WINNIPEG

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

Tycos

Accurate Regulation is the Secret of Power Economy

Tycos Temperature Instruments

Indicating—Recording—Controlling

give the engineer an accurate and constant check on steam developed and power transmitted They are a prime essential of wasteless, efficient power plant management.

Mercurial, Recording and Index Thermometers for all industrial and laboratory applications.
Electric Contact Thermometers.
Temperature, Pressure and Time Regulators.
Mercury Column Vacuum Pressure and U Gauges.
Base Metal, Rare Metal and Radiation Pyrometers.
Fery Radiation Pyrometers.
Hygrometers.
Hydrometers.
Mineral Oil Testing Instruments.
Aneroid Barometers.
Mercurial Barometers.
Recording Barometers.
Pocket Compasses.
Surveying Compasses.
Rain Gauges.
Anemometers.
Air Meters.
Thermographs.
Hand Levels
Aviation Barometers.
Inclinometers.
Sphygmomanometers.
Fever Thermometers.
Thermometers of all kinds for home and general use.

Tycos Singl-Duty Temperature Regulator

insures accurate automatic regulation. Air valve can be taken out for cleaning without disturbing dial.

293

Taylor Instrument Companies Rochester, New York

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents:
CLEVELAND
Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

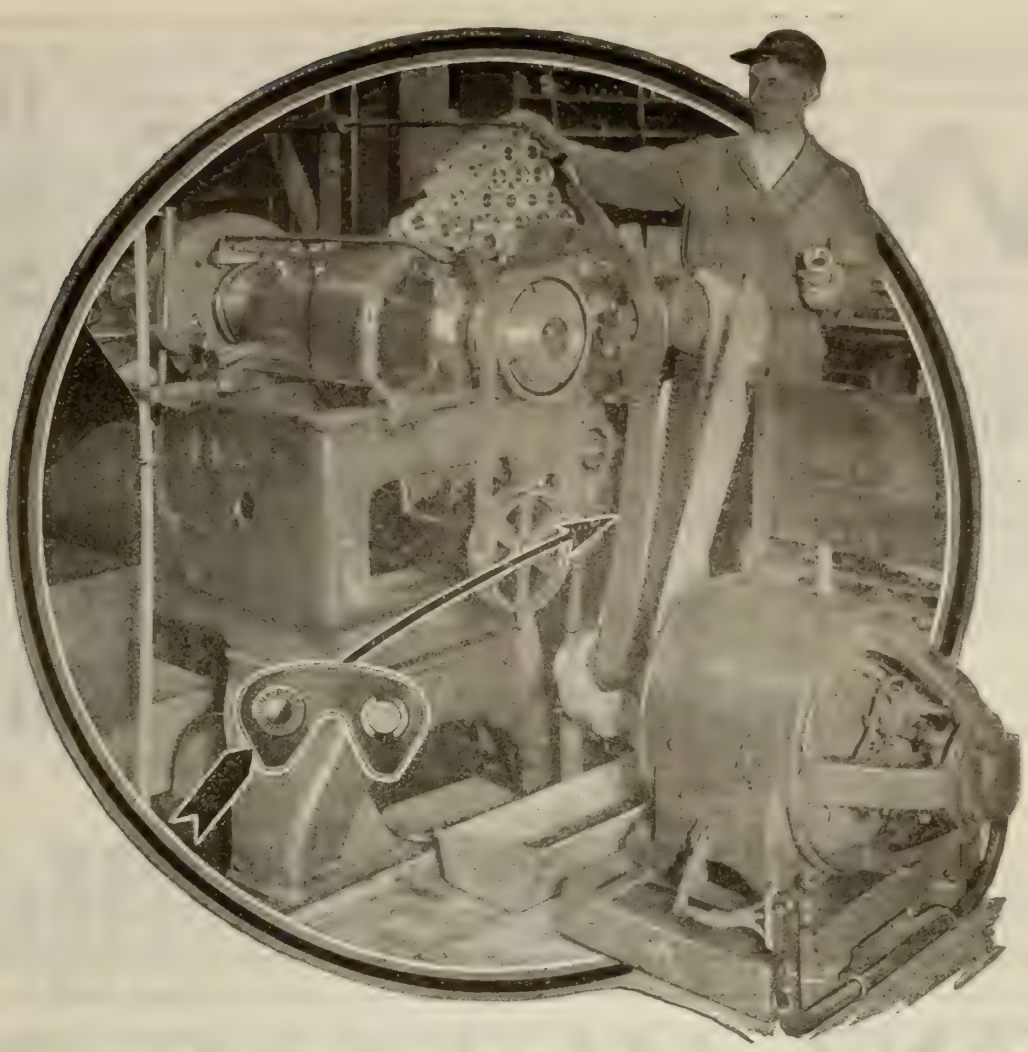
Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager



Silent Chain Drive Increased His Piece Rate Earnings 18%

THIS man is employed in one of America's leading manufacturing plants. He performs turret lathe operations on duplicate parts on a piece work basis.

Until recently his machine was belt driven. Now it is driven by Link-Belt Silent Chain. Since the change was made, his piece work earnings have increased 18%.

This increase was made on the same machine, same class of work, same operations, same hours, same everything as when belt drive was used.

His increased output is the direct result of the positive, non-slipping, smooth running effect of Link-Belt Silent Chain on the work in hand.

You, too, can increase the output of your plant, better your product and enable your piece work operators to enjoy greater returns by adopting Link-Belt Silent Chain Drive.

It is "flexible as a belt, positive as a gear, more efficient than either". Send for our Machine Tool Drive Book No. 312. Shows many applications and gives details.

CANADIAN LINK-BELT COMPANY
LIMITED
WELLINGTON AND PETER STS. - TORONTO

LINK-BELT
SILENT CHAIN DRIVES

We Also Make

- ☐ Elevators and Conveyors
- ☐ Link-Belt and Sprockets
- ☐ Silent Chain Drives
- ☐ Truck and Tractor Chains
- ☐ Electric Hoists
- ☐ Locomotive Cranes
- ☐ Wagon Loaders
- ☐ Coal and Ashes Systems

Write for Catalogs
Place X in Square

"WACO"

High Speed Steel

REGISTERED

"WACO"

TRADE MARKS

"Double Waco" Quality—for Quick Production Work.

"Turtle Brand"—High-class Tool Steels, Files and Drills.

Wortle Plates for Wire Drawers.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada:

MARSHALL, SON & BUNNEY

39 Richmond Street East - - - TORONTO, ONT.

HOYT METALS

"Frost King"
"Trojan"
"Nickle Genuine"
BABBITTS

Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.

Annual sales over $5,000,000.

Hoyt Metal Co., Toronto

New York, N.Y. London, Eng. St. Louis, Mo.

IMPERIAL GENUINE BABBITT METAL

The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

Say "W & B" Cotter Pins

Cotter Pins don't make up the big end of our business, but it's our business to make everything we make as well as it can be made.

That's our guarantee when you say "W & B" Cotter Pins in your order. We have them ready in all sizes or assortments. Also Flat Riveted Keys in sixty-nine sizes and patterns, and Flat Spring Keys in all sizes.

Send for new Spring Cotter List.

The Whitman & Barnes Manufacturing Co.
Office and Factory: St. Catharines, Ont.
London Office: 139 Queen Victoria St., E.C.

W&B
TRADE MARK REGISTERED

Established Whitman & Barnes 65 Years

TWIST DRILLS — REAMERS — WRENCHES — HAMMERS

Cuts Costs Increases Production ---*it is a Rockford Machine*

This powerful machine is made to drive high-speed drills up to 3" diameter, for drilling and boring tools up to 8" in diameter, for boring out cored holes in cast iron.

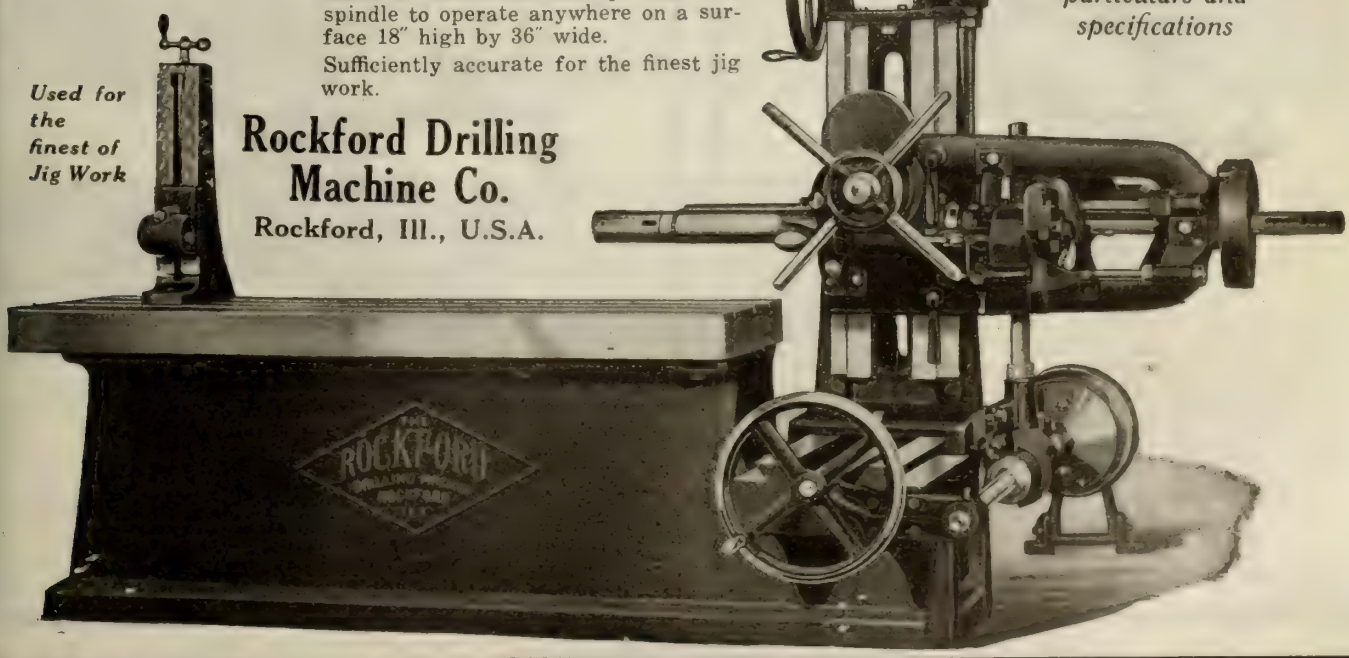
It has a lateral and vertical adjustment of the head that permits the spindle to operate anywhere on a surface 18" high by 36" wide.

Sufficiently accurate for the finest jig work.

Investigate now.

Write us for full particulars and specifications

Used for the finest of Jig Work



Rockford Drilling Machine Co.
Rockford, Ill., U.S.A.

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

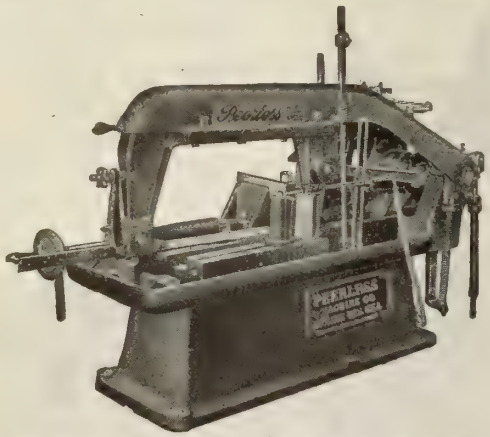
Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots *by the* HARMET Liquid Process

Peerless HIGH SPEED

The New Standard of Production

Why Not Cut Off Stock From 50 to 100% Faster?



Is there any reason why you should not profit by the superior speed, accuracy and capacity of the Peerless, as well as others? Why you should not do more work with the same number of machines, or the same work with fewer machines? Why you, also, should not save in room, in operating expense and in costly material?

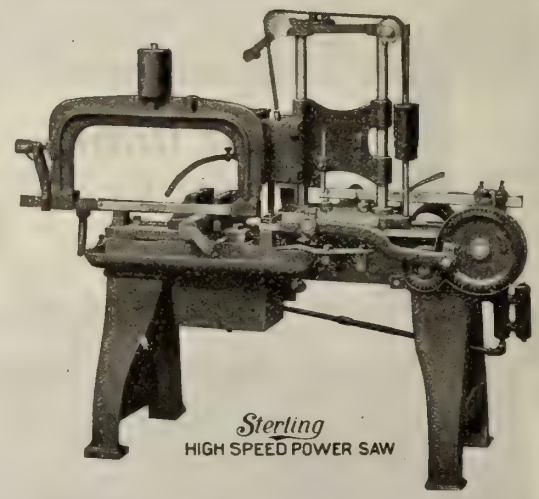
We will prove to you what the Peerless is doing in some of the largest plants in the country, or will let you prove its superiority in your own plant. A machine is ready for you to try, and if after 30 days' use you want to let it go, you may ship it back at our cost for freight both ways.

Write us about it—now.

PEERLESS MACHINE CO.
1607 RACINE STREET RACINE, WISCONSIN

"STERLING"

HACK SAWS



Sterling
HIGH SPEED POWER SAW

MANUFACTURED BY
DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A.

Standard the World over

"THE RACINE"

HIGH SPEED METAL CUTTING MACHINE

Reduces Blade Expense

Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

Use "Racine" H.S. Tungsten Power Blades

Racine Tool & Machine Co.

Melbourne Avenue - RACINE, WIS., U.S.A.

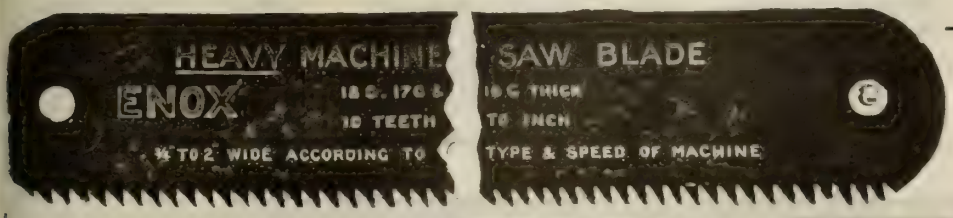
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

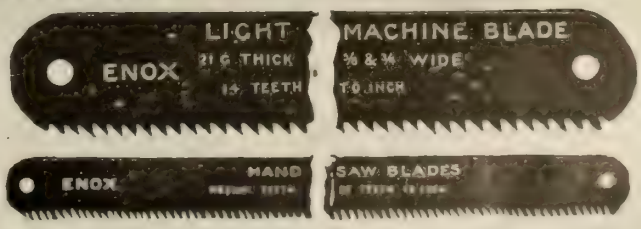
Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William



THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.

There is something more than just so many blades in a box of

Starrett Hack Saws

There is the Starrett reputation for quality of product. There's the ability to cut metal cheaper—and there's the feeling of confidence that Starrett trade-mark gives.

Catalog No. 21 will be sent free on request.

The L. S. Starrett Co.

The World's Greatest Toolmakers. Manufacturers of Hack Saws Unexcelled.

Athol - Mass.

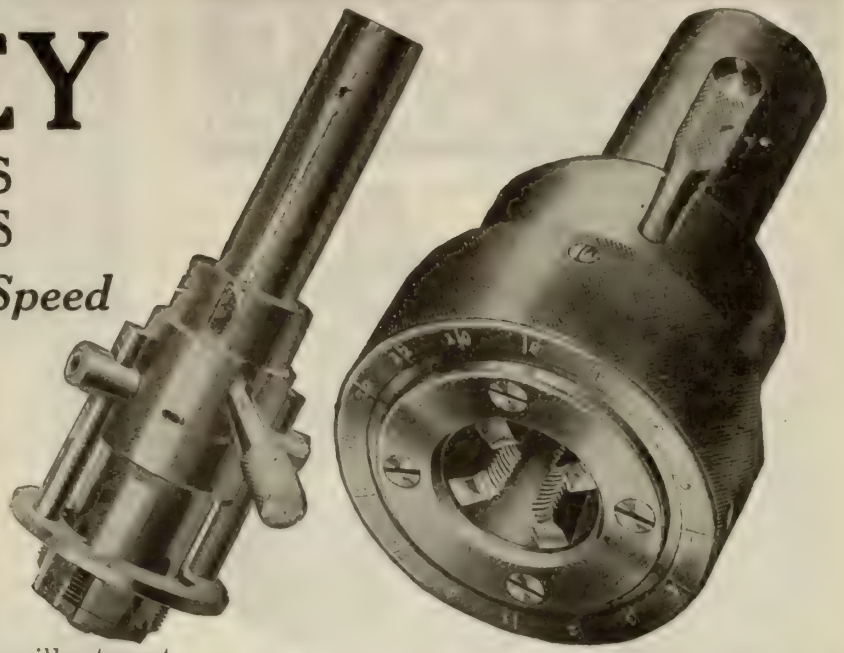
STARRETT HACK SAWS CUT QUICKER LAST LONGER

42-946

MURCHEY

COLLAPSING TAPS and SELF-OPENING DIES

Promote Accuracy and Speed



MURCHEY Collapsing Taps and Self-Opening Dies are cleared free from the thread instantly, preventing all danger of stripping, besides cutting time for production in half. **Thus you are sure of greater accuracy and greater production.** Murchey Tools are speeding production in all parts of the country on tapping machines, drill presses, monitor machines, boring mills, turret lathes, and all other machines to which taps or dies may be attached.

Let us know the class of work you are handling and we will show you how to increase your production 50 per cent. without running up the cost.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES & CO., 15 Rue Fenelon, Paris, France.

CUSHMAN

We've been Manufacturing

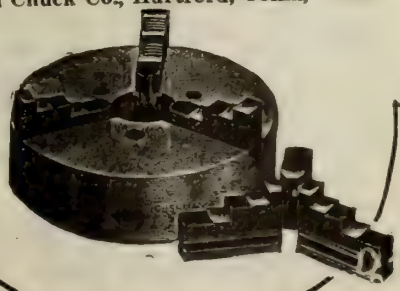
Nothing but Chucks and Their Accessories

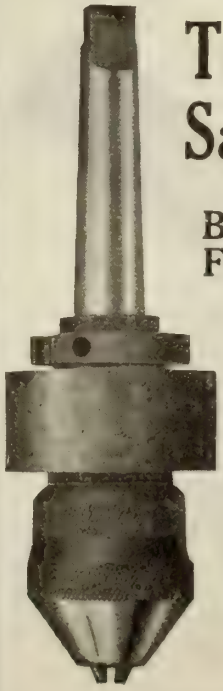
FOR NEARLY 60 YEARS

AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.
Cushman Chuck Co., Hartford, Conn., U.S.A.





Tap Chucks that Save Tap Costs

BICKNELL-THOMAS FRICTION CHUCKS

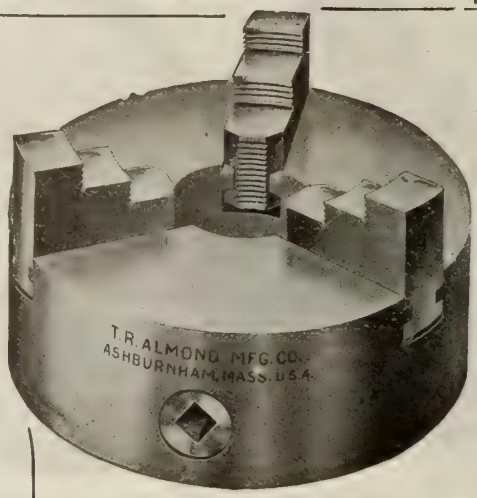
reduce tap breakage to the vanishing point. These chucks will hold the tap to the limit of its endurance, but a sudden strain sufficient to break the tap will cause the grip to loosen instantly. They are particularly adapted for tapping to the bottom of blind holes, for special work and—owing to their compact design — for use on multiple spindle machines.

Made in four sizes—one-eighth to one inch. Straight or Morse taper shanks.

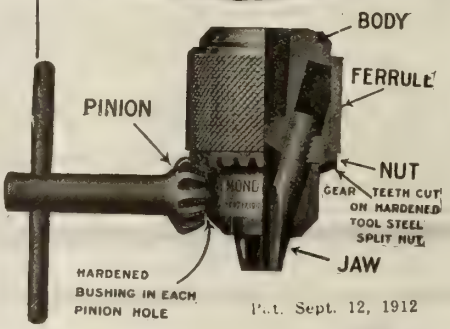
BICKNELL-THOMAS CO.
GREENFIELD, MASS, U. S. A.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



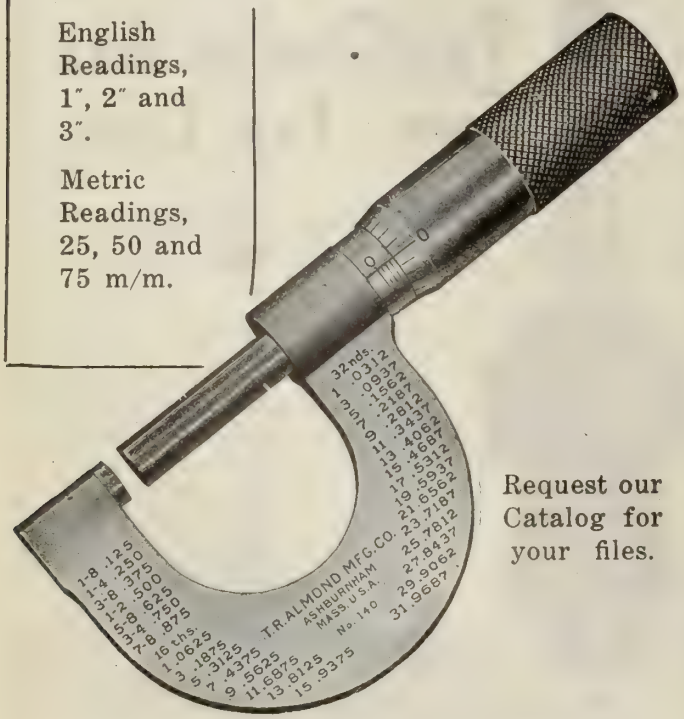
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

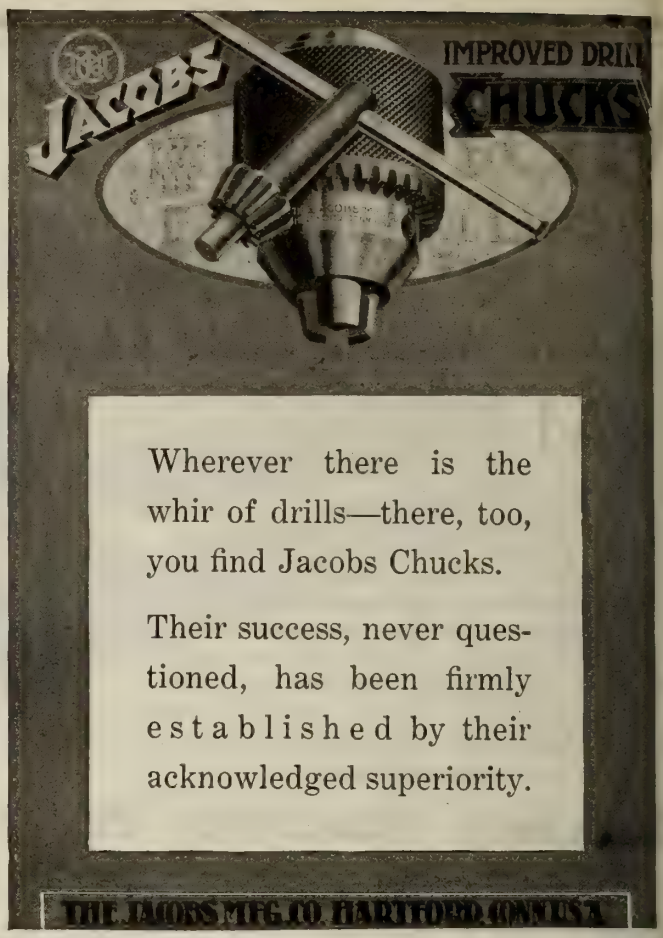
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.

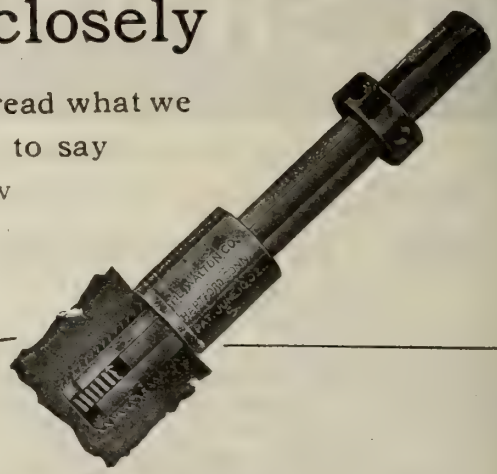


Wherever there is the whir of drills—there, too, you find Jacobs Chucks.

Their success, never questioned, has been firmly established by their acknowledged superiority.

Look at this again —closely

and read what we have to say below



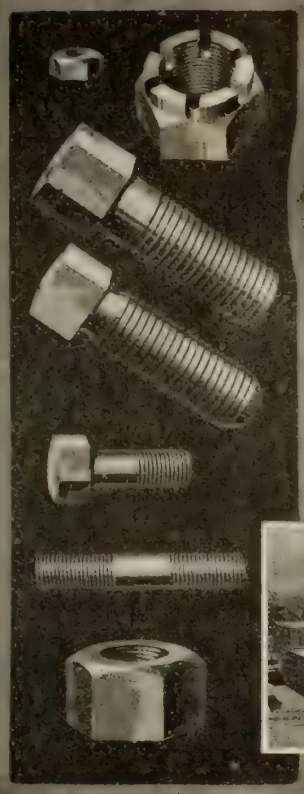
WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

STANDARD

SCREW MACHINE PRODUCT

SPECIAL



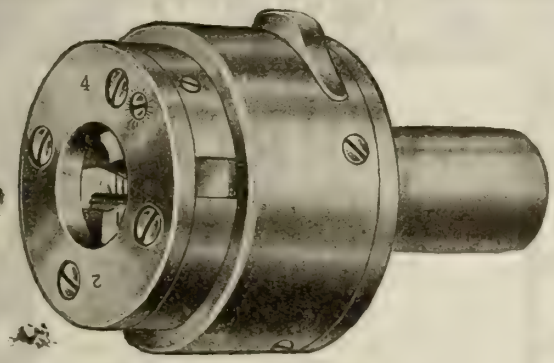
NUTS—
Plain—S.A.E.
Castellated—S.A.E.
Semi-finished—V—U.S.S.

SCREWS—
Cap—V—U.S.S—S.A.E.
Set—U.S.S.—V.

SPECIALS—made to customers' specifications up to 2¼" diameter, 10½" long.

THE NATIONAL ACME COMPANY

G.T.R. and DeCourcelles
MONTREAL, P.Q.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

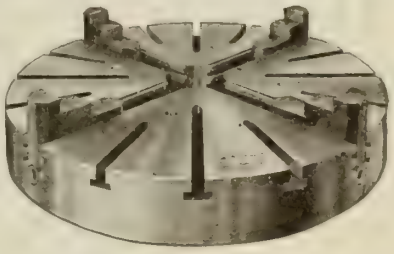
The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

GOOD MECHANICS
Show preference for the
UNION INDEPENDENT CHUCK



It has an iron body, and is made heavy and strong. The double bearing ribs for the jaws make a stiffer chuck for heavy work than the ordinary single rib type.

The screws are also of the "socket" type and operate in hardened steel thrusts, which also add to the strength and stiffness of a chuck that is designed for **heavy duty.**

The jaws are wide and the screws are correspondingly large.

UNION MANUFACTURING CO.
New Britain, Conn.
New York Office - - 26 Cortlandt St.
Makers of a Complete Line of Chucks

Williams' Superior Drop-Forged Wrenches

WHEREVER wrenches are used, particularly in exacting production requiring hard and continuous service, Williams' Wrenches are preferred.

Through constant and systematic effort, during nearly fifty years, to produce only the best, Williams' Drop-Forged Wrenches have been so developed that to-day their superiority is generally conceded. There's a strong, dependable Williams' Wrench, *Standard* in design and size, for every recognized trade need. Every one of the 40 patterns in about 1000 sizes, with openings from 3/16 to 7⅝", carries the Williams' guarantee of service.

Specify "Williams' Wrenches" and get superior quality. Copy of our Wrench Booklet on request.

J. H. Williams & Co.

"The Wrench People"

45 Richards Street, Brooklyn, New York

The A. G. Low Co., Ltd., 45 Pacific Ave., Saskatoon, Sask.
Agents for Manitoba, Saskatchewan, Alberta and British Columbia

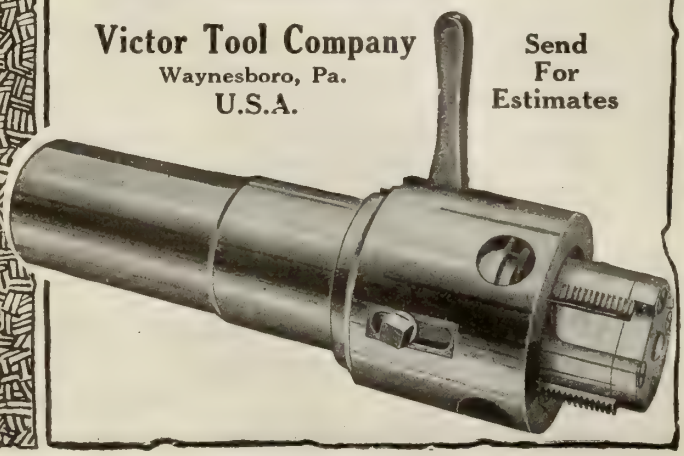
We wanted something original— this is what we got.

"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
U.S.A.

Send For Estimates



MORROW SCREWS MORROW

MORROW
INGERSOLL

"Morrow" products are made by Canadian workmen in a fire-proof, up-to-the-minute, daylight plant — with Canadian capital—an all-Canadian institution producing the best

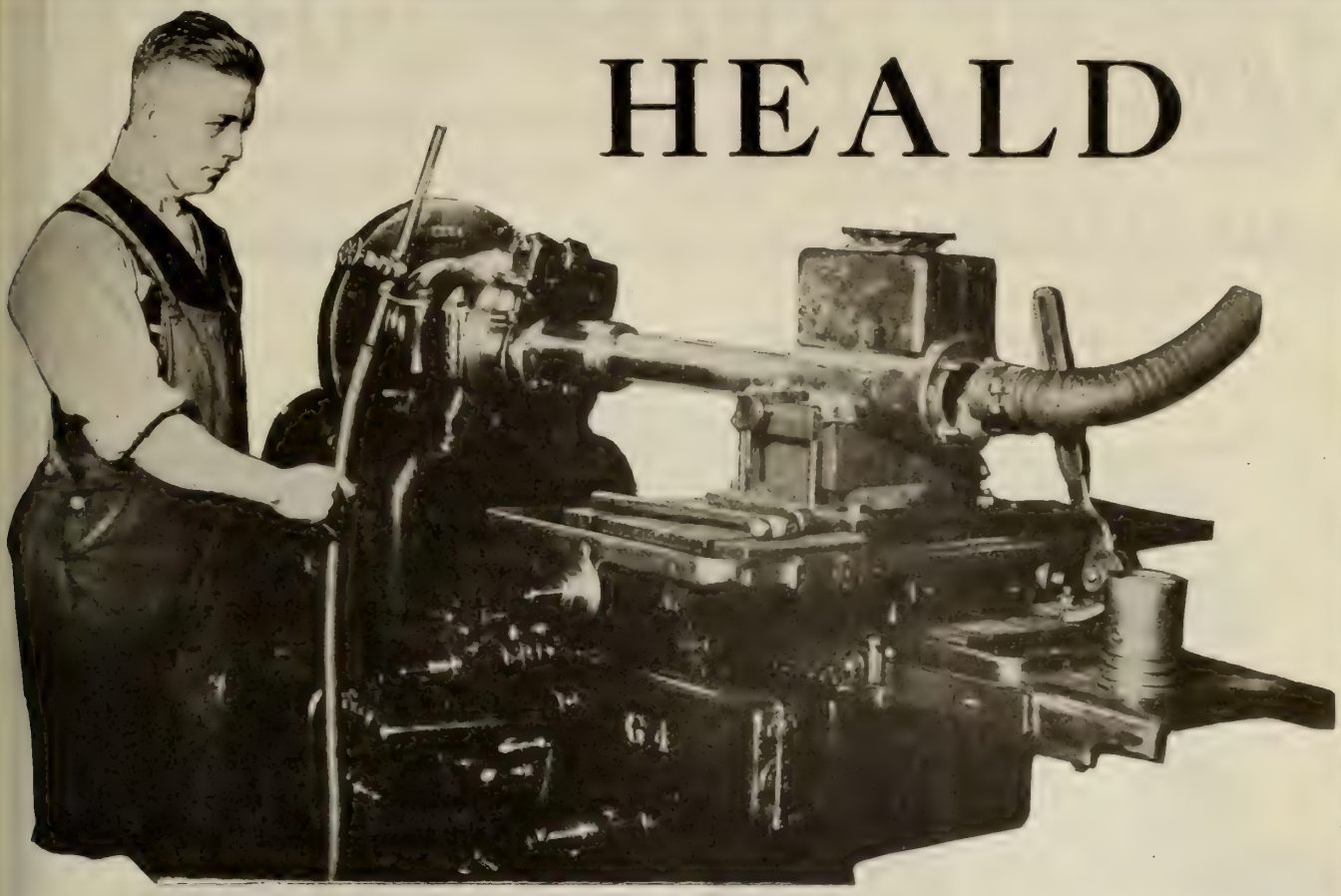
Set Screws
Cap Screws
Nuts
Twist Drills
made in Canada. The reliable kind. The jobbers carry them.

John Morrow Screw & Nut Co.
LIMITED
INGERSOLL - CANADA

Buy Ingersoll Files from us. 'They cut faster and wear longer."

DRILLS FILES

MORROW NUTS MORROW



Economy in Grinding Stationary Gas Engines

The John Lauson Mfg. Co., of New Holstein, Wis., at whose factory the above photograph was taken, makers of stationary gas engines, are convinced that the Heald No. 60 Cylinder Grinding Machine increases production and accuracy, while reducing the cost of manufacturing by grinding bores.

They have demonstrated that ground cylinders will cut the testing of running in time 50% or better and will produce a more desirable and economical engine.

In their catalogue they state that their cylinders and pistons are ground to size, which assures a smooth, round cylinder that will hold compression under all conditions, will last longer and deliver more power and require less lubricating oil than the bored type.

The above conditions are true not only with stationary engines, but also of every combustion engine, including automobiles, airplanes and tractors.

Write for Literature. Send samples or enquiries to our Service Department. We have eight engineers at your disposal

THE HEALD MACHINE COMPANY
Worcester Massachusetts

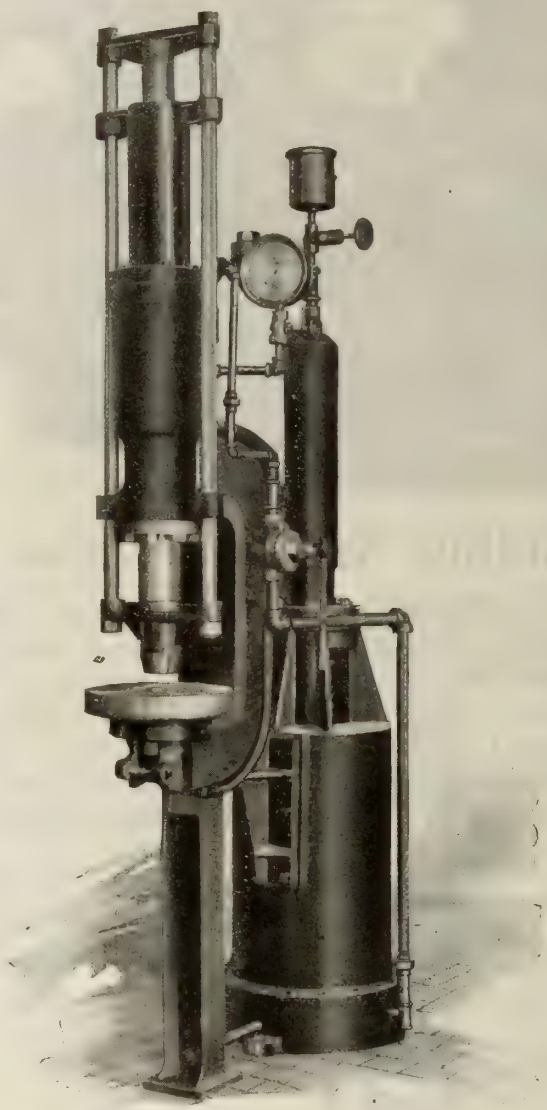
New York, 839 Singer Bldg. Philadelphia, 1408 Commonwealth Bldg. Chicago, 24 Jefferson St. Detroit, 911 Majestic Bldg. Cincinnati, 311 Provident Bank Bldg. Cleveland, 1102 Swetland Bldg. PACIFIC COAST AGENTS: Eccles & Smith, Los Angeles, San Francisco, and Portland.
FOREIGN AGENTS: Alfred Herbert, Ltd., England. Societe Anonyme, Alfred Herbert, France, Switzerland, Spain and Portugal. Societa Anonima Italiana, Alfred Herbert, Italy. Horne Co., Ltd., Japan. Wilh. Sonesson & Co., Sweden, Denmark and Norway.

ORIGINALITY

is Characteristic Always of

"METALWOOD"

DESIGNS and DEVELOPMENTS



The "Metalwood" line of these Quick Operating Hydro-Pneumatic Presses comprises a variety of styles, types and sizes.

By performance through a period of years, these presses have established themselves in a wide range of industries as standard tools for light straightening, broaching, forcing and assembly operations.

The "R-149" style press of 20-ton capacity shown here is described in our bulletin B-47.

METALWOOD MANUFACTURING CO.

High Speed Hydraulic and Hydro-Pneumatic Machinery

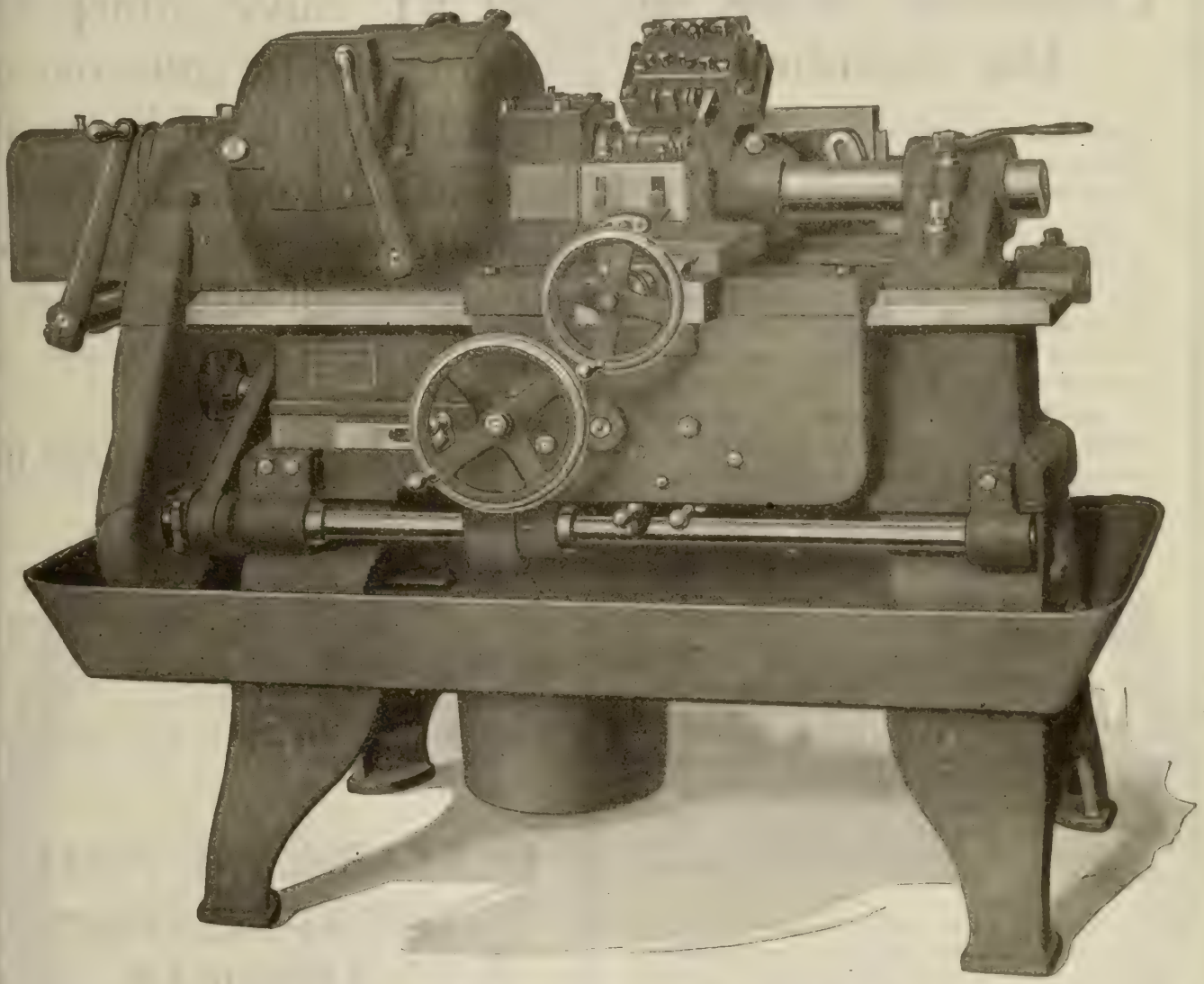
DETROIT, MICHIGAN

EXCLUSIVE SALES REPRESENTATIVES:

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

REED-PRENTICE COMPANY

WORCESTER MASS. U.S.A.



PISTON PRODUCTION

A REED-PRENTICE AUTOMATIC LATHE FINISH TURNING, GROOVING AND FACING A 3¾" PISTON IN ABOUT 2 MIN. 30 SEC.

THE PISTON HAS BEEN ROUGHED OUT ON A REED-PRENTICE AUTOMATIC OF THE SAME TYPE BUT WITH DIFFERENT TOOLING IN ABOUT 1 MIN. 35 SEC. BEFORE COMING TO THIS MACHINE.

MAY WE FIGURE ON YOUR WORK USING A SPECIALIZED MACHINE OF THIS TYPE?

CANADIAN FAIRBANKS-MORSE CO., LTD.
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES

Notes On Grinding

NORTON COMPANY WORCESTER, MASS.

No. 55A

Cylindrical Work In Die Grinding

In die grinding the cylindrical operations are almost entirely confined to the grinding of punches, both straight and tapered.

This is usually done on a universal or small cylindrical grinding machine and may be done wet or dry. When grinding wet be sure the stream of cooling water and lubricant is ample. If only a small trickle of water reaches the work, the cooling will be only local and will cause the metal to shrink at the point where it touches the work, causing checks and surface cracks by the unequal stresses set up within the steel.

For grinding steel punches, Alundum wheels of grain, sizes 36 to 60, and grades K, L and M, are doing the work very successfully.

If the punches are of high speed steel, the tendency should be toward slightly coarser and softer wheels. A hard wheel does not permit the cutting particles to break away fast enough for the wheel to cut cool and free, and when used on high speed alloy steels, the hard wheel will develop heat and burn the work. For this reason the slightly coarser and softer wheels give the best results on this type of work.

A grinding machine that is in first class condition will permit the use of a softer and faster cutting wheel and still give the same finish and wheel life as that obtained on an inferior machine using a harder, slower cutting wheel.

On necking and drawing die punches which are to be used for brass or other materials tending to load up, somewhat finer wheels are used to insure a good finish that will take a bright polish.

NORTON COMPANY

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal. Toronto, Ottawa, St. John, N.B. Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N. Y. CHIPPAWA, ONT. NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 11 NO JEFFERSON ST.

TRADE NORTON MARK

Skilled Artisans Prefer Standard Grade Tools

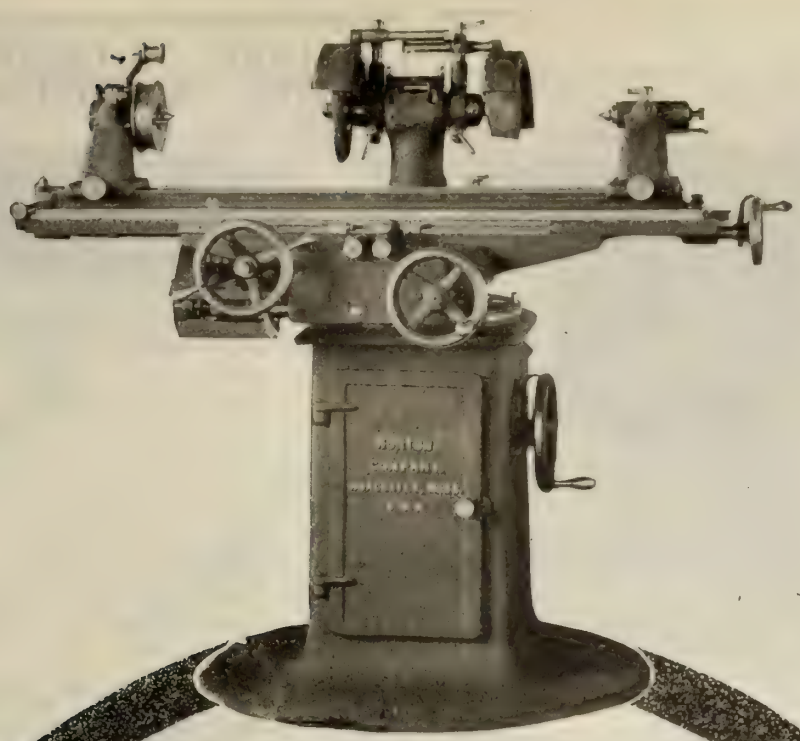
The skilled mechanic MUST have sharp files otherwise he gets no satisfaction out of his work

As soon as his file becomes dull tell him to turn it in and get a new one The result will be better work and greater satisfaction to all concerned.

And it pays. New files cost little labour costs much.

Good steel, accurate cutting and proper hardening insure long life to "Famous Five" files.

Specify them when ordering They are:



NORTON

UNIVERSAL TOOL AND CUTTER

GRINDERS

You know these machines, so there's no need for a long-winded argument.

About all we wish to say here is that you can get IMMEDIATE DELIVERY on them.

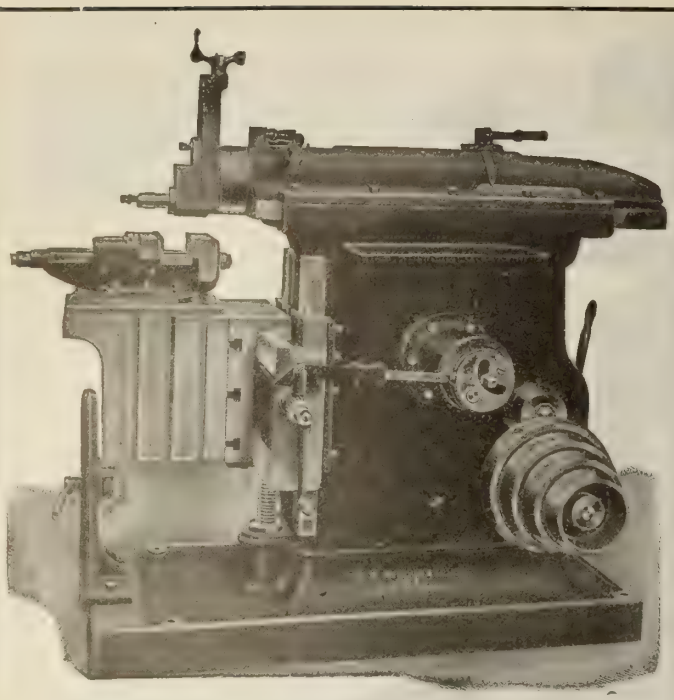
The Norton Universal, made in two sizes, No. 1 and No. 2, is specially adapted to tool room work.

How about putting one or more in your plant at once? Catalog T C-7 gives all the necessary information. Get in touch with us or our nearest agent the quickest way—by wire or telephone.

NORTON GRINDING CO.

Chicago Store, 11 N. Jefferson St. Worcester, Mass.

Vonnegut Machinery Company, Indianapolis, Ind. **Robinson, Cary & Sands Company**, St. Paul and Duluth, Minn. **Manning, Maxwell & Moore, Inc.**, St. Louis, Mo. **Henry Prentiss Co.**, New York, N.Y.; Boston, Mass.; Buffalo, N.Y.; Rochester, N.Y.; Syracuse, N.Y.; Scranton, Penn. **The Motch & Merryweather Machinery Company**, Cleveland, O.; Detroit, Mich.; Pittsburgh, Penn.; Cincinnati, O. **Eccles & Smith Company**, San Francisco, Calif.; Los Angeles, Calif.; Portland, Ore. **The Canadian Fairbanks-Morse Company, Ltd.**, Montreal, Que.; Toronto, Ont.; Vancouver, B.C. **C. T. Patterson Company, Ltd.**, New Orleans, La. **Kemp Machinery Company**, Baltimore, Md. **W. E. Shipley Machinery Company**, Philadelphia, Penn. **English Tool & Supply Company**, Kansas City, Md. **Alfred Herbert**, Coventry, England; Paris, France; Milan, Italy. **The F. W. Horne Company**, Tokio, Japan. **Izanosskoff & Co.**, Petrograd, Moscow and Ekaterinburg, Russia.



McDougall SHAPERS

Combine the best features of all machines which have hitherto been placed upon the market, and nothing has been included, except those points which experience has shown to be essential.

An examination of the construction will reveal features that make for increased production, ease of operation and accuracy.

Write for descriptive literature.

The R. McDougall Company Limited

Manufacturers

GALT, ONTARIO, CANADA

ARE-MAC-DEE IS A GUARANTEE

MARK YOUR PRODUCTS THE "MATTHEWS" WAY

"Matthews-made" steel stamps and lettering dies make easily read and durable marks on all classes of products. Matthews Champion Type Holders—for flat and convex surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years' experience.

Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

Canadian Fairbanks-Morse Co., Limited

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"**—the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

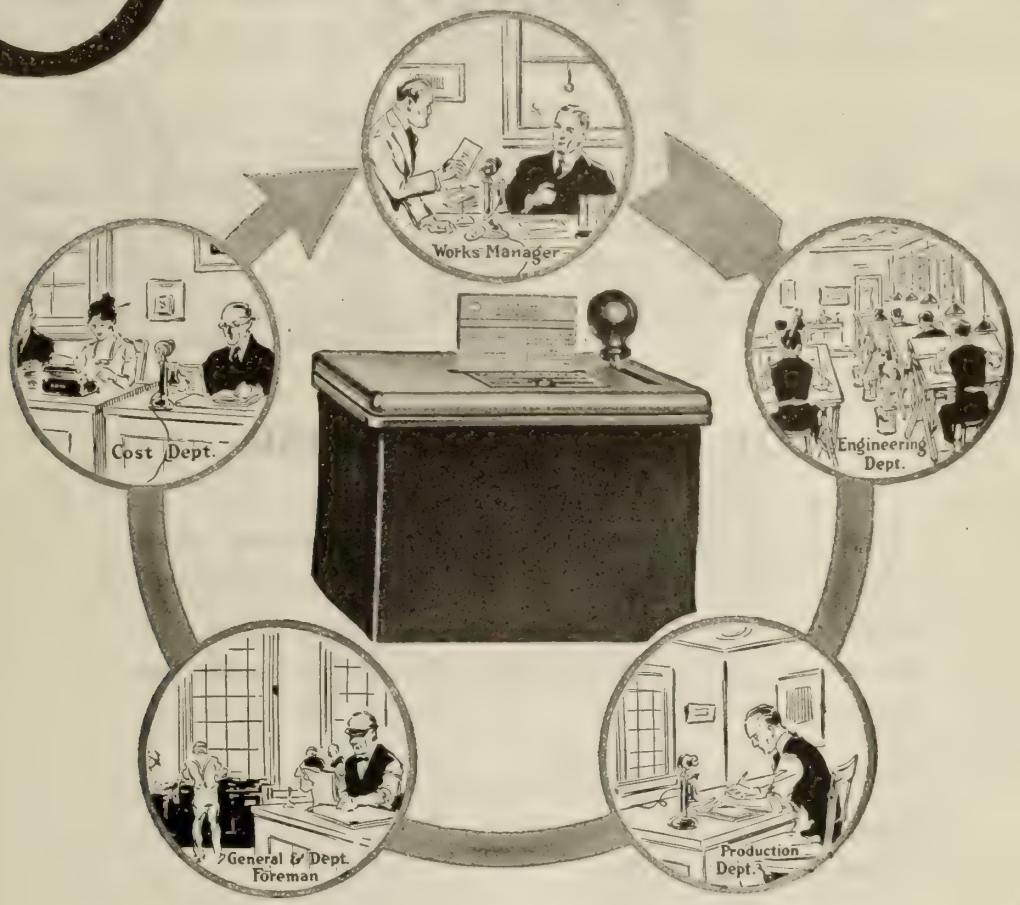
The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company

HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

GISHOLT



Efficient Factory Control Is Built Around the Periodograph

All departments benefit from the time the order comes to the works manager.

Periodograph time tickets help plan and route the work, report the correct time on each operation and give the facts from which accurate costs may be figured.

Gisholt Methods Insure Accuracy and Economy

Gisholt Methods Insure Accuracy and Economy

Get the full story

GISHOLT MACHINE CO., 1153 East Washington Ave. MADISON, WIS., U. S. A.

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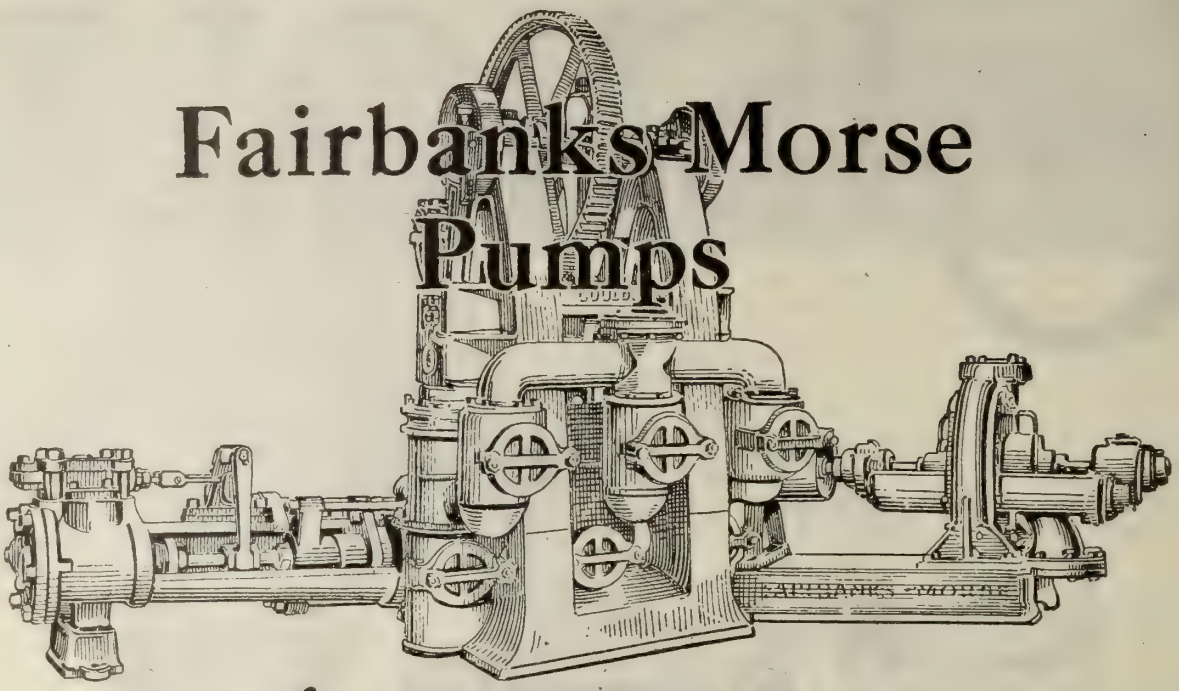

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MANUFACTURING NEWS

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Had Eight-Hour Working Day Twenty Years Ago

Why Fight Labor? That is the Question Put Forward by Sir Robert Hadfield, Head of the Great English Steel Concern—Greater Things in the World Than More Production

WHEN a man with the standing of Sir Robert Hadfield, chairman and managing director of Hadfield's, Ltd., speaks on the relations of capital and labor, it is certain that his audience is going to listen. Sir Robert does not speak as a theorist, but from years of actual experience; not as a man who has tried and failed, but as one who has succeeded; nor does his message bear the mark of a man who has fought strikes successfully or unsuccessfully, for he has beaten the strike before it ever arrived. His firm employs 15,000 men — they went through the war, and through the period of unrest following, as they have gone through preceding years—all without a strike.

SIR ROBERT HADFIELD, Bart.

Chairman and Managing Director of Hadfield's Limited. The firm employes some 15,000 men, has had an eight-hour day for 20 years, and the works have been always free from strikes.

Nor is the Hadfield a sweat shop, nor a long-hour proposition. Firms that are fighting the eight-hour day must appear as still in the dark ages to the Hadfields. Their works have had the eight-hour day for 20 years. It was a great big chance then to start the eight-hour plan in competition with all the long-hour shops of the world. A weak concern would have gone down and out. Hadfield's were—and are—a strong concern and they did not go down and out. Rather they went up and on.

The Hadfield process of casting steel ingots came to be well known in Canada during the period of the war. It was found to be thoroughly reliable and productive.

In an article from Sir Robert Hadfield, in "Factory," he gives his views on many matters. We moved a river out of its bed, he says, and made a new one for it, in order to enlarge the area of our works at Sheffield for the ever-increasing demands of war. Merely moving that river would have been an achievement of itself a few years ago; we did it as an incident to making munitions. We can do as much as that for the work of peace. If it is necessary to shift a social river in order to give a proper freedom for the adjustment of the relations of labor and capital—we can shift that river. For it is upon finding a better relation between labor and capital that the peace hangs.

I speak of labor and capital as though they were separate entities and as though it were inevitable that there should be labor and capital. I do not know that any such separation is ordained for all time and I rather suspect that a few years more may change something of that relation, but to-day it is the only one that we know and I am not at all convinced that anything can be gained by destroying capital—which is the ideal of Bolshevism. I think that we can gain more real ground by keeping the best of what we have and then endeavoring, with absolutely open minds, to find some way of bettering it.

To-day the relation between capital and labor is chaotic; the employer seems to be far

away (speaking generally and not specifically) from his employee and more or less the same condition holds in other countries, but the gap is not as wide as appears on first impression. The most radical—and not the average—worker speaks for the employee and the most backward or "conservative,"—and not the average—owner talks for the employers. Neither is representative of his class; the average worker does not wish to destroy the place in which he works and the average employer does not want to get the last drop of blood out of his employee. It is well to bear in mind that a reasonable adjustment will most certainly not satisfy the extremists of either class.

The basis of bad labor conditions is the delusion that long hours mean large production and that low wages mean cheap production. Therefore, the unthinking employer takes it that he can meet competition only by working men through long hours at low wages. And in to-day's cry for intensive production for peace as a solution for the problem of replacing the wastage of war, it is natural that hours and wages should come to the front.

How Higher Wages and Shorter Hours Can Lower Production Costs

I have demonstrated to myself that higher wages and shorter hours are aids to low cost production—if machinery can be brought in to help the worker. More than 20 years ago my firm established the 8-hour day and wages have increased several times, yet our output to-day per pound sterling of wages paid is greater than it was in the era of the 56-hour week when the men came to work in the dawn without their breakfasts. Having long ago reduced the hours per week, it would not personally be any great shock further to reduce them; it is a shock to go at one clip from 56 to 40 hours and that is the position of most manufacturing firms. Most of them are unprepared to cut the working week and maintain even a reasonable output. They think that in such a case they would not be able to meet competition—and probably they would not.

Therefore my suggestion is, that as preliminary to reaching a better basis, we get rid of one of the bogies of competition by taking hours of labor and minimum wages out of the discussion by equalizing them under an international agreement; and it seems to me that the prevailing idea about more production, if that means increasing the pressure upon the human unit, will have to be, to some extent, modified.

There is a personal limit to output; one of the strongest guarantees for future quiet would be to have some international understanding on this mad rush after more and more production; its present course can lead only to Bolshevism. No human being can really wish to see the level of output maintained at the war standard; flesh and blood could not stand such pressure. It seems to me that the present craving for very short hours is a natural reaction of the inhuman war pressure that prevailed during hostilities.

Such pressure is not now desirable; I do not at all mean that any of us—worker or employer—should do less than a proper day's work. We shall have to increase production to beyond the pre-war level. But that will come about in the natural course of events through the further development of the machine and without forcing the human being. We can use the mechanical element to accomplish that which the human element cannot. I ride in a motor car because it saves time; a century or so ago I might have been carried in a palanquin. My chauffeur is paid very much more per mile than the little bearers would have been and he has a much easier time; so do I. Is not that then the direction for industry to take?

Increased production will come; it cannot be helped. The requisite improvements in machines are inevitable and it will hasten those improvements if we could put an international prohibition upon the number of hours a man can do manual labor. To-day, many in England live in fear of the competition of America, of Japan, or of Germany; but each of those countries also lives in fear of British competition. Competition is good in its effects, but over-competition harms both the individual and the country and is quite as harmful as under-production. As regards this particular aspect of the subject I recommend readers of this article to see the interesting book by Bastable on "The Commerce of Nations." Although issued some time ago, it had a remarkable effect upon my own mind, showing that most of the great wars of the world had proceeded from trade rivalry, commencing originally in this respect between tribes, cities, guilds, small states, and finally modern powers. There is no doubt that at the bottom of the last great war there existed trade jealousy; Germany thought she was the Heaven-born country to take the world under her wing in trade matters, which of course was a ridiculous and far-fetched idea, as recent events have shown.

But the same story will be repeated unless we learn the lesson indicated in this article, namely, the stupendous necessity—I use the word advisedly—of the leading nations of the world now coming to an understanding upon

what are termed trade matters. The same jealousy will spring up as in the past and we shall have the old cries of "Free Trade," "Tariff Reform," "Protection," "Fiscal Reform," "Commercial Treaties," and the like, but none of these will settle the difficulty unless a genuine attempt is made to try and unify the trade conditions of the world as a whole, at any rate regarding Europe, America, and certainly some parts of the Far East. Now is the time to make this effort when the nations of the world have been brought together in a manner which has never before been possible.

I commend this phase of thought most earnestly to the readers of this article, feeling sure that if some arrangement could be arrived at, even small as it might be in the first instance, this is the only possible solution of the world's difficulties with regard to interchange of the productive capacities of different countries. My country tried to set an example in the establishment of free trade. We in many respects unselfishly threw open our markets to the world; we did our best, but other countries did not respond. On the other hand, it can be truthfully said that we did more than any other country. However, in the future it is more than probable that we cannot take the same line of policy unless there is response not only from our Anglo-Saxon relatives, but from other countries too. Here again the world conference now assembled at Paris must face this situation if the peace of the world is to be assured for future generations.

Is is my view that the talk of competition and of consequent trade wars has done much to bring about the present disturbed conditions. A workable internationalism might start with equalizing, at least to the extent of hours and minimum wages, world-wide industrial conditions. Of course the process would not be quite as simple as it sounds, but I can see no insurmountable obstacles. An international basis of industrial output and development is feasible, if only the will to bring it about is present.

If we could thus dispose of hours and at least minimum wages we should also dispose of that employer who is always striving to hold back the employer with advanced ideas. There are backward and misguided owners who imagine that conditions should not be changed and who use all of their powers of boycott and intimidation to restrain the owner who thinks differently from them. There are workers who adopt a similar policy. Much unfair opposition was met with when my firm started the 8-hour day. Had we not been possessed of ample financial resources our plans would have been wrecked simply because we wanted to give the worker a better chance. A firm financially weaker would have had to give up the experiment.

Because of this kind of attitude, trade unions came into being and, as a reply to them, came employers' associations; their respective functions are quite alike—for the one to get the better of the other. There is no thought of mutuality. The two bodies make treaties with each other as though they were enemy countries and then set up elaborate and cumbersome mechanisms for the settlement of the disputes which are certain to arise out of the agreements. Disputes which might be settled on the spot in 10 minutes, drag through weeks of meetings by district and national bodies. Little differences soon become important, even national affairs. For instance, the 47-hour week in manufacturing is threatening to split on such a trivial adjustment as when the men shall start work and whether or not there shall be a break in the morning for breakfast. Just the other day I

EQUAL RIGHTS TO ALL—MY LABOR POLICY

YOU must give confidence to all classes, confidence to those who have brains, to those who have capital, and to those with hearts and hands to work. I say to labor, you shall have justice; you shall have fair treatment, a fair share of the amenities of life, and your children shall have equal opportunities with the children of the rich. To capital I say: You shall not be plundered or penalized; do your duty by those who work for you, and the future is free for all the enterprise or audacity you can give us. But there must be an equal justice. Labor must have happiness in its heart. We'll put up with no sweating. Labor is to have its reward. And when the whole nation sees that wealth lies in production, that production can be enormously increased, with higher wages and shorter hours, and when the classes feel confidence in each other and trust each other, there will be abundance to requite the toil and to gladden the hearts of all. We can change the whole face of existence.

DAVID LLOYD GEORGE

discovered that many of our men were quite disturbed by a rule against smoking while at work; they wanted to have a pipe during the morning. We have always permitted smoking on night work but, for no particularly good reason, smoking has not been allowed during the day.

Arrangements which tend to more and more formal relations may not be the best, as in the case of joint industrial councils as projected in the Whiteley Report. Insofar as the shop committees are concerned the plan is good. I take it as fundamental that there must be some machinery for a mutual exchange of view between the employer and employee in any large establishment. We have often had such committees and our people have been able to appeal to a common forum. I am glad to say we have never had a strike—which is, unfortunately, somewhat a rare record.

I hope that it will be possible by mutual arrangement and through the higher standard of life that high war wages have given to the what might be called the "intellect" of industry, and instead of having the employer directing with knowledge and the employee merely working and without knowledge, that the worker will appreciate the scientific and financial problems of industry and become a co-worker. What we need is a higher level of intelligence in the worker rather than more production; given that intelligence the production will take care of itself. And so also will the cost of production.

What Sir Robert Thinks About Welfare Work

Those of us who are employers should make up our minds to face the future as something which will not only change the present working relation, but will change it for the better. For the worker has not had a full chance to develop and it is not good for society that one class should have infinitely greater opportunities than another. The way to development is not through paternal attention in the direction of welfare work.

Proper welfare work may be necessary in the case of those who have not even the comprehension that there is a better way of living and so cannot realize their freedom; but welfare work is really only a part of an education and not an end in itself. The providing of good houses and a decent place in which to work is not welfare work, but a primary duty of the employer if the local housing conditions are bad. The real point is to give the worker the money and the leisure for his own development.

Let me quote a passage from an address by Harold Cox, because he exactly expresses the thought that I have in mind:

"First of all, why have the masses of our people so long been condemned to live in poky houses and mean streets, many of them with insufficient food? You answer that it is the result of low wages. I ask again: Was it necessary that the wages should be so low? The reply obviously is that the work was worth so little, or in other words, the worker produced so little. But was it necessary that the worker should produce so little?

"Cannot we on the one hand secure universal employment, and on the other widespread enjoyment? If our people permanently insist upon a higher standard of living for themselves, their own demands for comforts and luxuries, either of home manufacture or of foreign importation, will create employment for themselves either in home or export industries. Reciprocally, if we utilize for the purpose of peace the tremendous productive power which the war has shown we possess, we can secure for our whole population a richer, a fuller, and a happier life."

We have heard much during the war about the working people buying pianos and indulging in other expenditures which are called luxuries. Why should not a worker have a piano? Why should anyone cavil at anything a worker buys? Is it not a good sign that he is interested in these things? Is he not a human being?

But it seems to be the fashion to talk as though the worker were not a human being and that he would not appreciate conveniences, even luxuries, if he had them. Take for instance some dwellings that I put up in Sheffield twenty-five years ago. They were not elaborate, but they were decent and they had in them bathtubs and other accommodations. The bathtubs annoyed many of my friends; they revived the old story about tubs being used for coal or vegetables or for practically any other purpose other than bathing.

What actually happened? The people not only used the tubs but their friends came to indulge in the luxury of a hot bath at home in their own home.

But all of these things—these aids to better living—are but incidents; the end is a much larger affair. That end is the mental and physical equipment if possible of this generation of workers and certainly of the next, to enable them to take a larger place in the scheme of life.

To this end I would advocate almost any reasonable change that would improve the condition of the man who honorably works with his

hands. I think that he should have the same advantages as the brain worker and be raised to his standing. Why should not the manual worker have a vacation with pay? He would be the better for having a respite from the business of earning a living—just as all of us are. I want to see generally introduced the paid vacation time, not as a magnanimous act, but as a help to efficiency.

Many of these questions are international and I think that England and America as representative of the Anglo-Saxon race could not do better than join together in the work. We have combined for the war and with extraordinary efficiency. Why should we not extend that principle? Why should not wages in England be as good as wages in America and the hours of working just the same in the two countries? The men are very much the same. We have the finest opportunity of exchanging ideas by the wonderful way that we have been brought together in this war. We are together now. Do let us remain together and work side by side, not merely from the selfish point of view of earning money and paying dividends, but of trying to improve the condition of humanity.

BORING OPERATION ON THE GUN AT THE WORKS OF MESSRS. VICKERS LTD., SHEFFIELD, ENGLAND

THE *Marine Journal*, of New York, says, "It was the American idea of a convoy system that won the war in putting our troops safely across the Atlantic." Such rubbish is as nauseating to the well-informed American as it is to the British or Canadian reader. In the light of the wonderful change of feeling that has taken place between United States and Britain, the writer who pens such rubbish should be placed in the extra hazardous class. His vision is of the knot-hole size, and is not suitable for spreading abroad.

WHEN a man leaves off his vest and coat for the summer, where is he going to wear his fountain pen?

Methods of Milling and Boring Yoke and Cap

Illustrating Various Jigs Employed in the Various Operations Throughout the Manufacture of These Pieces

By F. SCRIBER

THE purpose of this article is to illustrate methods which have proved profitable for machining the yoke and cap (Fig. 1). This yoke has an elongated slot cast at one end, which slot is swung from the radius A and is not finished by machining, although both sides of the bosses surrounding it are finished, all finished surfaces being indicated by the F marks in the usual manner.

The first operation on the yoke and likewise on the cap is to machine the surfaces where they bolt together, and this is done as illustrated in the fixture (Fig. 2) for the yoke and Fig. 3 for the cap. Following this the bosses at the elongated slot are machined by straddle milling, using the fixture shown by Fig. 4, for holding the yoke at this time. Next both the yoke and cap are held in the drill jig (Fig. 5), while the screw holes are drilled and counterbored. The two parts are then held together by the screws, the holes in the yoke being, of course, first tapped to receive them. For the purpose of boring the two large holes face plate fixtures of the type shown by Figs. 6 and 7 are used, these being used on a turret lathe having the necessary boring, reaming and facing tools, also a back facing bar of the type shown in Fig. 8.

Referring to Fig. 2 the yoke A is located in a vee block B, which is relieved in the centre so both ends of the large boss on the yoke will rest in it. The outer end of the long arm on the yoke rests against the block C. which locates the yoke radially. To securely hold the yoke in place under the cutting strains two clamps, D and E, are provided which grip the work in the rough hole, while a pin F is used to take the thrust of th cut, four cutters being used to mill th tongue groove and surface as shown b the sectional view of the cutters.

Fig 3, in which the cap for the yok is milled, also shows a sectional view o four cutters which surface the cap an mill the tongue. To hold this cap whil milling it is located on three pins A, I and C, and is pushed back against th steel seat D by the clamp E, this clam being backed up by the solid cast iro part of the fixture at F, while the bolt (and nut, of course, operate this clamp t grip the work.

There is a decided advantage in ar ranging a clamp as shown in this fix ture, as it being on an angle it is possibl to arrange it so the nut on the bolt wi not interfere with the cutters when mill ing across, although in this particula instance no trouble would arise from thi source were other types of clamps use as there is plenty of room. The advant age of this type of clamp in this instanc lies in the fact that this clamp does tw things: it holds the work down an pushes it against the seat D, at the sam time, while when released the work i readily removed as the clamp does no go over the top of the work and, there fore, need not be pulled out of the way.

Before going ahead with the boring o these yokes the elongated bosses ar straddle milled as shown in Fig. 4 by th two cutters A and B; the work in thi instance is located by the tongue groov by means of the swinging cover and it i held against this swinging cover C b means of the spring pin D, that is t say, when the cover is down in the pos tion shown and is held by the swingin bolt E, the spring pin holds the wor against the cover, the spring pin i turn being held by screw F, which ha a tapered shoe in front of it. Thi squares the work up and for locating enc ways two screws are used, one G bein stationary while the one H is adjustabl and is used for binding the work. To re move the work after milling it is simpl necessary to swing the cover C out c

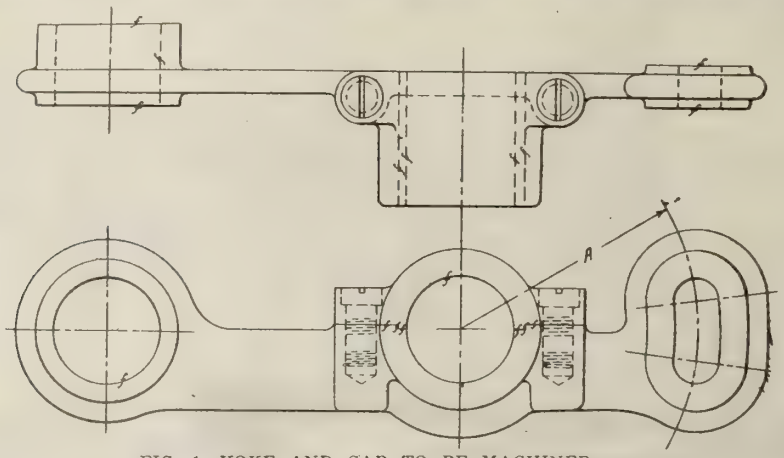


FIG. 1—YOKE AND CAP TO BE MACHINED.

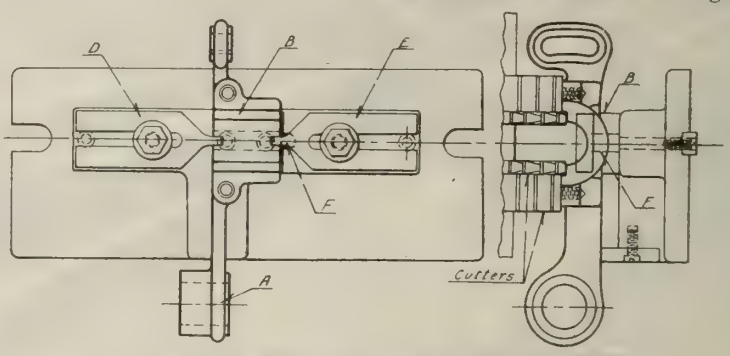


FIG. 2—FIXTURE FOR FIRST OPERATION ON YOKE.

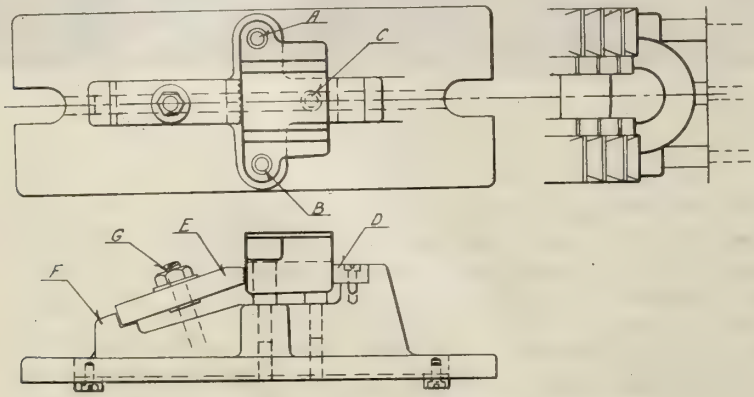


FIG. 3—FIXTURE IN WHICH CAP FOR YOKE IS MILLED.

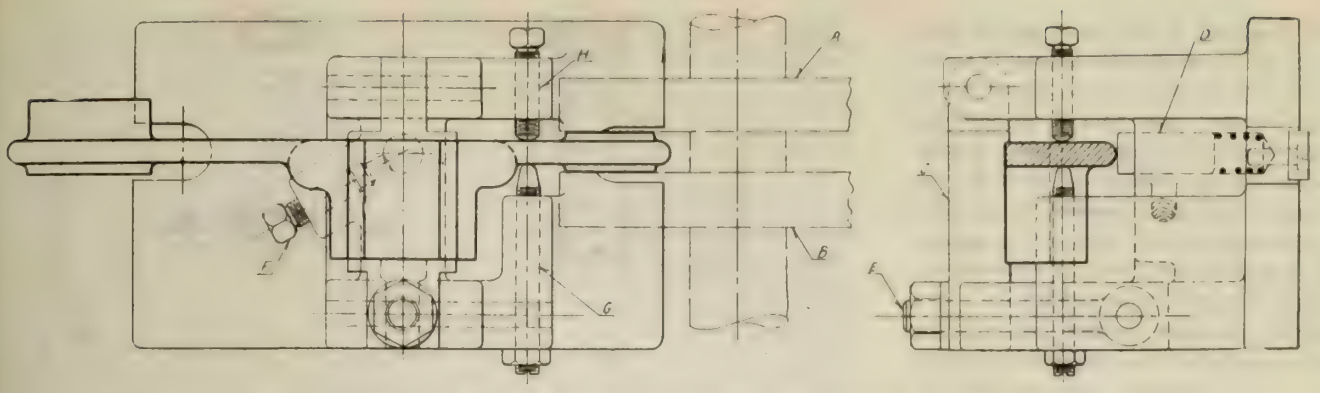


FIG. 4—FIXTURE IN WHICH THE ELONGATED BOSSES ARE STRADDLE MILLED.

the way, loosen the set screw H and take out the work, after which the screw F is released slightly and the jig is ready to receive another part.

Both the yoke and the cap are now placed in the jig (Fig. 5); after being fitted together they are set on two pins A and B, which go under the bosses which have the screws in them. A hinged cover is also used in this jig, this being designated by letter C, the cover is swung into position and held there by the quarter turn screw D, while the set screw E holds the work tight in position. To locate the work endways two pins, F and G, are employed, which together with the screw H locates the work in the correct position (from the boss) for drilling and counter-boring for filister head screws.

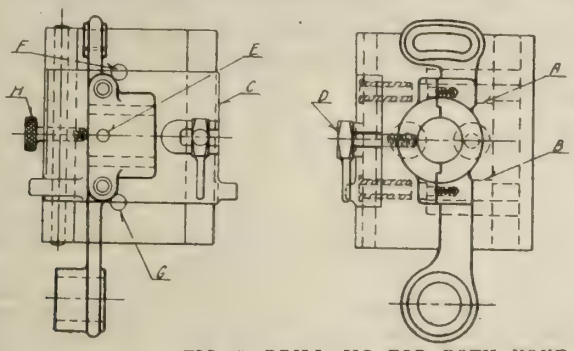


FIG. 5—DRILL JIG FOR BOTH YOKE AND CAP.

After drilling and counterboring the parts are removed from the jig and the screw holes are tapped into the yoke. Next after cleaning all the chips out the screws are put into position and the cap and yolk are next machined together. The first hole bored is the large centre hole, and by refering to Fig. 6 the manner of accomplishing this will be clearly understood.

Advantage is taken of the finished bosses at the elongated slot for squaring the work in this instance, while the hole is bored central with the large boss by locating the boss in the vee block A. This vee block is of the floating type and is beveled off so as it will only bear at the centre of the vee. To hold the yoke in this vee block the square head screw B is used. After settling the work up lightly in the vee block it is securely locked in place by the nut and washer C, which pulls it down against the stud D. When this is done the set screw B is firmly set up and the yoke is then held securely, all that is necessary for the actual boring, although to eliminate chatter a spring pin E is used under the long end of the yoke. Were this not done there would be a constant rattle of this long end, while machining the work. The main part of this fixture is made of cast iron and it contains a pilot bushing for guiding the boring bars while they are machining out the holes.

Fig. 7 illustrates the final operation on this part, which consists of boring the hole at the long end and advantage is taken of the hole just machined and the finished boss at the elongated slot to hold the work. The fixture itself is of cast iron and is indicated as A, an expanding bushing B in the centre hole correctly locates the yoke and a stud C, with nut and washer, grips the short end, while the long end, which is being machined, is securely held against the fixed screw D by means of the adjustable screw E. These two last screws take all cutting strains directly, the other bushing and stud being just used for locating purposes, although they also do their share in supporting the work.

It will be noticed that two cast iron lugs, F and G, are used on this fixture, their function is to counter-balance the yoke so the fixture will revolve without pounding. As it is necessary to finish the back of this boss as indicated at X advantage is taken of the back facing bar in the machine to do this. This back facing bar is, therefore, indicated on the drawing as it comes through the headstock spindle.

For doing the actual work facing a type of tool such as is shown in Fig. 8 is used. In connection with this tool a boring bar, A, is shown, this, of course, machines out the hole and is supported

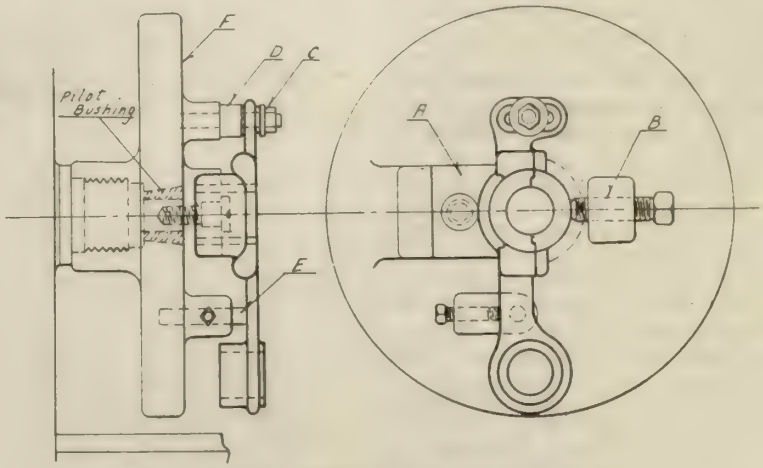


FIG. 6—BORING FIXTURE FOR CENTRE HOLE.

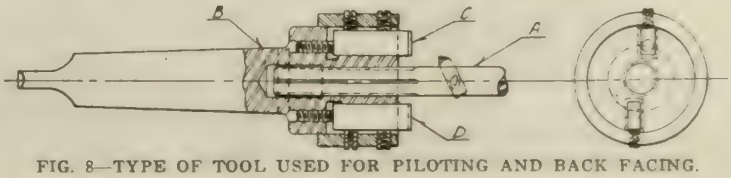
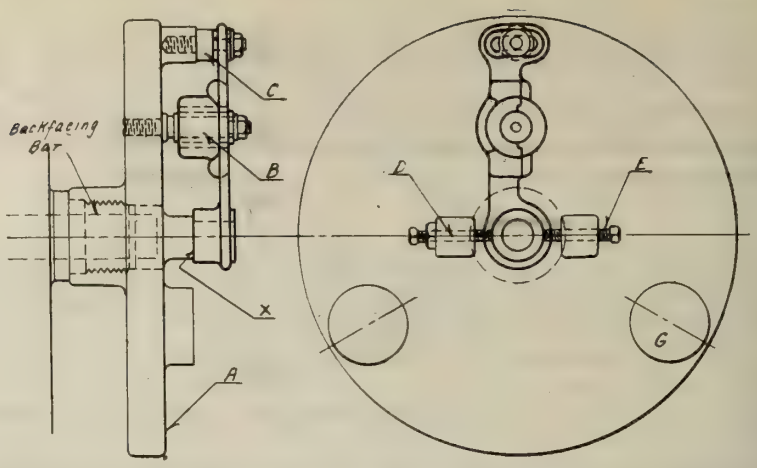


FIG. 8—TYPE OF TOOL USED FOR PILOTING AND BACK FACING.

at its free end in the shank of the back facing tool B, while two cutters, C andD, do the actual back facing, these again being clamped and backed up by the screws shown. This arrangement of combination boring, facing and back facing, does away with one operation on the part and where one cut is sufficient to accomplish a satisfactory finish of the work it is the economical thing to do.

While, of course, tools actually as shown would not be applicable to many jobs, still it is believed the principles involved will convey suggestions which will be found valuable in handling other tool arrangements for machining work.



BORING ARRANGEMENT FOR END HOLE.

The Electric Furnace and the Non-Ferrous Metals

The Following Paper Was Read by the Author Before the Cleveland Engineering Society on March 11. The Utility of the Electric Furnace for the Melting of Non-Ferrous Metals and Their Alloys is Clearly Developed

By E. F. COLLINS, General Electric Co.

Continued from last issue

Fig. 3 shows a working installation of furnaces of this type, having melting capacity of 1,500 lbs. of brass per hr. The most recent design of this type of 1,500 lbs. furnace is shown in Fig. 4, which illustrates a class 1 type furnace, in the furnace classification table already given.

The induction type of furnace is said to be exceptionally efficient thermally while melting. We shall see, however, that its overall working efficiency for the week is not appreciably from furnaces of Class 1, and it is desired to call attention to the fact that kw. hours per ton consumed in melting by no means indicates the highest overall working efficiency. Suppose for illustration we concede that the induction type of furnace has the highest thermal efficiency in melting. A certain furnace of this type has a crucible capacity of 400 lbs., and no load loss or radiation of 8 kw. hrs. per hour, and melts a charge of red brass each hour. Suppose a charge is poured at 1,300 C., it is necessary to use hand ladles pre-heated in pouring the charge. The furnace must be kept hot 24 hours per day, when the crucible has once been heated up. Let us now compare the effective working kw. hrs. consumption per ton with that of a 2,250 lb. per hour tilting type furnace of design described by the speaker, and melting 18,000 lbs. of red brass per 8-hour day. It will be noted that this furnace may be charged by machine, whereas the crucible furnace must be carefully charged by hand. One man's labor will operate, i.e., charge and melt this metal, say at $4.50 per day. or for $1 per ton labor. Pouring of charge will be by hand ladle, preheated, and should cast the same as pouring a like quantity of metal from crucibles.

It seems that since 5 to 6-400 lb. furnaces must be employed to give same metal output as one 2,250 lb. tilting furnace, that the labor of attendance, charging and melting should cost at least 2¼ times as much in the crucible furnace as in tilting hearth type, or 2.25 per ton. Hence, it follows from above that:

Metal melted per week in 400 lb. crucible induction furnace, 8-hr. working day, will be 48x400=19,200 lbs.

Kw. hrs. to melt 19,200 lbs. at 200 kw. hrs. per ton will be 200x9.6=1,920 kw. hrs.

Kw. hrs. to keep furnace hot while not melting, 24x7=168; 168—48=120 hrs. per week will be 120x8=960.

Total kw. hrs. per week 2,880.
Kw. hrs. per ton, 2,880/9.6=300.
Power cost per ton at $.01 ..... $3.00
Excess labor cost of 400 lb. crucible furnace over 2,250 lb. tilting hearth per ton 1.25

$4.25

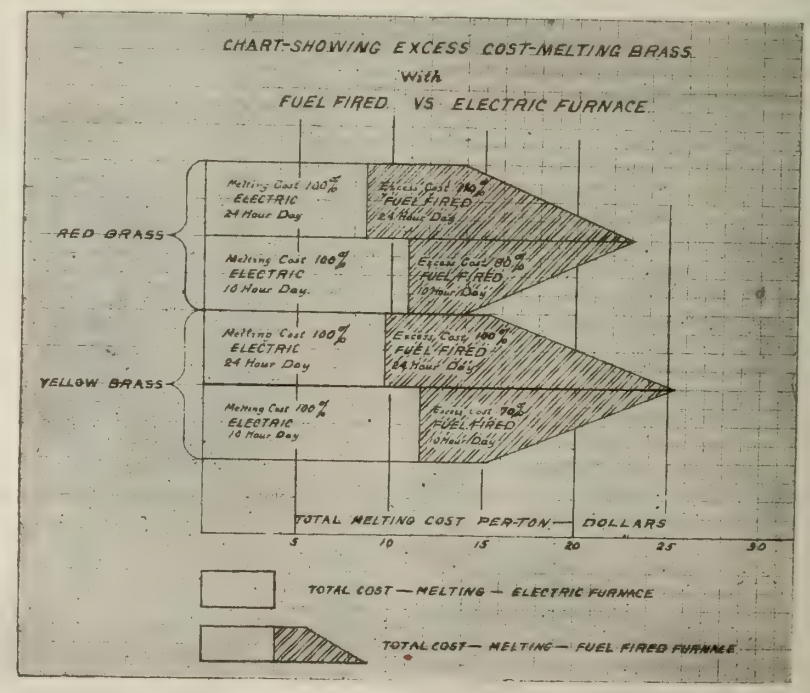


CHART 1—EXCESS COST OF GAS MELTING OVER ELECTRIC IN THE MELTING

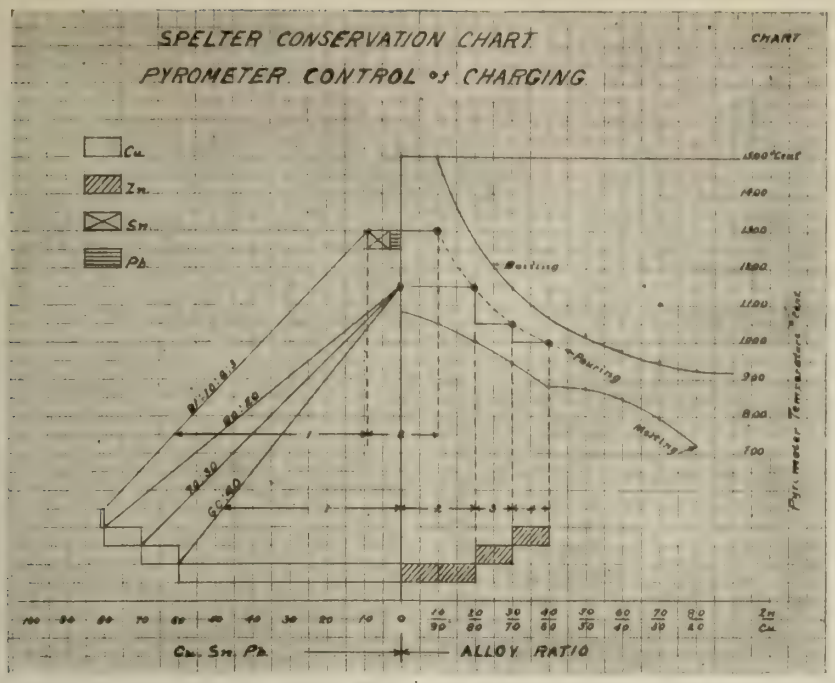


CHART 2—SPELTER CONSERVATION CHART WITH PYROMETER CONTROL OF CHARGING.

This $4.25 is the power costs that may be allotted per ton to the 2,250 lb, furnace and maintain equal all week efficiency for the same total amount of metal melted by either furnace. In other words if the large tilting furnace melts with the not unexpected consumption of 425 kw. hrs. per ton it has equalled the performance of the induction crucible furnace, which, offhand, seems much more efficient because we say it melts for 200 kw. hrs. per ton. Large capacity induction furnaces might change the above somewhat, but the speaker does not know of any successful design on the market at present for melting brass in capacity exceeding 600 lbs. In fact these are limited in their use to certain mixtures only. Leaded brass above three per cent., I believe, cannot be successfully handled due to fluxing action on crucibles.

The above clearly shows that a furnace should not be selected merely because it melts at a low kw. hr. per ton, but all its other characteristics should be studied, and its overall cost of turning out metal considered when conforming to local conditions, since different working cycles may give widely different overall results.

Cost of Electric Melting vs. Fuel Fired Furnaces

The speaker wishes to call attention to certain characteristics, losses, handicaps, etc., which influence the overall cost of melting, and must be considered in making up true melting costs. These will now be considered and their effect shown upon costs as tabulated in the table.

Sources of Melting Loss in Melting

(1) Temp. control, electric, excellent; fuel fired, indifferent. (2) Size of charge, electric, controllable; fuel fired, controllable. (3) Gas flow from furnace, electric, negligible; fuel fired, large volume of combustion gases must pass out. (4) Furnace atmosphere chemical condition, electric, free from oxygen and injurious gases; fuel fired, contaminated by impurities of fuel, protection against oxygen only through excess fuel supply. (5) Speed of melting, electric, much greater than fuel fired; fuel fired, much less than electric.

The above statement is the principal loss in melting brass alloys. It will be noted that conditions are under absolute control in the case of the electric, whereas in fuel fired places the control of temperature is indifferent, and large volumes of gas of combustion must pass through the furnace and likewise since heat is generated through oxidization of fuels, the furnace chamber cannot be free from oxidizing and contaminating influences upon the metal.

First Source of Loss
Temperature Control
In a Given Electric Furnace, Pounds of Metal Lost in Melting Increases As The Temperature for Forming Lies Above Melting Point of Alloy

In illustrating how lack of temperature control may increase metal losses in melting brass, let me present the following test: First, 70:30 brass is made in the electric furnace taking 420 lbs. of copper and melting down and then adding 180 lbs. of zinc, at 1,170 degrees C., pouring at 1,150 degrees C. Second, 420 lbs. of copper was melted down and 180 lbs. of zinc added at 1,100 C., and poured

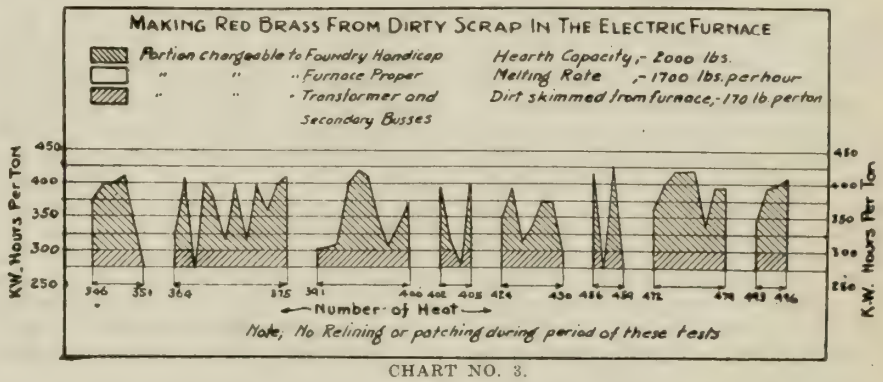
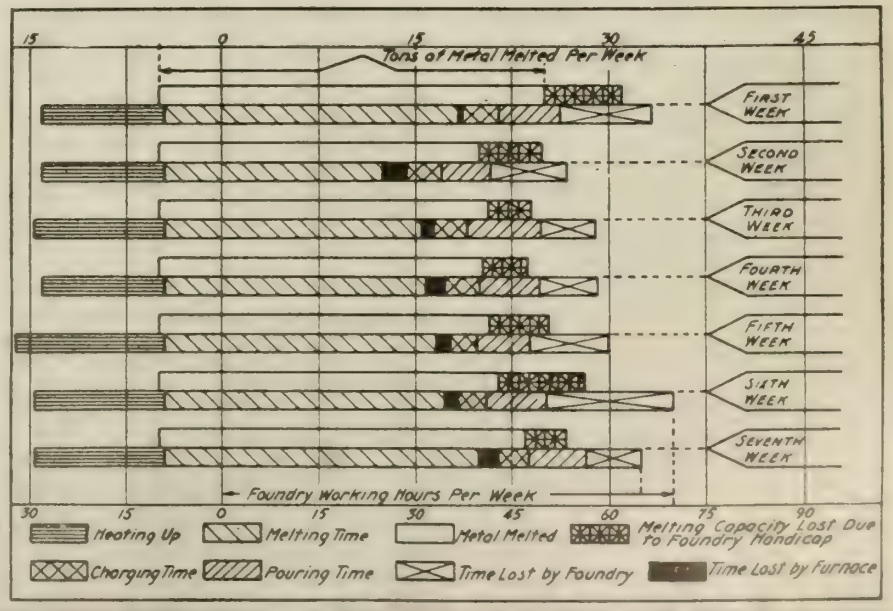


CHART NO. 3.



THIS CHART SHOWS THE CONTINUITY OF ELECTRIC FURNACE SERVICE IN MELTING BRASS COMMERCIALLY.

at 1,100 degrees C., with the following tabulated results:

TABLE 2.

Yellow Brass Metals lbs.	Temperature of alloying.	Pouring Temp.	Alloy recovered	Per Cent. Zn. loss	Per Cent. Metal loss
(a) 420 cu. 180 zn.	1170° C. 2140° F.	1150° C. 1150° C.	565 lbs.	19	5.8
(b) 420 cu. 180 zn.	1100° C. 2010° F.	1100° C.	590 lbs.	5 6	1.6
CHEMICAL ANALYSIS. Test Corresponding to Above.					
(a) Cu. 70 Zn. 30	1170° C.	1150° C.	Cu. 75.9 Zn. 24.1	24	7.3
(b) Cu. 70 Zn. 30	1100° C.	1100° C.	Cu. 71.3 Zn. 28.7	5.5	1.6

The results in Table 2, showing the effect of temperature on the same metal (yellow brass) are consistent with a curve shown as melting and boiling curves, chart 2. If one follows the pouring temperature curve shown he will not get excessive metal loss in melting in the electric furnace. If one can keep under this curve then losses will be decreased. Hence, one may control his melting loss readily in the electric furnace by observing this alloying and pouring temperature.

Second Source of Loss in Melting

The Number of Pounds Lost on Melting Is Independent of Charge in a Given Electric Furnace, Free From Ventilation

Metal Melted	Charge Lbs.	Temp. Melt.	Metal Loss
2696 lbs.	674	1100° C	1.4%—37.6 lbs.
3727 lbs.	832	1200° C	1.3%—38.4 lbs.

Third Source of Loss in Melting

In the fuel fired furnace the magnitude of loss from this source is influenced by speed of melting and pressure, volume and velocity of gases flowing over the melting metal; thus increasing the atmospheric pressure in furnace, decreasing the volume and velocity of the gases tends to reduce volatilization loss. For each fuel there is a maximum limit to gas speed or velocity through the furnace since each fuel in developing the required heat units to get the heat out at a given speed must develop a certain volume of gases which must pass out. Hence the proper gas velocity is inseparably connected with products of combustion results from various fuels. Approximate volume of flue gases average in coal, coke and oil furnaces from 3,350 to 5,800 cu. ft. per 100 lbs. of metal melted. Hence, it is easy to see how the flow of gas may bring about a very large volatile loss in the fuel fired furnace. In the electric furnace the gas flow is very small and consequently, though its atmosphere be saturated with metal vapors, so little gas leaves the furnace during the melt that the loss resulting is negligible.

Fourth Source of Loss in Melting Oxidization

Copper, zinc, tin and lead, the constituents of commercial brasses, are all very readily oxidizable at the temperatures to which they must be heated for melting and pouring. Oxidizing results in loss of metal and actually burns the metal to a dross. One can readily maintain a neutral or reducing atmosphere in the electric furnace, but it is certain that carbon monoxide must be so high and oxygen so low that one cannot, in ordinary fuel furnaces, hope to maintain a reducing atmosphere without sacrificing many heat units through burning carbon to CO instead of CO_2.

Gas absorption is proportional to the temperature and the time metal is held in contact with gases. Incidental and intimately connected with oxidization of metal is the absorption of gases. In melting the constituents of an alloy, a gas may enter into chemical union with some of its metals, forming oxides, or they may be occulated in the alloy. As an illustration, when silver is molten (1,020 degrees C.), it can absorb about 20 times its own volume of oxygen. On cooling it gives up the oxygen absorbed as evidenced by the well-known spitting of silver on freezing. Absorption of gases is greater as the temperature increases, since when the metals freeze, absorbed or dissolved gases are given up. If they are unable to pass through the metal before it freezes sponginess and blow holes in the alloy will be produced. The same effect may be produced by air trapped in pouring, by gases evolved by moulds or cores when hot metal enters them, but dissolved gas is unquestionably a principal source of porosity and blow holes. All fuels used in the foundry at the present time contain sulphur in some degree. This sulphur is a very common cause of trouble. Melted brass absorbs sulphur greedily and gives it up upon cooling in the sand moulds, forming porosity and blow holes. One successful brass foundry asserts that many of the failures usually attributed to oxygen are really due to sulphur. In the most careful crucible melting in coke fired furnaces, the metal will absorb .002 to .005 per cent. sulphur, Figs. 5 and 6. Sulphur accumulates in a metal each time melted, which accounts for the dark skin of rerun castings, as compared with first melt metal.

(To be continued.)

Average Cost of Melting Brass with Fuel-Fired or Electric Furnace.

Furnace type	Pit	Pit	Tilting	Pit	Reverb.	Pit	Tilting	Crucible	Crucible	Tilting	
Furnace draft	Natural	Forced	Forced	Natural	Natural	Forced	Forced	Burner	Burner	Electric	
Furnace fuel	Coke	Coke	Coke	Coal	Coal	Oil	Oil	Natural Gas	City Gas	Electric	
Fuel cost price	9.75	9.75	9.75	8.00	8.00	0.098 gal.	0.098 gal.	0.30M	0.60M	0.015 kw.-hr.	
Cost per Ton Making Red Brass. Pouring at 1300 deg. C. (Zinc 10 per cent. or less).											
Fuel quantity	1400	700	600	1200	900	50 gal.	60 gal.	4800	7000)	400 kw. hr. 250 kw. hr.-24 hr.	10 hr.
Metal loss	70	30	30	70	124	30	44	40	40		15
Fuel cost	$6.82	$3.41	$2.92	$4.80	$3.60	$4.90	$5.88	$1.44	$4 20	$6.00	$3.75
Zinc value at 10c lb.	7.00	3.00	3.00	7.00	12.40	3.00	4.40	4.00	4.00	1.50	1.50
Cost reclaiming	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.15	0.15
Renewals and repairs	0.40	0.40	0.35	0.40	0.50	0.50	0.50	0.35	0.30	1.00	1.00
Cost preheating crucible	0.40	0.40	0.40	0.40	0.40	0.40	0.10	0.40	0.40	0.10	0.10
Furnace labor	2.25	2.25	2.25	2.25	1.50	2.25	1.50	2.25	2.25	1.00	1.00
Miscellaneous and labor and fuel	0.50	0.50	0.50	0.50	0.50	0.40	0.40	0.40	0.40	0.20	0.20
Cost charcoal	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.05	0.05
Air for blast	....	0.15	0.15	....	....	0.15	0.15	0.15	0.15	....	....
Crucible cost	5.00	5.50	5.50	5.00	....	8.00	....	8.00	8.00	....	....
Interest crucible stock	0.10	0.10	0.10	0.10	....	0.10	....	0.10	0.10	....	....
Lining pouring crucible	....	....	0.30	....	0.30	....	0.30	0.30	0.30	0.30	0.30
Electrodes and coke	....	....	....	....	....	....	....	....	....	0.60	0.60
Cost per ton—total	$23.09	$16.33	$16.09	$21.07	$19.82	$20.32	$13.85	$10.01	$20.72	$10.90	$9.65
Cost per Ton Making Yellow Brass (Zinc 10 to 40 per cent.)											
Fuel quantity	1000	600	400	700	400	40 gal.	45 gal.			(350 kw. hr. (10-hour day	220 kw.-hr. 24-hour day
Metal loss	100	40	56	100	200	60	70			30	
Fuel cost	$4.88	$2.92	$1.95	$2.80	$1.60	$3.92	$4.41			5.25	$3.30
Zinc value at 10c lb.	10.00	4.00	5.60	10.00	20.00	6.00	7.00			3.00	3.00
Cost reclaiming	0.50	0.50	0.50	0.50	0.50	0.50	0.50			0.15	0.15
Renewal and repairs	0.40	0.40	0.35	0.40	0.50	0.50	0.75			1.00	1.00
Cost preheating crucible	0.40	0.40	0.40	0.40	0.40	0.40	0.10			0.10	0.10
Furnace labor	2.25	2.25	2.25	2.25	1.50	2.25	1.50			1.00	1.00
Miscellaneous and labor and fuel	0.50	0.50	0.50	0.50	0.50	0.40	0.40			0.20	0.20
Cost charcoal	0.12	0.12	0.12	0.12	0.12	0.12	0.12			0.05	0.05
Air for blast	....	0.15	0.15	....	....	0.15	0.15			....	....
Crucible cost	4.50	5.00	5.00	4.50	....	4.50	....			....	....
Interest crucible stock	0.10	0.10	0.10	0.10	....	0.10	....			....	....
Lining pouring crucible	....	....	0.30	....	0.30	....	0.30			0.30	0.30
Electrodes and coke	....	....	....	....	....	....	....			0.60	0.60
Cost per ton—total	$23.6[illegible]	16.34	$17.22	$21.57	$25.42	$18.84	$15.35			$11.65	9.70

Shop Arithmetic, Cube Root and Mensuration

Seventh of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinist Trade—The Present Article Takes Up the Two Subjects Mentioned in the Title.

By J. H. RODGERS

THE extraction of the cube root of a number is quite similar to the process for finding the square root, but involves additional calculations. The method, however, is easily acquired with a little study and application. Like square root, the number is divided into periods, but in the case of the cube root the periods have three figures each. The largest number expressed with one figure is 9, and the cube of 9 is 729, (three figures). The largest number expressed with two figures is 99, and the cube of 99 is 970,299 (six figures, or two periods of three figures each). Therefore, the cube root of a number less than a thousand would be a number less than ten, and possibly a fraction. The cube root of a number over a thousand and less than a million would be a number having two figures or two figures plus a fraction.

The process of extracting the cube root of a number can best be explained by a concrete example. Suppose it is desired to make a cube of cast iron that will weigh 3,042 lbs., the weight of a cubic inch of the metal being ¼ of a lb. The number of cubic inches in the block would be the total weight divided by the weight of one cubic inch.

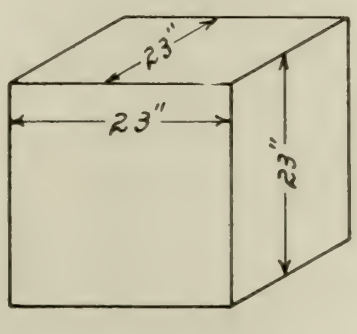
Now as the block is a cube, (equal on all sides), the length of one edge would be equal to the cube root of 12,168, and the solution would be 23.

$$\frac{3042}{\cdot 25} = \frac{3042}{1} \times \frac{4}{1} = 12168 \text{ cu. in.}$$

The number is first divided into periods of three figures each, commencing at the right or unit figure. The first period, then, is 12, and the largest number whose cube is less than this is found (mentally), to be 2, as 2x2x2=8. This root is then placed in the quotient and likewise to the extreme left column, A, and the product of these two placed in a central column, B. This result is then multiplied by the root and the product placed under the first period. Add the root, (2), to the first column and multiply the result, (4), by the root, (2), and add this result, (8), to the column B, and annex two ciphers, obtaining the trial divisor 1,200. Add the figure of the root to the first column, A, and annex one cipher. It is found that the trial divisor is contained in the new dividend three times; this figure, (3), is the second figure of the root. Add it to the first column, A, and multiply the result by the root just found, (3), and add the product to the trial divisor for the true divisor. Multiply the true divisor by the last figure of the root, (3), and place the product under the dividend. In this instance the remainder is 1 and need not be considered further, as it has an insignificant value. The cube root of the number 12,168 is then 23; or a cube of cast iron, 23 inches on a side, would weigh 3,042 lbs.

The cycle of operations in extracting the cube root might be stated as follows. Divide the number into periods of three figures each. Find the largest number whose cube is less than the first period, for the first figure of the root. Place this in column A. Multiply by the root figure and place result in middle column, B. Multiply by the root figure and subtract the result from the first period, and annex the next period to the remainder. Add the root figure to column A, and multiply by the root figure, adding the result to column B, and annex two ciphers. Add the root figure to column A and annex one cipher. Divide the dividend by trial divisor, (column B), for the next figure of the root, and repeat the process just explained.

$\sqrt[3]{12168}$		23
(A)	(B)	
2	4	12168 (23
2	8	8
4	1200	4168
2	189	4167
60	1389	1
3		
63		



If the above explanation is not quite clear to any reader, further details will be given on request, or a brief study of cube root can be had from any text book, as evolution is largely used in solution of shop problems, and will be frequently required further on in the course.

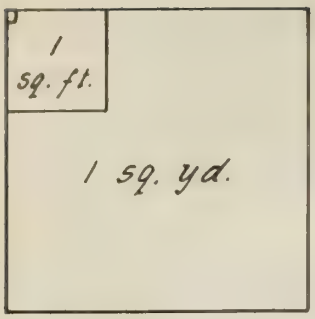
Mensuration

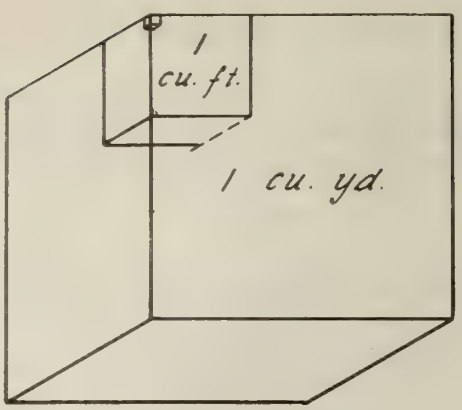
As it is very difficult to give a practical example of the application of one phase of mathematics without involving other elements, the instruction, so far, has been of an elementary character, outlining the fundamental processes necessary for the solution of actual shop problems. Many other important details are required to be learned, but it is only in their variety of uses that they may be termed different, as every mathematical calculation is based on the four primary fundamentals, namely addition, subtraction, multiplication and division. All reckoning is based on these four principles, either singly or in combination.

A very large percentage of shop problems are possible of solution by mensuration, or the application of that branch of geometry that deals with the measurement of lines, surfaces and solids; in other words, distances, areas and volumes. It is taken for granted that all followers of this series are familiar with the various tables and values upon which mensuration depends, such as linear, square and cubic measure. Distance is measured in length only. Areas are measured in length and breadth. Volumes are measured by length, breadth and thickness. In square measure a unit is always taken as a base, such as the square inch, square foot, square yard, etc.

These sketches are a graphical representation of the three principal units of square and cubic measures. It will be seen from the above that area deals with an enclosed space bounded by definite lines, and that at least three straight lines are necessary to define the surface. In treating on mensuration we will consider some of the more common figures connecting with the triangle. The area of a triangle is equal to one-half the product of the base and the altitude, or distance from the base to the opposite apex, as at D.

When a four sided figure is a perfect square, or when the space enclosed is a rectangle (four sided figure with four right angles), the area equals the length times the breadth. If the area is known and one of the sides, the other side may



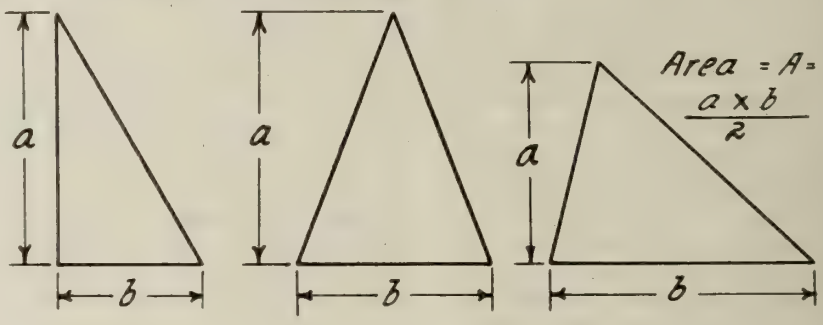


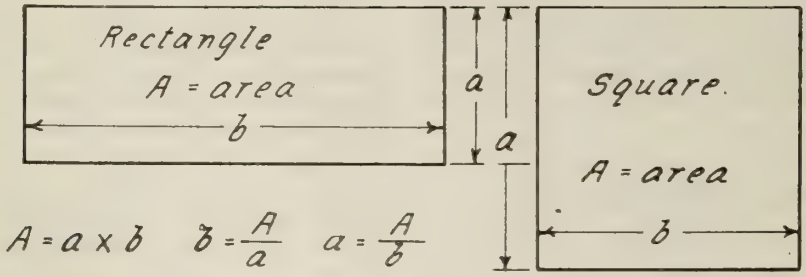
be found by dividing the area by the known side.

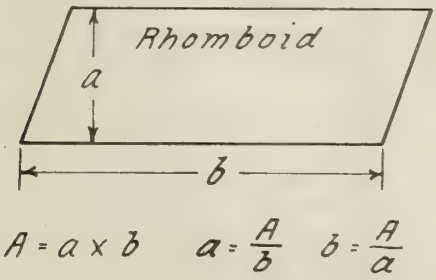
A modification of these two figures is shown below, where the two opposite sides are parallel, the opposite angles are equal but none of them right angles. The areas of these figures are found by multiplying the base, B, by the altitude, A.

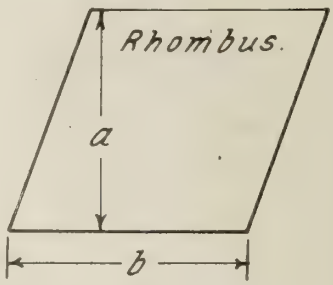
When only two sides are parallel, the figure is called a trapezoid, and the area is found by multiplying one-half the sum of the two parallel sides by the altitude.

A four-sided figure that has no two sides equal nor any two of the angles equal is called a trapezium, and the area is found by dividing the space into two triangles, by drawing a diagonal line and finding the area of the two triangles as explained above.









As the area of other straight-lined figures are determined by modifications of the foregoing, they will not be treated on here, but will be considered under the head of trigonometry, as related to shop practice.

The circle, with its various component parts and elements, is met with more frequently than any other single element of mathematics. The space enclosed is larger than in any other figure bounded by the same length of perimeter or circumference. A graphical comparison of areas for equal perimeter is here shown.

The circumference of a circle is found by multiplying the diameter by the constant 3.1416, and the area is found by squaring the diameter and multiplying by the constant, .7854. If the area is known the diameter may be found by dividing by .7854 and extracting the square root of the quotient. A piston is to have an area of 200 sq. in., what will be the diameter?

The areas of regular figures vary as the square of their sides or diameters. That is to say a square 3 inches on a side will be nine times as large as one 1 inch on a side. Or a circle whose diameter is two inches will only be one-quarter the size of one four inches in diameter. This can be illustrated more clearly by means of a simple sketch.

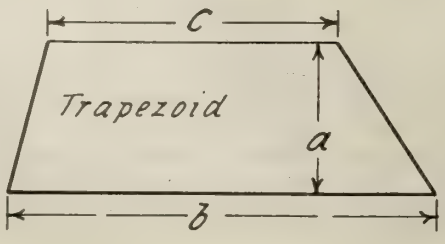
If a piece of steel 1 foot long, and one inch in diameter weighs 2 2-3 lbs., what would be the weight of a bar of similar steel 5 inches in diameter and 8 feet long? As the areas vary as the square of the diameters the weight per foot of the large bar would be,

And the weight for the 8 feet would be 66.6x8=532.8 lbs. It might be stated here that a convenient rule for finding the approximate weight of round machinery steel, per foot of length, is to divide the square of 4 times the diameter by 6, or expressed as a formula, and solving the above question, we have,

$$\text{Weight per ft.} = \frac{4xD}{6} = \frac{4x5}{6} = 66.6$$

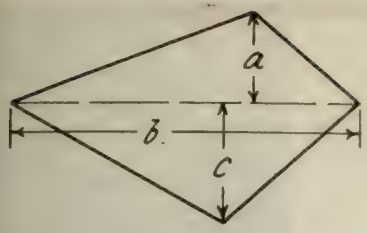
and for 8 feet the weight would be 66.6x8=532.8 lbs.

In a ventilating system three pipes branch off from the main header, to supply different departments. If the sizes of these pipes are 8, 12, 16 inches in diameter what must be the diameter of the main header to maintain equal pressure or supply to each section? This problem could be solved by finding the combined areas and finding the corresponding diameter for a circle of that area. However, as areas vary as the square of the diameter we can extract the square root of the sum of the squares of the three diamet-



$$A = \frac{b+c}{2} \times a$$

$$a = \frac{A}{\frac{b+c}{2}}$$

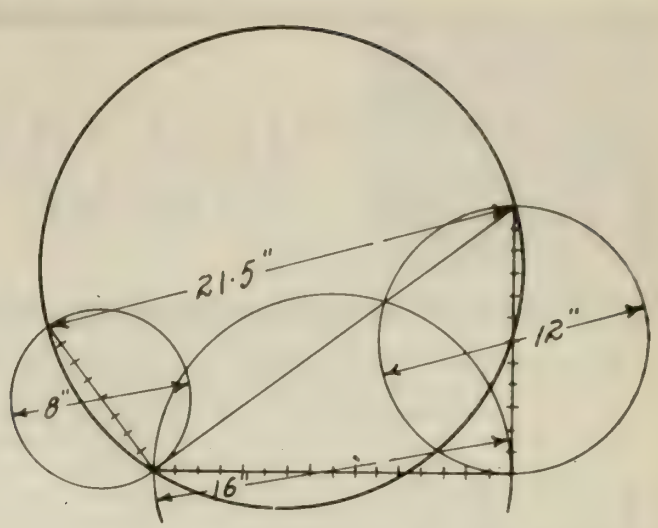


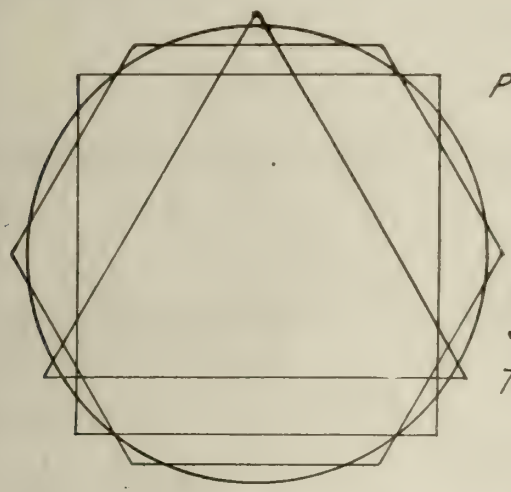
$$\text{Area} = A = \frac{b \times a}{2} + \frac{b \times c}{2}$$

ers, for the required diameter of the main header.

This may be graphically solved by the general method for the solution of right triangles, the sides representing the diameters of the smaller circles, the operation being continued until the final diameter is obtained. The answer to the above is here given.

The application of the above is derived from the fact that the length of the hypotenuse of a right triangle equals the square root of the sum of the squares of the two sides adjoining the right angle.





Perimeter = 12

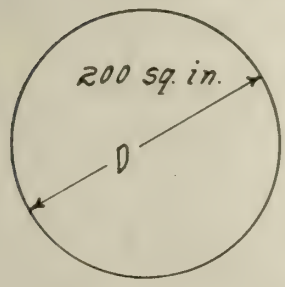
Areas.

Circle = 11·46

Hexagon = 10·4

Square = 9

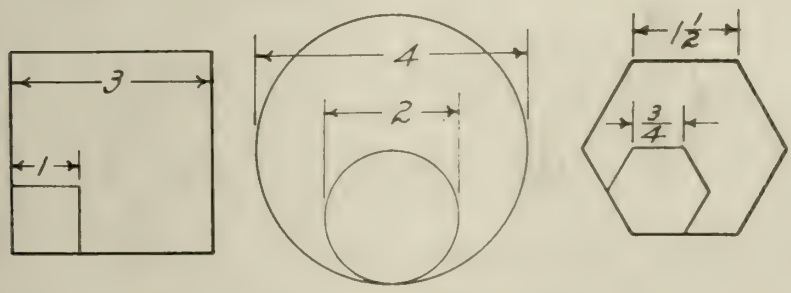
Triangle = 6·9.



$$\text{Area} = D^2 \times \cdot 7854$$

$$D^2 = \frac{A}{\cdot 7854} = 254 \cdot 65$$

$$D = \sqrt{254 \cdot 65} = 15 \cdot 95''$$



$$1^2 : 5^2 = 2\tfrac{2}{3} : x$$

$$x = 2\tfrac{2}{3} \times 5^2 = 2\tfrac{2}{3} \times 25 = 66 \cdot 6 \text{ lbs.}$$

$$\sqrt{8^2 + 12^2 + 16^2} = \sqrt{64 + 144 + 256} = \sqrt{464} = 21 \cdot 54 \text{ inches.}$$

ELECTRICAL SUBMARINE DETECTOR

By H. J.

This most interesting article describes the invention and development of the submarine detector, which, it is claimed, was largely instrumental in the successful combating of the submarine menace, but for obvious reasons very few descriptive technical details are given. The author describes the collaboration of the British and other allied naval and scientific missions, with the engineers and naval authorities of the U. S. and the firms, individuals, and localities where the experimental work was carried out.

The detector or listening device is fixed on the hull of the vessel and connected through into the interior where the listener was located. The original difficulties caused by the rolling of the boat and the lapping of the waves against the sides were overcome. In the first ocean test made in the autumn of 1917, a vessel was detected by means of sound waves travelling through the water, her course and speed accurately charted and her exact position determined within a point of the compass more than an hour before the vessel herself had become visible over the horizon.

The author recounts the trials made with the apparatus in listening to ships passing in and out of Boston Harbor, and shows that it was not only possible to differentiate between different vessels by the different sounds made by their engines, but that it could even be predicted when a submarine was diving by the change which could be distinctly heard from oil engine to electric motor.

The article is completed by a description of some of the results obtained when the detectors were tried in European waters under the auspices of the British Admiralty and the very exact information which the listeners were able to supply is illustrated by actual examples.

WHAT OUR READERS THINK AND DO

LATHE ATTACHMENT FOR COVERING LICKERINS WITH MATALIC WIRE

B. G. Barrett

BEFORE going into the description of the lathe attachment, let the writer first explain that this covering about to be spoken of goes on what is known as a lickerins roller.

These lickerins rollers are used on a cotton carding engine, and the teeth on the same often get damaged owing to nails or other hard material in the cotton coming in contact with them.

The writer personally knows of one machine of this style which was idle during the war, while waiting to ship the damaged roller to England to be reclothed. It is the writer's strong belief that some plant here in Canada could easily work up a business on this work alone.

Now since the roller proper has been explained let us study Fig. 1, which shows the roller and the attachment complete. The roller, A, is made from grey iron, and a square thread of 1 in. pitch, with eight different starts, is cut on this roller. This operation is performed by means of a chaser, which cuts all the eight threads at one time.

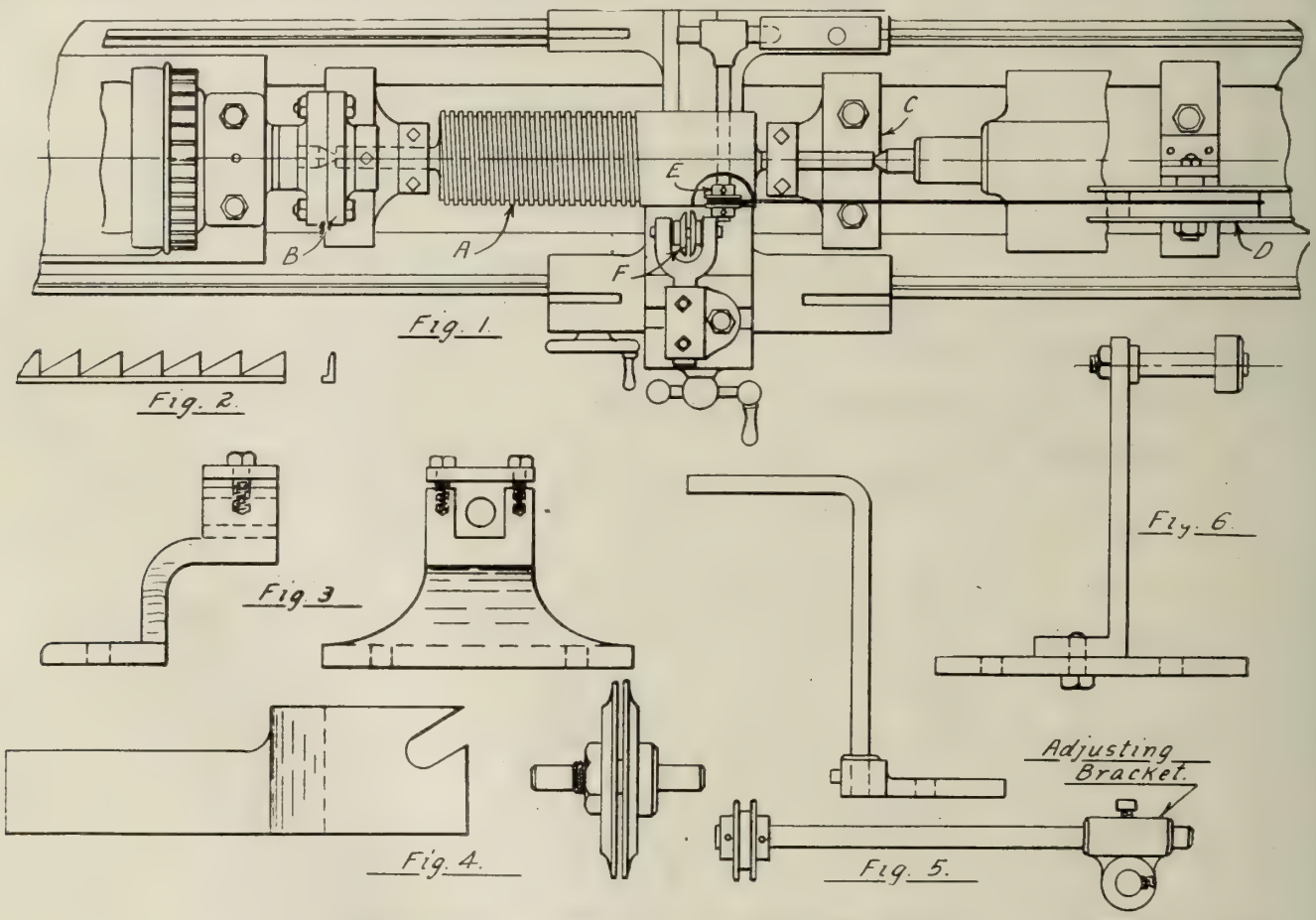
The roller is placed between centres and driven by the floating driver, B. On account of the driving ends being so frail, it is very important that the bracket supports, C, as shown, should be used.

The metallic wire itself is illustrated at Fig. 2. This wire is made from No. 9 round material, the process being to pass the wire through rolls, then punching the teeth out automatically. The teeth are now wound onto a reel, D, as shown at Fig. 1.

This reel is placed on a specially made bracket, which is bolted to shears of lathe (shown in the plan view). The wire is now brought forward over guide roll E, and through pressing mill F. The mill in turn is pressed to roller by use of the cross slide.

The lathe is now started, and, owing to the action of the mill revolving, the bead on the wire is forced into the grooves cut in the roller, and held tight so that all the teeth appear to be separate.

In order to make my description plainer I have shown the attachment separate in different views. Fig. 3 illustrates two views of shaft supports, while Fig. 4 shows side view of mill and mill holder. This mill is made from tool steel hardened and ground, and is held apart to conform with wire to be used on roller by means of tin washers. The complete arrangement is held by means of a tightening nut on the arbor as shown.



VIEW SHOWING THE COMPLETE FIXTURE WITH DETAILS.

Fig. 5 illustrates the guide roll and bracket. This bracket is bolted to the back end of carriage and is adjusted to the required position by means of the bracket on guide roller bar, also by the slot in the lathe carriage.

Fig. 6 shows a side view of the reel carriage which is so simple no further explanation is necessary.

The writer has tried to describe plainly this attachment, and, together with his sketch, believes the same will be easy to follow, but should any reader desire further information I will be only too pleased to forward more information on the subject upon request.

THREE-STOP TURNOVER JIG

By A. E. Kipps

The jig as shown in the accompanying illustration to drill the portion shown in separate view at H.

As can be noticed, the jig is of the turnover type and has three stops in its one revolution. The four views of the jig as shown illustrate its design clearly and further explanation is almost unnecessary except to say that E represents the locating pins, F a slotted washer, and G a taper wedge.

Of course their duties are easily grasped, the washer F being slotted in order that it can be removed quickly without taking the nut off the main spindle. The hole through the work is sufficiently large to allow it to slip over the nut without touching. The taper wedge G merely tightens up the spindle before drilling.

After the installation of this jig the cost of production on the work shown was reduced fully 50 per cent., which was to say the least a considerable saving.

SAVING THOSE OVER-EXPOSED BLUEPRINTS

By J. H. MOORE

While we don't like to admit that sometimes when exposing a tracing with the blueprint paper in place, we underestimate the strength of the light (natural or artificial), yet still the fact remains, and must be faced. Usually a few cuss words are said, the spoiled ? blueprint grabbed, crushed, and thrown into the waste paper basket.

Is This Altogether Necessary?

The writer believes not, for he has seen many a very badly overexposed blueprint brought back to usefulness, and almost normal color, by placing a teaspoonful of hydrogen-peroxide to each quart of water used for washing purposes.

Of course, you first wash the print in clear running water until the blue liquid, which always occurs, is thoroughly washed away. The prints are now placed in the saving solution and soaked in same until the proper color is obtained.

The print is once more washed in clear water.

The describing of the process has, in reality, taken longer than the actual operation, and should readers in like difficulty care to try this, they will be surprised at the results.

CLEANING OFF THE TITLE STAMPS

By J. H. M.

Before entering this article, I hardly know exactly whether I should spill the beans, as it were, or not, but even though I should bring the wrath of all firm owners on my head, here goes.

If readers should ever desire to clean their stamp pads (no matter what the breed) here's an easy tip:

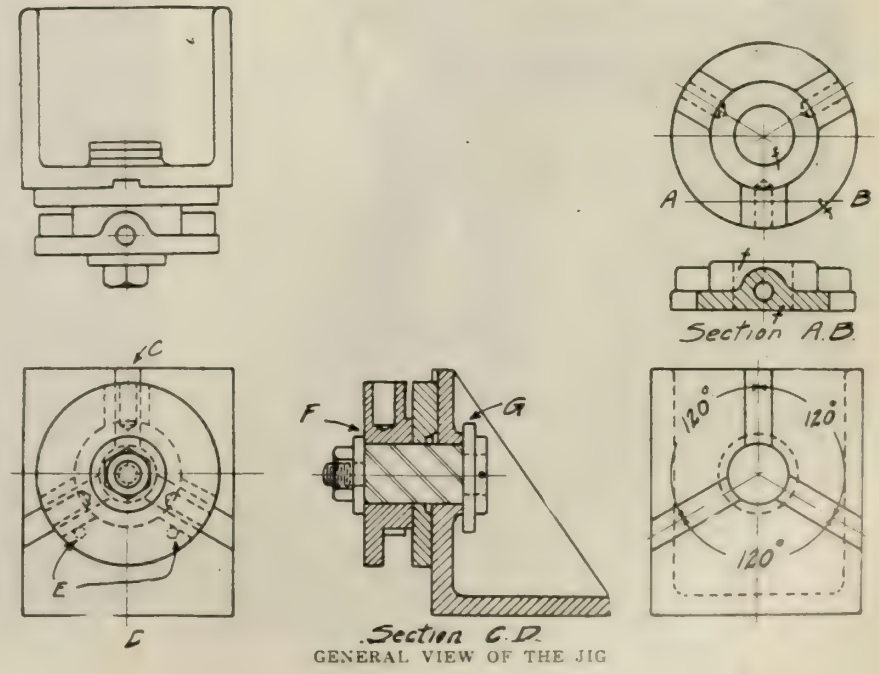
Get hold of one of those fire extinguishers of the Pyrene type, and get a little of the carbon titra chloride out of it, when you will find that you've discovered the ideal stamp cleaner.

However, it might be just as well not to let your executive head see you getting the aforementioned dope.

POWDERED COAL

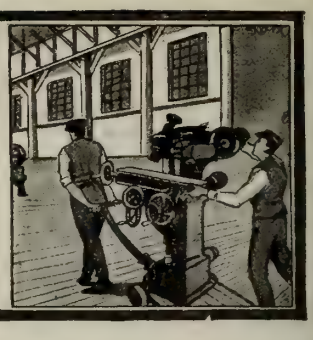
A good many attempts have been made, during the past twenty odd years, to burn coal reduced to a very fine powder in boiler furnaces and in the cylinders of internal combustion engines, but up to the present no appreciable success has been attained in the United Kingdom. In all attempts that have been made, both in connection with the use of coal dust in boiler furnaces, and in engine cylinders, the same process has been followed; the coal has been ground to a very fine powder, practically to an impalpable dust, to a dust of such fineness that it floats in the air, and in any atmosphere to which it has access. In several methods employed for crushing the coal, water has been used to assist in the process, and, as the writer believes, it has not been possible to prevent a certain quantity of the water being converted into vapor, and passing over with the steam of coal dust into the furnace, or the engine cylinder. Of course this is equivalent to firing the boiler or the engine cylinder with wet fuel; the water vapor has to be raised to the temperature of the hot gases formed by combustion, and is in some cases decomposed into its constituents, oxygen and hydrogen, at the expense of the heat furnished by the burning of the coal dust, and thereby lowering the efficiency of the boiler. Probably this would not be a serious matter if the burning of the dust could be carried out continuously and the cost of crushing it was not prohibitive. In the process of washing coal, the water that is employed carries off a certain quantity of the loose dust that is present on the lumps, etc., of the coal; the washing water is drained in to a settling tank, and the coal dust is allowed to fall to the bottom, and it was this dust, carrying a good deal of water, that is being employed. The engineer of the colliery told the writer he had found on testing it that it evaporated a little over 50 pounds of water per pound of coal sludge consumed.

The great difficulty that has arisen in connection with the burning of coal has been to get rid of the clinkers. When the coal has been crushed, in the manner described above, usually no endeavor has been made to separate the ash, the foreign matter, from the coal proper, and so, both in the boiler furnace and in the engine cylinder, small quantities of clinker have been formed, which have deposited on the heating surfaces in the boiler furnaces and boiler flues, and in the valves of the engine cylinder, with the result that while successful steaming has been obtained at first, and a short run with the engine, the deposit of clinker has soon reduced the quantity of steam generated owing to the thermal resistance set up by the deposit, and the engine has been prevented from working.



GENERAL VIEW OF THE JIG

DEVELOPMENTS IN SHOP EQUIPMENT



GRAY'S ROTARY SHEET METAL CUTTER

THE accompanying illustration shows a new development in the art of cutting sheet metals. This metal cutter is manufactured by the Brown Boggs, Company, Ltd., Hamilton, Ont. It is not a rotary shear, but employs a new method in cutting sheets and plates up to and including 3-16 in. thickness. All kinds of shapes can be made and all springing and buckling are eliminated, a feature which is not found in the metal shear.

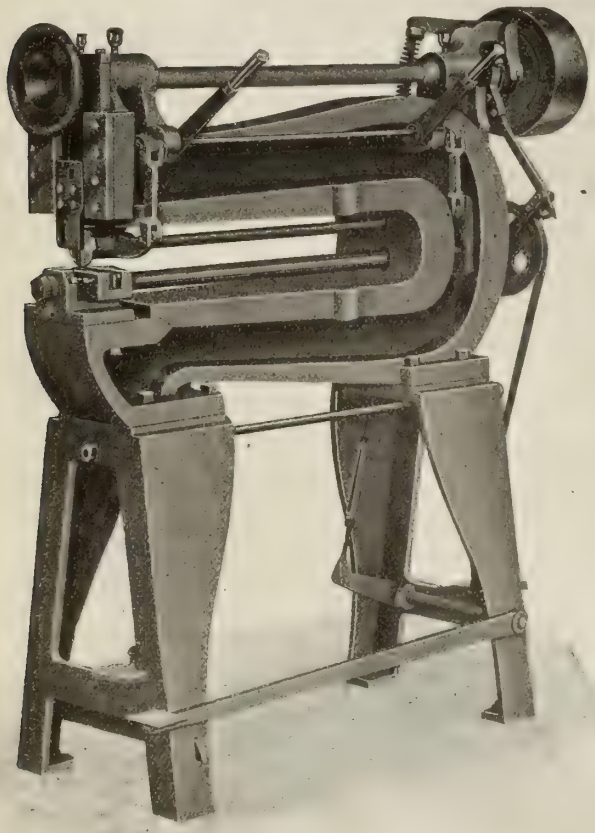
This machine automatically feeds the stock in a similar manner that cloth is fed into a sewing machine, and it is possible to cut to a line as easily as it is possible to sew to a line on cloth. The feed being absolutely under the control of the operator, it is possible to start and stop at any desired point in sheet or plate and change direction of cutting at will. The cutting device takes out a kerf, giving the same result in a sheet or plate that is obtained with a jig saw in wood, leaving a square, uncrimped edge to all material.

The cutting members are composed of a reciprocating tool which operates continuously when clutch is thrown in; a horizontal stationary member which, in conjunction with two lower feed rollers, practically forms a three-sided die. An upper feed roller under spring compression holds the stock rigidly in proper position, and by intermittent feeding of both lower and upper rollers the stock is advanced in regular stages and while the reciprocating member is above the stock.

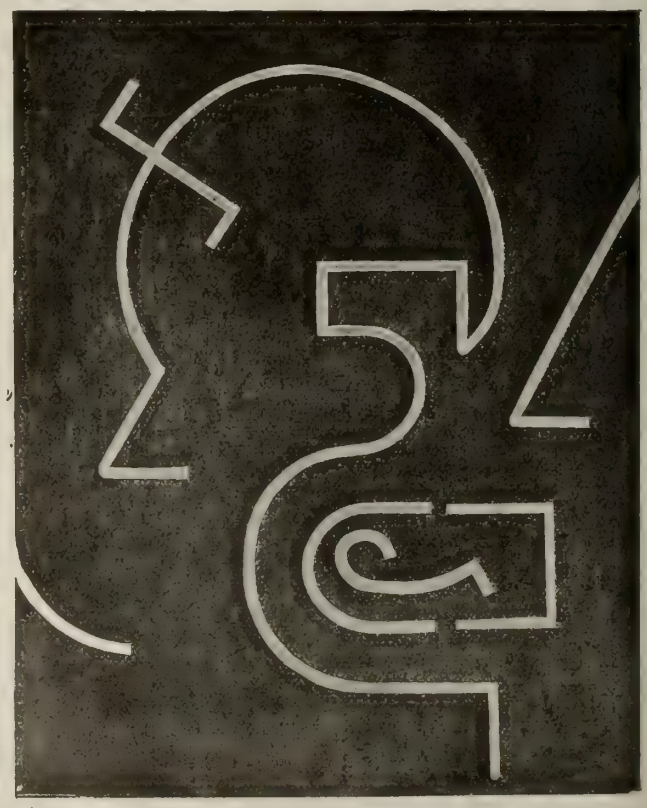
This machine cuts very rapidly, being able to obtain a speed of thirty inches a minute in maximum thickness of material; the thinner the gauge of material the faster machine can run. The feed is geared to advance the stock 1-16 in. per revolution of fly-wheel. For technical work, or such with very complicated shapes, machine should run about 200 r.p.m.; for general work about 400 r.p.m.; in reasonably light gauge about 500 r.p.m.

The feed is controlled independently of the cutting device, thus permitting the operator to gauge his work with precision. This control is obtained both from front and rear of machine, thus enabling the cutting of stock of unlimited length and limited in width only by depth of throat, which is 34 in.

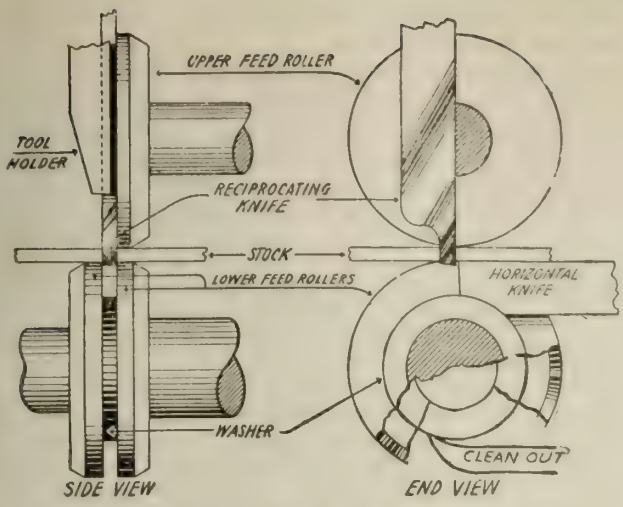
The reciprocating knife is formed from a piece of best quality high-speed tool steel 3 1-16 in. by ¾ in. in section and 7½ in. in length, and held rigidly in position on one side and both edges by a tool holder, the upper feed roller giving support to other side. The lower end is shaped as shown in cut, on an ordinary emery wheel, and hardened in the ordinary manner. Uusually makers of steel furnish directions for obtaining best results in hardening their respective kinds. The end is ground at slight bevel, making an angle of about 85 degrees in relation to the perpendicular front edge of knife, thus giving the knife a slight lead into stock. The rear edge of cutting end, after grinding, has reduced



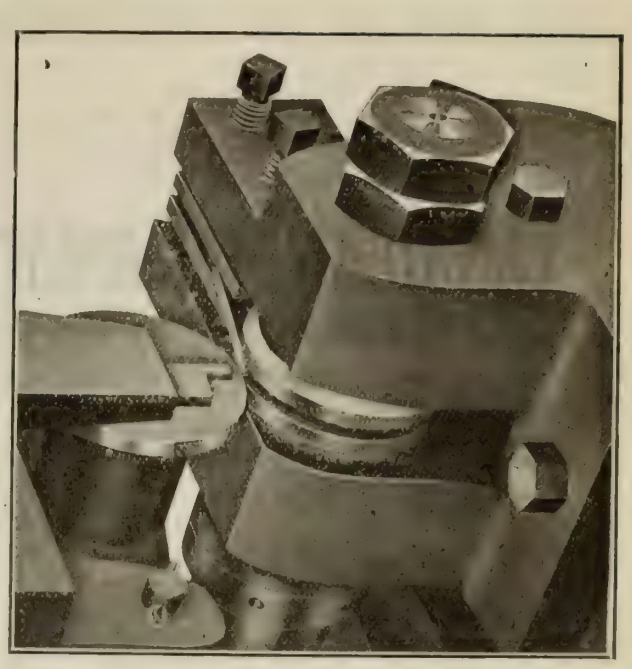
SHEET METAL CUTTER.



SHAPES CUT BY MEANS OF METAL CUTTER.



SECTIONAL VIEW OF CUTTER.



VIEW OF CUTTING MECHANISM

this portion to a section 3-16 in. by ¼ in., is slightly rounded off to give clearance to this part of knife, in making a curve or circle, the cutting being done by sides and front of knife only. The grinding of a knife in its entirety should not require more than three minutes, after a little experience. For adjustment of height of knife a set screw is fitted in top of tool holder immediately above knife, thus giving close adjustment of cutting point vertically, which, when knife is at lowest point should be about 1-16 in. below top of horizontal knife. This set screw also allows for re-grinding knife and again placing in proper position, having a travel of 1¼ in. vertically.

The horizontal knife is formed of the same kind and section of steel as reciprocating knife, and about 6 in. in length. It is shaped as shown in cut and hardened as above mentioned. It should be ground so that the top cutting edge is about 1-32 in. below level of highest point of lower feed rollers, when bearing on washer between lower feed rollers, and set forward of the cutting edge of the front of the reciprocating knife sufficiently to allow ordinary writing paper to easily pass between. It is held rigidly in position as well as properly adjusted by means of four lock-nutted set screws. The chips obtained by cutting process rotate with lower feed rollers, and by means of a tongue-shaped member having a chisel point with bearing on above-mentioned washer, are carried down an incline trough and to waste basket.

FLAT TAIL-CENTRE FOR PORTER CABLE LATHES

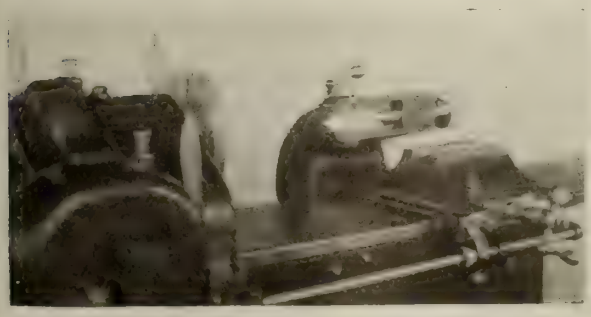
A great many users of the Porter Cable Lathes have found that on jobs having two or more diameters, material saving in time could be made by arranging a gang of tools so as to turn all of the sizes at one pass. Heretofore, this multiple tool system could only be applied to those jobs, the finished diameters of which were larger than the boss containing the tail spindle.

The Porter Cable Co., Syracuse, N.Y., have recently brought out a tailstock carrying a flat centre after the order of a grinding centre which permits handling multiple diameter jobs running as small as 5-16 in.

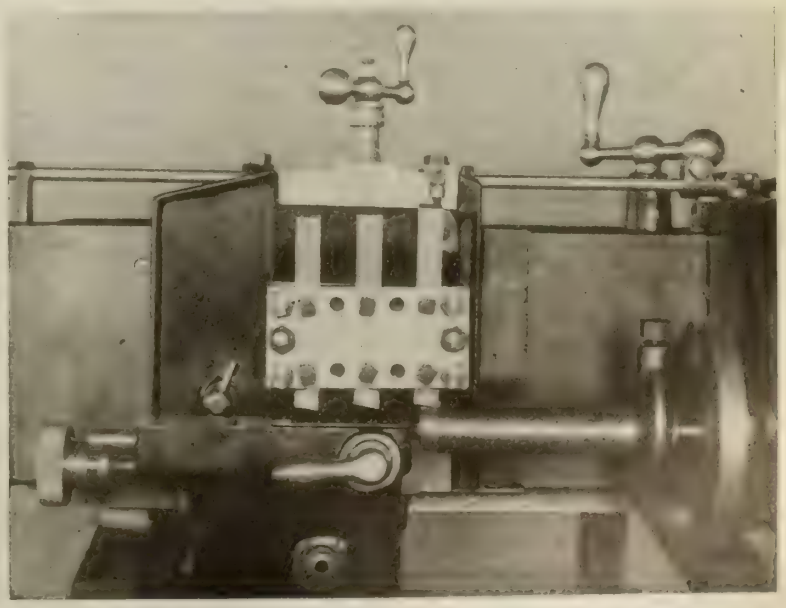
The illustrations plainly show the arrangement of tools and construction of the device which is applicable to any Porter Cable Lathe now in use, owing to the fact that a special fixture for grinding is furnished with each equipment.

CONSERVATION OF HEAT

Asbestos insulation between the courses of brick boiler settings reduces air leakage and conserves heat, which is usually wasted with the ordinary air space. Firebrick should withstand temperatures up to 3,000°F., but it conducts heat six to ten times as rapidly as asbestos felt. The smaller the air spaces in the insulation, the less the loss of heat by convection. High-grade asbestos fibres become brittle and start to disintegrate at 1,200-1,500°F., but the material does not go to pieces much below 1,800°F.



FLAT TAIL CENTRE.



FLAT TAIL-CENTRE FOR PORTER CABLE LATHES.

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A Mechanical Triumph

THERE is much to be learned yet before flying across the Atlantic will become common practice. The craft that succeeded did well. Alcock and Brown met with difficulties, but they had one circumstance much in their favor, viz., the wind. The whole feat was a magnificent spectacle of cool, deliberate daring, of keen observation and of skillful flying.

But it was more than that. There is a feature that the public is apt to overlook in the wild plaudits it is heaping on the men who actually made the trip.

What made that trip possible? Largely the magnificent Rolls-Royce motors that supplied the power.

Have you heard any shouts for the mechanics who made those splendid machines? Have you seen anything of them in print at all? Not likely.

And yet that flight was not only a triumph of British daring and nerve, but it was a triumph of engineering skill and mechanical ingenuity. In fact, had the builders of those motors been less skilled at their trade, had the designers been less worthy, or the inspectors less watchful, there would have been no successful flight. There would have been no great Vickers-Vimy plowing through clouds, mist, sleet, now a few feet from the ocean's surface, and again ten thousand feet high.

It was workmanship that made that flight possible. The men who played a part equally as important as those who made the flight are unknown to the world at large. Their product is known and admired. But as far as the spectacular part of the victory is concerned, they have little share in it.

From this considerable distance, CANADIAN MACHINERY doffs its hat and salutes the designers, the builders, the inspectors—in fact, all who had anything to do with the turning out of the Rolls-Royce motors that drove that plane without a serious hitch, for over 16 hours at a speed of some 120 miles an hour.

Being Prompt in Business

HENRY B. THOMSON, of the Canadian Trade Commission, has not a particularly good impresison of the manner in which Canadians attend to business. He even claims that the sloppy methods as used by many of the firms are actually hurting the chances of Canadians securing business which, with more care and attention, might come to this country. Mr. Thomson says:

"It has been brought to our notice by several firms here that Canadian manufacturers and others are very lax in not replying to correspondence and enquiries, and it is having the effect of creating an impression that Canada as a whole is not looking for business, or making much effort to get it. Trifles of this kind create a false idea, as the people in the United States are very particular about prompt reply to enquiries, and furthermore carry on a regular follow-up course of correspondence. Not only has it a bad effect in creating an impression of slackness, but it also causing some of the importers here to make strong representations to the Government to remove the import trade restrictions with other countries that are not within the Empire. At the present moment, Canada is, as you are well aware, particularly favored in this regard as compared with the United States, but if the representations of the importers are sufficiently strong and insistent, the Government will be forced to allow certain commodities to be brought in here on par with Canada, because these commodities cannot be procured, or apparently so, within the Dominion. Even if they have not got the stocks on hand, or do not deal in the commodities they are asked about, surely it would be a simple matter for them to write a note to the English firm enquiring and explain the situation to them."

One good way to kill business is to take a man's inquiry and leave it unanswered for a month or so. And one equally good way to create the impression that you are interested is to answer courteously and promptly. A half-dead concern can very often impart an impression of life by prompt action in dealing with correspondence.

Paying For the Frills

PERHAPS people require too much waiting on these days. And of course all this helps to chase up the cost of living. J. A. Leduc, M.P. for Westmount-St. Henry, told the Cost of Living Committee of the Commons that by conducting a "cash and carry" business and owning his own abattoir he was able to sell beef at a reduction of from 30 per cent. to 35 per cent. On other provisions by the "cash and carry" system he was able to sell at from 20 per cent. to 25 per cent. cheaper. For the best roasts of beef in small cuts he said he had not yet charged more than 30 cents per pound. He had only done so this year. Rib roasts he sold for 25 cents; shoulders, 15 cents to 16 cents; round roasts, 25 cents; brisket, 15 cents; shanks, 10 cents to 12 cents.

This same speaker blamed the telephone for much of the cost. People called for the highest priced cuts, believing they were the best. Then came the cost of delivering to them, all of which added to the cost.

One has only to stop and think for a moment to see light on this subject. Go around any of the department store stables and notice the number of rigs, autos and other forms of conveyance. Then on top of that, put the drivers, stablemen, mechanics, etc., and you have an outfit about long enough to run a fair-sized circus.

Costs the store a lot of money to keep all the outfiit going.

Not by any means. The store is not foolish. The customers who demand and use the delivery service pay for it, and customers who carry their material pay for it too, because there is no difference between the cost of carried and delivered goods.

In the mad rush that has taken place for business, dealers have encouraged the delivery system. They have been educating people to be lazy.

Stores are operating now that go to the other extreme, and they ought to be able to whittle some of the underbrush from the H. C. of L. forest. Upon entering you take a basket, wander around the store and help yourself, all goods being price-marked. Upon leaving your goods are taken from your basket and bagged; you pay the cashier and get out. You pay clerk and truck horse, and are entitled to a good-sized reduction on your goods. You are really helping to do away with that circus that has

formerly been kept up to trundle every pound and ounce to your back door.

You can't afford a rig to have a drive in, and yet you can afford a rig to have your purchases come in. Perhaps that is not a parallel case in all details, but the idea is there and it cannot be denied.

We are living in an age when frills and trimming are called for and where froth and bubbles have gained a commercial value. For all this we kick as we pay and pay as we kick.

A Baffling Proposition

WHILE in many instances it is comparatively easy to determine the direct cause of boiler failure and explosion, the history of the events leading up to the rupture are more or less obscure and somewhat difficult to determine. Such seems to be the case in the recent explosion at Newmarket, where five and possibly more lives have been lost. The boilers themselves, made by one of the most widely known firms, embodied careful workmanship and were far removed from the type of boiler usually featuring in such accidents. Monthly cleaning-down seems to have been practised, inspection was in the hands of a reputable insurance company, and the boiler at the time of the accident was notably free from scale and evidences of corrosion.

The failure in itself was due to a crack existing in the rear head of one of the drums and which extended, roughly speaking, throughout that part of the circumference below the water line. The remainder of the head showed, by the tear made when it parted company with the boiler, the excellent quality of the steel and its freedom from flaws.

While the immediate cause of the explosion is easily determined, it is in the history of the crack that the true explanation of the accident must be found. The location of the crack immediately outside the rivet holes, and the entire absence of pitting or other forms of corrosion render usual explanations untenable, and the character of the flaw which indicates crystallization necessitates other considerations.

Of late years obscure chemical phenomena occurring in the operation of boilers have received attention, and it is possible that the embrittling action of sodium salts through the action of liberated hydrogen caused the initial failure of the plate.

Trouble has been experienced elsewhere due to this cause, and if such failures become prevalent it will add one more burden to the load of vigilance carried by the operating engineer.

The Development of the Oil Engine

THAT the internal combustion engine is destined to take a very prominent place in future marine design, is becoming daily more apparent.

Repeated good performances of this type of motor are gradually overcoming the conservatism of shipbuilders and owners, and a striking instance of this is shown in the latest addition to the fleet of the Glenn Line, Ltd., Glasgow.

This company had already four vessels equipped with internal combustion engines, but the fifth, the "Glenapp," is larger and faster than any motor cargo ship hitherto built.

The "Glenapp," to which reference was made some time ago, is 470 feet over all by 56 feet beam, and moulded depth 36 feet 6 inches. Her gross tonnage is 7,260, so that her deadweight will be about 10,000 tons.

The engines, of the Burmeister & Wain type, built by Harland & Wolff, under license, are two in number, each developing 3,200 I.H.P. The B.H.P. is about 2,600. They are of the four-cycle type, eight cylinders to each engine. The speed is low, 125 rev. per min., the cylinders being 760 m.m. (about 30 ins.) bore and 1,100 m.m. (about 43⅜ in.) stroke. The fuel injection air is provided by a three-stage vertical air compressor on each engine, and there is an auxiliary air compressor driven by a 100 H.P. motor.

All the auxiliary machinery on deck and below is electrically driven, the current being supplied by three generators of the direct current type, running at 220 volts. Each of these is coupled direct to a 320 H.P. four-cycle Diesel engine, running at 210 R.P.M.

On a consumption of 24 tons of oil per 24 hours, including auxiliaries, a loaded speed of 13½ knots is maintained, and when light, 14½ knots.

The engine room staff consists of eight engineers, six greasers and three electricians.

Some people persist in looking on the oil engine as a passing fad, but every day brings proof of its ever-increasing use by far-seeing owners.

THE real pleasure and lasting joy in business is not in gouging the public and making undue profits. The man or firm going through life with a dollar glued to the eye misses the best. "What can I do for you?" is a much better slogan than "What can I do you for?"

* * *

IT'S A caution what an interest some folks take in the tariff. The chap with a couple of heads of cabbage and a row of onions is powerfully concerned over the rate on agricultural implements.

* *

SOME of those whose pay envelope depends upon their ability to write newspaper headings must make a great and a generous living. The Cobalt *Nugget*, for instance, upon reading that the Government was able to buy steel plate for $2.75 against a previous $3.25, announces: "Price of Steel Plate on the Toboggan." The fact is that steel plate was deliberately taken from 3.25 per pound to 3c, and later, on March 31, to 2.65. There was no toboggan or panic about it, simply an attempt to get away from war levels as quickly as possible.

* * *

THE packers and the butchers have adjusted their differences. All of which, being interpreted, means that the dear general public can look out.

* * *

A DETROIT man has quit the pulpit because the world does not want the gospel as he wants to preach it. The world has been preached at until it's black in the face, and what it wants is some church members who will measure up to the preaching that is done to them.

* * *

THERE'S no chance for any reduction in the price of coal, and coal dealers are even advising people to burn egg coal in their furnaces. Firing the average furnace with egg coal is about as entertaining and as unsatisfactory as eating peas with a knife.

* * *

HAVING won the war, and made the world safe for democracy, the nations are now doubling up their standing armies and looking over the new designs in guns and munitions.

* * *

TORONTO relief firemen, boiler washers and helpers, chemical attendants, outside attendants, outside coal and ash men presented to the mayor a request for an increase in their weekly wage from $25 to $28 a week. Old H. C. of L. is always hanging around, waiting to lead in a new deputation.

* * *

A SUGAR refinery in Montreal hastens to deny that it has any labor trouble. Conditions are as sweet as the product of the factory.

* * *

THE chap who advertises a horse and sleigh for sale, when the thermometer is hangin' its head against the 90 mark, is our idea of a bang-up, honest-to-goodness optimist.

MARKET DEVELOPMENTS

Certain the Market is Not Going Lower

Steel Men Contend That the Low Point in Operation Was Touched Toward the End of May—There is a Decided Improvement in the Scrap Metal Market, Owing to Better Conditions in United States

THE settlement of the strike of the metal trades in Ontario centres is a much-desired matter just at present. There are some places where they have turned from war lines to peace products, and for some months have been engaged in making purchases and getting the equipment ready for manufacturing. This work has been pretty well completed now, and the lining up of the equipment has been finished. Some of the firms which have need of tool room work are sending it out of the strike district, even to points across the line, in order that they may be ready to get production as soon as possible once the strike is settled. These delays are going to keep back production at a time when the market is good.

Buying is not in as great quantities as had been hoped for. The small shops are not buying to any great extent. Many of these are constant customers of the warehouses. They do not carry any stock of their own, but the daily turn-over of the large warehousing firms is being affected by the dropping out of the small shops. The larger places are still buying, for the most part, pretty much on a hand-to-mouth basis, waiting for more settled conditions to come to pass.

Prices, through all the period, remain steady. Steel salesmen are more certain than ever that there will be no sag in values. They believe that late in May saw the mills at their lowest level of operation, and they hold that now that this period has been passed, any movement will bring values to a higher level. There is a good deal of room for argument here, as the mills are still quite a distance from capacity operations. There is still some shading of prices, but it is held that this is added evidence of strength, in that it has been accomplished without anything that looks like a landslide in prices.

The scrap metal market is showing a decided improvement. Most of this is due to the fact that United States is just now taking large shipments from some of the larger Canadian yards, and will continue to do so. Brass and copper are in demand, and there is some added strength to steel and iron.

It cannot be said that the Canadian situation is gaining strength in itself as rapidly as that in U.S., but it is benefiting from it.

MONTREAL WANTS TO HAVE THE LABOR TROUBLES SETTLED BEFORE BUYING

Special to CANADIAN MACHINERY.

MONTREAL, Que., June 19.—Despite the fact that optimism dominates the industrial situation, the present actual business is only of normal proportions, and future developments, if contemplated, are receiving little more than passive attention at the present time. It is not unlikely that the near approach to the signing of peace is an important influence in the deferred expansion of domestic activity. and the opening of those reconstruction plans that have been expected since the beginning of the year. Still another factor that adds to the complex nature of existing conditions is the uncertainty that surrounds the labor situation. Strikes are still of daily occurrence and the general unsettlement that prevails handicaps the manufacturers from establishing a basis on which to branch out on any new enterprise. As long as the element of strife permeates the industrial life of the country, sound progress must bide her time. Steel business cannot be said to have shown much improvement, although some reports of a favorable character have been received from dealers. What sales are being made are invariably of small volume and for prompt delivery; future business of a new nature is almost nil. The hope is expressed that business will show a gradual improvement during the weeks following the final peace settlement, but on the other hand there are those that maintain that the better adjustment of labor troubles is essential before any permanent expansion can be consistently carried out. It has been stated that American business is picking up and that mills and furnaces are slowly increasing their production, but as yet this has had little effect in the Canadian market. It is almost conceded that stability of present prices is assured and that any changes will be in an upward direction. Slight fluctuations are not impossible but a general lowering of prices is, apparently, out of the question. Dealers in metals would not be surprised to see a stronger market in the near future owing to the better inquiry that has developed during the past week. The suspension of operations in many of the industrial trades has reacted on the machine tool business and tool sales have fallen off. Scrap is improving again and quotations reflect a stronger market.

Improvement Looked For

While the week's activities have not been of a character that would indicate that business is better, the undertone appears to be one of those that precede a greater demand. This is not due to the local situation but rather to the developments that are taking place across the line, a factor that is invariably followed by activity here. The better inquiry is already showing itself and the week will probably develop some interesting features. No price advances are noted this week but it is not unlikely that an upward revision may be made next week.

Strikes Affect Tool Demand

The effect of the country-wide strikes in the various trades is not conducive to

increased business. The movement of machine tools and supplies has shown a slight falling off, and what scattered sales are made are invariably arranged where tools are in stock or can be had on very early delivery. Volume of business is comparatively light, and seldom is an order placed for more than one or two machines to one customer. It is reported that some firms are contemplating advances where recent reductions were made owing to the continued and often increased cost of production. Few now look for any marked return to 1914 conditions, and when the uncertainty of the peace treaty is disposed of the attitude of labor and their demands will create a new factor that will renew the difficulty in the ultimate solution of the industrial problem.

Scrap Improvement Again Returns

Following a week of comparatively light activity, the movement of old materials is again assuming larger proportions, and sales are more regular and of greater volume. The local demand is still normal, and the bulk of the growing business is for export requirements, many of the sales going to the United States centres. The consumption here is still light owing to the low operating capacity of many of the mills, but the American mills, apparently, are increasing production, and scrap requirements are consequently an incidental factor. The tone of the market has created a better feeling here and the consumers of scrap are taking a renewed interest in present developments. The greater portion of the present sales appear to be in the metals, with coppers leading. The week's advances on copper range from one cent on light to 2½ cents on heavy and wire, the quotation range being from 12½ cents for light copper to 16¼ cents for crucible. Red brass has advanced 2 cents and is now quoted at 10 cents per pound. Yellow brass turnings at 7½ cents shows an advance of one cent per pound. Light and medium brass are now 6 and 8 cents respectively. Leads are up ½ cent per pound. Heavy melting steel has been moving more freely and dealers are quoting $10.75 per ton, an advance of $1 per ton. Machine cast iron is up $3 per ton, the current price being $18 per ton. Wrought pipe has jumped from $6 to $8 per ton. Stove plate shows a similar advance, the quotation being $14 per ton.

BUSINESS REMAINS GOOD AROUND HERE

Although Strike is Making it Hard to Get Production in Some Lines

DEALERS report a fair amount of business during the last week or so. None of them claim that things are exceeding their expectations, yet on the other hand, none of them are willing to admit they expected things to be much better. The strike is still holding back considerable nice business, and is sending work into channels that will mean quite a considerable loss to the shops in this district in weeks and months to come.

POINTS IN WEEK'S MARKETING NOTES

Although bidding for pig iron business is fairly brisk there is a feeling that prices are going to hold.

Scrap metal prices look about due for a rise, there being an especially good demand just now for copper and brass.

One of the big problems the U.S. machine tool dealers have to attend to just now is to bid against their Government in the sale of machinery. The Government has a lot of material, taken from warships, but little used.

The steel market, it is contended, shows added strength by reason of the fact that the shading and cutting done on certain contracts have not produced a general decline.

It is probable that some point in May saw the low mark at the steel mills. Reports are to the effect that there is big business ahead once the difficulty of "getting started" has been overcome.

Scrap metal dealers assert that now is a good time for foundries and mills to buy scrap as they look for higher prices shortly.

The strike of metal workers is holding up developments in several lines. In some cases work is being sent to points not affected by the strike.

The Machine Tool Market

The small order is what provides the greatest amount of business just now. The railway shops ought to be ready to place a lot of business for which specifications have been out and tenders placed some time. Automobile plants have also been buying machinery. But the strike is the question that is making the most difference now, and its settlement is more anxiously looked forward to than for some time. Some of the firms have decided that they will not wait for the trouble to be settled here, and have sent their work out of this district, some of it across the line, in order that their plants shall not be held up when it comes to jig and fixture work.

Dealers here are not at all anxious to see any more used machinery from war plants come into the market here. There are opportunities to buy from some of the American plants at pretty attractive prices, but the feeling is that the Canadian market has had about as much of this material as it could well absorb, and that it would be better for all to let the U.S. market take care of the war shop material that is being taken out of its shell shops.

The manner in which this trade is affecting American markets was stated to CANADIAN MACHINERY to-day by a traveler for one of the large American manufacturers. "There is an immense amount of this war material on the market yet," he stated, "and it is keeping us pretty busy to know how to meet the situation. The thing is quite different to the Canadian shell shops. In this country your shops were run night and day for month after month, and there was some real wear and tear on the machinery. The shops in Canada got big production for a long time. Things are different in many of the U.S. shops. There the plants were just being put into shape. Many of the machines had never done more than a few operations. Some of them, many in fact, had never been taken out of the crate. I met a man in Rochester just the day before I came over here," he went on. "He was in the market for some surface grinders and other machines and I thought he was a sure sale. But he was going down to New York to look over the Government machines, a list of which had been furnished to him. I knew I would have to cut pretty close on the price to get him thinking away from the Government material, so right off the bat I put down a figure that was really lower than I had any right to go. He smiled and said he could buy the same machine from the U.S. Government, crated and never used, for a much lower figure. Of course I told him to go to it. I would have done the same thing under similar circumstances. The machine he will get will be the same machine I would have sold him, but I could not get near his price." Continuing along other lines in relation to machine shops in U. S. the traveler gave it as his opinion that some of the railroad shops, when they were returned to their owners, would be pretty well disorganized, he claiming that the manner of doing business in them was slack, and that the systems that many of the roads used were more or less in disuse.

In Steel and Iron

Some of the warehouses are feeling the effects of the strike, but none of them are complaining about the volume of business that is coming their way. The little shop that does not carry stock at all is the chief contributor to the sum total of business done by the warehouses. He is missed these days. His rig does not take away a big load but it comes almost every day. Some of the cities of the province are buying well just now. They have good business on their books and are buying liberally. There is a lot of material being used in the work on the Welland canal just now, and there are some operations there that bring the lifetime of much of the material even down below the supposed minimum. It is estimated, for instance, that each month will see at least $25,000 worth of wire rope used up on the dredges, many of which are work-

ing right down in hard pan under very heavy strain. Of course it is necessary to keep a good stock of this material on hand, otherwise operations would be held up.

The Imperial Oil Co., at Sarnia, are having considerable work done for them, and this calls for a big supply of tubes.

Dealers still insist that they see no chance of the steel market breaking. In fact reports that are coming in from the big rollers indicate that were any change to be made, it would be toward a stronger rather than a weaker market.

Better Reports in Scrap

Although there is not sufficient added strength in the scrap metal market to warrant dealers in marking up the prices, the chances seem to be that if the improvement continues this will have to be done. The greater part of the improvement though, is in the United States market, which is just now taking quite a lot of material from some of the larger yards in this country. Dealers hesitate to mark up the prices they are willing to pay because they fear they may have to recede later on, and they do not wish to do this. There is a large enquiry for copper and brass. Iron and steel is better in the U.S., but it cannot be said that the recovery has reached the Canadian market to any degree. The firms that are buying here are still working on a hand-to-mouth basis. Dealers here state that if the Canadian foundries and shops are in a position to buy for future needs, right now is the best time, as they are certain that prices will not come to any lower levels, and there may even be a scarcity in some lines if the U.S. demand continues to take large shipments from the yards here.

Another lot of U.S. shell steel scrap was disposed of this week. Dealers claim that the policy followed by the U.S. authorities is the right one. They dispose of the scrap in lots, depending on its location. In this way they are getting rid of their material without throwing the market out of joint or disturbing the prices.

PITTSBURG SAYS THE BIG WORRY IS "TO GET STARTED" IN BUYING

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., June 19.—Production of steel ingots in May was at the rate of about 26,450,000 gross tons a year. This represented about 45 per cent. of capacity, against 65 per cent. in April, 77 per cent. in March, 85 per cent. in February and 87 per cent. in January. The improvement in the buying of steel began about the second week in May, and this improvement caused somewhat heavier production of steel, even before the end of May. The increase does not show in the monthly statistics because previously production had been declining so sharply. It is probable that at some time in May the rate was down to 50 per cent. of capacity, perhaps in the third week of the month, but with the heavier buying for more than a month past there has been a gradual gain and the rate at present may be estimated as being about 60 per cent. Unless midsummer conditions cause a material slump in production, as the market is almost invariably dull in July and August, the low point in output in May, say 50 per cent. of capacity for a part of the month, will pass into history as the record low rate after the war. It is almost the universal opinion that there is a period of several years of great activity, say from five to ten years, ahead of the trade, the main difficulty being in getting started.

Steel Corporation Tonnage

The Steel Corporation's unfilled obligations at the end of May amounted to 4,282,310 tons, representing a decrease of 518,375 tons during the month, while the decreases in the preceding four months had averaged slightly more than 600,000 tons a month. The May decrease represented about 38 per cent. of the month's capacity, and as shipments were about 58 per cent. of capacity the new bookings appear to have been only about 20 per cent. of capacity, the smallest for a great many months.

Such a showing appears decidedly unfavorable, and certainly out of keeping with the universally admitted fact that the steel market began to grow more active before the middle of May. The difficulty lies with the Steel Corporation report, which includes contracts. Trade practice has been, as to many contracts, that the buyer could specify or not, as he chose, the mills usually cancelling unspecified quotas at the end of the quarter, and sometimes, in recent years, at the end of each month. The contract does not produce mill operation except as it is specified against. The Steel Corporation booked very little contract business in May, and only a very moderate amount of strictly new business in the form of shipping orders. On the other hand, it received specifications, or shipping orders, against contracts in much larger volume than in April. It is learned in well-posted quarters that the actual shipping orders received in May, in new orders and in specifications against contracts, amounted to fully 75 per cent. of the month's capacity. This enabled the Steel Corporation to increase its mill operations somewhat in the latter part of the month, and there has been a slight further increase this month. Yet the monthly report of "unfilled tonnage," which has been given out regularly for many years, made a very poor showing. Sometimes, on the other hand, it makes what appears to be a good showing when fundamental conditions are not nearly as good as is thus suggested.

Steel Prices

In some quarters it is claimed that there is less shading of steel prices than formerly, say a fortnight or a month ago, but these claims are to be doubted. There is probably about as much shading as formerly. The market, nevertheless, may be said to be on a safer foundation for this reason, that the price cutting does not precipitate a general decline. Earlier in the year many producers, if not all producers, had the idea, perhaps a correct one at the time, that if there were any price cutting it would precipitate a break and the whole bottom would fall out of the market. That was why they embraced Secretary Redfield's proposal, afterwards called "price stabilization" in February, because they hoped it would enable them to agree among themselves as to prices, but lost all interest in the matter when about April 1, the Attorney-General rendered an opinion that the whole procedure would be in violation of the Sherman law.

Price cutting, where it exists, rarely runs to $4 a ton, and is more commonly about $2 a ton. Claims are that the great bulk of the business is placed at regular or March 21 prices, but one should not feel too secure about this.

A marked improvement has occurred in the buying of merchant steel pipe, which has been one of the laggards among finished steel products. Since about the first of the year oil country goods have been in excellent demand, and now some of the mills are fully sold for two or three months, one or two being actually behind in deliveries. With the larger demand for merchant or ordinary standard steel pipe the pipe mill operations are much better rounded out.

Sheet Buying

While demand for sheets has been moderately good since the first of the year, averaging fully up to the general run of finished steel products, there has been a gradual further improvement since the fore part of May, when buying was rather light. The buying is more widespread in character. While the leading buying interest is still the automobile trade, some other classes of buyers are coming more to the front, particularly in black and blue annealed. Galvanized sheets continue to move very slowly. Despite the great campaign of road building that is supposed to be in progress the demand for galvanized corrugated culvert stock is conspicuously light. It is said that more than 80 per cent., and perhaps 90 per cent., of the sheets bought are at full prices, 4.35c for black, 6.70c for galvanized and 3.55c for blue annealed.

Pig Iron

Pig iron is perhaps a shade stronger. Of course there is no advancing tendency, but there is somewhat less disposition on the part of certain furnaces to cut prices. This cutting arose largely from furnaces going outside their regular districts in order to eke out on the limited demand from their regular trade, and with more buying by their regular customers these furnaces are less dis-

posed to go outside their districts. The Cleveland furnaces, for instance, are now making few if any offers in the Pittsburgh market, which should normally be supplied by the valley and scattered Western Pennsylvania furnaces. It looks now as though the prices of March 21 would hold fairly well, with such declines as certain districts must have to make a regular price structure. The war time prices did not recognize the differentials that usually obtain between districts. Birmingham iron, for instance, has declined about $3 a ton, whereby it can now penetrate some northern markets in competition with northern furnaces.

U.S. MACHINE TOOL MARKET IS BATTERED WITH SECOND-HAND STUFF

Special to CANADIAN MACHINERY.

NEW YORK, June 19.—There is no broadening of demand for machine tools, but a fair business is being done in some lines. It is undoubtedly a fact that the dumping of hundreds of used tools on the market is affecting sales of new tools to a considerable extent, but there is no tendency to become unduly pessimistic over this condition, because it is realized that the second-hand tools must eventually be absorbed and machine-tool builders would like to see them removed as a market factor as quickly as possible. The high prices of new tools are causing many prospective buyers to look about carefully for slightly used tools which will answer their requirements. None of the tools of the Ordnance Bureau of the War Department have yet been placed on the market, and latest reports indicate that these will inventory from $50,000,000 to $75,000,000. Private manufacturers, however, are offering used tools, the latest offering being from the Savage Arms Corporation, all of whose plants were 100 per cent. engaged in war work. The tools which this concern has to dispose of are valued at about $1,000,000. The Bureau of Aircraft Production, War Department, and the Emergency Fleet Corporation, have many hundreds of slightly used tools to sell, and their stocks are being looked over carefully by many prospective buyers.

Protest Against Policy

Strong protests have been made by machine-tool builders in the Cincinnati district against the proposed policy of the United States Government in dumping surplus machine tools on foreign markets. A resolution signed by 20 prominent machine-tool builders has been sent to Ohio representatives and senators says: "Please do what you can to prevent dumping of Government machine tools on foreign markets, as it will seriously affect every machine-tool plant in Cincinnati and the country at large. Truck manufacturers stopped this, why can't we? If surplus machines must be disposed of, why not arrange that Germany and Austria absorb them in their initial requisitions?"

The most active machine-tool markets are those of Detroit and Chicago. In all of the present buying the automobile industry continues to figure as the most important factor, as has been the case since the signing of the armistice. Other industries are beginning to buy, but the effect of this has been by no means important as yet.

Prices are being fairly well maintained, and while some concessions are occasionally granted to obtain desirable business, there appears to be no possibility of further general reductions of machine-tool selling prices by the manufacturers.

Chairman Hurley of the United States Shipping Board has cabled from France that 200 ships for France are to be built in American shipyards. It is thought here that this relates to the contract closed by the Foundation Co., New York. The Pacific Coast plants of this company were being dismantled and the machinery was to be shipped to France, where the ships were to be built. A few weeks ago, however, work was stopped and it was reported that arrangements probably would be made to build the French ships in the United States.

U.S. MARKET IS FIRM IN SCRAP NOW

Dealers Are Inclined To Hold Scrap Looking For a Rise Later On

THOUGH no very great volume of business is being done, prices are holding firm and the general feeling seems to be that better times are at hand. Following are the reports by districts:

Chicago.—With dealers holding most of the scrap, consumers are buying for immediate needs only. Prices remain firm but any considerable buying would have the effect of raising them. Government and railroad offerings are being absorbed easily.

Cleveland.—Trading has been confined to odd lots, the market generally being deadlocked. Consumers are offering prices below the market, and dealers are holding for prices better than those now prevailing. Some heavy melting steel has brought $17.

Philadelphia.—Prices are showing advances in various grades in this district. Heavy melting steel is quoted at $16.75 delivered. Cast iron turnings have advanced to $10.75. Foundry scrap is in good demand and scarce.

Pittsburgh.—An increased enquiry and small inclination to sell on the part of dealers has resulted in prices getting stronger. Heavy melting steel is expected to reach $18 at the first sign of real buying. Other grades are also firm.

Buffalo.—The market is showing increased strength over last week's prices, and dealers confidently predict $20 for heavy melting steel in the near future. The Government steel held in plants here is attracting much interest, a quantity of 20,000 tons at the Lackawanna Steel Co. being available for sale if the Government desires to put it in the market.

New York.—There is not much doing in the scrap market in this district. What there is is confined to heavy melting, turnings and borings. Prices are holding fairly well. Government scrap is being sold on bids, a good sized tonnage being closed.

St. Louis.—Prices here show an advance in all grades from one half to one point. Railroad offerings were actively competed for and brought good prices. Feeling is better than at any time since the recent slump.

Cincinnati.—Conditions are favorable to the scrap market, and prices show a slight improvement. The moulders' strike has been settled, and this will mean a better demand. The Pittsburgh steel interests are expected to enter the market shortly.

DISPOSING OF THE SURPLUS STOCKS

Sir Joseph Flavelle Has Been in England Trying to Wind Up Munitions Board

Sir Joseph Flavelle, chairman of the Imperial Munitions Board, has sailed on the Aquitania from London for Canada after a month's visit. Sir Joseph was engaged in winding up the affairs of the Munitions Board as well as attending to his own private interests. The main question has been the disposal of the surplus stocks of different materials on hand at the end of the war. There are very large quantities of iron, steel, copper, brass and lead as well as explosive constituents.

The Canadian trade mission in London has been endeavoring to dispose of these stocks, but the task has not been an easy one. The market is naturally overstocked with these materials and even for iron and steel for agricultural purposes there is scarcely any market. It was thought Germany and Austria would take quantities of copper and brass, but there are, of course, difficulties about payment. The trade mission is also assisting the overseas military authorities in the disposal of certain army property, such as shoes, etc. One item in the army property list that is giving no trouble with regard to disposal is motor cars. The Government has been selling these in Britain and actually realizing more for used cars than was originally paid for them, the price of motor cars in Britain being at present just about twice that in Canada.

NICE LOOKING SQUABBLE LOOMING UP OVER THAT SHIP PLATE CONTRACT

OTTAWA, June 19—At the request of the Government, construction on the new plate mill at Sydney has been stopped for the present. This somewhat unusual action leads to speculation as to the reason. By the terms of the contract for plates between the Government and the Dominion Steel Company, the making of ships' plates was to be begun in November. It was seen some time ago that it would be a physical impossibility to have the machinery installed by that time, and the manufacture of plates begun, as the frames of the mills are not yet completed; and as the price had fallen much below the contract price which was to be paid the company, it was generally anticipated that the Government was offered a good opportunity by this expected default to get rid of an unsatisfactory contract. By asking the company to cease further building operations for the present, it is possible that the latter is given an opening, of which they may be assumed to be wide enough awake to take advantage, to place the onus for the delay on the Government, and claim the full advantages of their contract.

At present the Government is getting its plates from Pittsburgh delivered at Halifax for a price of $3.50 per hundred pounds, as compared with the basic price

(Continued on page 60.)

S. F. BOWSER COMPANY, LIMITED, TORONTO, ONT.
Manufacturers Oil Tanks, Pumps and Storage Systems, organize as Canadian Company
April 1st, 1919

THE above, one of Toronto's live manufacturing firms, has just recently reorganized, to operate as a strictly Canadian organization, financed and managed under Canadian control.

S. F. Bowser Company, Ltd., has for a number of years been manufacturing and selling the famous Bowser gasoline and oil pumps, tanks and storage systems, under the control of the parent company at Fort Wayne, Indiana, U.S.A. Their Canadian business has grown steadily from year to year, practically their entire Canadian trade being supplied from the Toronto factory.

Believing thoroughly in and being enthusiastic about the future of Canada, this company decided recently to organize, under the Canadian laws, as a strictly Canadian firm, putting the management into the hands of their present efficient sales manager, Mr. H. C. Christie.

The illustrations shown herewith give a good idea of the present plant of the Bowser Company. This plant is of heavy construction and commodious, with large storage yard in the rear, having splendid railway facilities, and is amply equipped in all respects for taking care of the Canadian business. Last year their total Canadian business amounted to better than a half million dollars.

Mr. H. C. Christie, who has been for a number of years connected with the Canadian factory of the Bowser Company, recently as sales manager, has been elected manager with Mr. E. F. Cummings as factory manager. The other officers are: Mr. S. F. Bowser, president; Mr. S. B. Bechtel, vice-president; Mr. H. J. Grosvenor, secretary, and Mr. W. G. Zahrt, treasurer.

This organization stands ready at all times to assist users of gasoline and oils in solving their storage and distribution problems. A corps of engineers and draftsmen are kept busy planning and designing equipment for stores, garages, mines, mills, factories, railroads and other industries where oil storage is required. The Canadian Government, during its recent war activities, found use for Bowser product at a number of its important camps and aviation fields.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75

Toronto price:—
Silicon..2.25% to 2.75% $32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$19 50	$19 25
Electro copper	18 50	18 00
Castings, copper	18 50	18 00
Tin	58 00	55 00
Spelter	8 50	7 50
Lead	6 50	6 50
Antimony	9 00	9 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$12 50	$11 25
Copper, crucible	16 50	14 00
Copper, heavy	16 00	14 00
Copper wire	16 00	14 00
No. 1 machine composition	12 50	13 00
New brass cuttings	9 25	9 00
Red brass turnings	10 00	9 00
Yellow brass turnings	7 25	6 50
Light brass	6 00	5 00
Medium brass	6 00	6 00
Scrap zinc	5 00	5 00
Heavy lead	4 50	4 00
Tea lead	3 50	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 75	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	17 00	15 00
Rails	12 00	11 00
Malleable scrap	12 00	12 00
No. 1 machine cast iron	18 00	15 00
Pipe wrought	8 00	5 00
Car wheels	20 00	18 00
Steel axles	20 00	20 00
Mach. shop turnings	5 50	5 00
Stove plate	14 00	10 00
Cast boring	5 50	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks..list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 5%
At warehouse ..... list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	08½
Grits, 80 and finer	06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 30
Brass sheets, 24 gauge and heavier, base	$0 38

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

LeBLOND
HEAVY DUTY
Universal Millers

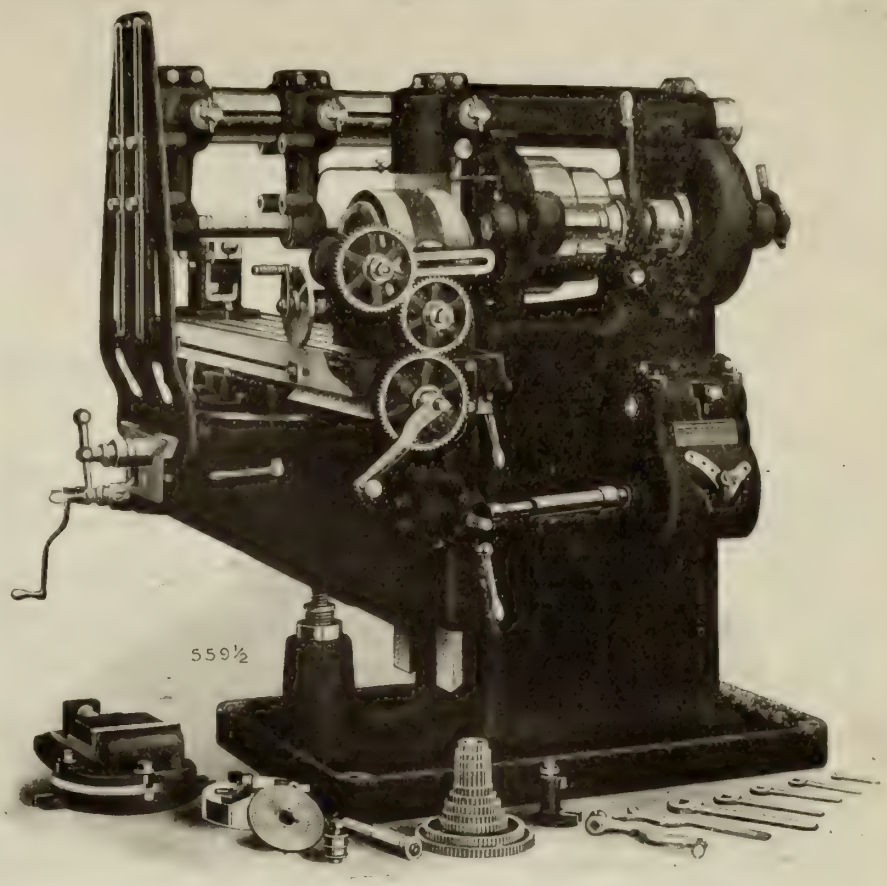
Are not only Tool Room Machines, but as a manufacturing proposition appeal to the careful buyer.

Their long life insures ample returns for the investment made.

May we explain to you their many advantages and the convenience of their control.

Carried in stock by

The A. R. Williams Machinery Co.
LIMITED
TORONTO



Acid Electric STEEL CASTINGS

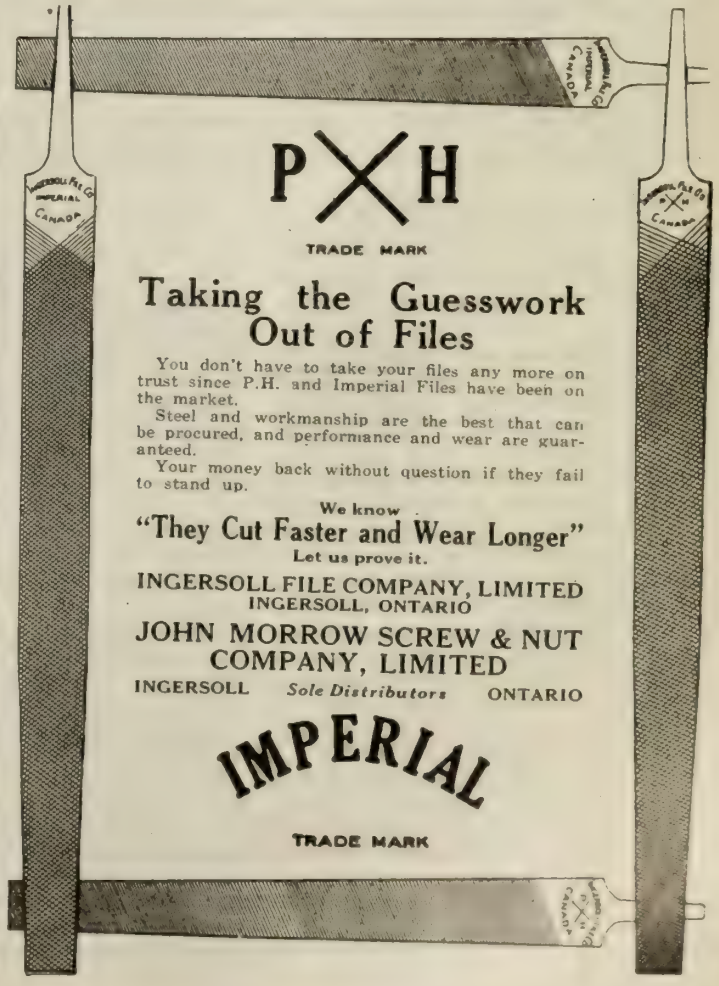
Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited
Steel Foundry Division, Lachine Canal
Head Office: 187 Delisle St. MONTREAL
Phone Victoria 1492



agreed on with the Dominion Steel Company of $4.15 at Sydney. The price to the Sydney company is subject to any reduction which may take place in the production of ingots. The Department of Marine and Shipping has power under its contract to put its accountants into the plant every six months after the supply of plates has begun to ascertain what the cost of ingots has been during the preceding half year. It is understood that there has been no reduction in cost recently, so no reduction in the price of plates may be expected from this source.

Although it is some weeks now since the company was notified that there must be some readjustment of the contract, the Department has as yet received no reply to its communication. Hon. Mr. Ballantyne informed me to-day that the matter would have to be adjusted satisfactorily without further delays, and he is pressing for a reply.

MINISTER SAYS C.M.A. DOES NOT GIVE INFORMATION HE REQUESTS

Special to CANADIAN MACHINERY.

OTTAWA, June 19.—At its recent meeting in Toronto the Canadian Manufacturers' Association passed certain resolutions regarding the necessity for an increase of shipping facilities by purchase, lease, or building, and forwarded the same to the Dominion Government. When this was brought to the attention of the Minister of Marine he showed some signs of impatience. "It is now about ten months, quite a time before the war ended, since I requested Mr. Walsh, the traffic manager of the Canadian Manufacturers' Association, to furnish me with a statement showing the amount of tonnage the association had or could secure for export business, when it would be ready, and from what points the shipments would be made. This was in order to give us an idea of what marine tonnage they would need. I have never had a reply to that request. I also made the same request to Mr. G. M. Murray, who said that he would see that the information was forthcoming, but that produced no more effect.

"It seems to me that the first thing for the manufacturers to do before passing or forwarding a resolution of this kind, is to send that statement asked for so long ago."

The complaint is very common in different departments having business with the Canadian Manufacturers' Association that there is a great deal of loose talking and urging about export business, and not enough concerted effort to secure it. The first move for the manufacturers is to circularize their membership as to the quantity of goods they have or expect to have, and when they will be ready for shipment. It is understood the C. M. A. was asked to give a statement to Mr. Hanna, of the Canadian National Railways.

I am told that a ship of the Canada Steamships, Ltd., recently loaded at Montreal for France and had to scour the United States for part of her cargo, otherwise she would have gone partially empty.

ABERTA TO HAVE A STOCK TAKING

Her Natural Resources Are to be Investigated and Placed on Proper Record

An intelligent stock-taking of the natural resources of Alberta is the real object behind the Alberta Industrial Development Association. This association works in conjunction with the Industrial Department of the Government of Alberta. Mayor M. A. Brown, president of the association, speaking to CANADIAN MACHINERY of the proposition, stated that it was the first time that such a movement had been attempted. Certainly the matter is being approached in a most thorough manner, and Alberta will be able to tell the manufacturers of the country just what they have there in the way of material, labor, fuel and transportation facilities. With this information in hand, the Westerners feel that the manufacturers ought to be able to judge for themselves whether it will be good business or not for them to locate there. There will be no attempt to encourage any lines that are not likely to succeed.

The work will include that of research, in order that the natural resources of Alberta may be listed. One of the first items will be iron ore. It is immaterial to Medicine Hat whether this is smelted in B. C. or elsewhere. The idea just now is to find where the deposits are in the West, and where the logical point is for treating them. Wider markets will be sought for the coal deposits, and in this connection it is likely that a new furnace, especially for burning Western coal, will be placed on the market. Several stove makers of the East are considering this matter. The various clay deposits will also be thoroughly analyzed.

Mayor Brown is organizing now also for the Industrial Congress, which is to take place from August 11 to 16. This will be in the form of a provincial tour, starting from Medicine Hat, going to Lethbridge. They will be in Calgary 13th and 14th, and then on to Edmonton. The week-end will be spent at Banff. Invitations are being sent to 18,000 manufacturers. Henry Ford has promised to attend, as well as Robert Dollar, Jos. Oliver, E. R. Erskin, Louis Hill, of the C.N.R.; E. W. Beatty, president of the C.P.R.; and D. B. Hanna, president of the National Roads.

The real motive is that Alberta shall have her natural resources catalogued in order that manufacturers shall see for themselves just what is offered there. Already the association, finding one of the large shell shops out of work at the end of the war, has been able to show that tractors can be made profitably, and these implements are now being turned out of the shop formerly devoted to munitions.

OPEN NEW BRANCH

Wm. B. Scaife & Sons Company, of Pittsburgh, announces the opening, on July 1st, of a Chicago sales and engineering office at 38 South Dearborn street, with Charles F. O'Hagan, formerly chief engineer of the company at Pittsburgh, as resident engineer and manager.

This company is the oldest manufacturing concern west of the Allegheny Mountains. During the more than one hundred years since their business was founded, they have from time to time, as conditions arose, added to their manufacturing facilities. They now manufacture black or galvanized, riveted, brazed or welded steel tanks for air, gas and liquids, steel shipping drums, range boilers, steel structures; also the well-known We-Fu-Go and Scaife water softeners and filtering equipment.

NEW KITCHENER PLANT

Mr. C. Rieder, who recently became president of the Ames-Holden-McCready Co., wholesale shoe manufacturers, has been in Kitchener, and yesterday made the announcement that the property of the late Ward Bowlby, consisting of about five acres of land on King Street West, had been purchased for manufacturing purposes. Mr. Rieder declined to divulge the nature of the industry to be erected, but it is generally understood that it is proposed to erect a large and up-to-date plant for manufacture of tires and other rubber goods.

Mr. Rieder intimated that building operations would commence within a few weeks, and that the new factory would be one of the largest of its kind in Kitchener. He declared that he looked upon Kitchener as the rubber centre of Canada, and this was why it was decided to locate the new plant here.

Export Conditions Discussed.—At the meeting of the Canadian Manufacturers' Association the subject of export markets came up. Many of the members do not see eye to eye with Mr. Lloyd Harris on this subject, and feel that the home market offers enough business just now without going abroad to look for more. Mr. Bulman, the retiring president, said that he thought the British manufacturer still had the advantage over the Canadian. Mr. Harris, of the Harris Printing Co., thought that the Dominion Government should establish consulates in foreign countries to facilitate export trade.

— the secret of Lower Tapping Costs

The expert hand tapper is a good man to have on your pay roll, but here is an attachment that will tap holes as quickly as they can be drilled, and **ten times faster** than is possible by hand. The action of the Wahlstrom Tapping attachment closely imitates hand tapping, because of the mechanically obtained **oscillating movement** and it greatly reduces tap breakage.

Try one and you are sure to want more. There is nothing about this attachment to get out of order and the quality assures a **long, lasting,** good service.

Takes taps of all sizes up to ½ inch.

Order one on trial, your money promptly refunded if you are not satisfied.

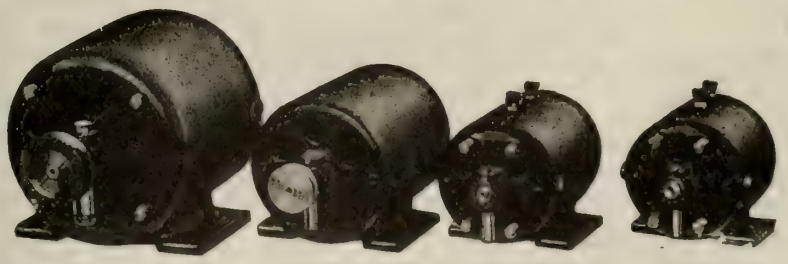
Aikenhead's Wahlstrom Attachment

Send for Bulletin.

AIKENHEAD HARDWARE, LIMITED

17 Temperance St., Toronto

Aikenhead's "Menominee" Motors



25 cycles, 110 volts. Single phase. In ⅛, 1/6, ¼, 1/3 and ½ Horsepower. Speed 1,450 R.P.M.

Type "A" Induction Motors

As illustrated are self-starting, quiet running. They will serve you well and long.

In Stock for Immediate Shipment.

AIKENHEAD HARDWARE, LIMITED

17 TEMPERANCE ST., TORONTO

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Ottawa.—Contracts for the reconstruction of new lines and extensions of existing lines have been announced by the Canadian National Railways. The length of new lines to be constructed will be approximately 340 miles, all in the West and chiefly in Saskatchewan. It is understood contracts already have been let, and the work is to be rushed to completion. The contracts include construction for: The Amaranth extension, 35 miles, on the west side of Lake Manitoba. Melfort northeasterly line, 30 miles, in Saskatchewan. Humboldt-Melfort line, Saskatchewan, 32 miles. This is to complete this line. Eslin, southeasterly, 35 miles, in the lake country, Sask. Oliver-St. Paul de Metis, 22 miles, Alberta. Peebles, southeasterly towards Lampman, Sask., 20 miles. Hanna-Medicine Hat, Alta., 72 miles. Acadia Valley line, 25 miles, from a point a little southeast of Alsask, Sask., running westerly into Alberta. Swift Current extension, 27 miles. Luks Lake extension, Sask., southwest from Dumblane, 22 miles. Turtleford extension, 2 miles. This is the extension of the line, North Battleford to Turtleford.

MUNICIPAL

Chatham.—The Public Utilities Commission of Chatham has been advised that Chatham will now pay $29 per horse power for current, as compared with $30.87 before. There has been a big increase in power purchased from the Ontario Commission, and the new rate is the result.

Sarnia.—The purchase of a municipal paving plant was given a six months' hoist by the Sarnia City Council at a special meeting, and it was decided to readvertise for tenders for the completion of the resurfacing work on the paved streets of the city. The session was somewhat stormy and was replete with hints of influences, Bolshevism and threats of resignation by Ald. Kirby.

TENDERS

The Department of Railways and Canals is asking for tenders for the supply of sand, which will be received up till June 26. Specifications and tender forms can be obtained from the Chief Engineer of the department, Ottawa, and the engineer in charge of the Welland ship canal, St. Catharines, Ont.

The Lindsay Central Fair Association is asking for tenders for the erection of a new building. Plans and specifications by G. W. Gouinlock and G. W. King may be seen at the office of J. P. Ryley, secretary, or J. Carew, Lindsay, also at the architect's office, Toronto.

PERSONALS

Mr. William C. Wilson, of the William C. Wilson Co., is leaving for England the first week in July. Mr. Wilson's visit is in the nature of a business trip, and he intends to try and place a line of auxiliary marine machinery manufactured in Canada with British shipbuilders and shipowners. In the present congested state of the British engineering industries, Mr. Wilson sees a favorable opportunity to exploit Canadian-made goods. The lines include steering gears, winches, windlasses, accommodation ladders, etc., and all have the seal of approval of Lloyd's surveyors.

MARINE

Port Arthur.—The two ships that are now building at the plant of the Port Arthur Shipbuilding Co. for the Canadian Government, will be named the "Canadian Cadet," and "Canadian Adventurer," respectively.

Victoria.—The Nippon Yuson Kaisha steamer "Kature Maru" sailed from here for the Orient with a Red Cross party and an aviation party bound for Siberia. The Red Cross party consisted of doctors and nurses for the hospitals along the route of the Siberian railway. The aviation party consisted of twelve French airmen also for Siberia.

London.—The application of the Canadian Pacific Railway Company to transfer a number of their ships to Canadian registry is freely rumored here. Sir George McL. Brown admitted that he had heard of it. It is said that Chairman Bosworth has sailed for Canada to discuss the matter with the heads of the line there. This action is considered to be the great step in the formation of a Canadian mercantile marine, as it is expected that probably other lines sailing to and from Canada may follow the C.P.R.'s lead to some extent.

Victoria.—The yards of the Foundation Co. were the scene of another launching, when the steamship "Canada" was successfully launched in the presence of a large and distinguished company. Capt. Andre Millot and A. O. P. Francis, the French consul, were among the guests. Capt. Millot is the French High Commissioner, and has been on the coast some time looking after the various French interests. The "Canada" was the seventh of the wooden steamers to be launched on the present contract for twenty.

TRADE GOSSIP

The Metal Stamping Works of the Laval Industrial Co., of Laval, P.Q., was destroyed last week by fire; the loss is estimated at about $18,000.

$150,000 Fire at Newcastle.—The fire which broke out in the lumber storage of the Edward Sinclair Co. mill, near Newcastle, N.B., did damage amounting to about $150,000.

New Rolling Stock.—The Canadian National Railways are out to purchase twenty mail cars and twenty first-class coaches, the largest amount of rolling stock to be placed by any railway since the beginning of the war. The estimated cost of the cars is $800,000, about $20,000 each.

Electrifying Great Britain.—The British Government has definitely committed itself to the adoption of electricity for heating, power and lighting. The country will be divided into districts, each of which will have a commission having power to acquire electric plants and build others where they think necessary. Water powers will be used as well as steam plants.

New Railway Shops.—The new Canadian National Railway shops at Leaside, near Toronto, will be opened almost at once. The work of construction is practically completed, and some of the workmen are already on the premises. The plant consists of a roundhouse, power house, administration building, locomotive repair shop, car repair shop and transfer plant.

What is British Made?—There is a difference of opinion as to what is understood by British made. For instance, motor cars made in Canada, that is, with the exception of the engine, would be shut out of the British preference. The tariff of Canada recognizes any article which is 25 per cent. manufactured in Great Britain as being of British make, and negotiations are now going on with the British Board of Trade to have the same ruling apply with regard

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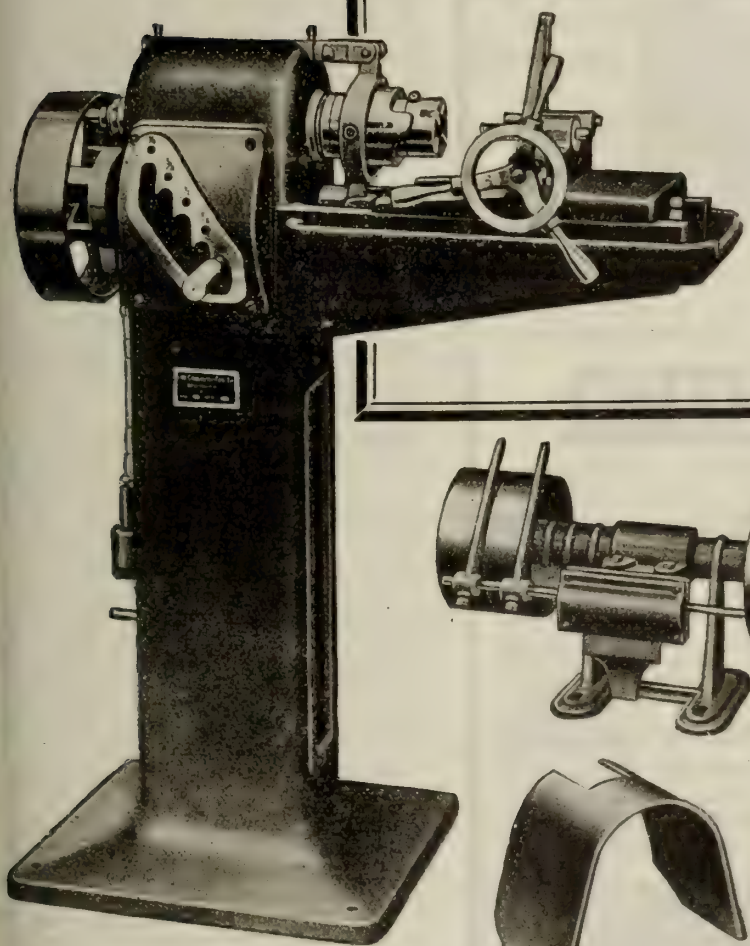

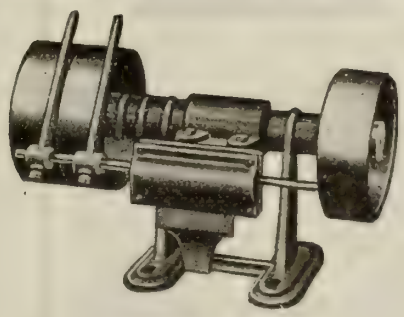

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to Canadian goods partly manufactured in foreign countries.

Moved to Toronto.—To make 200 range boilers a day and employ 300 men to start, the advent of the John Wood Manufacturing Co., of Conshohocken, Pa., into the industrial life of Toronto was made when the Chartered Trust & Executor Co. put through the deal for the purchase of the Holden-Morgan munition plant on Coxwell Ave., south of Danforth, for about $100,000.

New Directors.—It is officially announced by President F. G. Wallace at a meeting of the directors of the Canadian Locomotive Co., that M. J. Haney, president of the Home Bank of Toronto, and Jas. Carruthers, the well-known financier of Montreal, were elected to fill the vacancies on the board created by the deaths of President J. J. Harty and Senator H. W. Richardson.

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Not only does "Puro" prevent sickness, but SAVES DRINKING TIME and reduces water bills 15% to 35%.
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Canada's Foreign Credits.—The credit of $25,000,000 which Canada is extending to Belgium is well advanced. The Canadian Pacific ocean service steamers have the contract for moving the goods and the first sailing took place on June 14. The negotiations with France, leading to the placing of a credit with that nation, are held up for the present. Italy, who is receiving frozen meat from the Dominion, may also negotiate a credit here to cover the cost of these shipments.

Electric Furnace.—The Electric Furnace Co., Alliance, Ohio, has just shipped one of its standard nose tilting type furnaces to the United States navy yard at Washington. D.C., to be used in the Government brass foundry there. This furnace is provided with a motor operated tilting mechanism, and has a maximum hearth capacity of 2,000 lbs. The shell is 7 in. in diameter, and the furnace is rated at 105 kw. in electrical capacity.

The Hannifin Manufacturing Co., Chicago, have issued a catalogue descriptive of the Hannifin Aero chucks. This line of chucks and other air operated mechanism is unusually complete and the catalogue is replete with details of the various lines manufactured for use in the machine shop. The air operated chuck devised for the munition industry has found a valuable place in peace time manufacture.

Firm Reorganized.—The firm of John W. Gates, Ltd., of Montreal, has recently been reorganized under the name of the Gates Refractories Limited, for the purpose of manufacturing all kinds and shapes of high grade refractory bricks for furnace purposes. The company is now capitalized at $250,000; a plant has been acquired in Montreal East for $25,000, and the erection of kilns and the installation of equipment has already commenced. Operations will be started within the course of a few weeks.

Commissioner Chisholm's Remedy.—Riverdale and other parts of Toronto have been suffering considerably from the effects of the soot deposited by the smoke from the many locomotives working in the vicinity. A test case is being brought against the C.P.R., to see if the city by-law cannot be enforced against the company for operating locomotives that give forth more smoke than the law allows. Commissioner Chisholm suggests the electrification of all railroads coming into the city as the only remedy.

Leather Prices High.—Owing to the depletion of stocks of tanners in Canada, caused by the lifting of the British embargo to Canada, while the American embargo continued, prices have advanced materially. Tanners are exercising extreme caution, as they feel that

the high prices may come down materially during the next few months, and are, therefore, unwilling to speculate on the future values. They are, therefore, keeping operations down, and this combined with the scarcity of raw materials, tends to keep the prices firm at their present levels.

Disastrous Boiler Explosion.—A disastrous explosion of a water tube boiler occurred at Newmarket, Ont., recently. The rear head of the steam drum blew out, demolishing the building immediately in its path, and blowing the occupants of the floor out into the street, injuring about thirteen, five of whom have since died. The immediate cause of the explosion was the deterioration of the metal below the water line of the drum, but the precise nature of the causes leading to this deterioration remains to be determined at the investigation which will be made

Furnace Installation.—The Electric Furnace Construction Co., Finance Building, Philadelphia, reports the following orders received for "Greaves-Etchells" electric furnaces; Lancia Co., Turin; Bresciana Co., Brusche. They have also successfully started up new furnaces at the Daimler Motor Co., Coventry; at the Tyne Electric Steel Foundries, Ltd., and also a furnace for Kayser-Ellison & Co., Ltd., Sheffield, designed for up to 15 tons cold metal or 20 tons hot metal process.

Oshawa.—Only eight votes were cast against the by-law to grant the Ontario Steel Products Co., of Gananoque, a fixed assessment of $20,000 for 10 years, on the factory buildings they propose to erect on the Rider property and premises, which they have purchased on the Ritson Road, north of the C.N.R., while 604 property owners voted for it, or nearly 99 per cent. The result of the voting was obtained with practically no organization and little effort.

Explosion an Accident.—The case of the explosion that occurred at the Davie Shipbuilding Co. plant, Lauzon, Levis, Que., that resulted in the death of one of the employees named Robert Henley, and serious injury of another named Xavier Levesque, was cleared up and found to be an accident. It appears that among the scrap recently purchased by the Davie Shipbuilding Co. included some piping that had been purchased from one of the Dominion munition plants. The pipe that caused the accident was placed on a bench to heat the T that could not be loosened, and naturally the workmen or no officer in connection with the works had the least idea that there was cordite or guncotton in the pipe. The pipe did not, however, burst with the force of the explosion. It appears from the investigation that fireman Henley was in the act of passing the mouth of the pipe lying on the bench, when the heated pipe went off, and he caught the full force of the contents, which stripped him of his clothing, and knocked him heavily against the wall, which resulted in his death.

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WANTED—POSITION AS FOUNDRY FOREman, capable of fulfilling all duties required. Machinery or jobbing shop preferred. Excellent references. Reply Box 603, Canadian Machinery, Toronto.

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Used locomotive crane.
Engine—Double-cylinder, 9" x 12" stroke.
Boiler—Vertical, new tubes, hood and smoke-stack, good for 100 lbs. working pressure.
Bucket—¾-yard, boom 58 ft. 6 in. long, wheel base 14 ft., gauge 14 ft.; hoisting and slewing gears in good condition.
All motions operated from one platform.
Further particulars on application to:
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1—"Used" Plate Punch and Shear 36" gap, capacity ⅞" hole in ⅞" plate
—also—
1—"Used" Air Compressor, steam actuated — compound steam—simple air —12" x 12" cylinder.

Both machines must be modern in design and in good operating condition. Offers with full details, price and shipping point, will be considered.

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PRODUCTION MAN WANTED BY LARGE concern manufacturing heavy hardware lines. Must possess wide mechanical knowledge and have had considerable shop experience. Graduate preferred. Apply giving full particulars as to age, experience, salary expected, etc., to Canada Foundries & Forgings, Ltd., James Smart Plant. Brockville, Ont. (c25m)

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Alley & McLellan Air Compressor 600 ft. at 100 lbs. pressure, 125 H.P. Motor, heavy duty 600 R.P.M. 3 phase 60 cycle 550 volts.
Ingersoll-Rand 800 ft. Air Compressor.
1 Tube Mill Fraser & Chalmers 5 x 22.
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Also large assortment of Pumps, Tanks, Classifiers, Boilers and Mining Equipment for sale.

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FOR SALE—One used lighting unit, consisting of one 25 K.W., 125 volt, 200 ampere direct current generator to operate at speed of 320 to 350 r.p.m. Generator made by Westinghouse Company. This machine is directly connected with a Goldie & McCulloch 9x10 Ideal engine. This machine can be examined and all particulars obtained at the plant of

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ONE NO. 4 R "REBUILT" COWAN TRANSveyor in "first-class condition," carrying capacity 3500 lbs.; carry wooden platform up to 40 x 66". AAdress R. B. Smiley, Canadian Mgr., 120 Glenholm Ave., Toronto, Ont. (c26m)

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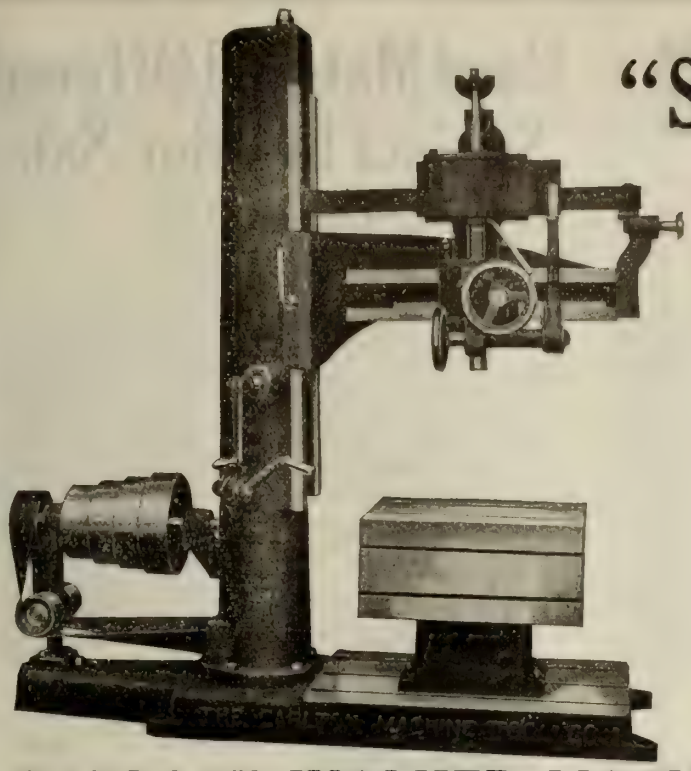

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Generator. K.W.	Volts.	R.P.M.	Engine. Cylinder Dimensions.
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260	220	214	15 x 17"
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25	440	1200	8 x 8"
50	2200	300	11 x 19 x 11"
50	2300	300	11 x 12"
100½	240	277	14 x 14"
125	220	225	14½ x 18"
125	240	200	12 x 21"
150	220	225	10 x 20 x 18"
150	2300	225	14 x 22 x 16"
200	2300	200	
300	480	150	14 x 28 x 30"
300	2300	150	18 x 30 x 22"
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450	550		24 x 36 x 36"
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Perring Accumulator with 28 tons of Iron on Platform 2,000 lbs. water pressure is raised.

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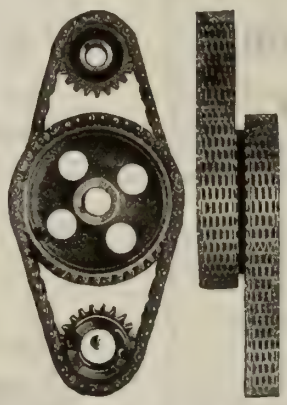

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During this long period not a single "Whitney" Chain or Sprocket had to be replaced and the condition of every Drive has been pronounced remarkable.

One Drive recently examined had given over 35,000 miles' service and both Chains and Sprokets were in such perfect condition that they appeared good for more than double that record (Sprockets having no adjustment).

The links of this SPECIAL CHAIN have finished faces and reamed holes, and the smooth faces do not damage the Sprocket teeth.

Our war contracts were such that we did not announce this SPECIAL CHAIN until after the conflict was over.

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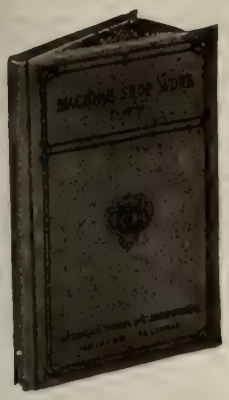
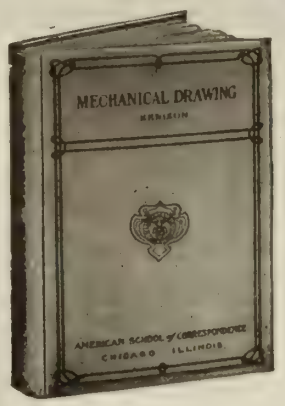
Mechanical Engineering Books

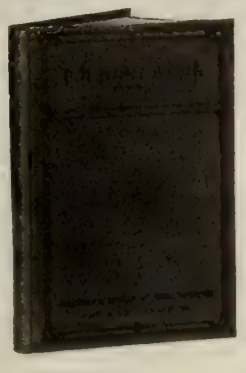
If you are desirous of improving yourself in your trade and so putting yourself in the position of making more money, these Mechanical Engineering Books will be found helpful.



MACHINE-SHOP WORK. By Frederick W. Turner, Instructor in Machine-Shop Work, Mechanics Arts High School, Boston. 208 pp., 241 illus. Cloth binding. The use of various hand tools is explained, followed by a comprehensive discussion of the lathe and lathe tools, with the methods of screw cutting, taper and eccentric turning, etc. The way to figure compound gears for screw cutting; drilling; boring; planers; shapers; slotters; milling machines and cutters; how to cut spirals, gears, cams, etc.; grinding; the operation of automatic machines. Price $1.75



MECHANICAL DRAWING. By Ervin Kenison, S.B., Assistant Professor of Mechanical Drawing, Massachusetts Institute of Technology. 176 pp., 120 illus. Cloth binding. Gives a course of practical instruction in the art of Mechanical Drawing, based on methods that have stood the test of years of experience. Includes orthographic, isometric and oblique projections, shade lines, intersections and developments, lettering, etc., with abundant exercises and plates. Price $1.00

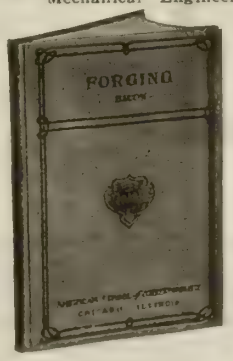


FOUNDRY WORK. Revised by Burton L. Gray, instructor in Foundry Practice, Worcester Polytechnic Institute. 224 pp., 191 illus. Cloth binding. A practical handbook on standard foundry practice, including hand and machine molding, cast iron, malleable iron, steel and brass casting, foundry management, etc. Includes use of various types of molding machines. Price, $1.00

PATTERN MAKING. By James Ritchey, Instructor in Wood Working, Armour Institute of Technology. 160 pp., 250 illus. Cloth binding. Shows the reader how to take the blueprint and from it make the pattern for any kind of casting under any condition. The allowances for shrinkage, draft, and finish are explained. Simple and built-up patterns of all kinds are clearly treated. Various special cases are taken up, such as pulleys, cranks, pipe connections, valves, etc. Price.....$1.50

MACHINE DESIGN. By Charles L. Griffin, S.B., Assistant Engineer, the Solvay-Process Co., American Society of Mechanical Engineers. 208 pp., 82 designs. Cloth binding. Explains in detail how to make the entire design of all kinds of machinery, how to lay out gears, etc., with complete specimen designs of numerous machines. Price ...$1.50

TOOL MAKING. By Edward R. Markham, Consulting Mechanical Engineer, formerly Superintendent of the Waltham Watch Tool Co., American Society of Mechanical Engineers. Author of "The American Steel Worker." 224 pp., 325 illus. Cloth binding. Takes up the methods of treating tool steels—annealing, tempering, spring tempering, hardening, case-hardening, etc.; how to make drills and reamers of all kinds; the making of arbors and mandrels, taps, hobs, reamer and tap-holders, jigs, gauges, dies and die-holders of all kinds, counterbores, facing tools, milling cutters, hollow mills, and forming tools. Gives all necessary information for tool making in all its branches. Price $1.75



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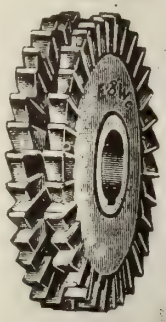

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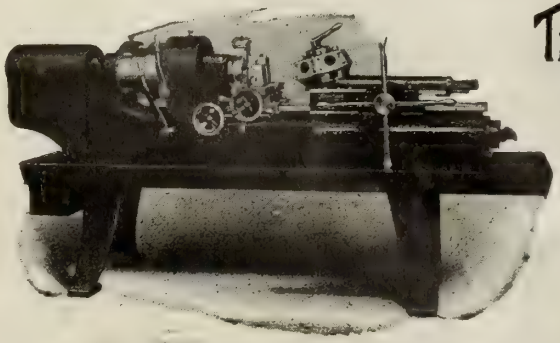

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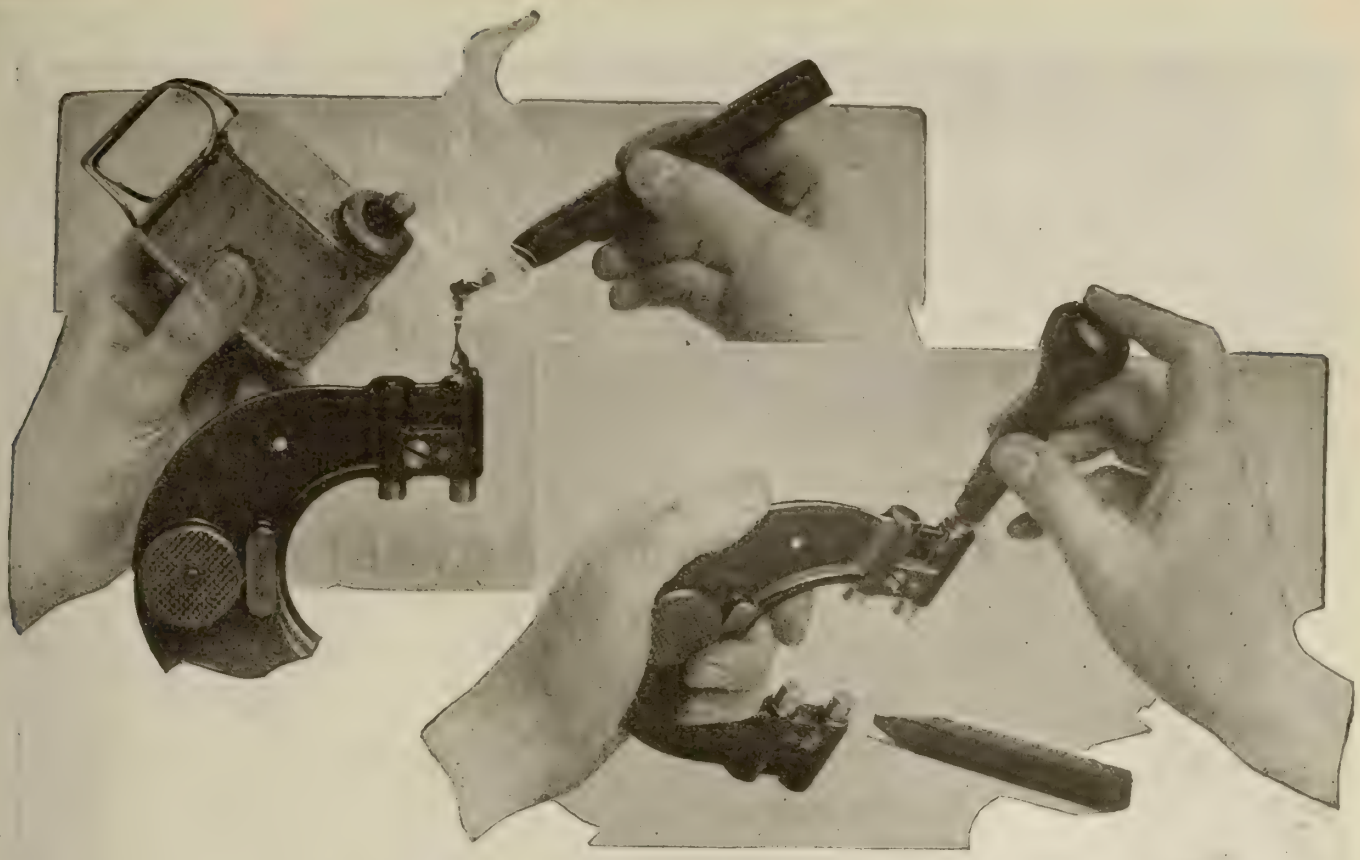

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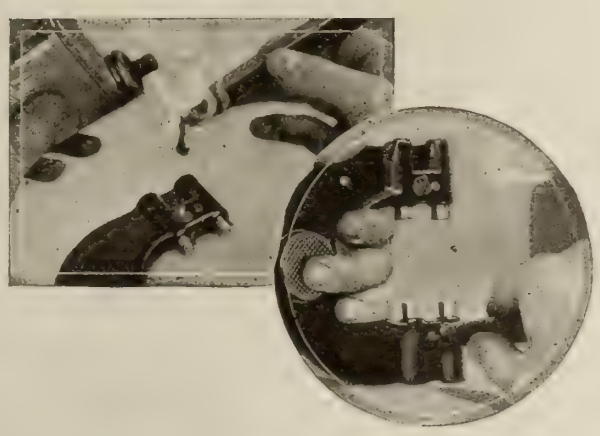

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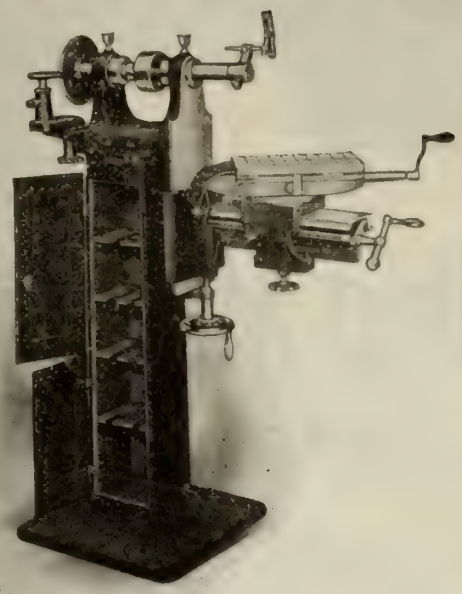

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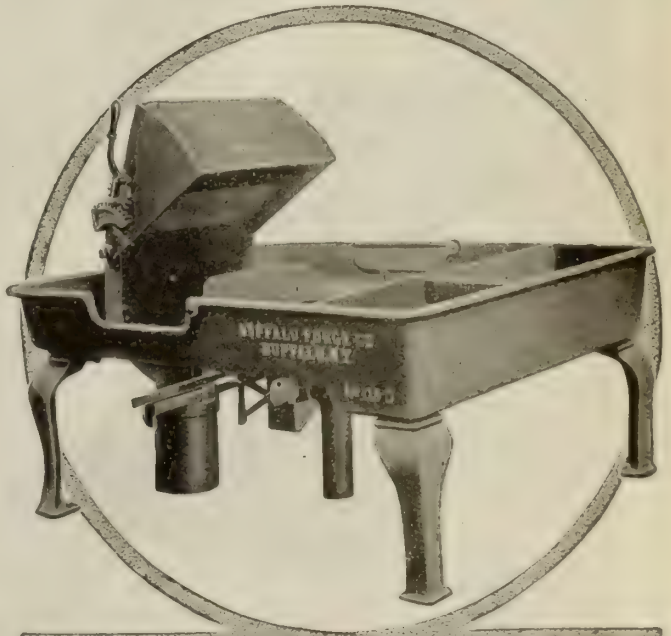

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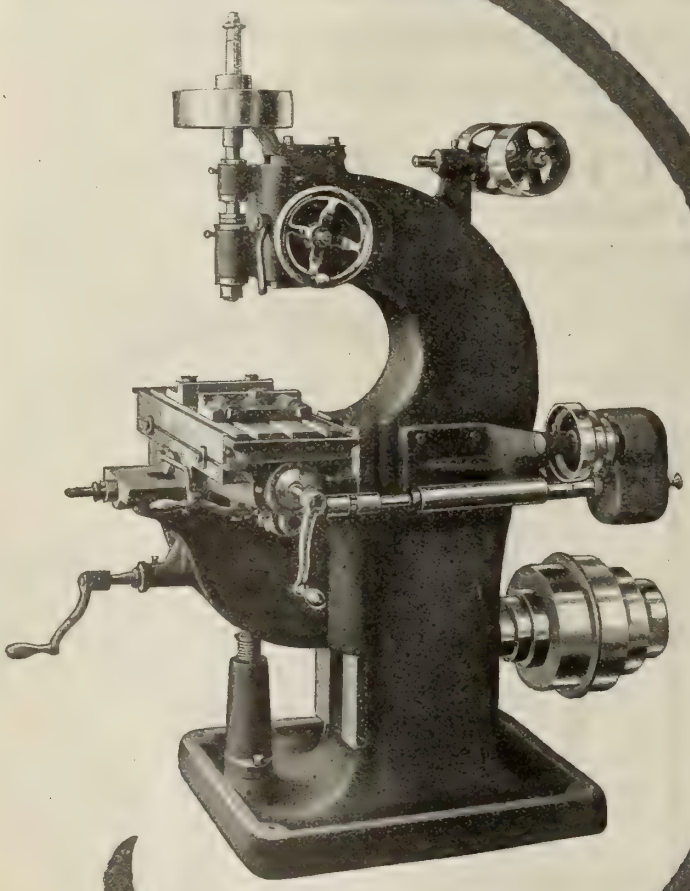

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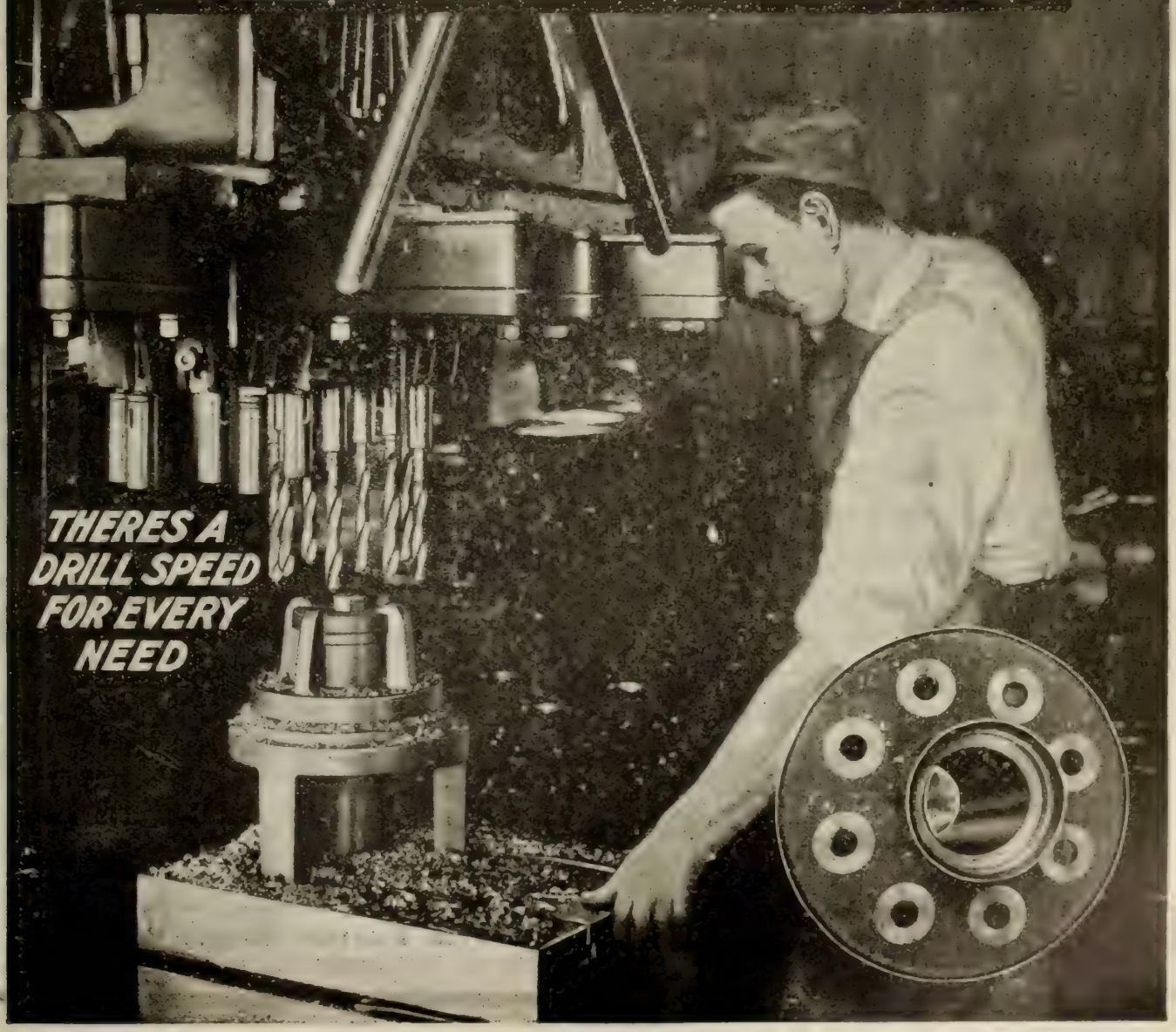

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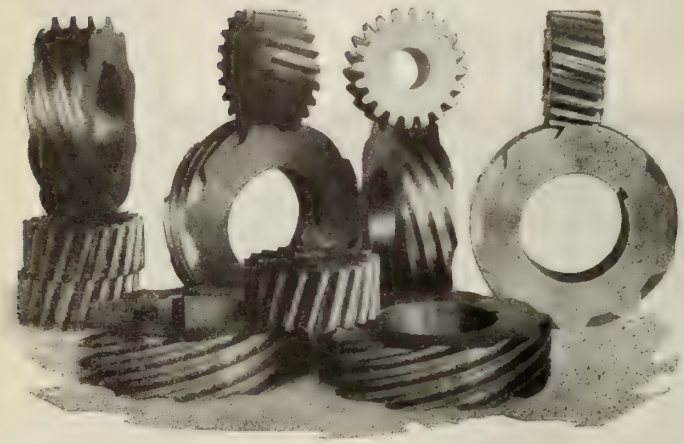

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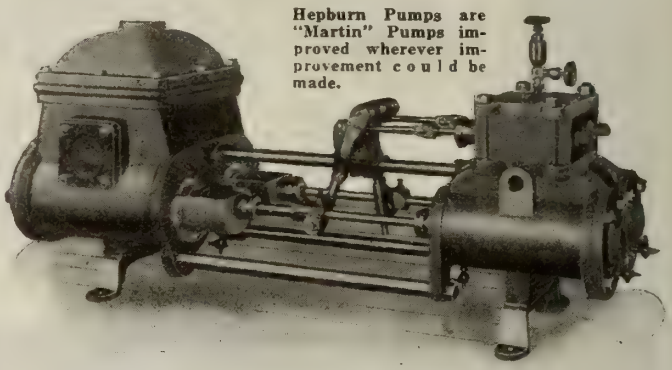

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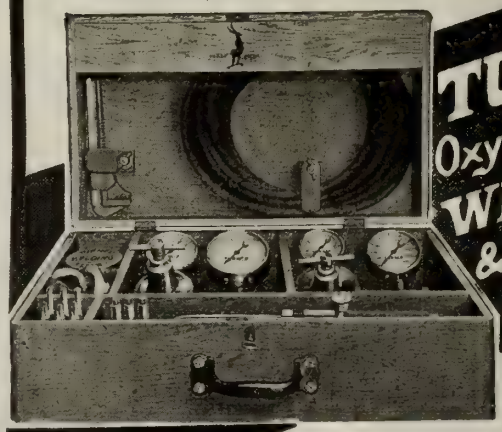

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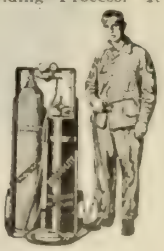

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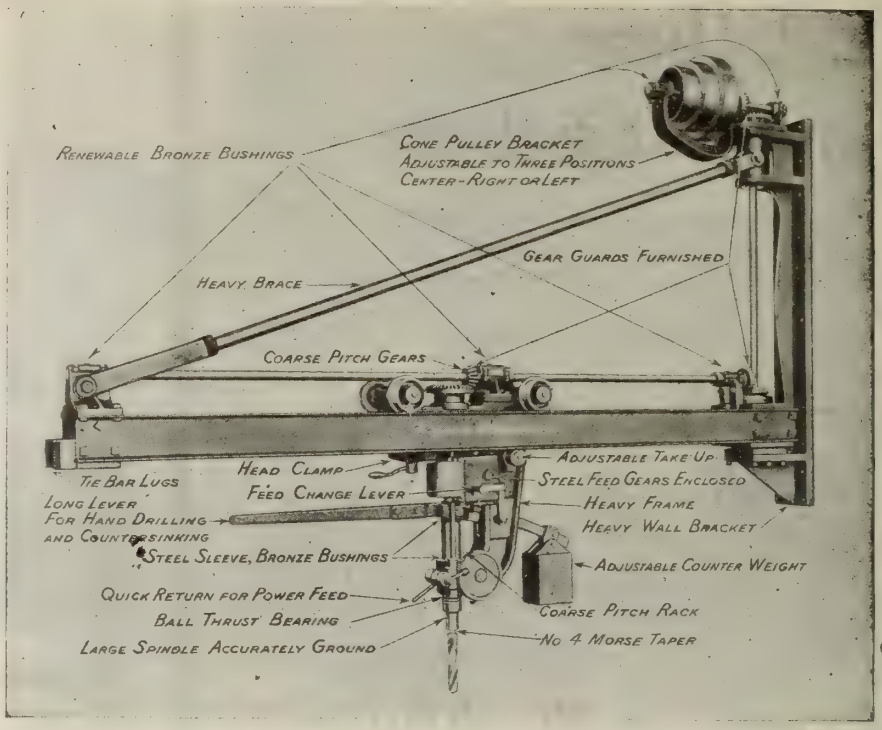

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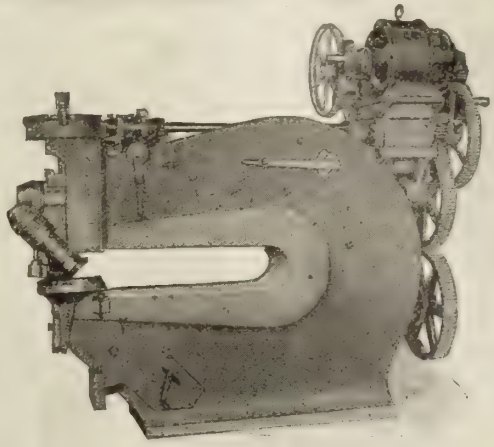

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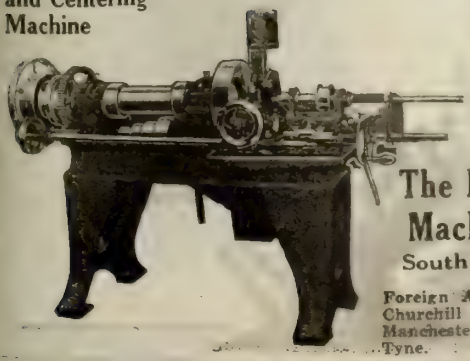
One Cuts Up
Another Cuts Down
and
They Both Cut
At Once

Here's Real Economy

This patented Hurlbut, Rogers Cutting-Off and Centering Machine embodies two cutting-off tools—one cutting up and the other cutting down; each holding the work against the other. What is the result?—**the production is doubled and the cost is cut in half.** Further, the centering operation goes on at the same time. Doesn't this appeal to you as real economy in production? When you are assured of such good-paying results why hesitate to adopt this machine? Soon pays for itself.

Let us hear from you and we will give you the full story of its ability.

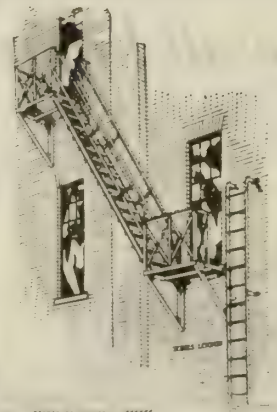
Hurlbut, Rogers Cutting-off and Centering Machine



The Hurlbut, Rogers Machine Company

South Sudbury Mass.

Foreign Agents — England: Chas. Churchill & Co., Limited, London, Manchester, Glasgow, Newcastle-on-Tyne.



FIRE ESCAPES

Danger to Life

is not a thing that many business heads would willingly perpetuate, yet continued neglect to provide adequate fire escape facilities is simply inviting disasters such as horrify the country from time to time.

When a man knows his duty, he should not wait to be **forced** to do it, should he?

If your facilities are ample, you do not need our services. If not, we are ready to help in every possible way. Write for illustrated folders, estimates and diagrams on your requirements.

THE DENNIS WIRE AND IRON WORKS CO. LIMITED
LONDON
CANADA

Halifax Montreal Ottawa Toronto Hamilton Winnipeg Calgary Vancouver

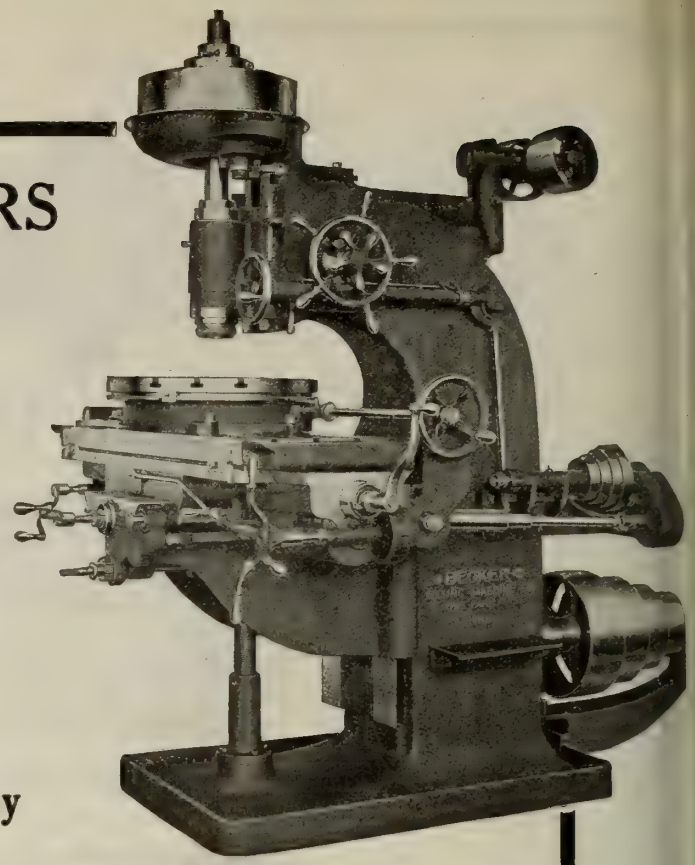
BECKER BELT-DRIVEN MILLERS

for

GREATER PRODUCTION because they work continuously—every hour of operation is a production hour—

ECONOMY OF OPERATION because they are power savers; the internal belt drive forms an elastic drive to the spindle that prolongs the life of the cutter by eliminating chatter and vibration.

ACCURACY because the machines have exceptionally fine feeds and are equipped with micrometer dials and stop gauges. The Patent Becker Gibbing keeps the work permanently aligned with the spindle.



Becker Milling Machine Company

HYDE PARK, BOSTON, MASS.

A. R. WILLIAMS MACHINERY COMPANY, LIMITED, - 64 FRONT STREET WEST, TORONTO
RUDEL-BELNAP MACHINERY COMPANY, LIMITED, - 137 McGILL STREET, MONTREAL

Adapted to all kinds of Rapid Manufacturing

WHETHER your lathe requirements must suit the rapid manufacture of intricate parts or versatile demands of modern tool room practice, one of the Whitcomb-Blaisdell Line will fit exactly your individual needs.
When you buy a Whitcomb-Blaisdell Lathe you get a big measure of service in return for every dollar invested. The entire line of W-B Lathes is distinguished for superior design, workmanship and material.
Rigid inspection and thorough working tests in our shops are your assurance of accuracy and dependability.

Whitcomb-Blaisdell Machine Tool Co.
WORCESTER, MASS., U.S.A.

Write To-day for our lathe Catalog which describes our complete line.

Whitcomb-Blaisdell LATHES

STEEL CASTINGS

Mild Steel, High Carbon Steel, Manganese Steel, Chrome Steel

We are manufacturers of Steel Castings running from ½ lb. to 5,000 lbs. each and are in good position to furnish prompt deliveries at moderate prices. Try us with your next order.

The Wm. Kennedy & Sons, Limited, Owen Sound

ESTABLISHED 1860

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

Castings-Forgings

A FEW days lost in striving to ascertain where certain steel products can be obtained means money and prestige sacrificed—and a set-back to your policy of prompt delivery.

CUT delays to the minimum, and assure yourself of systematic co-operation by placing your orders for FORGINGS AND CASTINGS with us.

OUR equipment is as complete as a Foundries Equipment could be, our service organization Dominion-wide in scope, ever on the alert to give you practical, efficient service.

NO matter what your requirements be, we can supply you promptly. If service and quality count with you—we will eventually receive your enquiries.

DOMINION FOUNDRIES & STEEL, LIMITED

HAMILTON, CANADA

Opportunity Knocks Here Every Week!

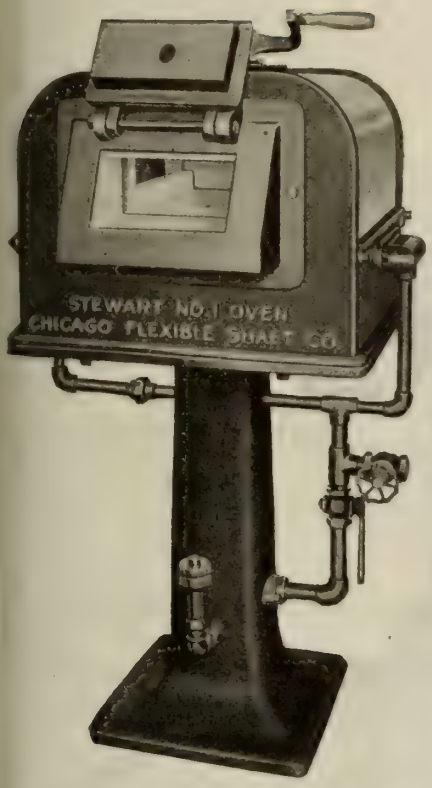
It may not knock for **you** this week, but read these pages regularly and grasp the opportunity when it presents itself. Every ad here is an opportunity for someone! Your time is coming. If you think the time is ripe to spring that little proposition of yours, send in your copy now for the next issue. If it is of interest to our readers, rest assured it will get attention.

CANADIAN MACHINERY

Classified Advertising Section

143 University Avenue TORONTO

Stewart Gas and Oil Furnaces For High Speed Steel



Gas or Oil-burning

Specifications:

Opening, 5 in. high, 9 in. wide x 13½ in. deep.

Floor space, 28 in.

Diameter of gas and air connections, 1¼ in.

Net weight, 950 lbs.

Shipping weight, 1,000 lbs.

Balanced door, $3.50 extra

Price, with blower....$121.50

Price, without blower. 91.50

F.o.b. Chicago.

The sturdy Stewart No. 1 Oven Furnace, here illustrated, is one of our lines of indirect-heat furnaces for hardening high-speed and carbon steel, dies, tools, punches, cutters, springs, knives, etc.

It is also suitable for annealing or carbonizing small work.

The raised sides of its hearth prevent work from rolling off, while the open space above permits the hot gases from the combustion chamber beneath the slab to surge upward over the work, without coming in direct contact with it.

The lining of this furnace — heavier than need be—is of molded units of high-refractory fire clay. It lasts for years, with an occasional replacement of the hearth.

Relining is a matter of removing a few bolts and replacing the old "Monolith" with a new one, from our stock.

Positive and accurately-flexible control of heat, whether gas or oil are used, is an important factor in the widespread favor in which this line of furnaces is held, by heat-treating experts.

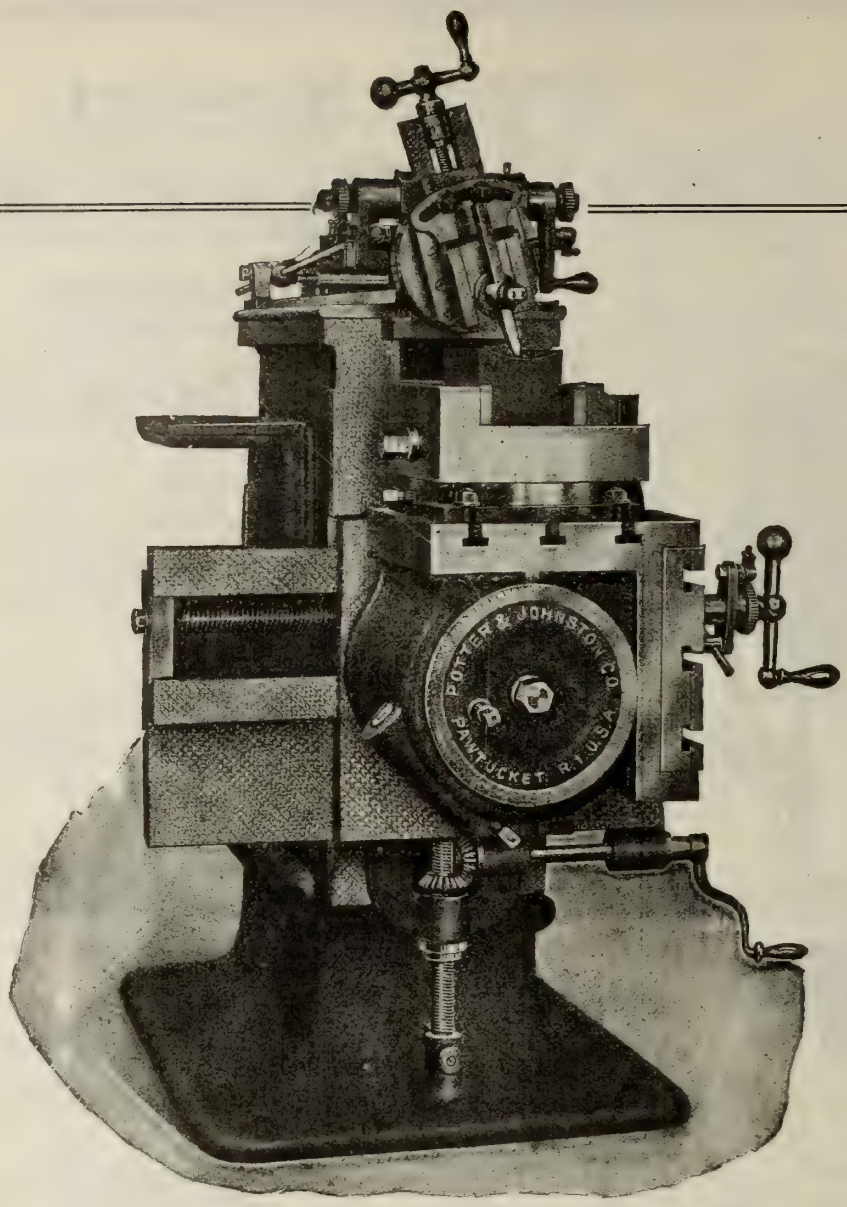
30-DAY TRIAL OFFER

All Stewart Furnaces are sold under positive guarantee of satisfactory performance; and we further show our faith in our products by offering to ship any stock size furnace, subject to acceptance after 30 days' trial.

Send for our catalogue.

Chicago Flexible Shaft Company

1148 So. Central Ave., Chicago, U.S.A.



Potter & Johnson 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnson Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA

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For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

CONSOLIDATED POWER PRESSES

The GRANT

Spins a Polished Rivet Head Every Second Without Noise

A dozen of these GRANT ROTARY RIVET SPINNING MACHINES going at full speed would not awake a light sleeper in the same room.

The GRANT is fast. In one second it will quietly spin a polished rivet head without breaking or in any way marring the casting. It will rivet tight or loose, as required. The GRANT boosts the output, cuts the cost, and turns out perfectly accurate work.

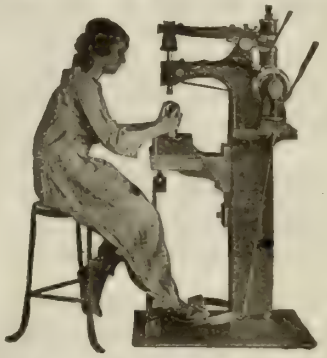
Pleased to tell you more about it. Write.

Grant Noiseless Rotary Rivet Spinning Machine

The Grant Mfg. & Machine Co.

Holland Ave., Bridgeport, Conn.

The Hammer With The Human Stroke



HEADS RIVETS COLD

Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:—

A rivet a second, sizes up to 3/16".
A rivet in two seconds, size ¼" to ⅜".
A rivet in three seconds, size 7/16" to ⅝".

And on special order we build machines to handle rivets up to 1½" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the High Speed Riveting Hammer does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

and

Let us shoulder your riveting problems.
Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.

ROCHESTER, N.Y.

THE TEST THAT SHOWS

When you can cut from a bar of about 20 carbon steel, reducing from 4 in. dia. to 2⅝ in., using a solid high speed tool and a European Tool Post, using in one feed .030 in. with a spindle speed of 41 R.P.M., cutting about 40 feet per minute, and in another feed .008, at a speed of 115 R.P.M., with a cutting speed of 110 feet per minute, cutting off about 8 cubic inches per minute, and the high speed tool will not stand up to any more,

It shows the Power of

The Lathe with the Pull. 18 Inch Geared Head.

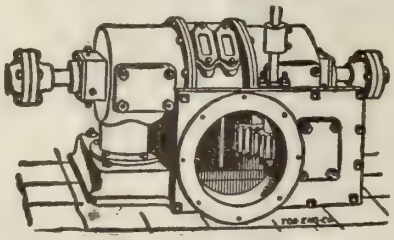
THERE IS NO MORE POWERFUL LATHE MADE THAN A CISCO

The Lathe of Simplified Accuracy

BUILT IN
14" - 16" - 18" - 24"
Engine or Tool Room
Cone Drive, Motor Drive, Geared Head
Motor Driven Geared Head

Made in
CINCINNATI, U.S.A.
by
THE CISCO MACHINE TOOL CO.

WATER POWER DEVELOPMENT



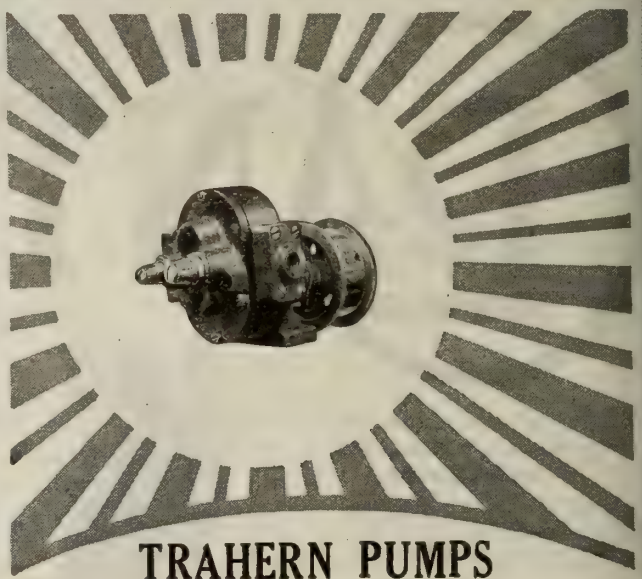
Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO



TRAHERN PUMPS

We positively guarantee that our pumps will deliver all the coolant that can be forced through the discharge opening, according to the size of the pump used, while operating from 300 to 500 R.P.M. A centrifugal pump delivering the same sized stream of lubricant must operate at a speed of at least 1000 R.P.M. This excessive rate of speed necessarily results in a short lived pump.

A Trahern operates at low speed and has long life.

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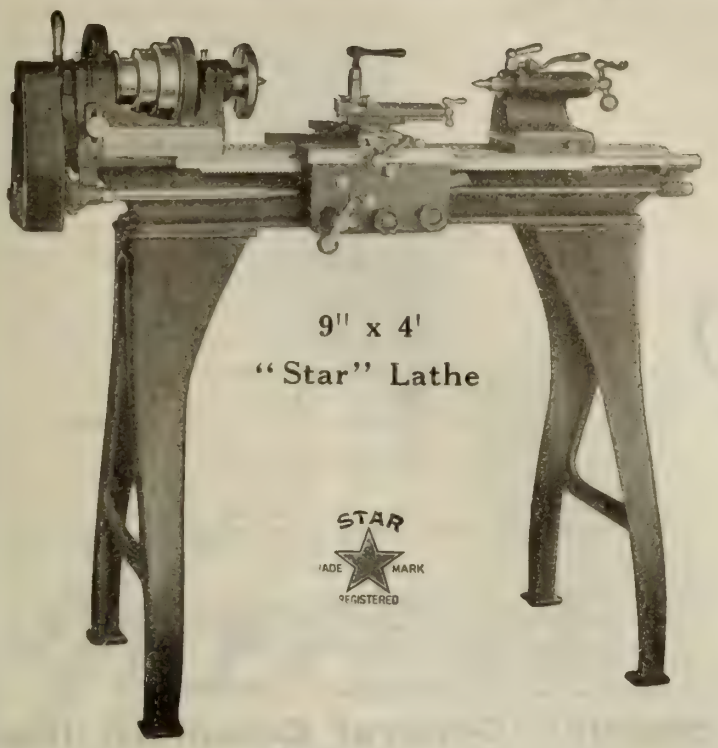
TRAHERN PUMP COMPANY
Rockford, Illinois

Canadian Agents: A. R. Williams Machy. Co., Toronto, Ont., Canada

Use a small lathe for your small jobs—



THINK

what a saving you can effect in space and overhead cost by using a small lathe for small work.

"STAR" LATHES

are built for small work

in tool rooms, scientific instrument shops, experimental departments and light, accurate commercial work generally. They are marvellous in their output and accuracy and very easily operated.

Drop us a line for new circular.

The Seneca Falls Mfg. Co., Inc.
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SPECIAL TOOLS

Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems

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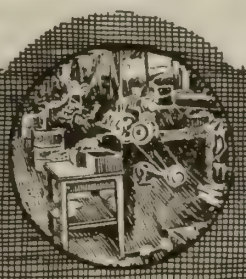


DUNBAR SPRINGS

ACCURACY ASSURED

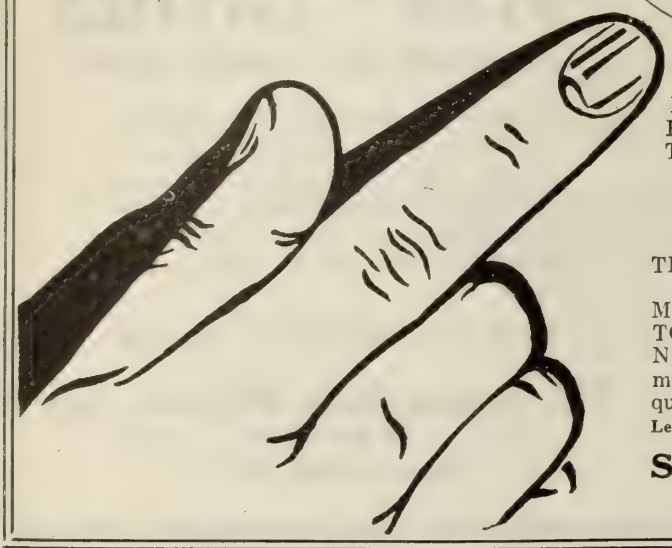
You can always depend upon Dunbar Springs being **accurate.** Before proceeding with any order the first few springs are carefully tested and checked up for this very purpose.

Seventy-two years' experience making flat and spiral springs of every description enables us to furnish you with springs of the highest quality, that can be depended upon under all conditions.

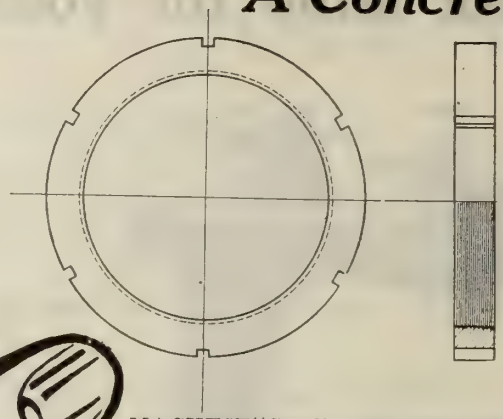
Send blue prints for estimates.

The Dunbar Brothers Co.
BRISTOL, CONN

Smalley-General Thread Miller Saves Time on Main Spindle Nut Work



A Concrete Example



A vital factor in competition to-day is speed in production. You need the Smalley-General Thread Miller for quantity work. Speed, convenience and accuracy are the features of this modern cost-cutter. The following time-study illustrates what it will do:

MACHINE—Smalley-General Thread Miller No. 2.
PIECE MACHINED—Main spindle nut.
THREAD—Diameter, 8"; length, 1¼"; 8 pitch U.S. Standard.
1. Work chucked.
2. Threaded surface milled from rough.
3. One side faced.
4. Put on mandrel. Turn other face and outside.

TIME—Milling operation, 1 min. 45 sec. Milling feed, 14.3" per min.
MATERIAL—Cast iron.
TOTAL TIME in thread miller, floor to floor, 3¼ min.
NOTE—Smalley-General Thread Miller Method involves no more chuckings than in a lathe and saves much time. Also quality of work better.

Let us tell you more about the "Smalley."

Smalley-General Company, Inc.
Bay City, Michigan
Canadian Agents—Rudel-Belmap Co., Limited, Montreal and Toronto.

MORSE DRIVES

Flexible as a belt Positive as gears
Longer life than either

Our engineers, experts in the art of designing chain drives, will gladly call and assist in solving any power plant transmission problem without obligation.

We are always glad to furnish special information pertaining to our field, and welcome inquiries.

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FACTS will Surprise You

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ASSISTANCE FREE

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"MORSE" is the guarantee always behind our Efficiency, Durability and Service

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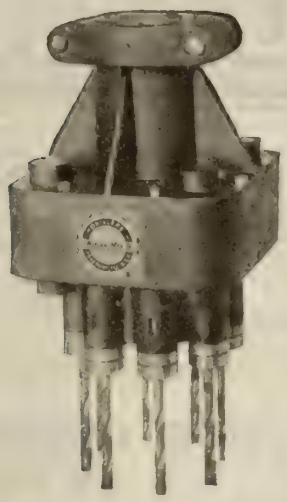
HEAVY HARDWARE
Mill Supplies Automobile Accessories
WE SHIP PROMPTLY

SMELTERS & WELDERS GOGGLES

We have a style to meet every requirement

Write for Catalogue
Consolidated Optical Company
Montreal Toronto Winnipeg Vancouver

2 Minutes or 20?



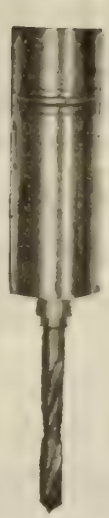
This Is The Vital Question

Do you drill ten holes in the time it takes for one? The Hoefer Auxiliary Head equips any driller so as to accomplish this big saving in time. It speeds up production in drilling tremendously. Not only do you save the drilling time, but also the time now lost in shifting the jigs and raising and lowering the spindle for the extra holes.

Hoefer Auxiliary Heads are made in any multiple, arranged in any manner, from 2 up. They are made by expert tool makers and unqualifiedly guaranteed to handle accurately the work for which they are designed.

Investigate now—every day you use a single drill where the multiple may be used you are paying for an auxiliary head through increased costs, but not securing its benefits.

Write for catalog. Send a blueprint of some of your work for estimate of time and cost.



THE HŒFER Mfg. Co., Freeport, Ill.

621 Washington Blvd., Phone Haymarket 2408, Chicago, Illinois; 1113 Citizens' Bldg., Phone Main 795, Cleveland, Ohio; 708 Empire Building, Phone Court 1911 or 1912, Pittsburgh, Pa.; 602 Kerr Building, Phone Cherry 2884, Detroit, Mich.; 30 Church Street, Phone Cortland 1615, New York City; Badger-Packard Mchy. Co., Milwaukee, Wisconsin; National Supply Co., Toledo, Ohio.

The Canadian Fairbanks-Morse Co., Limited

"Canada's Departmental House For Mechanical Goods"

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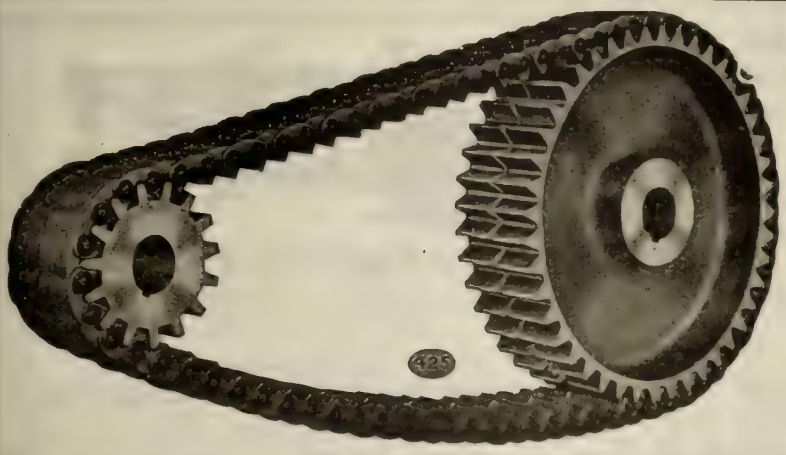

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POWER TRANSMISSION CHAINS

CANADIAN AGENTS FOR

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Patent Silent and Bush Roller Chains

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Rocker Joint Silent Chains

Chain Drives from ¼ H.P. to 5000 H.P. in successful operation

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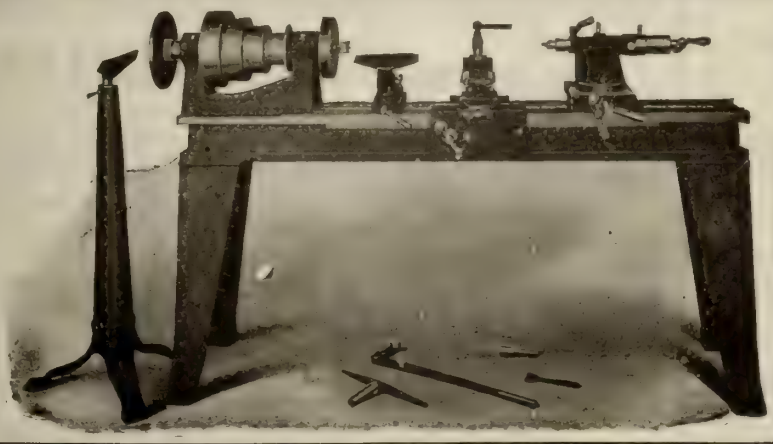

A Favorite—

Blount Pattern-makers' Lathe

FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catolog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

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All Kinds

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HEATING and PLUMBING CONTRACTOR
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MACHINE SHOP and BLACKSMITH WORK

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Machine Work Wanted for Lathes, Shaper, Milling Machine and Planer, etc.

Quotations given on all classes of work. Wrought Iron Pipe Bends made to order, ¼ to 8". Pipe Cut and Threaded, ⅛ to 12".

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FOR EVERY SERVICE

Bristol's Recording Pyrometer furnished with patented frictionless smoked chart recording system especially valuable for processes requiring continuous heat treatment.

Simplicity of construction and ruggedness make them ideal shop pyrometers. The ONLY pyrometer equipped with Weston milli-voltmeter movement.

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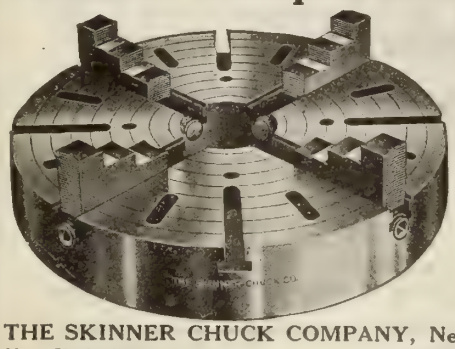

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The last word in chuck construction.

Wide jaws; hardened steel thrust bearings: adjusting screws of large diameter threaded full length; jaws ground after hardening, etc

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Factory and Main Office: New Britain, Conn.
London Office: 149 Queen Victoria Street
San Francisco Office: Rialto Building

THE WIRE IS PERFECTLY STRAIGHT
and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

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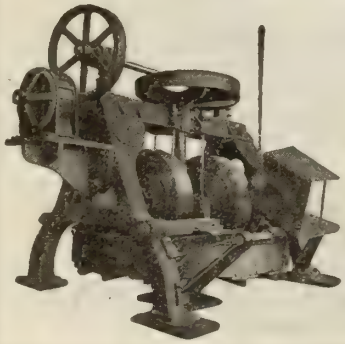
Formerly John Adt & Son. Established 1866.
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

Canadian Steel Foundries Need Frost Improved Sand Mills

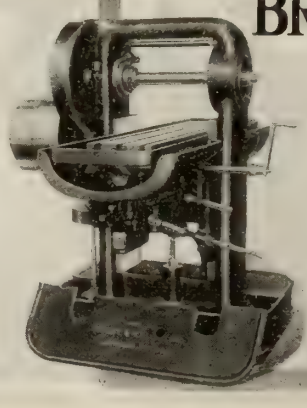


WINNING FEATURES

Heavy Mullers
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago

BRIGGS MILLERS



This Miller is breaking production records wherever introduced. It handles work no other machine of its size can touch and it does perfectly accurate work. Rigid, powerful, accurate.

We should like to show how "Briggs" adaptability and convenience can better output and lower costs for you. Get in touch with us.

Gooley & Edlund, Inc.
CORTLAND, N.Y.

FOREIGN AGENTS: Allied Machinery Co., of America, Paris, Turin, Zurich, Petrograd, Barcelona; Burton, Griffiths & Co., Ltd., London, Manchester and Glasgow; Andrews & George, Tokyo.

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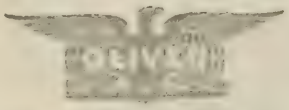

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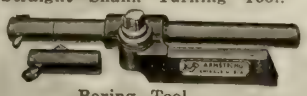

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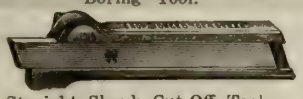

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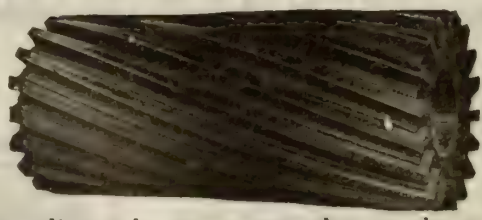

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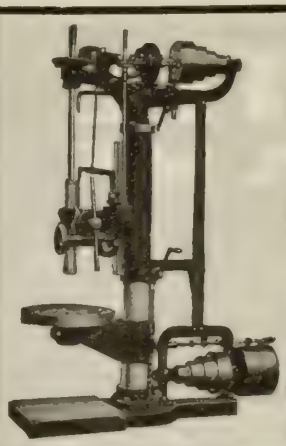

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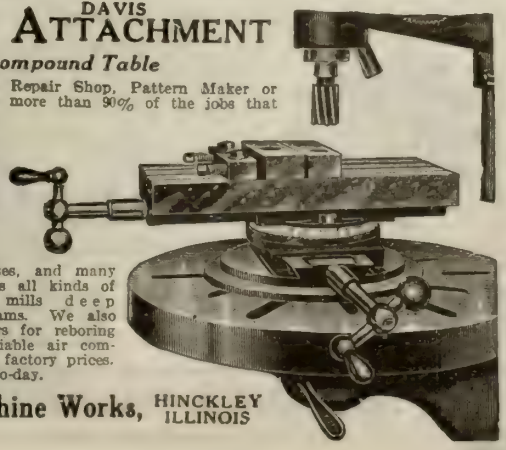

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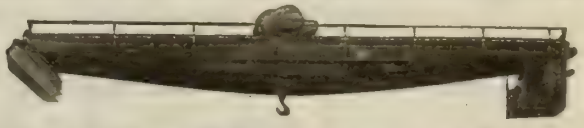

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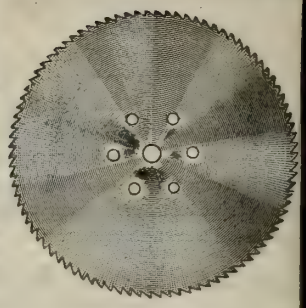

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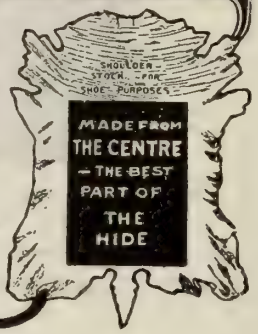

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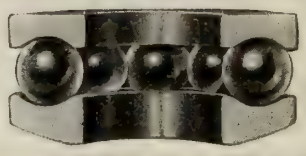

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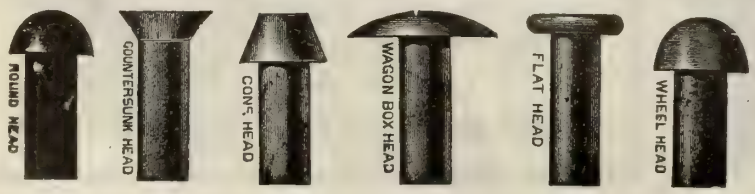

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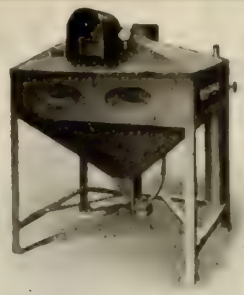

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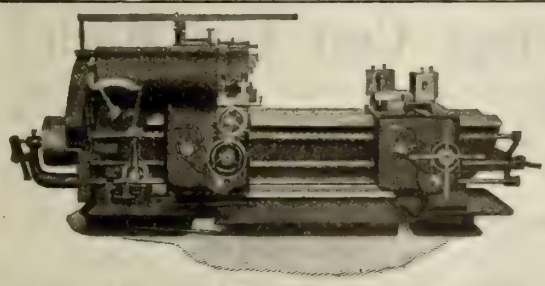

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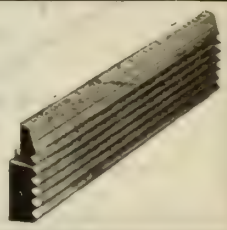

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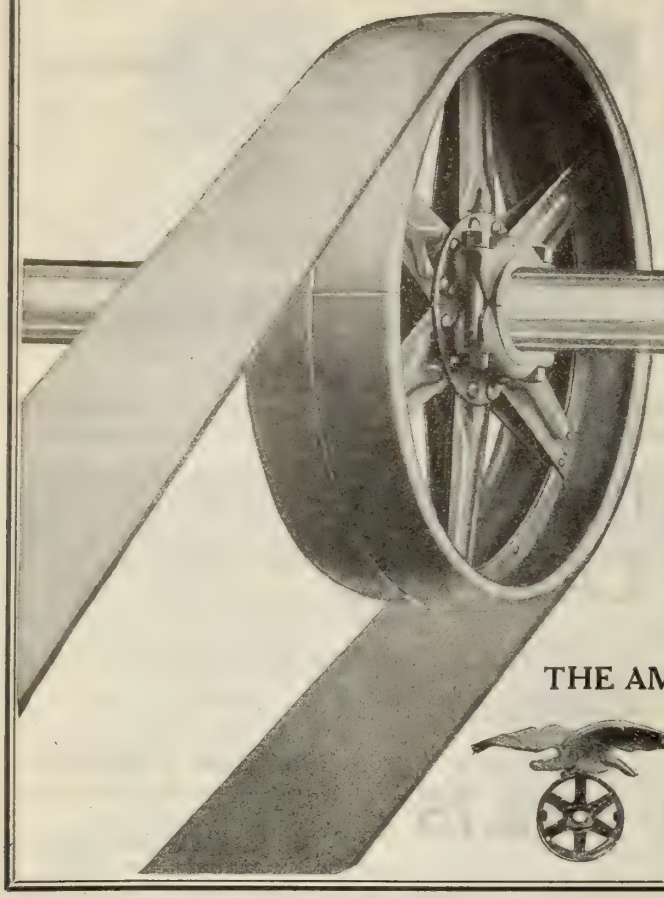

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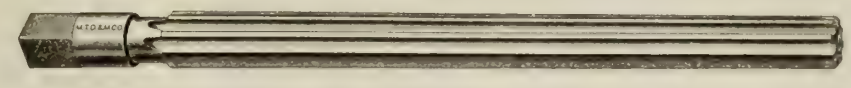

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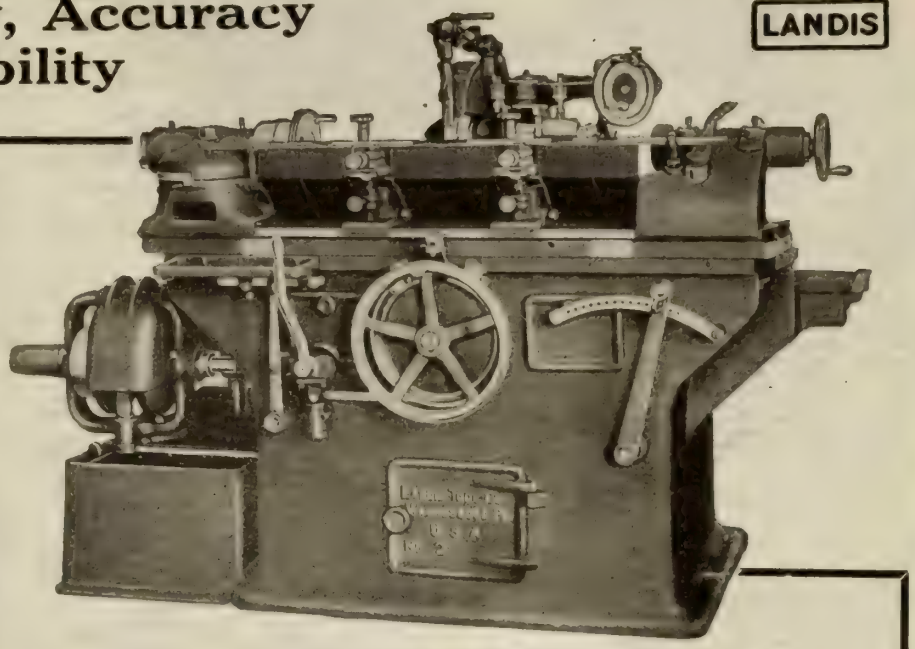

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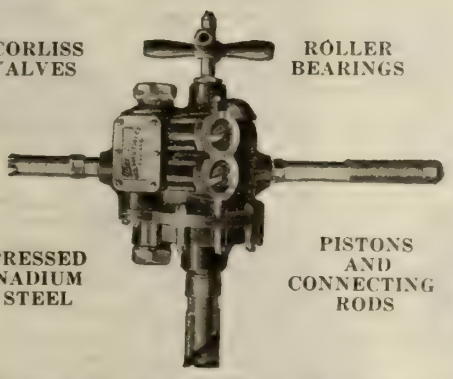

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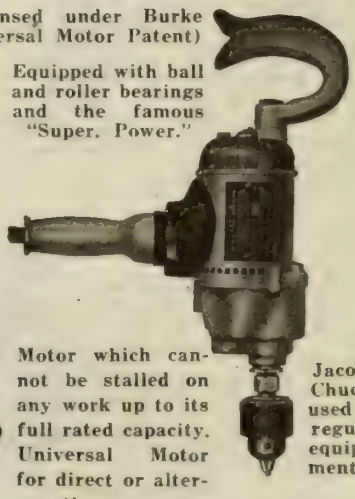

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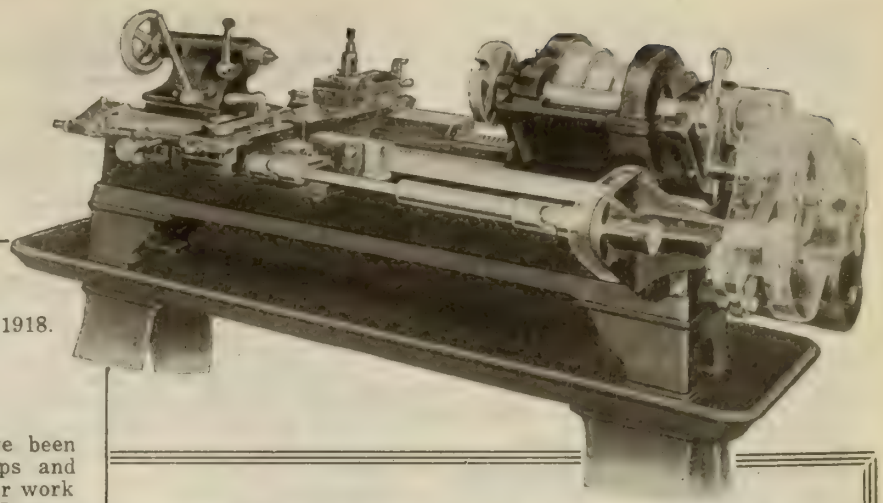
One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th, 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

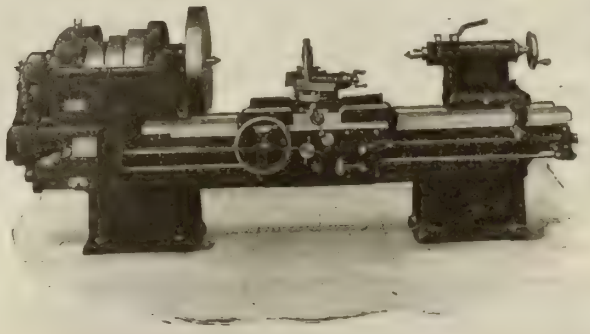
The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system. Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

SIDNEY

Sidney for Service

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohio

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

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Ingersoll File Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Marshall, Son & Bunney, Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
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Toronto Iron Works, Ltd., Toronto.

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Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

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Wells Bros. of Can., Galt, Ont.

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GASOLINE TANKS
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GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind

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GAUGES, FUSE HOLE
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Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
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Toronto Tool Works, Toronto, Ont.
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Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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Katie Foundry, Galt, Ont.

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Williams & Wilson, Ltd., Montreal, Que.

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Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
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Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

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Grant Gear Works, Boston, Mass.
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Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
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Morse Twist Drill & Machine Co., New Bedford.
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Gardner Machine Co., Beloit, Wis.
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Garvin Machine Co., New York.
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Modern Tool Co., Erie, Pa.
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Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
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Taps, Dies & Reamers

Butterfield Tools assure the utmost in accuracy and they take heavy cuts with an ease and speed that make the best material look soft.
Let us make you acquainted with them now by sending a trial order.

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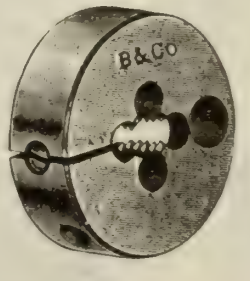

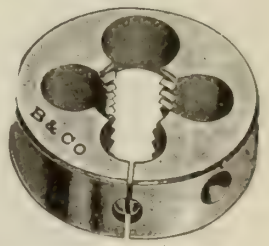

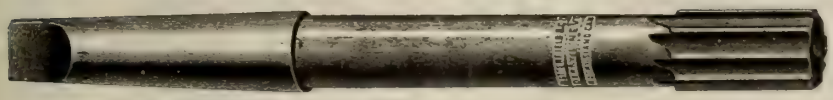

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Wisconsin Electric Co., Racine, Wis.
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Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Diamond Saw & Stamping Works, Buffalo, N.Y.
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Ford-Smith Machine Co., Hamilton, Ont.
McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
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Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Canadian Billings & Spencer Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
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A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Limited, Montreal, Que.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
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Matthews, Jas. H. & Co., Pittsburgh, Pa.

HAMMERS, NAIL MACHINE
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HAMMERS, STEAM
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Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
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Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

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HEAT TREATMENT OF STEE L
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HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

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Strong, Kennard & Nutt Co., Cleveland, Ohio.

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General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

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Albany Hardware Spec. Co., Albany, Wis.

HIGH SPEED TOOL METAL
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J. F. A. Comstedt, New York City, N.Y.

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Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES
London Bolt & Hinge Works, London, Ont.

HOBS
Greenfield Tap & Die Corp., Greenfield, Mass.
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Can. Matthews Gravity Carrier Co., Toronto, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, CHAIN AND PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, ELECTRIC
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

HOOKS, BELT LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

HOPPERS
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

HOSE, PNEUMATIC
Baxter & Co., Ltd., J. R., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

HOSE, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

HYDRAULIC MACHINERY
Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.
Williams & Wilson, Limited, Montreal, Que.

HYDROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

INDICATORS, SPEED
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
Fred C. Dickow, Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal, Que.

INDICATING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

INGOT METAL
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
United Brass & Lead Ltd., Toronto.

INGOTS, STEEL
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

INGOTS, FORGING AND ROLLING
Electric Steel & Metals Co., Welland, Ont.

INSTRUMENTS, ENGINEERING
Consolidated Optical Co., Toronto, Ont.

IRON GREY
Brockville Foundry Co., Brockville, nt.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

IRON SAND
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

IRON, WROUGHT, ROLLED AND PIG
Swedish Steel & Importing Co., Ltd., Montreal.

IRREGULAR CUTTING SHEARS
Quickwork Co., St. Marys, Ohio.

JACKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK
Canadian Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

JAWS, FACE PLATE
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JOINTERS
The Gray Ball Bearing Co., Ltd., Toronto.

JIGS, TOOLS, ETC.
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt.
Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.

JOURNAL WEDGES
Canada Foundries & Forgings, Ltd., Welland, Ont.

KEY SEATERS
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

KEYS, MACHINE
Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

KILNS
Can. Blower & Forge Co., Kitchener, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

KNIFE GRINDERS
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LABELS AND TAGS
Matthews, Jas. H. & Co., Pittsburgh, Pt.

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Northern Crane Works, Walkerville.

LACING MACHINES
Clipper Belt Lacer Co., Grand Rapids, Mich.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

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Acme Machine Tool Co., Cincinnati, Ohio.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHE CHUCKS (SEE CHUCKS)

LATHE DOGS AND ATTACHMENTS
Armstrong Bros. Tool Co., Chicago.
Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

LATHES, AUTOMATIC AND SEMI-AUTOMATIC
Gisholt Machine Co., Madison, Wis.
Wood Turret Machine Co., Brazil, Ind.

LATHES, AXLE
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, BORING
Bridgeford Mach. Tool Wks., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Blount, J. G., & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, BAND TURNING
Roelofson Machine & Tool Co., Toronto, Ont.

LATHES, BRASS
Acme Machine Tool Co., Cincinnati, Ohio.
Hardinge Bros., Inc., Chicago, Ill.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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Acme Machine Tool Co., Cincinnati, Ohio.
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Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.

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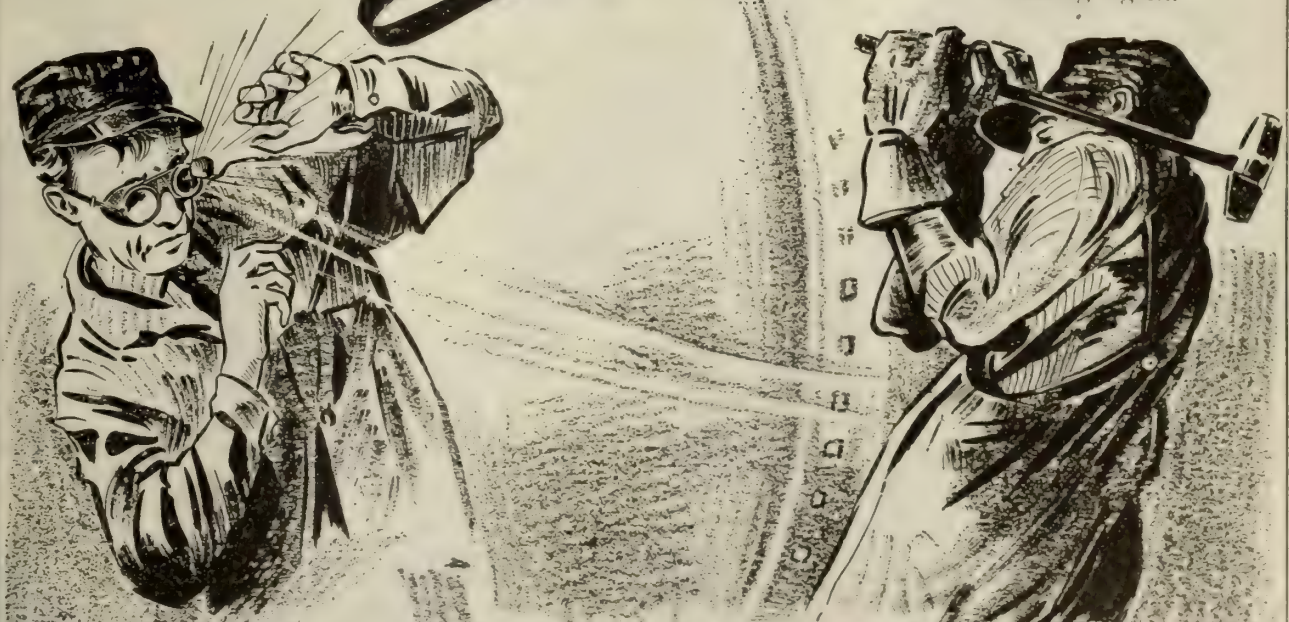

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Gisholt Machine Co., Madison, Wis.
Kennedy & Sons, Wm., Owen Sound, Ont.
R. McDougall Co., Galt.
Miles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
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Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Sidney Tool Co., Sidney, Ohio.
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Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blasdell Mach. Tool Co., Worcester. Mass.
A. R. Williams Machy. Co., Toronto.
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LATHES, HORIZONTAL
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Garlock-Walker Machy. Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Bertram, John, & Sons Co., Dundas Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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Bertram, John, & Sons Co., Dundas, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Whitcomb-Blaisdell Mach. Tool Co., Worcester Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

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Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TURRET, HAND, HORIZONTAL
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram, John, & Sons Co. Dundas Ont.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
H. C. Dodge, Inc., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
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Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

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Standard Optical Co., Geneva, N.Y.

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Can. Winkley Co., Ltd., Windsor Ont.

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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

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Williams & Wilson, Limited, Montreal, Que.

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LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

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The Thos. Pink Co., Ltd., Pembroke, Ont.

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Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

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Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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National Automatic Tool Co., Richmond, Ind.

MACHINERY, TRANSMISSION (POWER)
Morse Chain Co., Ithaca, New York.

MACHINES, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, ROLLING AND BENDING
Stoll Co., Inc., The D. H., Buffalo, N.Y.

MACHINES, RUNNING, BALANCING
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MACHINES, MULTI-BORING
National Automatic Tool Co., Richmond, Ind.

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Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MACHINE TOOLS
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Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford. Mass.
Pratt & Whitney Co., Dundas, Ont.

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Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
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The Geo. F. Foss Mchy. & Supply Co., Montreal
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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Hoefer Mfg. Co., Freeport, Ill.

METAL SAWS, POWER
Hoefer Mfg. Co., Freeport, Ill.

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Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

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Can. Winkley Co., Ltd., Windsor, Ont.

METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
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Almond Mfg. Co., T. R., Ashburnham, Mass.
Taylor, J. A. M., 315 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Frost Mfg. Co., Chicago, Ill.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
The Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co. Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING TOOLS
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Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto
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Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
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Garvin Machine Co., New York.
MULTI-DRILLING MACHINERY, VERTICAL AND HORIZONTAL
The National Automatic Tool Co., Richmond, Ind.
MULTI-BORING MACHINES
The National Automatic Tool Co., Richmond, Ind.
MULTI-TAPPING MACHINERY, VERTICAL AND HORIZONTAL
The National Automatic Tool Co., Richmond, Ind.
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Graham Nail Works (operated by Canada Metal Co., Ltd.), Toronto.
Page Steel & Wire Co., Adrian, Mich.
NAIL SETS
Morrow Screw & Nut Co., John, Ingersoll, Ont.
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Sleeper & Hartley, Inc., Worcester, Mass.
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Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.
Turner Brass Works, Sycamore, Ill.
NICHROME CASTINGS
Can. Driver-Harris Co., Ltd., Walkerville, Ont.
NICKEL
Boker & Co., Inc., H., Montreal, Que.
NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
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Williams & Wilson, Limited, Montreal, Que.
NITROGEN
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National Machy. Co., Tiffin, Ohio.
NUT FACING AND BOLT SHAVING MACHINES
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Landis Machine Co., Waynesboro, Pa.
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Oliver Machinery Co., Grand Rapids, Mich.
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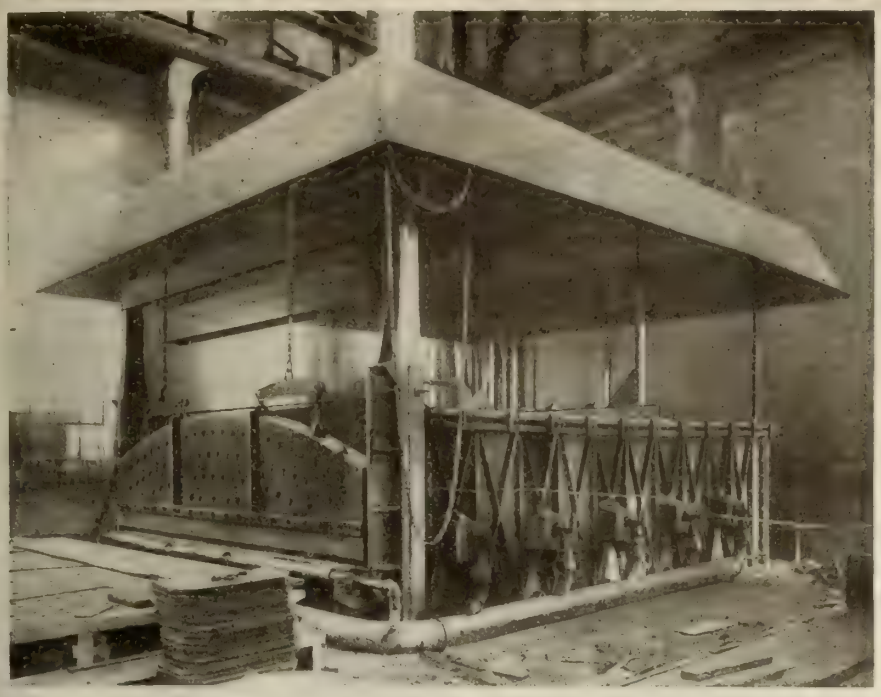

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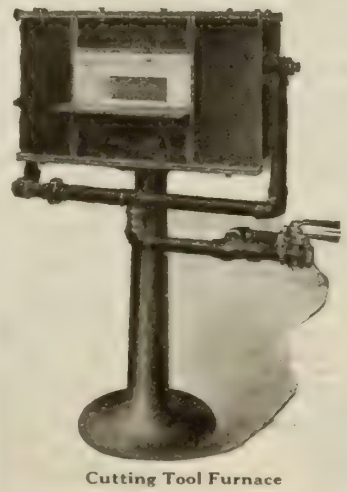

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Why was Trotzky allowed to leave Canada?

Colonel MacLean discusses this question in the June issue of MACLEAN'S MAGAZINE. He tells the story of Trotzky's activities, of his arrest and subsequent release in full detail, tracing the threads of a strange intrigue from Germany to Washington, and Washington to Ottawa. It is a gripping story, the most important inside story of the war.

Other National Features of This Issue

"Victory Stuff" By Robert W. Service.

"Solving the Problem of the Arctic" By Vilhjalmur Stefansson.

"The Gold Wolf" By W. A. Fraser.

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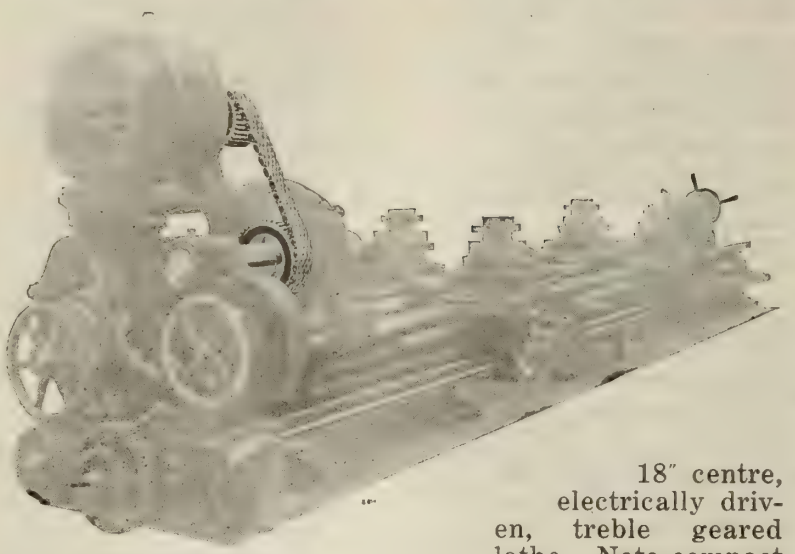

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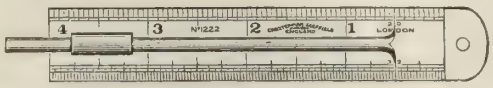

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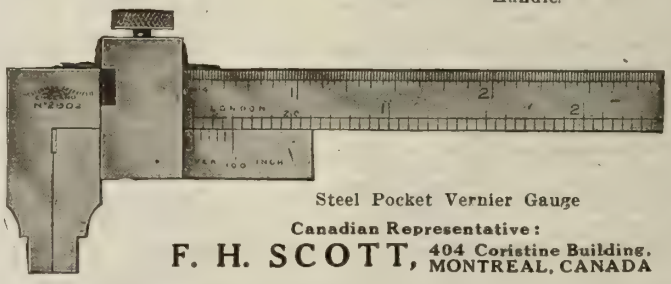

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CANADIAN MACHINERY

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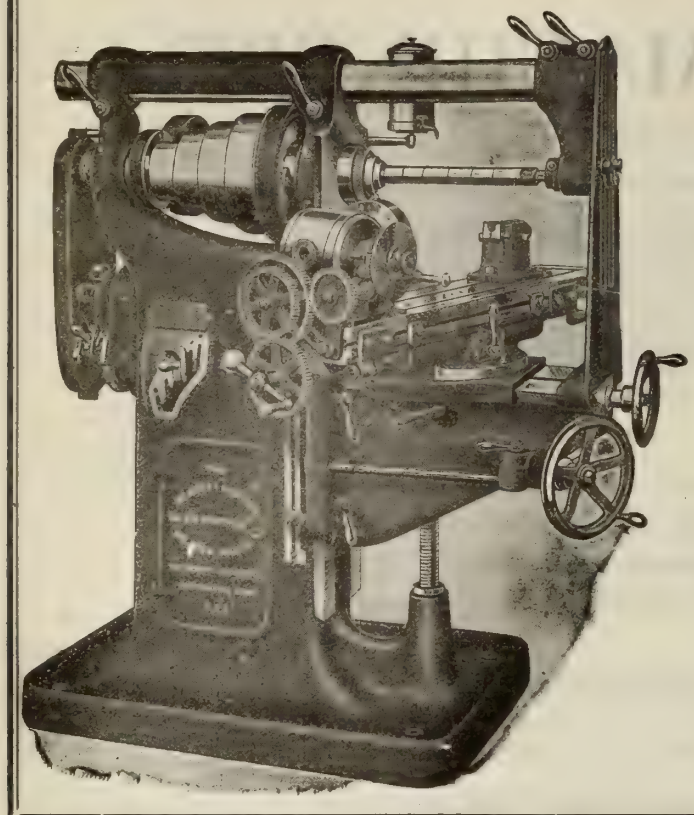
Anybody Can Operate This Miller



and Turn Out a Pile of Work so Simple to Operate is the

"HENDEY"

Skilled mechanics are scarce these days—but anyone can run a machine of its simplicity and turn out work accurately and fast without trouble.

All Feeds positive driven through gearings giving 18 changes.

This is the universal type—designed to handle all milling operations performed on machines of this character, either with regular equipment or by aid of attachments, which can be supplied for increasing efficiency and scope of machine.

Write for full description

The Hendey Machine Co.

Torrington, Conn., U.S.A.

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Tungsten
Hack Saw Blades

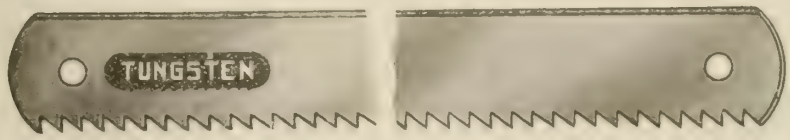
These TUNGSTEN HACK SAW BLADES have been in operation in the largest cutting-off plants in Canada, working on all classes of steel, iron pipe, aluminum, brass, copper, etc., and have never yet been known to fail. They master all cutting-off difficulties. Efficiency and economy are the two things that every manufacturer is working for to-day, and TUNGSTEN HACK SAW BLADES, from this standpoint, are the best that can be bought.

In ordering blades be sure to specify just what work they are expected to do so that we can furnish a blade that will exactly suit your requirements.

FLEXIBLE BLADES FOR HAND USE

HIGH SPEED HEAVY POWER BLADES

For "Racine" and all heavy duty machines.



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The Geo. F. Foss Machinery & Supply Co., Limited

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Foss MACHINERY AND MILL SUPPLIES

C.M.C.

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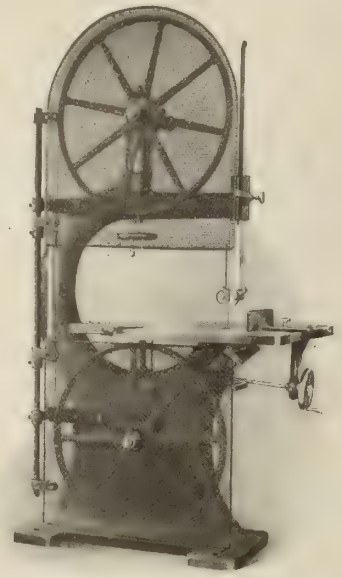
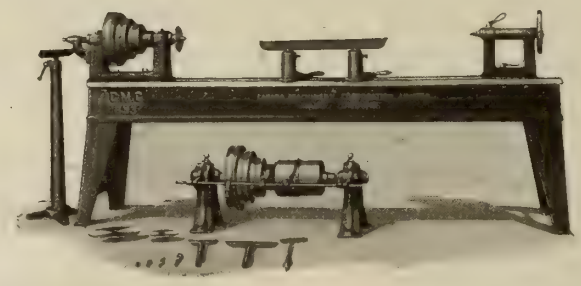
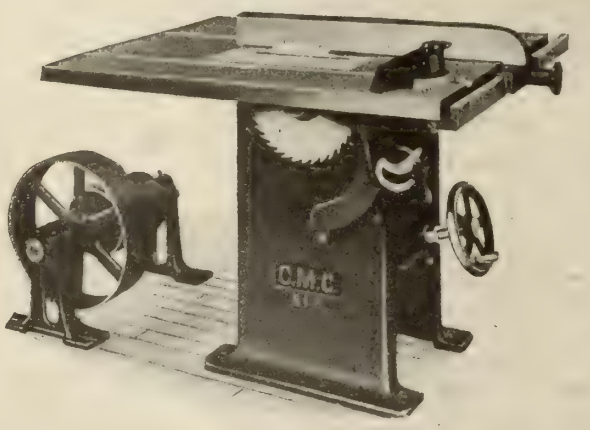


No. 714 Band Saw with guards

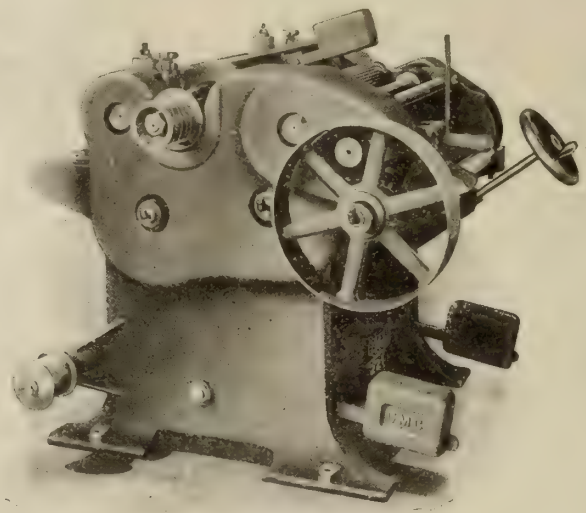


No. 833 Wood Turning Lathe

We manufacture a line of woodworking machines which are specially adapted for use in pattern shops and technical and training schools. We cannot display them all here but would be pleased to furnish you with particulars of any other machines in which you may be interested.



No. 617 Variety Saw



No. 221 Heavy Pony Planer

C.M.C. Machines are guaranteed.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: Brock Avenue Subway

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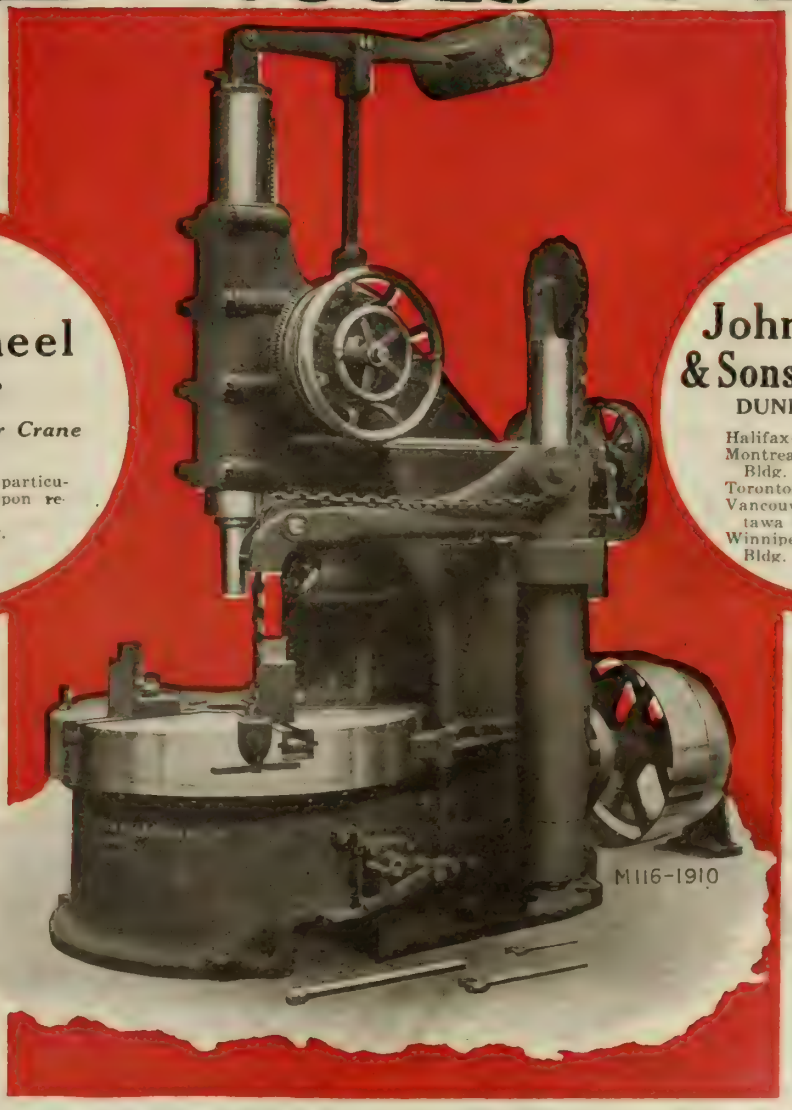
CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXI. No. 26. Publication Office: Toronto, June 26, 1919 Subscription Price $3.00 per Year

BERTRAM MACHINE TOOLS



42" Car Wheel Borer

Equipped with Air Crane for Wheels

Photograph and full particulars gladly mailed upon request.

Write us now.

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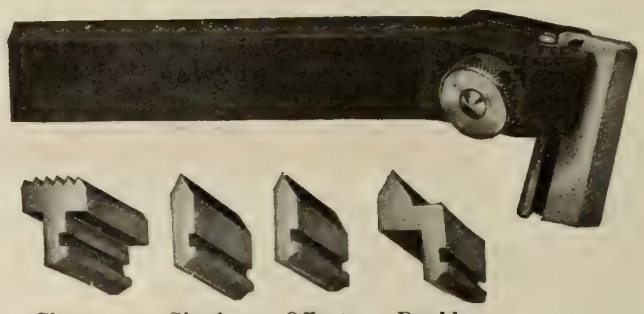

Chaser | Single Point | Offset | Double Onset

Uses the same holder for chasers and single point cutters. The change can be made in a jiffy.

A few of its advantages:

- Threads can be cut very close to shoulder.
- Tools are sharpened by simply grinding off top of cutter.
- Combines economy with all features essential in a threading and forming tool.
- Cutters have 15 deg. clearance, which experience has taught gives the longest wear in various metals.

PROMPT SERVICE

is assured at our nearest office. Place your order there to-day.

PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

Precision Machine Tools

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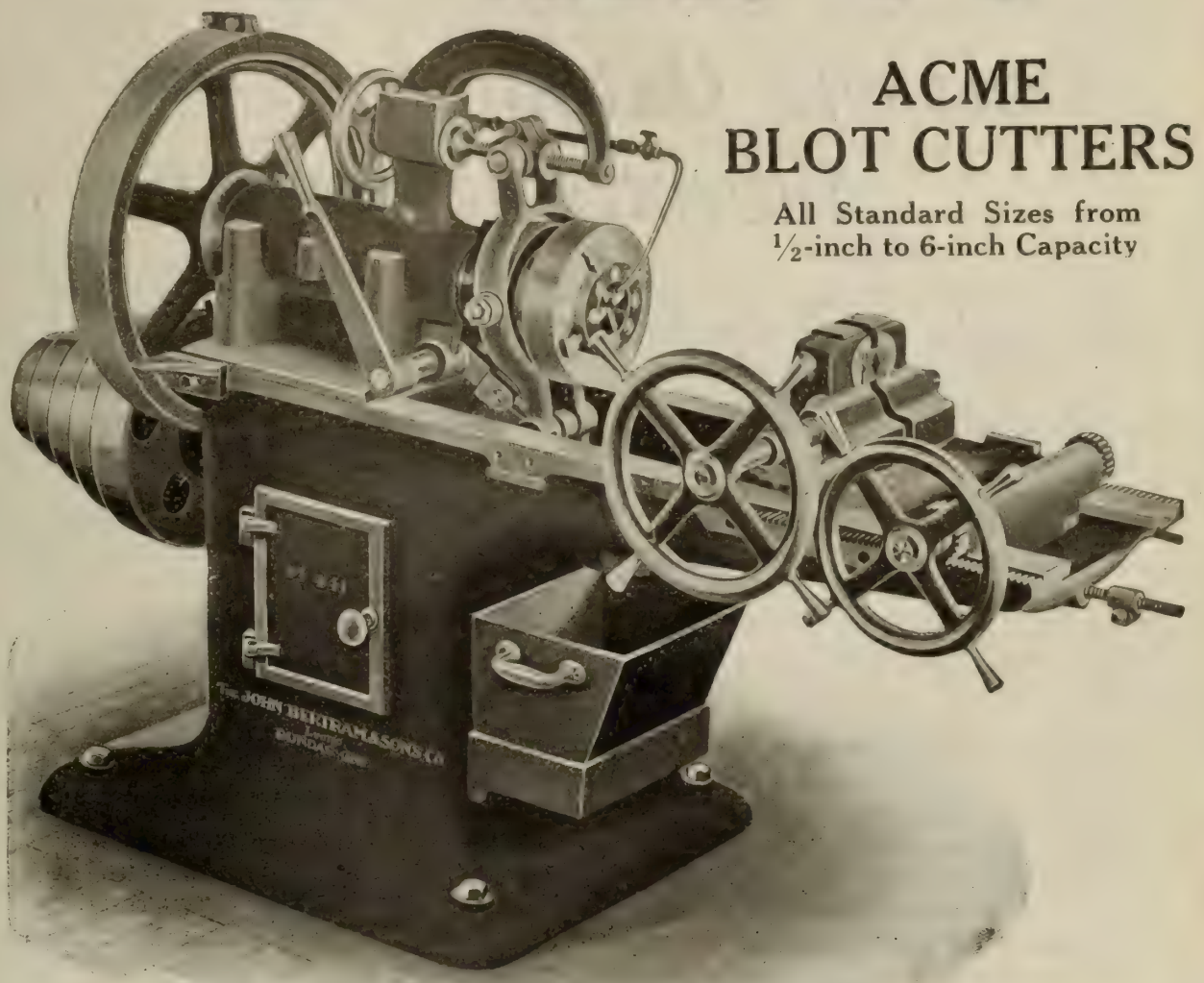
ACME BLOT CUTTERS

All Standard Sizes from
½-inch to 6-inch Capacity



Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of Pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE
OR MACHINES IN WHICH YOU ARE INTERESTED

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Limited
DUNDAS, ONTARIO, CANADA

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The Publisher's Page

TORONTO JUNE 26, 1919

Oversold Output Is Advertising Impetus

AMONG the factors which make advertising such a dominant force in American business is the faith of the largest investors in the printed word.

It wasn't so long ago—as a matter of fact has the time really passed?—that a manufacturer curtailed his advertising because his factory was oversold. The old cry, "Nothing to advertise; I'm flooded with orders," ruled.

Fortunately for the manufacturer, this view has given way to sound merchandising. The advertiser to-day sees the value and necessity of intrenching himself in the market he has won, even though the counter attack of his competitor seems far off, even improbable.

Back in the days when the world was engaged in position warfare it was a principle that a portion of captured line must be **consolidated** without delay. The whole idea was this—a section of the enemy's line had been captured, but that enemy's dominant purpose was to reform his forces and counter attack. Sometimes the position was lost and taken a dozen times.

This necessity of consolidation, of digging in and preparing for the counter thrust, exists in business. And the more important the position held, the more tempting is the counter attack desire.

The Goodyear Tire & Rubber Company recently threw a bulwark of newspaper pages between its business and competition. This concern advertised that in spite of an output increased to an average of 24,536 finished tires a day, it had been impossible to meet existing demand for its product.

The consumer is told that the Goodyear Company regrets its inability to serve all of its customers, despite its increased production.

The dealer is not neglected. The consumer is asked to overlook any shortage in the dealer's stock because of the impossibility of keeping that stock complete. This is another link in a remarkably fine consolidation.

All this goes to show that this keen advertiser knows that it does pay to advertise aggressively even though the factory output is sold out a long way ahead.—Printers' Ink.

Canadian Machinery and Manufacturing News, June 26th, 1919. Vol. 21, No. 26. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as Second-Class Matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.

STEEL & IRON
PRODUCTS
OF
EVERY DESCRIPTION
Quality
Service
THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON
MONTREAL

Algoma Steel Corporation LIMITED

Sault Ste. Marie, Ontario.

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

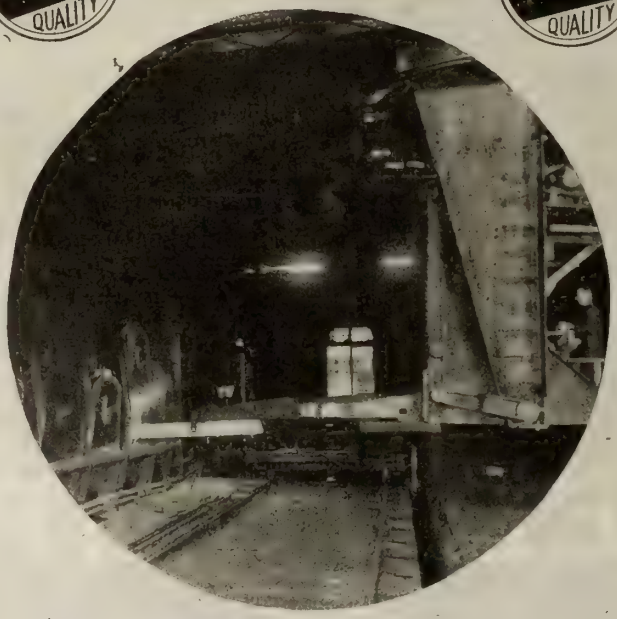
SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

MARK OF ALGOMA O.H. QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

MARK OF ALGOMA O.H. QUALITY

BLOOMS, BILLETS, SLABS,

STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORAT ION FROM THE WATERFRONT

BRIDGEFORD

Big Chips Mean Big Production

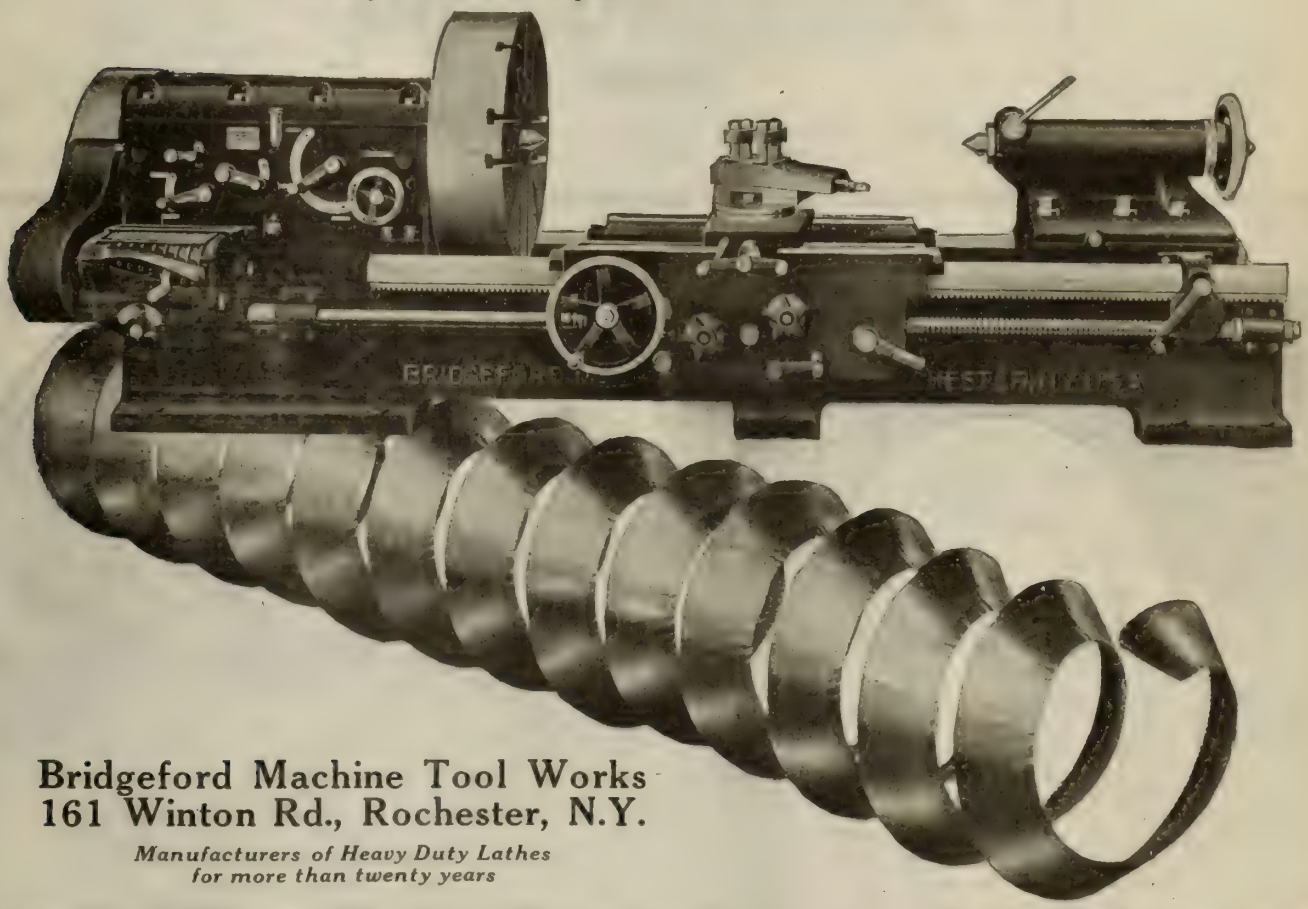
The chip shown below was taken on a "Bridgeford" from the first rough turning of a 50 point carbon steel forging in one of the prominent American plants. The feed was 1/8" and the depth of cut 7/8" at a speed of 55' per minute.

Chips like these are not unusual, as the Bridgeford is a glutton for work, taking deep cuts, with a heavy feed, working sometimes day and night and still retaining its accuracy for thread cutting and finish cuts.

Big chips mean production and you can always depend upon a Bridgeford for accuracy, production and consistent service.

One well-known manufacturing plant has 200 reasons for being satisfied with Bridgefords.

There's a Bridgeford for every heavy duty lathe requirement. If you have a lathe problem, put it up to Bridgeford. Facts and figures cheerfully furnished on request.

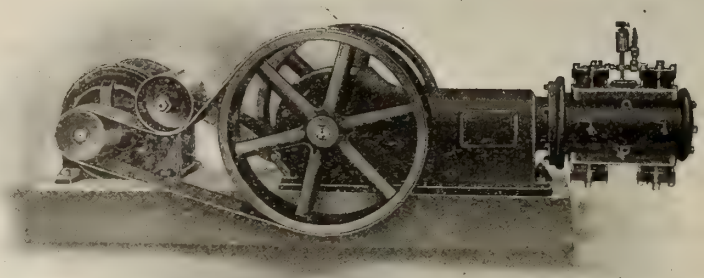


Bridgeford Machine Tool Works
161 Winton Rd., Rochester, N.Y.

Manufacturers of Heavy Duty Lathes for more than twenty years

BRIDGEFORD

COMPACTNESS



This 10" x 8" Air Compressor takes up a space of 11'-0" x 3'-0", motor and all

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO. ESTABLISHED 1900
Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company Montreal Que.

Strong in the Neck

WILT

Machine shop foremen and superintendents who invariably specify **"WILT"** when requisitioning tools know **WILT Drills** are superior—are absolutely guaranteed against defective material and workmanship—are rigidly inspected before being shipped. To produce more, use **WILT Drills.** To produce more economically, use **WILT Drills.** Elimination of breakage alone will save you much.

WILT

HIGH SPEED AND CARBON TWIST DRILLS

WILT TWIST DRILL CO.

OF CANADA, LIMITED

Walkerville. Ontario.

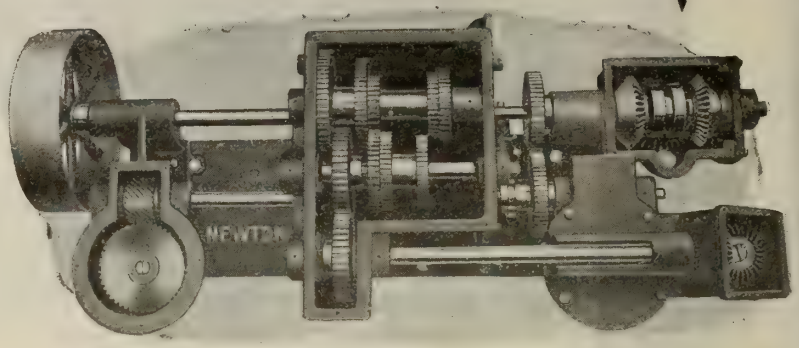
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C.2, Eng.

"Where there's a WILT, —there's the Way."

THE JOHNSON FRICTION CLUTCH

OVER THERE

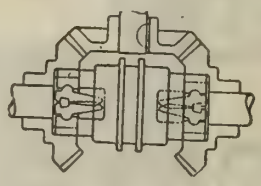
is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.



Courtesy of Newton Machine Tool Works, Philadelphia, Pa

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads., note the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are your requirements?



Double Clutch in Nest of Gears.

Our Yellow Data Sheets are free. Send for some.

AGENTS: CANADA—Williams & Wilson, 84 Inspector St., Montreal; The Canadian Fairbanks-Morse Co., Limited, Montreal and Branches. ENGLAND—The Efandem Co., Limited, 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth St., Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud; 18 Fauborg du Temple, Paris.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

E&M

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Steel Castings

High Grade STEEL Castings

Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

GSC

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

Milwaukee, Wisconsin

DETROIT—823 Dime Bank Building

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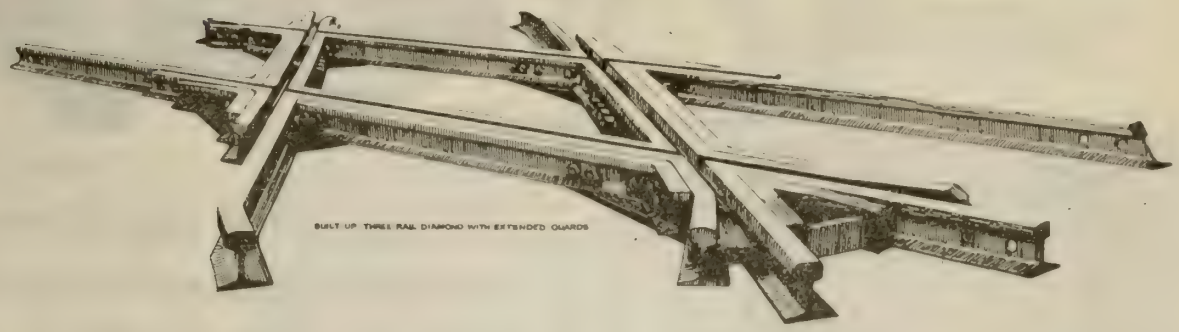
OF ALL KINDS FOR STEAM AND ELECTRIC RAILWAYS

Built-up, Hard-Centre and Solid Manganese-Steel

Manufacturers of Balkwill Articulated Cast Manganese Crossings



CANADIAN
STEEL FOUNDRIES
LIMITED

Transportation Building, Montreal

Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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ELECTRIC STEEL CO.
LATROBE, PA.

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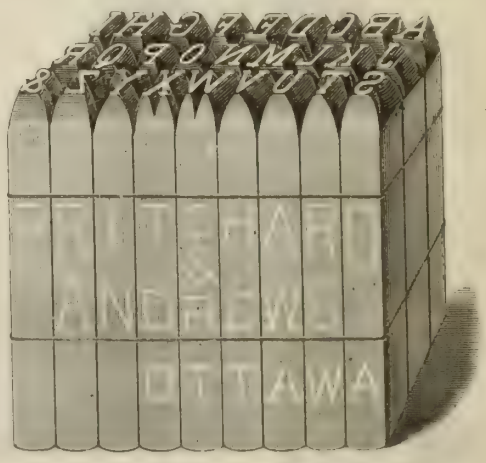
Uranium



STEEL STAMPS

FOR MARKING ALL CLASSES OF METAL WORK

We will Give You Satisfaction on all Work of this Kind.

Send for Prices

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General Engravers and Die Sinkers
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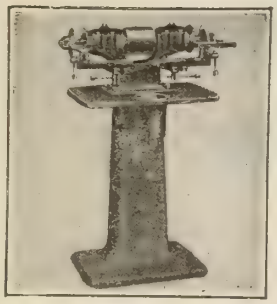
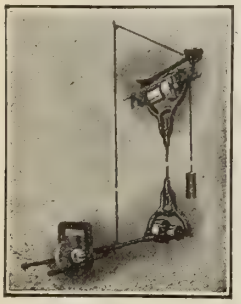


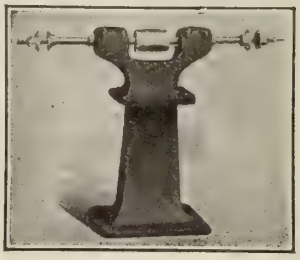
General Purpose Grinder

Water Tool Grinder

Heavy Type Floor Grinders



Swing Grinder



Polisher and Buffer

Modern, rigid, well-balanced machines that give real grinding service.

Manufactured by

The Ford - Smith Machine Co.
LIMITED
HAMILTON, ONT. - CANADA

CLEANLINESS CAPACITY

EFFICIENCY DURABILITY

A Time Tried and Proven Economy Bearing Primarily Built for Line Shafting

THE ESTEEM in which CHAPMAN DOUBLE BALL BEARINGS are held is born of a certain and intimate knowledge of their superiority in actual service and power saving ability, an estimation which is highest among over 4,000 plants using them.

A Few of the Many Well Known Plants Using Chapman Double Ball Bearings

Pierce-Arrow Motor Car Co.....Buffalo, N.Y.
Bethlehem Steel Co.....South Bethlehem, Pa.
Ford Motor Co.....Walkerville, Ont.
International Harvester Co.....Hamilton, Ont.
Goodyear Tire & Rubber Co...Bowmanville, Ont.
Canadian Rand Co.....Sherbrooke, Que.

Chapman Double Ball Bearings are built so as to fit any hanger frame.
They reduce power costs 15% to 40%.
They are entirely drip proof.
They are dust and dirt proof.
Require lubrication once a year.
They increase production.

Send for Catalog No. 3-B and Proof

The Chapman Double Ball Bearing Co., Limited

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The Transmission Ball Bearing Co., Inc.
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Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

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Head Offices:
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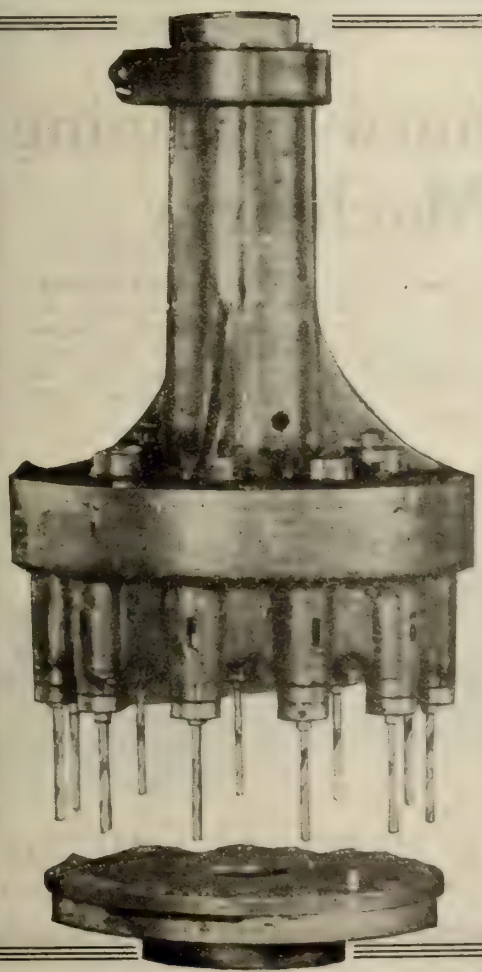
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process



SPEED UP THE WORK

Rising costs are knocking the bottom out of profits these days!
Materials and labor are up. No chance to reduce them. But you can speed up your work. The Hoefer Manufacturing Company has a proposition that will cut your drilling cost. Not guesswork, either, but on a basis proved by experience.
By using Hoefer Auxiliary Heads you can drill ten, twelve or more holes in the same time as one. Not only do you save the drilling time, but also the time lost shifting the jigs and raising and lowering the spindle for the extra holes.
360 manufacturers, 99 distinct lines of business—probably some of your competitors—employ Hoefer Auxiliary Heads to increase profits. They say the Hoefer Auxiliary Heads pay for themselves in 30 to 60 days.
Hoefer Auxiliary Heads are made in any multiple, arranged in any manner, from 2 up. Made by expert toolmakers and guaranteed to handle accurately the work for which they are designed.
Investigate now. Stop the leakage of dollars due to the use of single drills. Write for catalog and send blueprint of some of your work for estimate of time and cost.

The Hoefer Mfg. Co., Freeport, Ill.

621 Washington Blvd., Phone Haymarket 2408, Chicago, Illinois; 1113 Citizens' Bldg., Phone Main 795, Cleveland, Ohio; 708 Empire Bldg., Phone Court 1911 or 1912, Pittsburgh, Pa.; 602 Kerr Bldg., Phone Cherry 2884, Detroit, Mich.; 30 Church Street, Phone Cortland 1615, New York City; Badger-Packard Mchy. Co., Milwaukee, Wisconsin; National Supply Co., Toledo, Ohio.

The Canadian Fairbanks-Morse Company, Limited
"Canada's Departmental House for Mechanical Goods"
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HŒFER Auxiliary Heads

MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times.

Are your Tools made of Red Cut?

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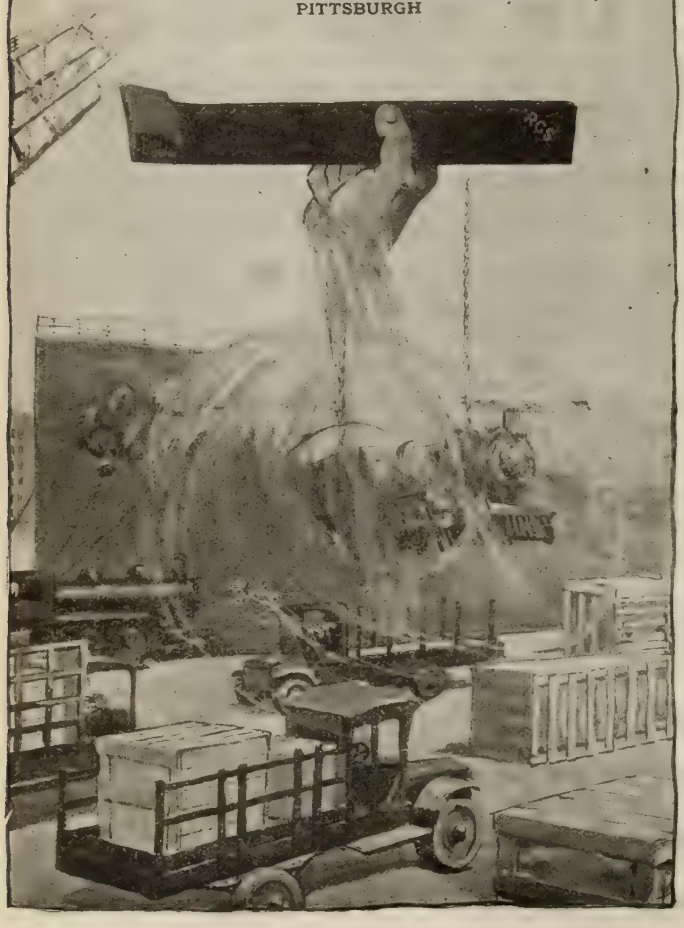
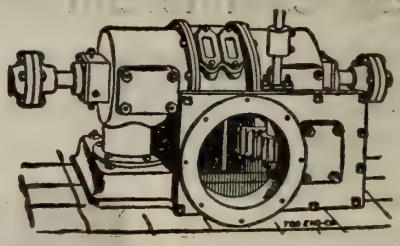


WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

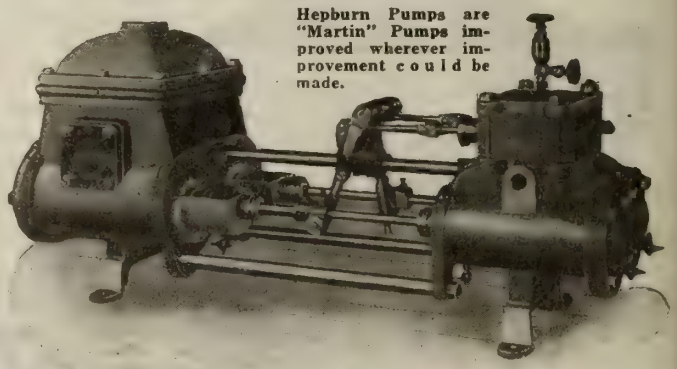
We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



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18-60 Van Horne Street Toronto, Ontario

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DON'T RATTLE

USE — A — WRENCH

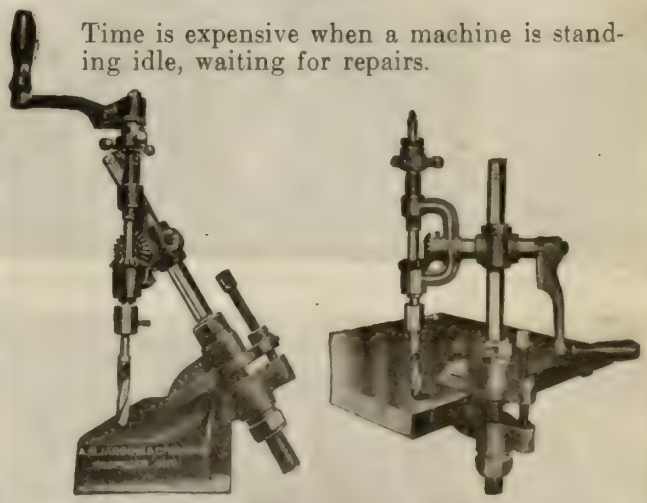
THE WORLD IS FULL OF NUTS
ENDURANCE WRENCHES NEVER WEAR OUT
CANADIAN BILLINGS & SPENCER PLANT - Welland, Canada

Crucible
AND
Open Hearth Steel
Tool Steel
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856
Frankford, Phila.
New York Office 217 Broadway
RALPH B. NORTON, AGENT
Montreal, Canada

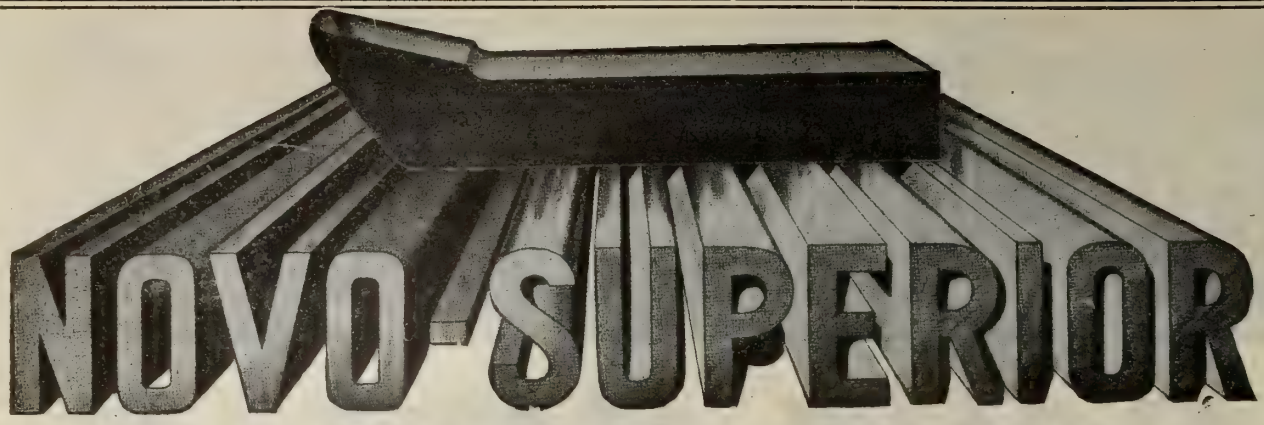
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.
Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO



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INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
Music Wire for Springs, Steel Balls.
Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws - for wood and for hot or cold metal cutting
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Insures Maximum Production

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"WACO"

High Speed Steel

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"WACO"

TRADE MARKS

"Double Waco" Quality—for Quick Production Work.

"Turtle Brand"—High-class Tool Steels, Files and Drills.

Wortle Plates for Wire Drawers.

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WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada:

MARSHALL, SON & BUNNEY

39 Richmond Street East - - - TORONTO, ONT

IMPERIAL GENUINE BABBITT METAL

The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

THE

TRADE K-A T-IE MARK

FOUNDRY

GALT - ONT.

Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. **We can advise you** and we have expert metal and wood patternmakers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

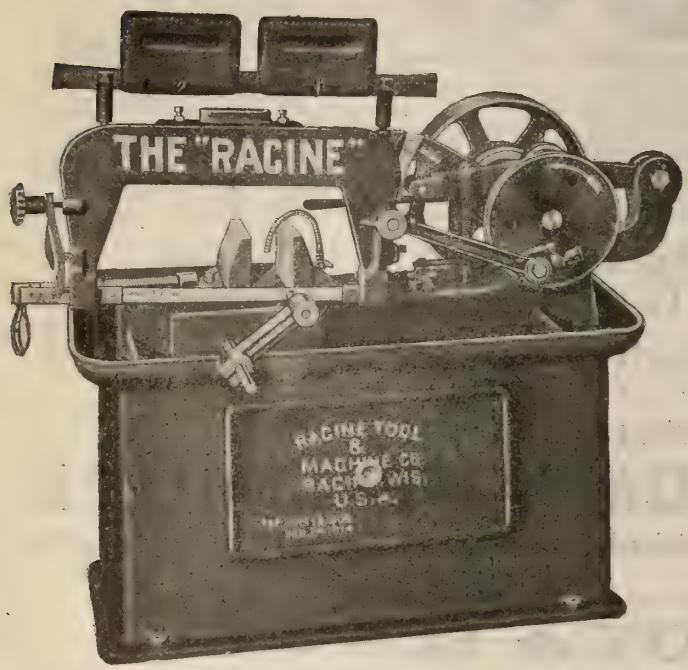
send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

ASK US

"THE RACINE"

High Speed Metal Cutting Machine



Reduces Blade Expense

Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

Use "Racine" H.S. Tungsten Power Blades

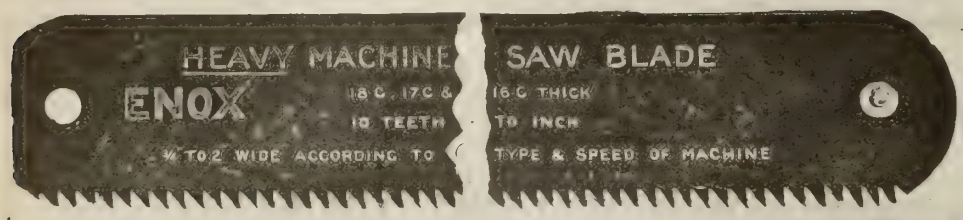
Racine Tool & Machine Co.
Melbourne Avenue
Racine, Wis., U.S.A.

SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

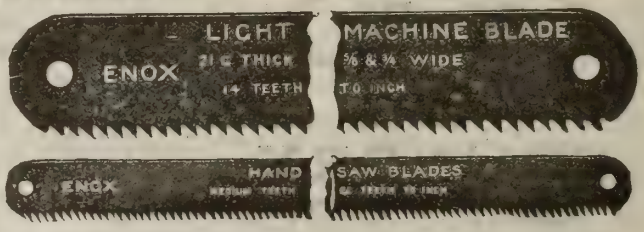
Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST



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Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

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FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

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THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.

Starrett Tools

Carry with them the assurance of accuracy. For almost 40 years the name of Starrett has meant unvarying accuracy to the men who use precision tools.

Catalog No. 213, showing 2,100 kinds and sizes of fine precision tools, sent free on request.

The L. S. Starrett Co., Athol, Mass.

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

New York **London** **Chicago**

Trussed Concrete Steel Co., Limited Walkerville, Ont.

FOR INSTANCE---

The Trussed Concrete Steel Co., Limited, of Walkerville, Ontario, is one of the foremost reinforced concrete concerns in Canada, as well as the largest Canadian manufacturers of steel sash and steel casement windows. Their opinion of Goodyear Extra Power Belting is pithily expressed in this letter from Mr. S. Farrell, purchasing agent:

"We have been users of different types of belts for quite some time, but we have no belt which will stand wear as long as the Goodyear Extra Power Belting, which we purchased from you some time ago. The photograph shows your "Extra Power" belt in use on an air compressor. It has been in use on same for some time and is still as good as new, while other belts previously used lasted only two weeks. We are gradually replacing all our belts with Extra Power."

GOODYEAR

MADE IN CANADA

Power Costs Money---Conserve It

Goodyear Extra Power Belting Costs You Less Because of Longer Service---And Saves Enough Power to Pay for Itself

Industry wastes a great sum of money through inefficient transmission of power.

Belts slip—pulleys are out of alignment—bearings worn—belts too heavy or too light. And yet superintendents and managers wonder why production slows up—why costs mount.

Today thousands of Candian industrials have reduced their power-waste measurably through the correct application by Goodyear men of Goodyear Extra Power Belts to their drives.

Goodyear Extra Power Belts have increased power transmission in many cases to a remarkable degree.

They have provided steady, uninterrupted operation of vital machinery.

They have given long, low-cost service.

Letters on our files vouch in cold figures and warm praise for the results obtained from Goodyear Extra Power Belts.

A Goodyear man will call on you at any time you say—without obligation to you. He will record the size of pulleys, horse-power transmitted, speed, length of drive, conditions of work. And when our recommendation comes to you, it will bear the stamp of engineering ability. Phone, write or wire the nearest branch.

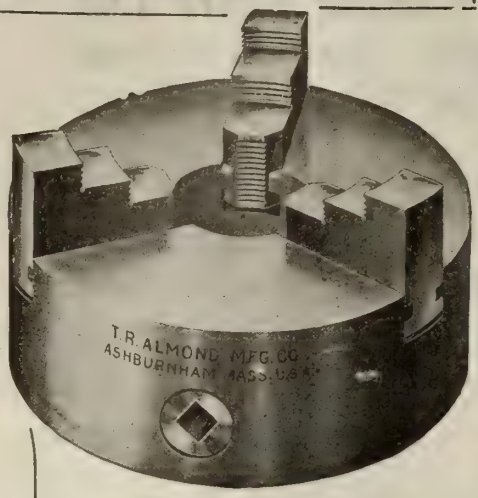
The Goodyear Tire & Rubber Co., of Canada, Limited

Halifax, St. John, Quebec, Montreal, Ottawa Toronto, Hamilton, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver

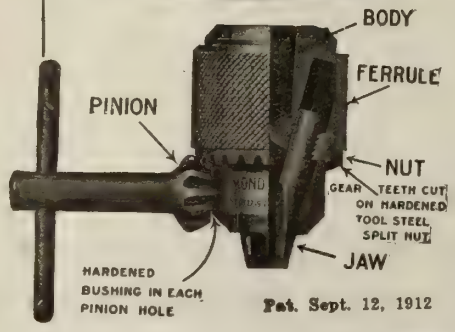
EXTRA POWER BELTING

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



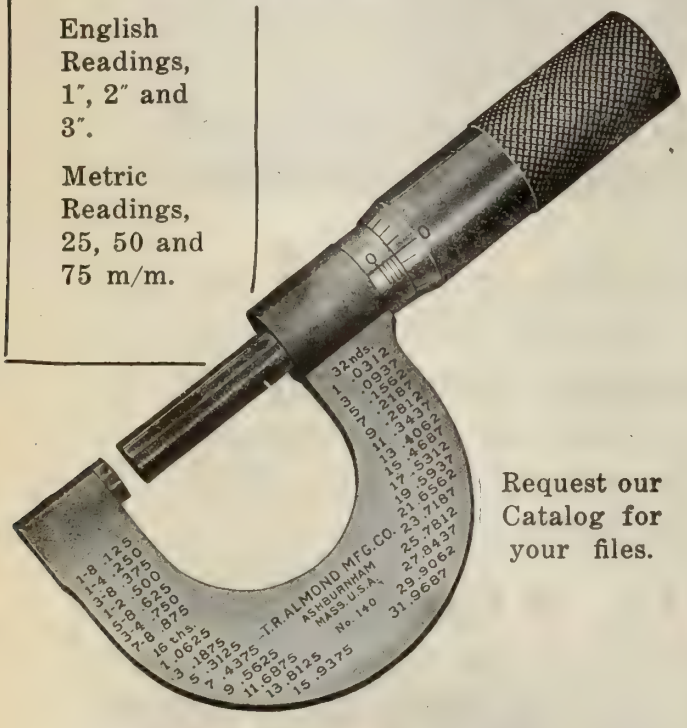
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



Request our Catalog for your files.

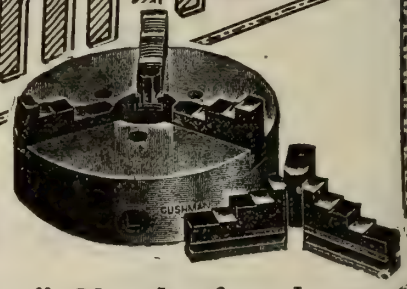
T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.

Made to work quickly, conveniently, safely and easily—closed and opened by a slight twist of the key—

Jacobs Chucks

hold tools firmly and precisely and save time and labor. Wherever durable, reliable chucks are demanded there Jacobs Chucks are found.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

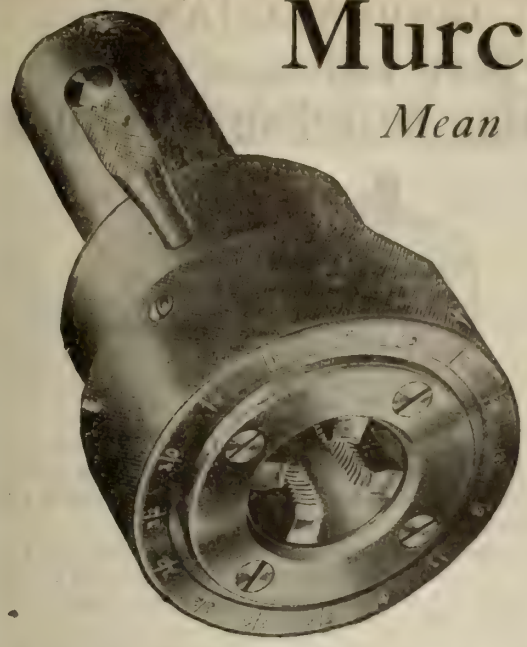
Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

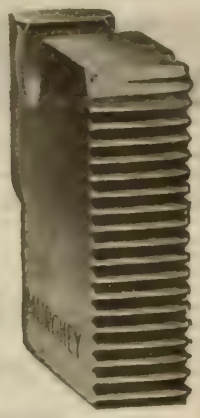
Cushman Chuck Co., Hartford, Conn.

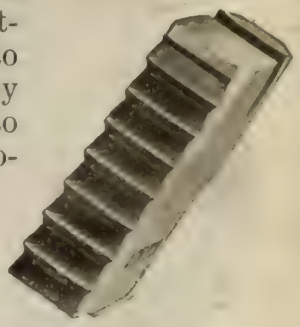
CHUCKS

Murchey Chasers

Mean Quick Deliveries







Murchey Tools will cut your tapping and threading costs. **They will boost production 50%.** Another important feature is Murchey's **Quick Deliveries on Chasers.** This is a Murchey specialty. No waiting! We get your chasers to you when you want them. Why not use Murchey Tools to speed up your threading production?

Send for a Murchey Tap or Die on approval and give it a trial. You will then secure actual proof of its value to you.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO,, Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.

H & G

Die Head Cuts

Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

Eastern Machine Screw Corp.

New Haven - Conn.

B-T THREAD LEAD INDICATOR

Be Sure You're *Right*--Then Go Ahead

Getting the right thread lead instantly, and maintaining a constant check upon it, minimizes the possibilities of delays in assembling and reduces the number of parts scrapped through incorrect measurements.

B-T Thread Indicators detect errors of one thousandth of an inch from correct lead. They are easily read--absolutely accurate—and can be used for testing odd pitches, as well as external and internal threads.

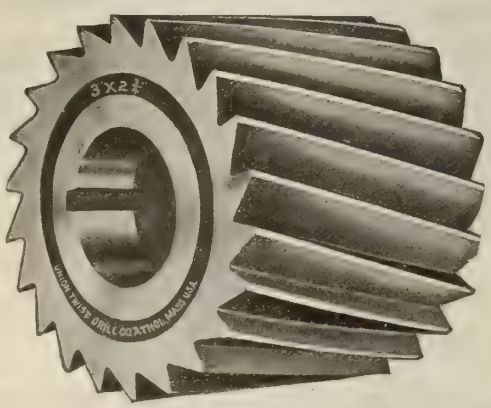
BICKNELL-THOMAS CO.

GREENFIELD, MASS.

Have you a copy of our booklet?

Butterfield

Milling Cutters, Taps Dies, Reamers and Screw Plates



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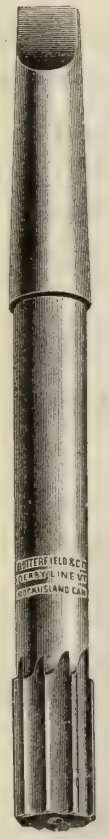
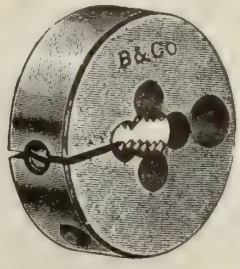
Butterfield Quality

It's the happy combination of specially trained men and the finest special machinery. Try it once—and you'll want it ALWAYS.

ASK FOR OUR CATALOGS





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Rock Island, P. Q.

Toronto Office
220 King Street West

4

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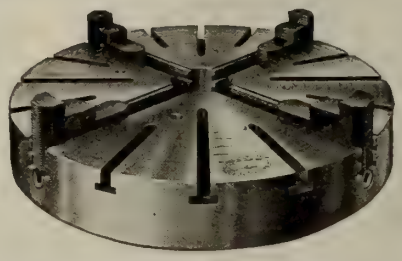

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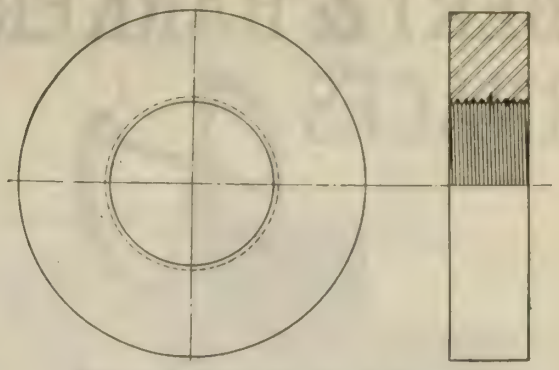

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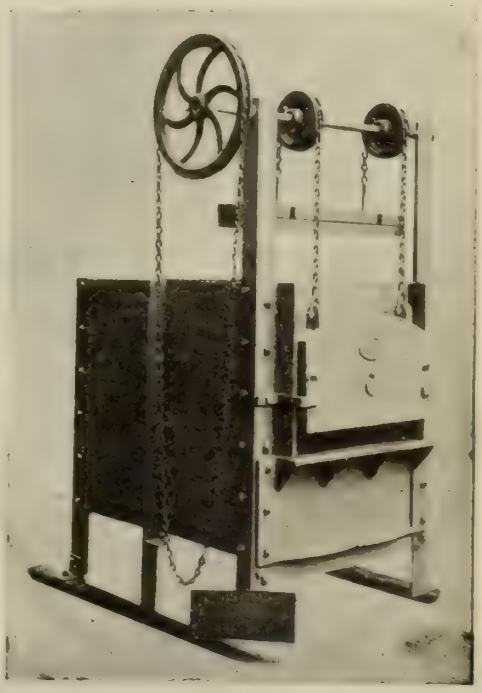

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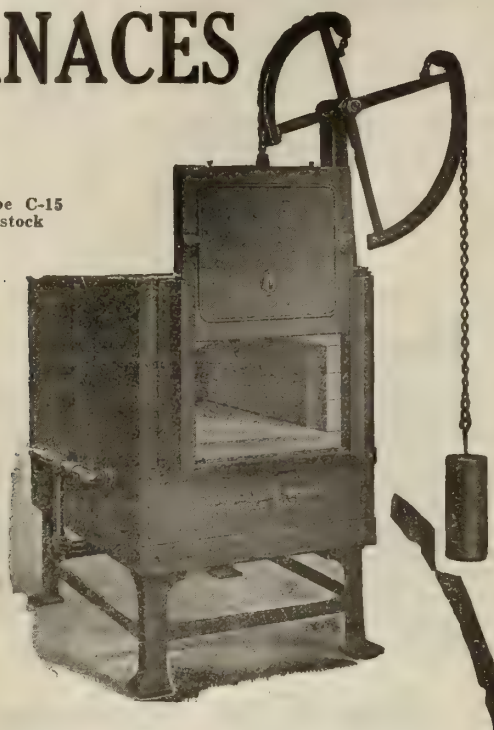

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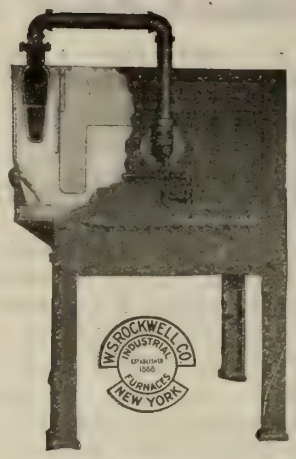

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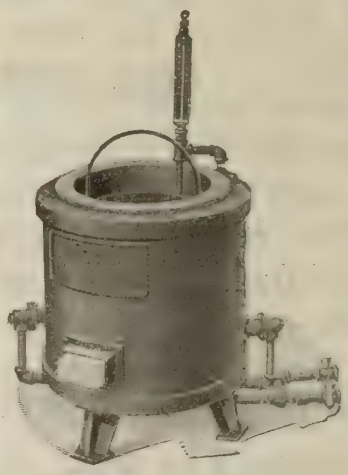

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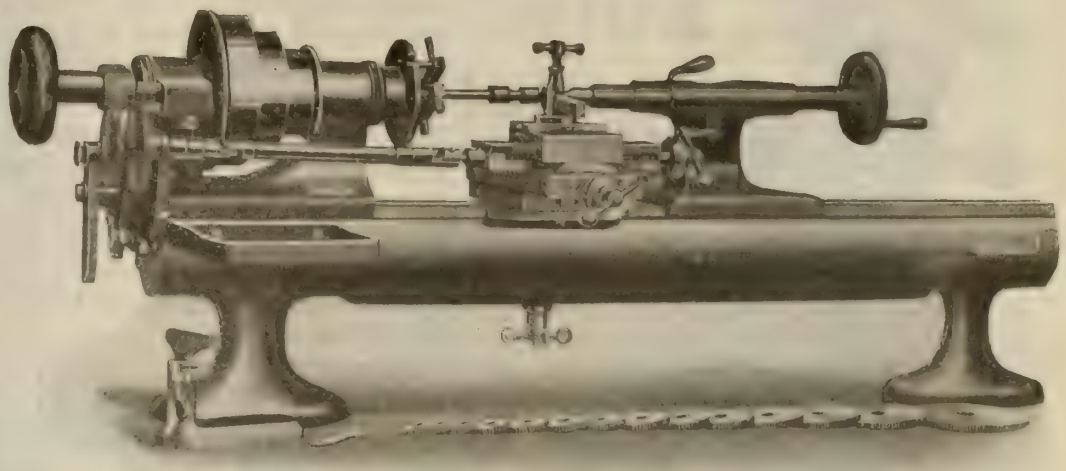

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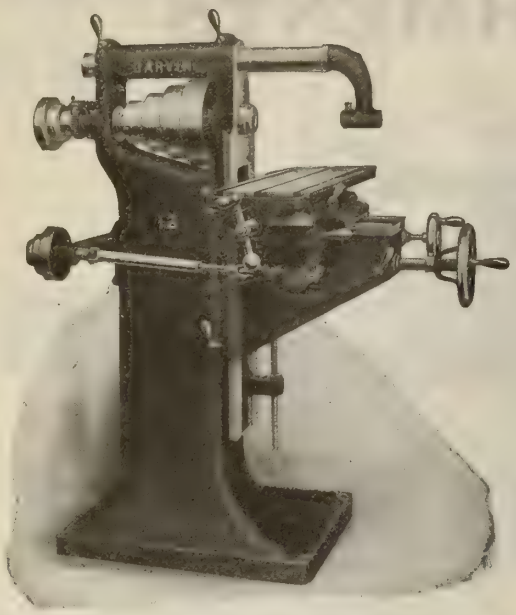

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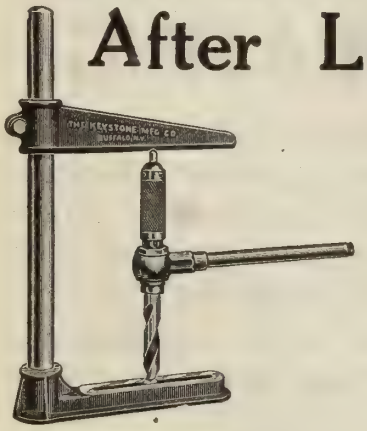

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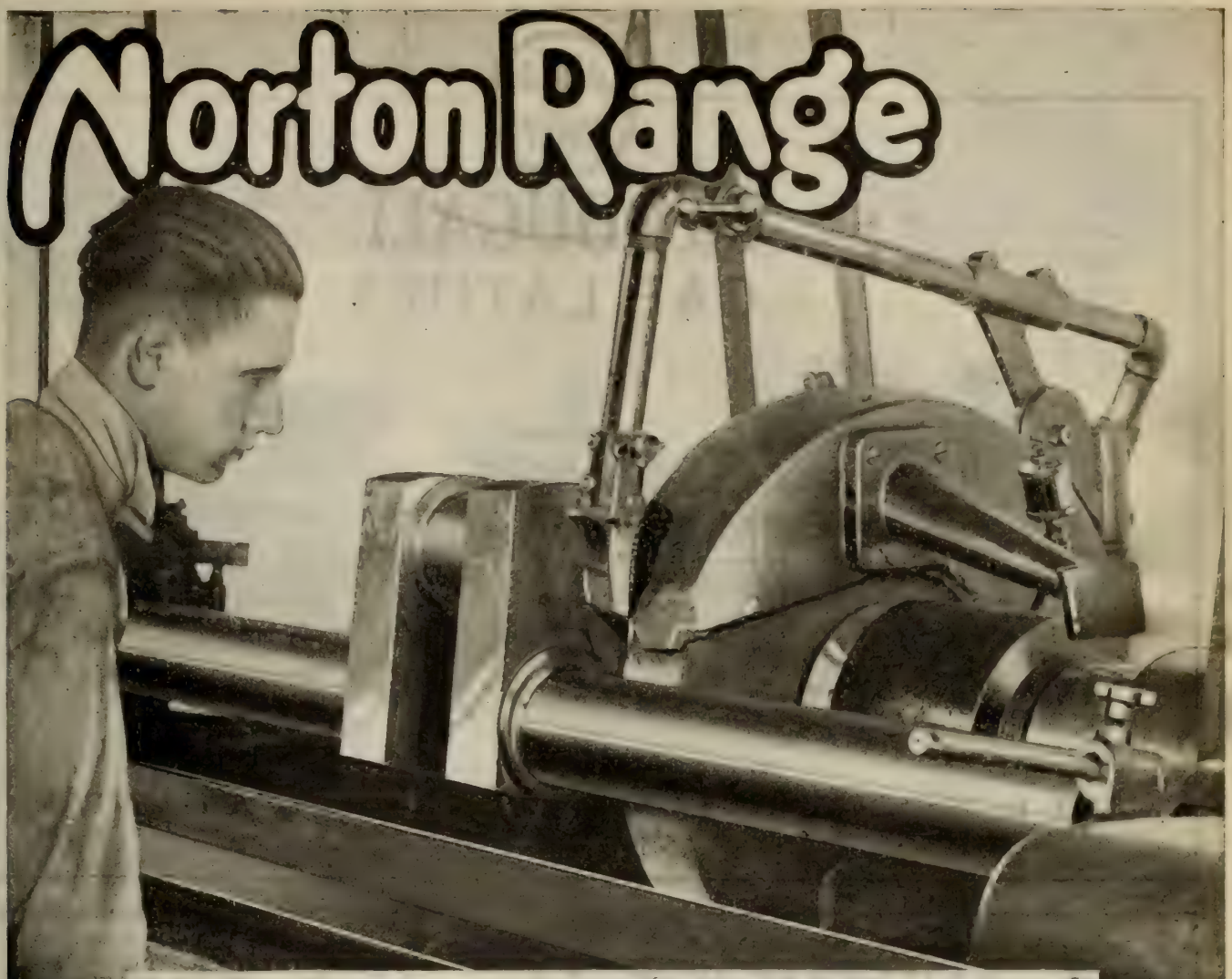

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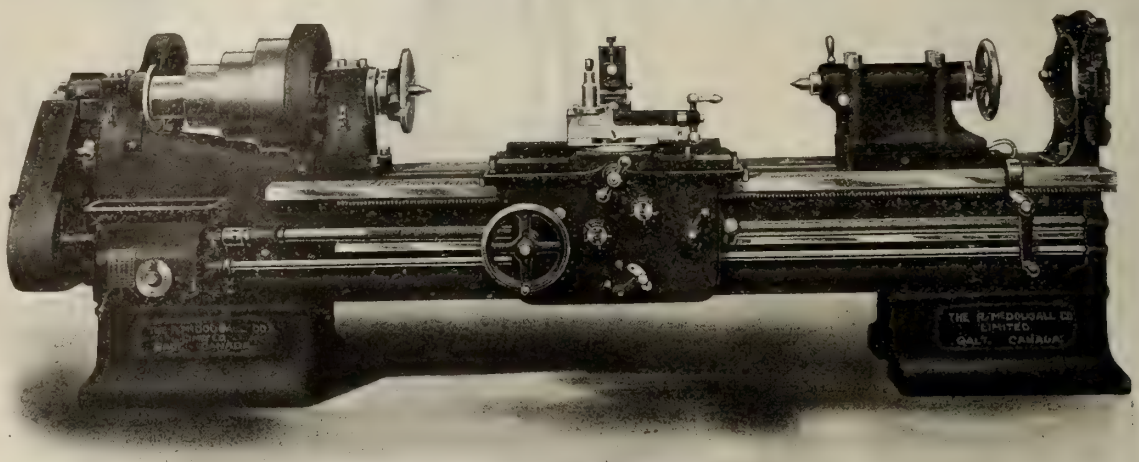

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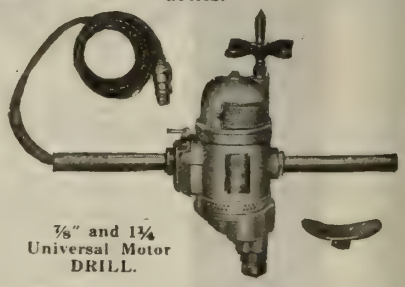

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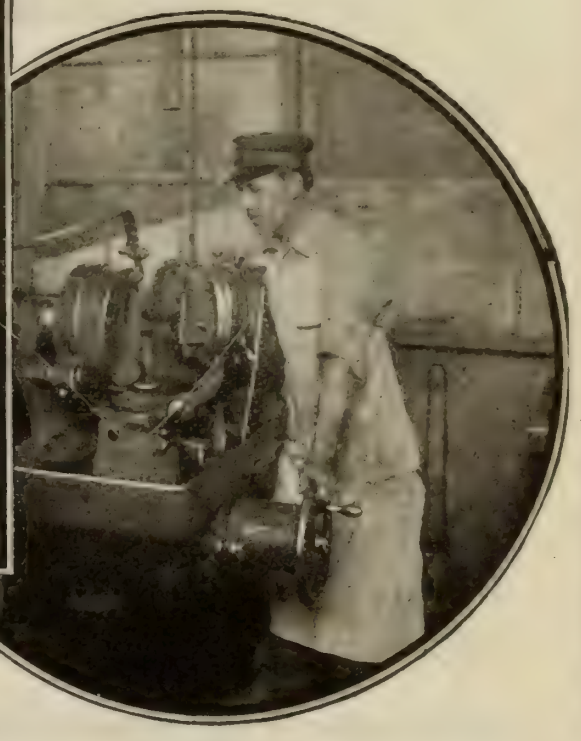

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CANADIAN MACHINERY
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MANUFACTURING NEWS

Volume XXI. No. 26. Toronto, June 26, 1919

Making the Hollifield Target Practice Rod

An Interesting Description of a Device Which Gives the Army Recruit All of the Actual Rifle Practice Without Either the Recoil or the Noise.

By DONALD A. HAMPSON

ONE of the problems that had to be solved at the beginning of the war was how to teach the vast new army to shoot. The production of arms and ammunition was pitifully small for a long time, and very little of this could be spared for use in camps. A majority of the recruits had never even handled a gun before, much less learned to fire one accurately. It was quite natural that the War Department turned to the Hollifield Rod for training purposes, a device that had been used to a limited extent in the army before, and to a large extent by the U. S. navy.

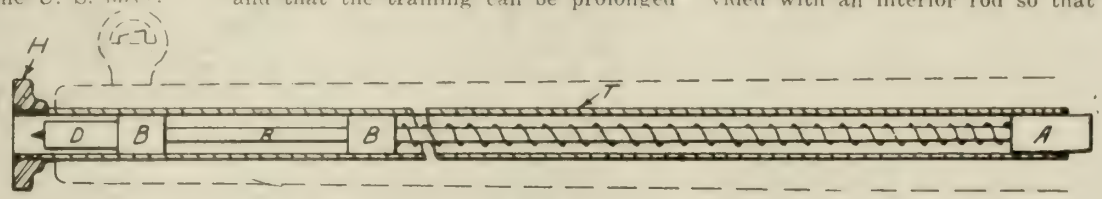


FIG. 1 A SECTION THROUGH THE DEVICE.

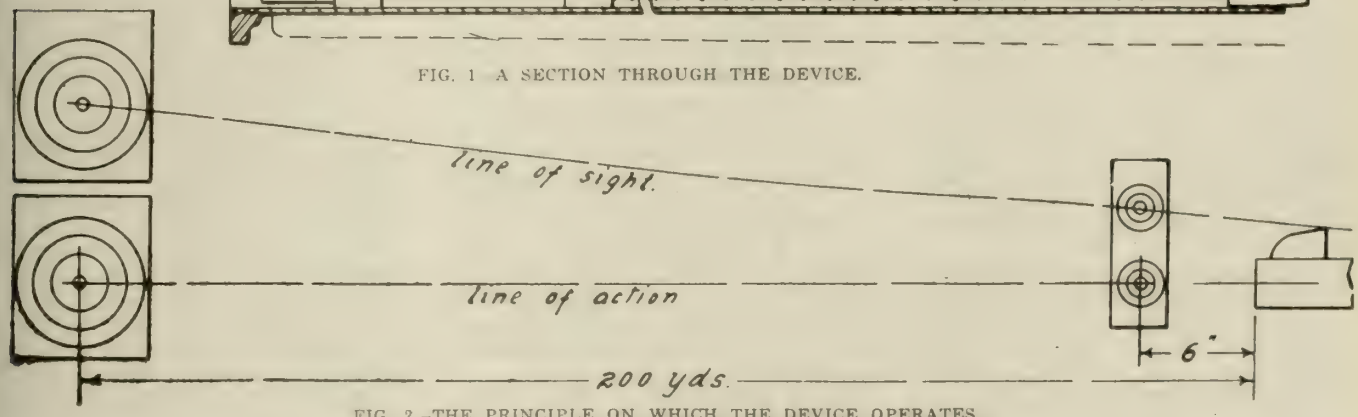


FIG. 2—THE PRINCIPLE ON WHICH THE DEVICE OPERATES

This device is made by the Hollifield Target Practice Rod Co., of Middletown, N. Y., and is the development of a patent taken out by an old army surgeon, Dr. H. B. Hollifield, of Washington, D.C., Briefly, the device consists of a brass tube which is slipped into the barrel of a rifle, the tube containing a rod, which is held normally back against the bolt of the gun, but which is ejected by the blow of the hammer so that the sharp point of the rod strikes a miniature target placed about six inches from the muzzle of the rifle. A record of the shot is thus made just as in actual range work; the rod is speedily drawn back into the tube by a spring, when the device is ready for another shot. As far back as 1878 some sort of a device along these lines was experimented with, but lack of interest in arms and target practice caused it to be dropped.

It will be seen that by the use of the Hollifield Rod, which is at present the only apparatus suited to the instruction of large numbers at any time or place, the recruit is given actual training in handling, aiming, and firing the rifle, and that the training can be prolonged indefinitely without further expense other than the initial cost of the device. When not in use by one recruit, another may use rifle and device, so that the distribution of a few rifles and devices to a company is the means of quickly bringing that company up to a set standard of efficiency in marksmanship and at no great expense. This training of eye and muscles preliminary to actual work is in line with the modern practice in other fields where dummy street car platforms for motormen, vestibule schools for factory hands, shadow movements for time study work, etc., are the means of saving long and expensive periods of "breaking in."

The Hollifield device gives the recruit all of actual rifle practice with the exception of the recoil and the noise. (As a matter of fact the Hollifield Co. has successfully worked out attachments which give these realistic additions to dummy practice, but the plain device is considered all sufficient by army officials.) For rapid-fire work, a set of dummy cartridges is used, these being loaded from the clip just as regular ones, provided with an interior rod so that they may be fired in turn, and being ejected from the gun by the usual bolt action.

Though quite simple in construction there are a number of points of interest in the manufacture of the rods. The materials are received in the form of bars and tubes, and the labor consists of screw machine and bench work, threading and assembling.

Fig. 1 is a section through a device. T is the brass tube of 0.030 in. wall, with a brass head H which serves as a puller and prevents shoving too far in the rifle. The rod R slides in bearings BB and has

a soft steel butt piece A against which the firing pin strikes and a needle point of hardened tool steel D which is driven against the target. The rod R is polished drill rod, 0.109 in. in diameter, made by manufacturers of knitting needles who give the same temper and finish to these rifle length pieces as to their regular product. The pieces A and D are tapped 7-64 in. by 48 and screwed home on the rods.

In Fig. 2 will be seen the principle on which the device operates and which makes it as true a test of the rifleman's skill as is outdoor range work. It is the old principle of similar triangles, and though the limits of the page necessitate a greater angle, it shows that the miniature target but two inches high and placed only six inches away is as difficut to hit as the full-sized one set at 200 yards or more away.

As anyone can tell by testing a knitting needle, the steel is given an unusual temper—is so hard that it turns a file, but has great elastic properties. In order to thread the rods for the end pieces, the temper must be drawn for one-half inch back from each end. The arrangement shown by Fig. 3 is used for this purpose. Fig. 3 is a side elevation. R and W are the parts of a rack on which about forty rods are laid at a time with their ends resting against the flame deflector S. The part W of the rack is a water-jacketed casting, and, so confined, the flame from holes in the gas pipe G heat the ends of the rods almost as quickly as they are properly arranged. As fast as the ends get up to a full red the rods are plunged into a box of lime close by—this treatment completes the annealing so that the rods may be threaded; after the box is full—about ten thousand rods—the rods are annealed on the other end.

Threading is done in a special machine which employs an Errington tapper for the reverse. The rods are gripped in a vertical position by a quick-acting clamp, with end projecting downward toward the die, which is brought up to the work from below. A style of die holder is used with the tapper that permits free washing out of the chips by the cutting oil that is piped to the end of the rod being threaded. By this arrangement a minimum of oil is left on the rods to wipe off, and the operator can devote all his attention to filling the machine. About 3,500 threads a day are thus turned out.

Commercial straightness is not accurate enough for rifle practice work, and each rod has to be hand straightened so it is not more than one-thousandth out at any point. This is so slow a job that experienced men straighten not over two hundred rods in a day. The operation is similar to the one employed on some twist drill and reamer work, but the great length of these rods, their small diameter, and the hard temper, puts the work in a class by itself.

Fig. 4 shows the bench fixtures used. Straightening blocks B of hard, close-grained cast iron, 3 in. by 3 in. by 26 in., finished all over, are set in a holder and placed so the upper surface is on the level with the workman's eyes. The blocks are tilted slightly; in drill practice, if a part will roll down this incline it is straight enough, but for this rifle work the rod must pass the more rigid test of shutting out all light as well. Sheets of heavy white paper, C, are fastened back of the block, and behind these, lights are placed. The workmen thus do not face any direct glare, as outside light is also closed off. The rods are straightened by hammering down the high spots with a 4 oz. pein hammer. Extra blocks are kept ready at all times. The constant driving of hard rods in the cast iron surface grooves the latter quite rapidly so that the four sides last only a week before replaning is necessary.

A certain percentage of all rods is tested for correct temper. The simple test fixture shown in Fig. 5 is used for this. Two pins are set in a piece of sheet steel near one end and the graduated arc is laid out at the other. Normally the rod stands as shown—free end pointing to 1—it must stand bending around against the pin at 8 without breaking and must return to 1 again, to pass inspection.

The screwing on of the butts, points, and brass heads is no small item. The brass tubes are threaded in a machine of the geometric type, using an opening die. To prevent tearing of this fine thread in soft brass, the dies are brushed (while revolving) every dozen cuts with a brush slightly damp with lard oil. A hand fixture is employed to screw the head on the tube, the head being gripped in a collet that does not mar the knurled edge, and a friction device slipping before excessive pressure can be applied at any point.

The pieces that go on the steel rod have a thread ⅜ in. long. These pieces are started on by hand and then taken to a sensitive drill that is equipped in the manner shown in Fig. 6. A two-inch common bench vise is fastened to the table of the machine to be used as a holder for the rods while the butt pieces are tightened up. In this connection, it might be added that a vise will often do as well as any holding fixture that might be made up and at considerably less expense. The driving mechanism is fastened in the drill spindle, which is running all the time. It consists of an adjustable friction device X that is set to give a uniform driving tension without twisting off the rods and a ball chuck Y that grips the butt. This chuck has three ⅜ in. balls very near its lower end, confined in recesses that are cam shaped to allow a release and a gripping position, as in usual practice. No springs are required, the contacting surfaces automatically roll the balls into place as the spindle is brought down and a quick lift disengages them.

The needle-pointed ends, of course, must be screwed on after the rod is put into the tube. Owing to commercial variations, it is necessary to correct any eccentricity of the point after it is in its final tight position on the rod. The fixture shown by Fig. 7 was made for this purpose. The assembled outfit is laid in a V block at its breech end, which also projects the rod as shown. In this position the extreme end of the rod comes in a slot in the hardened block B which serves as a rest, anvil, and grip,

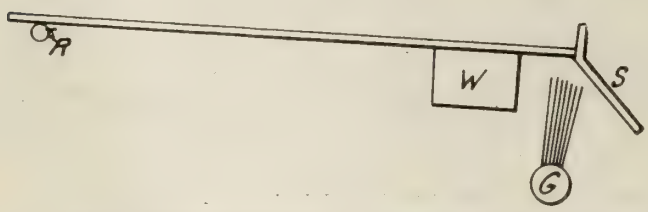


FIG. 3—THE ARRANGEMENT TO DRAW THE TEMPER FROM THE RODS.

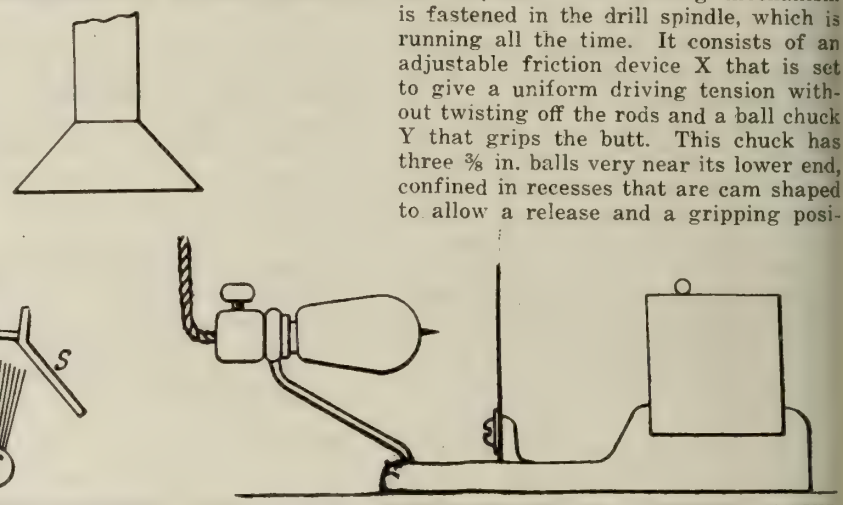


FIG. 4—BENCH FIXTURE USED FOR STRAIGHTENING BLOCKS.

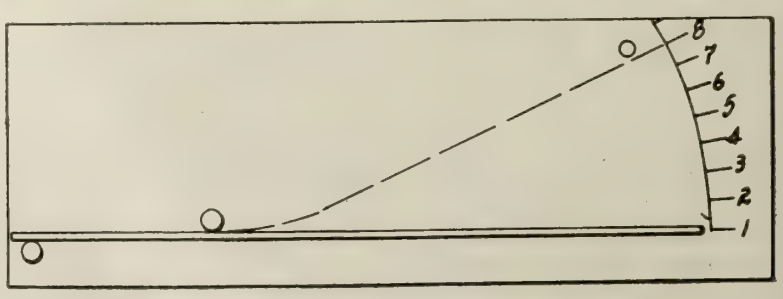


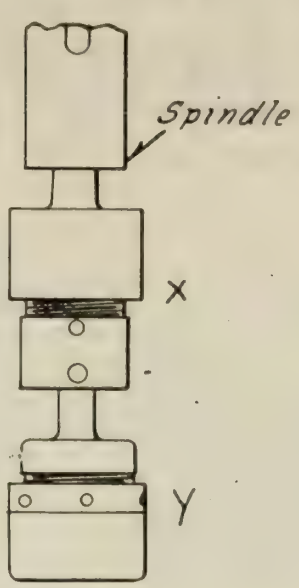
FIG. 5—TEST FIXTURE FOR TEMPER OF RODS.

the slot being a snug running fit on the rod. By twirling the rod between thumb and forefinger, the workman sees any inaccuracy in the slowly revolving point. This he corrects by driving on the body of the point with a light hammer. The celluloid card placed just back of the point greatly assists in this work, it being possible with its graduations to instantly "spot" an error as small as the width of a line.

A final test of the outfits is made in the service rifle rigidly clamped in a fixture which incorporates a testing target accurately aligned with the line of action and of sight. To pass this final test, it is necessary to go to the seeming needless accuracy in manufacturing; an error of 0.005 in. in one of the rods would be doubled if the rod turned (rotated) from top to bottom, with a corresponding disparity on the target card with its fixed centres of bull's eyes. Though unbelievable to the layman, "gun sharks" are able to detect such minor inaccuracies when holding the rifle in natural firing positions.

The screw machine work presents nothing unusual from good practice. One part, the bullet for the dummy cartridges, has a nominal 0.112 in. hole for a depth of 15-16 in. This is made as in Fig. 8 by using drills one size larger than the last and dividing the work among three positions on an Acme, making a short easy drilling and a minimum of time per piece. Some of the other parts are made two or more at a time and some two per cycle by double camming on single spindle machines. All the 7-64 in. tapped holes are tapped off the automatics, the wisdom of not retarding the automatics with this delicate operation being thoroughly proven by the decreased time loss with tap breakage.

Other work connected with the Hollifield Rods consists of making the rubber target holders, against which the hardened needle points strike, the containers for the outfits, attachments for using the bayonet as a support when practising in the field, etc. Besides the service outfits, the device is made for sporting rifles, and as such has a field of usefulness at all times of the year for competition and keeping marksmen in the best of training.



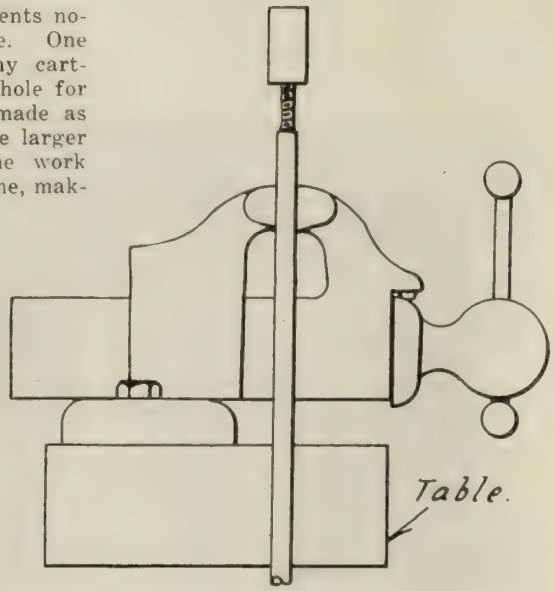


FIG. 6 FIXTURE USED TO SCREW THE HEAD ON THE TUBE.

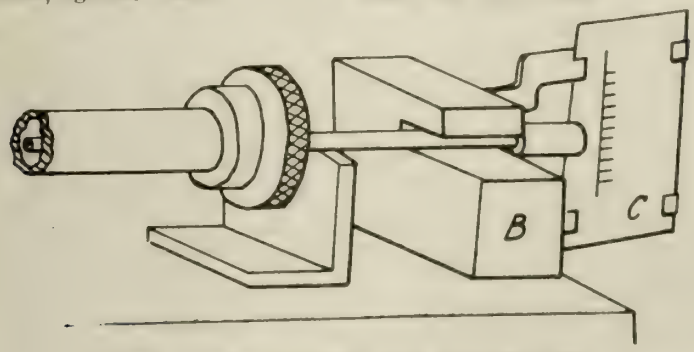


FIG. 7—TEST FIXTURE FOR ECCENTRICITY.

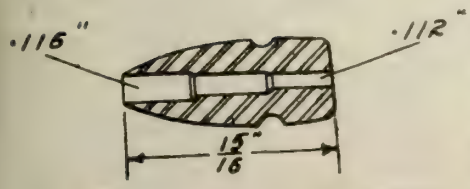


FIG. 8 THE BULLET FOR THE DUMMY CARTRIDGES.

AFTER-WAR PRICES

No subject is quite so debatable as that of the conditions which will ultimately rule as to the price of commodities when the aftermath of war has been stabilized. On the other hand, there is the belief not merely that pre-war prices will never return, but that a very large permanent increase in all directions is certain; on the other, the belief is tenaciously held that the stagnation which has been the result of previous wars will bring prices ultimately to a point within hailing distance of those of 1914. It is extremely difficult to be a prophet, and, in addition, it is a role which is by no means comfortable, as history in the past has shown. There is argument enough and to spare to support both views. That individually the present generation and that following are certain to be intrinsically poorer cannot be doubted, the point at issue is in what proportion. Liquid capital, owing to the exigencies of the situation, will command a higher return, but this in itself is nothing deplorable. Interest rates are based upon two factors: activity of demand and available amount. Capital being accumulated, collective savings, and war being a sort of rake's progress, the amount has been seriously depleted, while essential restoration in every direction will make enormous calls upon the collective purse.

The resilience after the exhaustion of war depends upon productivity and the limitation of wants, upon united effort and collective thrift in order that the reconstructed state shall be something more than solvent, that it shall be prosperous. Taxation is only one among many other things which will help the individual to limit his desires. The State will have to see that the accumulated capital is utilized within its own borders, and will be wise enough to penalize the export of wealth. After all, it is not the extent of the commitment that matters so much as the belief of the creditor that the debtor, given time, can pay; that is, it is the credit standing which affects the results.

High prices will prevail for a considerable spell after hostilities cease, no sane man can doubt, for essential trade will be more than fully occupied in overtaking arrears added to the further avalanche of essential work postponed owing to present needs. Certain prospective utility work of national character—to be exact, housing—contemplates a 70 per cent. increase for five years and a permanent increase of 30 per cent. above 1914 prices. These are the only definite figures yet given as the considered conclusions of responsible men.

In engineering matters, which concern this journal most, certain facts must be realized in any due perspective of the future. Although the machine value per productive unit has shown a remarkable increase, a very large proportion of machine tools have had their life shortened by years and renewal will be the order of the day.

Audible Electric Signals in Industrial Plants

An Extract From a Paper Presented Before the Rochester, N.Y., Section of the American Institute of Electrical Engineers, Also Before the Erie Section of the Same Organization

By V. KARAPETOFF, Professor of Electrical Engineering, Cornell University, Ithaca, N.Y.

NO industrial plant of any magnitude may be considered fully efficient unless means are provided for promptly locating any important employee, no matter where he may be within the plant. A private telephone system, however extensive, serves this purpose only as long as the needed man is at his desk, but as soon as he leaves his desk the problem of locating him becomes a hit or miss proposition. On the other hand, a superintendent, a foreman, a millwright, a repair man, etc., is ordinarily useful only in so far as he can freely move about the shop without the fear that someone of importance may need him. Thus, within the last few years, under the tremendous impetus of the pressure for an enormous increase in the production of munitions of war, audible electric signals have been introduced into many industrial plants.

Such an electric signal is usually similar in construction to the familiar electric "horn" used on automobiles. It consists of a diaphragm with an anvil at its centre. A toothed wheel driven by a small electric motor strikes the anvil many times a second and causes it to vibrate vigorously. These vibrations produce the well-known warning tone, which carries over a considerable distance. The device is provided with a projector or horn, the shape of which depends on whether it is desired to scatter the sound, to intensify it in horizontal direction, or to deflect it downward. Such motor driven signals are now made much more powerful than automobile horns, and are wound for 110 or 220 volts, direct or alternating current, so that they can be connected to a lighting or power circuit, and do not require a separate low-voltage battery.

With such electric audible signals scattered throughout the plant, it becomes an easy matter to locate instantly any person to whom a code number has been assigned. For example, when the manager wishes to speak to one of the assistant superintendents, who may be anywhere in the plant, he simply tells the telephone operator to sound this particular man's call. As soon as this assistant superintendent hears his call, he comes to the nearest telephone, whereupon the operator connects him with the manager.

It would be rather inconvenient for the telephone operator to sound various calls by hand; therefore a special code-calling automatic instrument has been developed for this purpose. The operator merely sets the desired person's code number on a dial and pulls a lever, a contact making mechanism is thereby set in motion which closes the electric circuit and operates the code signals throughout the plant the required number of times (usually three times) and then stops automatically.

In noisy and in open places, or in large factory lofts, the electric horns mentioned above constitute the most suitable type of signal. In offices they may be replaced by less loud electric gongs, bells, buzzers, air whistles or incandescent lamps. In some cases two separate circuits are run from the code-calling mechanism, one circuit for ordinary calls, the other for fire alarm gongs, or for some other special purpose. Sometimes two allied plants are operated side by side with a separate staff in each. Then the same code combinations can be assigned in both plants, but the horns in one or the other plant will sound according to which of the two circuits is closed.

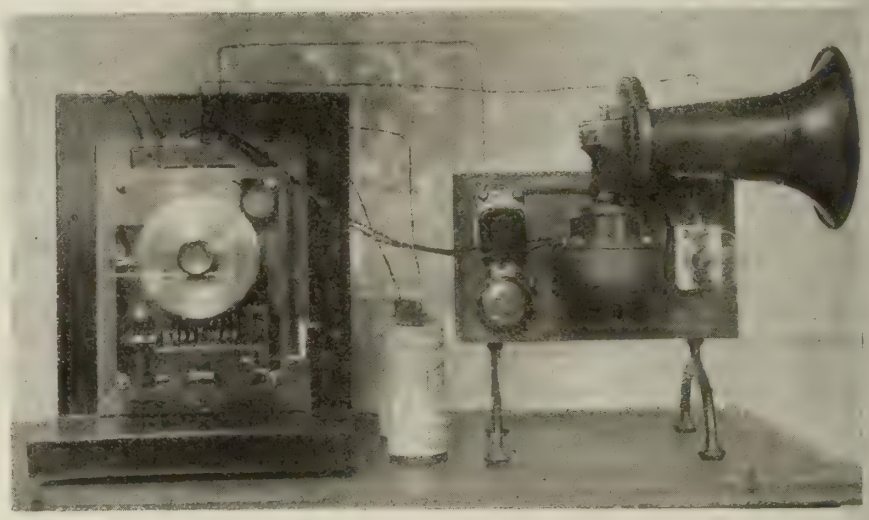


FIG. 1—KLAXOCATOR, ACTUATING AN ELECTRIC HORN, A BELL AND AN ELECTRIC LAMP.

A further application of loud electric horns in industrial plants is for extensions to telephone bells. The ordinary telephone ringer is not loud enough in many shops when the foreman is away from his desk. In this case a relay is connected in parallel with or in place of the telephone ringer, and when it is actuated it closes a secondary circuit which causes an electric horn to sound. This call should be a single blast to distinguish it from code calls.

Audible electric signal systems are also used in various plants as warning signals on cranes and hoists, also to call a shifting locomotive, to indicate the beginning or the end of a certain operation, or for other local purposes. Like in the case of any convenience, once such an electric system has been installed, the superintendent, the foreman, and even the operatives themselves will find new uses for it.

Editor's Note:—At Fig. 1 is shown one of these code-calling instruments. The name given this instrument is that of Klaxocator, and the signals which it actuates are an electric horn, a bell and an electric lamp.

LOWERING A HEAVY STEEL PLATE

By H. J.

An interesting engineering operation is reported concerning the lowering of a heavy steel plate at the gas works of the Consolidated Gas, Electric Light, and Power Company of Baltimore, Md. The plate, which is to form the bottom of the tank containing the new gas-holder, is 219 feet in diameter, and weighs 234 tons. It was delivered in the form of ⅝ in. sheets of steel plate averaging 12 feet by 6 feet. These plates, supported on wooden troughs, were riveted together until the circle at the bottom of the tank was completed. To lower this huge plate, 150 giant jackscrews were inserted at regular intervals throughout its area. The wooden supports were then removed. A man at each of the handles of the jackscrew awaited the signal to turn; a signal-man at the centre of the plate struck a piece of steel with a hammer, and at each stroke the 150 men made a half turn on the 150 jackscrews. The work of lowering was accomplished in 32 minutes.

ACID-PROOF CEMENT FOR PIPE FITTINGS

An excellent cement for packing the joints of piping or vessels containing strong acid solutions is made by mixing equal parts of asbestos fibre, linseed oil, and white lead. For weak acids the cement can be cheapened by the addition of clay.

Making Steel in Canada

THE Blast Furnace, With Its Various Intricate Parts, is Something Not as Familiar to the Mechanical Trade as it Should be. "Furnaces, Like the Female Sex, Are Sometimes Hard to Handle."

Part II—The Blast Furnace

IT would be interesting to try and describe the evolution of the blast furnace; to describe the primitive furnace of Tubal Cain, the hole in the rock and the bellows of goat skin, but the task would be too long. Sufficient to say that the history of the blast furnace has been one of progress, small beginnings, gradual growth, based on experience and knowledge, and the end is not yet.

Let us consider first what makes up a complete furnace plant.

1st—Bins for storage of raw material, ore, limestone and coke.

2nd—Water supply for cooling purposes.

3rd—Blowing engines for blast air.

4th—Stoves for heating blast air.

5th—Furnace for actual melting or reduction purposes.

6th—Rolling stock, cars for raw material, ladles for cinder and hot metal.

7th—Mechanical appliances, hoisting engines, cranes, bell operating cylinders, mudguns, etc.

To discuss all these portions we must first have a knowledge of the various parts and their names. Fig. 1 gives a good idea of a modern furnace; all the important parts are numbered and the names generally used listed below:

1—Furnace foundation
2—Hearth or crucible bottom blocks
3—Hearth jackets
4—Hearth
5—Bosh
6—Bosh bands
7—Bosh coolers
8—Mantle
9—Inwalls
10—Furnace shell
11—Stock hopper
12—Little bell
13—Stock distribution
14—Lower hopper
15—Large bell
16—Abrasion plates
17—Bell operating mechanism
18—Skip bridge
19—Skip car
20—Furnace columns
21—Hot blast main
22—Bustle pipe
23—Tuyere pipe or stock
24—Iron notch
25—Tuyere zone jacket
26—A frame furnace top
27—Gas outlet
28—Breeder pipe
29—Downcomer pipe
30—Stove
31—Cold blast main
32—Hot blast valve
33—Gas main
34.—Equalizing pipe.
35—Scale car
36—Cinder notch

The usual arrangement of plant is shown in Fig. II, but sometimes space causes stoves to be placed at an angle to the furnace.

The reader should endeavor to get firmly fixed in his mind the path of the gas and air by studying Fig. II and the following explanation.

The air is compressed to about 16 lbs. per sq. inch pressure by the blowing engines (6,000 cubic feet of air for each 100 lbs. of pig iron are about the usual requirements), passes along pipe A (cold blast main), is admitted by means of a cold blast valve to whichever stoves are "on air." Stoves will be described more fully later, for the present we can consider them as steel shells containing a checker work of brick, capable of receiving heat from gas and imparting heat to air.

The cold blast passes through the stove, is heated, passes out through the hot blast valve, along the hot blast main (B), to bustle pipe and furnace tuyeres.

While this is happening in say "A" stove, the gas passing from the top of the furnace through the downcomer, dust catcher, and gas main, C, is being burnt in, say, B and C stoves, the waste gases passing through the chimney valve to the stove draft stack.

It will be seen at once that, by the proper manipulation of the various valves, stoves can be changed from gas to air at will. The usual period is one hour on blast or air, three hours on gas; the temperature of the heated air is around 1,300 to 1,400 degrees Fahr.

It is, of course, understood that the skip car is used to convey stock to the furnace, which is admitted by means of the small and big bell.

Now that we have a general idea of what a blast furnace consists of, and the way the various portions are arranged, let us consider things more in detail.

First, look at Fig. 1, and notice how the furnace is built, the columns (20) support the mantle, (8), the mantle consists of a stiff circular girder, carrying not only the furnace shell and top gear, but all the brick lining above the mantle; in a modern furnace this weight is about 2,000 tons. Consider the responsibility of designing columns to carry this load and the necessity for good foundations under the columns.

The purpose of this construction is to allow the hearth and bosh to be relined without touching the inwalls.

The hearth jacket, (3), is an important item. Fig. 1 shows one form; a better construction consists of an inner cast iron jacket containing cooling pipes, and an outer steel jacket 2½ in. to 3 in. thick, riveted together and surrounded by steel bands, Fig. III.

The purpose of the hearth jacket is to prevent the liquid metal being forced out of the bath by the pressure inside. This sometimes happens and a stream of metal shoots out, cutting and destroying all and everything in its path.

The iron notch, (24), deserves attention, for it is the business end of the outfit. It is usually located about 12 inches above the bottom of the hearth. It is one of the most simple parts of the furnace; no water cooling, small, about 10 in. x

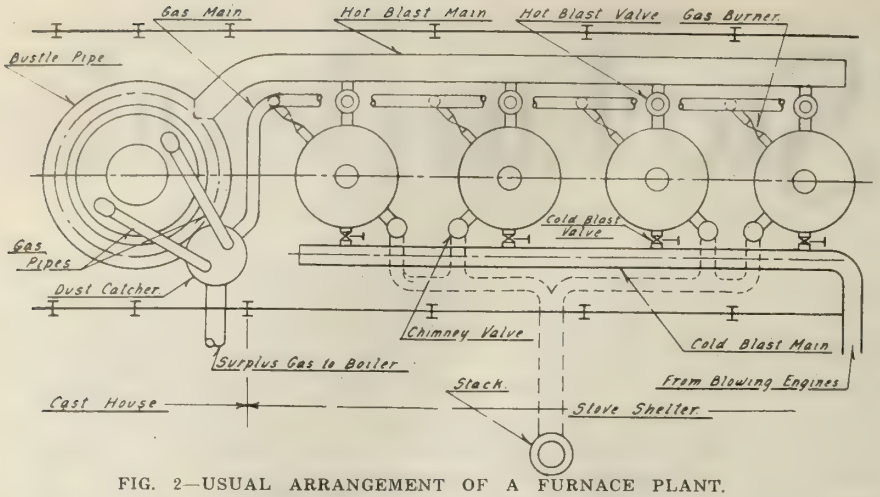


FIG. 2—USUAL ARRANGEMENT OF A FURNACE PLANT.

6 in., open when pouring and closed at other times by forcing balls of clay into it by a machine called a mudgun. The clay, of course, soon burns into place and is as solid as the furnace lining.

In normal operation tapping takes place at four hour intervals, and is affected by drilling with a long rock drill and sledge; a dangerous job, and one demanding skill, strength, courage and care.

Some 4 ft. to 6 ft. above the iron notch are located the cylinder notches, (generally one on each side of the furnace). Now notice a peculiar thing; liquid iron will flow through clay or brick and will not affect it; cinder or slag will cut brick work quickly. Therefore, a metal opening must be provided for cinder, and to keep it from burning away it must be water cooled. The cinder notch is usually built up of three parts; monkey, intermediate cooler and cooler, (Fig. IV). The monkey is closed by means of a ball of clay.

Above the cinder notches we have the tuyeres; one of the most important parts of the furnace. Because of the heat of the blast the hot blast main, bustle pipe and tuyeres are all lined with fire brick, a beautiful piece of brickwork, for every joint must be fitted and close else the fierce cutting blast, with a temperature of 1,400 degrees Fahr., and a pressure of 16 lbs. per sq. in., will come in contact with the steel work and cut through it in a short time.

A modern 500-ton furnace has twelve tuyeres, equally spaced, (see Fig. V), notice the water-cooled portion extending into the furnace, the blow pipe, which often has to be renewed; notice how the elbow section, or boot leg, as it is called, can be swung back to allow of a quick change of blow pipe or cooler. The eye sight is closed by a piece of heavy glass or mica, and is used by the furnace operator to inspect the working of the metal. The portion of the furnace above the hearth and below the mantle is called the "bosh." The actual melting takes place in this region, and the brickwork is subjected to intense heat and abrasion. The usual construction consists of heavy steel bands spaced about 12 inches apart, and cooling plates inserted at frequent intervals to keep the brickwork from overheating.

Fig. VI shows a typical cooling plate; usually made of a brass mixture, sometimes the plates are set direct in the brickwork, sometimes in a cast iron housing, or box; the object of the housing is to facilitate renewal should a plate burn out.

Operating a furnace is a simple and routine proposition when all is going well, but furnaces are known to their keepers as members of the female sex, and they have all the beauties and uncertainties of that sex, and at times they do not go well. The iron notch cannot be opened, the cinder reaches the tuyeres, or the stock sticks, scaffolds and freezes, to say nothing of blow-outs and gas leaks. All these things call for a high degree of skill and intelligence on the part of the operator, for a false move on the part of someone may endanger a life and property.

Yet how strange that this fascinating field is neglected by college trained men; often because it means a few years of hard toil before reaching a position where they can employ their technical training.

To stand in front of a furnace pouring is a wonderful sight. To see the cinder notch opened and watch the tons of slag drained to the huge ladle; to see the preparations for casting pigs in the floor of the cast house, or the less picturesque operation of pouring through the iron runners to the iron ladles, is a sight, which, if witnessed for the first

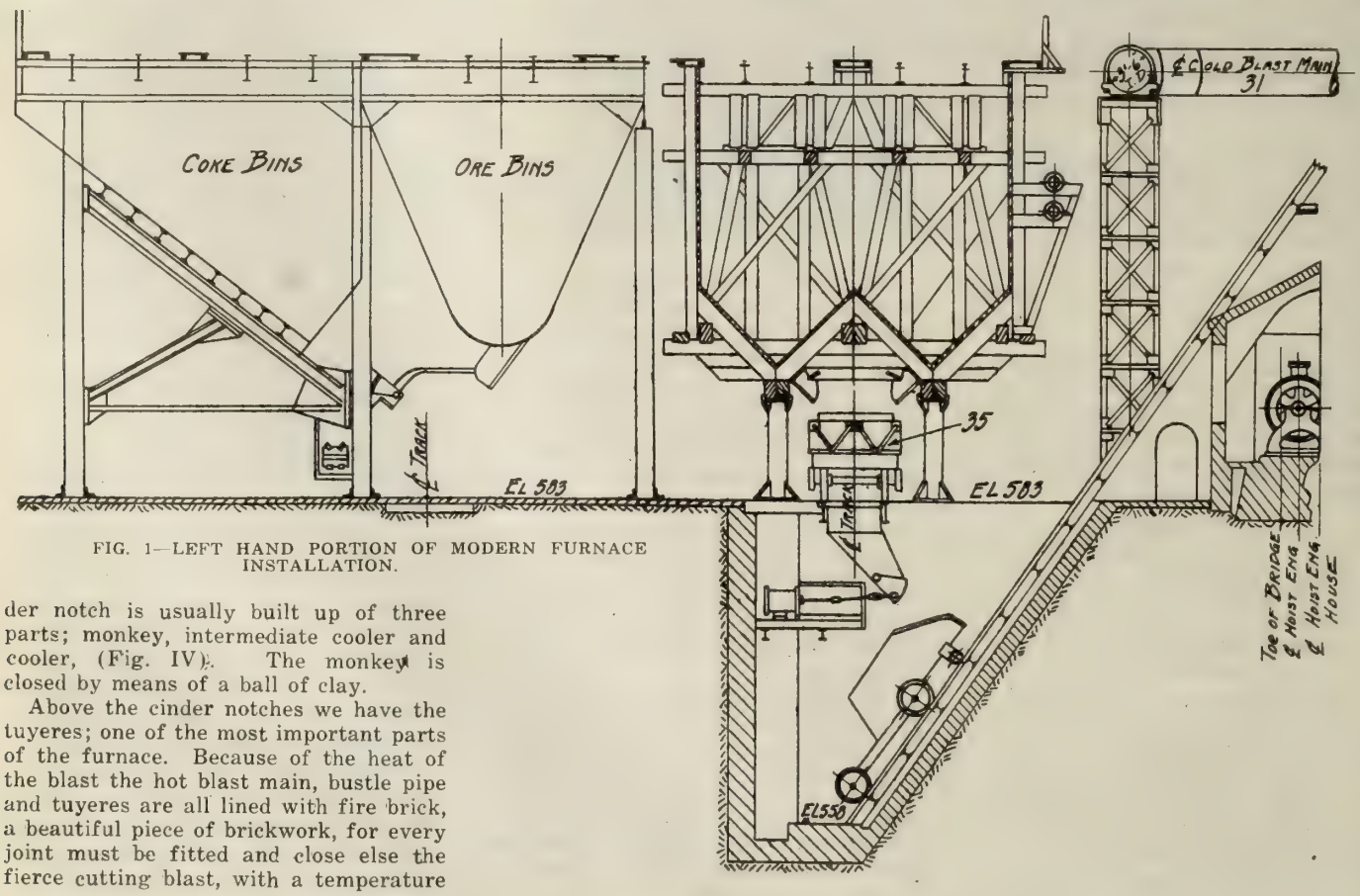


FIG. 1—LEFT HAND PORTION OF MODERN FURNACE INSTALLATION.

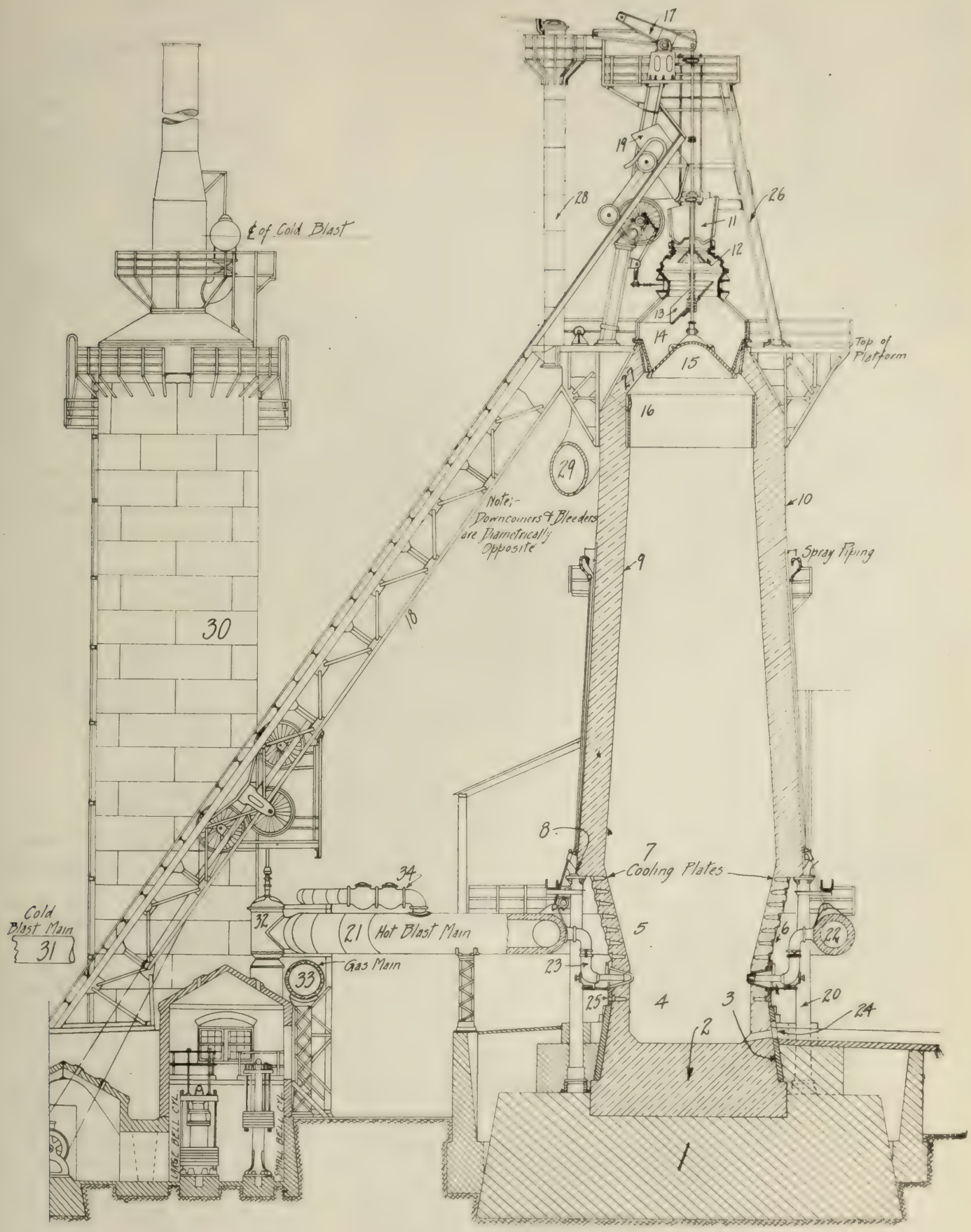


FIG. 1 (CONT.)--RIGHT HAND PORTION OF MODERN FURNACE INSTALLATION

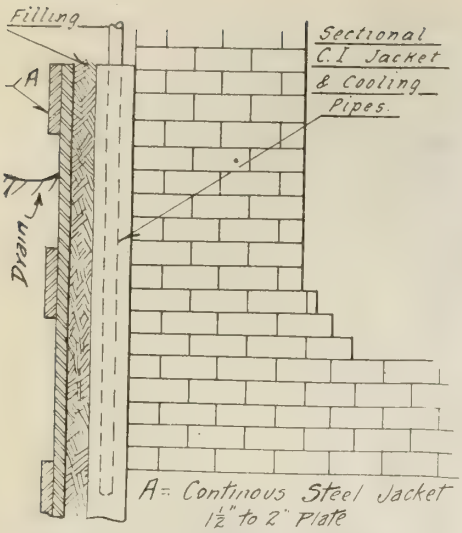


FIG. 3—HEARTH JACKET.

time at night, will never be forgotten.

I remember two brothers who worked at a steel plant; they often talked of their work at home, and their mother, who listened, formed a vague idea of the operations she had never seen. One evening she was persuaded to visit the plant, she saw the mills, the huge revolving fly wheels and rolls, they visited the open hearth and saw 100-ton furnaces roll over and pour out their contents; they reached the blast furnace just as pouring commenced; the younger brother pointed out the pouring stream, with its scintillating sparks, with pride. Mother grasped his arm; "John," she whispered, "where do we go when the blamed thing starts to go round?"

But let us return to our furnace. The brickwork above the mantle is often protected by cooling plates or pipes. The furnace shown in Fig. 1 is cooled by a spray on the outside of the shell. This is not a successful method in cold climates, or where high winds are encountered.

The steel shell is of heavy plate work, ½ in. to ¾ in. plates, for as the lining wears hot spots appear on the steel work. At the stock line, or throat of the furnace, cast iron abrasion plates are inserted to prevent wear to the brick work.

The brick lining deserves a few words. At the bottom of the hearth the pressure is the greatest, and the temperature is about 3,000 degrees Fahr. Large blocks are employed here. They are of high grade fire clay, laid with a thin joint and fitted by rubbing down with carborundum stone. All joints are carefully staggered, for a leak here would be fatal. In the bosh the temperature is higher, 3,200 degrees Fahr. to 3,500 degrees Fahr., and brickwork of very highest grade must be employed. From the mantle up the temperature drops to 500 degrees Fahr. at the stock line, and second class bricks can be accepted about half way up the inwalls.

Notice the thickness of brickwork, 3 ft., 0 in., to 3 ft., 6 in., insuring a body of material to hold the heat and stand the abrasion of a long campaign. Thin wall furnaces have been unsuccessful, mainly because an excessive amount of water cooling was required, and it is just as bad for a furnace to be too cold as too hot.

The furnace top is a source of contention among blast furnace engineers; history for just a minute, please. All furnaces were at first filled by hand, men or women, carts, wheelbarrows or baskets, and the ore, lime and coke could be distributed just as the superintendent of the furnace desired. If one side of the furnace was cold additional coke could be fed to that side; if hot, vice versa. With the first mechanical tops this could not be done and many operators were dissatisfied. Patent tops with distributors were developed by the score, some worked, many did not, often because the inventor forgot that a blast furnace top is at the best a dirty, hot, mechanical rocking place, where springs, cams and gears have only a short life, where adjustments cannot be maintained and the hammer often the favorite tool in more senses than one.

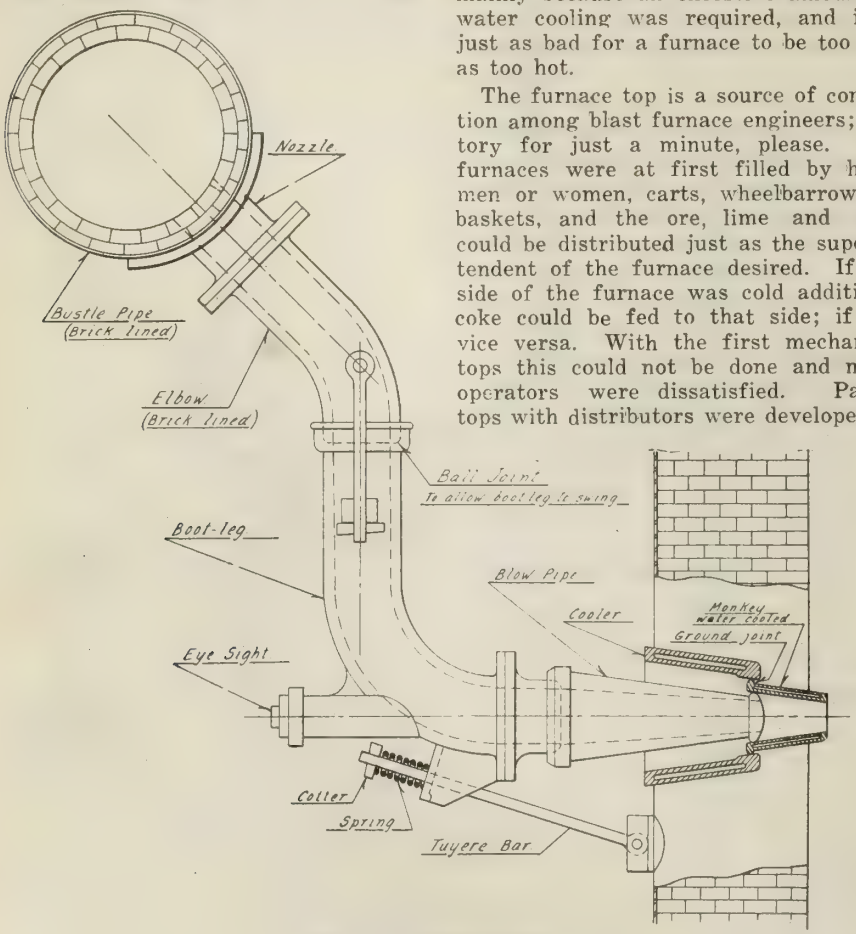


FIG. 5—TUYURE STOCK.

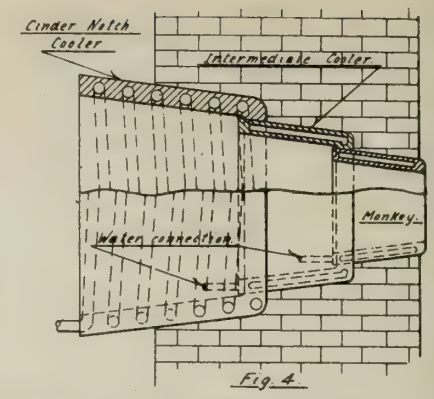


FIG. 4—CINDER COOLER.

Let us consider what we must have on a furnace top.

1st—A support for the sheaves of the skip car rope.

2nd—A hopper into which the skip car can dump.

3rd—A bell to admit the charge to the inner hopper.

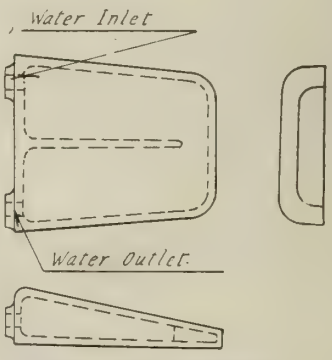


FIG. 6—BOSH COOLERS.

4th—A bell to admit the charge to the furnace.

5th—Mechanism for operating the bells.

The two bells are, of course, to prevent the escape of gas each time a charge is admitted into the furnace. One bad accident to a furnace is to drop or lose a large bell. Fig. 1 shows all these parts very clearly with the addition of a simple distributor, that in part meets the demands, but there is room for much engineering skill on a furnace top yet.

At the furnace top is also located the gas outlets. The modern way is to arrange two to four outlets, as shown in Fig. VII, the ascending gas carried with it many particles of fine dust, coke or ore; especially when small or large explosions occur, the valve at the top takes care of explosions, acting as a safety valve, the long riser gives the heavy dust a chance to fall back to the furnace, so that the gas going to the dust catcher is fairly free from large particles of dirt.

Dust catchers take many forms, but

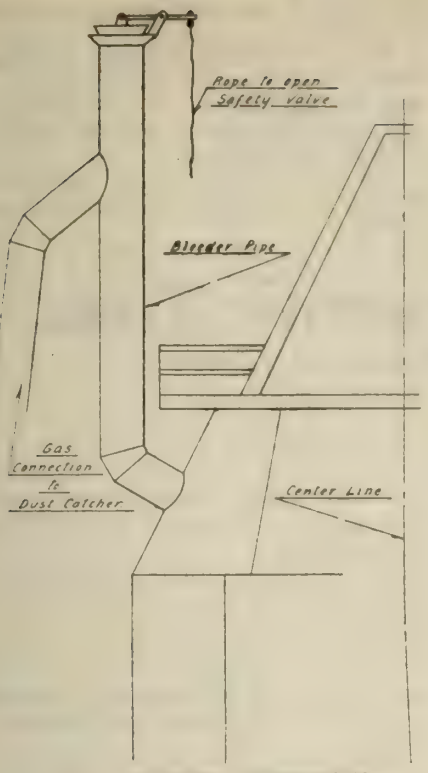


FIG. 7—BLEEDER CONNECTION.

are mainly based on the principle that if the velocity of the gas is lowered dust will be allowed to be deposited.

Skip engines are steam or electric driven. Absolute freedom from breakdowns is more important than absolute economy.

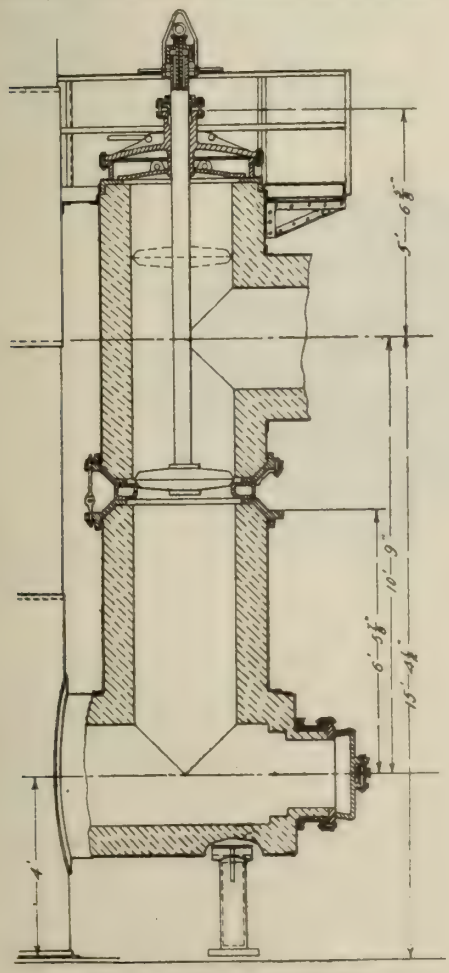


FIG. 9—HOT BLAST VALVE.

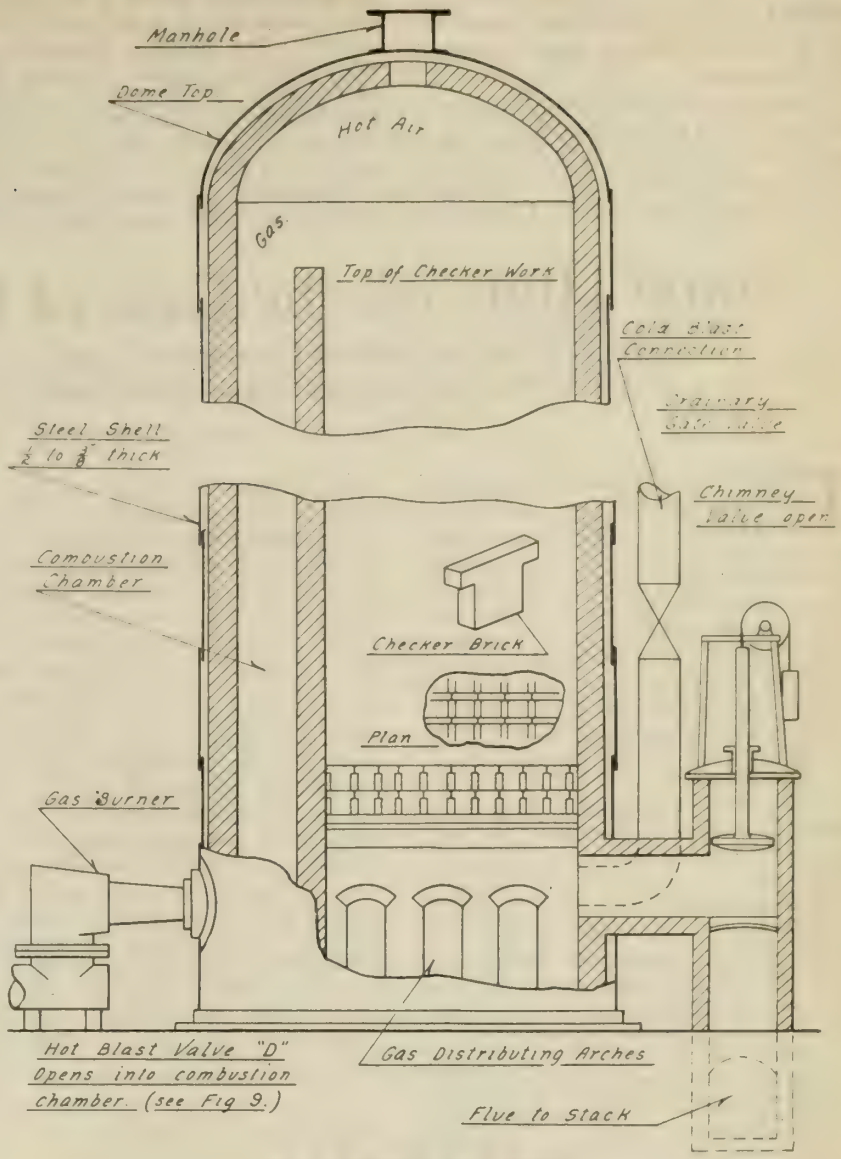


FIG. 8—SECTION OF A STOVE.

Bells are lifted by steam cylinders or electric hoist; dependability again being the chief feature desired.

Now let us consider the stoves more in detail. There are shown two main classes, those that have the draft stack on top as shown in Fig I, and those that have a common stack for all four stoves and separate from any of them as shown in Fig. II. Most Canadian plants favor the latter design. A section of a stove is given in Fig. VIII.

Just at this point we cannot resist going into history for a few minutes. Away back in 1825 James Neilson started using preheated air for furnace blast. The saving was so pronounced, even with low temperatures, that he patented the idea and several forms of stoves, but there were avaricious men in those days, even as to-day, and a combine of Scotch furnace owners, anxious to save a few pence in royalties, took a pledge to break the patent by any means, legal or otherwise. The fight was long and bitter, but in the end the pence-saving Scotch lost the day.

The early stoves were cast iron pipes set in brick chambers, and if the temperature exceeded 700 or 800 degrees Fahr. the life of the tubes was very short. In many cass the stove was located on top of the furnace.

Referring to Fig. VIII, this stove is known as a two-pass stove, the gases passing up and down before going to the chimney flue. Other designs have three or four passes, but many passes often cause trouble with blocked passages, etc.

The gas from the furnace top is burnt by a special burner at A. The products of combustion pass up the combustion chamber, down through the many openings in the checker work, heating the whole mass of brickwork on the way, finally the waste gases pass out by way of the chimney valve B. The draft of the stack is, of course, the actuating force.

After heating the gas is shut off, air doors closed, chimney valve closed and cold blast valve, C, and hot blast valve, D, opened. The cold blast is then heated for furnace operation.

Notice the hot blast valve in Fig. 9, the seats are water cooled and arranged so as to be easily removed, the valve and stem are water cooled, and every

part is brick lined; this is indicative of all blast furnace work; heat to be resisted and yet working parts arranged just the same.

Furnaces are rated by their production per day of twenty-four hours. Their heights are for the most part the same, 70 ft. to 85 ft., if made higher the weight of stock would crush itself; if lower the top temperature would be too high, and there would not be space for the various changes. The diameter of hearth, therefore, controls the size. Roughly, a furnace having a 13 ft., 0 in. diameter hearth will produce 250 tons per day. A furnace having a 16 ft., 6 in. diameter hearth will produce 500 tons per day.

To produce 500 tons of metal, 1,000 tons of ore, 1,200 tons of coke, 500 tons of limestone and 3,100 tons of air must be handled.

We have covered a big field in a short time. Study the illustrations and reason out the why of the various parts and more information will be obtained than by mere reading.

Our next subject will be "Operation and simple chemistry of the blast furnace."

Some Hints on the Care of Pneumatic Tools

A Talk on the Various Conditions Under Which Pneumatic Tools Are Used, with Suggestions as How Best to Meet These Conditions

By A. W. SWAN

THERE are few modern machines of such importance, considering weight and size, as the pneumatic tool, more particularly in connection with shipbuilding. Considering the conditions under which the average pneumatic tool is operated, in all temperatures, exposed to unfavorable weather conditions in outdoor work, or in dusty surroundings in machine shop and foundry, it is not surprising that care of the tool is well repaid by increased work and longer life.

In the first place, whatever the tool, riveter, grinder, chipper, drill, etc., the air supplied must be as clean and dry as possible.

The cleanliness of the air can be assured by having the intake for the compressor suitably placed; the dryness depends also on the compressor. In two-stage air compression, a large percentage of the moisture contained in the air is removed by a moisture trap in the intercooler. For large installations, it is well worth while to supplement the intercooler moisture trap by an aftercooler, in which the air is again cooled after the final compression, and still moisture removed. The Hog Island Shipyard compressed air installation is the second largest in the world; all the air is compressed in large two-stage machines, and passed through aftercoolers.

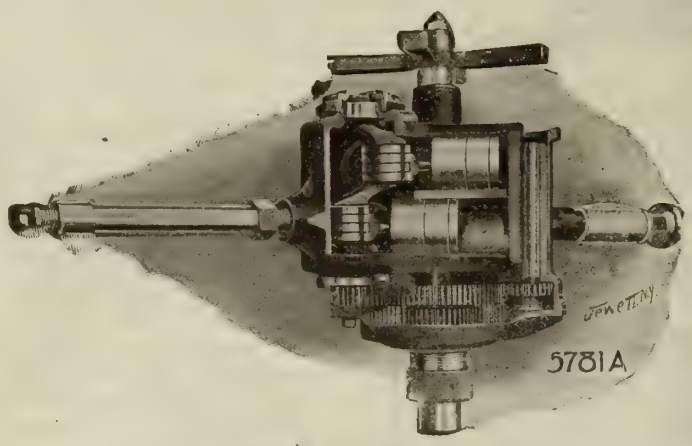
The main difficulty due to moist air comes in cold weather; air exhausting from pneumatic tools is very cold in any case, due to expansion, and the cooler the air the less moisture will it hold, the result being that in cold weather the exhaust of the tool rapidly becomes clogged with ice deposited from the air, unless means are taken to prevent this happening. Still another preventive is to have a reheater in which the air is heated just before reaching the tool; the air is then too warm to deposit the moisture in the form of ice, and the reheater has the further advantage of expanding the air, increasing the supply to the tool. It seems at first rather absurd to cool the air after leaving the compressor only to heat it before reaching the tool; the point is that the air would cool anyway, and it is better to catch the moisture in the aftercooler trap, than to have it deposited in the pipe line. Marble cutters who use the small carving pneumatic tools sometimes in the winter put a lubricator filled with alcohol on the discharge line and allow it to feed with the air and this prevents freezing, but the quantity has to be carefully gauged.

Good lubrication is the secret of good performance for pneumatic tools as for other machines. Riveters, chippers, and other reciprocating tools require a light bodied oil of high grade, and should be oiled three or four times a day. Drills, etc., should be packed with a grease that is not too light—if it is too light it will cause heating—and do not require attention so often as riveters and chippers. They should, however, be turned over frequently to allow the grease to reach all working parts. Grinders, close corner drills, etc., sometimes use 600 w. steam cylinder oil with excellent results on a mixture of grease and 600 oil.

Pneumatic tools of all kinds should be cleaned once a week. Riveters, etc., should be taken apart and cleaned in a bath of kerosene. For drills and grinders it is sufficient to pour in kerosene, run the machine light for a few minutes, drain out the kerosene, and fill with grease.

In case of trouble with valves, etc. the less tinkering the better. The pneumatic tool is made up of parts of selected material, generally high grade steel, heat-treated and ground to close limits, and a very little filing will usually do a great deal of harm. For the same reason home-made substitutes for parts that need replacement are decidedly false economy.

In cold weather on outside work, a useful tip is to warm the tool slightly before starting work.



SECTIONAL VIEW OF PNEUMATIC TOOL.

ASSOCIATION OF BRITISH MOTOR AND ALLIED MANUFACTURERS

The above is the title of a new corporation which has been formed to promote and develop the British overseas motor trade. This body, in conjunction with the Overseas Trade Department of the British Government, has already sent one expert on overseas commerce as a commissioner on a tour of investigation into the Eastern markets. The principle of co-operation thus established between the manufacturing concerns and a Government department is expected to have lasting effects on the conduct of the trade. Inside knowledge of the conditions and requirements of foreign markets will now be forthcoming firsthand from reliable sources, enabling firms to adopt the right methods of business for particular lines.

British firms are watching closely the steps that United States makers are taking for setting up branch works in Canada in order to be able to avail themselves of the favorable terms of a preferential tariff when it becomes definitely established.

Canadian Machinery Drafting Course—Part VII

In Which We Enter the Subject of Orthographic Projection, Studying Various Simple Objects to be Found in General Working Practice—Students Will Do Well to Carefully Follow This Section

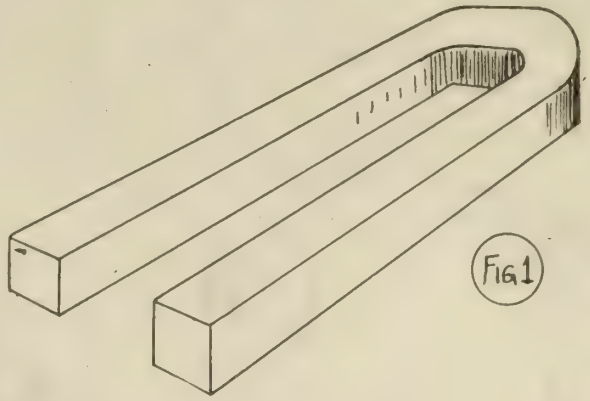
By J. H. MOORE, Associate Editor Canadian Machinery

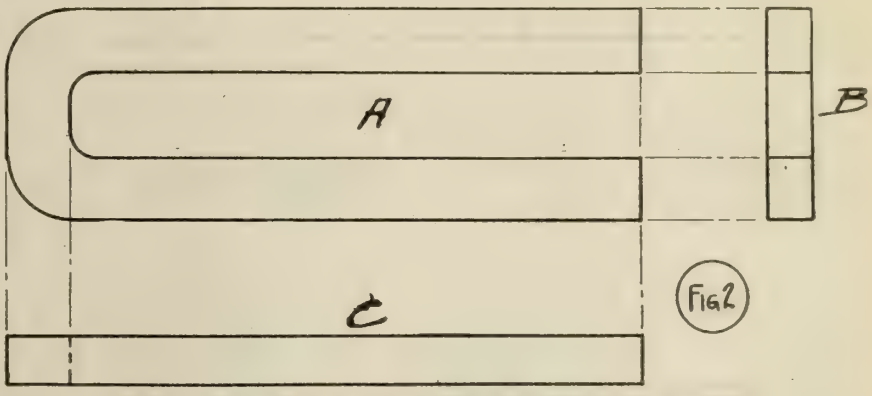
THE subject of projection drawing (or orthographic projection as it should be properly termed) is one of very vital importance, and one which, to make a success of this course, must be given fairly good space and treatment. In order to make the same interesting to the students in general, we will use (as far as possible) objects with which the machine apprentice is entirely familiar. In this way the subject becomes more interesting, and the fact that the machine apprentice knows from actual experience that such objects really exist, guarantees that the apprentice in the drafting room will likewise be well aware of their existence. Perhaps a good heading to begin with would be the statement as follows:

The Representation of Objects

In Fig. 1 we will illustrate a clamp of the usual nature found in most machine shops. Its uses are varied, as far as the various styles of machines used on, but as is well known, its main function is to clamp. This object is drawn as it actually appears when the eye of the observer is in some certain position. As can be well understood, this sketch at Fig. 1 does not show the true length of the various lines, in fact this sketch is simply known as a perspective drawing. Such a sketch is of no practical value to the machinist or tool maker, except to show what the object looks like. Of course, on a simple piece, such as this illustrated, one could easily work from the same if dimensions be placed on it, but without dimensions is is useless as an actual working drawing, for in no way can you measure the true length of the lines.

In order to represent this object in such a manner that any line can be measured directly we employ the method called projection drawing. In a perspective drawing various sides are shown but in a projection drawing only one side is shown at a time, the others being hidden.





FIGS. 1 AND 2—ILLUSTRATING THE TWO STYLES OF DRAWING.

Let us illustrate this point by referring to Fig. 2, which shows the same clamp drawn up by the projection method. First let us consider the view A. This view is what is termed a top view. or plan view, namely a drawing which represents the object as if it were resting on a horizontal plane, and the observer looking at it from above.

But from this view we get no idea how thick this clamp is, and if the slot runs clear through its thickness. In other words we must have a front view, or front elevation. To get a complete idea of the side appearance of the clamp we need a side view of side elevation, so we will no wproceed to view B at Fig. 2, where we see the front elevation, that is the view drawn by imagining the eye to be so situated that the observer looks directly at the front of the object.

The result is clearly shown.

The side elevation is now drawn, as if it were projected on a vertical plane at right angles to the horizontal plane. The projection of such a view would look like that shown at C.

In order to show these various views in a manner that one view cannot be mistaken for another, they are always arranged on the drawing in a certain fixed and invariable manner. Fig. 3

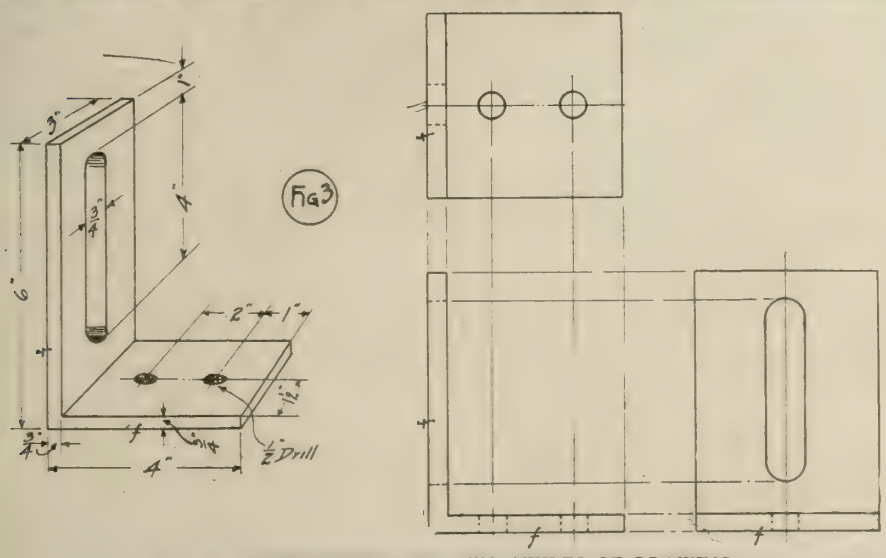
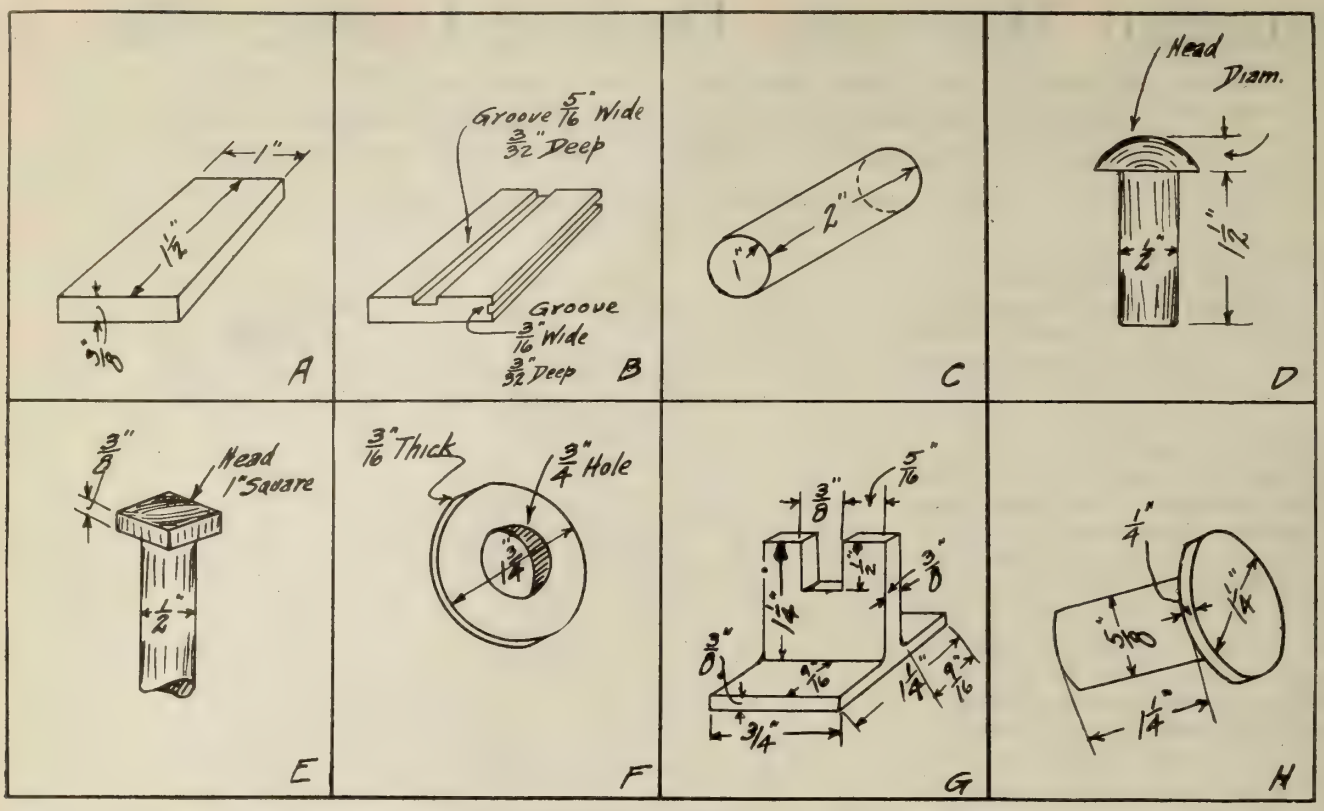


FIG. 3—ILLUSTRATING THE TWO STYLES OF DRAWING.



ILLUSTRATIVE SKETCHES A TO H.

illustrates another well known object, namely an angle plate. To illustrate the principle clearly we give dimensions on the perspective sketch, from which we will proceed to make a projection drawing.

Starting at the plan we draw the view shown at A. We next project the two elevations as illustrated. It is a matter of taste which of these three views you start on, for it makes no difference which is drawn first, but the general arrangement is always as shown.

Any departure from this standard arrangement should be guarded against, but should for some reason or other, the draughtsman decide to change the relation of these views, he should state clearly on his drawing the change made and why.

The broken centre lines are used to show the connection existing between the different views of the object, and to indicate axis of cylindrical surfaces of any kind, but as the best method of following out a subject of this nature is by an actual study of the objects, let us go on to discuss plate No. 7.

As per usual, 9x13 in. is to be the actual drawing size, and 9½x13½ in. the trimming sizes. Preserve the 1 in. space at the bottom for title purposes as usual.

To aid the student we illustrate a chart at Fig. 4, showing rough sketches of the various objects about to be discussed for projection drawing on this plate.

A, the first object, represents a tool steel block 1½ in. long, 1 in. wide and ¾ in. thick. B represents this same block after a groove had been cut on two of its sides as shown, these grooves being 5-16 in. wide on top, and 3-16 in. wide on side, each being 3-32 in. deep.

At C is illustrated a cylindrical piece of tool steel, while D represents a rivet of the round button head type. E shows a square head bolt, while F represents a round washer, numbers of which can always be seen around a machine shop, of all thicknesses.

In each case dimensions are given, so that to transfer from the perspective to projection becomes an easy matter.

Students will notice that for the objects C. D. E and F. only two views are given. The reason for this is no doubt self apparent, namely that were we to draw a third view of these pieces, it would be simply a repeat of the side elevation, for the pieces being round, the front and side elevations are similar. This, of course, does not always apply, for in the more difficult cases of projection more views than even the three

HERE ARE THE PRIZE WINNERS FOR PLATE No. 3.

1st—Carl Rowson, Port Hope, Canada.
2nd—Ernest Bell, Amherst, N.S., Canada.
3rd—H. Luxon, Hamilton, Canada.

Is your name here? If not it may be next week, so keep on sending us your work.

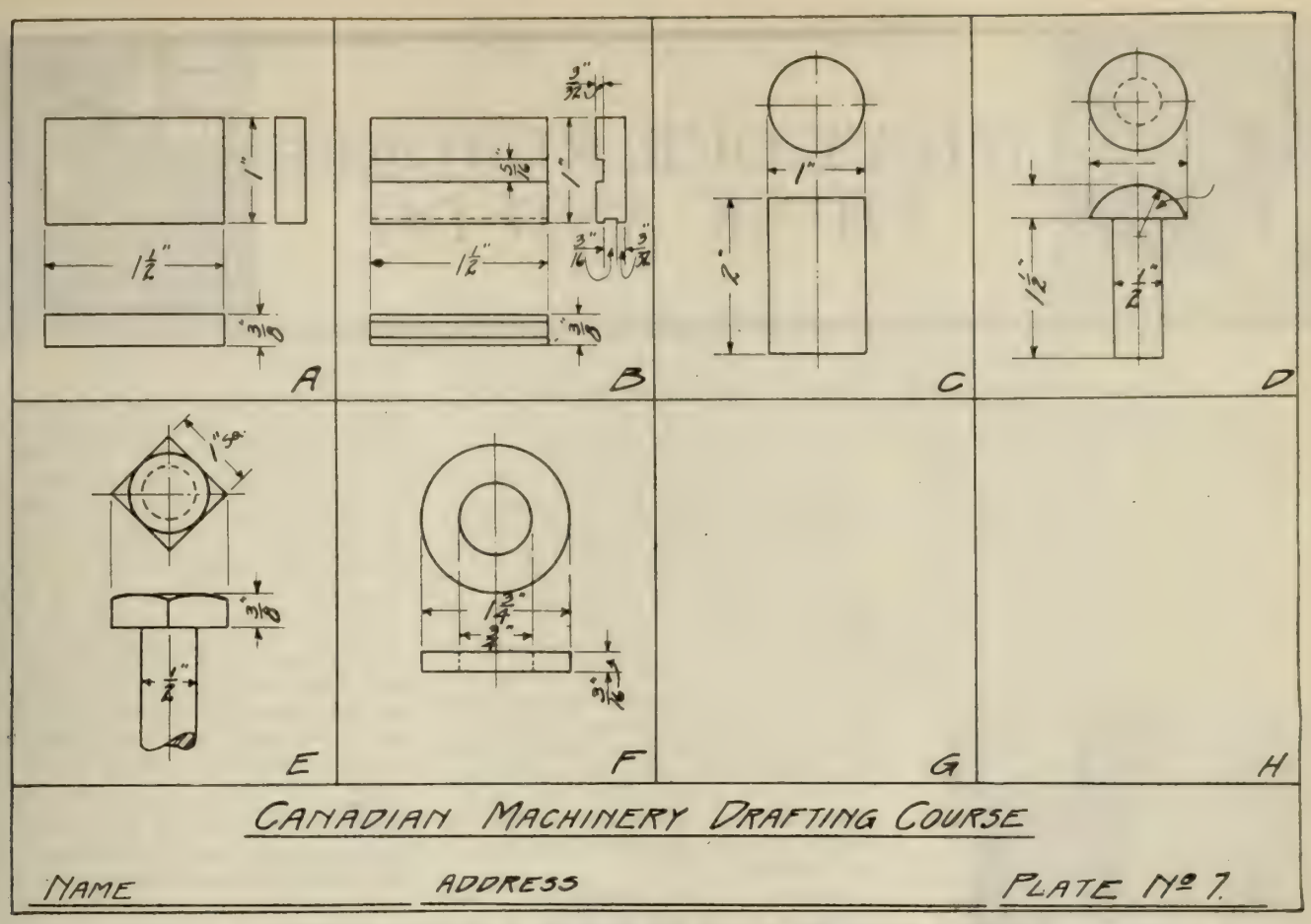
Tear off and send with drawing

Name .....

Address .....

Position .....

Firm's name.....



HERE IS PLATE NO. 7. BE SURE AND FILL IN THE SPACES G AND H.

already spoken of are required, owing to the intricate nature of the object, but as this is really a more advanced subject, we will keep for the present to the three views, or two as the case may be.

We have divided this plate No. 7 into 8 parts as shown, leaving the last two spaces vacant, for a good reason.

In order to make sure that students have grasped the principle of projection, we have illustrated on Fig. 4 two objects G and H. These objects are well known, namely, first G is a small, simple bracket from a machine. All dimensions are plainly marked. H represents a flanged piece of work, usually made up in most machine shops for various types of work.

Now, the object is as follows: Study these sketches carefully, then draw up your idea of what a projection drawing of these pieces would look like.

Put all dimensions on the various views on this plate, and use the illustration of plate No. 7 as shown with this article for a guide. Above all stick to it, and send us your work. True, the weather is good, almost too good to work perhaps, but think a moment, for by following up this course you are building up something which will bring you returns at some future date well worth the present sacrifice.

Auto scooters, which are undoubtedly going to become very popular, are still on the imports prohibition list, and several firms are busy manufacturing to take full advantage of the protected period.

WILL THE FORMER CONDITIONS EXIST

The modern manufacturing methods installed for production in the national interest, the specialization, repetition and standardization called into being are going to persist. These all involve a greater expenditure on mechanism relative to the number of operatives, the cost of the product falling as methods are made more intensive and expenditure on machines goes up. Materials, semi-manufactured, which form the basis of the industry, will remain high in price for a very long period; the total production will be insufficient to fill demand for years. The maker of mechanism competes for material in the same market as the shipbuilder and railroad. The price of the material in a lathe is directly affected by the demand for steel rails, boiler plates and section material, of which not merely this country, but the entire world are in sore need both now and for the coming decade. Agriculture, again, will use more and more mechanical devices. The productivity of Mother Earth, both on and below the surface, is the great essential to human maintenance and comfort, and to get maximum results at the lowest cost means the intensive application of mechanical art.

Whatever may be the result of the "crash of peace" in the way of slump elsewhere, it is certain that it will not affect the business of mechanism for a very long time. Hence high prices of material and product will rule for an indefinite period. As labor costs are in the main greater than material costs, if prices gradually descend it will be due to greater individual productivity. This is where better methods of organization, standardization and specialization and the due application of scientific methods of production may help equate the advanced prices of material. We are now in a period when adulteration, so far from being a matter of reproach, is a patriotic necessity. Former standards of material cannot be maintained, for it it needful to spin out a fixed quantity of any commodity by admixture with a substitute of less value, or even to use the substitute in defiance of former prejudice. The use of the cheaper material or one of inferior quality has not in the majority of instances been attended with any disastrous result; indeed, the contrary has in many instances been the case. Standards have had to be lowered by necessity, and there will be a clear gain in price by retention of the substitute where this is suitable. Doubtless, there would have been evolutionary substitution, but the war has hastened such alteration by many years. Again, workmanship has in many cases been too high in character for the use, and cutting out unnecessary finish has tended to cut costs. It might have come without the war, but the necessity and limitation imposed have hastened the event. There have been large gains as well as enormous wastage. The former will persist when the latter ceases. Pre-war conditions and pre-war prices cannot be restored, but alteration of the conditions may and will help to limit the rise in price.

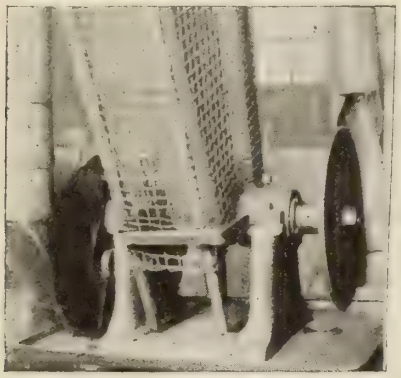
WHAT OUR READERS THINK AND DO

A FULL ANTI-FRICTION GRINDER

By DONALD A. HAMPSON

The grinder shown by the photograph is a home-made one, but is right up-to-date. It is fully equipped with anti-friction bearings. The head casting is a stock part in the shop where the grinder is used and its size lent readily to the desired sizes of bearings selected.

The boxes were bored out to receive the linings of a pair of Hyatt 1¼ in. roller bearings, 4 in. long. Dust caps



HOME MADE DISC GRINDER.

will be seen at the ends of the boxes. Within these, in addition to the usual felt washers, there are ball thrust bearings of generous size. Provision is made to take up end play by the use of washers, if it ever becomes necessary.

On one side of the grinder, the snagging of castings is done on a 14 in. Norton wheel. On the other side various sizes of disk wheels using carborundum cloth circles are carried. Disking naturally puts considerable end thrust on a grinder and here the anti-friction qualities of the ball bearings show to best advantage.

They say in the shop that this grinder runs itself; it takes three full minutes for it to stop after the belt is shifted off. And what is more to the point, two men working on the machine don't stop it now as they used to with plain bearings.

An interesting feature is the way the disks are screwed on. They slip a ball thrust bearing on the shaft against the flange and tighten the disk against this. No wrench is required for loosening—the workman takes hold of the disk with his hand and gives it a turn and it loosens itself. The thrust bearing seems to keep the disk tight without wedging it fast.

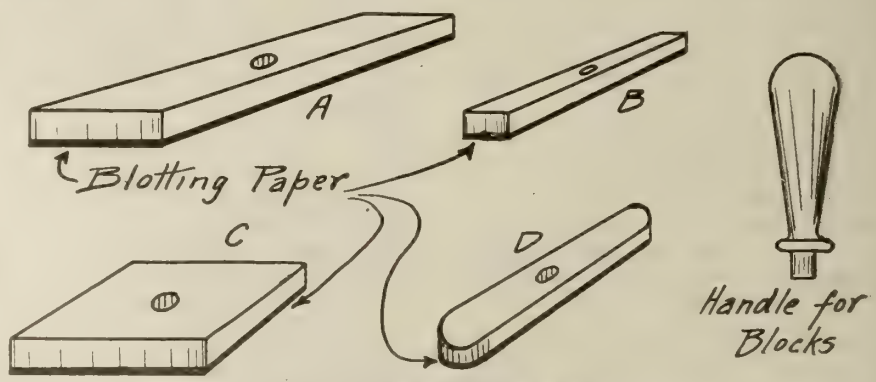
MAKING CORRECTIONS ON BLUE-PRINTS

By Harrison Jenkins

Readers no doubt at some time or other have required to make some corrections on blueprints, and perhaps went through the laborious task of first blotting out the dimension in black with pen and ink before adding in the new figures. This scheme has two disadvantages: first the time necessary to blacken in the figures not desired, and second, that you cannot very well place the dimension in its former position, except you write the correction in white ink (which is not always easy to get). If white ink is not to be had, then it means that you must crowd in the figures somewhere else, not always a wise plan to follow.

An easy way to overcome all such trouble is to make little blocks of such length and width as best suits your usual needs. Four such blocks more than likely will cover all the changes you will ever desire. Glue (or hold by thumb tacks) pieces of blotting paper as shown.

Simply moisten these pads with the usual bleaching solutions of washing soda, caustic potash, or strong ammonia, in fact any alkali, and press the pad on your blueprint, when you will not only accomplish a quick job, but will make a neat white space in which you will be able to print in black ink your desired correction.



SKETCH SHOWING THE BLOCKS.

MAKING CASTINGS FROM MIXED COPPER ALLOYS SWARF

In dealing with finely divided metal, the first thing is to pass it through a magnetic machine to remove iron, and preferably the next thing should be to mix in about 5 per cent. in bulk—net weight—of hardwood charcoal, granulated to the size of large peas, dust not being wanted. Large crucibles should be used for melting, a few pounds of brass or gun-metal being melted before the swarf is put in, it being desirable to have a small bath of molten metal to start with. The swarf should be added to the bath of metal in moderate quantities until the crucible is full of metal to within 2 in. of the top, when, if possible, the crucible should be lifted and skimmed into an iron scoop, and then replaced in the fire, the dirt taken off being placed in a brick or metal bin and saved for further treatment. When in the fire again the metal should have salammoniac well stirred in at the rate of from 2 oz. to 4 oz. per 100 lb. of metal—a small excess does no harm—and when the fumes cease to come from the metal the crucible should be lifted, well skimmed, and be poured into the moulds, but on no account may it be stirred at this stage. Clean castings should be secured that will turn up without blemish in this way, the castings having a clear brownish skin when cold. If too hard, the castings should be taken from the moulds while red hot and plunged into cold water, this annealing and softening them so that they machine readily. So far as possible, copper-tin and copper-zinc alloys should be kept separate, and phosphor bronze should be kept out of brass mixtures while aluminum should be kept out of both, this metal causing pin holes under the skin except in a few of the copper zinc mixtures and phosphorus often has the same effect where zinc is present. Where ferro-bronze is used the scrap should always be separately collected, as the iron does not fit in well with miscellaneous scrap as a general thing, and manganese bronze should be kept separate where possible for the same reason.—

A Discussion on the Subject of Jigs and Fixtures

Can a More Accurate Tool or Fixture be Produced by Using Approximate Measurements, Than by Using Strictly Precision Methods—This Article Discusses Various Questions on Jig Fixture Design

By WILLIAM ERNEST

WHEN one starts to speak of jigs and fixtures, he might begin alright, but he can hardly be expected to finish his subject; its ranges are almost without limit. A too common error among toolmakers is the notion that a jig is essentially a very fine piece of work. Of course, jig and fixture work can be carried to very fine limits if necessary, but on the other hand, a large percentage of jigs for drilling need be no closer than an ordinary mechanic can lay out with dividers and centre punch.

The object of these tools is to produce an article with unskilled help in the least possible time, as good as a practical mechanic would without their aid. Therefore, it would be wise for the tool designer and the toolmaker to be governed by the circumstances incident to the job in hand. In so doing a more accurate tool can ofttimes be produced by using approximate measurements than by using strictly precision methods.

This may appear to be a paradoxical statement, but the following illustration will suit to prove its feasibility. Suppose, for instance, we have to make a jig to drill a hole in the centre of a drop forging, which is just a plain round piece, say, for instance, one inch in diameter, and we have only the blueprint of the piece to make our jig by.

The drawing, of course, will give the dimensions of the forged piece and the toolmaker is expected to make a jig to produce a hole in the centre of any number of pieces. Whilst forged articles are all practically the same, a glance at a few forgings will be sufficient to convince anyone that any attempt at precision methods on such a job is just waste of time. To sum up, it can almost be reduced to the following rule: One hole in an unfinished article can be no more accurate than the rough surface, and each subsequent hole can only be accurate in relation to the centre of the first. So it can readily be seen that if a mean between all the conditions surrounding this particular job are taken into consideration, such as burrs, lumps, fins, scale, flat spots, draft, etc. What is needed is just plain, common sense and intelligent application, instead of precision.

Now let us consider another type of jig, which is very common to many branches of the metal working industry. We mean those used in drilling holes in a circle equally spaced, such as are in flanges, hubs, etc. To illustrate the best way to tackle such a job, we cannot do better than cite an instance which actually occurred, thereby proving the easiest method, as well as showing how mechanical commonsense wins out. Such sense can readily be acquired by reading trade journals, thereby gaining a broad view of all conditions relative to one's line of business.

Just for a moment or two imagine yourself to be the boss of the toolroom and are handing out the work in the instance I refer to.

Two jigs are required for drilling six holes in a circle in some rough malleable iron flanges. The holes are for ordinary ⅜ finished bolts and a 25-64 drill is used to give sufficient clearance. As the boss with the foregoing facts to guide you, you hand out a job to Jack and Bill. Bill is one of those chaps that is always blowing about accuracy, so you merely give him the blueprint of the article and tell him to make a jig. Jack being a reasoning and practical sort of fellow, asks just what is the job for, etc., and is told all that is required is for the bolts to go in through the flange and then through wood, and then to be drawn up with a washer and a nut.

Now, let us watch these two lads start work on their respective jobs. Let us assume it is first thing Monday morning. Of course, everyone feels good and fresh after Sunday's rest up, and our nervy men feel like chewing up anything from brass to high speed steel; both are now well on their way laying out their jig plates, and by 7.30 Jack has his laid out and Bill is still fussing around with jig buttons. It's amusing to watch Bill work. As I said before, they both feel like tearing things up. Bill forthwith starts to give good proof of this fact by busting a jig button up in his jig plate.

It is now 8 o'clock and Jack is sitting on a stool at the drill press with his tongue out, eagerly trying to spit the centre punch prick on his plate, while Bill holds forth like a Bolshevik orator concerning the way this 'ere shop runs. Jack, being of a humorous turn of mind this morning, feels the little grin devils hammering at his slats, urging him to laugh at the thought of the precise methods Bill will have to use to get that little tap out.

However, in due course both are nearly working again with hopeful prospects. Bill is now actually in the lathe carefully boring out his job and feeling real pleased with himself. Nothing else unusual happens till dinner time and after a good meal both return to the shop a little before the whistle blows feeling like giants filled with new wine. In this frame of mind Bill commands the attention of a novel noonday audience and creates quite an impression upon some concerning the wonderful refinements of modern mechanics.

As soon as the shop gets fairly started again, Jack gets his jig bushes made and his rival begins to sit up and take notice. The usual little finishing touches, such as pressing in bushings, lapping the same and generally humoring things into working condition, occupies Jack's time till next morning at 11.30, when he turns in the job, fit for a king. On the other hand, Bill is still fussing around with his accurate methods and even if he gets his job as accurate as he intends to, it will not do a better job. To be brief, it took Bill just 10 hours longer to produce the same results as Jack. It might be argued that Bill's job was the most accurate, which fact is granted concerning the jig itself, but it must be remembered that tools are only a means to an end, which in this case means drilled flanges good enough for practical purposes. We could hold forth about jigs and fixtures until Doomsday, and the half will never be told. Trusting we have all learned a little from Bill and Jack, we will leave it for some of their contemporaries to tell us more.

TRACING BY ARTIFICIAL LIGHT

By Harrison Jenkins

The writer, in his experience in the drafting business, had to resort on one occasion to artificial light for an aid in tracing, and a brief description of this experience might not be amiss.

A certain drawing was handed to the writer with the instructions: "Trace that." "That" happened to be a dirty, much-oiled and handled paper drawing. I could hear the words still ringing clearly, "Trace that," so I got to work, but it was slow sledding. So slow, in fact, that I stopped and rigged up the following scheme: I took a blue print frame we had and placed the drawing firmly on the glass, then pasted it to the glass all around the edges. I now turned the frame over and placed a piece of tracing cloth on the other side of the glass, fastening this in like manner. I next set the frame on the desk in such a manner that I was able to place a good, strong light directly behind the drawing, when by the transmitted light I could then easily trace with more speed and ease.

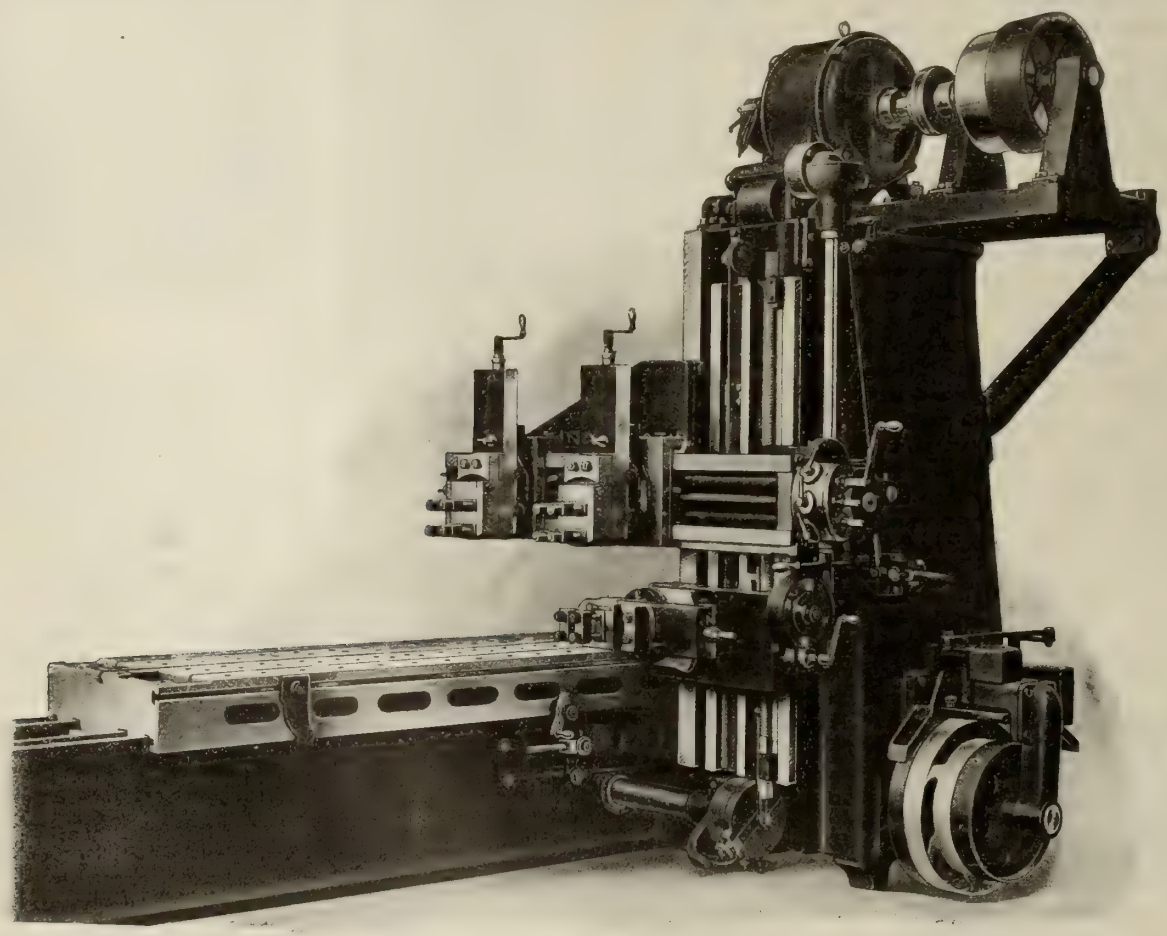
DEVELOPMENTS IN SHOP EQUIPMENT

Cincinnati Open-Side Planing Machines

In This Article Is Described a New Product in So Far as the Cincinnati Planer Co. Is Concerned, for This Firm Has Formerly Confined Itself to Planing Machinery of the Double Housing Type.

THE Cincinnati Planer Co., Cincinnati, Ohio, have recently placed on the market a new and complete line of open-side planing machines. This is a new departure for this concern, and it is stated that the best of care has been exercised in the design of these machines, to embody all the features of the double housing type.

The machines are manufactured in three sizes, 36 x 36 in., 48 x 48 in., and 72 x 72 in. The points of superiority cited are power rapid traverse for the rail heads, a box-type table, forced lubrication of the Vs, a patent "two speed" drive on the 36-in. and 48-inch machines, quick-reverse aluminum pulleys, an extra capacity table, a box-type bed closed on top, a bed bored for shaft bearings by means of jigs, a bull wheel revolving with the shaft in bearings at the side, bronze bushed self-oiling loose pulleys, a self-releasing combination friction, patent gear-shaped tumbler and dogs, a safety locking device, a down-feed screw and collar of one-piece construction, ball bearings on the down-feed screws, down-feed screws in tension at all times, adjustable taper gibs throughout, a vertical slide maintaining a full bearing on the harp at all times, micrometer collars for horizontal and vertical feeds, simplex feed gears, a patent power-elevating device, and all gearing completely covered. The side head has a long narrow guide for the saddle on the column; an independent adjustable-feed gear, and a handle for the vertical movement; a self-contained counterbalance system, and a releasing latch handle for the tool block.



GENERAL VIEW OF THE MACHINE.

The rail heads are provided with a

rapid power traverse mechanism.

The Vs of the bed and table are oiled by force lubrication from a pump which delivers the oil into the Vs directly under the tool point, and from this point it is distributed over the entire length of the bed to either end, from where it returns to the tank, the oil passing through two strainers before it is again used. For planing work that is wider than the table, the use of an auxiliary rolling table is recommended, this being supplied at extra cost if desired. The 36-in. and 48-in. machines are regularly furnished with a "two-speed" drive, giving two cutting speeds and a constant speed return, but where a greater number of speeds are needed either reversible or non-reversible motor drive is furnished, these requiring direct current.

The Bed

The bed is of heavy-box section, and is especially strengthened where the gearing and column are mounted. Heavy T-shaped girths at short intervals tie the walls together, and further strength is added by closing in the top between the Vs with an integral part of the casting. The column seat is deep and wide, providing a large surface for the column fastening, and is entirely inclosed on all sides. The length of the bed has very little overhang of the table when planing at full stroke.

The column is of box-type construction and is fastened to the bed by tongues and grooves in addition to the regular bolts and dowel pins. It is made with considerable taper toward the bottom.

The Table

The table is of the box type, the bottom being entirely closed. Heavy ribs at short intervals tie the top and bottom securely together, and prevent springing either when clamping work upon it or while it is at the limit of its travel. The T-slots are planed from the solid (not cored), the centre slot extending the full length of the table. Stop holes are drilled and reamed throughout the entire surface of the table. By drilling extra holes at each corner of the table and by carrying the centre T-slot the entire length, it is possible to plane from 6 to 10 in. longer than the rated capacity of the machine. Making the under side of the table solid also prevents dirt and chips from falling through the holes into the ways. Each section of the rack is bolted and doweled to the table.

The gearing and rack are cut from the solid by a system of special cutters for each gear, this method giving a smooth-running machine, and insuring strength and long life. All the large gears and racks are made from semi-steel castings, and the pinions from steel forgings. All gearing is completely covered for protection against accidents.

The driving shafts are made of 75-point carbon steel, and are ground, after the splining and all work has been done, to insure accuracy. Large reservoirs with self-oiling wicks furnish continuous lubrication to the shaft bearings. Each bearing is provided with a small reservoir, and an oil groove is cut on the inside at the top and bottom. The bearings for the driving shafts are ground internally and are fitted into the bed, the holes in the bed being bored out to a jig. No bushing is less than 7 in. long.

Knee and Cross-rail

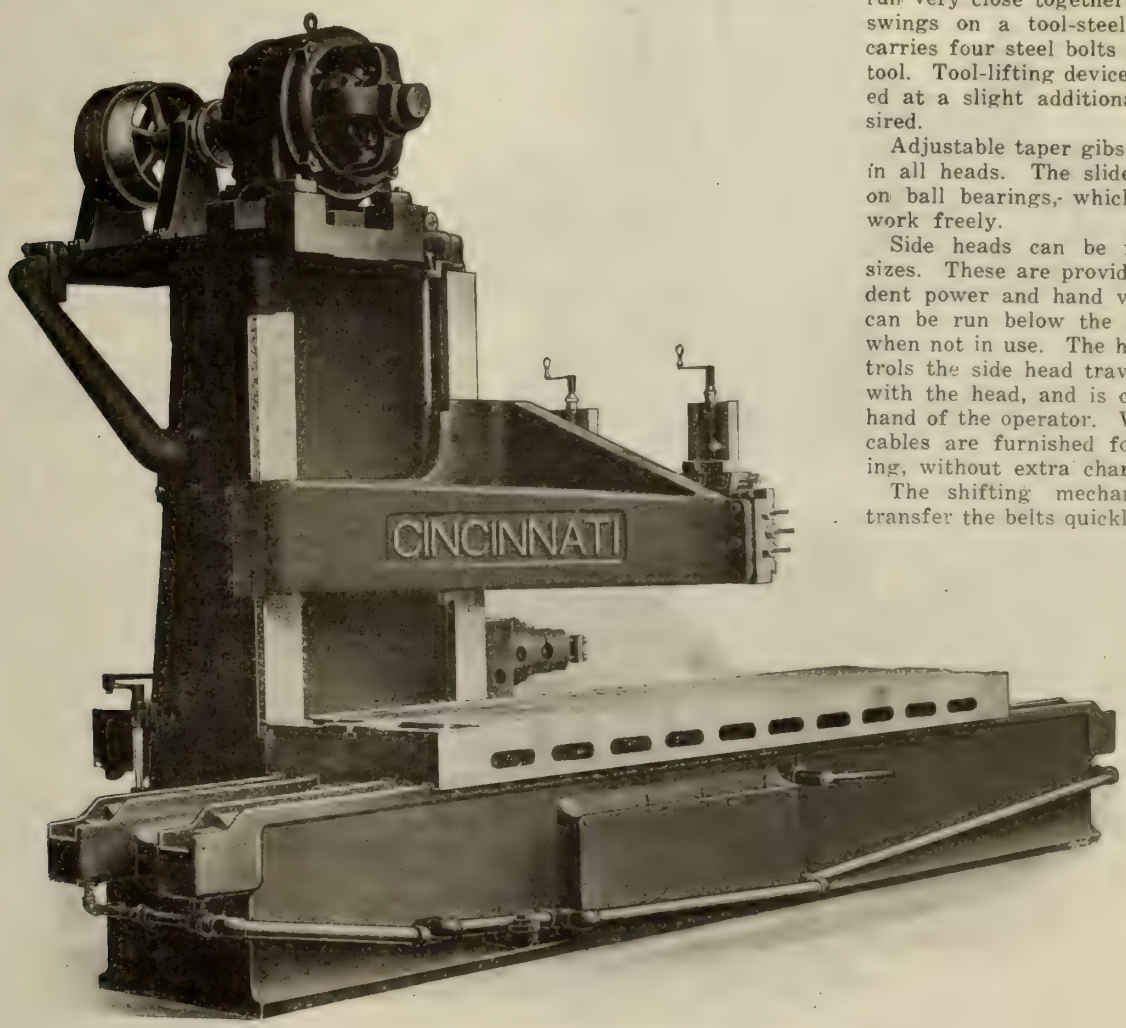
The crossrail is bolted and doweled to the knee and is raised and lowered by means of a power-elevating device operated through frictions by the lever on the right side of the column. The knee is formed at the top to provide a long bearing on the face of the column; it is also provided with a narrow guide arrangement with taper gibs and clamps.

The heads are distinctive, the end of the tool block and slide being made round to avoid projecting corners on angular work. They are scraped to the rail, and graduated for swiveling up to 90 deg. They have automatic feeds in all directions, and can be operated from either side of the machine. The saddles being right and left, the heads can be run very close together. The tool block swings on a tool-steel taper pin, and carries four steel bolts for clamping the tool. Tool-lifting devices can be furnished at a slight additional cost when desired.

Adjustable taper gibs are incorporated in all heads. The slides are also hung on ball bearings, which allow them to work freely.

Side heads can be furnished on all sizes. These are provided with independent power and hand vertical feed, and can be run below the top of the table when not in use. The handle which controls the side head travels up and down with the head, and is convenient to the hand of the operator. Weights and wire cables are furnished for counterbalancing, without extra charge.

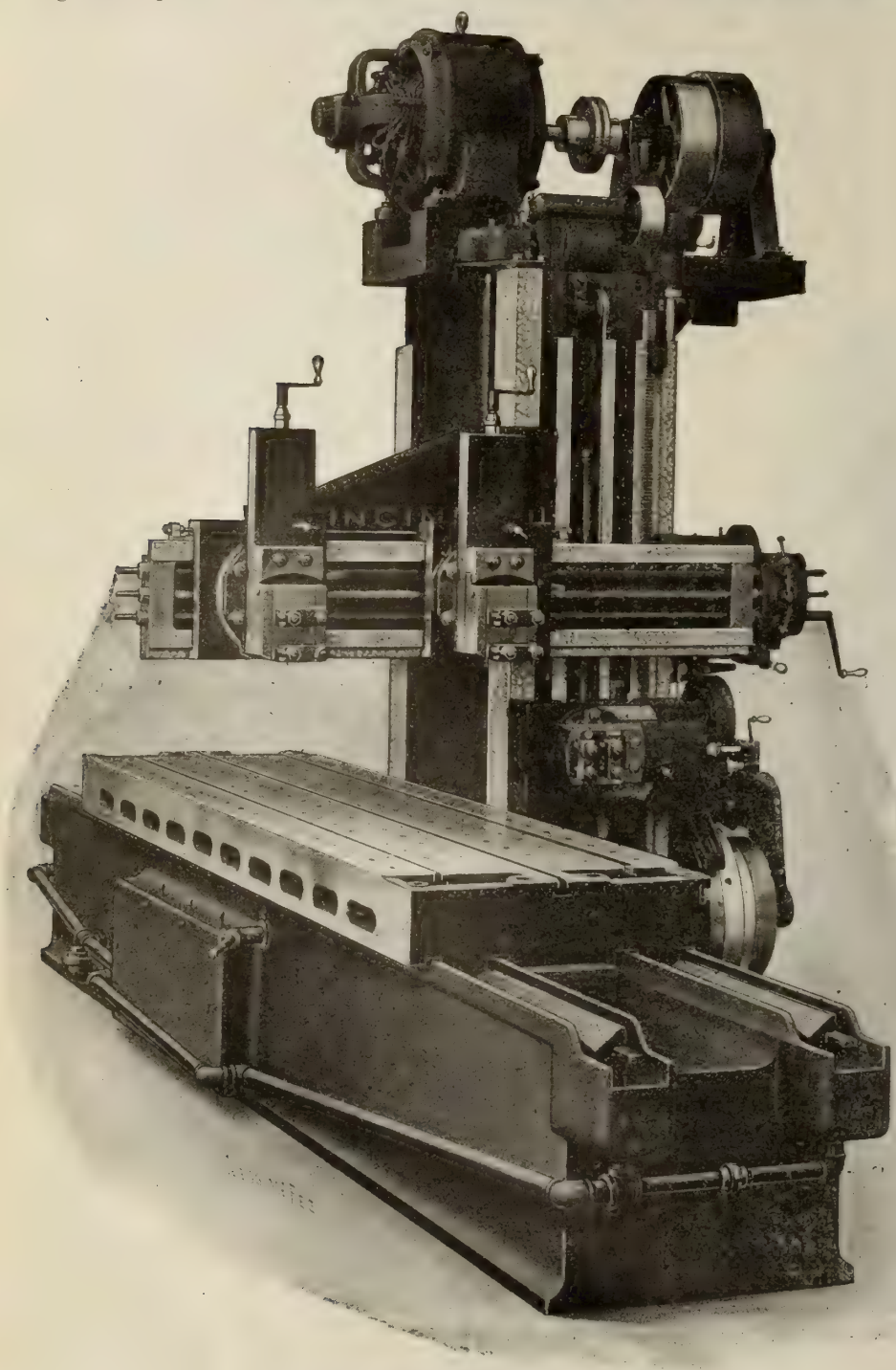
The shifting mechanism is said to transfer the belts quickly and noiselessly



VIEW OF MACHINE FROM ANOTHER ANGLE

when running at the highest speeds. The belt arms are provided with an adjustment that keeps them in proper position at all times, and are provided with an extra support on the bracket which relieves the fulcrum stud from undue strain, doing away with the usual wear at this point. The studs are hardened and ground. The cam and rollers are protected from dirt by a cover, which entirely incloses the mechanism. A drip pan is provided under the shifting mechanism for catching the oil, preventing it from getting on the belts. By means of shifting levers at both the front and rear the operator can control the motion of the table without walking around the machine. The safety locking device permanently locks the entire shifting mechanism, preventing the table from starting, except at the will of the operator. This is a valuable attachment, being a safeguard against accident and spoiled work. It consists of a spring plunger, which enters a seat in the bed, and holds the shifting lever in a fixed position.

No doubt further detailed information on these machines can be easily secured by those interested, if a written request is forwarded to this concern.



ANOTHER VIEW OF THIS MACHINE

JAPAN'S STEEL CONSUMPTION

The consumption of steel in Japan, which was only 218,000 tons in 1902, and had risen to 654,000 tons, or more than treble, in ten years, has been increasing in the same ratio ever since, and the total reached 1,182,000 tons in 1917. Assuming that the demand increases at this ratio henceforward, the production for 1920 should amount to 1,635,000 tons.

The demand during 1917 was adequately met with imports assisted by domestic products, but in the meantime, Japan's steel industries have made considerable progress. Before the war the demand was met almost wholly by imports. Thus, in 1902, the consumption was 218,000 tons, of which the Japanese products accounted for only 31,000 tons, or 15 per cent. Later, the Government Iron Works began producing steel, and the domestic output reached a respectable amount in 1911. Still the figure for 1911 was only 191,000 tons, representing only 30 per cent. of the whole demand for the year. The proportion was increased to 33 per cent. for 1913, and for 1914 the figure grew to 282,000 tons. Imports of steel in 1913 were 543,000 tons, but they fell off to 408,000 tons in 1914. In 1915 they had further decreased to 243,000 tons. This was due to a diminution of the supplies from England, Germany and Belgium. For 1916 the figures rose to 454,000 tons, as the American supply had increased; and for 1917 it reached 675,000 tons. America began supplying Japan with steel only upon the stoppage of the English and German supplies. In 1914 American imports were 68,000 tons. They rose to 133,000 tons in 1915, to 291,000 tons for 1916, and to 680,000 tons for 1917. Later the American supply fell off as a result of the U.S. prohibition of exports.

In 1914 the total consumption of steel was 660,000 tons, but had reached 810,000 tons in 1916, and 1,180,000 tons in 1917. As the imports did not increase in proportion, the requirements were covered principally by an increased domestic yield. In 1914 the domestic products were 282,000 tons, but for 1917 they were nearly doubled to 529,000 tons. The price of steel under these conditions increased greatly. Cast steel, for instance, is now quoted at Y. 1,200 per ton, as against Y.200 of Y.220 before the war, and wrought steel has risen from Y.150 or Y.200 to Y.850 in the same interval.

As a result of this Japanese steel works have been making profits of 120 per cent., and have paid 50 per cent. dividends. Encouraged by this they have all extended or are extending their activities, the most ambitions of these extension plans being those of the Japan Steel Tube Works, the Nitto Steel Works, the Oshima Steel Works, the Kobe Steel Works and the Tokai Steel Works.

There are now the Japan Specific Steel Works, the Hirota Steel Works of the Fujita-gumi, the Dobashi Steel Works, the Electro-Steel Works and the Japan Electro-Iron Works, and others, turning out high speed steel, but there seems to be still something to be desired on the technical side, as sometimes very fine qualities are produced, but, generally speaking, the products are not yet up to the uniform high standard required.

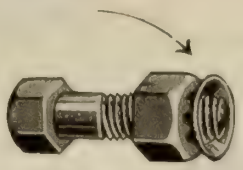
NEW TYPE OF NUT LOCK

GUARDING against accident to life and machinery is one of the most important features of industrial enterprise. "Safety first" movements have made remarkable progress during the past few years, and the beneficial results have been ample compensation for the time and money spent for the better protection of the worker, and the safer operation of machinery and equipment. Injuries to workers are very frequently associated with the disarrangement of some portion of the mechanism, following the loosening of a nut or bolt. The securing of a nut, to prevent it backing off as a result of vibration, stretch or other cause, has long been a study of mechanical engineers and manufacturing executives.

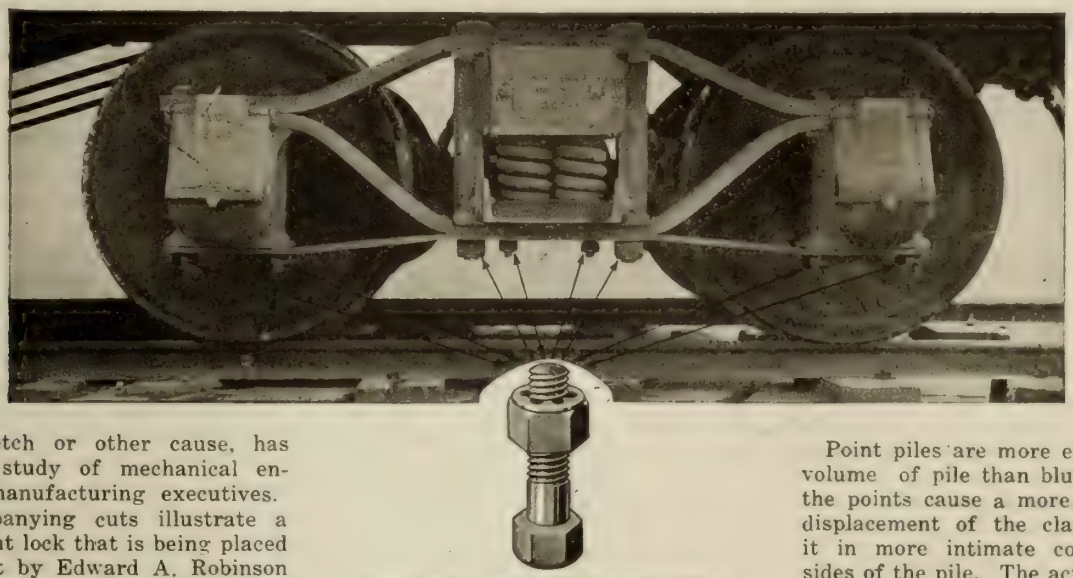
The accompanying cuts illustrate a new type of nut lock that is being placed on the market by Edward A. Robinson Co., Ltd., of 228 Craig street, Montreal. This Hold Tite Nut Lock is a novel departure from the usual method, inasmuch as no additional nut is used, the lock being obtained by means of a specially designed washer, the use of which, it is claimed, has many advantages over the extra nut variety of locking devices.

As shown in the illustrations the method of applying the nut lock is extremely simple, but its simplicity is one of the greatest factors of its efficiency. The notched inner edge of the washer is placed against the outer surface of the nut after the same has been thoroughly tightened. The nut lock is then forced to its locking position by means of another nut, or forced down by the blows of a hammer. This action causes the edges of the notched portion to grip the thread close to the nut, and wedges the two so firmly together that no amount of vibration will change their initial locking position. The thread of the bolt is not distorted, and only a slight injury is made at a few points on the thread immediately adjoining the nut, but this has little effect on the removal of the nut when such is desired.

The nut lock being quite thin it is an easy matter to split it when occasion requires. Another feature in this respect is the saving in the thread and bolt length, an important detail where many bolts are used and where lightness is essential. With this device it is claimed



that the shoulders on many shafts may be eliminated, and, by the use of shallow grooves parts can be rigidly located in position. In this way a saving of material is effected and machining operations reduced.



THE NUT LOCK IN ACTUAL USE.

RESISTANCE OF CLAY

For tapered bodies gradually forced into clay the load necessary to produce a given penetration is very much greater the less the percentage of water in the clay. Clay containing a definite percentage of water, and at a definite temperature, has a definite pressure of fluidity, and when this pressure is reached and maintained the clay yields indefinitely as a dense and viscous fluid, unless it be restrained from flowing or caused to rise so as to produce a statical head of clay. The pressure of fluidity is greater when the percentage of water is less, or when the temperature is lower. The pressure of fluidity per se is independent of the depth and depends solely on the percentage of water in the clay and the temperature of the clay.

For equal depths, tapered piles support a larger load per unit volume of the piles than piles having parallel sides. The reason is that in the case of tapered piles their surfaces keep in more intimate contact with the clay, with the result that the support due to the friction on their sides is greater than is the case in parallel piles. In order to increase the resistance of piles they should be corrugated as well as tapered. The reasons why parallel piles with blunt ends are not so efficient per unit volume is that the pile, in entering the clay, rubs the surfaces near the top of the hole made so much that the friction (or cohesion) is reduced there, and also because the clay, in squeezing laterally from under the end particularly loses contact with the sides of the pile, thus also reducing the friction on which the supporting capacity of a pile depends. The mean intensity of friction for the same depth of penetration on the sides of parallel piles is greater in the case of piles of small cross-section than in the larger ones, but if the diameter of the pile be reduced beyond a certain amount (the depth of penetration being constant) then the mean intensity of the friction appears to decrease again. Consequently, for a given quantity of material of which to make piles a large number of small piles is more efficient than a smaller number of large ones.

Point piles are more efficient per unit volume of pile than blunt ones because the points cause a more gradual lateral displacement of the clay, thus leaving it in more intimate contact with the sides of the pile. The action of the point of a pile is to cause the pressure of fluidity to be attained on its surface, whereupon the clay flows out of the way.

The resistance to penetration is considerably greater the lower the temperature of the clay, probably because the pressure of fluidity increases as the temperature decreases. The density of clay decreases as the percentage of water increases. The work done per unit volume of displacement increases as the angle of taper decreases, but when the taper approaches 0, or is 0, then the work done is less than when the angle of taper is larger. When a disc is forced into clay, the sides of the hole do not crush in (unless a certain critical depth be attained) because the pressure of fluidity of the clay having been attained immediately under the disc, the clay flows laterally, but the moment it has escaped from beneath the disc the pressure is reduced to the statical pressure corresponding to the local head of clay, and when this is less than the pressure of fluidity the clay does not flow into the hole made by the disc. If, however, the penetration of the disc be carried far enough, then ultimately the statical head of clay will be equal to the pressure of fluidity and the sides of the hole near the bottom will crush in.

The friction of clay on wood was found to be greater than on tin plate. The tensile strength of the clay experimented with was greater when it was raw and dry than when it was baked.

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The Metal Workers' Strike

FROM information coming to CANADIAN MACHINERY from what it considers to be most reliable sources, there is a feeling abroad that the metal workers' strike in Toronto can and should be settled. The belief is becoming very general that the moderate men on both sides could come together and bring about a basis that would bring the men back to work in short time.

This is not a time to stick at small things, neither on the part of the men nor the employers.

There are two sides to every question, and there is no chance under the sun that in the present struggle the men are all in the right or the employers are all in the wrong, neither is there any likelihood that the employers are the holders of all the virtues and the men of all the shortcomings.

There are cases of hardships on both sides. There are molders and mechanics who cannot stand the strike that they are engaged in. They make a good fight, and they are not complaining openly, but it does not take a great deal to get beneath the surface. They know that the summer is well on, and that they have expended in many cases what savings they have, and in many other cases they have borrowed. Strike pay at best is only an aggravation. it cannot, for a married man, do much more than pay rent.

There are shops that are suffering for the want of the skilled mechanic. There are jobs that have to be turned away, and there is work being directed to other and strange channels that it may take some time to recover. There is tool room work that has been sent out to other centres—in some cases across the line. There are general managers and other executives occupying higher-up positions who want their men back. They feel that they should never have left them because what differences there were were not insurmountable by any means. They feel that a little reasoning together would clear the air.

There are shops where the men have actually come in a body to discuss the matter with the management, and it was found that there was, as stated above, very little difference of opinion. Certainly there does not appear to be any great issue at stake that would warrant making the present a protracted strike, in which suffering is certain to be brought upon a great number of people.

Why not look at the thing in a big way? The strike has got to be settled some time. These men who are out in hundreds now are going to go to work some time, in some shop. These shops where the strike has taken place are going to operate by some means or other. There is nothing more certain. They are not going to stand idle forever. Well, if these things are going to come to pass eventually, why not now? The longer the men remain away from work, the harder on their pockets, and the harder for the shops to gather up the old lines to keep the works busy.

The average healthy, wholesale man does not like a strike. There may be an impression abroad that a mechanic glories in a strike. He does not. He does not relish being idle.

The same employer does not care for a strike. It may be imagined that the heads of companies and corporations have no concern for the men. It may be popular opinion that they rather delight in getting a strike on in order to run down the scale of wages and lengthen out the hours of employment. That class of employer is a rarity. This paper knows for positive fact that there are lots of big employers in Toronto whose greatest joy is in what they can put into their business, and what their business can enable them to do for the men working for them. It is a serious and a cruel blunder to picture employers as a class as being grasping and selfish.

The time is certainly here for the average men on both sides to come together. This Toronto strike can be settled. Of that there seems to be no doubt. These parties should come together with an open, unbiased mind and get down to brass tacks.

Business Conditions Sound

REPORTS from the larger steel producing centres state that the rate of production is increasing. In at least two leading lines some of the mills have put their prices on a higher level, and in doing so they give evidence that they are not afraid of sacrificing any business.

There is undoubtedly a stronger tone in the market. It is being reflected even in the scrap metal market, where bids are on the increase for any material offering.

There are, and probably always will be, cases where price concessions will be made for a desirable tonnage. That is not a sign of weakness. It is simply following out the practice of every business, where an advantage rests with the purchaser who comes into the market with a worth-while order.

In some of the larger cities of the Dominion it is safe to state there are millions of dollars' worth of structural orders waiting for conditions to become more favorable before proceeding with the work of erection. There is a degree of urgency in some of these cases that is likely to bring action soon.

The foundations of trade are secure. There may be a little tightening in some lines, but it is not general. There are good days on ahead. Business conditions have had testing enough to wreck them. There has been a regular procession of monkey wrenches tossed into the wheels of industry, and if affairs were going to seed they would have done so long since. The very fact that we are still a good distance from the bow-wows is proof enough that we are not yet headed in that direction.

TWO lawyers, by mistake, got locked up for a couple of hours in a Detroit jail. Justice may be slow, but it is sure in the end.

IT IS predicted that the habit of giving tips will pass out largely in United States with the coming of prohibition. The claim is that a man parts with his money more readily when half-tanked. Not so. We've seen a perfectly sober man part with his coin when a porter took his young broom and made a couple of swipes at an imaginary spot in the middle of his back.

IN SOME states a person who has been fined for speeding is forced to have a distinguishing mark placed on his car. There are some drivers, who, were their gigs decorated every time they kicked over the limits, would have their outfits looking like a barber pole sprouting in a poppy patch.

Giving the German U.C.-97 the "Once Over"

The Mechanism a Marvel of Compactness

By T. H. FENNER, Editor Marine Engineering

IN the days when we used to read Clark Russell and Capt. Marryatt, most of us were familiar with the pirate barque, the first view of which was the flash of a royal sail above the horizon. Quickly she rose, till she lay revealed as "a long, low, rakish craft," and we busily prepared for action while our mothers vainly called us to come for supper.

Some vagrant thoughts of this nature came to my mind on my way to the Toronto wharf, where lay a craft, lately manned by more cruel and bloodthirsty pirates than our boyhood authors ever dreamed of. They differed in other respects too. The pirate of the Spanish Main fought generally till his ship went down under him. The North Sea pirates usually submerged their ships before the fight started, though, of course, many of them, like the famous McGinty, haven't come up yet.

The "U.C. 97" is certainly long and low, but she is anything but rakish looking. Her length overall is 191 ft., and her beam 18 ft. Her depth is about 12 ft. From the outside she looks familiar, so many photos and moving pictures having been seen of late of this type of craft. The comparatively high forward deck, with the superstructure forming the conning tower hatch standing prominently out, the 10.5 centimetre gun on the fore deck, all fitted into one's preconceived idea of the vessel.

The "U.C. 97" was built in the same year that saw her inglorious surrender, so she is a good example of the later type. She is of the mine laying class, being furnished with six mine tubes, and able to carry fourteen mines.

There is not much to be seen on deck, though what there is attracts one's interest. The most prominent object, of course, is the periscope, which rises from the central control room to a height of about ten feet from the deck. There is a round hatch just forward of this, giving ingress to the forward end of the hull, while there is another hatch aft, opening into the engine room. These are in addition to the main, or conning tower opening, which was the one used chiefly when pursuing her occupation in war time.

Just abaft the conning tower is a metal plate upon which was written the words in German, "Telegraphieren Sie sofort liegestelle an Ubootsverein Kiel." Then in addition, "Unterseeboot hier gesunken." The meaning of this eruption of caligraphic symbols in plain English is, "Telegraph at once to the U-boat depot at Kiel, U-boat sunk here." If the pirate met his just deserts, this plate was to be attached to a buoy, when it would form a guide to the fate of the vessel.

Another point that attracted the eye was the life buoys, upon which were painted in black letters the legend "U.C. 97, ex-German submarine." The "ex" is what appeals to the Canadian visitor.

Leaving the deck, one descends the after hatch to the engine room, and is immediately impressed with the idea of compactness carried to the nth power. The writer has been in the engine rooms of T.B.D.'s and battleships, which are good examples of fitting a large amount of machinery into a small space, but never has he seen anything to compare with this.

One's first idea is that if for any reason this power plant should be taken out of the hull and placed on the dock, it would never be put back again. The mind at first seems unable to correlate the various parts and their uses. The network of pipes, valves, electric wires, instruments, switchboard, telegraphs, all seem a hopeless jumble. However, with the courteous assistance of the U.S. navy man in charge of the engine room things began to clarify. As this man has been in the vessel since she left Harwich, Eng., to cross the Atlantic under her own power, he is pretty well acquainted with her, and very willing to impart his information.

Everything Is German

Everything in the boat being German made the instruments and valves and telegraphs are lettered and marked in German. This made them as useful to the American crew that took her over as a musket would be to a cow. They discovered the meaning of the various things by elimination and experimenting. They traced valves and wires when it could be done, and when it couldn't jammed in the switch or opened the valve and observed results. This is a good plan, though not recommended to one of weak nerves. It may interest some of the protagonists and antagonists of the metric system to know that the centigrade scale is used for temperatures, while pressures are marked in atmospheres.

The main propelling plant consists, of course, of internal combustion engines. These are connected through a positive clutch to the main generators or motors as the case may be. The engines are of the four-cycle type, having six cylinders to each engine, twelve in all. They run at about 450 revolutions per minute, developing about 300 b.h.p. on each engine. They are of the full Diesel type, the compression pressure carried being about 700 lbs. per sq. in. On the forward end of each engine is carried the fuel oil pump, which is operated from the crank shaft by a chain drive. The pump is of the constant stroke type, and regulation is effected by cutting down the fuel delivered to the cylinders, the superfluous oil being passed back to the suction side.

The motors for driving the vessel when under the surface are situated at the after end of the engine, with a clutch interposed, as mentioned. When on the surface the engine drives, the motors are generators, the current being used to charge the storage batteries, these being in two units, of 62 cells each, 124 cells in all. The capacity of this battery is 8,800 ampere hours. It may be remarked here that every auxiliary is electrically operated, the telegraph indicators from control room to engine room and their stations included. Another feature of these telegraphs is that not only does the order appear on the dial, but a pilot lamp is also lighted.

Large Number of Motors

At this stage attention was drawn to the fact that for steering gears, pump and winch operating, as well as other auxiliaries, there were 30 motors of various sizes installed, besides the main motors. The engineer then began to point some of them out, and the writer began to feel like a child at a conjuring show. He delved between the main engines and found three or four motors behind each, pointed to our feet and discovered more, and showed some fastened to the frames in a vertical position. While taking these facts in, one noticed the arrangement of the various spanners needed for overhauling. These were mounted on plates fastened to the frames where they curved inwards over the top of the engines, and were in such a position that they could be reached in a moment and at the same time were out of everybody's way.

At the after end of the starboard engine is a four-stage motor-driven air compressor. This supplies the air for compression, starting and reserve flask for the main engines. It is like everything else on this craft, a miracle of compactness. The low, or rather the first stage and second stage cylinders are on the bottom, while the third and fourth stage are on top of these, tandem fashion. The intercooling is done by coils in the base of the bedplate. This machine delivers the air at a pressure of 600 lbs. per sq. in. to the cylinders and reserve flask. At the after end of the port engine is placed an auxiliary

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MARKET DEVELOPMENTS

Lots of Business—But It's on Paper Yet

Structural Steel Should Come Along With Some Big Orders Soon—United States Mills Are Now Asking, in a Few Cases, an Increase Over Prices That Have Prevailed for Some Weeks

THE particu'ar branch of the steel industry interested in structurals is watching eagerly for some sign of the opening of the building season. It is estimated that there must be, in Toronto alone, some $15,000,000 worth of buildings—on paper. When these can be converted in real business there should be some trade worth securing. A movement in structurals would be good news for the Canadian trade. It is difficult to keep as closely in touch with the situation here as in United States, because statistics are more complete and more accessible. For instance, the Bridge Builders and Structural Society can state definitely that, in proportion to the capacity of shops, the work placed is as follows: January, 12 per cent.; February, 12½ per cent.; March, 17 per cent.; April, 24½ per cent.; May, 49 per cent.

It is worthy of note that some of the American steel mills are now asking a firmer price on such staple lines as steel plate and iron and steel bars, the increase being about $1 per ton. Thus they quote 2.70 for plate against the prevailing 2.65. There are other indications that bolster up the argument of those who hold that a buying movement of any size at all will bring about an increase in prices, although they are yet far and above the prewar level. While all this may be quite true, it is no use losing sight of the fact that a good-sized tonnage gets a very fair market preference.

Small tools and supplies are not selling in any volume. The market for these is tighter than usual. Most of the shops that have been getting in equipment have done so, and not until they come to the point of production will there be any call for new supplies for replacement purposes. There are various orders and inquiries out in the market in certain sections, but it is hard to tell whether they are all genuine, or merely tossed in to find out the strength and movement of the market.

There is more strength in the scrap metal business than for some weeks. Copper and red brass are stronger, but the rest of the group did not move up along with these. Steel and iron remain somewhat stagnant. It is apparently a good time to buy for use, and a good time to hold for speculation.

SIGNING OF PEACE SHOULD REMOVE THE BIG BOGEY FROM THE MARKET

Special to CANADIAN MACHINERY.

MONTREAL, June 26.—General business activity continues steady without special feature, although strikes are still a factor that prevents speedy adjustment of industrial conditions. With this to offset signing of peace it begins to be a question whether the next week or so will develop any pronounced activity of a permanent character. Settlement of labor difficulties is virtually imperative before actual reconstruction can be commenced. It is thought by many, however, that the element of strife is gradually dying out and that a spirit of co-operation will form a basis of agreement between capital and labor, so that before the summer is over, industrial life will become more settled and resumption of business will be more general and open the way for greater expansion. Steel business is still of a nominal character with dealers holding firm on all price quotations. There is a feeling that mills are gradually increasing their output, but the present demand does not imply that consumption has greatly increased. The metal situation, seemingly, is steadily growing stronger, and this is reflected in price advances. Machine tools are moving slowly but steadily. Old materials are in slightly better demand with the market firm.

Machine Tools Move Slowly

Some dealers report a fairly good business in single tools, while others state that sales are particularly light, the bulk of the existing business being in the small tools and supplies. In some cases where tools have been on order time extensions were necessary owing to the effect of labor troubles on production. Delivery on tools of a special character is becoming more uncertain. The argument of an unsigned peace will soon be a thing of the past, and it will then be seen what actual bearing this phase of present unsettled conditions has upon the delayed start on general reconstruction. The labor unrest and the contention that cost of production does not warrant expansion may be the next forte of the backward manufacturer. In the meantime the possibility of enlarging our export trade is gradually becoming more difficult owing to the efforts put forth by other manufacturing countries. The storage of machine tools belonging to the American Government is still in effect here as few of these have as yet been disposed of.

Scrap Continues Firm

No important developments have taken place in the old material situation, but the steady demand for small quantities is encouraging in face of the quiet character of the past two months' business. While dealers are not generally accumulating large stocks there is less reluctance to purchase when reasonable supplies can be acquired. The added interest of the consumer reflects the returning confidence in the trade and the belief is accelerating that activity will soon be of a nominal nature. The present demand is well distributed although heavy melting steel and machine shop

turnings appear to have a leading position. The sales in the district are about the same, but present inquiry apparently indicated a heavier demand shortly. Much of the material now moving is going to American buyers. The advances noted last week are still holding, and it would not be surprising to hear of a stronger market at an early date.

Metals Continue Strong

The metal market appears to emphasize the belief that a firm market may develop out of the prevailing unsettled conditions. The present demand is not excessive, and in fact is not much greater than that of the past several weeks, but the steady nature of the business that is now passing through the dealers' hands would seem to indicate that consumers are showing greater confidence and are better assured that existing circumstances will hardly permit a lower level for price quotations. Copper has taken on additional strength on the rise of the American market, and the local quotation of 20½ cents for lake and 19½ cents for electro, represents an advance of one cent per pound. The present supply of unsold tin in the States prevents the entire removal of import restrictions, but this will probably adjust itself within a month or so, and lower price quotations may shortly follow. Dealers here quote 56 cents per pound. Spelter has developed strength in the States, and if this continues prices here will likely advance; at present the metal is firm at 8½ cents per pound.

Lead is moving a little better and an advance of ½ cent puts the current price at 7 cents per pound. Antimony shows a similar advance, the quotation being 9½ cents per pound. Aluminum is unchanged at 38 cents per pound.

PLENTY OF WORK BUT MOST ON PAPER

Buying in This District is Largely Confined to the Actual Needs of the Case

TORONTO.—Buying is big on paper and small in reality. That is another way of stating that dealers are having a hard time trying to convert some of the blueprints into actual business. It is commonly reported that a large amount of structurals must be placed shortly, as programmes that call for their use have been prepared some time now, and the need for the building is going to become more pressing as time goes on.

Buying is not heavy this week. It is still of the hand-to-mouth sort, and seems likely to continue so.

Much Stock on Hand Yet

Some of the local warehouses are not yet cleared out of all their war material. They had been buying heavily during the war, finding it necessary to carry a heavy stock in many lines in order to keep the material on hand that the builders of war machinery and supplies needed on short notice. Of course, they could not control the prices at which this stock was taken in, and there has been quite a decline in several lines, it coming quickly and giving them no chance, in a comparatively small market, to get rid of their war material.

In fact one of the large warehouse men, speaking about this to CANADIAN MACHINERY this week, stated that his firm could not make money on the year's operations now. "It is a queer way to look at it, but the more we sell the more we lose, as there are indications of the market becoming stronger in some of the lines."

Buying of warehouse material is dull. The orders that come in are small, and those firms that have contracts that will carry them on for some time are fairly well covered in the main.

The movement of structurals, stated another dealer, must start in the not distant future. "I have been told," he stated, "that there are in Toronto at least $15,000,000 worth of structural buildings on paper in the office of the architects. There are in the list stores and office and apartment buildings, and there are many cases in which the erection is going to be a matter of necessity, which may prove the determining factor in causing these people to come into the structural market to buy their material. As far as we can learn the price of the steel shapes is not the main consideration. The would-be builders are scared out of action by the prices they will have to pay for everything in the nature of supplies, and the wages of the trades employed are still very high in comparison with other buildings that are carrying on business with which the new high priced building will have to compete. A movement in structurals," he stated, "would be one of the best things that we have had a chance of seeing for many a month."

There are no indications that prices are going any lower. Against this is the fact that some of the independents are putting their prices up on certain lines. For instance some of the mills now quote steel plate at 2.70 base, against the prevailing 2.65, claiming that they could not make money at the lower price.

Travelers who cover the northern part of the country claim that the bookings have been good with them. Interests in that section seem to be quite satisfied that prices can be no lower under present conditions, and they are going ahead on the assumption that any change made will be toward a higher level.

Small tools and supplies in general are not moving out quickly in this section. Firms that are equipping have been pretty well supplied, and the wear of actual production has not started yet to bring them into the market for repeat or replacement orders. Canadian high speed cutters have an advantage under present conditions in some high speed lines. The Canadian list sells net now, while the U. S. goods have to go at list plus 40 to make up for the duty and other charges.

Montreal has marked prices in advance of what Toronto is prepared to go, and that is but natural, as Montreal is rated more as a consuming point than Toronto, and freight makes the difference. In the local list this week all coppers and red brass are stronger. The yellows remain the same, the cause probably being because spelter and lead are rather weak in tone.

The copper class is stronger, without a doubt, and it is a safe guess that prices will be marked up again before many days are over, as everything seems to point in that direction.

The market for scrap iron and steel is weak. This may be due to the strike, and some dealers even go so far as state that it is due to the peace terms not being signed. Dealers report that there is not a great deal of material being offered, as it seems most of the holders are looking for more money for their assortments and are hanging on in consequence.

POINTS IN WEEK'S MARKETING NOTES

Pittsburgh reports that the improvement in the placing of steel orders is keeping up, and that in some lines capacity is now near the 75 per cent. mark.

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Some of the independent mills are asking a better price for plate and bars than has been going for some time. The increase amounts to about $1 per ton.

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A large amount of structural steel should come into the market some time soon. One dealer figures that in Toronto alone there are $15,000,000 in buildings on paper.

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Some of the Canadian warehouse men claim they will lose money on the year's business. This is due to a large stock when the war ended and subsequent shrinkage in price. "The more we sell the more we lose," was one dealer's way of stating the case.

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The sale of small tools and supplies in general is limited at present. The settling of strikes and the securing of production is necessary before this business will become very active again.

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The automobile business has been responsible for nearly all the sales of machine tools that have been made across the line for some months past.

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There is more strength in certain parts of the scrap metal market this week. Copper and brass are bringing better prices, but the recovery in the iron and steel is not well under way yet.

AUTO BUSINESS THE BIG ANCHOR OF NEW YORK MACHINE TOOL BUSINESS

Special to CANADIAN MACHINERY.

NEW YORK, June 26.—There is quite a contrast between the Central West and the East in the volume of machine-tool business. With many machine-tool manufacturers Detroit has been the most productive source of orders since the first of the year, but Chicago and Cleveland have lately been showing considerable activity, while the Eastern markets, New York, Boston and Philadelphia, in particular, are rather quiet. A moderate business in small lots is being done in the East, but the volume of orders is by no means up to expectations.

During the past week there have been a few buyers of fair-sized lists of tools, notably the Fellows Gear Shaper Co., Springfield, Vt.; the New England Westinghouse Co., Springfield, Mass.; the Wright Roller Bearing Co., Philadelphia. In all three cases the buying of new equipment is directly attributable to the activity in the automotive industry. The Fellows Gear Shaper Co. has received so many orders for its gear shapers from automobile companies that an addition to its plant was made necessary. The New England Westinghouse Co. is engaging in the manufacture of electric starters and lighters for automobiles, and the Wright Roller Bearing Co. is making bearings for automobiles. Most of the activity in the machine-tool trade in recent months has been traceable to the expansion of the automobile industry, and manufacturers in other lines, with some exceptions, have not yet hit their normal manufacturing stride.

It is difficult to gauge the extent to which sales of new tools are being lessened by the immense amount of second-hand machinery on the market, but it is considerable. Many of the used tools being offered are practically as good as new, and manufacturers in some lines are taking advantage of the opportunity to make savings. Some machine-tool builders are taking back tools of their own make from war plants, are rebuilding them, and reselling with them their own guarantee the same as if the tool were brand new. This is done to prevent, as far as possible, the sale of tools of their make which are not in good condition and which would, therefore, cause dissatisfaction.

In the Chicago market two good-sized lists are now active. The Chicago Pneumatic Tool Co. requires about 40 or 50 tools for its new plant at Franklin, Pa., now in course of construction, and the Worthington Pump and Machinery Corporation wants about an equal number of tools for its Cudahy, Wis., plant. The Defiance Machine Works, Defiance, Ohio, has received an order for special machines from the General Motors Corporation, the order totalling about $1,500,000.

PITTSBURGH REPORTS THAT THERE IS NO LET-UP IN THE IMPROVED MARKET

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., June 26.—On the whole there has been a further improvement in the demand for finished steel products. The indication is that buyers want more material for current consumption rather than being desirous of covering ahead. This gives the market a strong position as the demand does not rest upon mere "confidence" in the future, so much spoken of, but rather upon the actual current consumption of steel being larger.

In one line, however, the heavy buying of the past few weeks has resulted in the purchases being for forward deliveries even though the buyers would prefer early deliveries. That line is "oil country goods" and particularly the larger sizes of lap weld pipe. Several of the mills have fallen behind in deliveries and have to enter their customers' orders as for forward delivery when prompt delivery would be preferred. One large interest has such an accumulation of orders that its lap weld departments would be kept busy to the end of the year even if there were a considerable falling off in the rate of buying, while such falling off is not expected.

In sheets there is a little banking up of orders and deliveries of some classes of sheets are deferred. The mills could meet this situation by operating at heavier rates as the average sheet mill operations are now about 70 per cent., but they do not wish to do this, since, if the market follows precedents, there will be a slackening in demand for July and August, and it is well to have a reserve of orders and maintain a uniform pace.

Wire products show a demand that is altogether satisfactory to the mills, and is larger than some mills counted upon. One large independent interest, for instance, figured on a certain demand through the summer and concluded it could spare one of its two-rod mills for a rebuilding operation. It now finds itself crowded to get out its orders with the other rod mill.

In bars, plates and tin plates, there is no material improvement in demand. The plate demand is far below capacity, which was increased so much during the war, and it is doubtful whether plate mills as a whole are operating at anything like a 50 per cent. of capacity.

Structural Demand

Starting with practically nothing a few months ago there has been a progressive improvement in building operations involving skeleton steel structure and in bridges. The activity in new construction of this general class is still very light compared with the activity in ordinary everyday consumption of steel, but it is on the increase. The fabricated steel jobs being let are all small, with an occasional exception, but as reported for some time past a large amount of work has been designed and figured upon, so that when investors are ready to give the word there will be little delay in starting the actual work and specifying the shapes for the mills to roll.

The reports of the Bridge Builders' and Structural Society show that up to date, the amount of fabricated steel work placed is light, but also that there has been a constant, and of late, a rapid increase in the volume of business. These reports show, in fabricated steel jobs let relative to the capacity of the fabricating shops, the following: January, 12 per cent.; February, 12½ per cent.; March, 17 per cent.; April, 24½ per cent.; May, 49 per cent. The doubling from April to May is particularly significant.

Pig Iron Irregular

There are many irregularities in the pig iron market but they are ascribable in large part to the fact that the pig iron market started out on a false basis, there being simply horizontal reductions of $3 a ton in December and $4.25 a ton effective March 21, the latter being the reduction recommended by the Industrial Board, afterwards defunct. This left it that the March 21 prices were based upon the basings adopted for the war control. That was necessary in the circumstances but it was not the logical structure or the structure the market had maintained prior to the war, when prices were reached through competition. Pig iron f.o.b. Birmingham furnaces, for instance, should not be as high as f.o.b. Chicago or valley furnaces. Again, the war control allowed eastern Pennsylvania furnaces to base prices at Pittsburgh, while Buffalo had to take the same price f.o.b. furnace. Accordingly, Birmingham prices declined while the eastern Pennsylvania furnaces had to get on an f.o.b. furnace basis, which involved a decline. It might be supposed that Buffalo would have been able to maintain the price, but such was not the case as Buffalo furnaces have lately sold at $25.50 to $26 at furnace, No. 2 foundry with silicon 1.75 to 2.25 per cent., on which the Industrial Board price was $26.75, furnace, a price which the valley furnaces are still making an effort to maintain. On silicon, 2.25 to 2.75 per cent., on which the War Industries Board allowed an extra of $1.25, differentials of 50c to $1 are now more common.

The pig iron markets cannot be quoted closely for the reason that in many cases the furnaces will quote f.o.b. furnace price for iron to go out of the district rather than to customers in their own districts. They are doing what in International trade is called "dumping," and there is greater competition between districts than usually obtains.

Generally speaking, however, pig iron has declined very little, and there is not much prospect of its declining in future. This does not mean that it is going to advance shortly, though there are some

predictions along that line. Pig iron is always sluggish about starting advances, though it sometimes moves fast once it gets going. When there is a large number of idle furnaces, as at present, prospects of better demand tends to bring the furnaces in. They expect higher prices but they are willing to sell a limited tonnage as "backlog" at current prices, or even at cut prices. This occurred in the first half of 1915, when pig iron demand continually increased, but as one furnace after another came in it acted as a drag on the market. Furnaces would not cut prices much, however, as they could not afford to do so. No furnace would take orders at a loss just for the sake of getting into operation again.

Connellsville Coke

This is the usual period for semi-annual contracts for Connellsville furnace coke. A few weeks ago there was talk of flat prices for the half year but coke operators wanted considerably more than furnaces would pay, and as the operators expected pig iron to advance and furnaces were not so sure about that, there was little difficulty in arranging sliding scale contracts, the price of coke delivered each month being fixed by the prevailing price of pig iron. These ratio contracts are practically all on the basis of 6¼ to 1, i.e., if basic pig iron is $25, valley, which is about the market now, the coke will be billed at $4 per net ton at ovens. Every change of 25c in pig iron would mean a change of 4c in the billing price of coke. Foundry coke has sold rather freely for second half at $5 to $5.50, depending on grade.

THERE IS A LOT OF PIG IRON BEING BOUGHT IN U.S. POINTS

THE heavy buying movement noticed last week still continues. The steel making grades are not in request, the large volume of business being confined to the foundry and malleable class.

Chicago.—If the present demand keeps up some of the furnaces that are now out will have to be blown in again. Iron in yards and the somewhat restricted daily output has been sufficient to meet demand up to now, but with some firms taking more iron for second half than they have usually required for the whole year, more production will be necessary.

New York.—There has been lively buying during the past week, and certain sellers have been cutting prices to get a share of the business, though the general tendency is for higher rather than lower prices. Sales of foundry amounted during the week to around 50,000 tons, and there is still a good demand.

Boston.—Total sales while smaller than last week's have been fairly good. The small order is most prevalent, car loads and tonnages up to 500 being the rule. One enquiry is for 2,000 tons, this being the largest. Prices are somewhat better than last week's.

Pittsburgh.—Foundry iron has had a good week, sales amounting to 25,000 tons being reported, while steel making grades are not in request. National Radiator, Union Radiator, and Standard Sanitary are the largest buyers. The latter firm has an enquiry for 10,000 tons for July-August delivery on the market.

Philadelphia.—The business done in this district has not been up to expectations. However, as there is a good volume of enquiries, hopes are entertained of a better week this week. Prices are not holding firm, quotations covering a wide range.

Cleveland.—Heavy bookings have continued during the past week, foundry and malleable grades being the favored ones. An aggregate of about 100,000 tons has been sold, which is about half the total amount since the buying movement began. There are large inquiries on the market, but steel making grades are not asked for.

Buffalo.—Heavier shipments and large sales have been the feature here. The selling amounts to about 100,000 tons in the aggregate, and at least one interest has increased its prices on low silicon grades.

Cincinnati.—There is not much business being transacted in this district, although inquiries are numerous. Consumers seem to be well provided for last half business.

St. Louis.—The movement in pig iron seems to be getting stronger, although not as yet very active. There have been a number of small sales, while some good sized contracts for second half have been made. The week's sales will total about 5,000 tons.

THE GERMAN U. C. 97

(Continued from page 681.)

air compressor, also motor driven, the function of which is to act as a booster. Air can be taken from the discharge side of the main compressor at about 600 lbs. per sq. in., and delivered from the auxiliary compressor at about 2,300 lbs. per sq. in., for discharging torpedoes.

Other Features of the Boat

In the small space aft of the engine room there are sleeping quarters for four men. It must not be supposed that this space is devoted entirely to accommodation, for it is not. Part of the space is occupied by an oxygen tank, the use of which when submerged for lengthy periods will be obvious.

Going forward from the engine room one passes through a further space partly devoted to sleeping accommodation. Before reaching this, however, there is noted at the forward end of the engine room, on each side of the vessel, the "Kingston" valves for flooding the tanks and submerging.

When manoeuvring on the surface these tanks were left full open, the air vent from the tanks being closed. Thus if a speedy dive were necessary all that was required was to open the air valves, when the tanks would immediately fill and what is known as a "crash dive" would ensue. That is practically a dive at full speed, exactly as a man diving from a spring board would enter the water.

There are four bunks in this space, and the men in the two top bunks must be very careful how they raise their heads or they will knock them on the cluster of valves immediately above. This is an impressionistic sketch, so I am not going to attempt to say what these valves are for. However, I did notice a label on one which read "kalte wasser," and I judged rightly that it led to the water service of the engine.

The Central Control

From here one goes forward to the principal compartment, known as the central control. This is directly under the conning tower hatch and is where the periscope is located. Directly to the port side and ahead of the periscope is the navigating compass. All around are telegraphs, gauges and pilot lights. There is a little more room here as the control chamber occupies practically all the beam of the inner hull. When we say room we mean two men can move without passing through each other, which can't be done anywhere else. All the necessary operations for submerged navigation are controlled from this part, which is practically the brain of the craft.

Just forward of this room are the sleeping quarters of the officers. These, like the men's, are merely bunks fitted up on the vessel's sides, amidst cables and pipes. Forward again are the torpedo and mine tubes.

The writer emerged from the forward hatch feeling a great respect for the men who can keep the sea for days together under war conditions in craft of this kind. At sea one gets accustomed to discomforts, but the absolute confinement of a craft of this kind must be trying in the extreme. Add to this the feeling that any moment you may be drowned like a rat in a trap, and there is small wonder that men's morale became weak. One wonders still further how men who had the fibre to keep the sea under such conditions could be guilty of the brutal crimes they undoubtedly committed.

One gathered that on the voyage from England the "U.C. 97" behaved well. She rolled very heavily, and lost her diving rudders in the heavy sea, they not being designed with a view to ocean travel.

The starboard engine developed piston trouble, but the port engine ran for fifteen days without a stop. One of the pistons from the starboard engine was on the platform, showing a crack across the head. These pistons are not oil cooled, and probably the cracking was due to overheating.

I asked one of the young chaps on deck as to the extent of the rolling. He assured me solemnly that "she rolled from 65 to 70 degrees."

He Swats the Metric System Hip and Thigh

Fails to See Any Good Reason for Agreeing to a Change Being Made

By DONALD A. HAMPSON, Ass. Mem. A.S.M.E.

IN the June 5th issue of CANADIAN MACHINERY, a correspondent writing on the pros of the metric system, calls attention to the fact that a year's saving would result by the abolition of the old system of measurements. This has long been one of the strongest planks in the metric platform, one that is swallowed hook, line, and sinker by the hearer who is a hearer only, not a thinker.

Down in New York city they went to work to see if this were true and carefully tabulated the mathematical work each scholar must perform during the entire years of the course. The result showed up the rashness of the "year's saving" claim, for the entire time devoted to such work in the grammar school course hardly totalled more than a year. And a little thought by any one will quickly prove this to be so. There is no denying that there would be a slight saving in time, but that saving would be entirely on the reduced number of tables to be memorized—and at the age when most children are learning these tables, they can memorize the whole batch in a week's time.

Adoption of the metric system would not abolish for an instant the importance and the use of addition and subtraction, involution and evolution, factoring and percentage, and a dozen other subjects in arithmetic including fractions—fractions that are so despised and yet so useful. And then on into algebra and the geometries—how much would actually be saved there? The real purpose of study is to stimulate thought, and the seemingly long course in arithmetic covers the least possible number of subjects to give pupils a general knowledge of the underlying science, upon which the scholar may build his structure into any special branch he may select in his higher education. The metric system, besides decreasing the number of tables to be learned, might save—yes, it would save—time by shortening the work of calculations of the sort where a decimal point could be moved.

But actual practice does not show these cases as a rule: for instance, there would be no saving in the calculations of Smith's last Western trip because he travelled 3,408 kilometers at 3½ cents per kilometer over the figures if he had gone 5,126 miles at 4 cents a mile—Smith, by the way, is our carburetor salesman, and he sells them for $5.46 each (the very least we can get them out for) and on the trip mentioned he sold 2,803 of them to 187 dealers and garages. There is a typical example of practice—figures as taken from the books. If there is a metric enthusiast present who can show us where the system will save anything on that job, let him stand up.

The long, laborious work of the arithmetic class has another end in view—that of speed, smoothness, and accuracy. Practice makes perfect and if the scholar was told that the shifting of a decimal would do his multiplying and dividing and was given little or no practice with those branches as they do occur in the hard, cruel world, what a sad awakening he would have "when he got old enough to go to work," and how swift and correct his calculations would be. All that laborious work of the school days with the arithmetic "as she is" go to make the scholar's work correct—the practice so acquired is just like the running-in that any worthwhile machine gets before it is sent out—it smooths out and breaks down the little roughnesses and locates the weak points, the absence of which process would utterly condemn the product in the world of commerce.

The correspondent stated that he had to look up the tables in the arithmetic to determine the value of the rod and certain other units of the surveyor's system. That certainly is no argument for the metric system—in all probability the said correspondent is not a surveyor and like millions of others who eke out an existence by means other than the transit and chain, he has forgotten the exact wording of something he learned twenty years ago—take the grammar and the geography and the physiology that were carried through the same period of childhood and try the same experiment with some exact point in those subjects to see if the memory has not rusted a bit. It is the lack of use rather than the difficulty of the system; a surveyor has no trouble in keeping rods separated from acres, but he would very likely stumble on the units of apothecaries' weight which he learned at the same time that our correspondent was memorizing surveyor's measure.

It has been truly said that people will sign any kind of a petition. Also when any reformer or schemer or long-haired gent proposes a different way of doing things he collects a following and gets more or less newspaper space—he gets notoriety for himself, probably a living, and usually gets some legislator to introduce a bill saddling the new and odious thing upon the public. Because this individual has some axe to grind and the rest of the world has a living to earn (and is almost too busy to notice every fool thing propounded) the said legislation flourishes and is fastened upon us before we realize the evil of the thing.

The metric system is not necessarily bad, but its advocates "work while you sleep," and they do not present things as they really occur in practice. The actual shortcomings of the established system are not as glaring as presented nor will the advent of the metric system suddenly resolve the world's work into a millennium of fives and tens. Offhand, anyone might be excused for hailing the metric system as a cure-all on hearing a certain side glowingly presented. But just consider a few facts and judge whether they do not favor the English system when the light is flashed into every corner—much as the year's school saving can be proven misleading.

As to world commerce. France and Germany are the two foremost metric countries. Germany is mostly down and out. France (if we can believe newspaper pleas for money) has no money to spend for goods from other countries and needs all her energies for years to come to upbuild her own country before entering the world's markets. England and possessions are positively anti-metric—so much so that a group of wise and competent men who have been investigating the matter for two years with a view of a bigger world business have reported finally and absolutely against the metric system. Outside of the three countries named we have a score of smaller nations who are supposed to be rather metric. The American Society of Mechanical Engineers has never actually gone on record as favoring either system, but it has conducted exhaustive investigations in these countries and with American exporters to them and the findings are overwhelmingly in favor of the English system. These findings are to be found verbatim in the society's transactions.

As to the saving in the time of schooling. This has already been surveyed. But it should be added that departments of education make a serious mistake in allowing teachers to falsely boost the metric system. I, with millions of others, was taught that the system was a

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 18
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$20 50	$19 25
Electro copper	19 50	18 00
Castings, copper	19 50	18 00
Tin	56 00	55 00
Spelter	8 50	7 50
Lead	7 00	6 50
Antimony	9 50	9 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
tandard couplings, 4" and under 40%.
4½" and larger, 20%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$12 50	$12 00
Copper, crucible	16 50	15 00
Copper, heavy	16 00	15 00
Copper wire	16 00	14 50
No. 1 machine composition	12 50	14 00
New brass cuttings	9 25	9 00
Red brass turnings	10 00	9 00
Yellow brass turnings	7 25	6 50
Light brass	6 00	5 00
Medium brass	6 00	6 00
Scrap zinc	5 00	5 00
Heavy lead	4 50	4 00
Tea lead	3 50	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 75	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	17 00	15 00
Rails	12 00	11 00
Malleable scrap	12 00	12 00
No. 1 machine cast iron	18 00	15 00
Pipe wrought	8 00	5 00
Car wheels	20 00	18 00
Steel axles	20 00	20 00
Mach. shop turnings	5 50	5 00
Stove plate	14 00	10 00
Cast boring	5 50	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅝" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅝ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and emi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts,	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws ....list plus 20,	30
Thumb screws	40
Thumb nuts	75
Patch bolts ..... add	20
Cold pressed nuts to 1½ in. ..add	$1 00
Cold pressed nuts over 1½ in....add	2 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sies up to 52	40
S.S. drills, wire sizes, No. 53 to 80	40 plus 10
Standard drills, al sizes	40 plus 10
3-fluted drills, plus	10
Jobbers' and letter sizes	40 plus 10
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	20 to 50
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	**.08½**
Grits, 80 and finer	**.06**

BRASS

Brass rods, base ½ in. to 1 in. rod	0 30
Brass sheets, 24 gauge and heavier, base	$0 38

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	-
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

panacea for all mathematical evils; at that age, scholars necessarily have to take things for granted as they are taught and I came to look on the world as all wrong because houses were not made with just ten windows and cities were not all spaced so many meters apart.

As to the shortcomings of metric measurements. In the first place, it is admittedly a system founded upon a wrong unit—the 39.37". Why a foot, or a hundred inches or a mile should not have been the basis of linear measurement will always remain a mystery. There is no more logic in the selection of the meter as it is than if the distance from Toronto to Quebec had been selected and some divisor of this adopted as the unit of length. A straight decimal system based upon time-tried units such as feet, cubic feet, and pounds is far ahead of the metric system and if we are ever going to make a change, let that change be logical, sensible, and sane. Should a new world be opened up to-morrow, the metric system could be installed without the slightest hitch and it would have some advantages over ours, but the forced, or voluntary adoption by the nations of this world would plunge it into a state of chaos. Unless every building and machine and public work and labor-saving device were immediately scrapped, we would have the old sizes coming up for a hundred years.

Considerably over a century ago the metric system was introduced in France and for the greater part of that time it has been obligatory, but to-day the old units are in extensive use. Silk is France's greatest industry and it was supposed to be converted a hundred years ago; Paterson, N.J., is the seat of the silk business in America and Paterson men in the Army visited the French factories after the armistice, but strange to state, they report on their return to this side that the yard and other English measurements are in as common use in those factories as in the American ones.

As to the case of conversion to metric units. School children would have no trouble in familiarizing themselves but it is the men and women of mature years whose minds are not elastic that will be confused. To them—the workers and buyers of the world—the separation of deki from deci, milli from hecto, centi from kilo and the unfamiliar meters, liters, and grams will cause endless confusion. The good old feet and inches, pounds and ounces, quarts and gallons are names so short as to be easily remembered and quickly spoken—they are distinctive, so much so that they live in one's mind, they are actually related to and inseparable from the unit itself—a fifty-year mechanic does not have to stop when he sees 582 M.M on a drawing and, scratching his head, slowly conclude that "let's see, deci means ten, millimeter means ten more, 582 millimeters is 582 tenths."

As to inter-relation of units. In the matter of feet and inches, there is at present no conflict and no confusion. To measure 40' 6½" along the wings of an airplane is as simple and quick as to measure it as 12379.13 M.M. or 12,379 M.—the feet and inches way is as short to speak or write as the other; it is only in the conversion to units of a higher or lower denomination that there is a metric gain—but how often is this conversion actually required, let me ask? Is the saving on that rare occasion worth while to upset our entire system? And as to similarity between names and progressions with different scales, this is only a talking point of the theorists. The chemist doesn't care what system the banker uses, machinists do not worry about surveyors' businesses, coal dealers have nothing in common with those who deal in liquids. Just as the great mass of people have no use for a foreign tongue, and have forgotten what they ever knew of one, just so is each man independent of his neighbor and of the language of his neighbor's business.

And as to machine shop. There is no business in this world that does not touch the machine shop at some point of its career, so it follows that the shop's relation to the metric system is the most important of all. The fact that the shops of America have made untold numbers of parts to metric measurements in the last five years is no argument for the system. Machine shops can make anything, to any system of measurement. Metric scales and metric drills have been stock parts for years. Brown & Sharpe make some of these metric parts—they have made the Government standards for the most of the metric countries—yet we find the members of this firm among the most active in denouncing the adoption of the system.

Brown & Sharpe may be looked upon as the cornerstone in the system of machine shops in America. The firm of Sellers & Co., of Philadelphia, and that of Whitworth, in England, may be regarded as truly representative: both of these adopted the metric system for a period of ten years in an unprejudiced effort to ascertain what was best **and both abandoned it.** If there was no other testimony at all, that furnished by these three representative concerns—who serve the world—should outweigh that of a handful of enthusiasts whose work begins and ends within a fifty-foot circle.

There is one department in the business with which the writer is connected that produces annually $200,000 worth of appliances sold througout the American continent. All of these have renewable wearing parts—bushings, pins, and slides—which we keep in stock for replacement for the various designs. Orders for replacements for the goods sold in 1903-4 have begun to come in within the last year or so; previous to that the repair business did not amount to $10 per year. The life of these (or any other tools) can only be gauged by actual service: the renewal of simple parts makes these appliances good for another fifteen years and a further renewal extends the life to a grand total of forty-five years, if the owner chooses to scrap at that time. Right there is one of the strongest arguments against the adoption of another system of measurements—it is the point on which the public is most concerned.

This instance from real life is just a flea bite to the entire commercial world. Consider the automobile: everyone knows the difficulties of getting repair parts for them, yet the manufacturers are the strongest financially and have the most efficiently run departments of any industry to-day. Would the adoption of the metric system in part or in whole salve the feelings of the car owner who "has had his troubles with repair parts?" The auto has done more to bring the public in touch with mechanics than anything since the advent of modern plumbing. Suppose there is metric compulsion and we cannot longer get wrist pins for our 1916 flivver, plumbers cannot supply one-inch water pipe and ¾" faucets, printers cannot get parts for their presses and linotypes, builders are not allowed to plane boards an inch and a half thick, coal men dare not sell a ton of chestnut, and railroads must discontinue that "impractical" 4' 8½" gauge of track. Then we must sell our flivver for junk, re-pipe our house entirely, printers must buy new and inexpensive (?) machinery or tie the disabled parts up with string and paste, tear out half a building to have all doors and walls match the new thicknesses of lumber, coal men must put in new scales reading to liters (oh, beg pardon, I should say kilograms), and the railroads must rebuild every piece of rolling stock and every mile of track. It is either that or maintain two standards for fifty or a hundred years. Where is the saving and where is the gain? What becomes of the high cost of living?

As compared with facing such a front, that of the Germans was only a starter. There is the machine shop argument—it touches every man, woman, and child for a century. It is said that the engineering calculations under the metric system would be vastly shortened. In a majority of cases, it would actually be but a fraction of one per cent. Those old 8's and 9's would creep in just as often, and iron and cement would still bear their same relation in the scale of gravity, and moments would have to be found by multiplying grams and meters. Where there was a minute's saving by shifting the decimal point, it would be swallowed up by the time spent in the conversion of some data available in English units, but not yet translated to metric, and not likely to be for ten years to come.

And finally, the incompleteness of the thing. After we had absorbed the present metric system, we might begin to look around. Then we would find that our system of time had not changed and our watches continued to serve up twenty-four hours to the day, there still would be degrees of latitude and longtitude, the surveyor's transit and the machinist's protractor would be cold blooded in their persistence of dividing circles into 360 degrees, twelve months would constitute a year and thirty days a month (horrible to contemplate), each dollar would be made up of a hundred cents and other subdivisions without Frenchy names, printers would be setting type to pica measurements, and so on ad infinitum. Truly, our metric friends have overlooked much in their straining at a gnat to swallow the camel.

THE season for pickling and preserving draws nigh. Then will the head of the house find his shaving mug filled with jelly, and his favorite razor peeling the small onions. Great days, them!

U.S. Government sold airplanes and realized 13 per cent. of the original cost. And we rise to remark that money can likewise take to wings without tinkering with the airplane business.

REPORTS tell of a little child being drowned by falling into an open rainbarrel, sunk in the ground. Of all fool traps for children, the open cistern heads the list. It belongs in the same category as the idiot who rocks the boat, or the very well-intentioned young chap who shortly before his funeral gazed down the barrel of a gun, and didn't know it was loaded.

A GOOD Yankee named Liar has had his name changed. Well, he may quit the name, but there's quite a heap of other folks ready to work on the job.

OUR idea of a real jackass is the old fossil weighing 250 who imagines he can go to a picnic and run the 100 yard fat man's race in less than half an hour.

WHO IS BLIND?

Will every person who reads this notice, and knows a blind man or woman anywhere in Canada, kindly send the name and address of that blind one to the Canadian National Institute for the Blind, 36 King St. East, Toronto.

The institute is conducting work for the blind along the most modern scientific lines and desires that each blind resident of Canada should have the opportunity of availing himself or herself of the benefits represented by this work.

The immense task of registering every case of blindness can only be accomplished successfully by the earnest co-operation of the public generally. That is why we ask you to send the names and addresses of blind people you may know.

The following departments of work are being actively prosecuted by the institute:

Industrial Department for Men.
Industrial Department for Women.
Department of Field Work.
Department of Home Teaching.
Department of Prevention of Blindness.
Library Department.
Department of After Care.
Residence and Vocational Training Centre for Blinded Soldiers.

To send information or obtain information, address the General Secretary, Canadian National Institute for the Blind, 36 King St. East, Toronto.

Large Foreign Order.—Armstrong, Whitworth of Canada, Ltd., with works at Longueuil, Quebec, have just completed one of the largest individual orders for steel tires placed this year, covering 3,000 tires, placed by the Netherlands Government, New York office, for shipment to the Dutch Indies. These tires were manufactured from raw materials at this company's works at Longueuil. The steel was made in Heroult electric furnaces, and the tires were manufactured with the equipment installed early in 1918 when the tire and wheel plant was added to the present works at Longueuil. This is a concrete example of what Canadian manufacturers can do to secure foreign trade, and the success with which this order was handled by this company has acted as an impetus to further developing foreign trade. Needless to say, the Netherlands Government assured themselves of the very high quality of steel tires which this company are making before placing the order in their hands, and it should be a source of gratification to Canadian manufacturers to know that markets heretofore controlled by Germany can be secured.

Add to Algoma Plant.—Further important extensions in the Canadian steel industry are foreshadowed in a decision just made by the Lake Superior Corporation to begin work immediately on an extension of the rail mill of the Algoma Steel Company's plant at Sault Ste. Marie, Ont. The purpose of the extension is to make possible the production of structural steel up to 23 inches. Work will be begun at once, and the extension will cost several hundred thousand dollars. It is expected to be completed by November. It was stated yesterday that this is but the first step in a considerable development of the plant with a view to further caring for the Canadian market for this form of steel product, and that the ultimate scheme will be on a large scale. The present extension is not made with any understanding with the Dominion Government, but is said to be based on the expectations of the market for Canadian produced steel, which is expected to extend on a large scale. The rail mill of the Algoma Steel Company is now running at about 46 per cent. capacity, and the other portions of the steel plant are going at about full capacity.

British Forgings Sold.—The negotiations with Baldwins, Ltd., the Welsh tinplate makers, for the purchase of the British Forgings plant in Toronto, and the establishment of extensive works for the production of tin plate and other products on a big scale have been brought to a successful conclusion, according to a statement by R. Home Smith, member of the Harbor Commission, on whose property the plant is to be located. Details are for the present lacking, according to Mr. Smith, who explains that the deal was completed following negotiations with J. C. Davies, representing the company, who was in the country for about a month conducting his inquiries. The matter has also been taken up in England by Sir Joseph Flavelle, chairman of the Munitions Board. The enterprise promises to be one of the most important in the country. It is proposed to expend between two and three million dollars on plant, and a couple of thousand men will be employed at the outset. Much will depend upon the treatment of the company and its interests as to future expansion. Toronto has not offered much encouragement to big business in the past, and it is to be hoped that there will be a change of attitude in this case.

NEW COUNTER SIGN

The Wilt Twist Drill Company of Canada, Limited, Walkerville, Ont., have issued a very attractive counter sign. This sign, which is intended for distribution to the trade, can be used either as an easel or hung on the wall. Those who are selling Wilt products will find this a very attractive means of keeping the Wilt name before the buying public.

Leather Prices High.—Owing to the depletion of stocks of tanners in Canada, caused by the lifting of the British embargo to Canada, while the American embargo continued, prices have advanced materially. Tanners are exercising extreme caution, as they feel that the high prices may come down materially during the next few months, and are, therefore, unwilling to speculate on the future values. They are, therefore, keeping operations down, and this combined with the scarcity of raw materials, tends to keep the prices firm at their present levels.

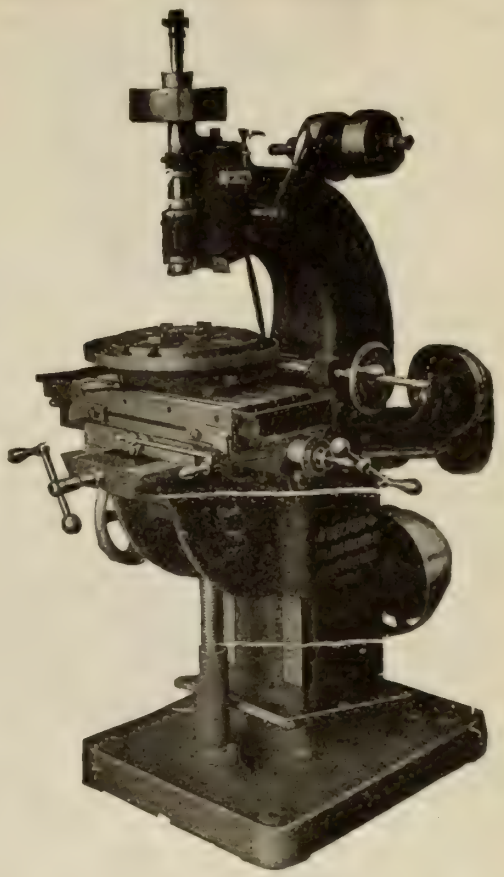
BECKER

Belt Driven Millers

The Machine that Gives the Smooth Finish

Stringent shortage of labor during the war put a premium on machinery of superior productive ability. Never was the capacity and value of Becker Millers better emphasized than during that period. And Becker Millers will always continue to demonstrate their ability to return maximum production for minimum expenditure of manual effort.

Send us blue prints of your work and other data and we will submit estimates on Becker production. Adopt this "safety-first" course; it may mean added profits to you.



The A. R. Williams Machinery Co.
LIMITED, TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited
Steel Foundry Division, Lachine Canal
Head Office: 187 Delisle St. MONTREAL
Phone Victoria 1492

MORROW SCREWS MORROW

MORROW
INGERSOLL

In assembly you should use only the best "Morrow's."

Best Jobbers carry "Morrow's."

Set Screws, Cap Screws—"It's the finishing die that does it."

Nuts (every variety of finish).

Twist Drills, "will do more drilling with less regrinding."

Order Ingersoll Files from us, "they cut faster and wear longer."

John Morrow Screw & Nut Co.
LIMITED
INGERSOLL - CANADA

Always, everywhere, use "Morrow" products. Made just a little better than seems necessary.

DRILLS FILES

MORROW NUTS MORROW

STORAGE OF COAL AND SPONTANEOUS COMBUSTION

Coal should be stored in small quantities as near to the point of consumption as possible. Small coal piles rarely ignite from spontaneous combustion. Coal should be stored near the point of use to avoid re-handling, extra transportation and the degradation of size which follows each re-handling. For these reasons the bureau would advocate storage, so far as possible, in the bins and yards of the ultimate consumer, thus dividing the risk of loss from spontaneous combustion. If large storage piles are necessary, certain general principles must be borne in mind. The generation of heat is the result of slow oxidation of the coal surface. The oxidation is much more rapid from freshly mined coal or from freshly broken surfaces. The oxidation rate increases rapidly with increased temperature. Different coals have different oxidizing rates. These facts lead to the following recommendations:—Where there is choice of coal to be stored, that having the lowest oxidizing rate should be chosen, if known. Between two coals, that which is least friable, and therefore which presents the least total coal surface in the pile, should be selected.

The method of handling should be such as to produce the least freshly broken coal surface. The coal should be as cool as possible when piled. Piling warm coal on a hot day is more likely to produce spontaneous combustion. The coal must be kept from an extraneous source of heat. Alternate wetting and drying of coal during piling is to be avoided if possible. The fine coal, or slack, is the part from which spontaneous combustion is to be expected. Piling of lump coal where possible is therefore desirable.

In the process of handling, if the lump coal can be stored and the fine coal removed and used immediately, the practice prevents spontaneous combustion in coals which would have otherwise given trouble. The sulphur content of coal is believed by many to play an important role in spontaneous combustion. The evidence on this point is still conflicting, but to play safe, it is desirable to choose coal having a lower sulphur content when choice is possible.

There is a current belief that dissimilar coals stored in one pile are more liable to spontaneous combustion. The evidence on this point is also conflicting, but to play safe it is advisable to store only one kind of coal in a pile. The ground on which a coal pile is built should be dry. The foregoing recommendations are all derived from the factors affecting the heating of coal. There should be no spontaneous combustion, whatever the heating rate, provided the heat is carried away as rapidly as produced. This fact brings about the following recommendations:—

Coal piles should be made that there is ready movement of air for ventilation throughout all parts of the coal pile. This is the condition when the entire pile is made of coarse lump coal. With ordinary coal piling this is difficult. The surfaces of coal piles should be so exposed as to allow the pile to cool; or else the coal should be so stored that air circulation within the pipe is very small. When the air circulation is reduced to a minimum, as in air-tight bin, with no opening in the bottom, the oxygen of the air is soon removed and the mass of the coal lies in an inert atmosphere, except for small local circulation near the surface. Air-tight bins are usually impracticable, but the following practice is recommended to approximate these conditions:—

In making a coal pile of mixed sizes, the coal should be so handled as to make a homogeneous pile and prevent the segregation of coarse and fine coal. This frequently determines the most desirable machinery for unloading coal. It is common practice to limit the height of a coal pile, this for two reasons:—A pile too high crushes the lower layers of coal, producing more fines; the larger the pile the less the heat-dissipating surface there is exposed in proportion to the heat generating capacity of the pile. Twelve feet in height is a common limit.

Whatever precautions are taken in choice and handling of coal, provision should be made for keeping track of the temperature rise in a coal pile and for rapid rehandling of portions of a pile in case of excessive heating. In a coal pile covering considerable area, it should be so subdivided that in case of spontaneous combustion of a portion, the heat will not be transmitted to the whole pile, thus accelerating the heating of portions of the pile which normally would have remained cool.

To keep track of the temperature of coal piles, it is recommended that ½ in. iron pipe be driven vertically into the pile at distances of 15 ft. or 20 ft. apart. A maximum thermometer lowered into the pipe to varying depths will indicate the temperature of a pile opposite the thermometer.

A survey of the pile and a survey of the temperature of all parts of the pile. Actual removal need not begin during the first three months after the pile is made, and once a week thereafter until the pile has evidently ceased to heat. As soon as any portion of the pile reaches the temperature 150 deg., provision should be made for removing that portion of the pile. Actual removal need not begin until the temperate has reached 180 deg., but at these temperatures the rate of oxidation is dangerously rapid. The object of rehandling the coal is to allow it to cool below a dangerous temperature. Any method of rehandling which does not allow of cooling will only transfer the difficulty from the old pile to the new one. It is usually useless to employ water in an attempt to cool a coal pile.

Lack of provision for rapid reloading, cooling, and repiling of coal is the cause of serious loss from spontaneous combustion.

BUYING PIG IRON

THE buying movement in the pig iron trade continues to develop. Booking of foundry and malleable are heavy, and there is some demand for steel making grades. Following are reports from various centres:

Chicago.—Active trading is the rule in this district this week, and buyers are coming into the market in good shape. One sale reported was for 12,000 tons foundry iron. Malleable is beginning to figure in the enquiries, and for larger quantities than usual.

New York.—With sales active in all grades, but chiefly in foundry, a week of trading has been concluded that outclasses the four previous weeks. Total business in foundry iron amounted to 50,000 tons, and enquiries for as much more are on the market.

Buffalo.—Enquiry is so strong and actual business in such volume that some interests are contemplating increased production. Some enquiries are for first half of 1920. Sales amount to approximately 125,000 tons foundry iron, and there are enquiries for about 30,000 tons.

Pittsburgh.—A good amount of foundry iron has been sold during the week, in most cases in small lots. There is a scarcity of heavy melting scrap, and the shortage is made up by using more pig iron. One firm is looking for 3,500 tons basic for spot and July delivery.

Boston.—The buying movement, while not so evident here as elsewhere, has been sufficient to create a demand that has had the effect of stiffening prices. One sale of 3,000 tons of high silicon is reported, and 2,000 tons malleable are expected to be placed this week. Prices range from $28.75 to $29 for No. 2 foundry.

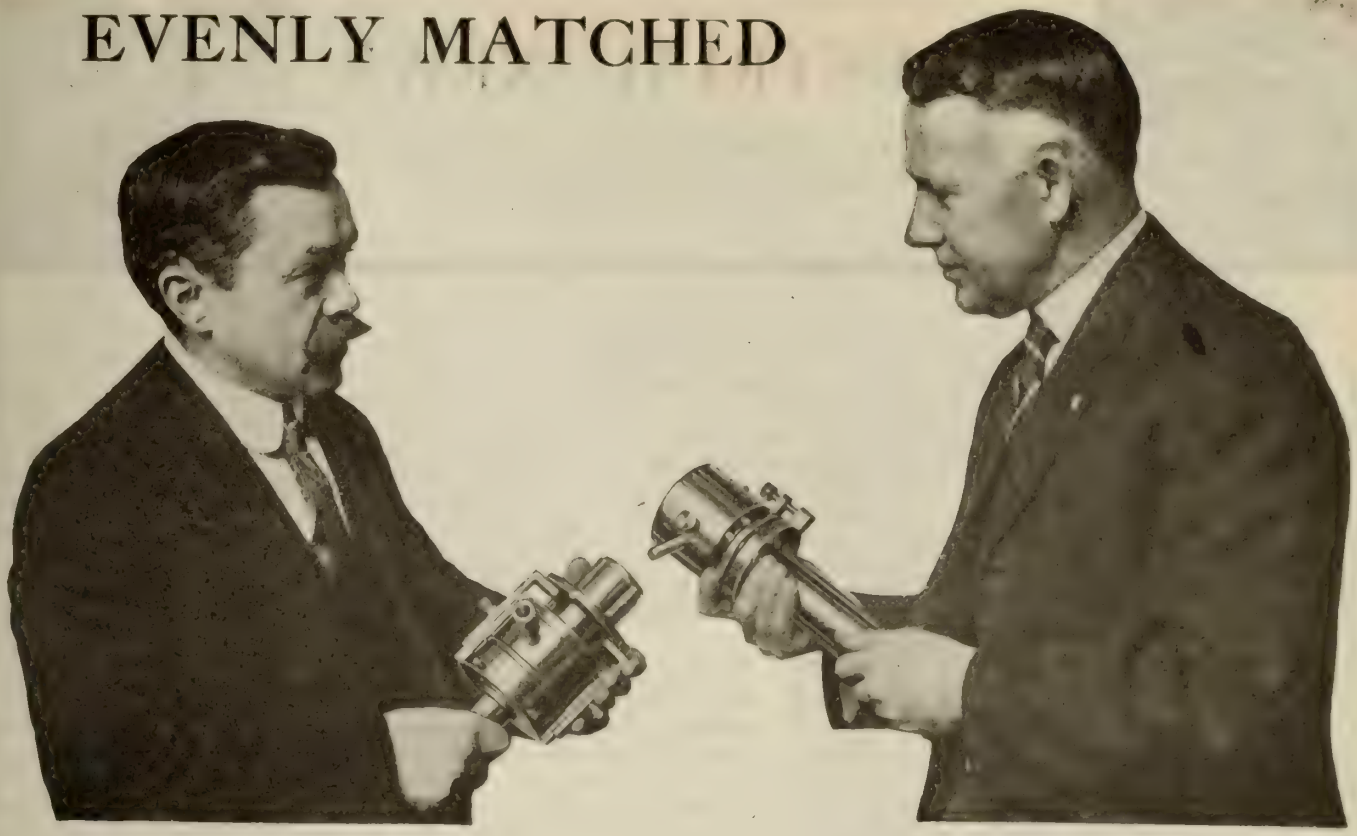
Philadelphia.—Demand is not very brisk, compared with other districts, but dealers state their total is above the average of any month this year. Furnaces are taking iron only for future delivery, and some are piling iron in the expectation of better prices later. Prices for iron on hand show a slight concession.

Cleveland.—Large sales of foundry and malleable amounting in the aggregate to 100,000 tons is the result of the past few days' business. New inquiries for malleable and foundry grades are plentiful, though there is little inquiry for steel making grades.

St. Louis. — Improvement is being shown in this district, and one sale of 2,100 tons No. 2 Southern is reported. Inquiries for third and fourth quarter are coming out.

Birmingham.—Lower prices and good demand are the prevailing conditions here. Prices have been affected by the absorption of freight rates by some sellers. Rates are from $24.50 to $25.75 according to grade of silicon.

EVENLY MATCHED



The man who is tapping internal screw threads with a Geometric Collapsing Tap is evenly matched with the one who is cutting external screw threads with a Geometric Self-opening Die Head.

Commenting on the policy of THREADS, the monthly publication of The Geometric Tool Company, a London supporter of the Geometric method, says:

"The policy you advocate as to work is good, yet you are inconsistent in making a tool that avoids it."

Geometric Self-Opening Die Heads and Collapsing Taps

Help You to Avoid Work by Doing it for You

The Geometric Catalogue will tell you how

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents: Williams & Wilson, Limited, Montreal; The A. R. Williams Machine Co., Limited, Toronto, Winnipeg and St. John, N. B.

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

TRADE GOSSIP

A New Alloy.—It is reported that a new alloy has been discovered that is lighter than aluminum. The alloy is being used in the manufacture of airplane piston rods for the Italian army planes by a firm in the Province of Quebec.

No Work on C.N.R.—No work will be done on the line of the Toronto and Eastern Railway this year by the Canadian National Railways. There is no money available for this purpose. Some time ago the Government stated that it would dispose of the road to the Ontario Hydro, but nothing has been done along this line.

New Company Starts.—Statement was issued at Toronto City Hall, that the Nukol Company had taken a lease of the property formerly occupied by Toronto Shipbuilding Company. The lease, which was issued by the Harbor Commissioners, is for 21 years. It occupies some 2½ to 3 acres. The company is importing machinery from Belgium, and will start operations in making Nukol as soon as it is installed.

Hamilton.—The Steel Company of Canada, which closed one of the open hearths at its local plant a few weeks ago for repairs, has reopened and about fifty hands were put to work. The force was further increased later. Two local plants asked the local branch of the provincial labor bureau for about 40 laborers, but not that many reported to the office. They will be secured later.

The Jeffrey Manufacturing Company, Jeffrey, Columbus, Ohio, have issued catalogue number 210 on the Jeffrey Pivoted Bucket Carrier, well illustrated with engravings and forming an unusually complete treatise on the subject of conveying. In addition to the many illustrations showing typical installations, line drawings are given which show practically all the dimensions necessary for the complete installation of this type of mechanical conveyer.

Veteran Contractors.—A firm of contractors has recently been formed in Vancouver, the members of which have seen service in France on railway work. They have taken a contract for one and a half miles on the Copper Mountain Railroad near Princeton. They will, as far as possible, employ none but returned men, and the wages paid will be up to the prevailing standard. To those men who stay on the work till completion a percentage of the profits will be given.

Sells Buffalo Plant.—The Russell Motor Car Company has sold its Buffalo plant, which was an important subsidiary during its operations on war contracts. It is said that the sale is an advantageous one, realizing more than the company put into it. It is reported that the company is having a successful year, and will close its fiscal year on July 31, with a good record, though somewhat less earnings than in the bumper period before the close of the war.

Business Change.—The Monash line of pressure reducing valves and pump governors, formerly manufactured and sold by the Monash-Younker Co., of New York and Chicago, has been acquired by the Harrison Safety Boiler Works, of Philadelphia. The purchase includes a stock of manufactured parts and valves, drawings, patterns, trade mark, and goodwill. The Harrison Safety Boiler Works will manufacture and market the valves under the trade name "Cochrane-Monash," and will supply repair parts for valves now in use.

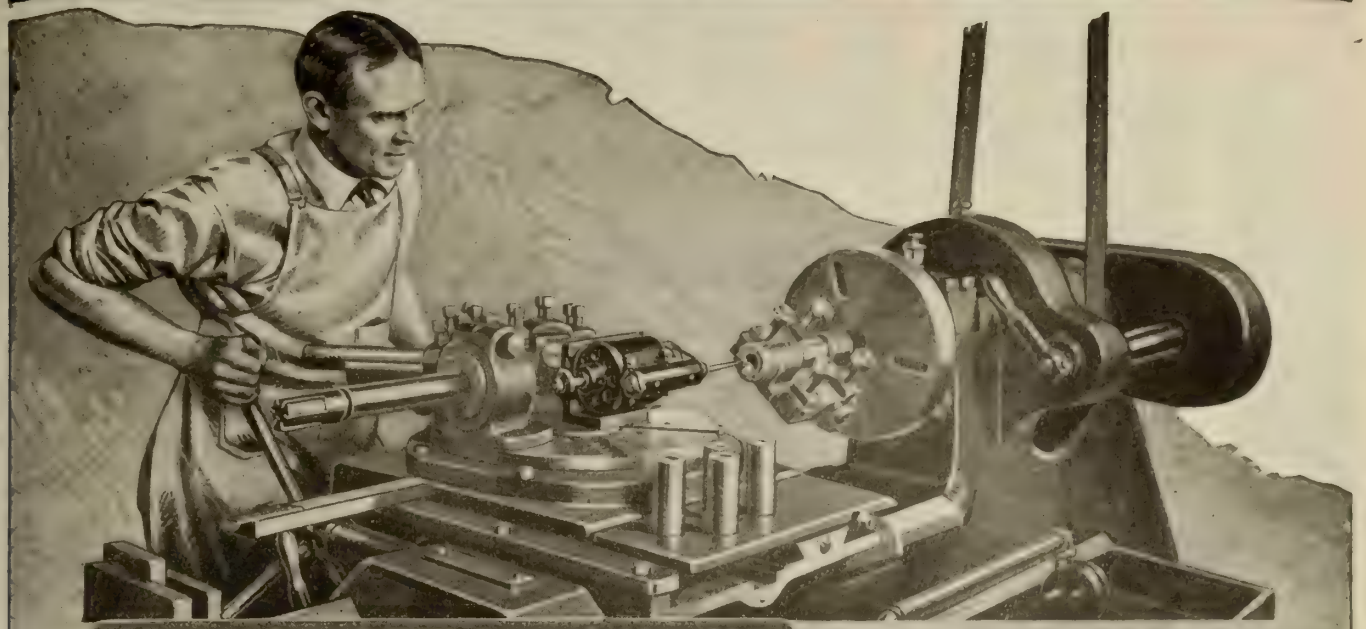
Strike Settled.—The strike of 175 shipworkers and helpers at the shipyards of the Canadian Allis-Chalmers Company's plant at Bridgeburg has been settled. The men returned to work following a consultation with officials of the company. Although not all the points asked for were conceded, the men get a wage increase of between 10 and 12 per cent., and a 48-hour week. Hitherto they had been working 60 hours. The company conceded several points to the men, and through the surrender by both sides of certain points the strike was brought to a close by a compromise. The strike lasted about three weeks. Not all of the big forces at yards, however, went out on strike, the electricians, plumbers, carpenters, etc., remaining on duty during the entire period.

Profit-Sharing Plan. — The Dominion Sheet Metal Corporation, one of Hamilton's largest industries, has inaugurated a profit-sharing scheme for employees. Eight per cent. preferred stock will be offered to the employees, the number of shares to be based upon earnings. The offer will be made at par, although the stock has been selling at from 110 to 112 in a limited way. The employees are to pay for the stock at the rate of 2 per cent. per month. They will be credited with the 8 per cent. dividend at the rate of 2 per cent. each quarter, and no charge will be made for interest or unpaid balances. The arrangement means 14 per cent. annual credit and no interest charge. All employees are also to have one week vacation, for which they will be paid.

Strike at Midland.—The Midland Shipbuilding Company has shut down its plant. A press despatch from Midland says:—After ten days of negotiations between the striking iron workers and the officials of the Midland Shipbuilding Company the plant closed down. The strike started on the 6th, when 175 men walked out because the company refused to grant a 44-hour week and an increased scale. Two proposals were made by the company: first, that the men take over the boat now under construction for the Imperial Government and work such hours as they decided upon, the boat to be completed by a named date, the men to receive their present wages in the meantime and a bonus at the appointed date. The other proposal was that the iron work should be completed for a lump sum, to be divided as the employees saw fit. Both offers were refused, and the plant is therefore closed down, affecting 305 men, who were drawing weekly wages totalling $9,000.

Welland "Telegraph":—The worst industrial blow Welland has ever received was in the decision of the directors of the Canadian Steel Foundries last week to dismantle the Welland plant and ship the machinery to Montreal. The work began on Monday and by the end of the week much of the equipment was on the way to Montreal, and the balance of it was loaded or being loaded on cars. A year ago this firm was employing about eight hundred hands.

It is stated that the land and buildings will be offered for sale at once. Prospects of sale, however, are very remote. The plant was built for a specific purpose, and unless for an industry of closely allied nature it would not be likely to prove suitable. The industry began a dozen years ago as the Ontario Iron & Steel Company, financed principally by Albany interests. It was agreed at the beginning that $200,000 would be spent in plant and that 100



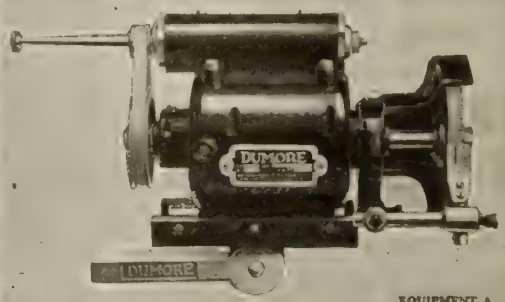
GRINDING HARDENED BEARINGS IN PLACE

STARTING and finishing this job with one set-up—from machining the casting to grinding the hardened bearing in place—is a good illustration of the **DUMORE** grinder on production. This method positively aligns each bearing with the rest of the machining, by tempering. And the danger of chatter-marks, taper or bell-mouth is eliminated because the **DUMORE** grinder is perfectly balanced throughout and gives correct cutting speeds to even small emery wheels. Limits of .0001″ are easily maintained.

There are any number of jobs in your shop for the **DUMORE** grinder which this illustration will suggest. Give your workmen the use of a tool that will speed their work, turn out better tools and improve the quality of your product. The **DUMORE** grinder is light and portable—may be carried anywhere in the shop and quickly set up.

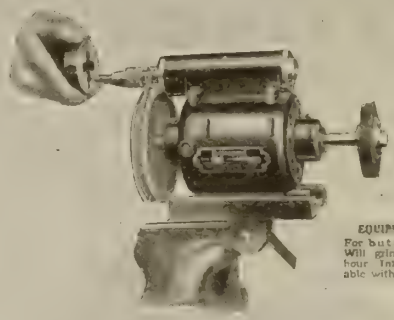
Ask your dealer for a demonstration. If he is not able to supply your needs, write us for further information and prices.

WISCONSIN ELECTRIC COMPANY
2012 Sixteenth Street Racine, Wis.



EQUIPMENT A
For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches. 30,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.

EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 an hour. Interchangeable with A and B

DUMORE HIGH SPEED GRINDERS

Oil Tempered Steel Springs

—for every purpose and the best for each use.

Special styles of all kinds to order.

THE CLEVELAND WIRE SPRING COMPANY
Cleveland, Ohio
U.S.A.

Special Machinery
MADE TO ORDER

Mill Machinery, Engine Work
Grey Iron and Brass Castings

TRY US FOR GENERAL REPAIRS

ALEXANDER FLECK, LIMITED
(Vulcan Iron Works) OTTAWA, ONT.

WIRE SPRINGS OF ALL KINDS
Machine Springs, Valve Springs, Automobile Cushion Springs, etc., of a quality that defies competition. Tell us your requirements. Send sample or specification for price.
JAMES STEELE, LIMITED
GUELPH, ONTARIO

CASTINGS
Medium Weight Grey Iron, Brass, Etc.
JOBBING
GREENLEAFS, LIMITED
Belleville, Ontario

BOLTS AND RIVETS

We are equipped to fill the requirements of the Marine trade promptly. Square head, hexagon head and all kinds of Machine, Deck, Carriage Bolts and Rivets.

QUALITY PRODUCTS
LONDON BOLT & HINGE WORKS
LONDON, CANADA

hands would be employed. It had some years of hard sledding and frequent changes of management before being taken over by the Canada Car and Foundry Company, the present owners. The company spent thousands of dollars in new equipment. They specialized on railway work, and their product annually was in excess of five million dollars. The company operate many plants —at Fort William, Amherst, N.S.; Longue Pointe, and Point St. Charles. It is believed that the closing of the Welland plant marks the first step in the consolidation of all the plants in Quebec.

TENDERS

Tenders will be received up till July 10 for the erection of a four room addition to the Public School of Trenton, Ont. Plans and information can be obtained from S. B. Coon & Sons, architects, Excelsior Life Building, Toronto. The Department of Public Works are asking for tenders for the construction of Postal Station B, Hamilton, Ont. Plans and specifications can be obtained at the Department Offices, Ottawa, Superintendent of Dominion Buildings, Postal Station F, Toronto Overseer of Dominion Buildings, Central Post Office, Montreal, and the caretaker, Public Building, Hamilton.

The British Admiralty ask tenders for the purchase of a coal hulk now at Bermuda, with a coal capacity of about 3,000 tons. Mean draft, light, about 16½ feet, 335 feet long, 52 feet breadth. No engines, two marine return-tube type boilers. Tender forms can be obtained from the Director of Contracts, Admiralty, London, or British Senior Naval Officer, 44 Whitehall, New York, or Naval Store Officer, H.M.C. Dockyard, Halifax, N.S. Tenders due August 1.

INCORPORATIONS

Incorporation has been granted to the Booth-Coulter Coppersmithing Co., Ltd. The firm is to carry on a general foundry and machine shop, and to carry on business as founders, engineers, manufacturers and dealers in brass, copper, zinc, iron and other metals, and as machinists and smiths; to manufacture, buy, sell, trade in, deal in and deal with iron, steel, copper, brass, tin, zinc, and other metals or combinations or products thereof, and generally in hardware of all descriptions, machines and machine supplies and other goods, wares and merchandise. The head office is at Montreal, and the capital is placed at $100,000.

Letters have been issued incorporating the Ker and Goodwin Machinery Co., Ltd., Brantford, with a capital of $500,000, divided into 5,000 shares of $100 each. The purpose of the incorporation is that the company may carry on the business of manufacturing, selling and dealing in all kinds of articles made from mineral, metal or wood, including all kinds of machinery, machine supplies, tools and all articles and commodities, of which steel, iron, brass, copper, or any kind of mineral, metal or wood forms a part; to acquire and take over as a going concern the business now carried on at Brantford under the style and firm of Ker and Goodwin Machine Company, Limited.

MARINE

Washington.—A huge deal in steamships was recently consummated in New York when the United States Shipping Board sold nineteen steel steamers at an aggregate price of $27,821,120. The price per ton varied from $210 to $225 according to size. The board are now organizing a selling organization to handle the disposal of about 1,800 wood and steel steamers, the price of which will amount to $2,500,000,000. The board expect to realize a considerable profit over the cost of the Government in the first place.

New York.—A deal that has been occupying a good deal of attention during the past few months received its quietus the other day at a meeting in Hoboken. This was the proposition to sell to a British syndicate all the ships of the International Mercantile Marine which were under British registry. When the votes were counted it was found that out of a total of 608,593 shares, 560,072 were against the proposed sale. The voting occupied only half an hour, and the proceedings were conducted in absolute harmony, with a complete absence of the acrimonious discussion that has featured previous negotiations on the subject.

Thorold.—A collision in the Welland Canal resulted in damage to the sand steamer, E. Gunnel. The steamer colliding with her was the Fresco, and the collision occurred at a sharp bend near the Port Robinson bridge. The Fresco is owned by the U. S. Shipping Board, and her skipper is Geo. Cottrell.

Cleveland.—The downbound freight market is unchanged, more tonnage offering than cargo to fill it. Many steamers are coming down light, both the ore and grain movements being slight. The coal movement is also slowing up, shipments for last week showing a decided decrease.

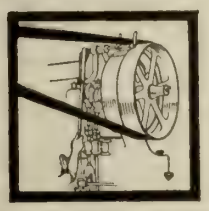
Cleveland. — The steamer Gogebic, beached near Pie Island, Lake Superior, after hitting a rock, has been abandoned to the underwriters as a total loss. The vessel is owned by the Central Steamship Company of Fort William. She is 275 feet long by 40 feet beam and 19½ feet deep.

PERSONAL

The Cleveland Milling Machine Company announces the employment of Mr. W. E. Miller as the Pittsburgh district manager. Mr. L. H. Mesker, vice-president of the Cleveland Milling Machine Company, has turned over the duties

BELTING

SCANDINAVIA BELTING

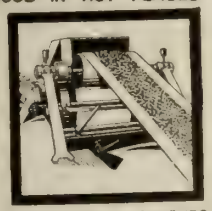


GOOD ON BELT SHIFTERS

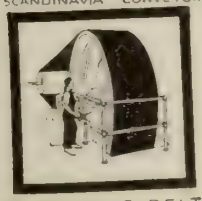
GOOD IN OILY PLACES

GOOD IN DUSTY PLACES

GOOD IN HOT PLACES



SCANDINAVIA CONVEYOR



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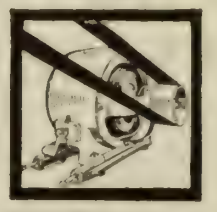

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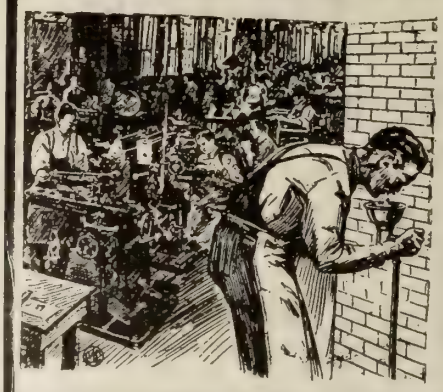

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The new French agency is the J. Horstmann Company, under the personal direction of Mr. Henri Nourry, who is a member of the firm of J. Horstmann.

His many friends throughout the country were grieved to learn of the death at St. Michael's Hospital of J. Frank Brown, following an operation for appendicitis. Deceased was the second son of J. F. Brown, 143 Dowling avenue, Toronto, was 21 years of age, and before enlisting with the 1st Tank Battalion was metallurgist chemist at his father's plant. Brown's Copper & Brass Rolling Mills, New Toronto. He received his education in the Separate and Technical Schools, was well known in athletic circles, and was an accomplished musician.

Col. H. J. Lambe, D.S.O., who has lately returned, after four years and eight months' service overseas, and who for many years has filled the position of District Engineer of the Department of Public Works of Canada, has been promoted to the position of the Superintending Engineer of the Province of Ontario, with headquarters at Toronto. As such, Col. Lambe will maintain for the Dominion Government the general supervision of all harbors and rivers in this province. Col. Lambe is a graduate of the Royal Military College of Canada; a member of long standing of the Engineering Institute of Canada, and is president of the Royal Military College Club.

BOOK REVIEWS

"Automobile and Aero Engines," by Rene Devillers, translated by Wm. John Walker, E. and F. N. Spon, Ltd., London and New York. Price 16/10.

Industrial progress and technical literature follow closely parallel lines, and where marked progress has been made in any branch of science it is necessary that recent knowledge gained by the few should be widely disseminated if stagnation is not to result. The war has witnessed a phenomenal advance in the theory and construction of the internal combustion engine as applied to land and aerial transport, and the author of the present work has achieved a high degree of success in the arrangement and choice of his material and in the bringing of the technical literature of the subject up to date. It may be mentioned at the outset that the work is not a mere collection of half-tone engravings and descriptive matter but is a well thought out treatise on actual design. Mathematics is necessarily called into extensive play, and indeed forms the groundwork of the whole structure. Much of the analysis comprised within the pages of this volume has as yet received little or no attention in any published textbook or periodical dealing with the subject, due, no doubt, to the restrictions placed upon such publication by war conditions. Calculus has necessarily been introduced into the many formulæ, but the treatment is exceptionally clear and lucid. Particular attention is drawn to Chapters IV, XII, XXIII and XXIV.

The first two, on the subjects of inertia forces and cams respectively, are dealt with in a manner which compel admiration for the author's lucidity of exposition. The expressions obtained in Chapter IV for piston velocities and accelerations although not new, are elegantly obtained and their connection with the corresponding expressions for the Desaxee engine, given in Chapter X are readily apparent. Chapter XXIII deals with the adaptability of power available to the power required for aeroplane sustentation and propulsion. This, besides opening up in excellent fashion a comparatively new field for future investigation, is interesting as a record of recent progress made in France in the economics of aeroplane power supply.

In Chapter XXIV, on the principles of super compression and super charging, analysis of these problems are given which will appeal strongly to the student interested in such matters. All French units have been transformed into the corresponding English units. For those wishing a sound and intimate knowledge of the design features of aero and automobile engine design the book is commended. The following gives a synopsis of chapters not mentioned above: The Working Mixture—The Laws of Gases and Their Application to the Working Mixture—The Four-Stroke Cycle—The Engine Turning Moment—The Cylinder—The Piston, Piston Rings, and Gudgeon Pin—The Connecting Rod—The Crank Shaft—Valves and Cam Distributor Gear—Induction and Exhaust Passages—Engine Power and its Variations—The Cooling System—The Crank Case and Lubricating System—Speed Regulation—Engine Starting—The Two-Stroke Engine—The Rotary Engine—The Laws of Similarity—Engine Testing and three Appendices, giving derivation of formula and table of atmospheric constants.

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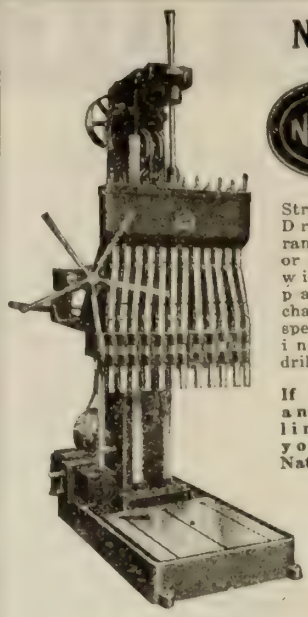

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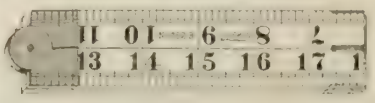

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WANTED — TOOL ROOM FOREMAN ON automobile drop forge dies and general machine work; must be skilled in close work; state age, salary expected, where last employed and in what capacity. Box 611, Canadian Machinery.

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Used locomotive crane.
Engine—Double-cylinder, 9" x 12" stroke.
Boiler—Vertical, new tubes, hood and smoke-stack, good for 100 lbs. working pressure.
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All motions operated from one platform.
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1—"Used" Plate Punch and Shear 36" gap, capacity ⅞" hole in ⅞" plate
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Both machines must be modern in design and in good operating condition. Offers with full details, price and shipping point, will be considered.

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EXECUTIVE POSITION WANTED—DO YOU require a man to take charge of either your Purchasing or Accounting Department? One who has initiative, and is not afraid of hard work or responsibility. Have had seven years' experience on foundry and general machine shop work, four of which was on munitions. If interested apply to Box 604, Canadian Machinery.

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A CANADIAN MANUFACTURER OF MACHinery for the use of Contractors, Miners, etc., is open to undertake the manufacture of any other machinery or device for the use of either contractors or miners, and invites correspondence with holders of Canadian patents, or with U. S. concerns desiring a Canadian manufacturing agency. Liberal inducements also offered for successful suggestions regarding machinery or other articles that can be manufactured and sold in connection with the above-mentioned lines. Address Box 610, Canadian Machinery. (c2m)

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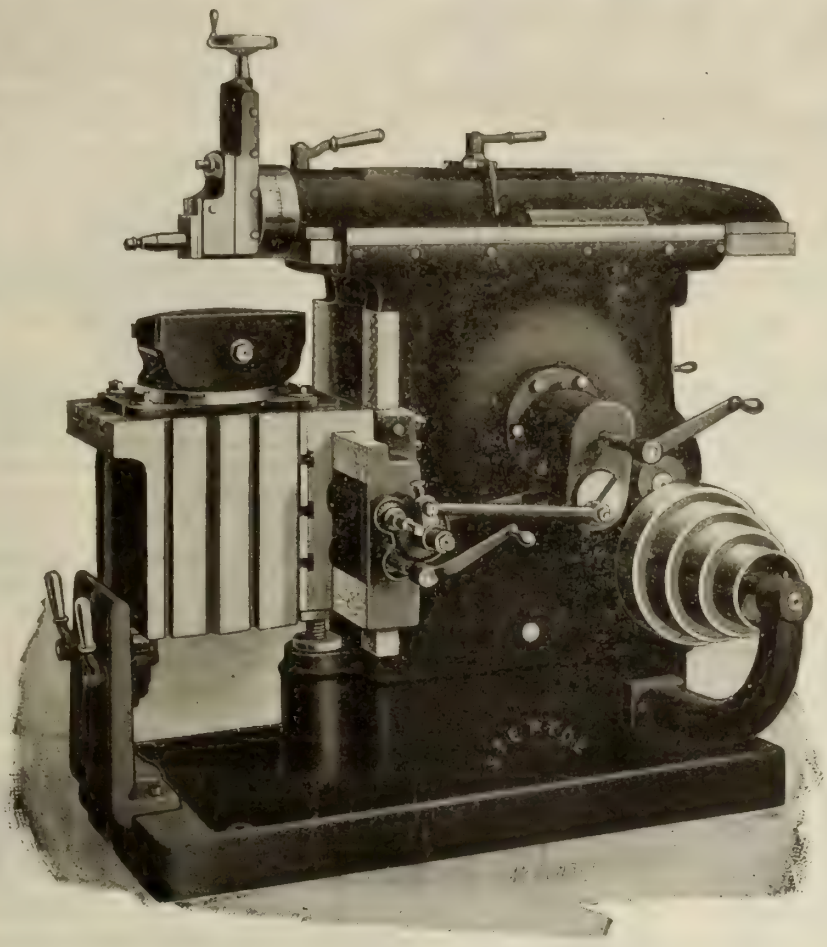
16" 20" 24"



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YOUNG NAIL KING OF EUROPE ARRIVES

A serious and earnest young man, who admitted that he had been called in Paris one of the "steel kings of France," arrived in New York by the French liner Espagne, with a contract for the construction over the Danube for the Roumanian Government of a big suspension bridge, one of the finest in the world. He is Reginald Ford, English born, but a citizen of France, where he has resided ten years, or since he was nineteen. His Paris address is 14 Rue Auber, and the great nail that pierces his illuminated sign there indicates that his specialty has been making nails. He admitted that he controlled the nail market of Europe, and that he had supplied all the nails for the boots of the poilus. He also sold to the French Government the telautograph, whereby the officers of the general staff of the French army could communicate directly with the army office in Paris or with the trenches. Mr. Ford said he was not related to Henry, although his Paris sign sometimes gave the impression to Americans in Paris that it might be that of the automobile maker, having no front name to it. Mr. Ford will stop several days at the Ritz-Carlton before going to Montreal, where he expects to place the contract for the building of the Roumanian bridge. He said frankly he was seeking financial backing for the projects that the Roumanian Government wishes him to promote and that he hoped to interest financiers of New York city. He said he was authorized to make contracts extending to at least $50,000,000.

Mr. Ford is unmarried, of youthful aspect, smooth shaven, dark eyed, good looking, cool and full of business confidence. He did not offer much voluntary information, but answered questions promptly.

The Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, have issued a booklet featuring the Lodge & Shipley line of lathes. In it is given a resume of the fundamental sales policy of the Lodge & Shipley Machine Tool Co.

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New and Slightly Used Machinery and Tools

1", 1½", 1⅝", 1¾", Turret Screw Machines.
No. 1, and No. 2 B.G. Automatic Tapping Machines.
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Floor and Bench Drill—Presses.
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Entire Plants or Separate Tools

What have you to offer?

State condition, make and price. We pay cash for any type of machines, motors or belting.

Give full details in first letter.

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13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
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15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
15" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 17"
17" x 8' New National Quick-Change Lathe
3—17" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 19"
17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 19"
18" x 24" New Rahn Larmon Lathe, D.B.G. Quick-Change
19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 21"
9—19" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 21"
25" x 14' New Sidney D.B.G. Quick-Change Lathe, swing 27"
33" x 14' Putnam, arranged for Motor Drive
6' Western Radial Drill
5' Bickford Single Pulley Drive Radial
100-lb. New Little Giant Hammer
50-lb. New Little Giant Belt Hammer
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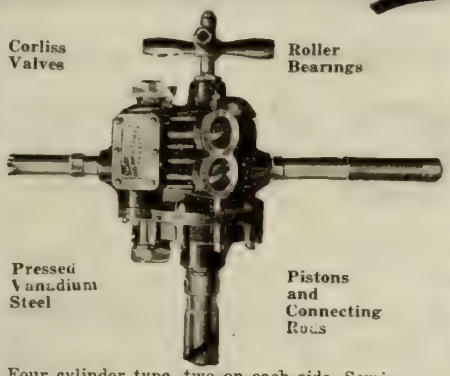

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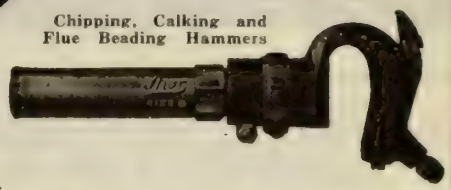
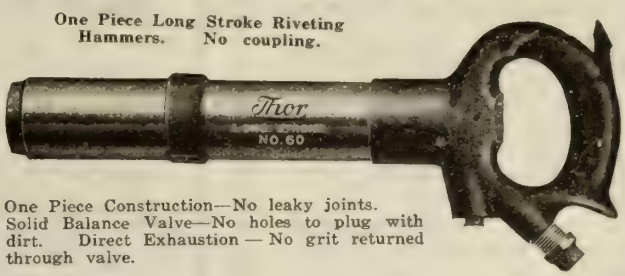


One Piece Long Stroke Riveting Hammers. No coupling.



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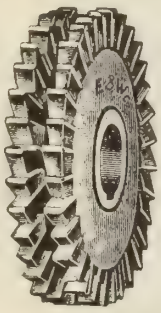

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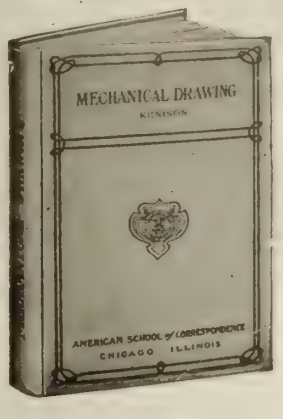

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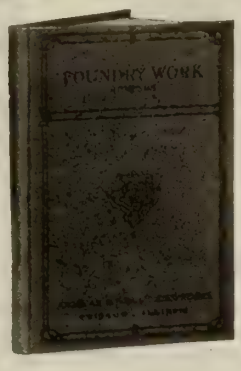

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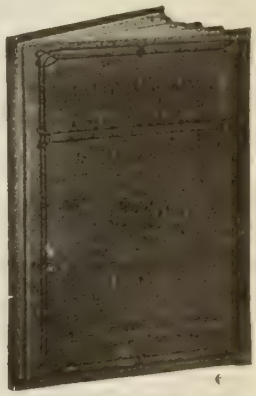

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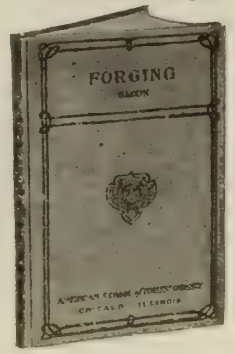

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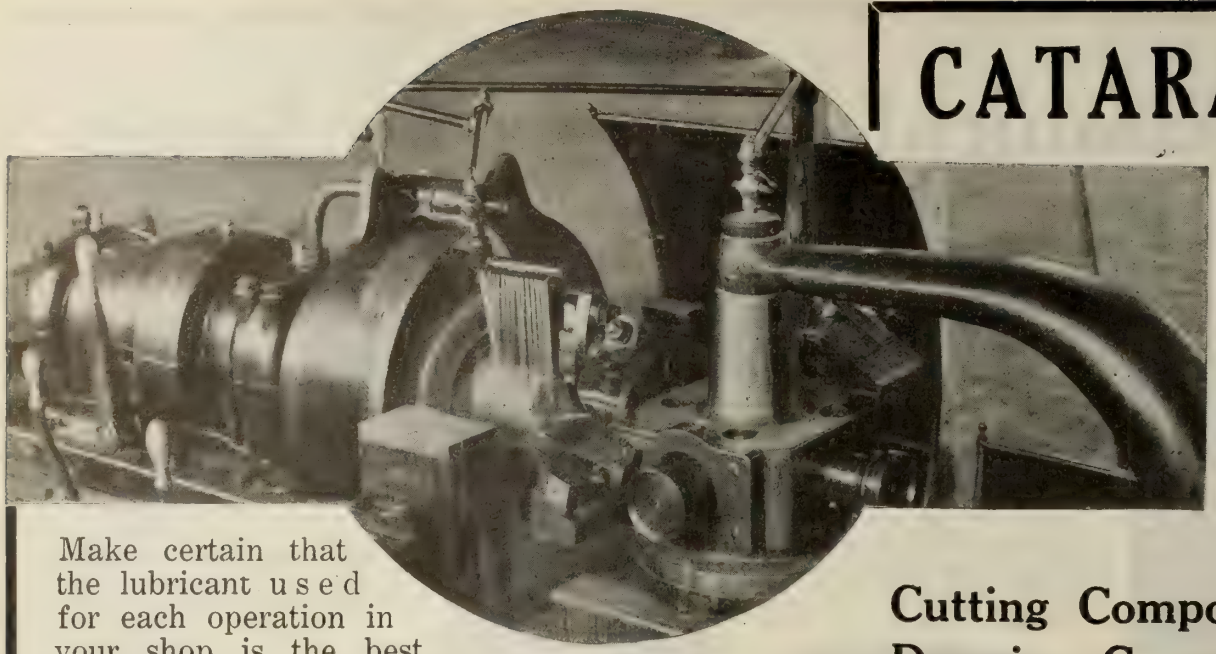

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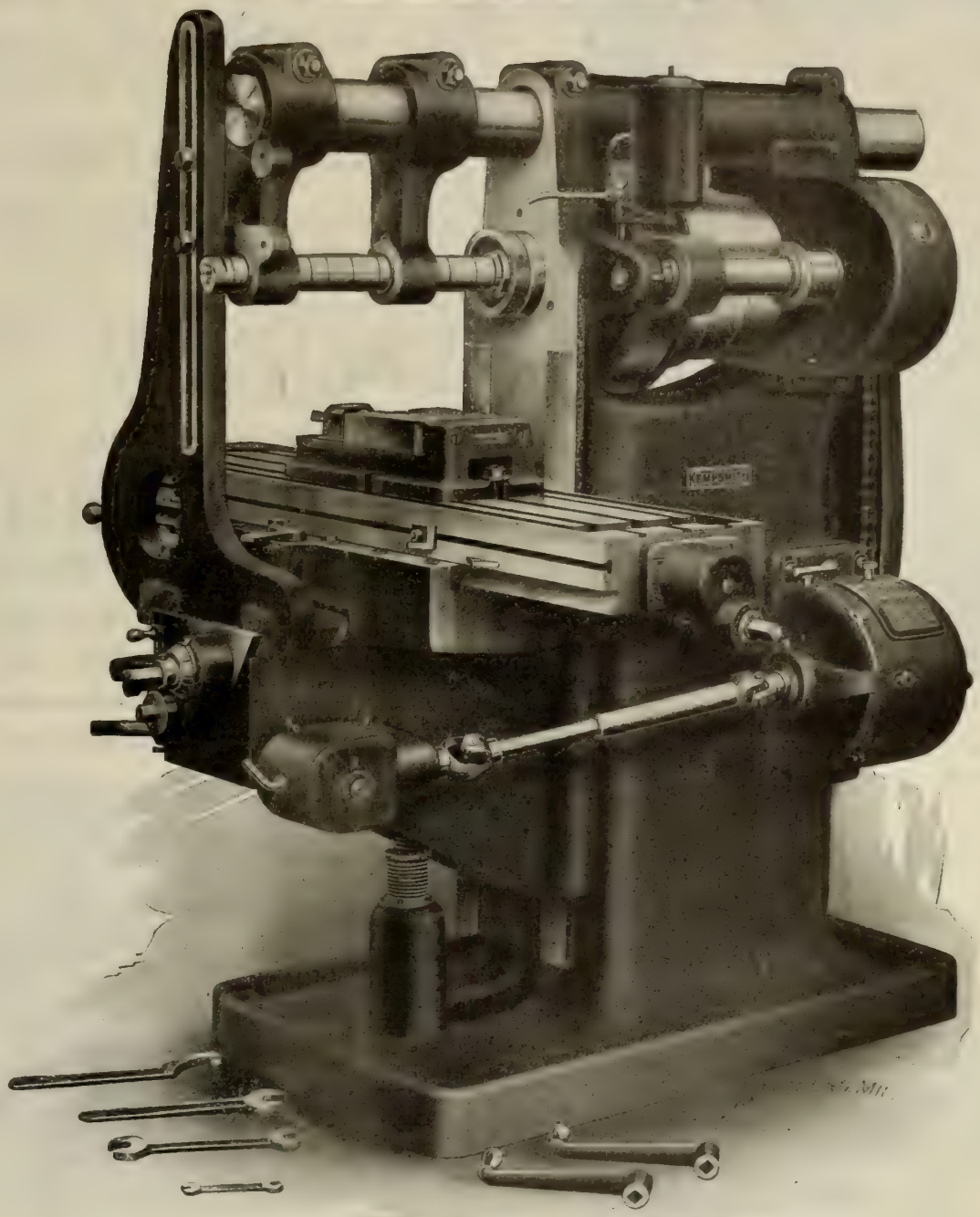

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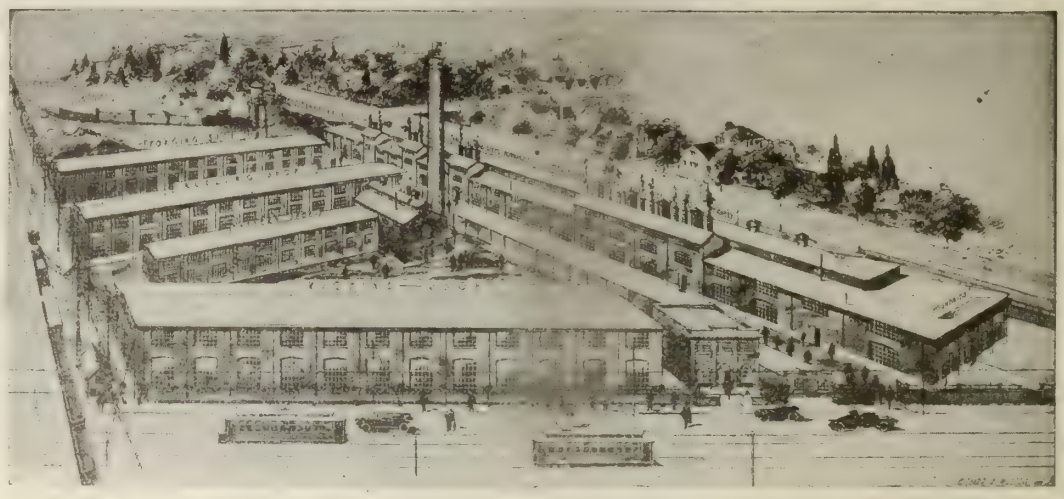

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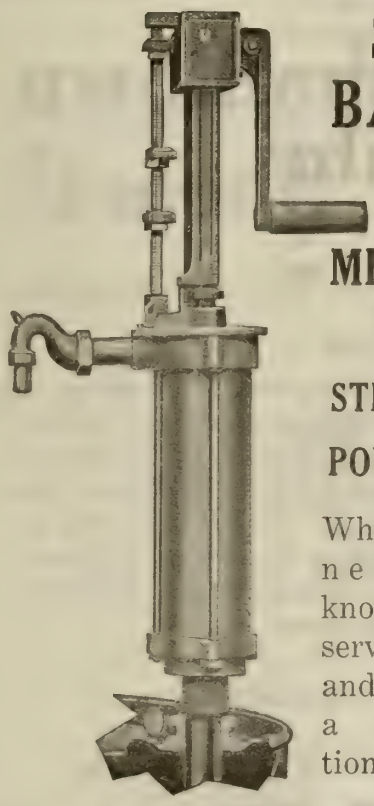

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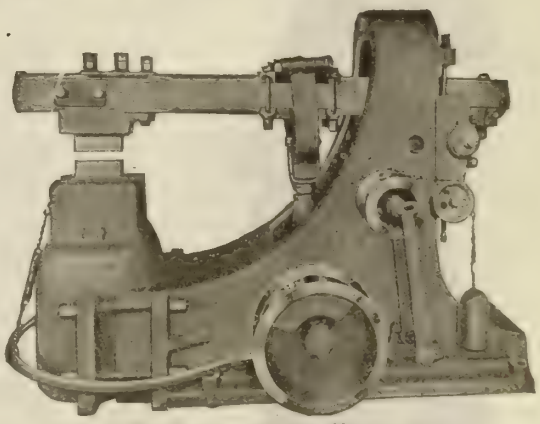

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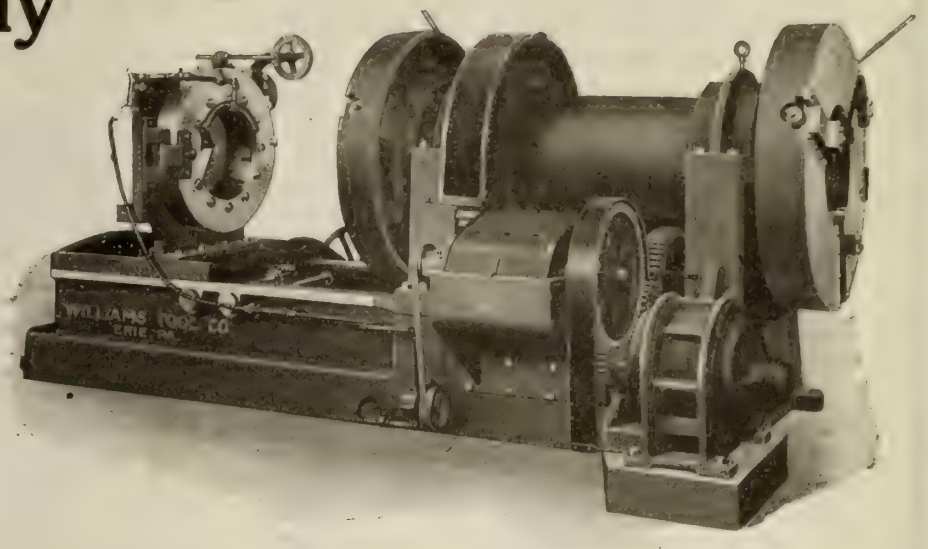

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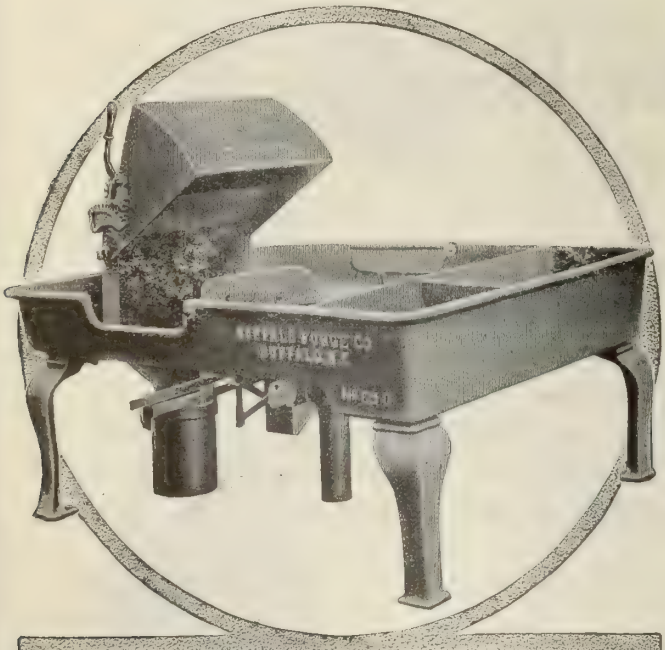

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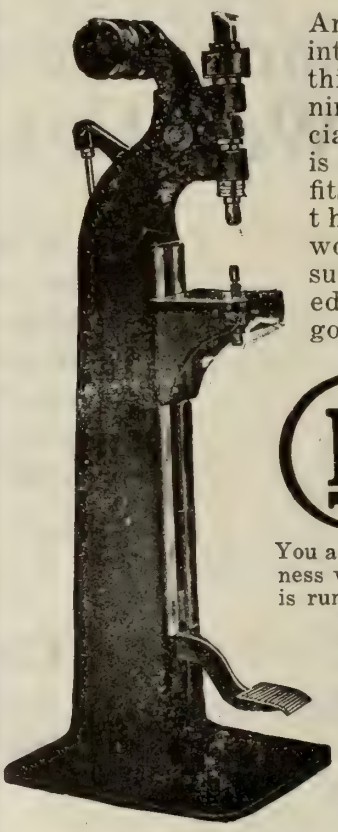

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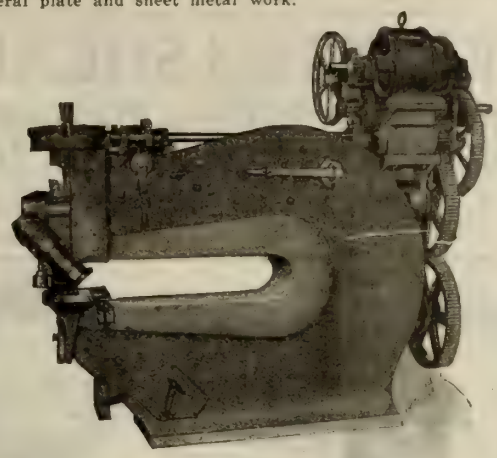

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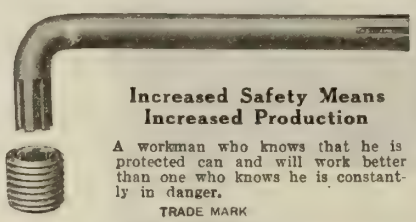

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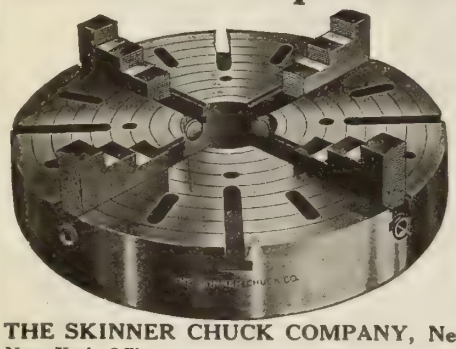

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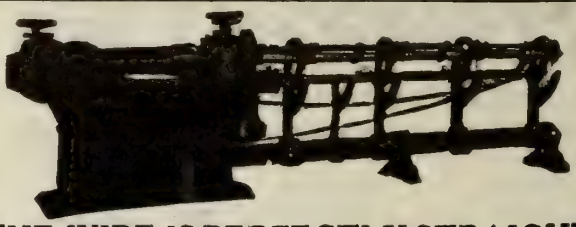

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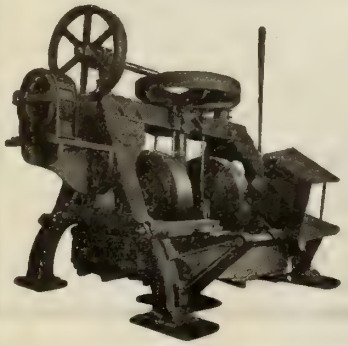

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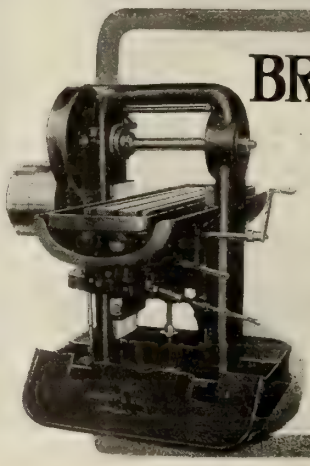

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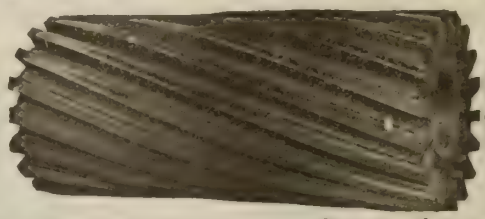

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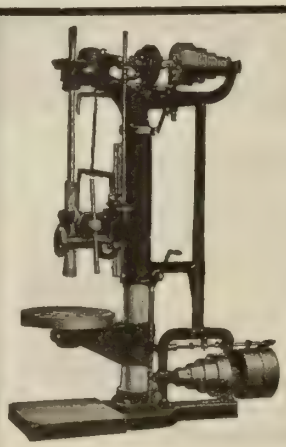

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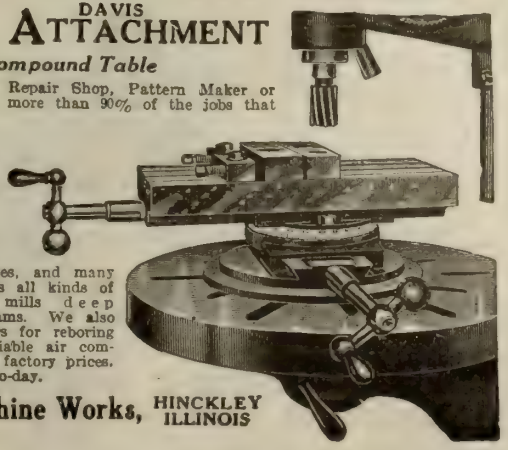

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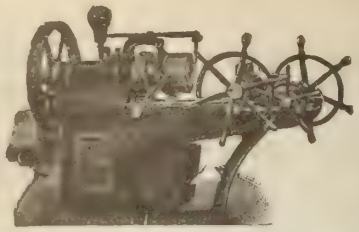

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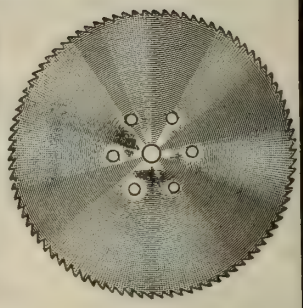

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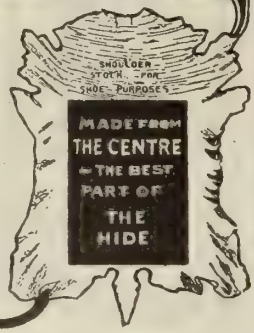

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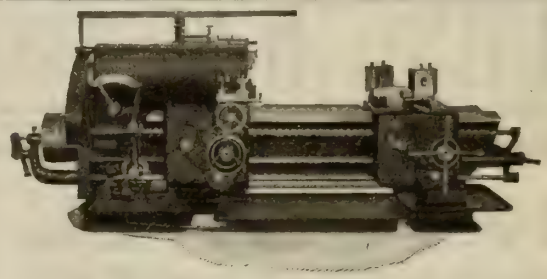

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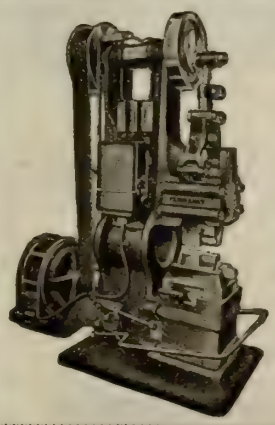

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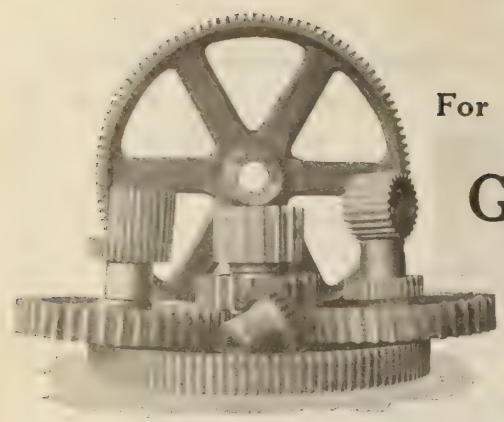

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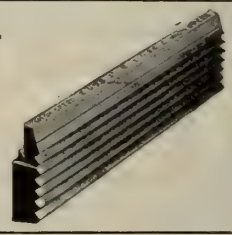

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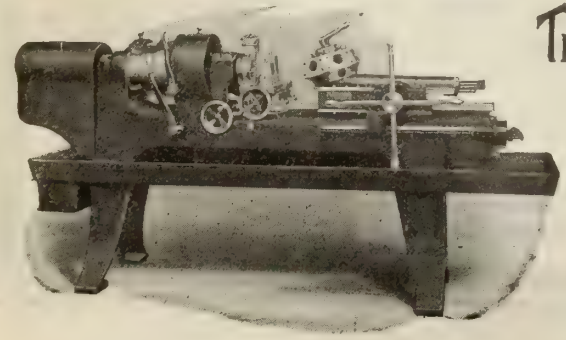

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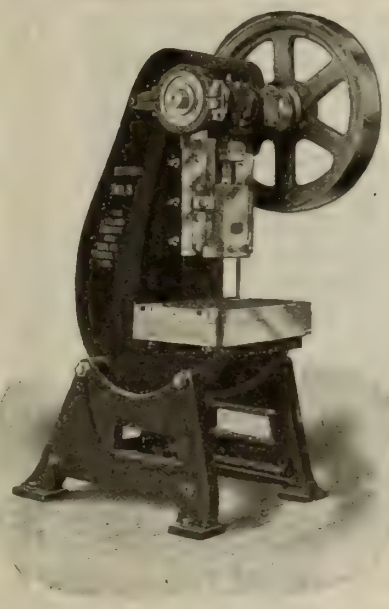

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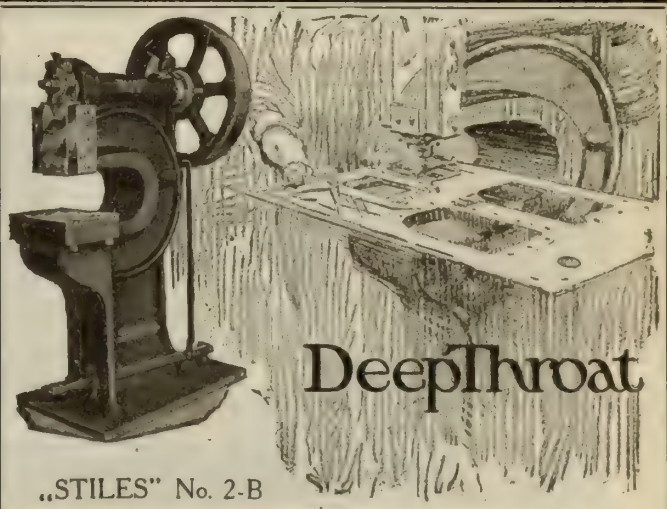

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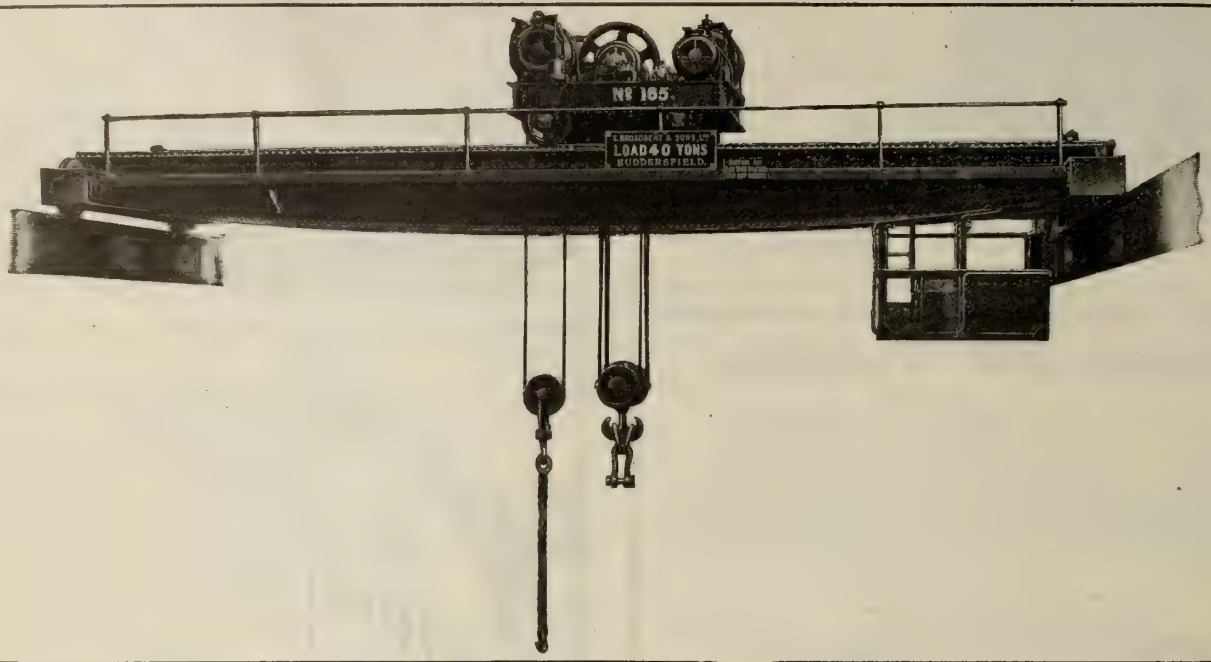

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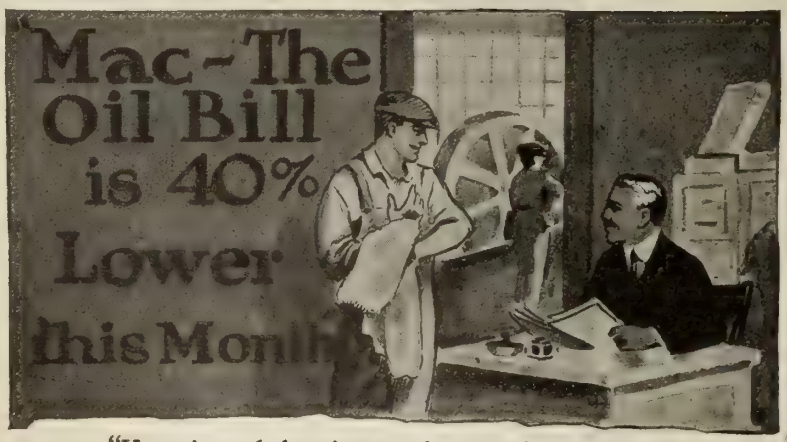

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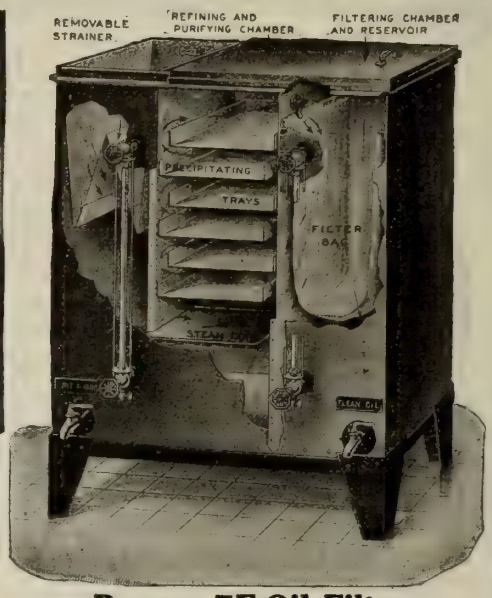

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Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

AIR COMPRESSORS
Darling Bros., Ltd., Montreal, Quebec.
Williams & Wilson, Limited, Montreal, Que.

AIR CYLINDERS
Smalley-General Co., Inc., Bay City, Mich.

AIR RECEIVERS
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.
Welding & Supplies Co., Montreal, Que.

AIR WASHERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

ALUMINUM
Canada Metal Co., Toronto.
United Brass & Lead, Ltd., Toronto.
Tallman Brass & Metal Co., Hamilton.
Williams & Wilson, Limited, Montreal, Que.

ALLOY, STEEL
Armstrong, Whitworth, of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal Que.
Firth & Sons, Thos., Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hawkridge Bros. Co., Boston, Mass
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ARBORS
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Co., Walkerville, Ont.
Sheldons Ltd., Galt, Ont.
Pangborn Corporation, Hagerstown, Md.

AUTOGENOUS WELDING AND CUTTING PLANTS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

AUTOMATIC MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Natonal Acme. Co., Cleveland, O., and Windsor.
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto, Can.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

AUTOMATIC METAL CUTTING-OFF MACHINES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.

AUTO SHEET METAL MACHINERY
Quickwork Co., St. Marys, Ohio.

AUXILIARY HEADS
Hoefer Mfg. Co., Freeport, Ill.

BABBITT METAL
Canada Metal Co., Ltd., Toronto, Ont.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

BAND SAWS
Oliver Machinery Co., Grand Rapids, Mich.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto
The Gray Ball Bearing Co., Ltd., Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Rochester Ball Bearing Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BALLS, STEEL
Atkins & Co., Ltd., Wm., Sheffield, Eng.
The Gray Ball Bearing Co., Ltd., Toronto.
Boker & Co., Inc., Montreal, Que.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Limited, Montreal, Que.

BALLS BURNISHING
The Gray Ball Bearing Co., Ltd., Toronto.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Katie Foundry, Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie, Ont.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BEADING MACHINES
Quickwork Co., St. Marys, Ohio.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT-LACING MACHINES, HOOKS AND PINS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

BELT HOOKS, WIRE
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn
Williams & Wilson, Limited, Montreal, Que.

BELTING, CONVEYOR
Can. Consolidated Rubber Co., Ltd., Montreal.
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BELTING, FRICTION AND SURFACE
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal, Que.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.

BELTING, WOVEN
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENDING ROLLS (PLUTE & AUGH)
Wickes Bros., Saginaw, Mich.

BENDING MACHINERY
Bertram & Sons Co., John, Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BLASTING MACHINES, SAND
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.
Williams & Wilson, Limited, Montreal, Que.

BILLET MARKERS
Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste. Marie, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLACKSMITH WORK
James Ballantyne, Montreal.
The Thos. Fink Co., Ltd., Pembroke, Ont.

BLANKING
Henry Hope & Sons of Canada, Ltd., Peterboro.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BLOW PIPES AND REGULATORS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

BLUE PRINTING MACHINERY
Commercial Camera Co., Province, R.I.
Mulliner-Edlund Tool Co., Syracuse, N.Y.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que
Joyce, Koebel & Co., Inc., New York.

BOLT CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BOLTS, STAY
John Morrow Screw & Nut Co., Ingersoll, Ont.

BOLTS, SPRING SHAKLE
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Morrow Screw & Nut Co., Ltd., John, Ingersoll.

BOLTS, PATCH
John Morrow Screw & Nut Co., Ingersoll, Ont.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto.

BOLT THREADING MACHINERY
Jardine & Co., Ltd., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Canadian Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Gisholt Machine Co., Madison, Wis.
Hoefer Mfg. Co., Freeport, Ill.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Oliver Machinery Co., Grand Rapids, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland, Ohio.

BRAKEBAND LINING CUTTERS
Peck, Stow & Wilcox Co., Southington, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland, Ont.

BRASS AND COPPER BARS, RODS

BRAKES, CORNICE
Peck, Stow & Wilcox Co., Southington, Conn.

AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.
Tallman Brass & Metal Co., Hamilton, Ont.

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co. Inc., Toronto, Ont.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BRICKS, FIRE
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

BRIDGES, RAILWAY AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.

BRONZE, COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville, Ont.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananogue, Ont.

BUSHINGS, BRONZE
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.

CALIPERS
Peck, Stow & Wilcox Co., Southington, Conn.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CALKS, BOOT
Lufkin Rule Co. of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co, Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBONIZING BOXES
Can. Driver-Harris Co., Ltd., Walkerville, Ont.
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal.

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert Niagara Falls, Ont.
Sheldons, Limited, Galt, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
Brockville Foundry Co., Brockville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland, Ont.

CARRIERS

COUPLING BOLTS
John Morrow Screw & Nut Co., Ingersoll, Ont.
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Sheldons, Limited, Galt, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
International Malleable Iron Co. Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAINS, AGRICULTURAL
Morse Chain Co., Ithaca, New York.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
Wright Mfg. Co., Lisbon, Ohio.

CHAINS, AUTOMOBILE ENGINE
Morse Chain Co., Ithaca, New York.

CHAINS, BICYCLE
Morse Chain Co., Ithaca, New York.

CHAINS, BLOCK
Morse Chain Co., Ithaca, New York.

CHAINS, DRIVE
Morse Chain Co., Ithaca, New York.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, New York.

CHAINS, SPROCKET WHEEL
Morse Chain Co., Ithaca, New York.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Itnaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 518 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass.
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL AND TAP
Swedish Gage Co., New York, N.Y.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

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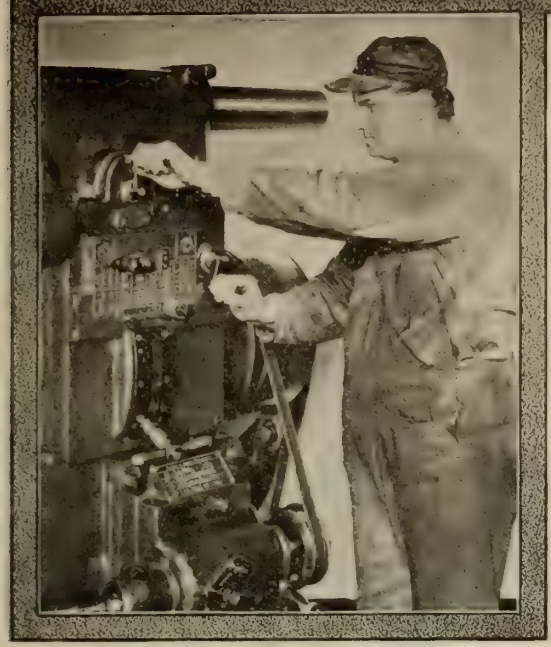
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCK SPRINGS
The Dunbar Brothers Co., Bristol, Conn.



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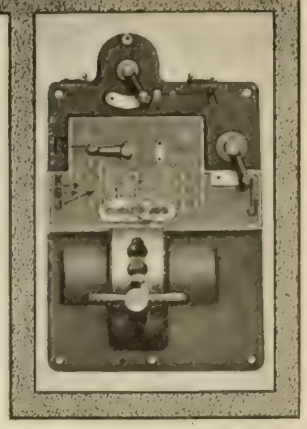

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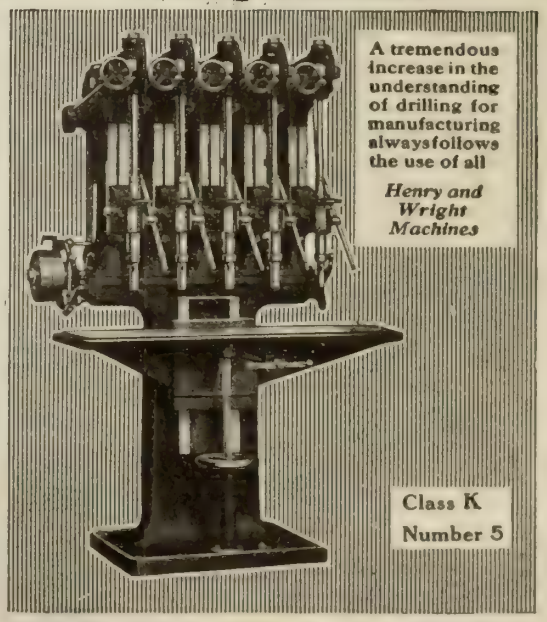

A tremendous increase in the understanding of drilling for manufacturing always follows the use of all *Henry and Wright Machines*

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The Henry & Wright Mfg. Co.

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Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.

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Marsh Engineering Works, Ltd., Belleville, Ont
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
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Sheldons, Limited, Galt, Ont.
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Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Smalley-General Co., Inc., Bay City, Mich.

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Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Welland Motor & Machine Co., Welland, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

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COOLERS
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Foster Machine Co., Elkhart, Ind.
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Williams & Wilson, Limited, Montreal, Que.

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Gardner, Robt., & Son, Montreal.
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Northern Crane Works, Walkerville.

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CRANES, GANTRY
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Quebec.

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Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Quebec.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

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Canada Found's & Forgings, Ltd., Welland, Ont
Williams & Co., J. H., Brooklyn, N.Y.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CHROME NICKEL STEEL
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.

CHROME VANADIUM STEEL
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

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Williams & Wilson, Limited, Montreal, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto

CUTTER HEADS
Oliver Machinery Co., Grand Rapids, Mich.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
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Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
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Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
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Tabor Mfg. Co. Philadelphia, Pa.
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Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
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Tabor Mfg. Co. Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Smalley General Co., Inc., Bay City, Mich.

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Kelley Reamer Co., Cleveland, O.

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Dominion Bridge Co. Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Anderson & Co. of Can., Geo., Montreal, Que.
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal, Que.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
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Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Atkins & Co., Ltd., Wm., Sheffield, Eng.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Marshall, Son & Bunney, Toronto.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Pratt & Whitney Co., Dundas, Ont.
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Rickert-Shafer Co., Erie, Pa.
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Williams & Wilson, Limited, Montreal, Que.

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Wells Bros. of Can., Galt, Ont.

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Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

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Wells Bros. of Can., Galt, Ont.

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Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
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Wells Bros. of Can., Galt, Ont.

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Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Wells Brothers Co. of Canada, Galt, Ont.
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DIE FORGINGS
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Worth Engineering Co., Toronto, Ont.

DIES, SCREW AND THREAD
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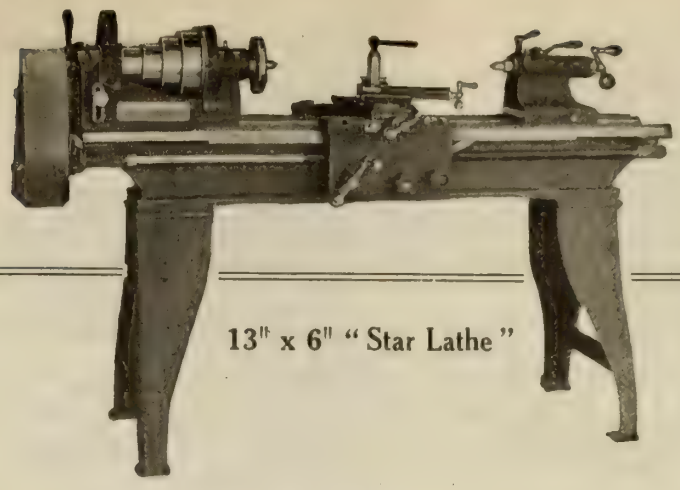
A. B. Jardine & Co., Ltd., Hespeler, Ont.



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This is a remarkably sturdy lathe for its size, and its ease of operation, handiness, and accuracy all make it an invaluable tool. It does the work of larger and costly machines at a much lower cost.

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Study the construction as shown here. You can readily see this is a real machine tool, carefully designed, and strongly built.

Our illustrated bulletin will interest you, giving detailed information.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

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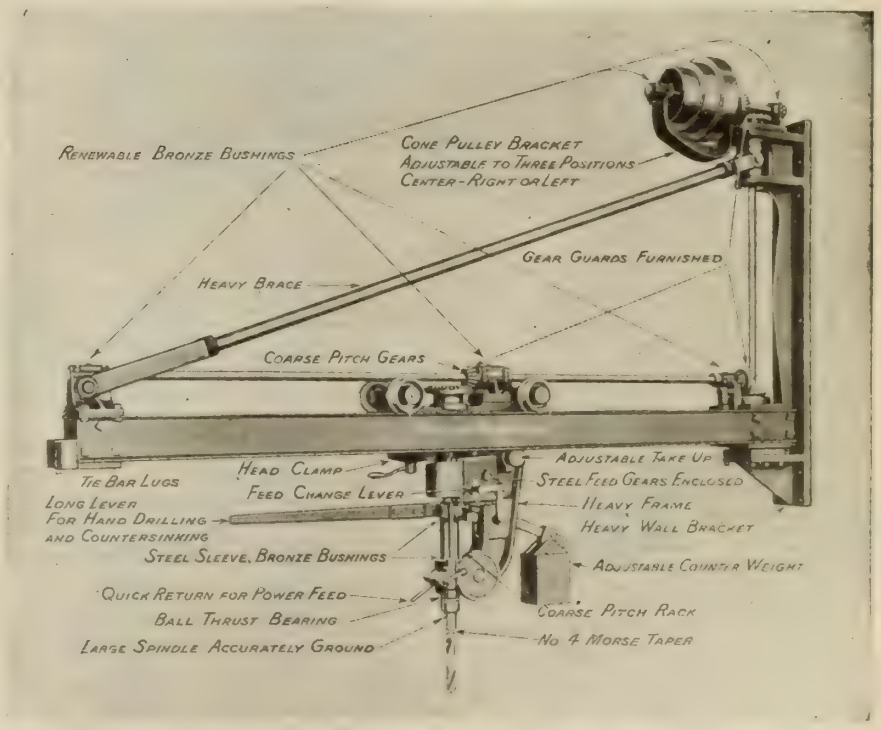

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Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
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A. R. Williams Machinery Co., Toronto.
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Fox Machine Co., Jackson, Mich.
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Garvin Machine Co., New York.
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Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
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Canada Machinery Corp., Galt, Ont.
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Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio
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Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
National Automatic Tool Co., Richmond, Indiana.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, SPECIAL
Hoefer Mfg. Co., Freeport, Ill.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

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Wickes Bros., Saginaw, Mich.

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Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

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Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal, Que.

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Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Wilt Twist Drill Co. of Canada, Walkerville, Ont.
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A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

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Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

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The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Coventry Chain Co.
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Pangborn Corporation, Hagerstown, Md.

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Sheldons, Ltd., Galt, Ont.

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MacKinnon Steel Co., Sherbrooke, Que.

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DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

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Sheldons, Ltd., Galt, Ont.

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Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

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Williams & Wilson, Limited, Montreal, Que.

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Ford-Smith Machine Co., Hamilton, Ont.

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Brantford Emery Wheel Co., Brantford, Canada.
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Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Sheldons, Ltd., Galt, Ont.
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Williams & Wilson, Ltd., Montreal, Que.

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Oliver Machinery Co., Grand Rapids, Mich.

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Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

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Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
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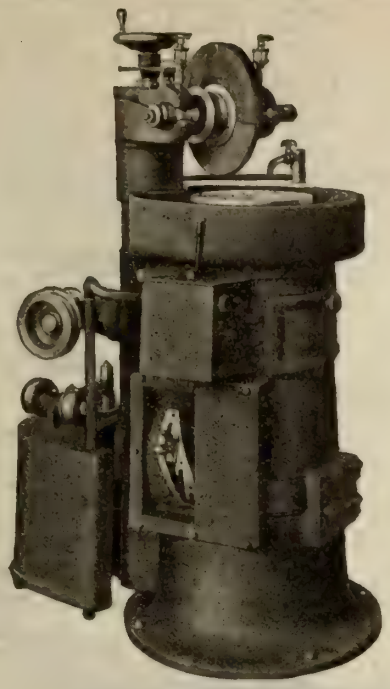

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Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill
United States Electrical Tool Co., Cincinati, O.
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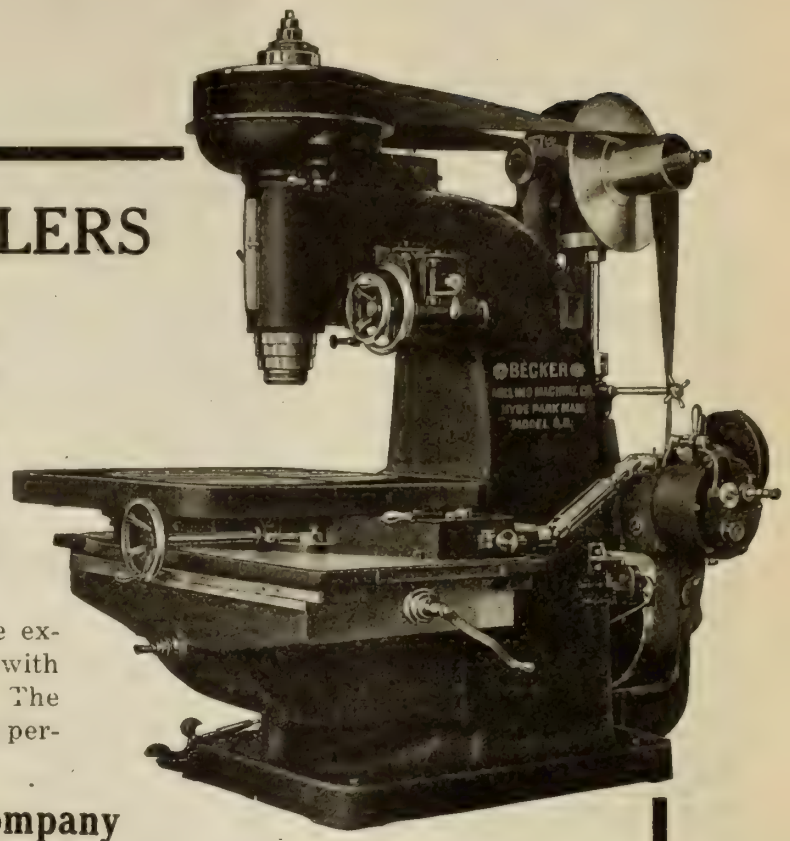

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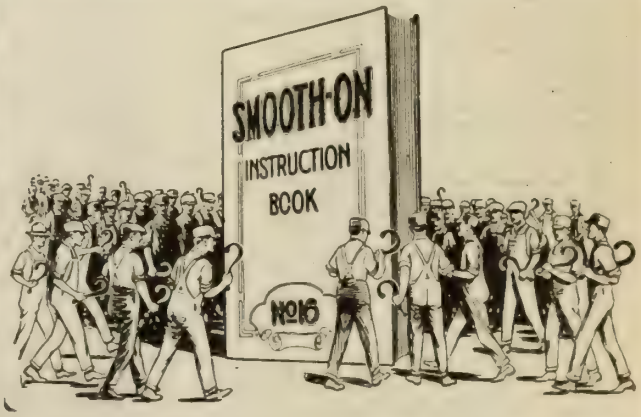

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Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Wing & Son, J. E., Hamilton, Ont.

GRINDERS, UNIVERSAL, PLAIN
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Reed-Prentice Co., Worcester, Mass.
Gisholt Machine Co., Madison, Wis.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
LeBlond Mach. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York, N.Y.
Norton Grinding Co., Worcester, Mass.
Wisconsin Electric Co., Racine, Wis.
Williams & Wilson, Limited, Montreal, Que.

GRINDING MACHINES, CAR WHEEL, CUTTER, CYLINDRICAL, CRANKSHAFT
Norton Grinding Co., Worcester, Mass.

GRINDING WHEELS
Aikenhead Hardware Co., Toronto, Ont.
Baxter Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Mahcine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Norton Co., Worcester, Mass.

GRIT, ANGULAR
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

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Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.
Strong, Kennard & Nutt Co., Cleveland, Ohio.

GUN AND AMMUNITION SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

GUN TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

HANDLES, BALANCE, CRANK AND MACHINE
Williams & Co., J. H., Brooklyn, N.Y.

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Aikenhead Hardware Co., Toronto, Ont.
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Boker & Co., Inc., H., Montreal, Que.
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Diamond Saw & Stamping Works, Buffalo, N.Y.
Ford-Smith Machine Co., Hamilton, Ont.
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Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
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Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
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Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer Ltd., Welland.
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High Speed Hammer Co., Rochester, N.Y.
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Niles-Bement-Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Limited, Montreal, Que.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited Montreal, Que.

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Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Matthews, Jas. H. & Co., Pittsburgh, Pa.

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Rice Lewis & Son, Toronto, Ont.
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HAMMERS, STEAM
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Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
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Oliver Machinery Co., Grand Rapids, Mich.

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Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
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Standard Pressed Steel Co., Philadelphia, Pa.
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General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

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Illinois Tool Works, Chicago, Ill.

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Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Can. Matthews Gravity Carrier Co., Toronto, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
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Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

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Clipper Belt Lacer Co., Grand Rapids, Mich.

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Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

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Pangborn Corporation, Hagerstown, Md.

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Metalwood Mfg. Co., Detroit, Mich.
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William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.
Williams & Wilson, Limited, Montreal, Que.

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Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

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Brown & Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Athol, Mass.

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Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Taylor Instrument Co., Rochester, N.Y.

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United Brass & Lead Ltd., Toronto.

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INGOTS, FORGING AND ROLLING
Electric Steel & Metals Co., Welland, Ont.

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Brockville Foundry Co., Brockville, nt.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

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Swedish Steel & Importing Co., Ltd., Montreal

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Quickwork Co., St. Marys, Ohio.

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Northern Crane Works, Walkerville.
Norton, A. O., Coatlecook, Que.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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JACKS, PIT AND TRACK
Canadian Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

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Skinner Chuck Co., New Britain, Conn.

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Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.

JOURNAL WEDGES
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A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Williams & Co., J. H., Brooklyn, N.Y.

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Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

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METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

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Bowser & Co., Inc., S. F., Toronto, Ont.

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Taylor, J. A. M., 313 Stair Bldg., Toronto, Ont.
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MILLS, SAND
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Bertram, John, & Sons Co., Dundas, Ont.
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Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
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Betts Machine Co., Rochester, N.Y.
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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
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Niles-Bement-Pond Co., New York.
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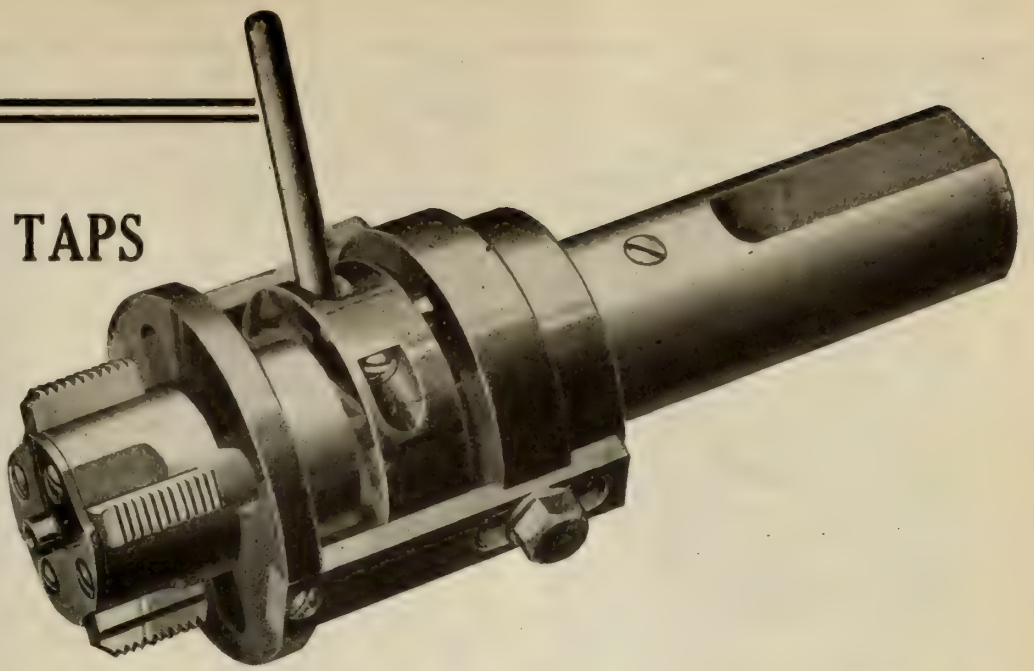

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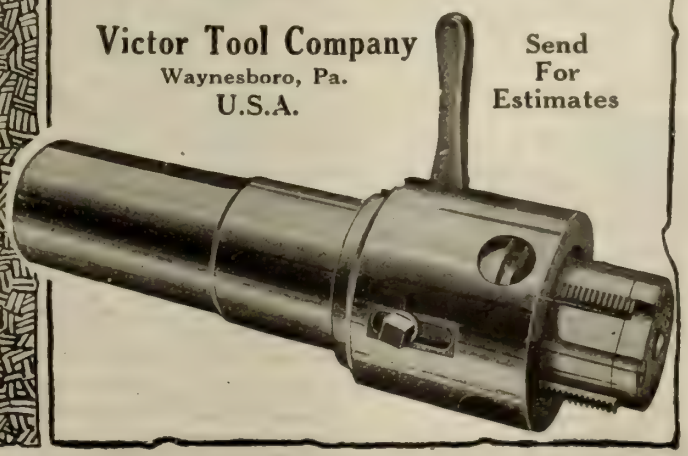

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Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
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Williams & Wilson, Limited, Montreal, Que.

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Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
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Landis Machine Co., Waynesboro, Pa.
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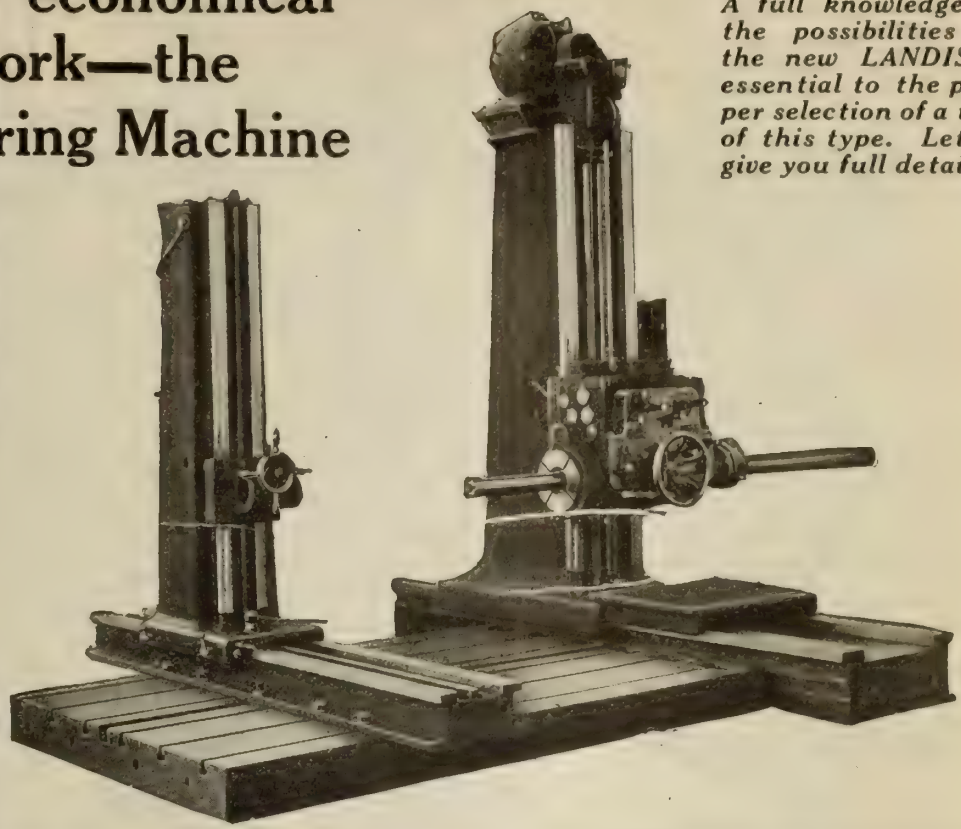

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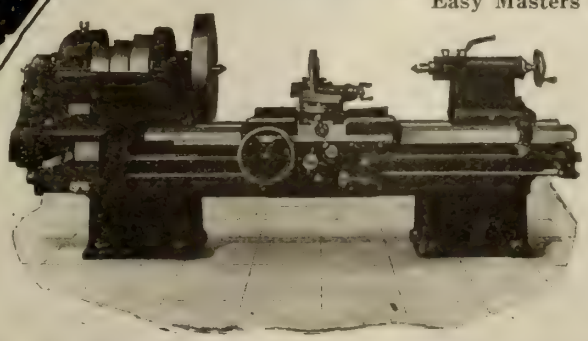

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A. R. Williams Machy. Co., Toronto.
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Ford-Smith Machine Co., Hamilton, Ont.
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Williams & Wilson, Ltd., Montreal, Que.

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Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn
Williams & Wilson, Limited, Montreal, Que.

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PULP MILL MACHINERY
MacKinnon Steel Co., Sherbrooke, Que.

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Sheldons, Ltd., Galt, Ont.
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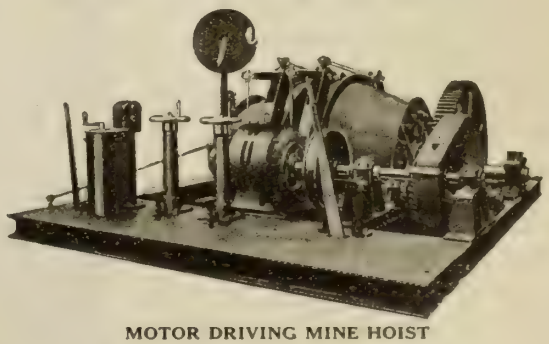

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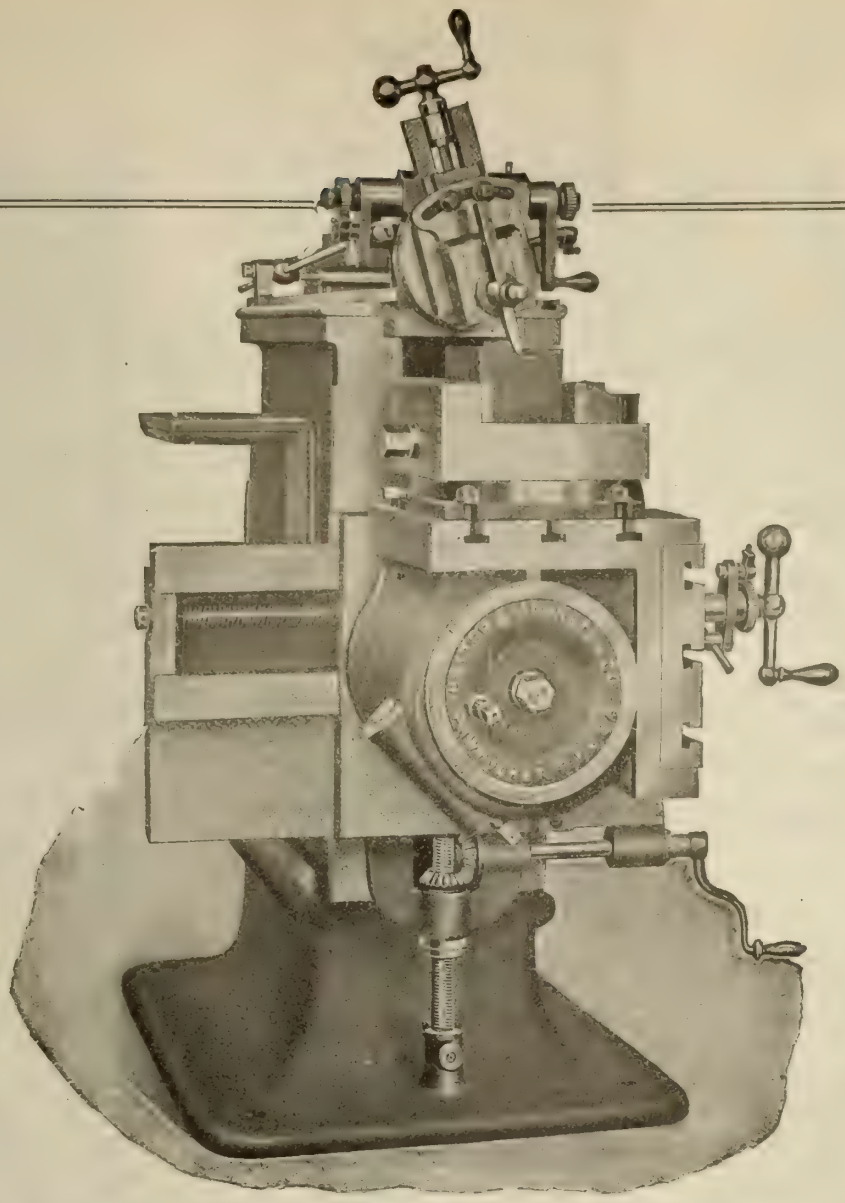

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THERE was a time when Canada had it in her power to end the war. In the early days of the Russian Revolution a bushy-haired German was taken off a boat at Halifax and interned at Amherst, N.S. He pretended to be a Russian but was known to be in German pay—on his way to push the revolution—British and American Intelligence Officers so informed our authorities. But pressure was brought to bear and the man was finally released. He got to Europe and became the most sinister figure among the Bolsheviki. Largely as a result of his work, Russia dropped out of the war and Germany was able to fight on for eighteen months. That man was Leon Trotzky. His real name was Braunstein.

Why was Trotzky allowed to leave Canada?

Colonel MacLean discusses this question in the June issue of MACLEAN'S MAGAZINE. He tells the story of Trotzky's activities, of his arrest and subsequent release in full detail, tracing the threads of a strange intrigue from Germany to Washington, and Washington to Ottawa. It is a gripping story, the most important inside story of the war.

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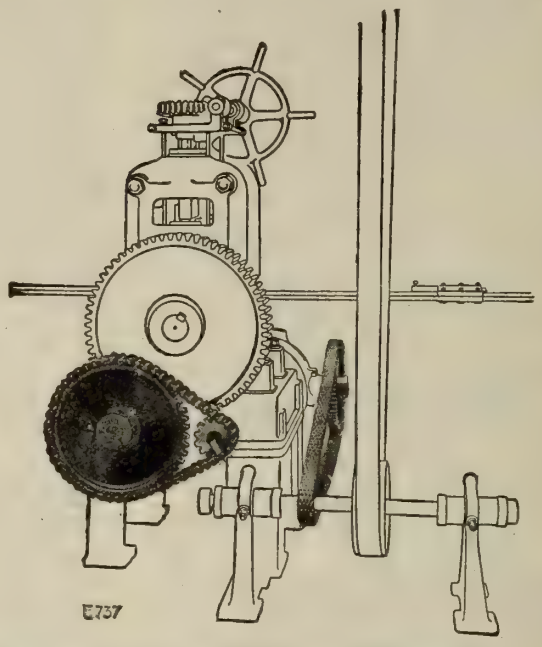

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A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI. TORONTO, JUNE 26, 1919 No. 26

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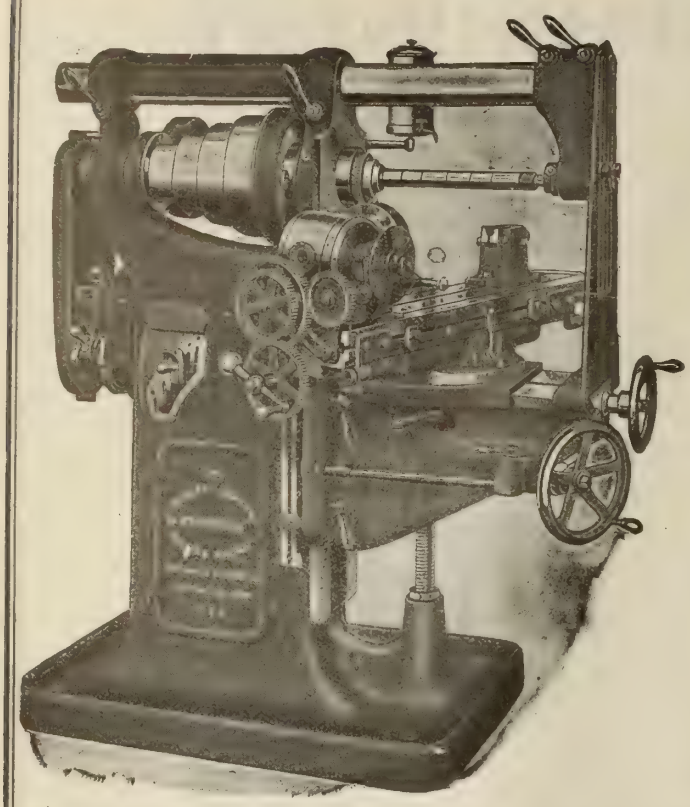

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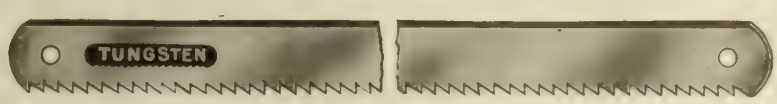

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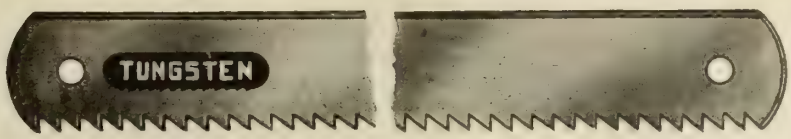

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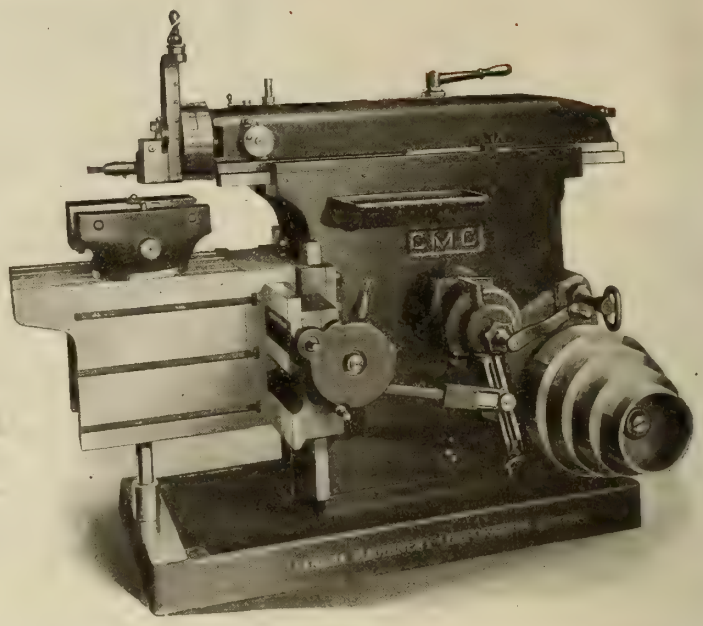
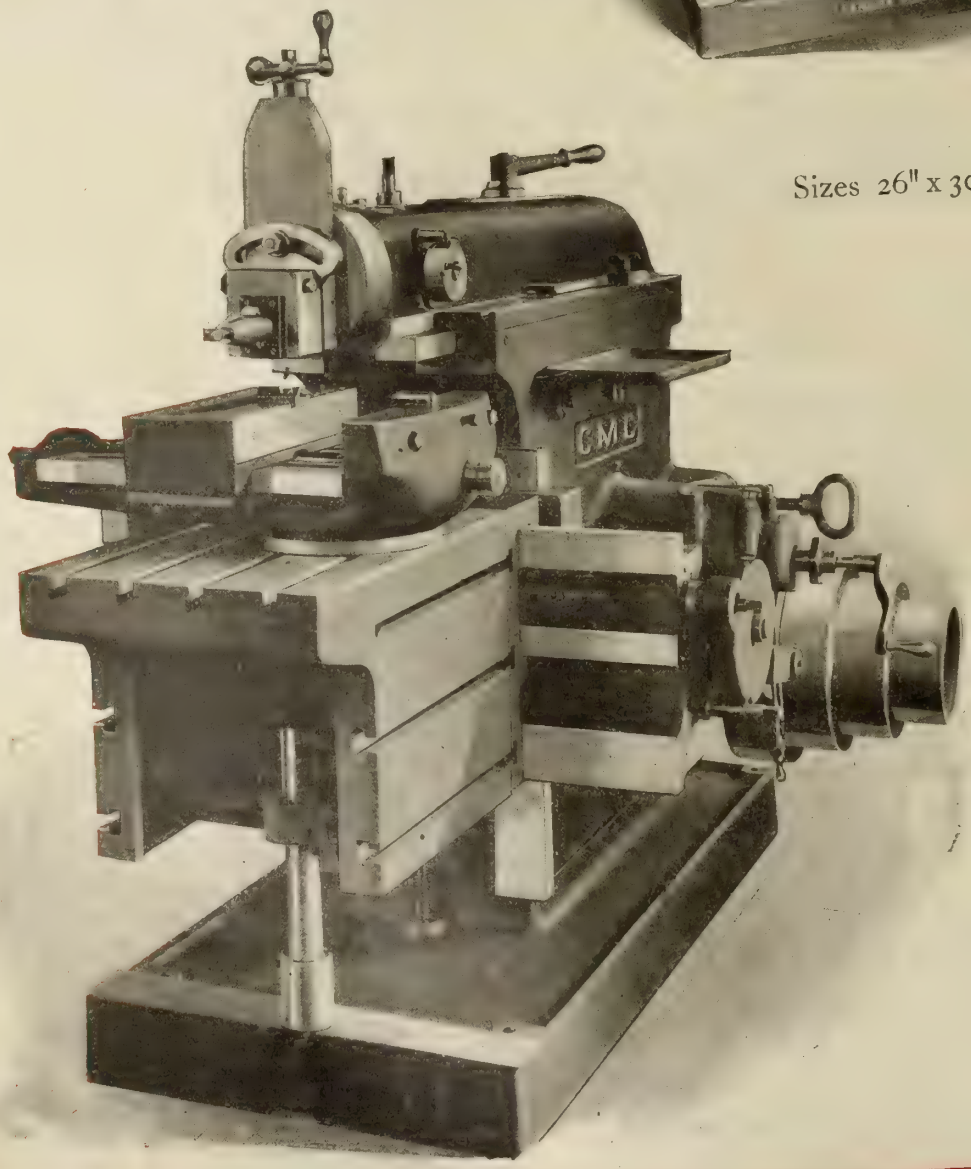
C.M.C. SHAPERS

Look good from any point of view---but let us tell you in our special bulletin how good they really are.



CANADA MACHINERY CORPORATION LIMITED

GALT - ONTARIO



Sizes 26" x 30" and 20" x 22"

Shipment from Stock